



**The Medical Council of Canada  
Le Conseil médical du Canada**

# **OBJECTIVES FOR THE QUALIFYING EXAMINATION**

Third Edition

# INTRODUCTION

The Medical Council of Canada (MCC) is pleased to publish a third edition of its examination Objectives, which will serve as the basis for the MCC Evaluating Examination and Qualifying Examination Part I and Part II.

These Objectives do not define a medical curriculum and should be used to identify the domains of cognitive and clinical skills evaluated by this national examination.

The development of these Objectives began with a Task Force on Objectives in the 1980's. Council accepted them in 1988.

From 1989 to 1992, the late Dr. Louis Levasseur, Chair of the Board of Examiners and Dr. J.S. Baumber, then as Chair of the Education Committee, and a group of co-authors from the University of Calgary, were involved in upgrading the examination and the development of the first edition of the Objectives.

The second edition was the result of revisions undertaken by a Task Force in 1997-98. That included a revision of MCC Clinical Objectives and the Working Group on Legal, Ethical and Organizational Aspects of Practice, a new section. The products of the two tasks were integrated into the second edition by Dr. Henry Mandin of Calgary, with the editing work of the late Dr. Bernard Lefebvre of Ottawa and Mme Mireille Lanctôt-Gagnon of Montreal. Both sets of Objectives serve to guide our test committees in developing our test materials and in blueprinting all of the Council's examinations.

Now in 2003, we publish the third edition, following a major collaborative effort involving the faculties of medicine, public members of Council, panels of practicing physicians, all headed by Dr. Mandin. However, this edition will be web based, with better indexing, making for easier use. Dr. David E. Blackmore, Director of Evaluation at the MCC, oversaw the latter development.

Based on these Objectives, the Examinations of the MCC serve to evaluate basic cognitive, reasoning skills and clinical aptitudes to be required of all physicians entering medical practice in Canada. Once a candidate successfully completes the MCCQE Part I and Part II, the physician is awarded the Licentiate of the Medical Council of Canada (LMCC) and that physician's name is entered on the Canadian Medical Register.

**W. D. Dauphinee**  
**October 2003**

## PREFACE

Like the preceding two editions, the current edition represents a 'work in progress'. Although several significant steps beyond the 1999 edition of these objectives have been accomplished, it is a certainty that the next edition will provide additional improvements. Perhaps since perfection may never be attained, it is more advantageous that each edition be an advance on the previous one. The most obvious advance for the third edition is its web format. We hope that this format will enable readers to locate the required set of objectives with greater ease.

One of the recommendations made by physicians from across Canada who reviewed the second edition was to translate and apply the generic objectives in the Legal, Ethical and Organizational domains of medicine to actual clinical situations. In the current edition, we selected a number of appropriate clinical presentations and after referring to the generic Legal, Ethical, and Organizational objective, applied these to the specific presentation. No attempt was made to translate all of the generic objectives to all of the clinical presentations. It was considered desirable to provide a number of examples without attempting to be comprehensive. Depending on our readers' comments, this process of translation and application may be extended for the next edition.

The Third Edition includes a new section, **Applied Scientific Concepts**. In the belief that a true understanding of clinical situations requires in many instances the application of scientific concepts that underpin clinical medicine, an attempt was made to identify such concepts. These concepts are included in the hope that they will assist candidates with their comprehension of the various clinical presentations. Since this is a first attempt, the list of concepts provided remains incomplete. If readers indicate that this listing of scientific concepts is valuable, a concerted effort will be made to ensure a more comprehensive list with the next edition. Most important, this section is *not* included for the purpose of creating a separate set of examination questions, but rather to make the reader aware of some of the Applied Scientific Concepts that are relevant to a given clinical presentation.

Those readers who count the number of clinical presentations in the current edition may be surprised to discover that the number appears to have contracted. What is being observed is not a contraction but a re-organization of the clinical presentations. The actual number remains stable. The human body continues to react to an infinite number of insults in a finite number of ways, and the present edition, by identifying all of these ways, continues to define the domain of medical knowledge in a comprehensive manner. We have again listed all of the clinical presentations alphabetically. The Table of Contents is organized by clinical presentation, but the search engine should provide the best assistance.

The objectives have been updated, extended, and the format used for each presentation has been changed in a minor fashion. The first category displayed now is **Rationale**. The **Rationale** provides an overview of why facets of the problem are critical for the competent physician by highlighting fundamental, vital issues. The **Causal Conditions** or **Diseases** leading to the clinical presentation are the next category. The manner in which the conditions are organized was carefully considered, and in so far as possible a logical scheme was selected. The third category is **Key Objective(s)**. The **Key Objective(s)** proposes to emphasize the one or two elements of the clinical presentation that are essential to the successful management of the problem. The fourth and last category, the **Objectives**, is intended to stress those elements of the data gathering, diagnostic process and management that are central to the specific presentation.

Although no attempt has been made to identify those *Clinical* objectives that might be best evaluated in either Part I or Part II of the Medical Council of Canada Qualifying Examination, the *Legal, Ethical, and Organizational* objectives have been identified in such a manner. Some are clearly identified as belonging in Part I, and all are

subject to evaluation in Part II. This separation was completed in recognition of the fact that some of the legal, ethical, and organizational objectives are learned best during graduate clinical education. As before, some of the objectives that emphasize management also are likely to be achieved after a period of post-graduate clinical experience. Such objectives are evaluated more appropriately in Part II of the examination.

The objectives have been defined in behavioral terms, and are intended to reflect our expectations of competent physicians in the supervised practice of medicine. They are written for those who have the task of writing evaluation questions for the purpose of certifying basic medical competence as well as for candidates being examined. The authors gave careful consideration to the choice and meaning of verbs used to define the behaviors expected within the various objectives.

The assumption has been made that it is better to prevent than treat, and that rational treatment is possible only after a diagnosis has been established. The **Objectives** deal with data gathering, diagnostic clinical problem solving, and the principles of management which are applicable, in part or in whole, to clinical situations faced by physicians. The section of **Population Health and Its Determinants**, has been separated into a clinical presentation relevant to the practice of medicine that addresses the needs of populations rather than individuals. The **Pediatric Objectives** stress health maintenance and disease prevention through an understanding of the complexity of the process of growth and maturation from infancy to adulthood. Physicians caring for children become their advocates at all interfaces of the child with society and must work comfortably with many other health professionals to achieve these goals. There are, however, many childhood diseases that present unique challenges to the physician in terms of diagnosis and management. Where appropriate, selected clinical presentations have been separated into adult and pediatric sections.

In addition to the remarkable contribution made by the authors of this Third Edition, I am most appreciative of the comments and suggestions made by many physicians from across Canada, the representatives of 12 licensing authorities and the two national certifying bodies, as well as, the Associate Deans and faculty members of all sixteen medical schools. Finally, I must acknowledge the many hours and dedication of Ms. Natalie Auger in the preparation of the numerous drafts and final manuscript. Without her help and skills, this task would have been impossible.

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**2003**



## Table of Contents

GENERAL OBJECTIVES (000) .....	5
ABDOMINAL DISTENSION (1) .....	8
ABDOMINAL MASS (2) .....	10
ADRENAL MASS (2-1) .....	11
HEPATOMEGALY (2-2) .....	12
SPLENOMEGALY (2-3) .....	13
HERNIA, ABDOMINAL WALL AND GROIN (2-4) .....	14
ABDOMINAL PAIN, CHILDREN (3-1) .....	15
ABDOMINAL PAIN, ACUTE (3-2) .....	17
ABDOMINAL PAIN, CHRONIC (3-3) .....	20
ABDOMINAL PAIN, ANORECTAL (3-4) .....	22
ALLERGIC REACTIONS/FOOD ALLERGIES INTOLERANCE/ATOPY (4) .....	23
ATTENTION DEFICIT/HYPERACTIVITY DISORDER (ADHD)/LEARNING DISORDER (5) .....	25
BLOOD FROM GASTROINTESTINAL TRACT (6) .....	27
BLOOD FROM GASTROINTESTINAL TRACT, UPPER/HEMATEMESIS (6-1) .....	28
BLOOD FROM GASTROINTESTINAL TRACT, LOWER/HEMATOCHEZIA (6-2) .....	30
BLOOD IN SPUTUM (HEMOPTYSIS/PREVENTION OF LUNG CANCER) (7) .....	32
BLOOD IN URINE (HEMATURIA) (8) .....	34
HYPERTENSION (9-1) .....	37
HYPERTENSION IN CHILDHOOD (9-1-1) .....	39
HYPERTENSION IN THE ELDERLY (9-1-2) .....	41
MALIGNANT HYPERTENSION (9-1-3) .....	43
PREGNANCY ASSOCIATED HYPERTENSION (9-1-4) .....	45
HYPOTENSION/SHOCK (9-2) .....	47
ANAPHYLAXIS (9-2-1) .....	49
BREAST LUMP/SCREENING (10-1) .....	51
GALACTORRHEA/DISCHARGE (10-2) .....	53
GYNECOMASTIA (10-3) .....	55
BURNS (11) .....	57
HYPERCALCEMIA (12-1) .....	59
HYPOCALCEMIA (12-2) .....	61
HYPOPHOSPHATEMIA/FANCONI SYNDROME (12-3) .....	63
HYPERPHOSPHATEMIA (12-4) .....	64
CARDIAC ARREST (13) .....	65
CHEST DISCOMFORT/PAIN/ANGINA PECTORIS (14) .....	68
BLEEDING TENDENCY/BRUISING (15-1) .....	70
HYPERCOAGULABLE STATE (15-2) .....	73
ADULT CONSTIPATION (16-1) .....	75
PEDIATRIC CONSTIPATION (16-2) .....	77
CONTRACEPTION (17) .....	78
COUGH (18) .....	80
CYANOSIS/HYPOXEMIA/HYPOXIA (19) .....	82
CYANOSIS/HYPOXEMIA/HYPOXIA IN CHILDREN (19-1) .....	84
DEFORMITY/LIMP/PAIN IN LOWER EXTREMITY, CHILD (20) .....	86
DEVELOPMENT DISORDER/DEVELOPMENTAL DELAY (21) .....	87
ACUTE DIARRHEA (22-1) .....	90
CHRONIC DIARRHEA (22-2) .....	92
PEDIATRIC DIARRHEA (22-3) .....	94
DIPLOPIA (23) .....	96
DIZZINESS/VERTIGO (24) .....	98
DYING PATIENT/BEREAVEMENT (25) .....	100
DYSPHAGIA/DIFFICULTY SWALLOWING (26) .....	103
DYSPNEA (27) .....	105

TABLE OF CONTENTS

ACUTE DYSPNEA (minutes to hours) (27-1) .....	107
CHRONIC DYSPNEA (weeks to months) (27-2) .....	109
PEDIATRIC DYSPNEA/RESPIRATORY DISTRESS (27-3) .....	111
EAR PAIN (28) .....	113
GENERALIZED EDEMA (29-1) .....	115
UNILATERAL/LOCAL EDEMA (29-2) .....	117
EYE REDNESS (30) .....	119
FAILURE TO THRIVE, ELDERLY (31-1) .....	122
FAILURE TO THRIVE, INFANT/CHILD (31-2) .....	124
FALLS (32) .....	126
FATIGUE (33) .....	129
FRACTURES/DISLOCATIONS (34) .....	131
GAIT DISTURBANCES/ATAXIA (35) .....	133
GENETIC CONCERNS (36) .....	135
AMBIGUOUS GENITALIA (36-1) .....	137
DYSMORPHIC FEATURES (36-2) .....	138
HYPERGLYCEMIA/DIABETES MELLITUS (37-1) .....	140
HYPOGLYCEMIA (37-2) .....	143
ALOPECIA (38-1) .....	145
NAIL COMPLAINTS (38-2) .....	146
HEADACHE (39) .....	147
HEARING LOSS/DEAFNESS (40) .....	149
HEMIPLEGIA/HEMISENSORY LOSS +/- APHASIA (41) .....	151
ANEMIA (42-1) .....	154
POLYCYTHEMIA/ELEVATED HEMOGLOBIN (42-2) .....	158
HIRSUTISM/VIRILIZATION (43) .....	160
HOARSENESS/DYSPHONIA/SPEECH AND LANGUAGE ABNORMALITIES (44) .....	162
HYDROGEN ION CONCENTRATION ABNORMAL, SERUM (45) .....	164
INFERTILITY (46) .....	166
INCONTINENCE, STOOL (47-1) .....	168
INCONTINENCE, URINE (47-2) .....	170
INCONTINENCE, URINE, PEDIATRIC (ENURESIS) (47-3) .....	172
IMPOTENCE/ERECTILE DYSFUNCTION (48) .....	174
JAUNDICE (49) .....	176
NEONATAL JAUNDICE (49-1) .....	178
JOINT PAIN, MONO-ARTICULAR (ACUTE, CHRONIC) (50-1) .....	180
JOINT PAIN, POLY-ARTICULAR (ACUTE, CHRONIC) (50-2) .....	181
PERIARTICULAR PAIN/SOFT TISSUE RHEUMATIC DISORDERS (50-3) .....	183
LIPIDS ABNORMAL, SERUM (51) .....	185
LIVER FUNCTION TESTS ABNORMAL, SERUM (52) .....	187
LUMP/MASS, MUSCULOSKELETAL (53) .....	190
LYMPHADENOPATHY (54) .....	192
MEDIASTINAL MASS/HILAR ADENOPATHY (54-1) .....	194
MAGNESIUM CONCENTRATION SERUM, ABNORMAL/HYPOMAGNESEMIA (55) .....	196
AMENORRHEA/OLIGOMENORRHEA (56-1) .....	198
DYSMENORRHEA (56-2) .....	200
PRE-MENSTRUAL SYNDROME (PMS) (56-3) .....	201
MENOPAUSE (57) .....	202
COMA (58-1) .....	204
DELIRIUM/CONFUSION (58-2) .....	206
DEMENTIA (58-3) .....	208
MOOD DISORDERS (59) .....	213
MOUTH PROBLEMS (60) .....	215
MOVEMENT DISORDERS, INVOLUNTARY/TIC DISORDERS (61) .....	217
DIASTOLIC MURMUR (62-1) .....	219
HEART SOUNDS, PATHOLOGICAL (62-2) .....	221
SYSTOLIC MURMUR (62-3) .....	223

TABLE OF CONTENTS

NECK MASS/GOITER/THYROID DISEASE (63) .....	225
NEWBORN, DEPRESSED (64) .....	227
NON-REASSURING FETAL STATUS (FETAL DISTRESS) (65) .....	229
NUMBNESS/TINGLING/ALTERED SENSATION (66) .....	231
PAIN (67) .....	233
GENERALIZED PAIN DISORDERS (67-1-2-1) .....	236
LOCAL PAIN, SHOULDER/ELBOW/WRIST/HAND (67-1-2-2) .....	238
LOCAL PAIN, HIP/KNEE/ANKLE/FOOT (67-1-2-3) .....	240
LOCAL PAIN, SPINAL COMPRESSION/OSTEOPOROSIS (67-1-2-4) .....	242
LOCAL PAIN, SPINE/NECK/THORACIC (67-1-2-5) .....	244
LOCAL PAIN, SPINE/LOW BACK PAIN (67-1-2-6) .....	246
SYMPATHETIC/COMPLEX REGIONAL PAIN SYNDROME/REFLEX SYMPATHETIC DYSTROPHY (67-2-1) .....	248
CENTRAL/PERIPHERAL NEUROPATHIC PAIN (67-2-2) .....	249
PALPITATIONS (ABNORMAL ECG-ARRHYTHMIA) (68) .....	251
PANIC AND ANXIETY (69) .....	253
PAP SMEAR SCREENING (70) .....	255
PEDIATRIC EMERGENCIES - ACUTELY ILL INFANT/CHILD (71) .....	256
CRYING/FUSSING CHILD (71-1) .....	259
HYPOTONIA/FLOPPY INFANT/CHILD (71-2) .....	260
PELVIC MASS (72) .....	262
PELVIC PAIN (73) .....	264
PERIODIC HEALTH EXAMINATION (PHE) (74) .....	266
NEWBORN ASSESSMENT/NUTRITION (74-1) .....	269
INFANT AND CHILD IMMUNIZATION (74-2) .....	271
PRE-OPERATIVE MEDICAL EVALUATION (74-3) .....	272
WORK-RELATED HEALTH ISSUES (74-4) .....	274
PERSONALITY DISORDERS (75) .....	276
PLEURAL EFFUSION/PLEURAL ABNORMALITIES (76) .....	279
POISONING (77) .....	281
CONCEPTS OF HEALTH AND ITS DETERMINANTS (78-1) .....	283
ASSESSING AND MEASURING HEALTH STATUS AT THE POPULATION LEVEL (78-2) .....	284
INTERVENTIONS AT THE POPULATION LEVEL (78-3) .....	285
ADMINISTRATION OF EFFECTIVE HEALTH PROGRAMS AT THE POPULATION LEVEL (78-4) .....	286
OUTBREAK MANAGEMENT (78-5) .....	287
ENVIRONMENT (78-6) .....	288
HEALTH OF SPECIAL POPULATIONS (78-7) .....	289
HYPERKALEMIA (79-1) .....	291
HYPOKALEMIA (79-2) .....	293
ANTEPARTUM CARE (80-1) .....	295
INTRAPARTUM CARE/POSTPARTUM CARE (80-2) .....	298
OBSTETRICAL COMPLICATIONS (80-3) .....	300
PREGNANCY LOSS (81) .....	302
PREMATURITY (82) .....	305
PROLAPSE/PELVIC RELAXATION (83) .....	307
PROTEINURIA (84) .....	309
PRURITUS (85) .....	311
PSYCHOTIC PATIENT/DISORDERED THOUGHT (86) .....	313
PULSE ABNORMALITIES/DIMINISHED/ABSENT/BRUITS (87) .....	316
PUPIL ABNORMALITIES (88) .....	318
ACUTE RENAL FAILURE (ANURIA/OLIGURIA/ARF) (89-1) .....	319
CHRONIC RENAL FAILURE (89-2) .....	321
SCROTAL MASS (90) .....	325
SCROTAL PAIN (91) .....	327
SEIZURES (EPILEPSY) (92) .....	328
SEXUAL MATURATION, ABNORMAL (93-1) .....	330
SEXUALLY CONCERNED PATIENT/GENDER IDENTITY DISORDER (94) .....	332
SKIN ULCERS/SKIN TUMORS (BENIGN AND MALIGNANT) (95) .....	334

TABLE OF CONTENTS

SKIN RASH, MACULES (96)	335
SKIN RASH, PAPULES (97)	337
CHILDHOOD COMMUNICABLE DISEASES (97-1)	339
URTICARIA/ANGIOEDEMA/ANAPHYLAXIS (97-2)	341
SLEEP AND CIRCADIAN RHYTHM DISORDERS/SLEEP APNEA SYNDROME/INSOMNIA (98)	343
HYPERNATREMIA (99-1)	345
HYPONATREMIA (99-2)	346
SORE THROAT (RHINORRHEA) (100)	348
SMELL/TASTE DYSFUNCTION (100-1)	350
STATURE ABNORMAL (TALL STATURE/SHORT STATURE) (101)	352
STRABISMUS AND/OR AMBLYOPIA (102)	354
SUBSTANCE ABUSE/DRUG ADDICTION/WITHDRAWAL (103)	355
SUDDEN INFANT DEATH SYNDROME(SIDS)/ACUTE LIFE THREATENING EVENT(ALTE) (104)	357
SUICIDAL BEHAVIOR (105)	359
SYNCOPE/PRE-SYNCOPE/LOSS OF CONSCIOUSNESS (FAINTING) (106)	362
HYPERTHERMIA (107-1)	364
FEVER OF UNKNOWN ORIGIN (107-2)	366
FEVER IN A CHILD/FEVER IN A CHILD LESS THAN THREE WEEKS (107-3)	368
FEVER IN THE IMMUNE COMPROMISED HOST/RECURRENT FEVER (107-4)	370
HYPOTHERMIA (107-5)	372
TINNITUS (108)	374
TRAUMA/ACCIDENTS (109)	376
ABDOMINAL INJURIES (109-1)	378
BITES, ANIMAL/INSECTS (109-2)	380
BONE/JOINT INJURY (109-3)	382
CHEST INJURIES (109-4)	383
DROWNING (NEAR-DROWNING) (109-6)	384
FACIAL INJURIES (109-8)	386
HAND/WRIST INJURIES (109-9)	387
HEAD TRAUMA/BRAIN DEATH/TRANSPLANT DONATIONS (109-10)	388
NERVE INJURY (109-11)	391
SKIN WOUNDS/REGIONAL ANAESTHESIA (109-12)	392
SPINAL TRAUMA (109-13)	394
URINARY TRACT INJURIES (109-14)	396
VASCULAR INJURY (109-15)	397
DYSURIA AND/OR PYURIA (110-1)	398
POLYURIA/POLYDIPSIA (110-2)	400
URINARY OBSTRUCTION/HESITANCY/PROSTATIC CANCER (111)	401
VAGINAL BLEEDING, EXCESSIVE/IRREGULAR/ABNORMAL (112)	403
VAGINAL DISCHARGE/VULVAR ITCH/STD (113)	406
VIOLENCE, FAMILY (114)	408
CHILD ABUSE, PHYSICAL/EMOTIONAL/SEXUAL/NEGLECT/SELF-INDUCED (114-1)	410
ELDERLY ABUSE (114-2)	412
ADULT ABUSE/SPOUSE ABUSE (114-3)	413
ACUTE VISUAL DISTURBANCE/LOSS (115-1)	414
CHRONIC VISUAL DISTURBANCE/LOSS (115-2)	416
VOMITING/NAUSEA (116)	418
WEAKNESS/PARALYSIS/PAREISIS/LOSS OF MOTION (117)	420
WEIGHT GAIN/OBESITY (118-1)	422
WEIGHT LOSS/EATING DISORDERS/ANOREXIA (118-2)	424
WEIGHT (LOW) AT BIRTH/INTRAUTERINE GROWTH RESTRICTION (118-3)	426
LOWER RESPIRATORY TRACT DISORDERS (119-1)	427
UPPER RESPIRATORY TRACT DISORDERS (119-2)	429
WHITE BLOOD CELLS, ABNORMALITIES OF (120)	431





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## GENERAL OBJECTIVES

### Rationale

An appropriate history-taking and physical examination are essential for the candidate's identification of the clinical presentation, derivation of possible diagnoses, and rational plans for investigation and management. Frequently, the social, cultural and behavioral characteristics of the patient may make it challenging to obtain the clinical data (e.g., language, altered mental status). However, the candidate must be able to implement timely and appropriate plans for investigation and management based on the information obtained.

### Objectives

Faced by a patient with a clinical problem, candidates will:

- ❖ Obtain pertinent information about the patient.
- ❖ Perform an appropriate physical examination.
- ❖ Order relevant investigations.
- ❖ Arrive at a reasonable diagnosis(es).
- ❖ Formulate management plans for short and long term care.

### Communication Skills

Competent candidates will communicate effectively with patients, families, and other relevant persons by:

- ❖ Demonstrating a compassionate interest, respect, and understanding of the patient as an individual, while maintaining a professional relationship.
- ❖ Listening and interpreting information.
- ❖ Eliciting the concerns of the patient using non-directive (open-ended) and directive (closed-ended) questions, paraphrasing and summarizing when appropriate.
- ❖ Evaluating information gained from non-verbal communication.
- ❖ Describing the effect of their own affective response on the doctor/patient relationship.
- ❖ Demonstrating non-judgmental behavior.
- ❖ Outlining the socio-cultural and individual influences that affect the doctor/patient relationship, such as:
  - sex role and gender identity of both the physician and patient
  - socio-cultural and religious differences
  - lifestyle
- ❖ Demonstrating ways of dealing effectively with difficult situations (e.g., excessively talkative and rambling, reticent, excessively quiet, crying, hostile and/or angry patients).
- ❖ Demonstrating ways of dealing effectively with the mentally and physically disabled patient.
- ❖ Eliciting and interpreting the anxieties related to embarrassment, fear of disease and confidentiality.
- ❖ Discussing sensitive issues such as sexual dysfunction, family dysfunction (including marital dysfunction), homicidal and suicidal risks.
- ❖ Discussing the emotional effects of physiological events.
- ❖ Demonstrating emotional and social support to gain confidence and cooperation.
- ❖ Evaluating the interaction between members of a family where appropriate.
- ❖ Discussing information at the appropriate intellectual level for all ages and conditions.

## History

Competent candidates will:

- ❖ Elicit and interpret pertinent events from the patient, family or other sources.
- ❖ Demonstrate the ability to modify their history according to the severity and urgency of the problem at hand.
- ❖ Demonstrate the ability to record and/or summarize information in a timely manner.
- ❖ Provide a clear definition of the patient's problems upon which to base further investigation, diagnosis and ongoing management

## Physical Examination

Competent candidates will:

- ❖ Perform a physical examination appropriate to the age of the patient and nature of the clinical problem(s) presented.
- ❖ Elicit and interpret information through continuous observation.
- ❖ Demonstrate the ability to record and/or summarize information in a timely manner.
- ❖ Provide a clear definition of the patient's problems upon which to base further investigation, diagnosis and ongoing management.

## Investigations

Competent candidates will:

- ❖ Select and interpret appropriate laboratory and other diagnostic procedures that confirm the diagnosis; exclude other important diagnoses or determine the degree of dysfunction.
- ❖ Discuss the limitations and contraindications of common investigations.
- ❖ Determine the reliability and predictive value of common investigations.
- ❖ State the effect of demographic considerations on the sensitivity and specificity of diagnostic tests.
- ❖ Demonstrate ways to deal effectively with unexpected findings, ill-defined results or normal variance not indicative of disease.
- ❖ Outline the physiological, biochemical and pathological principles of common investigations.
- ❖ Perform common procedures using the appropriate instruments and materials.
- ❖ Describe any discomfort, harm or inconvenience to the patient associated with the investigations they have selected.

## Clinical Judgement And Decision-Making

Competent candidates will:

- ❖ Differentiate between important and spurious information.
- ❖ Interpret pertinent data in order to:
  - list and prioritize a differential diagnosis for common clinical problems
  - diagnose specific common diseases
  - diagnose more rare, but life threatening diseases
- ❖ Differentiate among acute emergency situations, acute exacerbations of chronic illnesses and serious but non-emergency situations.
- ❖ List the indications for specialized care and/or consultation.
- ❖ Discuss pertinent information with other members of the health care team including consultants.
- ❖ Evaluate critically, their own professional competencies and determine their personal learning needs.

## Management Skills

Competent candidates will:

- ❖ Outline the initial management for both common and more rare but life-threatening conditions.
- ❖ Determine the importance of time and place in determining appropriate management.
- ❖ Evaluate the response to therapy and other management.
- ❖ State the pharmacologic effects, the clinical application including indications, contraindications, major side effects and interactions of commonly used drugs.
- ❖ Discuss the diagnosis, treatment plan and prognosis with the patient, family and other concerned individuals, where appropriate.
- ❖ Outline the contribution and expertise of other health care professionals and community agencies.
- ❖ Select the appropriate multidisciplinary teams for the optimal care of patients.
- ❖ Select psychological methods of treatment where appropriate.

## Health Promotion And Maintenance

Competent candidates will:

- ❖ Formulate preventive measures into their management strategies.
- ❖ Communicate with the patient, the patient's family and concerned others with regard to risk factors and their modification where appropriate.
- ❖ Describe programs for the promotion of health including screening for, and the prevention of, illness.
- ❖ Describe the concept of illness behaviour and its influence on health care.

## Critical Appraisal/Medical Economics

Competent candidates will:

- ❖ Evaluate medical evidence in both clinical and academic situations.
- ❖ Evaluate scientific literature in order to critically assess the benefits and risks of current and proposed methods of investigation, treatment and prevention of illness.
- ❖ Demonstrate the use of the computer for appropriate data retrieval and function.
- ❖ Define the socio-economic rationales, implications and consequences of medical care.
- ❖ Outline the principles of cost containment, cost benefit analysis and cost effectiveness.

## Law and Ethics

Competent candidates will:

- ❖ Discuss the principles of law, biomedical ethics and other social aspects related to common practice situations.



## ABDOMINAL DISTENSION

### Rationale

Abdominal distention is common and may indicate the presence of serious intra-abdominal or systemic disease.

### Causal Conditions

1. Ascites (in average adult, >1.5 L required for clinical diagnosis)
  - a. High albumin gradient (>11g/L serum to fluid albumin ratio)
    - i. Portal hypertension (approx. 80% of patients with ascites)
    - ii. Congestive heart failure (<5% of patients with ascites)
  - b. Low albumin gradient (<11g/L serum to fluid ratio)
    - i. Peritoneal carcinomatosis (approx. 10% of patients with ascites)
    - ii. Peritonitis, infection
    - iii. Pancreatitis/Serositis
2. Bowel dilatation
  - a. Mechanical obstruction (e.g., adhesions, volvulus, malignancy, intussusception, constipation)
  - b. Intestinal pseudo-obstruction
    - i. Acute colonic
      - A. Toxic megacolon
      - B. Ogilvie syndrome (trauma/surgery, medical illness/drugs, retroperitoneal hemorrhage)
    - ii. Chronic intestinal
      - A. Myopathic (scleroderma, familial)
      - B. Neuropathic
        - I. Enteric (diabetes, amyloid, paraneoplastic, narcotics)
        - II. Extrinsic (MS, spinal injury, stroke)
    - iii. Other paralytic ileus (C. Difficile, peritonitis, post-operative, hypothyroid, hypokalemia)
3. Other
  - a. Pelvic mass (pregnancy, bladder, fibroids, ovarian mass, malignancy)
  - b. Bowel (feces, flatus, constipation, IBD, malabs.)
  - c. Mass/Organomegaly (see [ABDOMINAL MASS](#))

### Key Objectives

- ❖ Differentiate between causes of abdominal distention and develop an effective management plan.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate clinically the etiology of abdominal distention.
  - Elicit information on pre-existing disorders that would predispose to the various causes for abdominal distention.
- ❖ List and interpret the critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret abdominal imaging and other appropriate investigations used in cases of abdominal

distention.

- Perform paracentesis when indicated and interpret the results.
- ❖ Conduct an effective plan of management for a patient with abdominal distention:
  - Outline the short-term medical and surgical management of patients with bowel obstruction.
  - Contrast the immediate and long-term management of cirrhotic ascites vs. malignant ascites patients.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Explain that normal intestinal motor function is controlled by the extrinsic nerve supply (brain and spinal cord), the enteric brain (plexi within wall of intestine), and local transmitters (amines and peptides) that excite smooth muscles.
2. Identify that cells of Cajal serve as pacemakers in the intestinal tract, coordinating the functions of intrinsic and extrinsic neurons.

**Rationale**

If hernias are excluded, most other abdominal masses represent a significant underlying disease that requires complete investigation.

**Causal Conditions**

1. Organomegaly
  - a. Hepatomegaly
  - b. Splenomegaly
  - c. Enlarged kidneys (cysts, tumors, hydronephrosis)
2. Neoplasms
  - a. Lymphoma/Sarcoma
  - b. Gastrointestinal tumors (gastric, colon, pancreas, hepatoma)
  - c. Gynecologic tumors (ovarian, uterine)
  - d. Neuroblastoma
3. Other
  - a. Pelvic organs in abdomen (pregnancy, bladder)
  - b. Pancreatic pseudocyst
  - c. Vascular (AAA)
  - d. Abdominal wall masses

**Key Objectives**

- ❖ Distinguish the cause and nature of an abdominal mass based on history and physical findings.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine which patient is likely to have a neoplasm causing the abdominal mass.
  - Describe the risk factors which would predispose to the various causes for abdominal mass.
- ❖ List and interpret the critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - Select those patients that require diagnostic interventions (endoscopy, laparoscopy, percutaneous biopsy).
  - Order and interpret abdominal radiography in patients with an abdominal mass.
  - Interpret and discuss the role of serum tumor marker testing.
- ❖ Conduct an effective plan of management for a patient with an abdominal mass:
  - Discuss the medical and surgical management of patients with an abdominal mass.
  - Select patients in need of specialized care.



2-1

## ADRENAL MASS

### Rationale

Adrenal masses are at times found incidentally after CT, MRI, or ultrasound examination done for unrelated reasons. The incidence is about 3.5 % (almost 10 % of autopsies).

### Causal Conditions

1. Non-functioning adenoma (adenoma, carcinoma, metastatic 85%)
2. Functioning (15%)
  - a. Cortex (adenoma, carcinoma - 11%)
    - i. Cushing Syndrome (glucocorticoid, androgen excess - 9%)
    - ii. Conn Syndrome (aldosterone excess - 2%)
  - b. Medulla (pheochromocytoma - 4%)

### Key Objectives

- ❖ Determine whether the mass is malignant or not (if >4-cm, refer for specialized care).
- ❖ Determine whether the mass is functional or not.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate benign functioning adenomas from those that are non-functioning.
  - Differentiate benign from malignant masses by inquiring and examining for primary tumors which metastasize to the adrenal glands.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret investigations for the exclusion of functioning adrenal masses.
  - List features noted on diagnostic imaging techniques suggestive of malignancy.
  - Select patients and list indications for fine needle aspiration biopsy.
- ❖ Conduct an effective plan of management for a patient with adrenal mass:
  - Outline initial plan of management for patients with adrenal masses which are functioning.
  - Select patients in need of specialized care; list those requiring surgical referral, and those requiring referral to endocrinology/internal medicine.



## HEPATOMEGALY

### Rationale

The edge of the liver may be palpable without true hepatic enlargement (especially in infants and children), so liver span needs to be estimated. If the liver is enlarged, the cause of enlargement and extent of disease require to be established since prognosis is dependent on this information.

### Causal Conditions

1. Congestive - (heart failure, right, Budd-Chiari)
2. Infiltrative
  - a. Malignant (primary, secondary, lymphoproliferative, leukemia, polycythemia)
  - b. Nonmalignant (fat, cysts, hemochromatosis, Wilson, myeloid metaplasia, amyloid, metabolic myopathies)
3. Proliferative
  - a. Infectious (viral, TB, abscess, echinococcus)
  - b. Inflammatory (alcoholic/chronic hepatitis, sarcoidosis, histiocytosis X)

### Key Objectives

- ❖ Examine for hepatomegaly and differentiate an enlarged liver from liver displacement.
- ❖ In a patient with hepatomegaly, determine whether it is associated with splenomegaly.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether present are stigmata of right heart failure, chronic liver disease, an infective process (e.g., fever, chills, lymphadenopathy, etc.), a malignancy (weight loss, anemia or jaundice), in order to differentiate between causes of hepatomegaly.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Confirm apparent hepatomegaly on examination with diagnostic imaging.
  - Select and interpret laboratory investigations for various causes of hepatomegaly.
- ❖ Conduct an effective plan of management for a patient with hepatomegaly:
  - State that management depends on the underlying cause.
  - Select patients in need of specialized care.





2-3

## SPLENOMEGALY

### Rationale

A normal spleen is not palpable except in neonates and young children, so that a palpable spleen is indicative of an underlying problem unless it is confused with the left liver lobe or an enlarged left kidney.

### Causal Conditions

1. Congestive - (cirrhosis, right heart failure, portal/ hepatic/splenic thrombosis)
2. Infiltrative
  - a. Malignant (lymphoma, leukemia, polycythemia vera, tumors)
  - b. Non-malignant (Gaucher, amyloid, glycogen and other storage diseases, metaplasia, N-P)
3. Proliferative
  - a. Infectious (viral such as cytomegalovirus, bacterial endocarditis, TB)
  - b. Inflammatory (sarcoid, SLE, Still disease, Felty syndrome)
4. Hemolytic disease

### Key Objectives

- ❖ Perform an abdominal examination for splenomegaly and differentiate an enlarged spleen from the left kidney or left liver lobe.
- ❖ In a patient with splenomegaly, determine whether it is associated with hepatomegaly.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether stigmata of chronic liver disease, an infective process (e.g., fever, chills, lymphadenopathy, etc.), a hematological malignancy, weight loss, anemia or jaundice are present in order to differentiate between causes of splenomegaly.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret laboratory investigations for various causes of splenomegaly.
- ❖ Conduct an effective plan of management for a patient with splenomegaly:
  - State that management depends on the underlying cause.
  - Select patients in need of specialized care.



2-4

## HERNIA, ABDOMINAL WALL AND GROIN

### Rationale

Since twenty-five percent of males will develop an inguinal hernia in their lifetime, herniorrhaphy has become the most common surgical procedure performed by general surgeons.

### Causal Conditions

1. Congenital
  - a. Inguinal hernia (96% - male 9:1)
    - i. Indirect
    - ii. Direct
  - b. Femoral hernia (4% - female 4:1)
  - c. Umbilical
  - d. Diaphragmatic
2. Acquired - ventral (incisional, 5% of surgical procedures) hernia

### Key Objectives

- ❖ Select those patients with abdominal hernias requiring immediate rather than elective repair.
- ❖ List factors predictive of hernia recurrence post-operatively (such as obesity, ascites, and malnutrition).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate inguinal and femoral hernias from other causes of a groin mass such as lymphadenopathy, hydrocele, undescended testes or aneurysm.
  - Differentiate the various types of hernias on the basis of physical exam including visual inspection and special maneuvers.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective plan of management for a patient with an abdominal hernia:
  - Select through focused data gathering, patients in need of emergent surgical repair.
  - Counsel and educate patients on the risks associated with uncorrected hernias as well as strategies to reduce post-operative recurrence.
  - Select patients in need of specialized care.

### APPLIED SCIENTIFIC CONCEPTS

1. Explain that hernias are areas of weakness of fibromuscular tissues of the body wall through which peritoneal structures pass.
2. Contrast male and female embryology of the inguinal region in order to explain the greater frequency of hernias in males.



3-1

## ABDOMINAL PAIN, CHILDREN

### Rationale

Abdominal pain, a common complaint in children; may result from intra-abdominal inflammation or obstruction, but in a large proportion of cases, an identifiable cause is never found. Thorough clinical evaluation is the most important "test" in the diagnosis of abdominal pain so that directed management can be initiated.

### Causal Conditions

1. Right lower quadrant/Left lower quadrant
  - a. Bowel (gastroenteritis, appendicitis, constipation, Meckel diverticulitis)
  - b. Mesenteric lymphadenitis
  - c. Inflammatory bowel disease (site of pain depends on site of involvement, usually >10 years)
  - d. Inguinal hernia (incarcerated)
  - e. Urinary tract infection
2. Generalized
  - a. Peritoneal inflammation (trauma, ruptured viscus, bacterial peritonitis)
  - b. Bowel
    - i. Infantile colic
    - ii. Obstruction (intussusception if <5 years, intestinal malrotation often <1 year, volvulus, constipation)
    - iii. Henoch-Schonlein purpura
  - c. Malabsorption (lactose intolerance, milk proteins)
  - d. Functional/Psychosomatic (irritable bowel syndrome)
3. Localized/Back (pyelonephritis, stones, pancreatitis, cholecystitis etc.)

### Key Objectives

- ❖ Select patients with abdominal pain who require emergency treatment, medical or surgical.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit clinical findings which are key to establishing the most likely source of the pain.
  - Differentiate acute from chronic pain and organic from functional.
  - In an infant, determine whether an acute organic cause for the pain exists and differentiate from infantile colic or constipation.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select laboratory and diagnostic imaging to determine whether conditions requiring emergency treatment are present.
  - Interpret abdominal x-rays.
- ❖ Conduct an effective plan of management for a patient with acute abdominal pain:
  - Select patients who require emergency surgery and those who require emergency medical care.
  - Outline the initial plan of management in infants with acute intestinal obstruction.

- > Outline a plan of management for common causes of abdominal pain (e.g., infantile colic) with the child's interest as the focus (consider different age groups:<1 year,<2 years, 2-5 years, 6-14 years, adolescent).
- > Select patients in need of specialized care and /or further investigation.



3-2

## ABDOMINAL PAIN, ACUTE

### Rationale

Abdominal pain may result from intra-abdominal inflammation or disorders of the abdominal wall. Pain may also be referred from sources outside the abdomen such as retroperitoneal processes as well as intra-thoracic processes. Thorough clinical evaluation is the most important "test" in the diagnosis of abdominal pain.

### Causal Conditions

1. Diffuse
  - a. Peritoneal signs
    - i. Perforated viscus
    - ii. AAA rupture
    - iii. Small bowel infarction/Obstruction/Bacterial peritonitis
  - b. Peritoneal signs absent
    - i. Gastro-enteritis
    - ii. Irritable bowel syndrome, constipation
    - iii. Metabolic disease
2. Localized
  - a. Upper (exclude cardio-pulmonary causes)
    - i. Peritoneal signs
      - A. Cholecystitis/Cholangitis
      - B. Pancreatitis
      - C. Appendicitis
    - ii. Peritoneal signs absent
      - A. Epigastric
        - I. Peptic ulcer disease/Gastritis
        - II. Gastro-esophageal reflux disease
      - B. Right upper quadrant/Subcostal
        - I. Biliary colic
        - II. Acute hepatitis/Hepatic abscess
      - C. Left upper quadrant/Subcostal (Splenic infarct/Splenic abscess)
  - b. Lower
    - i. Peritoneal signs
      - A. Bowel
        - I. Appendicitis/ Mesenteric lymphadenitis
        - II. Diverticulitis
        - III. Incarcerated hernia
      - B. Genital
        - I. Salpingitis/ Pelvic inflammatory disease
        - II. Ectopic pregnancy
        - III. Ovarian torsion/Ruptured cyst
    - ii. Peritoneal signs absent
      - A. Urinary tract infection/ Renal colic (flank pain)
      - B. Inflammatory bowel disease
      - C. Psoas abscess

## Key Objectives

- ❖ Select patients with abdominal pain who require emergency treatment, medical or surgical.
- ❖ Determine whether extra-abdominal causes (myocardial infarction, etc.) may be causing the pain.
- ❖ In elderly and immuno-compromised patients, list unusual causes of abdominal pain.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate intra-abdominal vs. extra-abdominal or metabolic causes for acute abdominal pain.
  - Determine the onset, frequency, duration, locale, radiation, quality, severity of pain; differentiate the dull, aching, poorly localized visceral pain from sharp, localized parietal pain; identify aggravating and alleviating factors.
  - Examination focus includes abdominal, rectal, pelvic, and genito-urinary areas; describe whether patient is immobile or writhing; obtain vital signs and determine volume status.
  - Examine muscle wall, lungs, chest, and eyes for icterus.
- ❖ List and interpret the critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order CBC, urinalysis, electrolytes, glucose, creatinine, urea, liver function tests, amylase, chest x-ray, and ECG if indicated.
  - Interpret abdominal x-rays, CT (if indicated), ultra-sound (if indicated).
- ❖ Conduct an effective plan of management for a patient with acute abdominal pain:
  - Select patients that require emergency surgery and/or emergency medical care.
  - Outline a plan of management for common causes of abdominal pain.
  - Select patients in need of specialized care and/or further investigation.

## Ethics

### *Consent to Investigation or Treatment (CLEO 4.3)*

#### Detailed Objectives

- ❖ To explain the legal and ethical basis for consent.
- ❖ To demonstrate awareness of process for the assessment of capacity to give consent, and be able to conduct such as assessment.
- ❖ To recognize factors which can alter capacity (e.g., disease, drugs, depression).
- ❖ To identify appropriate substitute decision-maker, or the process to determine that individual.
- ❖ To communicate clearly information relevant to informed consent (what a reasonable person would want to know in a given circumstance).
- ❖ To identify reasonable steps to ensure understanding of information: can the patient explain the medical problem and the proposed treatment or test.

Physicians should mention a choice of possible approaches when discussing management in a patient who is near the end of life. Patients often find themselves embarking on a cascade of treatments while neither they nor their families were told that approaches other than the aggressive course was an option.

Physicians need to consider that the alternative to conventional, perhaps invasive care, is not simply comfort and pain control. In some situations (cardiac arrest, respiratory failure) there is no feasible middle-of-the-road treatment. In other instances, patients may choose to substitute medical treatment for surgical treatment. For example, antibiotics without cholecystectomy for acute cholecystitis may be more acceptable to an elderly patient.

## Applied Scientific Concepts

1. Outline the neurologic basis of abdominal pain, including pain receptors (stretch and chemical), and possible stimuli.
2. Explain why the localization of pain is imprecise including interplay between somatic and visceral afferent nerves.



## ABDOMINAL PAIN, CHRONIC

### Rationale

Chronic and recurrent abdominal pain, including heartburn or dyspepsia is a common symptom (20 - 40 % of adults) with an extensive differential diagnosis and heterogeneous pathophysiology. The history and physical examination frequently differentiate between functional and more serious underlying diseases.

### Causal Conditions

1. Upper (cardio-respiratory causes need to be excluded)
  - a. Dyspepsia/Epigastric
    - i. Bowel disease
      - A. Peptic ulcer disease
      - B. Gastro-esophageal reflux disease
      - C. Gastric cancer
      - D. Non-ulcer dyspepsia
    - ii. Biliary disease
      - A. Biliary colic, choledocholithiasis
      - B. Chronic cholecystitis
      - C. Sphincter of Oddi dysfunction
    - iii. Pancreatic disease
      - A. Chronic pancreatitis
      - B. Pancreatic cancer
  - b. Right upper quadrant
    - i. Biliary disease (as above)
    - ii. Hepatic disease
      - A. Hepatomegaly (fat infiltration/granuloma/congestion)
      - B. Malignancy (primary or secondary)
2. Lower
  - a. Bowel disease
    - i. Crohn disease (right)
    - ii. Diverticulitis (left)
    - iii. Irritable bowel syndrome
  - b. Genito-urinary disease
    - i. Endometriosis
    - ii. Ovarian cyst/Torsion
    - iii. Urinary tract infection/Stones (flank pain)
  - c. Hernias
    - i. Inguinal
    - ii. Femoral
3. Diffuse or local pain
  - a. Somatization
  - b. Abdominal wall
  - c. Lactose intolerance
  - d. Lymphomas/Neoplasms



## Key Objectives

- ❖ Diagnose somatoform disorders by inclusion rather than exclusion. Although visceral pain is typically poorly localized and often referred to distal sites, differentiate between various causes of chronic abdominal pain.
- ❖ Outline conservative management measures including dietary counseling.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between organic and non-organic causes of chronic abdominal pain.
  - Select patients in need of further laboratory and radiological investigation.
- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - Outline the significance of common findings on ultrasound or CT imaging of the abdomen as well as Barium contrast studies.
- ❖ Conduct an effective plan of management for a patient with chronic abdominal pain:
  - Discuss the current concepts of pathophysiology in the management of gastro-esophageal reflux and peptic ulcer disease.
  - Contrast the medical, surgical, nutritional and psychological management of chronic abdominal pain.
  - Select narcotics appropriately for patients and manage complications arising from the use of these drugs.
  - Counsel and provide appropriate education for patients with chronic abdominal pain syndromes.
  - Select patients in need of specialized care.

## Ethics

### *Truth Telling (CLEO 4.4)*

#### Detailed Objectives

- ❖ To understand and explain the ethical and legal basis for truth telling:
  - respect for patient's autonomy;
  - situations of inevitable disclosure;
  - provision of support with disclosure of difficult news; and
  - respect patient's need to make realistic life decisions.
- ❖ To respect patient's right to not know, and ascertain a patient's wishes:
  - identify and respect valid exceptions to truth telling;
  - seek consent for disclosure;
  - awareness of personal and cultural context and how that may influence a patient's choice; and
  - respect a patient's choice above that of family members.

After making the diagnosis of carcinomatosis in a patient with chronic abdominal pain, the physician may be asked by the patient to refrain from informing the immediate family, despite the fact that optimal care and quality of life requires family involvement. Although the physician wishes to respect the patient's choice above that of family members, additional information concerning the patient's personal and cultural context is obtained. Explanations are given about the need for family support, and the patient's consent for disclosure is sought.



3-4

## ABDOMINAL PAIN, ANORECTAL

### Rationale

While almost all causes of anal pain are treatable, some can be destructive locally if left untreated.

### Causal Conditions

1. Anorectal disease
  - a. Inflammatory bowel disease related
    - i. Abscess
    - ii. Fistula
  - b. Fissures, hemorrhoids
  - c. Chemotherapy
  - d. Neuropathic, psychological
  - e. Coccygeal pain, other pelvic floor muscle syndromes
2. Dermatologic disease
  - a. Psoriasis
  - b. Contact/Atopic dermatitis
  - c. Malignancy, ulcer
3. Infections
  - a. Sexually transmitted diseases
  - b. Bacterial, fungal, parasitic

### Key Objectives

- ❖ Perform visual inspection, palpation, and rectal examination in all patients presenting with anal pain.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between the causes of anal pain.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Based on inspection, palpation and rectal examination, differentiate the cause of anal pain.
- ❖ Conduct an effective initial plan of management for a patient with anal pain:
  - Select patients with perirectal abscess for urgent surgical treatment.
  - Counsel patients with hemorrhoids and anal fissure in the conservative treatment options including sitz baths, stool softeners, and secondary preventative measure such as strict avoidance of constipation.
  - Select patients in need of specialized care.



## ALLERGIC REACTIONS/FOOD ALLERGIES INTOLERANCE/ATOPY

### Rationale

Allergic reactions are considered together despite the fact that they exhibit a variety of clinical responses and are considered separately under the appropriate presentation. The rationale for considering them together is that in some patients with a single response (e.g., atopic dermatitis), other atopic disorders such as asthma or allergic rhinitis may occur at other times. Moreover, 50% of patients with atopic dermatitis report a family history of respiratory atopy.

### Causal Conditions

1. Generalized (anaphylaxis) (see [ANAPHYLAXIS](#))
2. Localized
  - a. Skin
    - i. Dermatitis/ Atopy/ Pruritus
    - ii. Urticaria
    - iii. Angioedema
  - b. Respiratory
    - i. Rhinorrhea
    - ii. Angioedema
    - iii. Wheezing
  - c. Gastro-intestinal tract
    - i. Food intolerance
    - ii. Celiac

### Key Objectives

- ❖ Elicit clinical data in order to differentiate allergic responses from those caused by other agents.
- ❖ Diagnose potentially lethal anaphylaxis and initiate immediate treatment.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit a history to identify the possible causes of an anaphylactic reaction.
  - Differentiate between food intolerance and food allergy.
  - Identify common allergens and their possible effects on susceptible children.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List cost effective use of tests designed to identify allergens.
  - Interpret results so as to differentiate the allergic from the non-allergic child.
- ❖ Conduct an effective initial plan of management for a patient with allergies:
  - Outline emergency management of a child with anaphylaxis.
  - Discuss skin testing in allergic children.
  - Outline the immediate and long-term management of the child with allergies including education and counselling for the child, parents, school, and the community.

- Identify the social and psychologic impact of allergic disease on the child and its family.

### **Applied Scientific Concepts**

1. Explain the physiologic changes caused by mast cells and basophil derived mediators in anaphylaxis.
2. Outline the interaction of different immune mediators involved in allergic reactions including leukotrienes, cytokines and other mediators.



5

## ATTENTION DEFICIT/HYPERACTIVITY DISORDER (ADHD)/LEARNING DISORDER

### Rationale

Family physicians at times are the initial caregivers to be confronted by developmental and behavioural problems of childhood and adolescence (5 - 10% of school-aged population). Lengthy waiting lists for specialists together with the urgent plight of patients often force primary-care physicians to care for these children.

### Causal Conditions

1. Attention deficit hyperactivity disorder (ADHD)
  - a. Inattentive subtype
  - b. Hyperactive/Impulsive subtype
  - c. Combined
2. Hyperactivity/Inattention secondary to other (learning/developmental) disorders
  - a. Developmental delay
  - b. Specific learning disability
  - c. Autistic spectrum disorder/Neurologic problems
3. Differential diagnosis
  - a. Depression/Bipolar/Anxiety/Psycho-social stress
  - b. Drugs (marijuana, alcohol)
  - c. Antisocial personality disorder, child abuse
  - d. Chronic medical disease (hyperthyroidism, seizures, lead toxicity)

### Key Objectives

- ❖ List diagnostic criteria for ADHD and some of the common co-morbid conditions (learning disability, language disorder, tic disorder, oppositional defiant disorder, enuresis, encopresis, etc.).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether there is family history for attention deficit or any of the co-morbid conditions.
  - Determine whether there is evidence of development delay, genetic syndromes, encephalopathies, poisoning (e.g., alcohol, lead), or other co-morbid/secondary effects of ADHD.
  - Obtain (with consent) an education history (from teachers); physical examination should focus on ruling out underlying medical disorders (hearing, vision, mental status, neurologic disease).
  - Accumulate all possible information first, then check DSM-IV criteria for diagnosis.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - State that there are no specific medical, neurological, or laboratory tests that are diagnostic.
  - Select patients who require further medical investigation or psychological testing.
- ❖ Conduct an effective plan of management for a patient with hyperactivity/attention deficit disorder:
  - Select patients in need of specialized care.

- Along with other care givers, outline a management plan which includes (when appropriate):
  - \* Parent, child and teacher education and other educational interventions and academic support;
  - \* Structured educational and recreational activities;
  - \* Behavioral management strategies;
  - \* Psychological counseling (individual and family); and
  - \* Sleep/Nutrition support, medication.

## General Organization

### ***Support Services in the Community (CLEO 6.3)***

#### **Detailed Objectives**

- ❖ The nature and role of federal programs and services.
- ❖ The nature and role of provincial programs and services.
- ❖ The nature and role of support services for youth.
- ❖ Mechanisms and organizations which provide social services related to health.
- ❖ Individuals able to assist with access to community services.

The management of patients with hyperactivity/attention deficit disorder is resource intensive. The physician requires special knowledge and skill in how to access the needed resources.

### ***Self-Regulation of the Profession (CLEO 6.6)***

#### **Detailed Objectives**

- ❖ The role and authority of the provincial licensing authority to regulate and govern all members of the profession in the public interest by setting and maintaining standards.

The management of patients with hyperactivity/attention deficit disorder may on occasion involve the use of medications that are considered controlled substances. Provincial licensing authorities may be involved in the regulation of such medications and may require the co-operation of the physician in regulating their use.

### ***Inter-Professional Issues (CLEO 6.9)***

#### **Detailed Objectives**

- ❖ The role and skills of practice of other health care workers who are self-regulated.
- ❖ The proper inter-professional relationship based on respect and clear communication.
- ❖ The delegation of acts between physicians and other health care workers.
- ❖ The ability to work in a collegial way within a team structure involving other physicians and health care workers.
- ❖ Maintain respect for the role of the other health professions at all times.

The management of patients with hyperactivity/attention deficit disorder may involve a team structure that includes other health care workers, educators etc. Excellent management of the patient is possible if the physician displays at all times the proper inter-professional relationship with other members of the health care team. This relationship and delegation of certain aspects of care must be based on respect and clear communication.

## BLOOD FROM GASTROINTESTINAL TRACT

### Rationale

Upper intestinal bleeding usually presents with hematemesis (blood or coffee-ground material) and/or melena (black, tarry stools). Lower intestinal bleeding usually manifests itself as hematochezia (bright red blood or dark red blood or clots per rectum). Unfortunately, this difference is not consistent. Melena may be seen in 5 - 10% of patients with colorectal/small bowel bleeding and hematochezia may be seen with massive upper gastrointestinal bleeding. Occult bleeding from the GI tract is identified at times by positive stool for occult blood or the presence of iron deficiency anemia.

### Causal Conditions

1. Upper gastrointestinal bleeding (see [HEMATEMESIS](#))
2. Lower gastrointestinal bleeding
  - a. Left colon (hematochezia/bright red - 75% colon, 20% upper GI/Small bowel)
  - b. Right colon (dark red, mixed with stool)

### Key Objectives

- ❖ Consider the possibility of lower GI bleeding in patients with melena.
- ❖ Consider the possibility of massive upper GI bleeding in patients with hematochezia.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Outline the diagnostic value/limitations of contrasting hematochezia and melena.
  - List and diagnose the most likely cause of blood in the stool.
  - Select patients requiring urgent assessment and treatment.
- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - See hematemesis and hematochezia.
- ❖ Conduct an effective plan of management for a patient with blood in stool:
  - Select patients in need of immediate therapy.
  - Evaluate patients in a cost-efficient manner.
  - Select patients in need of specialized care.



## 6-1 BLOOD FROM GASTROINTESTINAL TRACT, UPPER/HEMATEMESIS

### Rationale

Although at times self-limited, upper GI bleeding always warrants careful and urgent evaluation, investigation, and treatment. The urgency of treatment and the nature of resuscitation depend on the amount of blood loss, the likely cause of the bleeding, and the underlying health of the patient.

### Causal Conditions

1. Ulcerative/Erosive
  - a. Peptic ulcer disease (55%)
    - i. Infectious (*helicobacter pylori*)
    - ii. Drugs (NSAIDs)
    - iii. Stress ulcer
    - iv. Zollinger-Ellison
  - b. Esophagitis/Gastritis (peptic, infectious, drugs)
2. Portal hypertension (15% - esophageal varices, gastric, duodenal)
3. Trauma/Post-surgery (5% - Mallory-Weiss tear)
4. Tumors (5% - benign, malignant)
5. Vascular malformations (e.g., angiomas)

### Key Objectives

- ❖ Determine the hemodynamic stability of the patient and whether bleeding is active as a first priority, and resuscitate if necessary. Select patients requiring admission to intensive care units.
- ❖ Select patients in need of specialized diagnostic studies after adequate resuscitation and stabilisation (to prevent complications of endoscopy), and refer when appropriate in order to deliver associated treatment if required.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether a bleeding diathesis may contribute to the bleeding.
  - Diagnose the likely cause of hematemesis.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select appropriate investigations for the causal conditions of hematemesis, and determine whether bleeding disorders are present.
  - List the indications for diagnostic endoscopy and diagnostic imaging.
  - List findings suggesting that likelihood of re-bleeding is high.
- ❖ Conduct an effective plan of management for a patient with hematemesis:
  - List indications for nasogastric suction and/or endotracheal intubation.
  - List indications for pharmacologic, endoscopic or surgical treatment.
  - Outline a method for prevention of stress ulcers.
  - Outline the mechanism of action of various medical treatments (e.g., octreotide, vasopressin, IV erythromycin).



- > Outline treatment to decrease recurrence (e.g., eradication of *H. pylori* when diagnosed).
- > Select patients in need of specialized care.

### **Applied Scientific Concepts**

1. Briefly describe the normal gastric anatomy and physiology.
2. Outline the pathophysiology of and immune response to *H. pylori* infection.
3. Explain the effect of NSAIDs on the anatomy and physiology (e.g., on thick layer of hydrophobic mucous, on glutathione to scavenge superoxide radicals, on hydrogen secretion, on bicarbonate secretion, on tight junctions between cells, on blood flow).



## 6-2 BLOOD FROM GASTROINTESTINAL TRACT, LOWER/HEMATOCHEZIA

### Rationale

Although lower gastrointestinal bleeding (blood originating distal to ligament of Treitz) or hematochezia is less common than upper (20% vs. 80%), it is associated with 10 -20% morbidity and mortality since it usually occurs in the elderly. Early identification of colorectal cancer is important in preventing cancer-related morbidity and mortality (colorectal cancer is second only to lung cancer as a cause of cancer-related death).

### Causal Conditions

1. Upper gastrointestinal bleeding (see [HEMATEMESIS](#))
2. Lower gastrointestinal bleeding
  - a. Diverticulosis ( $\pm 40\%$ )
  - b. Angiodysplasia ( $\pm 25\%$ )
  - c. Other
    - i. Anorectal disease (<50 years of age - hemorrhoids, fissures)
    - ii. Colorectal cancer/Polyps (10 - 20% if >50 years)
    - iii. Enterocolitis (ischemia, infectious, inflammatory bowel disease)
    - iv. Other (small bowel neoplasms, NSAIDs, Meckel diverticulum)
    - v. Rectal injuries and sexual abuse

### Key Objectives

- ❖ List the key steps in the management of lower gastrointestinal bleeding in high-risk patients as resuscitation and assessment, localization, and diagnosis and treatment (early involvement of a gastroenterologist and surgeon is essential).
- ❖ Identify patients at high risk of colorectal cancer for screening using either fecal occult blood testing or colonoscopy.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - List indications for nasogastric tube aspiration and diagnose the most likely cause of hematochezia.
  - Perform rectal exam as part of the initial assessment.
  - Select patients requiring urgent assessment and treatment.
  - List and diagnose the presence of associated drugs or medical conditions predisposing to the development of diverticulosis or colorectal cancer.
- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - Select colonoscopy as the initial examination for diagnosis and treatment.
  - Outline role of radionuclide imaging and angiography in lower GI bleeding.
  - Select asymptomatic patients in need of screening for colorectal cancer.
- ❖ Conduct an effective plan of management for a patient with blood in stool:
  - Select patients in need of immediate therapy.
  - Evaluate patients in a cost-efficient manner.

- Outline the limitations of screening using fecal occult blood testing.
- Select patients in need of specialized care.



7

## BLOOD IN SPUTUM (HEMOPTYSIS/PREVENTION OF LUNG CANCER)

### Rationale

Expectoration of blood can range from blood streaking of sputum to massive hemoptysis (>200 ml/d) that may be acutely life threatening. Bleeding usually starts and stops unpredictably, but under certain circumstances may require immediate establishment of an airway and control of the bleeding.

### Causal Conditions

1. Airway disease (most common source of hemoptysis)
  - a. Inflammatory
    - i. Bronchitis (acute, chronic)
    - ii. Bronchiectasis, lung abscess, cystic fibrosis
  - b. Neoplasms
    - i. Bronchogenic carcinoma
    - ii. Endobronchial metastatic carcinoma (melanoma, breast, renal, colon)
    - iii. Bronchial carcinoid
    - iv. Kaposi sarcoma (in patient with AIDS)
  - c. Other (foreign body, trauma)
2. Pulmonary parenchymal disease
  - a. Infectious (TB, necrotizing pneumonia, mycetoma, aspergilloma)
  - b. Inflammatory/Immune (Goodpasture, pulmonary hemosiderosis, Wegener, lupus)
  - c. Other (coagulopathy, iatrogenic, cocaine, endometriosis)
3. Cardiac/Vascular
  - a. Pulmonary embolus with infarction, AV malformation
  - b. Elevated capillary pressure (mitral stenosis, tricuspid endocarditis, LV failure)

### Key Objectives

- ❖ Determine whether expectorated blood is true hemoptysis (originates below the vocal chords: alkaline pH, foaminess, pus) rather than upper respiratory or upper gastrointestinal bleeding (hematemesis).
- ❖ If possible, identify site of bleeding using clinical/diagnostic-imaging information. With massive hemoptysis/respiratory difficulty, once the patient is stabilized, refer promptly for bronchoscopy.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between the causes of hemoptysis; determine the presence of prior lung, renal, or cardiac involvement.
  - Identify presence of smoking, prior hemoptysis or family history of hemoptysis, infectious symptoms, upper airway or gastrointestinal symptoms; determine exposure to chemicals/asbestos, travel history, anticoagulants/platelet drugs; examine for skin rash, murmurs, deep venous thrombi.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:

- Select investigations to determine the cause of hemoptysis (urinalysis, creatinine, liver function, coagulation tests, x-ray, CT scan); list indications for bronchoscopy.
- ❖ Conduct an effective initial plan of management for a patient with hemoptysis:
  - In the presence of massive hemoptysis (>200 ml/day), ensure adequacy of ventilation and hemodynamic stability first and consult a specialist.
  - Reverse coagulation disorders rapidly.
  - Outline the management of causes of hemoptysis which are not life threatening and do not require immediate referral to a specialist.
  - Select patients in need of specialized care and/or consultation.

## Applied Scientific Concepts

1. Contrast the disproportionate amount of blood flow in the pulmonary arteries, almost the entire cardiac output but at low pressure, to the much smaller blood flow at high pressure through the bronchial arteries, usually one or two branches off the aorta for each lung. Despite this disproportion, >90% of the time, hemoptysis originates from the bronchial arteries.
2. Identify the pulmonary arteries as supplying nutritive blood supply for the airways, hilar lymph nodes, visceral pleura, and some of the mediastinum.

## BLOOD IN URINE (HEMATURIA)

### Rationale

Urinalysis is a screening procedure for insurance and routine examinations. Persistent hematuria implies the presence of conditions ranging from benign to malignant.

### Causal Conditions

1. Transient
  - a. Urinary tract infections
  - b. Exercise induced
  - c. Stones/Crystals
  - d. Trauma (kidneys, bladder, urethra)
  - e. Endometriosis
  - f. Thromboembolism
  - g. Anticoagulants (note that the incidence of hematuria in patients on anticoagulants is similar to that in patients not receiving anticoagulants)
2. Persistent
  - a. Extraglomerular
    - i. Renal
      - A. Tumors
      - B. Tubulointerstitial diseases (e.g., polycystic kidneys, pyelonephritis)
      - C. Vascular (e.g., papillary necrosis, sickle cell disease)
    - ii. Collecting system
      - A. Tumors
      - B. Stones
  - b. Glomerular
    - i. Isolated (e.g., IgA nephropathy, thin membrane disease)
    - ii. Post-infections (e.g., post-streptococcal)
    - iii. Systemic involvement (e.g., vasculitis, SLE)

### Key Objectives

- ❖ Differentiate red or brown urine from hematuria, transient from persistent, and glomerular from extraglomerular hematuria.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether the patient has true hematuria.
  - Diagnose the presence of urinary tract infections.
  - Differentiate between glomerular and extraglomerular hematuria by examination of urine sediment.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:

- Interpret reported urinalysis findings.
- Outline significance of patient's age, gender, and life style on diagnostic possibilities.
- ❖ Conduct an effective plan of management for a patient with hematuria:
  - Select treatment for patients with urinary tract infections appropriate for gender, lower, and upper urinary tract.
  - Outline a plan for investigation of patients with recurrent nephrolithiasis.
  - Formulate a management plan (non-pharmacological) for prevention of recurrent nephrolithiasis.
  - Discuss possible strategies for the detection and prevention of urinary tract tumors.

## Ethics

### *Consent to Investigation or Treatment (CLEO 4.3)*

#### Detailed Objectives

- ❖ To communicate clearly information relevant to informed consent (what a reasonable person would want to know in a given circumstance).
- ❖ To identify reasonable steps to ensure understanding of information: can the patient explain the medical problem and the proposed treatment or test.
- ❖ To determine free choice, and absence of coercion.

Once the presence of hematuria has been established and urinary tract infection has been excluded, it is critical to the further investigation of the patient to determine whether the hematuria is glomerular in origin or extra-glomerular. An experienced physician examining the urine sediment best accomplishes this differentiation. This information should be discussed with the patient before recommending more invasive and/or expensive investigations.

## Applicable Basic Principles of Law

### *Physicians' Legal Liability for Negligence (or, in Québec, Civil Liability) (CLEO 5.4)*

#### Detailed Objectives

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstances under consideration.
- ❖ The standard of care expected of a physician is one that would reasonably be expected under similar circumstances of an ordinary, prudent physician of the same training, experience, specialization, and standing.

Because persistent hematuria implies the presence of conditions ranging from benign to malignant, it cannot be ignored or assumed to be benign (e.g., urinary tract infection).

## Applied Scientific Concepts

1. Identify the anatomical sites that can cause persistent hematuria.
2. List and explain various clinical findings that predispose to nephrolithiasis such as hypercalciuria, hyperuricosuria, hyperoxaluria, hypocitraturia, dehydration, and pH changes.
3. Outline the role of humoral immunity and cellular immunity in glomerulonephritis and the target antigen predominantly localized in the glomerulus.
4. Outline the structural and functional consequences of immune deposit formation in glomeruli.
5. Explain the mechanisms of glomerular damage by immune events involving the complement system, polymorphonuclear cells, platelets, macrophages, oxidants and proteases.

6. Describe the manner in which macromolecules are prevented from entering Bowman space and the permeability changes that make entry possible.





## HYPERTENSION

### Rationale

Hypertension is a common condition that usually presents with a modest elevation in either systolic or diastolic blood pressure. Under such circumstances, the diagnosis of hypertension is made only after three separate properly measured blood pressures. Appropriate investigation and management of hypertension is expected to improve health outcomes.

### Causal Conditions

1. Primary
2. Secondary
  - a. Increased cardiac output (initially)
    - i. Renal parenchymal disease (e.g., renal failure, polycystic kidney disease)
    - ii. Mineralocorticoid/Cortisol excess (e.g., adrenal adenoma or hyperplasia)
    - iii. Other (hyperthyroidism)
  - b. Increased systemic vascular resistance
    - i. Angiotensin II excess (e.g., unilateral renal artery stenosis)
    - ii. Catecholamine excess (e.g., pheochromocytoma, drugs)
    - iii. Other
      - A. Coarctation of the aorta
      - B. Hyperparathyroid

### Key Objectives

- ❖ Define hypertension and perform BP measurements in a manner that avoids mislabelling patients.
- ❖ Select patients suitable to investigate for secondary causes.
- ❖ Select the most appropriate management for each individual with hypertension.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Diagnose hypertension, determine patient's age at onset and duration, family history, history of medications, dietary/alcohol history, possibility of sleep apnea.
  - Determine whether hypertension is refractory/severe, prior treatment and response, sudden dyspnea, known renal problems, headaches, palpitations, sweating, muscle weakness, polyuria.
  - Identify and determine extent of end organ damage; assess cardiovascular risk status of the patient.
  - Examine fundi, heart, peripheral pulses, femoral pulses, lungs, weight, look for bruits, edema.
  - Identify hypertensive emergencies (e.g., hypertensive encephalopathy, strokes, dissecting thoracic aortic aneurysm, malignant hypertension, acute left ventricular failure, acute glomerulonephritis).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Diagnose renal parenchymal disease by ordering urinalysis, electrolytes, glucose, and creatinine.
  - Order lipid profile and ECG; list indications for echocardiogram, ambulatory blood pressure, microalbuminuria;

- discuss cost effectiveness of investigation of hypertension.
- Select patients in need of specialized diagnostic care.
- ❖ Conduct an effective plan of management for a patient with hypertension:
  - Outline for patients non-pharmacological management strategies prior to pharmacological ones.
  - Select anti-hypertensive medication which will not adversely affect concomitant conditions such as diabetes mellitus, asthma, and will benefit congestive heart failure or myocardial ischemia.
  - Select appropriate agents for hypertensive emergencies (e.g., encephalopathy, dissection, etc.).
  - Communicate the importance of consultation with other health care professionals (e.g., dieticians).
  - Determine factors contributing to non-compliance and discuss possible management strategies.
  - Discuss cost effectiveness of management; select patients in need of specialized care.

## Applied Scientific Concepts

1. Outline the effect of cardiac output and systemic vascular resistance on blood pressure.
2. Discuss autoregulation and the eventual consequence of this process on blood pressure and systemic vascular resistance when cardiac output is increased.
3. Briefly explain the term "pressure natriuresis".
4. Outline the renin-angiotensin-aldosterone system.



9-1-1

## HYPERTENSION IN CHILDHOOD

### Rationale

The prevalence of hypertension in children is <1 %, but often results from identifiable causes (usually renal or vascular). Consequently, vigorous investigation is warranted.

### Causal Conditions

1. Neonates and young infants
  - a. Increased cardiac output (congenital renal disease)
  - b. Increased systemic vascular resistance
    - i. Ischemic renal disease, umbilical vessel catheterization, neurogenic tumors
    - ii. Coarctation of the aorta
    - iii. Hypercalcemia
2. Children and adolescents (1-10 years)
  - a. Increased cardiac output (renal disease, parenchymal)
  - b. Increased systemic vascular resistance
    - i. Renal disease, vascular
    - ii. Coarctation, or less commonly as above
3. Children and adolescents (11 - adolescence)
  - a. Primary
  - b. Secondary (renal disease or less commonly as above)

### Key Objectives

- ❖ Perform blood pressure measurements in infants and very young children with automated devices, and check BP tables for normal values.
- ❖ Diagnose hypertension when systolic or diastolic pressure (appropriately measured) > 95th percentile.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Diagnose hypertension and pseudo-hypertension; discuss white coat hypertension.
  - Elicit or rule out signs of secondary hypertension.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Outline value and use of ambulatory blood pressure monitoring.
  - Diagnose renal parenchymal disease.
  - Select patients in need of diagnostic imaging and other laboratory investigation.
  - Discuss cost effectiveness of investigation of hypertension.
- ❖ Conduct an effective plan of management for a patient with hypertension:
  - Outline for patients dietary treatment only if obese.
  - Select anti-hypertensive medication and dose.
  - Select appropriate agents for hypertensive emergencies (e.g., encephalopathy, cardiac failure, etc.).

- Select patients in need of specialized care.



9-1-2

## HYPERTENSION IN THE ELDERLY

### Rationale

Elderly patients (>65 years) have hypertension much more commonly than younger patients do, especially systolic hypertension. The prevalence of hypertension among the elderly may reach 60 -80 %.

### Causal Conditions

(same as hypertension in younger patients, but if age > 50 years, secondary hypertension becomes more likely)

1. Primary hypertension (see [HYPERTENSION](#))
2. Secondary hypertension

### Key Objectives

- ❖ Define hypertension in the elderly in a manner similar to younger patients; define pseudo-hypertension and white coat hypertension.
- ❖ Conduct antihypertensive pharmacologic treatment for systolic hypertension in the elderly patients when systolic blood pressure is consistently >160 mm Hg, (use standing blood pressures as a guide to therapy) since evidence of benefit exists.
- ❖ State that the benefit of treating hypertension in the elderly is two to four times greater than that achieved in the treatment of younger patients with primary hypertension.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Diagnose hypertension and pseudo-hypertension.
  - Select patients suitable for investigation of secondary causes.
  - Identify end organ damage.
  - Identify hypertensive emergencies (e.g., hypertensive encephalopathy, dissecting thoracic aortic aneurysm, malignant hypertension).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Diagnose renal parenchymal disease.
  - Select patient in need of specialized diagnostic care.
  - Discuss cost effectiveness of investigation of hypertension.
- ❖ Conduct an effective plan of management for a patient with hypertension:
  - Identify systolic and pulse pressure as major predictors of outcome in the elderly patient.
  - Recommend treatment for systolic pressure >160 mmHg or >140 mmHg with risk factors such as diabetes or smoking; initiate non-drug therapy (e.g., low salt/caloric diet, exercise) first.
  - Define the goals of treatment in elderly hypertensive patients and contrast these with the goals for younger patients.
  - Discuss outcome studies (e.g., diuretics are the preferred first-line drugs) and cost effectiveness in the management of hypertension.

- Select anti-hypertensives without adverse effects on concomitant conditions such as diabetes and asthma, avoid drugs causing postural hypotension, and initiate therapy gradually, gently.
- Select appropriate agents for hypertensive emergencies (e.g. encephalopathy, dissection, etc.).
- Determine factors contributing to non-compliance and discuss possible management strategies.
- Select patients in need of specialized care.

## Applied Scientific Concepts

1. Outline briefly the age-related changes in aortic vascular properties. These include structural changes (orientation of the laminar unit within the wall, elastin fibre fracture, composition of wall with increased collagen content) along with arterial pulse change, and explain the systolic and pulse pressure elevation in the elderly (elastic properties or diminished compliance of the walls of arteries).
2. List factors contributing to the increased prevalence of hypertension in the elderly (e.g., diminished compliance of arterial wall, diminished number of functioning nephrons).



9-1-3

## MALIGNANT HYPERTENSION

### Rationale

Malignant hypertension and hypertensive encephalopathies are two life-threatening syndromes caused by marked elevation in blood pressure.

### Causal Conditions

1. Primary hypertension (long-standing, uncontrolled, drug withdrawal)
2. Secondary hypertension
  - a. Increased cardiac output (secondary increase in vascular resistance)
    - i. Uremia with fluid overload
    - ii. Acute renal disease (acute glomerulonephritis, scleroderma crisis)
    - iii. Primary hyper aldosterone elevation
  - b. Increased vascular resistance
    - i. Renovascular hypertension (renal artery stenosis)
    - ii. Pheochromocytoma
    - iii. Drugs (cocaine, food or drug interactions with monoamine oxidase inhibitors)
    - iv. Cerebro-vascular (infarction, intra-cranial or subarachnoid hemorrhage)

### Key Objectives

- ❖ Differentiate primary malignant hypertension (marked hypertension with diastolic BP usually >140 mm Hg, associated with grade 3 - 4 retinopathy, and also present may be malignant nephrosclerosis) from secondary conditions such as uremia with fluid overload, cerebro-vascular accidents, brain tumors, head injury, seizure, etc.
- ❖ Conduct initial hypertension lowering treatment in a manner which lowers the blood pressure to a diastolic blood pressure of about 100 - 105 mm Hg within 2 - 6 hours (and not exceeding 25% of baseline).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate non-localizing neurologic symptoms (headache, nausea, vomiting, restlessness, confusion, seizures, and coma) from focal ones due to cerebral hemorrhage or infarct.
  - Determine quickly the presence of other hypertensive emergencies (e.g., aortic dissection, acute pulmonary edema, acute/impending myocardial infarction, cerebro-vascular events, etc.) and make blood pressure lowering the first concern.
  - Once blood pressure control is in place, diagnose the cause of the blood pressure elevation.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select laboratory tests with the maximum diagnostic information in the minimum amount of time (blood pressure control is of greater importance than investigation) since once medication is started, some tests cannot be interpreted.
- ❖ Conduct an effective plan of management for a patient with malignant hypertension:
  - Recommend admission to an intensive care unit for therapy of malignant hypertension.

- > Outline the immediate management of malignant hypertension with parenteral drugs in an ICU setting and with other medications if an ICU is not available.
- > Discuss advantages and disadvantage of various blood pressure lowering drugs used in malignant hypertension and other hypertensive emergencies.
- > Describe and explain the potential hazards of lowering blood pressure levels below 100 - 105 mm Hg diastolic or >25% of baseline.

### **Applied Scientific Concepts**

1. Explain hypertensive encephalopathy (refers to the occurrence of cerebral edema caused by hyperperfusion when a sudden, severe rise in blood pressure exceeds the capacity of the afferent arterioles to auto regulate).
2. Outline the mechanism of vascular injury when pressure exceeds autoregulation and the increase in pressure is transmitted to arterioles and capillaries, including role of renin-angiotensin.
3. Explain the potential ischemic consequences of an excessive hypotensive response to therapy when autoregulation capacity is exceeded at the lower pressure end of the auto regulatory curve.





9-1-4

## PREGNANCY ASSOCIATED HYPERTENSION

### Rationale

Ten to 20 % of pregnancies are associated with hypertension. Chronic hypertension complicates <5%, preeclampsia occurs in slightly >6%, and gestational hypertension arises in 6% of pregnant women. Preeclampsia is potentially serious, but can be managed by treatment of hypertension and 'cured' by delivery of the fetus.

### Causal Conditions

1. Chronic hypertension (BP >140/90 mmHg antedates pregnancy, or <20 weeks gestation, or persists >12 weeks postpartum)
2. Preeclampsia-eclampsia (new hypertension and proteinuria after 20 weeks gestation)
  - a. Preeclampsia superimposed on chronic hypertension
  - b. Preeclampsia superimposed on chronic hypertension and proteinuria, both present before 20 weeks (severe exacerbation of blood pressure, systolic >180 mmHg, diastolic >110 mmHg, in last half of pregnancy)
  - c. Preeclampsia superimposed on gestational hypertension
3. Gestational hypertension (latter half of pregnancy, no proteinuria)
  - a. Transient hypertension of pregnancy (resolves by 12 weeks postpartum)
  - b. Masked chronic hypertension (persists beyond 12 weeks postpartum)

### Key Objectives

- ❖ Describe normal changes in blood pressure during pregnancy and define hypertension in pregnancy with these changes in mind.
- ❖ Outline the treatment of preeclampsia including considerations for early diagnosis, medical supervision and need for hospital admission, and timely delivery.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - List some risk factors for development of preeclampsia; perform rollover test in at risk patients.
  - Differentiate preeclampsia from pre-existing chronic hypertension and gestational hypertension; differentiate preeclampsia superimposed on pre-existing hypertension from primary preeclampsia.
  - Elicit symptoms and signs indicative of risk for convulsions (e.g., headache, epigastric pain, visual abnormalities, proteinuria, etc.); measure pressure (normotensive for 20 weeks then >140/90 mmHg).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret laboratory investigation useful to the diagnosis of preeclampsia (>300 mg/d protein, hyperuricemia) and HELLP syndrome (hemolysis, elevated liver enzymes, low platelets).
- ❖ Conduct an effective plan of management for a patient with hypertension in pregnancy:
  - List the goals of management of hypertension in pregnancy (with respect to the safety of the mother and second, the delivery of a live infant not requiring intensive, prolonged neonatal care).
  - Discuss strategies for the prevention of pregnancy-induced hypertension in at risk patients.
  - List drugs indicated and contraindicated and pressure levels in the management of preeclampsia (systolic?160

mmHg, and diastolic  $\geq 105$  mmHg) and chronic hypertension (systolic  $\geq 150$  mmHg and diastolic  $\geq 100$  mmHg).

### **Applied Scientific Concepts**

1. Outline the changes in utero-placental circulation (impaired trophoblast invasion and placental ischemia) that occur in preeclampsia.
2. Outline later changes resulting from placental ischemia such as altered capillary permeability, intravascular inflammatory response, abnormal prostaglandin metabolism, and activation of endothelial cells and the coagulation system.



9-2

## HYPOTENSION/SHOCK

### Rationale

All physicians must deal with life-threatening emergencies. Regardless of underlying cause, certain general measures are usually indicated (investigations and therapeutic interventions) that can be life saving.

### Causal Conditions

1. Cardiac output diminished (increased systemic vascular resistance)
  - a. Hypovolemia
    - i. Hemorrhage
    - ii. Third space loss
    - iii. Other loss (GI, skin)
  - b. Cardiac dysfunction
    - i. Intrinsic
      - A. Myopathy (ischemic, dilated)
      - B. Rhythm abnormalities
      - C. Mechanical (aortic/subaortic stenosis, ventricular aneurysm)
    - ii. Extrinsic/Obstructive
      - A. Pulmonary embolus/Hypertension
      - B. Tension pneumothorax
      - C. Pericardial tamponade (constrictive pericarditis)
      - D. Aortic dissection, venacaval obstruction
2. Distributive (diminished systemic vascular resistance)
  - a. Sepsis (most common)/Anaphylaxis
  - b. Inadequate tissue oxygen (hypoxic lactic acidosis, carbon monoxide)
  - c. Other
    - i. Neurogenic, autonomic blockade
    - ii. Drugs
    - iii. Spinal shock
    - iv. Myxedema, Addison, liver failure

### Key Objectives

- ❖ Elicit clinical and laboratory information necessary to diagnose the correct type of hypotension/shock.
- ❖ Select the appropriate management strategy for the type of hypotension/shock.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Obtain history from relatives/medical records including recent complaints/activities, allergies, change in medications, drug intoxication, pre-existing diseases.
  - Examine quickly and efficiently for volume status, meningeal signs, absent breath sounds/crackles, consolidation, heart rhythm, murmurs, rubs, abdominal tenderness, rebound, bowel sounds, distention/ascites, masses, rectal

- bleeding, swollen calf, cold/hyperemic skin, rash.
- Diagnose hypotension/shock and determine the causes.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order CBC, electrolytes, liver/renal function, amylase/lipase, fibrinogen and fibrin split products, lactate, cardiac enzymes, arterial blood gases, toxicology, diagnostic imaging, ECG, urinalysis.
- ❖ Conduct an effective plan of management for a patient with hypotension:
  - Outline and conduct the initial management of the acute circulatory disturbance in a patient with hypotension/shock.
  - Determine and perform initial therapeutic interventions specific for the underlying cause of hypotension/shock.
  - Select and evaluate the clinical and laboratory parameters for monitoring a patient with hypotension.
  - Recommend admission to an intensive care unit for patients with shock in need of specialized care or consultation.

## Applied Scientific Concepts

1. Outline the effect of cardiac output and systemic vascular resistance on blood pressure and tissue perfusion.
2. Describe the effect of prolonged, severe hypotension on systemic tissue perfusion (results in decreased oxygen delivery, deprivation, and eventual cellular hypoxia).
3. List some derangement of critical biochemical processes (cell membrane ion pump dysfunction, intracellular edema, leakage of intracellular contents, inadequate regulation of intracellular pH) that result from cellular hypoxia.



9-2-1

## ANAPHYLAXIS

### Rationale

Anaphylaxis causes about 50 fatalities per year, and occurs in 1/5000-hospital admissions in Canada. Children most commonly are allergic to foods.

### Causal Conditions

1. Foods (peanuts/nuts, seafood, cow's milk, eggs, etc.)
2. Hymenoptera (bees, wasps) envenomation
3. Drugs
  - a. Beta-lactam antibiotics
  - b. NSAIDs
  - c. Anti-neoplastic medications
  - d. ACEI
4. Radiographic contrast media
5. Blood products
6. Latex

### Key Objectives

- ❖ Differentiate anaphylaxis from conditions which are similar such as shock from other causes, other flush syndromes, restaurant syndrome, increased endogenous histamine production, acute respiratory failure syndromes, or non-organic syndromes such as panic attacks or Munchausen syndrome.
- ❖ Initiate therapy by ensuring airway, intubation if necessary, establishing intravenous lines with large bore needles, stop antigen administration, and select pharmacologic agents.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Perform examination for skin involvement (90% have pruritus, urticaria, angioedema, flushing), upper and lower respiratory tract involvement (50%), shock or conduction disturbances (30%), gastrointestinal or nervous system involvement.
  - Obtain a chronology of possible causal events prior to anaphylaxis.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective plan of management for a patient with anaphylaxis:
  - Outline initial management for anaphylaxis.
  - Outline rationale for use of epinephrine, antihistamines, steroids, and  $\beta_2$  agonists in aerosols for respiratory symptoms.
  - Discuss biphasic anaphylaxis and protracted anaphylaxis.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Explain the physiologic changes caused by mast cells and basophil derived mediators in anaphylaxis.
2. Outline the interaction of different immune mediators involved in allergic reactions including leukotrienes, cytokines and other mediators.

**Rationale**

Complaints of breast lumps are common, and breast cancer is the most common cancer in women. Thus, all breast complaints need to be pursued to resolution. Screening women 50 - 69 years with annual mammography improves survival.

**Causal Conditions**

1. Breast carcinoma
  - a. Noninvasive (intraductal carcinoma, lobular carcinoma in situ)
  - b. Invasive (invasive ductal/lobular carcinoma, tubular, medullary, papillary, mucinous)
2. Nodularity - fibrocystic change
3. Lumps (gross cyst, galactocele, fibroadenoma)
4. Breast infections
  - a. Associated with lactation - lactational mastitis/breast abscess
  - b. Not associated with lactation - subareolar abscess/acute mastitis

**Key Objectives**

- ❖ Perform a standardized breast examination, ensuring the patient's comfort, proper draping, and the extent of palpation pressure that can be used without discomfort.
- ❖ List the risk factors for development of breast cancer in women.
- ❖ Outline a primary prevention strategy.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine lump location, how discovered, duration, discharge, change in size (with menses/time), past/family history of breast cancer, age of menarche, first pregnancy, menopause, alcohol, hormone replacement (risk for cancer).
  - Examine lump (number, hard/soft, movable/immovable, size, borders), axillae, supraclavicular area.
- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - Counsel/educate patients on the role of breast self-examination, mammography, ultrasound, fine needle aspiration, and core needle biopsy.
  - Select women who are at high risk for breast cancer based on age or the presence of other pre-existing risk factors/signs for mammography, family history (genetic screening).
  - List indications for ultrasonography, fine needle aspiration, fine needle aspiration biopsy, and core needle biopsy.
- ❖ Conduct an effective plan of management for a patient with a breast lump:
  - Outline the use of "triple diagnosis" (physical examination, mammography, fine needle aspiration) in reaching a satisfactory resolution for patients with lumps.
  - Outline the medical and surgical management of patients with suspected breast carcinoma.
  - List the indications for adjuvant therapy in patients with breast carcinoma.
  - Select patients in need of specialized care.

- Counsel women with risk factors for the development of breast cancer on the utility of screening.

## Ethics

### *Doctor Patient Relationship (CLEO 4.8)*

#### **Detailed Objectives**

- ❖ The physician will place the best interest of the patient first.
- ❖ To establish a relationship of trust between physician and patient.
- ❖ To follow through on undertakings made to the patient, in good faith.

Breast lumps may cause extreme anxiety in patients. An appropriate and prompt evaluation is important in order to relieve anxiety, even though breast cancer is not generally considered a medical emergency.

It is the responsibility of the primary care physician to be an advocate for the patient throughout the entire process of evaluation of the breast lump. The physician should learn about the proficiency of local consultants in order to communicate these facts to the patient. The patient needs to be followed very carefully, maximizing exchange of ideas at every step of the process until suitable resolution is achieved. Finally, support and thorough communication is essential.





10-2

## GALACTORRHEA/DISCHARGE

### Rationale

Although noticeable breast secretions are normal in >50 % of reproductive age women, spontaneous persistent galactorrhea may reflect underlying disease and requires investigation.

### Causal Conditions

1. True galactorrhea (fat droplets present)
  - a. Idiopathic (most common cause - 1/3)
  - b. Hyperprolactinemia
    - i. Physiologic (pregnancy, breast stimulation, stress)
    - ii. Autonomous prolactin production
      - A. Pituitary tumors (micro or macro-adenoma)
      - B. Ectopic production of prolactin (bronchogenic or renal cell cancer)
    - iii. Enhanced prolactin-release/Decreased clearance
      - A. Hypothyroidism, chronic renal failure
      - B. Steroid hormones (oral contraceptive pills)
      - C. Sucking reflex simulators (post-thoracotomy, burns, herpes zoster)
    - iv. Failure to inhibit release of prolactin (drugs/disease inhibiting dopamine)
      - A. Pituitary stalk section or compression by mass lesion
      - B. Drugs (phenothiazines, methyl dopa, opiates)
2. Abnormal breast discharge (usually Uni ductal, bloody or serosanguineous) - breast neoplasm, benign or malignant

### Key Objectives

- ❖ Differentiate between galactorrhea and breast discharge.
- ❖ Differentiate physiological from pathological galactorrhea.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether discharge is expressed or spontaneous, unilateral or bilateral, color of discharge, medication use, which patients have menstrual irregularities, infertility, headaches or visual changes, symptoms of hypothyroidism.
  - Examine breasts for skin lesions, unilateral/Uni ductal discharge, breast mass.
- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - If nipple discharge is bloody, order cytology.
  - Select and interpret laboratory and diagnostic imaging in a patient with galactorrhea.
- ❖ Conduct an effective plan of management for a patient with breast discharge:
  - Determine which patients likely have a breast neoplasm.
  - Outline the role of dopamine agonists (e.g., cabergoline, bromocriptine) in the management of patients with

- hyperprolactinemia and galactorrhea.
- Counsel/educate patients with galactorrhea about how to minimize it.
- Select patients in need of specialized care.



10-3

## GYNECOMASTIA

### Rationale

Although a definite etiology for gynecomastia is found in <50% of patients, a careful drug history is important so that a treatable cause is detected. The underlying feature is an increased estrogen to androgen ratio.

### Causal Conditions

1. Physiologic gynecomastia
  - a. Newborn (60 - 90 %)
  - b. Adolescence (persist in 25%)
  - c. Aging (50 - 80 years; decreased testosterone or increased binding globulin)
2. Pathologic gynecomastia
  - a. Deficient production or action of testosterone/Receptor blockade
    - i. Primary gonadal failure (Klinefelter, enzymatic defects in testosterone synthesis, testicular infections, trauma, malnutrition/starvation, renal failure)
    - ii. Secondary hypogonadism (LH deficiency)
    - iii. Androgen insensitivity, true hermaphroditism
  - b. Increased estrogen /precursors
    - i. Testicular/Adrenal tumors, tumors producing HCG ectopically
    - ii. Hyperthyroidism
    - iii. Liver disease
  - c. Drugs
    - i. Hormones (estrogens/estrogen-like, anabolic steroids)
    - ii. Inhibitors of testosterone synthesis/action (aldactone, cimetidine, flutamide)
    - iii. Drugs of abuse (alcohol, amphetamines, heroin)
    - iv. Other (methyl dopa, captopril, tricyclics, isoniazid, methotrexate, amiodarone)
  - d. Idiopathic

### Key Objectives

- ❖ Differentiate between gynecomastia and breast carcinoma.
- ❖ Differentiate between gynecomastia and pseudo-gynecomastia (fat deposition without glandular proliferation).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate patients with gynecomastia due to physiologic or pathologic causes; ask about drugs, symptoms of liver/renal failure, hyperthyroidism, impotence, and libido.
  - Examine for testicular size, abdominal mass.
  - Select patients with gynecomastia who require further investigation.
- ❖ List and interpret the critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:

- Select and interpret laboratory tests in the investigation of gynecomastia.
- ❖ Conduct an effective plan of management for a patient with gynecomastia:
  - Diagnose patients with physiologic gynecomastia who require no specific therapy.
  - Diagnose patients with drug-induced gynecomastia who would benefit from withdrawal of the drug.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Outline the hormonal control of female breast development.
2. Contrast pathophysiological mechanisms for gynecomastia (absolute increase in free estrogens compared to decreased endogenous free androgens, versus relative increase in free estrogen/free androgen ratio, as opposed to androgen insensitivity).
3. Contrast mechanisms of action of various drugs associated with gynecomastia.

**Rationale**

Burns are relatively common and range from minor cutaneous wounds to major life-threatening traumas. An understanding of the patho-physiology and treatment of burns and the metabolic and wound healing response will enable physicians to effectively assess and treat these injuries.

**Causal Conditions**

1. Thermal (flame, contact, scald)
2. Electrical (low voltage, high voltage, lightning)
3. Chemical (acid, alkali)
4. Radiation (UV, medical/therapeutic)

**Key Objectives**

- ❖ Diagnose burns according to depth and percentage total body surface area (TBSA) involved.
- ❖ Outline the initial management of major thermal trauma patients according to Advanced Trauma Life Support protocol.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine the depth and TBSA affected by 2nd and 3rd degree burns.
  - Determine the risk of associated inhalation injury.
  - Determine whether there are other associated clinical problems or other trauma.
  - Determine patient's tetanus immunization status.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order CBC, electrolytes, urea, arterial blood gases, and chest x-ray in patients with major burns.
  - Order carboxyhemoglobin to diagnose carbon monoxide poisoning.
  - Order bronchoscopy if inhalation injury is suspected.
- ❖ Conduct an effective initial plan of management for a patient with burns:
  - Identify patients requiring special care:
    - \* 2nd and 3rd degree burns > 10% body surface area;
    - \* 2nd and 3rd degree burns on face, hands, and perineum;
    - \* Circumferential or splash burns;
    - \* Electrical burns (including lightning);
    - \* Chemical burns; and
    - \* Pediatric burns suspicious for neglect or abuse.
  - Outline the outpatient management of minor cutaneous burns.
  - Stabilize the burn patient requiring referral to burn treatment center including stopping further burn injury, covering of burn area, protecting airway, resuscitate (oxygen, intravenous fluids), and provide physiologic monitoring and pain control.

## Ethics

### *Consent to Investigation or Treatment (CLEO 4.3)*

#### Key Objective

- ❖ Candidate will communicate with a patient or their legitimate delegate, so as to obtain their consent or refusal to a given investigation or treatment.

#### Detailed Objectives

- ❖ To recognize factors which can alter capacity (e.g., disease, drugs, depression).
- ❖ To identify reasonable steps to ensure understanding of information: can the patient explain the medical problem, and the proposed treatment or test.
- ❖ To recognize the duty to provide necessary emergency care where consent is unavailable.

### *Resource Allocation (CLEO 4.5)*

#### Detailed Objectives

- ❖ To recognize or propose fair means of resolving disputes for resources:
  - Consult hospital ethics committees or other responsible bodies.
- ❖ To choose interventions on the basis of best available evidence:
  - Avoid marginally beneficial investigations or treatments.

Communicate with the burn patients or their legitimate delegates in order to obtain consent or refusal to investigate or treat. Explain the potential outcome of the burn and available options; determine whether the patient can provide the information back to you in a coherent manner. Provide emergency care to a burn patient even if consent cannot be obtained. Consult hospital ethics committees about continuing care in patients with burns so extensive that mortality approaches 100%. In patients with severe burns, avoid marginally beneficial investigations or therapies.

## Applied Scientific Concepts

1. Describe the local (necrosis, inflammation) and systemic (fluids and electrolytes, hypermetabolism) manifestations of thermal injury.
2. Discuss the unique features of electrical injury in relation to skeletal muscle injury and potential effect on cardiac and renal function.
3. Outline the relation of the extent of thermal injury to metabolism, systemic complications (infection, gastric erosions, DIC), nutritional requirements and mortality.



12-1

## HYPERCALCEMIA

### Rationale

Hypercalcemia may be associated with an excess of calcium in both extracellular fluid and bone (e.g., increased intestinal absorption), or with a localised or generalised deficit of calcium in bone (e.g., increased bone resorption). This differentiation by physicians is important for both diagnostic and management reasons.

### Causal Conditions

1. Increased intestinal absorption
  - a. Increased intake (e.g., milk-alkali syndrome)
  - b. Vitamin D mediated (e.g., granulomatous diseases)
2. Increased bone resorption
  - a. Malignancy
  - b. Primary/Secondary/Tertiary hyperparathyroidism
  - c. Hyperthyroidism
  - d. Immobilization
  - e. Paget disease
3. Diminished excretion (familial hypocalciuric hypercalcemia, thiazides)
4. Miscellaneous

### Key Objectives

- ❖ Although not common, hypercalcemia can cause severe anatomic injury to the kidneys, and if severe, patients may develop hypercalcemic crisis. Formulate a management plan for hypercalcemia consistent with its causal condition.

### Objectives

- ❖ Through efficient, focused, data gathering,
  - Differentiate hypercalcemia caused by increased intake from that of excess bone resorption.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Contrast laboratory/diagnostic-imaging findings in the various conditions causing hypercalcemia.
- ❖ Conduct an effective initial plan of management for a patient with hypercalcemia:
  - Formulate a management plan for hypercalcemia which considers both the cause of the hypercalcemia as well as the volume status of the patient resulting from the hypercalcemia.
  - Select patients in need of specialized care.

### Applied Scientific Concepts

1. Outline the metabolism of calcium including absorption, various forms of calcium in the blood, deposition, resorption and excretion. Include the various hormones (parathyroid, calcitonin), vitamin D and calcium receptors affecting these processes.

## HYPERCALCEMIA

2. Outline the renal handling of calcium including role of hormones listed above.
3. Contrast the action of furosemide and thiazide diuretics on renal calcium handling.





12-2

## HYPOCALCEMIA

### Rationale

Tetany, seizures, and papilledema may occur in patients who develop hypocalcemia acutely.

### Causal Conditions

1. Loss of calcium from the circulation
  - a. Hyperphosphatemia (renal insufficiency)
  - b. Pancreatitis
  - c. Osteoblastic metastases
  - d. Drugs (EDTA, citrate)
  - e. Rhabdomyolysis
2. Decreased vitamin D production or action
  - a. Renal failure
  - b. Rickets
  - c. Malabsorption
  - d. Neonatal
3. Decreased PTH production or action
  - a. Postoperative
  - b. Autoimmune
  - c. Diminished response
  - d. Hypomagnesemia

### Key Objectives

- ❖ Calculate a corrected calcium concentration in the presence of hypoalbuminemia before initiating any other investigation (0.1 mmol/L for 5-g/L decrease).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate hypocalcemia caused by hyperphosphatemia/hypomagnesemia from that of diminished production or action of PTH or vitamin D.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Contrast laboratory findings in the various conditions causing hypocalcemia.
- ❖ Conduct an effective initial plan of management for a patient with neonatal or acquired hypocalcemia:
  - Formulate a management plan for acute hypocalcemia associated with either tetany or seizures.
  - Select patients in need of specialized care.

### Applied Scientific Concepts

## HYPOCALCEMIA

1. Outline the metabolism of calcium including absorption, various forms of calcium in the blood, deposition, resorption and excretion. Include the various hormones (parathyroid, calcitonin), vitamin D and calcium receptors affecting these processes.
2. Outline the renal handling of calcium including role of hormones listed above.
3. Contrast the action of furosemide and thiazide diuretics on renal calcium handling.



12-3

## HYPOPHOSPHATEMIA/FANCONI SYNDROME

### Rationale

Of hospitalised patients, 10-15% develop hypophosphatemia, and a small proportion have sufficiently profound depletion to lead to complications (e.g., rhabdomyolysis).

### Causal Conditions

1. Gastro-intestinal (decreased absorption)
  - a. Decreased dietary intake/Vomiting (prolonged, severe)
  - b. Decreased absorption (chronic diarrhea, steatorrhea, vitamin D malabsorption)
  - c. Antacids (binding of ingested and secreted phosphate)
2. Renal losses
  - a. Hyperparathyroidism (also associated with diminished vitamin D)
  - b. Osmotic diuresis (salt, glucose)
  - c. Primary (isolated, plasma cell dyscrasia associated, Fanconi syndrome)
3. Redistribution (intracellular shift)
  - a. Re-feeding (stimulated by insulin)
  - b. Respiratory alkalosis, acute
  - c. Hungry bone syndrome

### Key Objectives

- ❖ Select the most conservative form of therapy, since IV phosphate salts are potentially hazardous.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Diagnose the cause of hypophosphatemia.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - If no cause is clinically apparent differentiate between redistribution, gastrointestinal and renal causes by measuring fractional urinary phosphate excretion.
- ❖ Conduct an effective plan of management for a hypophosphatemic patient:
  - State that most patients will not require therapy other than repair of the underlying cause.
  - Select patients with vitamin D deficiency for replacement with vitamin D.



12-4

## HYPERPHOSPHATEMIA

### Rationale

Acute severe hyperphosphatemia can be life threatening.

### Causal Conditions

1. Decreased excretion
  - a. Renal failure
  - b. Increased tubular absorption (e.g., hypoparathyroidism)
2. Phosphate load
  - a. Endogenous (e.g., tumor lysis, rhabdomyolysis)
  - b. Exogenous (e.g., laxatives, vitamin D toxicity)

### Key Objectives

- ❖ Differentiate between the two main causes of hyperphosphatemia.

### Objectives

- ❖ Conduct an effective plan of management for a hyperphosphatemic patient:
  - Recommend low phosphate diet and phosphate binders (sevelamer hydrochloride, calcium carbonate) if chronic.
  - Select patients in need of referral.

### Applied Scientific Concepts

1. Serum phosphate concentration is primarily determined by the ability of the kidneys to excrete dietary phosphate. As a consequence, balance is maintained unless the load is acute and excessive (>130 mmol/day).
2. Outline the renal handling of phosphate and role of PTH.

**Rationale**

All physicians are expected to attempt resuscitation of an individual with cardiac arrest. In the community, cardiac arrest most commonly is caused by ventricular fibrillation. However, heart rhythm at clinical presentation in many cases is unknown. As a consequence, operational criteria for cardiac arrest do not rely on heart rhythm but focus on the presumed sudden pulse-less condition and the absence of evidence of a non-cardiac condition as the cause of the arrest.

**Causal Conditions**

1. Abnormalities of coronary arteries (85%)
  - a. Coronary artery disease (with myocardial infarction, with angina, silent)
  - b. Coronary artery spasm or embolism
  - c. Tachyarrhythmias (ventricular fibrillation/tachycardia, atrial fibrillation/flutter)
2. Abnormalities of cardiac conduction
  - a. Congenital
  - b. Acquired
    - i. Metabolic (hypokalemia/magnesemia, hypocalcemia, anorexia/starvation)
    - ii. Brady arrhythmias
      - A. Sinus node dysfunction
      - B. AV block (2nd, 3rd degree)
      - C. Antiarrhythmic drugs
    - iii. Other
      - A. Antimicrobial drugs
      - B. Psychotropic drugs
      - C. Vasodilator drugs
      - D. Serotonin antagonists
      - E. Street drugs
3. Abnormalities of myocardium
  - a. Hereditary (hypertrophic/dilated cardiomyopathy, RV dysplastic syndrome)
  - b. Acquired (associated with ischemic injury from coronary atherosclerosis, hypertension, diabetes mellitus)
    - i. Left ventricular hypertrophy
    - ii. Left ventricular systolic/Diastolic dysfunction
    - iii. Valvular disease, atrial myxoma
    - iv. Myocarditis, myocardial/Aortic rupture
4. Non-cardiac causes
  - a. Acute cardiac tamponade
  - b. Pulmonary embolus (massive)
  - c. Airway obstruction, tension pneumothorax
  - d. Primary electrical disease
  - e. Chest wall trauma

**Key Objectives**

- ❖ This ultimate medical emergency requires immediate treatment. Coincident with resuscitative attempts, elicit a history

and gather data from alternative sources to determine the cause of the arrest.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Identify and interpret quickly the signs of impending and actual cardiac arrest.
  - Differentiate between the possible causes of the cardiac arrest.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret appropriate investigations for patients presenting with cardiac arrest, including electrocardiography, chest x-ray, serum electrolytes, and blood gases.
  - If the resuscitation attempt was not successful, communicate with sensitivity the news of death to family members and discuss the possibility of an autopsy if indicated; if resuscitation is successful, communicate with sensitivity the news to the family and answer all pertinent questions.
  - Communicate appropriately with patients and family concerning "do not resuscitate" orders; at the same time, demonstrate respect for the patient's autonomy.
- ❖ Conduct an effective initial plan of management for a patient with cardiac arrest:
  - Evaluate the status of the airway and provide respiratory support as indicated.
  - Demonstrate the techniques of cardiopulmonary resuscitation according to the age of the patient.

## Ethics

### *Consent to Investigation or Treatment (CLEO 4.3)*

#### Detailed Objectives

- ❖ To explain the legal and ethical basis for consent.
- ❖ To demonstrate awareness of process for the assessment of capacity to give consent, and be able to conduct such an assessment.
- ❖ To recognize factors which can alter capacity.
- ❖ To identify appropriate substitute decision-maker, or the process to determine that individual.
- ❖ To communicate clearly information relevant to informed consent.
- ❖ To identify reasonable steps to ensure understanding of information: can the patient explain the medical problem and the proposed treatment or test.
- ❖ To determine free choice, and absence of coercion.
- ❖ To recognize the legitimacy of the intentions of impaired patients as they may have been expressed (advanced directives).
- ❖ To recognize the duty to provide necessary emergency care where consent is unavailable.

Providing CPR to a patient unable to give consent is ethically correct even though it gives emphasis to beneficence to the exclusion of autonomy. However, in other situations, most ethicists believe that autonomy takes precedence over beneficence. As a consequence, physicians generally request decisions about resuscitation from patients and their families. This does not mean that physicians should not provide patients and families with their expert opinion on the advisability of the procedure. This would be akin to abandoning responsibility to protect patients against inappropriate therapy in favor of complete autonomy. Rather than absolute autonomy, a more balanced approach of enhanced autonomy or fiduciary role is considered appropriate. Informed consent is a process that requires the involvement of both patient and physician. It is required that the physicians provide an opinion regarding what is considered the proper course of action. Decisions of whether to resuscitate or not are sufficiently important to require that they be made with full knowledge of all pertinent medical issues as well as information of the patients' wishes.

Informed consent requires explanations by physicians to patients and other decision-makers that facilitate reaching a decision.

With respect to cardiac arrest it may be difficult to be certain how much information to provide: what other physicians might say, what reasonable people would want to know, or what the physician in charge feels is most appropriate. Perhaps all three standards need to be met.

Cardiac arrest causes hypoxic-ischemic injury and neurological death. A key step in the optimal care of these patients is the understanding that when death is inevitable despite the best possible care, it is important to focus on offering the opportunity for solid organ donation as part of quality end-of-life care. Consequently, it is important to determine whether the patient had expressed intention for such donation through advanced directives. If not, a substitute decision-maker needs to be identified.

### **Resource Allocation (CLEO 4.5)**

#### **Detailed Objectives**

- ❖ To be prudent and avoid waste in the utilisation of scarce or costly resources.
- ❖ To recognize or propose fair means of resolving disputes for resources:
  - > primary obligation to patient;
  - > rank known patients ahead of unknown or future patients;
  - > use morally relevant criteria in allocating resource; and
  - > consult hospital ethics committees or other responsible bodies.
- ❖ To choose interventions on the basis of best available evidence:
  - > known to be effective;
  - > anticipated cost benefit; and
  - > avoid marginally beneficial investigations or treatments.

Based on the cost and availability of ICU beds, there tends to be admission triage for patients with severe brain injury following cardiac arrest perceived to have a poor prognosis. This may lead to exclusion of patients who might benefit from evolving neurological therapies as well as lost opportunities for potential organ donation for those patients who may be neurologically dead but not yet diagnosed. The process of making such decisions should include a careful definition and full discussion with family about the goals of therapy.

Consideration should be given to whether the goal is cure at the expense of short-term discomfort or to relieve pain and suffering or the possibility of organ donation. Thereafter a decision can be reached regarding the emergency room to ICU admission. If prognostic information indicates that there is no hope of meaningful recovery, end-of-life care is advised and provided. If advanced directive for organ donation exists, ICU may provide the opportunity for such donation to take place.

#### **Applied Scientific Concepts**

1. Outline the interaction between factors such as anatomic and functional abnormalities (e.g., coronary artery disease, cardiomyopathy), transient initiating events (e.g., electrolyte abnormalities, drugs), and arrhythmia mechanisms (e.g., re-entry, automaticity) responsible for cardiac arrest.
2. Explain the importance of determining the underlying heart rhythm on pathophysiological understanding as well as potential treatment strategies.

## CHEST DISCOMFORT/PAIN/ANGINA PECTORIS

### Rationale

Chest pain in the primary care setting, although potentially severe and disabling, is more commonly of benign etiology. The correct diagnosis requires a cost-effective approach. Although coronary heart disease primarily occurs in patients over the age of 40, younger men and women can be affected (it is estimated that advanced lesions are present in 20% of men and 8% of women aged 30 to 34). Physicians must recognise the manifestations of coronary artery disease and assess coronary risk factors. Modifications of risk factors should be recommended as necessary.

### Causal Conditions

1. Central
  - a. Cardiovascular - 25% (50% in older)
    - i. Ischemic
      - A. Myocardial infarction - <2% in primary care (acute, evolving, recent, established)
      - B. Angina pectoris
    - ii. Non-ischemic
      - A. Aortic aneurysm, dilating/dissecting (hypertensive, cystic necrosis, Marfan, etc.)
      - B. Pericarditis (infectious, post-MI, post-CABG, uremic, connective tissue disease)
  - b. Pulmonary/Mediastinal- 5%
    - i. Pulmonary embolus
    - ii. Tracheitis
    - iii. Mediastinal malignancy
  - c. Other - 30%
    - i. Gastro-intestinal-20%
      - A. Esophageal spasm, esophagitis/peptic ulcer disease, Mallory-Weiss
      - B. Biliary disease/pancreatitis
    - ii. Neuro-psychiatric - 10% (cardiac neurosis, anxiety, depression, somatoform)
2. Peripheral
  - a. Chest wall pain - 35% (costochondritis, herpes zoster)
  - b. Pulmonary - 5% (pleuritis, pneumothorax, pulmonary infarct, malignancy, etc.)

### Key Objectives

- ❖ Differentiate between visceral chest discomfort and superficial chest discomfort.
- ❖ Identify myocardial infarction and differentiate from other potentially lethal causes of chest pain (pulmonary embolism, aortic dissection, tension pneumothorax) early in order to take advantage of potential life saving therapy (if unstable, transport immediately after stabilization to ER by ambulance).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine site, description, provoking factors, and radiation of pain; associated symptoms and risk factors.
  - Differentiate cardiac pain from other types of visceral pain; important in the interpretation of chest pain in women



is the greater likelihood of angina being induced by rest, sleep, and mental stress.

- Obtain vital signs and examine heart (third heart sound, rub, murmurs) and lungs (crackles); palpate chest wall; examine abdomen.
- Differentiate myocardial infarction from angina utilizing more sensitive and specific serologic biomarkers and precise imaging techniques.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret electrocardiograms/exercise ECG, myocardial proteins in blood, and discuss newer biochemical markers (such as rise and fall in troponin T or I).
  - Select diagnostic imaging (x-ray, loss/reduction of tissue perfusion, cardiac wall motion abnormalities).
- ❖ Conduct an effective initial plan of management for a patient with chest discomfort:
  - Outline initial management of stable/unstable angina, acute MI, and other chest discomfort.
  - Manage women who present to the emergency room with new onset chest pain as aggressively as men, including immediate electrocardiogram, cardiac monitoring, cardiac troponin/enzyme measurements, cardiology consult, and admission to a coronary care unit.
  - List indications and contraindications of thrombolytic therapy; list potential complications.
  - Select patients in need of specialised care and/or consultation.
  - State the long-term management of patients after MI, including secondary prevention strategies.
  - Counsel patients with chest pain caused by life-threatening conditions; counsel their families.
  - Select cost effective investigative and therapeutic modalities.
  - Discuss 1<sup>o</sup> and 2<sup>o</sup> preventive strategy education for patients with ischemic heart disease.

## Applied Scientific Concepts

1. Compare some of the debated issues related to the genesis of heart sounds/murmurs and the mechanism of their production.
2. Outline the value of ECG on the one hand, and troponin, creatine kinase and CK isoforms as biomarkers of cardiac injury on the other hand, in the diagnosis of myocardial ischemia and infarction.
3. Formulate the pathophysiology of myocardial ischemia in terms of myocardial oxygen demand and supply. With respect to demand, evaluate the role of heart rate, afterload, myocardial wall tension/stress (product of preload and myocardial muscle mass), and myocardial contractility. With respect to supply, evaluate the role of oxygen carrying capacity of blood (oxygen tension and hemoglobin level), degree of oxygen unloading from hemoglobin, and coronary flow. With respect to coronary flow, evaluate role of coronary artery diameter, collateral flow, perfusion pressure (gradient from aorta, to coronary artery, to left ventricular end diastolic pressure), and heart rate/diastolic period.



## BLEEDING TENDENCY/BRUISING

### Rationale

A bleeding tendency (excessive, delayed, or spontaneous bleeding) may signify serious underlying disease. In children or infants, suspicion of a bleeding disorder may be a family history of susceptibility to bleeding. An organised approach to this problem is essential. Urgent management may be required.

### Causal Conditions

1. Purpuric disorders (primary hemostasis)
  - a. Platelet number or function
    - i. Decreased number
      - A. Production problem
        - I. Decreased megakaryopoiesis (aplastic anemia, toxic, displacement)
        - II. Ineffective megakaryopoiesis (B12/folate def., folate antagonist)
      - B. Accelerated destruction
        - I. Non-immune (TTP/HUS, DIC, infection)
        - II. Immune (ITP, SLE, quinidine)
      - C. Sequestration (splenomegaly)
    - ii. Abnormal platelets
      - A. Congenital (Von Willebrand)
      - B. Acquired (uremia, ASA, NSAID, anti-platelet agents)
  - b. Vessel Problem
    - i. Congenital (collagen disease, hered. hemorrhagic telang.)
    - ii. Acquired (vasculitis, steroids)
2. Disorders of coagulation (secondary hemostasis)
  - a. Congenital (factor VIII, IX)
  - b. Acquired (liver disease, vitamin K deficiency, anticoagulants, inhibitors)
  - c. Fibrinolysis (DIC, inhibitors)

### Key Objectives

- ❖ Categorise the causes of bleeding tendency according to broad categories, differentiate between causal alternatives, diagnose the cause, and select management to correct the underlying abnormality.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine response to trauma, ask about drugs, family history, past bleeding problems.
  - Differentiate between platelet, coagulation factor, and vessel disorders.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select investigative tests to differentiate between primary and secondary hemostasis disorders.
  - Contrast the results and their interpretation (PT, aPTT, platelet count, smear, TT).

- Select at risk families for investigation of potentially affected children.
- ❖ Conduct an effective initial plan of management for a patient with bleeding tendency or bruising:
  - Select platelet transfusions, vitamin K, antifibrinolytics, desmopressin, and plasma derivatives in the management of patients with bleeding disorders according to the diagnosis made.
  - Formulate a management plan for the reversal of the anticoagulant effect of heparin or warfarin.
  - Select patients in need of specialized care.

## Ethics

### *Consent to Investigation or Treatment (CLEO 4.3)*

#### Detailed Objectives

- ❖ To demonstrate awareness of process for the assessment of capacity to give consent, and be able to conduct such an assessment.
- ❖ To recognize factors which can alter capacity (e.g., disease, drugs, depression).
- ❖ To identify reasonable steps to ensure understanding of information: can the patient explain the medical problem, and the proposed treatment or test.

In a patient who is bleeding but refuses a blood transfusion, determine whether the decision can be justified within the context of a relatively stable set of values (i.e., why would the patient be willing to take risks?). If a coherent and consistent justification does not exist, identify a substitute decision-maker. For example, if the patient is delusional as a result of the blood loss, or is psychotic, the capacity to give informed consent should be questioned, and a substitute decision-maker should be identified. However, if the patient refuses because of a lifelong widely shared religious belief that prohibits blood transfusions, the capacity to give consent is probably present, and the decision should be respected.

### *Controversial and Evolving Ethical Issues in Practice (CLEO 4.10)*

#### Issues

- ❖ Maternal-fetal conflict of rights

#### Detailed Objectives

- ❖ The candidate will be aware that they may be asked to comment on unresolved or controversial ethical issues, and will be able to name and describe relevant key issues and ethical principles.

Prenatal diagnosis of sickle cell disease and thalassemia has been feasible for over 15 years and raises ethical issues for physicians. The decision to receive prenatal diagnosis is influenced by many things (culture, religion, education, number of children, etc.). Access to prenatal genetics services for all is important lest genetic screening become limited to the wealthy. Potentially, genetic disability could become an indicator of social class.

In reproductive genetics, there may be ethical obligations to both mother and fetus. Prenatal testing is seldom beneficial to fetal welfare but it may influence a mother's decisions about reproductive options. Prenatal counseling should be non-directive not restricted to those willing to have an abortion. Reproductive decisions must not be forced by the results of tests. Since the only pragmatic options for mothers are abortion or no children, it is vital that women not be pressured into prenatal diagnosis.

## Applicable Basic Principles of Law

## ***Statutory Requirements of Physicians (CLEO 5.6)***

### **Detailed Objectives**

- ❖ Physicians are legally required under certain provisions of various provincial and federal laws to report confidential information concerning the health, well being, morbidity, or mortality of a patient to the appropriate authorities.
- ❖ Reporting requirements vary from province to province, and often include areas such as:
  - suspected child abuse or abandonment.

At times it is possible that a child with extensive bruises represents not a bleeding diathesis but child abuse. There is a need to first make certain whether the problem is one of abuse or bleeding disorder. If the problem is suspected to be child abuse, there may be a requirement for reporting.

### **Applied Scientific Concepts**

1. Outline the manner in which hemostasis occurs physiologically.



## HYPERCOAGULABLE STATE

### Rationale

Patients may present with venous thrombosis and on occasion with pulmonary embolism. A risk factor for thrombosis can now be identified in over 80% of such patients.

### Causal Conditions

1. Inherited thrombophilia (<50 years of age)
  - a. Factor V Leiden mutation, antithrombin deficiency (>50% of inherited thrombophilias)
  - b. Defects in protein S, C, antithrombin
  - c. Other rare disorders
2. Acquired disorders
  - a. Malignancy
  - b. Surgery, trauma
  - c. Pregnancy, oral contraceptives, hormone replacement, tamoxifen
  - d. Immobilization, congestive heart failure, heparin therapy
  - e. Hyperhomocysteinemia
  - f. Hyperviscosity (Waldenstrom, multiple myeloma, polycythemia vera)
  - g. Other (antiphospholipid antibody syndrome, nephrotic syndrome)

### Key Objectives

- ❖ Identify patients at risk for venous thromboembolism (e.g., immobilization, surgery, stroke, malignancy, obesity, heavy cigarette smoking, oral contraceptive use/hormone replacement, postpartum, family history).

### OBJECTIVES

- ❖ Through efficient, focused, data gathering:
  - Determine the severity of the thrombotic condition and the presence of any acquired causes of hypercoagulability (see above); identify patients requiring screening for hereditary thrombophilia (e.g., <50 years of age, recurrent thromboses, family history of thromboembolism before age 50, unusual vascular beds such as portal, hepatic, mesenteric).
  - Examine extremities for superficial and deep vein thrombosis (e.g., edema, pain, warmth), skin necrosis, livedo reticularis; examine chest, heart, abdomen for ascites and hepatomegaly, rectal exam, pelvic in women.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients requiring compression ultrasonography, impedance plethysmography, or other testing for deep vein thrombosis.
  - Order CBC, blood smear, coagulation studies, liver/renal function tests, urinalysis for patients with established deep vein thrombosis.
  - Identify older patients who require screening for malignancy (e.g., PSA, occult blood).
  - Select patients in need of screening for antiphospholipid antibody, or other thrombophilia.
- ❖ Conduct an effective initial plan of management for a patient with a tendency to venous clotting:

## HYPERCOAGULABLE STATE

- Recommend strategies for prevention of deep vein thrombosis.
- Outline initial management in a patient with deep vein thrombosis.
- Select patients in need of specialized care.

### **Applied Scientific Concepts**

1. Outline the manner in which hemostasis occurs physiologically.

**Rationale**

Constipation is common in Western society, but frequency depends on patient and physician's definition of the problem. One definition is straining, incomplete evacuation, sense of blockade, manual maneuvers, and hard stools at least 25% of the time along with <3 stools/week for at least 12 weeks (need not be consecutive). The prevalence of chronic constipation rises with age. In patients >65 years, almost 1/3 complain of constipation.

**Causal Conditions**

1. Disordered lower intestinal motility
  - a. Diet/Lifestyle (low dietary calorie/fibre/fluid intake/activity level change)
  - b. Drugs
    - i. Neurally active (opiates, antihypertensive)
    - ii. Cation-containing (iron, aluminum)
    - iii. Anticholinergic (anti spasm, antidepressant, antipsychotic)
  - c. Idiopathic change in motility
    - i. Irritable bowel syndrome (70%)
    - ii. Outlet delay (pelvic floor dyssynergia) (15%)
    - iii. Colonic inertia (10%), normal colonic transit
2. Secondary constipation
  - a. Neurogenic
    - i. Central (MS, Parkinson, spinal cord injury)
    - ii. Peripheral (Hirschsprung, autonomic neuropathy, diabetes, pseudo-obst.)
  - b. Metabolic/Pregnancy (hypercalcemia, hypokalemia, hypothyroidism)
  - c. Obstructing lesions of GIT
    - i. Local ano-rectal problems (anal fissure/stricture/haemorrhoids)
    - ii. Colo-rectal (cancer, stricture, inflammatory dis., diverticular dis.)
    - iii. Bowel obstruction

**Key Objectives**

- ❖ Since constipation is usually not due to serious disease, first exclude low fibre and lack of activity.
- ❖ Determine whether the constipation should be investigated for a serious cause or should be managed symptomatically.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Obtain bowel diary, exclude secondary causes of constipation, determine drug history with temporal relationships, and diet/physical activity history.
  - Determine whether carcinoma of the rectum or colon is the cause of constipation in any patient over 40 years who presents with recent, marked change in bowel habit (constipation occurs in <1/3 patients with cancer of colon, diarrhea being more common).
  - Elicit a history of recent onset, aggravation, abdominal pain, blood or mucous, ribbon like stools (motility

- disorder/organic narrowing), urgency, tenesmus, diarrhea alternating with constipation.
- Determine whether there is evidence of anemia, weight loss, rectal prolapse; perform rectal exam.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret investigations including stool for occult blood, and select patients in need of examination with a scope or diagnostic imaging.
- ❖ Conduct an effective initial plan of management for a patient with constipation:
  - Outline a plan of management for simple constipation and constipation of disordered motility.
  - Select patients in need of specialized care.





16-2

## PEDIATRIC CONSTIPATION

### Rationale

Constipation is a common problem in children. It is important to differentiate functional from organic causes in order to develop appropriate management plans.

### Causal Conditions

1. Neonate/Infant
  - a. Dietary (insufficient volume/bulk/excessive cow's milk, early introduction of)
  - b. Anatomic
    - i. Anus (imperforate, atresia, stenosis)
    - ii. Intestinal (stenosis, atresia, Hirschsprung disease)
    - iii. Abdominal muscles (absent/abnormal/enteric smooth myopathy)
2. Older child
  - a. Dietary/Functional
    - i. Insufficient fiber/Fluid/Undernutrition
    - ii. Psychologic/Developmental delay/Bedridden/Withholding
  - b. Anatomic
    - i. Hirschsprung
    - ii. Bowel obstruction/Pseudo-obstruction
  - c. Neurologic
    - i. Spinal cord disorders (meningomyelocele)
    - ii. Amyotonia congenita
    - iii. Guillain-Barre
  - d. Endocrine/Metabolic (hypothyroid, diabetes insipidus/mellitus, hypercalcemia, hypokalemia, medications)

### Key Objectives

- ❖ Determine whether the constipated infant/child should be investigated for a serious cause or should be managed symptomatically.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Identify clinical features that help to distinguish functional from organic causes of constipation.
  - Evaluate the social and psychological effects of chronic constipation.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List appropriate investigation for chronic constipation.
- ❖ Conduct an effective plan of management for a patient with constipation:
  - Outline initial and long-term therapy for constipation including diet and education.
  - Identify children that require special as opposed to conservative management.

**Rationale**

Ideally, the prevention of an unwanted pregnancy should be directed at education of patients, male and female, preferably before first sexual contact. Counselling patients about which method to use, how, and when is a must for anyone involved in health care.

**Causal Conditions**

Types of contraception:

1. Non-permanent
  - a. Hormonal contraception (oral, injectable, implants, transdermal, post-coital)
  - b. Barrier methods (diaphragm, cap, condom)
  - c. Intrauterine devices
  - d. Other (abstinence, withdrawal, breast feeding)
2. Permanent contraception
  - a. Sterilization, male
  - b. Sterilization, female

**Key Objectives**

- ❖ Determine whether there are any absolute or relative contraindications to the use of hormonal contraceptives.
- ❖ If permanent contraception is being contemplated, determine the level of determination and commitment to proceed, level of understanding of options, and surgical or medical risks.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit obstetric and gynecologic history and determine risk factors for hormonal use.
  - Perform pelvic exam and exclude the presence of pregnancy if appropriate.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order appropriate cultures, Pap smear, and pregnancy test if indicated.
  - Order ultrasound to determine gestational age in a pregnant woman.
- ❖ Conduct an effective initial plan of management for a patient requesting pregnancy prevention:
  - Outline methods of contraception, risks of failure, complications, and drug interactions.
  - Counsel patient about efficacy, convenience, duration of action, reversibility and time to return to fertility, effect on uterine bleeding, risk of adverse events, affordability, and protection against sexually transmitted diseases.
  - Counsel patient about adjustments if pill is missed, or need to add barrier techniques.
  - Counsel patient on benefit of barrier contraception in conjunction with hormonal contraception in reducing HIV transmission and STDs.
  - Counsel patient about failure rates of sterilization, the importance of family being complete, and complications of various approaches.

- Counsel patient about the complications of pregnancy termination including potential guilt/emotional concerns.
- Select patients in need of specialized care.
- Discuss moral, ethical, and religious implications as well as their impact on society and you as a physician providing care, counseling, and/or treatment.

## Applicable Basic Principles of Law

### *Legal Aspects of Consent (CLEO 5.2)*

#### Detailed Objectives

- ❖ It is mandatory that the patient's consent be obtained for any medical investigation, treatment, or research.
- ❖ The consenting patient must have the legal capacity to consent: i.e., of a legal age to consent (different provinces specify differing ages at which a patient is deemed to be capable of giving consent). The treatment of minors often raises a number of important legal (as well as ethical and practical) issues for physicians.

Although different provinces specify different ages at which a patient is deemed capable of giving consent, minors may require contraceptive advice and prescriptions while at the same time desiring parental non-involvement. Physicians need to learn whether certain provinces make specific provisions for adolescents having the right to consent to contraceptives.

The physician who for personal reasons does not wish to provide confidential contraceptive advice to an adolescent should provide names and phone numbers of other physicians or clinics where this type of advice and care is available.

### *Legal Aspects of Confidentiality (CLEO 5.3)*

#### Detailed Objectives

- ❖ The patient's fundamental right to security of the person, reputation and social status, and various specific provisions in law require that physicians hold all information concerning a patient confidential.
- ❖ Due to the complexity of the rule/requirements of, and exceptions to, the duty of confidentiality, advice may be sought from provincial licensing authorities or legal counsel, when in doubt.

Physicians should acknowledge and accept adolescents' desire for privacy as a fundamental principle for providing confidential contraceptive advice and assistance. This goal can be realized by developing a relationship with adolescents that is independent from their parents.

It should be possible for an adolescent to obtain sexual information directly from the clinician. Physicians should educate parents and adolescents about the importance of direct interaction with the adolescent. The rationale for this direct interaction is the need for a change from communication primarily with the parent that occurs when children are younger. Respect of privacy is a normal part of the process of maturing. Moreover, parents need an explanation stating the importance of this type of visit being a positive experience for the adolescent. The physician should review with the parent the information planned for discussion, and then reviews the information with the adolescent alone. Parents need to be informed that usually discussions between teen patients and physicians are confidential with certain exceptions. These exceptions should be made clear to both parents and adolescents.

## Applied Scientific Concepts

1. Outline the stimulatory and inhibitory effects that lead to the release of a mature oocyte from the pool of primordial oocytes during a normal menstrual cycle.
2. List hormones, paracrine, and autocrine factors that contribute to the regulation of this process.



## Rationale

Chronic cough is the fifth most common symptom for which patients seek medical advice. Assessment of chronic cough must be thorough. Patients with benign causes for their cough (gastro-esophageal reflux, post-nasal drip, two of the commonest causes) can often be effectively and easily managed. Patients with more serious causes for their cough (e.g., asthma, the other common cause of chronic cough) require full investigation and management is more complex.

## Causal Conditions

1. Chronic cough (>3 weeks or longer)
  - a. Upper respiratory tract
    - i. Post-nasal drip
    - ii. Gastro-esophageal reflux
    - iii. Chronic sinusitis
    - iv. Drugs (ACE inhibitors)
    - v. Foreign body
  - b. Pulmonary
    - i. Obstructive airway disease - (asthma, chronic bronchitis, bronchiectasis, cystic fibrosis)
    - ii. Lung neoplasm (bronchogenic carcinoma, carcinoid tumor)
    - iii. Chronic lung infections (lung abscess, tuberculosis, aspiration)
    - iv. Interstitial lung disease
  - c. Cardiac - congestive heart failure
2. Acute cough
  - a. Infectious (URTI, bronchitis, pneumonia)
  - b. Irritant (noxious fumes, smoke)

## Key Objectives

- ❖ Differentiate true cough from upper airway clearing, saliva from sputum or hemoptysis, and patients with chronic cough due to upper, pulmonary, or cardiac.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether the patient has an upper respiratory tract infection, smokes or takes ACEI (if not, consider reflux or post-nasal drip).
  - Diagnose the cause of a chronic cough and distinguish those patients with innocuous cough from those with significant disease.
- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - Order and interpret a chest x-ray if appropriate.
  - Outline value of spirometry pre and post-broncho-dilators.
- ❖ Conduct an effective plan of management for a patient with a chronic cough:

- Prescribe appropriate medications (e.g., antihistamine-decongestant for post-nasal drip) used in the management of chronic cough, with proper attention to their indications, contra-indications and adverse effects.
- Select patients in need of specialized care.
- Counsel and educate patients with chronic cough including the provision of strategies aimed at smoking cessation.

## Applied Scientific Concepts

1. Outline the reflex arc that is stimulated to cause cough (receptors =>afferent nerves =>'cough center' in medulla =>efferent nerves =>expiratory muscles cough).
2. List a few sites of cough receptors (epithelium of upper and lower respiratory tracts, pericardium, esophagus, diaphragm, and stomach), and explain that they include both mechanical (touch, displacement) and chemical (gases, fumes).

### Rationale

Cyanosis is the physical sign indicative of excessive concentration of reduced hemoglobin in the blood, but at times is difficult to detect (it must be sought carefully, under proper lighting conditions). Hypoxemia (low partial pressure of oxygen in blood), when detected, may be reversible with oxygen therapy after which the underlying cause requires diagnosis and management.

### Causal Conditions

1. Central
  - a. High A-a gradient
    - i. Right-to-left shunt (not significantly improved by oxygen)
      - A. Atelectasis
      - B. Alveolar flooding
        - I. Lobar pneumonia
        - II. ARDS
      - C. Vascular communication
        - I. Pulmonary AV malformation
        - II. Right-to-left intra-cardiac shunt
    - ii. V/Q Mismatch (+ abnormal diffusion with exercise)(improves with oxygen)
      - A. Obstructive
        - I. Upper airway
        - II. COPD
        - III. Asthma
      - B. Pulmonary vascular (embolus)
      - C. Parenchymal (restrictive)
  - b. Hypoventilation (elevated Pco<sub>2</sub>)(A-a gradient normal)
    - i. Central control (stroke, narcotics, obesity, hypothyroid)
    - ii. Peripheral (neuromuscular, chest wall)
2. Peripheral (decreased oxygen delivery)(low cardiac output, arterial/venous obstruction)

### Key Objectives

- ❖ Define cyanosis, hypoxemia, and hypoxia (insufficient levels of oxygen in tissues to maintain cell function).
- ❖ Contrast pathophysiology of central cyanosis (arterial blood with 5 g/ml unsaturated hemoglobin) from peripheral cyanosis (5 g/ml unsaturated hemoglobin in capillary or venous blood).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate central cyanosis from peripheral and localized cyanosis.
  - Contrast respiratory causes and cyanotic congenital heart disease.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion,

differentiation, and diagnosis:

- Calculate A-a gradient for oxygen and use it to differentiate conditions with ventilation perfusion disturbances from those with normal gradient and hypoventilation.
- ❖ Conduct an effective initial plan of management for a patient with hypoxemia/cyanosis/hypoxia:
  - Outline an initial plan of management which includes treatment of the underlying condition along with oxygen administration.
  - List the adverse effects of oxygen treatment.
  - List useful outcome criteria for a trial of long-term use of oxygen in patients with chronic hypoxemia.



## 19-1 **CYANOSIS/HYPOXEMIA/HYPOXIA IN CHILDREN**

### **Rationale**

Evaluation of the patient with cyanosis depends on the age of the child. It is an ominous finding and differentiation between peripheral and central is essential in order to mount appropriate management.

### **Causal Conditions**

1. Neonatal
  - a. Central
    - i. Congenital heart disease
      - A. Increased pulmonary blood flow (transposition, truncus arteriosus, total anomalous pulmonary venous return, hypoplastic/single ventricle)
      - B. Decreased pulmonary blood flow (tricuspid, pulmonary atresia, tetralogy)
    - ii. Respiratory insufficiency
      - A. Pulmonary
        - I. Upper airway obstruction (e.g., nasal, tracheal, croup syndrome)
        - II. Lower airway (respiratory distress syndrome, sepsis, aspiration, diaphragmatic hernia)
      - B. Vascular (persistent pulmonary hypertension of the newborn)
      - C. CNS (maternal sedative, asphyxia, intracranial hemorrhage, hypoglycemia)
  - b. Peripheral vascular ("physiologic acrocyanosis", sepsis, cardiogenic/septic shock, thrombosis, vasomotor instability, coarctation, aortic stenosis)
2. Infant and child
  - a. Central
    - i. Pulmonary
      - A. Upper airway obstruction
      - B. Lower airway disorders (bronchiolitis, asthma, pneumonia, cystic fibrosis, embolus, aspiration, foreign body)
    - ii. Cardiac disease (congenital heart, myocarditis, cardiomyopathy, dysrhythmia)
    - iii. CNS depression (encephalitis, toxins, metabolic, neuromuscular)
  - b. Peripheral
    - i. Vascular problem (Raynaud, sepsis, thrombosis)
    - ii. Obstruction (superior vena cava syndrome, venous thrombosis, compartment syndrome)
    - iii. Hyperviscosity (polycythemia)

### **Key Objectives**

- ❖ Differentiate between peripheral and central cyanosis since exclusion of generalised cyanosis suggests the absence of primary lung or heart disease (whereas generalised cyanosis is more consistent with primary heart disease or respiratory insufficiency), then distinguish lung from heart disease.
- ❖ Explain that if the process causing peripheral cyanosis is severe enough (e.g., sepsis), generalized cyanosis may occur.

### **Objectives**



- ❖ Through efficient, focused, data gathering:
  - Elicit maternal history of illness or sepsis in pregnancy, gestational age, delivery complications, presence of meconium, suction of infant, Apgar score, family history of congenital heart disease.
  - Determine the vital signs, age of infant (ductus arteriosus usually closes by third day), whether the infant is alert and active, if infant is able to feed, and the presence of respiratory distress (tachypnea, grunting, flaring, retracting).
  - Perform examination of the newborn for evidence of respiratory distress, congestive heart failure or shock, signs of central nervous system depression, whether the cyanosis is central or peripheral.
  - Elicit history in the older child of acute versus chronic or recurrent cyanosis, history of lung disease or heart disease, history of foreign body or aspiration, fever, upper respiratory symptoms, exposure to medications, dyes, chemicals.
  - In the older child, focus examination first on respiratory distress and obtundation of neurologic disease; determine whether hypotension or bradycardia is present (ominous signs).
  - Differentiate between upper and lower air obstruction.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select appropriate investigations including diagnostic imaging, ECG, and blood tests.
  - Explain the interpretation of hyperoxia test (arterial blood gas from a site distal to the ductus on room air and 100% oxygen).
- ❖ Conduct an effective plan of management for a patient with cyanosis/hypoxia in children:
  - Outline initial management including cardio-respiratory monitoring.
  - Select premature infants with hemodynamically significant PDA to refer for NSAID therapy.
  - Explain the benefits of "knee-chest" position in a child with cyanosis and Tetralogy of Fallot.
  - Select patients in need of specialized care.

### Rationale

'Limp' is a bumpy, rough, or strenuous way of walking, usually caused by weakness, pain, or deformity. Although usually caused by benign conditions, at times it may be life or limb threatening.

### Causal Conditions

1. Trauma (stress fracture, traumatic epiphyseal injury) (see also [Fractures/Dislocations](#) and [Bone/Joint Injury](#))
2. Infections (septic arthritis, osteomyelitis)
3. Inflammatory (juvenile rheum. arthritis, reactive arthritis, toxic synovitis of hip)
4. Tumors (Ewing sarcoma, osteosarcoma, osteochondroma)
5. Other
  - a. Hip
    - i. Legg-Calvé-Perthes disease or epiphysitis
    - ii. Slipped capital femoral epiphysis
    - iii. Congenital dislocated hip
  - b. Knee
    - i. Osgood-Schlatter disease or epiphysitis
    - ii. Chondromalacia patellae
    - iii. Patella (tendon partial rupture, osteochondritis, subluxation, dislocation, meniscal injuries)
    - iv. Popliteal cyst
  - c. Spine (discitis, spinal epidural abscess, meningitis)
  - d. Soft tissue (contusion, myositis, bursitis, cellulitis)
6. Growing pains

### Key Objectives

- ❖ Determine whether the pain originates in joints or soft tissue.
- ❖ Since the most serious diseases causing leg pain in children are usually unilateral, determine whether the worsening knee pain is in fact unilateral.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Communicate to child and parents that worsening pain or limp > 2 - 3 weeks is unlikely to be the result of trauma even in the presence of trauma history.
  - Determine if the limp or pain is caused by serious entities.
  - Calculate leg length discrepancies (>1,25 cm may cause pelvic tilt and limp), describe gait.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patient in need of diagnostic imaging (e.g., x-ray) or specialized care for investigation.
- ❖ Conduct an effective plan of management for a patient with pain in the lower extremity and/or limp:
  - Select patients in need of specialized care.

**Rationale**

Providing that normal development and behavior is readily recognized, primary care physicians will at times be the first physicians in a position to assess development in an infant, and recognize abnormal delay and/or atypical development. Developmental surveillance and direct developmental screening of children, especially those with predisposing risks, will then be an integral part of health care.

**Causal Conditions**

1. Global delay
  - a. Environmental neglect (under-stimulation)
  - b. Chromosome disorders (e.g., trisomy 21)/Genetic syndromes
  - c. CNS abnormalities/Prenatal exposures (e.g., fetal hypoxia, fetal-alcohol syndrome, viral infection)
  - d. Other (inborn errors of metabolism/hypothyroidism/anemia/lead/idiopathic)
2. Speech/Language delay
  - a. Isolated speech/Expressive language delay
  - b. Combined expressive/Receptive language disorder
  - c. Hearing impairment
  - d. Autistic spectrum disorders (pervasive developmental disorder)
3. Motor delay/Impairment
  - a. Muscular dystrophy (Duchenne)
  - b. Congenital/Acquired CNS dysfunction (cerebral palsy)
  - c. Idiopathic/Benign familial hypotonia

**Key Objectives**

- ❖ Using knowledge of normal child development, determine which children have evidence of developmental delay.
- ❖ Determine whether the delay is global, isolated to speech/language or motor delay, includes abnormal social interaction.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine whether there are risk factors or relevant family history for development delay; any risk factors for hearing impairment or parents have any concerns about behavior or development.
  - Determine whether there was a congenital infection (e.g., HIV infection).
  - Determine whether there were factors predisposing to speech delay/language skills (e.g., ototoxic drugs, recurrent otitis, mastoiditis), delay in fine/gross motor function, self-help.
  - Perform a developmental assessment to confirm/disprove development delay (general/restricted).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List indications for referral for audiology assessment or speech and language pathologist.
  - List indications for referral for diagnostic developmental assessment, investigations for chromosomal, metabolic,

- or other genetic disorder, or neurologic evaluation.
- Determine if there is reason to suspect child abuse or neglect.
- ❖ Conduct an effective plan of management for a patient with development delay:
  - Select children in need of specialized care.
  - Once a diagnosis of global delay is made, along with other care givers, provide support for parents with the management plan (may include, when appropriate, medical care, multidisciplinary services, family support, child placement, and academic support). (In a child with speech/language development delay, plan may include when appropriate, speech therapy, amplification devices, family support, and educational modification.)

## Ethics

### *Resource Allocation (CLEO 4.5)*

#### Detailed Objectives

- ❖ To make health care resources available to patients in a manner which is fair and equitable, without bias or discrimination.
- ❖ To recognize situations in which allocation of resources is unfair, and seek resolution.
- ❖ To recognize or propose fair means of resolving disputes for resources:
  - primary obligation to patient;
  - rank known patients ahead of future patients;
  - use morally relevant criteria in allocating resource; and
  - consult hospital ethics committees or other responsible bodies.
- ❖ To choose interventions on the basis of best available evidence:
  - known to be effective;
  - anticipated cost benefit; and
  - avoid marginally beneficial investigations and treatments.
- ❖ To inform patient of impact of cost restraint in a supportive way.
- ❖ To be prudent and avoid waste in the utilization of scarce or costly resources.

Children with developmental delay will in some instances, depending on the underlying problem, have extremely high needs. Resources may be limited, but need to be made available to them in a manner that is fair and equitable, without bias or discrimination. The principles outlined above, if followed, will serve the practicing physician well in such circumstances.

### *Controversial and Evolving Ethical Issues in Practice (CLEO 4.10)*

#### Issues

- ❖ Genetic testing

#### Detailed Objectives

- ❖ When confronted with such a situation, candidates will:
  - discuss in a non-judgmental manner;
  - ensure patients have full access to relevant and necessary information;
  - identify if certain options lie outside their moral boundaries and refer to another physician if appropriate;
  - consult with appropriate ethics committees or boards; and
  - protect freedom of moral choice for students and trainees.

Some families will have children with developmental disorders caused by chromosome disorders or genetic syndromes. The issue of future genetic testing may arise. The manner in which this issue is to be discussed is non-judgmental. The family must have access to relevant and necessary information, and this should be obtained from appropriate sources and provided.

If certain options lie outside the candidate's moral boundaries, referral could be offered. Other options include consultation with ethics committees or boards.

## General Organization

### *General Organization of Medical/Health Care in Canada (CLEO 6.1)*

#### Detailed Objectives

Competent candidates will demonstrate the knowledge and principles with respect to:

- ❖ The key issues in the development of the Canadian Health Care System.
- ❖ The structure of government and the enabling legislation applicable to health care in Canada.
- ❖ The Federal Authority.
- ❖ The Provincial Authority.
- ❖ The public funding and administration of the system (federal and provincial).

Because the management of patients with developmental disorders is resource intensive, this group of children would benefit from improved government funding. Advocacy for such improvement in funding needs to be initiated at many levels by different advocates, including those in the medical professions.

### *Support Services in the Community (CLEO 6.3)*

#### Detailed Objectives

- ❖ The nature and role of federal programs and services.
- ❖ The nature and role of provincial programs and services.
- ❖ The nature and role of support services for youth.
- ❖ Mechanisms and organizations which provide social services related to health.
- ❖ Individuals able to assist with access to community services.

The management of patients with developmental disorder is resource intensive. The candidate requires special knowledge and skill in how to access the needed resources.

### *Inter-Professional Issues (CLEO 6.9)*

#### Detailed Objectives

- ❖ The role and skills of practice of other health care workers who are self-regulated.
- ❖ The proper inter-professional relationship based on respect and clear communication.
- ❖ The delegation of acts between physicians and other health care workers.
- ❖ The ability to work in a collegial way within a team structure involving other physicians and health care workers.
- ❖ Maintain respect for the role of the other health professions at all times.

The management of a patient with development disorder may involve a team structure that includes other health care workers, schools, educators etc. Excellent management of the patient is possible if the physician displays at all times the proper inter-professional relationship with other members of the health care team. This relationship and delegation of certain aspects of care must be based on respect and clear communication.



## ACUTE DIARRHEA

### Rationale

Diarrheal diseases are extremely common worldwide, and even in North America morbidity and mortality is significant. One of the challenges for a physician faced with a patient with acute diarrhea is to know when to investigate and initiate treatment and when to simply wait for a self-limiting condition to run its course.

### Causal Conditions

1. Infectious
  - a. Diarrhea predominant
    - i. Small bowel
      - A. Viruses (Norwalk, rotavirus)
      - B. Bacteria (*C. perfringens*, *V. cholera*, *E. coli*, salmonella, yersinia)
      - C. Parasites (*Giardia*)
      - D. Drugs, toxins
    - ii. Large bowel
      - A. Bacteria (*shigella*, *campylobacter*, *E. Coli* 0157:H7, salmonella, *C. difficile*)
  - b. Nausea and vomiting predominant (*B. cereus*, *S. aureus*)
2. Ischemic
3. Inflammatory
  - a. Non-bloody (Crohn ileitis, Crohn colitis)
  - b. Bloody (ulcerative colitis, Crohn colitis)

### Key Objectives

- ❖ Define acute diarrhea as >3 stools/day or >200 GMS of stool/day for >2 days, <2 weeks (chronic diarrhea lasts for >4 weeks).
- ❖ Categorise diarrhea as "pseudodiarrhea" if the above criteria are not met (i.e., increased frequency but normal consistency like in thyrotoxicosis, neurologic impairment, impaction, etc.).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Diagnose the presence of acute diarrhea; determine severity of illness (profuse watery diarrhea with dehydration and volume depletion, blood and mucus in stool, fever >38.5°, >6 unformed stools/day for >48 hours, severe abdominal pain in patient >50 years, immuno-compromised, >70 years).
  - Differentiate infectious diarrhea from inflammatory bowel disease and other causes of acute diarrhea; determine whether diarrhea acquired outside/in hospital.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients requiring stool occult blood and leukocytes.
  - Select and interpret appropriate investigations for patients with acute diarrhea.
- ❖ Conduct an effective initial plan of management for a patient with acute diarrhea:

## ACUTE DIARRHEA

- Outline management of patients with acute diarrhea: diet recommendations, volume repletion, advantages and disadvantages of oral and IV rehydration, symptomatic relief, antibiotic indication.
- Outline management of patients with acute diarrhea with attention to public health concerns.
- Select patients in need of specialized care and/or consultation.

**Rationale**

Chronic diarrhea is a decrease in fecal consistency lasting for 4 or more weeks. It affects about 5% of the population.

**Causal Conditions**

1. Steatorrhea (oily, foul, difficult to flush)
  - a. Luminal phase
    - i. Substrate hydrolysis (e.g., pancreatic insufficiency)
    - ii. Fat solubilization (e.g., liver cholestasis, ileal disease/resection, bacterial overgrowth)
  - b. Mucosal phase
    - i. Brush border (e.g., lactase deficiency)
    - ii. Epithelial transport (e.g., celiac sprue)
2. Large bowel (small volume, bloody, painful, tenesmus, urgency)
  - a. Secretory (colon cancer, villous adenoma, microscopic colitis)
  - b. Inflammatory
    - i. IBD (ulcerative, Crohn, diverticulitis)
    - ii. Infectious (pseudomembranous, TB, viral, amebiasis)
    - iii. Other (radiation/ischemic colitis)
  - c. Motility (IBS, hyperthyroid)
3. Small bowel (large volume, watery, weight loss, malnourished)
  - a. Osmotic (magnesium/phosphate/sulfate, carbohydrate malabsorption)
  - b. Secretory
    - i. Tumors
      - A. Neuroendocrine (gastrinoma/vipoma, carcinoid, mastocytosis)
      - B. Neoplasia (adenocarcinoma, lymphoma)
    - ii. Mucosal (Crohn, celiac, chronic infection, Whipple)
  - c. Disordered motility (IBS, diabetic neuropathy, hyperthyroid)

**Key Objectives**

- ❖ Define chronic diarrhea as >4 weeks in duration.
- ❖ Contrast small bowel and large bowel diarrhea.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate osmotic (improves with fasting) from secretory (continues with fasting) diarrhea, and mal-digestion from malabsorption.
  - Diagnose patients with irritable bowel syndrome and patients with inflammatory bowel disease.
  - Determine whether motility problems might be present.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:



- Select and interpret investigations for malabsorptive conditions.
- Select and interpret investigations for inflammatory bowel conditions.
- ❖ Conduct an effective initial plan of management for a patient with chronic diarrhea:
  - Outline plan of management for patients with chronic diarrhea, including the prevention and treatment of related complications (e.g., patients with celiac disease, pancreatic insufficiency, vitamin and mineral deficiencies).
  - Select patients in need of specialized care and/or consultation with other health care professionals.
  - Conduct education and counseling of patients with malabsorption and inflammatory bowel disease.

## Applied Scientific Concepts

1. Outline absorption of nutrients by describing the membrane transport systems of the small intestinal epithelium and the epithelial absorptive surface.
2. Contrast maldigestion (impaired digestion of nutrients) to malabsorption.
3. Contrast global malabsorption to partial or isolated malabsorption.
4. Describe the role of bile acids in fat absorption.



## PEDIATRIC DIARRHEA

### Rationale

Diarrhea is defined as frequent, watery stools and is a common problem in infants and children. In most cases, it is mild and self-limited, but the potential for hypovolemia (reduced effective arterial/extracellular volume) and dehydration (water loss in excess of solute) leading to electrolyte abnormalities is great. These complications in turn may lead to significant morbidity or even mortality.

### Causal Conditions

1. Neonatal
  - a. Diet related (milk protein intolerance, overfeeding)
  - b. Necrotizing enterocolitis
2. Older child (see [ACUTE DIARRHEA](#))
  - a. Infectious (viral/bacterial gastroenteritis, food poisoning)
  - b. Malabsorption
    - i. Lactase deficiency
    - ii. Cystic fibrosis
    - iii. Celiac disease
    - iv. Primary immuno-deficiencies (including HIV)
  - c. Other (drugs, laxative abuse, inflammatory bowel disease, etc.)

### Key Objectives

- ❖ Determine the degree and type of dehydration/volume depletion if any, and investigate possibility of electrolyte abnormalities (sodium/potassium/hydrogen ion concentration, abnormal serum).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit a history including previous weight, urine output, and associated symptoms; examine vital signs, mucous membranes, skin turgor, temperature of extremities, and fontanelle in infants, as well as clubbing, wheezing, abdominal exam, etc.
  - Determine whether others have developed diarrhea (food-borne outbreak) and whether the onset was <1 hour (probable chemical), <6 - 7 hours (probable toxin), or >15 hours (bacteria/viruses).
  - Elicit a history of duration of diarrhea, origin of food (80% of food-poisoning from commercial/institutional prepared food), stool pattern, aggravating and alleviating factors, stool description, fever or associated symptoms, diet history and travel history, etc in order to diagnose the etiology of diarrhea.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select blood and stool investigations in patients with diarrhea; interpret electrolyte abnormalities.
  - Outline investigation of chronic diarrhea.
- ❖ Conduct an effective plan of management for a patient with diarrhea:
  - Outline treatment for the underlying cause of the diarrhea.

- > Select patients who require referral to a nutrition expert (e.g., malabsorption, celiac disease, etc.).
- > Outline supportive management for patients with volume and/or electrolyte disorders: type of fluid and route (<5% require IV fluid), volume of fluid, and rate of administration.
- > Discuss nutritional rehabilitation in a malnourished patient.
- > Discuss the use of community resources and Public Health authorities if appropriate.

### **Applied Scientific Concepts**

1. Contrast the type of fluid lost by patients with secretory diarrhea (e.g., cholera: sodium + potassium concentration in diarrheal fluid similar to concentration in plasma) to that lost in most bacterial and viral enteritides (sodium + potassium concentration in diarrheal fluid is less than in plasma).
2. Contrast the effect of the two different types of diarrhea on electrolyte concentration and volume status if volume of diarrheal fluid lost is identical.

**Rationale**

Diplopia is the major symptom associated with dysfunction of extra-ocular muscles or abnormalities of the motor nerves innervating these muscles. Monocular diplopia is almost always indicative of relatively benign optical problems whereas binocular diplopia is due to ocular misalignment. Once restrictive disease or myasthenia gravis is excluded, the major cause of binocular diplopia is a cranial nerve lesion. Careful clinical assessment will enable diagnosis in most, and suggest appropriate investigation and management.

**Causal Conditions**

1. Monocular diplopia (refractive error, keratoconus, cataract, functional)
2. Binocular diplopia
  - a. Oculomotor nerves
    - i. 3rd nerve (ischemia, diabetes associated, aneurysm, tumor, trauma)
    - ii. 4th nerve (ischemia, diabetes associated, trauma)
    - iii. 6th nerve (ischemia, diabetes associated, tumor, subdural, trauma)
    - iv. Inter-nuclear ophthalmoplegia (multiple sclerosis, brain stem infarction) (In children consider post-viral inflammation, brain stem tumor)
  - b. Myoneural junction (myasthenia gravis)
  - c. Extraocular muscles restriction/Entrapment
    - i. Exophthalmos
    - ii. Orbital inflammation/Infection
    - iii. Orbital tumor
    - iv. Fracture of orbital floor

**Key Objectives**

- ❖ Determine whether the condition of monocular diplopia is present or the diplopia is binocular (resolves with occlusion of vision to either eye).
- ❖ Determine in which field the double vision is worst: same field of action (in case of paresis) or opposite to its field of action (in case of restriction).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Ask whether pain is present and location (generalised headache, or temple, or above eyebrow).
  - Determine whether restrictive disease, oculomotor nerve palsy or myasthenia gravis is the likely cause of diplopia; determine whether one pupil is dilated in a patient with third nerve palsy (suggestive of aneurysm in Circle of Willis).
  - Determine whether doubling of images occurred suddenly (acute event such as ischemia) or is gradually worsening (progressive process such as tumor or inflammation).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:

- Describe the value of a Tensilon test.
- List indications for angiography or CT/MRI.
- ❖ Conduct an effective plan of management for a patient with diplopia:
  - Select patients in need of specialized care.

## Applicable Basic Principles of Law

### *Physicians' Legal Liability for Negligence (or, in Quebec, Civil Liability) (CLEO 5.4)*

#### Detailed Objectives

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstance under consideration.

If a motor vehicle accident occurs, the physician who diagnosed diplopia may be legally liable if both the patient and/or the motor vehicles branch (provincial statutes vary) were not advised that driving is not permitted (until the diplopia is reversed, if possible).

### *Statutory Requirements of Physicians (CLEO 5.6)*

#### Detailed Objectives

- ❖ Physicians are legally required under certain provisions of various provincial and federal laws to report confidential information concerning the health, well being, morbidity, or mortality of a patient to the appropriate authorities.
- ❖ Reporting requirements vary from province to province, and often include areas such as:
  - fitness to drive a vehicle on public highways.

Physicians who diagnose diplopia are required to advise both the patient and/or the motor vehicles branch (provincial statutes vary) that driving is not permitted unless the diplopia is reversed.

## Applied Scientific Concepts

1. Three pairs of extra-ocular muscles move each eye in three directions: vertically, horizontally, and torsionally. Identify the muscles and the movement for which they are responsible.
2. Identify the parasympathetic fibers that run with the 3rd nerve as responsible for pupillary function that is affected by lesions compressing this nerve.
3. Contrast the cause of muscle fatigue (e.g., partial obstruction of receptor sites) to complete muscle paralysis.

**Rationale**

"Dizziness" is a common but imprecise complaint. Physicians need to determine whether it refers to true vertigo, 'dizziness', disequilibrium, or pre-syncope/ lightheadedness.

**Causal Conditions**

1. True vertigo - 50%
  - a. Peripheral vestibular dysfunction - 40%
    - i. Benign positional vertigo - 15%
    - ii. Labyrinthitis - 10% (unilateral/bilateral, otitis media, neuronitis)
    - iii. Other (Meniere dis. - 10%, aminoglycosides, acoustic neuroma)
  - b. Central - 10%
    - i. Cerebrovascular (cerebellar/brainstem infarction/hemorrhage, vertebro-basilar insufficiency)
    - ii. Demyelinating (multiple sclerosis)
    - iii. Drugs (anticonvulsants, hypnotics, alcohol)
2. Dizziness - 40%
  - a. Psychiatric - 15% (depression, anxiety/panic, somatization, alcohol)
  - b. Disequilibrium - 15% (peripheral neuropathy, visual impairment, drugs)
  - c. Syncope/Presyncope - 10%

**Key Objectives**

- ❖ Determine whether patients complaining of dizziness have true vertigo (an illusion of motion, self or environment, arising from asymmetry of the vestibular system, that is episodic, never continuous, provoked by head position change without decreasing blood pressure).
- ❖ Differentiate patients with central (more continuous, not positional) versus peripheral causes (abrupt onset/offset) for vertigo.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Distinguish clinically between vertigo, gait disturbances, orthostatic light-headedness, and other related disorders.
  - Ask about unilateral/bilateral hearing loss, drainage from ear, tinnitus, staggering or ataxic gait, double/loss vision, numbness, weakness, clumsiness, or incoordination.
  - Examine for nystagmus, hearing loss, Weber test, Rinne test, tympanic membranes.
- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - Order and interpret the appropriate laboratory, radiological and electrophysiological investigations used in the management of patients with dizziness/vertigo.
- ❖ Conduct an effective plan of management for a patient with dizziness/vertigo:
  - Determine which patients with central vertigo require more urgent management.
  - Describe the symptomatic management of patients with benign causes of vertigo.

## DIZZINESS/VERTIGO

- Counsel and educate patients with benign causes of dizziness/vertigo.
- Select patients in need of specialized care.

### Rationale

Physicians are frequently faced with patients dying from incurable or untreatable diseases. In such circumstances, the important role of the physician is to alleviate any suffering by the patient and to provide comfort and compassion to both patient and family.

### Key Objectives

- ❖ When caring for a dying patient, physicians must formulate a plan of management that ensures adequate control of pain, maintenance of human dignity, and avoids isolation of patients from their family.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Discuss with patients their wishes for care in their final days.
  - If a patient is currently incompetent and/or unable to express their wishes, determine whether an advanced directive was previously written.
- ❖ Conduct an effective plan of management for a dying patient:
  - Select analgesic dosages that are adequate for pain control and alleviate dyspnea in those who forego mechanical ventilation even if by doing so death is hastened.
  - Contrast respiratory depression caused by opioids to the respiratory rate of six to eight breaths per minute of the dying patient who is not receiving opioids (i.e., the respiratory depression is not caused by opioids but is actually a natural part of the dying process).
  - Explain that the correct use of morphine is more likely to prolong a patient's life (patient is more rested and pain-free).
  - Provide or arrange for emotional, physical, and spiritual support to the patient and family.
  - Discuss with a patient his/her wishes for care including resuscitation well in advance of their death.
  - Describe the role of an advanced directive and the impact this has on physicians.
  - Select patients in need of referral to other health care professionals.

### Ethics

#### *Doctor Patient Relationship (CLEO 4.8)*

#### Detailed Objectives

- ❖ The physician will place the best interest of the patient first.

Provide adequate relief of pain to a dying patient. Ethicists have considered the treatment of pain for a dying patient, and consensus has been reached that pain management at the end of life is the right of the patient and the duty of the clinician.

Manage severe pain in a dying patient as a medical emergency. The possibility of increased uncontrolled pain at the end of life is indeed an emergency. Such pain, if not brought under control, can be devastating to patient and family. It causes



suffering and may deprive the dying patient of power to complete many important tasks (e.g., placing legal affairs in order, grieving the loss of life, making apologies for strained relationships, and saying goodbye to loved ones).

### ***Controversial and Evolving Ethical Issues in Practice (CLEO 4.10)***

#### **Issues**

- ❖ Euthanasia
- ❖ Physician assisted suicide

#### **Detailed Objectives**

- ❖ The candidate will be aware that they may be asked to comment on unresolved or controversial ethical issues, and will be able to name and describe relevant key issues and ethical principles.

Prescribe medications that provide appropriate pain control. Physicians may have an inflated perception of the risk of hastening death by treating pain with opioids. As a consequence, they may fail to treat pain effectively because of concern with violating ethical and moral standards.

Distinguish between pain management for intractable symptoms and physician-assisted suicide. There is a need for physicians to balance such concerns with their moral obligation to treat pain in the suffering patient.

Appropriate treatment of pain is morally acceptable even if it hastens the death of a patient as long as there was no intention to do so by the physician (principle of double effect). The bioethical principle of double effect is important to patients and to physicians who care for such individuals. As Quill states, "To the extent that the principle allows patients, families, and clinicians to respond in an ethically and clinically responsible way to palliative care emergencies without violating the fundamental values of any of the participants, the principle of double effect should be used and protected". [Quill, T. Principle of double effect and end-of-life pain management: additional myths and a limited role. *J Palliat Med* 1998; 1:333.]

### **Applicable Basic Principles of Law**

#### ***the Patient: A Person with Human and Other Legal Rights (CLEO 5.1)***

#### **Detailed Objectives**

- ❖ To identify the patient (rather than the physician or the hospital, for example) as a key focus and central subject of medical practice.
- ❖ To demonstrate the knowledge that the patient has fundamental legal rights in the medical context, arising under both statutory law and the rulings of the courts that are binding on the physician.

Treat pain effectively in a dying patient. Administration of pain medication to a dying patient does not violate legal tenets.

Prescribe medications that provide appropriate pain control. Physicians may have an inflated perception of the risk of hastening death by treating pain with opioids. As a consequence, they may fail to treat pain effectively because of concern with violating ethical and moral standards.

Distinguish between pain management for persistent symptoms and physician-assisted suicide. Balance such concerns with the legal obligation to treat pain in the suffering patient.

Prescribe pain medication for physical, spiritual, and psychological suffering in a dying patient. While this may carry a small risk of hastening death, if it is not the intention of the treating physician, but it is intended to treat pain or relieve discomfort, it is legal. In contrast, physician assisted suicide involves supplying patients with the means, usually a medication, to end

their life. Euthanasia requires a physician to physically administer a medication with the intent of causing death.

Alleviate suffering in a patient enduring a terminal illness and experiencing pain even to the point of causing unconsciousness and hastening death. Indeed, there may be a legal risk to clinicians that do not treat pain effectively.

In summary, the treatment of pain is legally acceptable even if it hastens the death of a patient as long as there was no intention to do so by the physician (principle of double effect). As Quill states, "To the extent that the principle allows patients, families, and clinicians to respond in an ethically and clinically responsible way to palliative care emergencies without violating the fundamental values of any of the participants, the principle of double effect should be used and protected". [Quill, T. Principle of double effect and end-of-life pain management: additional myths and a limited role. *J Palliat Med* 1998; 1:333.]

**Rationale**

Dysphagia should be regarded as a danger signal that indicates the need to evaluate and define the cause of the swallowing difficulty and thereafter initiate or refer for treatment.

**Causal Conditions**

1. Oropharyngeal dysphagia (transfer dysphagia)
  - a. Structural (peritonsillar abscess, pharyngitis, tumor, Zenker diverticulum)
  - b. Neuromuscular
    - i. CNS (CVA, cerebral palsy, CNS tumor, head trauma, Parkinson, dementia)
    - ii. Cranial nerves (diabetes, laryngeal nerve palsy, polio, MS, ALS)
    - iii. Myopathic (dermatomyositis, polymyositis, myasthenia, sarcoidosis)
  - c. Functional (xerostomia)
2. Esophageal dysphagia
  - a. Mechanical obstruction
    - i. Intrinsic
      - A. Intermittent (lower esophageal ring, web)
      - B. Progressive (peptic stricture, carcinoma)
    - ii. Extrinsic (mediastinal mass)
  - b. Motility/Neuromuscular disorder
    - i. Intermittent (diffuse esophageal spasm)
    - ii. Progressive (scleroderma, achalasia)

**Key Objectives**

- ❖ Contrast difficulty initiating swallowing (coughing, choking, nasal regurgitation), from food sticking after being swallowed, then dysphagia involving only solid food from dysphagia of both solid and liquid food, and whether intermittent or progressive.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine the presence of food getting stuck immediately upon swallowing, coughing, choking, drooling, or nasal regurgitation.
  - Determine whether symptomatology starts several seconds after initiating swallowing, is restricted to solids, liquids, or both, is intermittent or progressive, symptoms are at or below sternal notch, and weight loss (late sign) is a problem, any neurologic symptoms, or aspiration.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients in need of specialised investigative procedures (e.g., endoscopy); if not available, select diagnostic imaging.
- ❖ Conduct an effective initial plan of management for a patient with dysphagia:

- Select patients in need of specialized care and/or referral.

### **Applied Scientific Concepts**

1. Outline the three phases of normal swallowing (oral preparatory, pharyngeal, esophageal), their timing and co-ordination, and role of the swallowing center within the central nervous system.
2. Outline the oral preparatory phase as voluntary control involving cranial nerves V, VII, and XII.
3. Briefly describe the reflexively controlled pharyngeal phase that involves cranial nerves V, X, XI, and XII including central inhibition of respiration.

**Rationale**

Dyspnea is common and distresses millions of patients with pulmonary disease and myocardial dysfunction. Assessment of the manner dyspnea is described by patients suggests that their description may provide insight into the underlying pathophysiology of the disease.

**Causal Conditions**

1. Cardiac causes (often associated with pulmonary edema)
  - a. Myocardial dysfunction
    - i. Ischemic/Hypertensive cardiomyopathy
    - ii. Dilated (idiopathic, alcoholic, hemochromatosis)
    - iii. Infiltrative
    - iv. Restrictive (amyloid, sarcoid)
    - v. Congenital hypoplasia
  - b. Valvular heart disease
  - c. Deconditioning
  - d. Pericardial disease (tamponade)
  - e. Increased cardiac output (anemia, AV malformation, hyperthyroid)
2. Pulmonary causes
  - a. Respiratory control (metabolic acidosis, ASA, pregnancy)
  - b. Ventilatory pump
    - i. Muscles/Nerves (Guillain-Barré, myasthenia gravis, hypokalemia)
    - ii. Chest Wall/Pleura (kyphos-scoliosis, pleural effusion, pneumothorax)
    - iii. Airways (asthma, obstructive lung disease)
  - c. Gas exchanger
    - i. Alveoli
      - A. Infectious (pneumonia - viral, bacterial, fungus (including PCP), HIV, TB)
      - B. Adult and neonatal RDS
      - C. Vasculitis (Wegener, Goodpasture)
    - ii. Diffusing membrane
      - A. Interstitial pulmonary disease (sarcoidosis, scleroderma, fibrosis)
        - I. Inhalational/Environmental "pneumoconiosis" (inorganic, organic)
        - II. Drugs/Radiation (amiodarone, bleomycin, I<sup>2</sup>-blockers, nitrofurantoin)
      - B. Emphysema
      - C. Neoplastic (lymphangitic carcinomatosis)
    - iii. Pulmonary capillaries (pulmonary embolism)
3. Other (anemia, anxiety, carbon monoxide)

**Key Objectives**

- ❖ Differentiate true dyspnea from tachypnea, hyperpnea, and hyperventilation.
- ❖ Differentiate between cardiac, pulmonary, and neuropsychiatric disease.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between causes of cardiac pulmonary edema (frequently a sensation of 'air hunger' or 'suffocation, smothering'; 'heavy breathing' or 'breathing more' with deconditioning).
  - Differentiate between causes of pulmonary disease ('rapid, shallow breathing' with chest wall or compliance problems; 'chest tightness' or 'constriction' with asthma; 'increased effort to breathe' with COPD or pulmonary fibrosis).
  - Diagnose acute, life-threatening dyspnea in the pediatric and adult patient.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select hematocrit to exclude anemia and interpret lung imaging.
  - Select and interpret heart related investigations (e.g., spirometry, oxymetry, blood gases).
  - Consider the future role of brain natriuretic peptide for differentiating between cardiac and pulmonary dyspnea.
- ❖ Conduct an effective initial plan of management for a patient with dyspnea:
  - Outline initial management for patients with acute dyspnea of cardiac, pulmonary, or neuropsychiatric origin.
  - Select patients in need of specialized care and referral to other health care professionals.
  - Select patients requiring hospitalization.
  - Conduct appropriate education of patients including secondary prevention strategies.

## Applied Scientific Concepts

1. Outline how respiration is controlled, how gas is exchanged and transported, and the consequences at the level of cellular respiration.
2. Relate the above mechanisms to tachypnea, hyperpnea and hyperventilation.

## ACUTE DYSPNEA (minutes to hours)

### Rationale

Shortness of breath occurring over minutes to hours is caused by a relatively small number of conditions. Attention to clinical information and consideration of these conditions can lead to an accurate diagnosis. Diagnosis permits initiation of therapy that can limit associated morbidity and mortality.

### Causal Conditions

1. Cardiac causes
  - a. Ischemic heart disease (acute myocardial ischemia)
  - b. Myocardial dysfunction (congestive heart failure)
    - i. Ischemic/Hypertensive cardiomyopathy
    - ii. Dilated (idiopathic, alcoholic, hemochromatosis)
  - c. Pericardial disease (tamponade)
2. Pulmonary causes
  - a. Upper airway
    - i. Aspiration
    - ii. Anaphylaxis
  - b. Ventilatory pump
    - i. Pleura (pneumothorax)
    - ii. Airways (bronchitis, bronchospasm)
  - c. Gas exchanger
    - i. Pulmonary embolus
    - ii. Pneumonia (viral, bacterial, atypical, fungus)
    - iii. ARDS
    - iv. Vasculitis (Wegener, Goodpasture)
  - d. Respiratory control (metabolic acidosis, ASA toxicity)

### Key Objectives

- ❖ Differentiate true dyspnea from tachypnea, hyperpnea, and hyperventilation.
- ❖ Diagnose and manage acute, life-threatening dyspnea.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between the causes of cardiac dyspnea.
  - Differentiate between causes of pulmonary disease.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret lung imaging (chest x-ray, lung scan, etc.).
  - Select and interpret heart and lung related investigations (ECG, arterial blood gases).
- ❖ Conduct an effective initial plan of management for a patient with acute dyspnea:

- > Outline initial management for patients with acute dyspnea of cardiac, pulmonary, or neuropsychiatric origin.
- > Select patients in need of specialized care and referral to other health care professionals.
- > Select patients requiring hospitalization.
- > Conduct appropriate education of patients including secondary prevention strategies.

## Applied Scientific Concepts

1. Outline how the respiratory system is designed to maintain homeostasis regarding adequate oxygenation and acid-base status.
2. Include oxygenation derangement as well acidemia and hypercapnia as causes of dyspnea in addition to stimulation of mechano-receptors throughout the upper airway, lungs, and chest wall.
3. Identify chemoreceptors in the carotid bodies and aortic arch that sense partial pressure of oxygen in arterial blood and are also stimulated by acidemia and hypercapnia as well as central chemoreceptors in the medulla as causing dyspnea even in the absence of activation of respiratory muscles.
4. Outline the physiology of respiration and its neurologic and biochemical control.



## CHRONIC DYSPNEA (weeks to months)

### Rationale

Since patients with acute dyspnea require more immediate evaluation and treatment, it is important to differentiate them from those with chronic dyspnea. However, chronic dyspnea etiology may be harder to elucidate. Usually patients have cardio-pulmonary disease, but symptoms may be out of proportion to the demonstrable impairment.

### Causal Conditions

1. Cardiac (chronic congestive heart failure, deconditioning)
  - a. Systolic/Diastolic dysfunction
    - i. Ischemia
    - ii. Cardiomyopathy
  - b. Pericardial tamponade
  - c. Anemia/Deconditioning
2. Respiratory
  - a. Ventilatory pump
    - i. Muscles/Nerves/Chest wall (post-polio, myopathy, myasthenia, kyphos-scoliosis, ALS)
    - ii. Pleura and lungs (pulmonary interstitial fibrosis)
    - iii. Airways - obstructive airways disease (asthma, COPD, bronchiectasis, broncho-pulmonary dysplasia)
  - b. Gas exchanger (alveolar blood, infection, emphysema, fibrosis, chr. emboli)

### Key Objectives

- ❖ Determine which factors may precipitate dyspneic episodes in patients with asthma or chronic obstructive lung disease.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between the different causes for obstructive airways disease (usually presenting with chest tightness) from interstitial disease (usually presenting with a sensation of rapid, shallow breathing), from deconditioning (usually a sense of heavy breathing), in contrast to pulmonary congestion (usually dyspnea within 50 - 100 feet of walking).
  - Obtain history of smoking, occupational history, and reproducible inciting events.
- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - Order and interpret appropriate initial investigations including CBC (exclude anemia), chest x-ray, arterial blood gas or oxymetry, and pulmonary function tests.
  - Outline the indications for cardiopulmonary exercise testing.
- ❖ Conduct an effective plan of management for a patient with chronic dyspnea:
  - Discuss the chronic pharmacological management of patients with obstructive airways disease.
  - Select patients in need of hospitalization and/or specialized care.
  - Counsel and educate patients in strategies for smoking cessation and avoidance of precipitants.

- Describe the complications of chronic hypoxia and hypercapnia and outline the role of oxygen supplementation in patients with chronic hypoxia.



27-3 **PEDIATRIC DYSPNEA/RESPIRATORY DISTRESS**

### Rationale

After fever, respiratory distress is one of the commonest pediatric emergency complaints.

### Causal Conditions

1. Upper airway problems
  - a. Croup
  - b. Foreign body aspiration
  - c. Laryngeal edema/Spasm/Epiglottitis
  - d. Retropharyngeal abscess
  - e. Choanal atresia
2. Lower airway/Pulmonary problems
  - a. Tracheitis/Bronchiolitis
  - b. Pneumonia/Atelectasis
  - c. Asthma/Bronchospasm
  - d. Respiratory distress syndrome of the neonate
  - e. Tracheo-oesophageal fistula
3. Cardiac problems
  - a. Congestive heart failure (left-to-right shunt, left ventricular failure)
  - b. Cardiac tamponade
  - c. Pulmonary embolus
4. Pleural problems
  - a. Pleural effusion, empyema
  - b. Pneumothorax
5. Neurologic problems (opiates, increased intracranial pressure, neuromyopathic)
6. Other (diaphragmatic hernia, massive ascites, severe scoliosis)

### Key Objectives

- ❖ For correct assessment, consider the respiratory rate in the context of age of the child (neonates normally breathe 35-50 times per minute, infants 30-40, elementary school children 20-30, and preadolescents 12-20) and observe the quality of the breathing.
- ❖ Differentiate dyspnea from tachypnea, hyperpnea or hyperventilation.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate the child who appears well from a child in distress or critical; ensure patent airway.
  - Determine presence, duration, and type of onset of respiratory distress, presence of cyanosis.
  - Perform examination for vital signs, retraction, flaring, wheezing, or coughing.
  - Perform examination of skin for cyanosis, pulse oximetry, upper airway, trachea, breath sounds, dullness, dysmorphic features, jugular veins, heart, edema, neurologic signs; differentiate cardiac from pulmonary,

neuromuscular or other causes.

- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Determine presence of hypoxia; select and interpret lung imaging and/or cardiac investigations.
  - Outline other investigative tests of blood, sputum, ECG, echocardiography, etc. including cultures, and special tests if patient is immuno-compromised.
- ❖ Conduct an effective plan of management for a patient in respiratory distress:
  - Outline immediate management of hypoxia; select patients in need of hospitalization/referral.
  - Discuss potential side effects of oxygen therapy.
  - Explain choice of antibiotics for pulmonary processes; discuss bronchodilators and steroid use.
  - Explain advantages/disadvantages of diuretics (e.g., furosemide) in treatment of cardiac dyspnea.
  - Counsel patients about secondary prevention strategies.

**Rationale**

The cause of ear pain is often otologic, but it may be referred. In febrile young children, who most frequently are affected by ear infections, if unable to describe the pain, a good otologic exam is crucial. (see also [Hearing Loss/Deafness](#))

**Causal Conditions**

1. External ear pain
  - a. Infections
    - i. Otitis externa
    - ii. Herpes simplex/Zoster
    - iii. Auricular cellulitis
    - iv. External canal abscess
  - b. Trauma (frostbite, burns, hematoma, lacerations)
  - c. Other (foreign body, cerumen impaction, neoplasm of external canal)
2. Middle and inner ear pain
  - a. Infections/Inflammation
    - i. Acute otitis media
    - ii. Otitis media with effusion
    - iii. Mastoiditis, myringitis, skull base infections (malignant otitis in diabetics)
  - b. Trauma (traumatic perforation, barotrauma)
  - c. Neoplasms
  - d. Other (Wegener, cholesteatoma)
3. Referred pain
  - a. Infections (sinusitis, adenitis, dental/pharyngeal/peritonsillar abscess, parotitis)
  - b. Neuralgia
  - c. Other (thyroiditis, cervical spine disease, temporo-mandibular joint dysfunction, wisdom teeth, migraine, trauma, neoplasms)

**Key Objectives**

- ✦ Perform careful examination of the head and neck and upper aero-digestive tract, including the jaw, parotids and thyroid for referred pain, as well as ears (use tuning fork), cervical lymphatics, and mastoid areas.

**Objectives**

See [Hearing Loss](#)

See [Tinnitus](#)

**Applied Scientific Concepts**

1. Explain that obstruction of the eustachian tube (from infection, allergy, enlarged adenoids, and inefficient opening,

decreased stiffness) may lead to middle ear effusion, contamination of the effusion (from nasopharyngeal secretions) and then cause acute infection (otitis media).

2. List common pathogens (strep. pneumoniae, hemophilus influenzae, Moraxella catarrhalis).



## GENERALIZED EDEMA

### Rationale

Patients frequently complain of swelling. On closer scrutiny, such swelling often represents expansion of the interstitial fluid volume. At times the swelling may be caused by relatively benign conditions, but at times serious underlying diseases may be present.

### Causal Conditions

1. Underfill edema (effective arterial blood volume underfill)
  - a. Altered volume/Capacitance ratio
    - i. Pregnancy
    - ii. Liver disease
    - iii. AV fistula
  - b. Altered starling forces
    - i. Increased hydrostatic pressure (right cardiac failure)
    - ii. Decreased oncotic pressure (nephrotic syndrome, cirrhosis)
    - iii. Increased capillary permeability (sepsis, ARDS, burns, trauma, post surgical and allergies)
    - iv. Increased interstitial oncotic pressure (myxedema-non-pitting)
  - c. Left ventricular failure
2. Overfill edema (effective arterial blood volume overfill)
  - a. Renal failure (also nephrotic syndrome if GFR is decreased)
  - b. Drugs (amlodipine, NSAIDs, etc.)
3. Idiopathic

### Key Objectives

- ❖ Differentiate systemic edema from local edema; categorise edema as underfill or overfill based on patient's volume status, since management may be affected.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between the various causes of systemic edema; obtain history of cardiac, renal or hepatic disease; determine where the edema is located (pulmonary edema, peripheral, ascites, local).
  - Examine for vital signs, skin temperature, distribution of edema, presence/absence of pulmonary edema, central venous pressure, cardiac examination, evidence of renal or liver disease.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret laboratory investigations for edema (urinalysis, creatinine, electrolytes, ECG, chest x-ray, echocardiogram, liver function tests, etc.).
- ❖ Conduct an effective initial plan of management for a patient with edema:
  - Outline a plan of management for edema of varying causes.
  - List appropriate dietary interventions.

- > List complications of diuretic use; contrast diuretic use in "underfill" versus "overflow" edema.
- > Select patients in need of specialized care and/or consultation.

## **Applied Scientific Concepts**

1. Explain the meaning of 'effective arterial blood volume', primary salt retention, and secondary salt retention.
2. Draw body compartments and approximate relationship to body weight.
3. Outline the impact of Starling forces in a capillary bed.
4. Describe sodium metabolism including hormonal controls.
5. List 4 classes of diuretics and the renal tubule segment on which they have an effect.
6. Contrast 'forward' (left ventricular) to 'backward' (right ventricular) failure.





## UNILATERAL/LOCAL EDEMA

### Rationale

Over 90 % of cases of acute pulmonary embolism are due to emboli emanating from the proximal veins of the lower extremities.

### Causal Conditions

1. Venous insufficiency
  - a. Post-phlebitic syndrome
  - b. Deep venous thrombosis
    - i. Lower extremity (proximal, calf vein)
    - ii. Upper extremity
2. Trauma (muscle strain, tear, twisting injury to extremity, hematoma)
3. Lymphedema
  - a. Primary
  - b. Secondary (malignancy, chronic cellulitis, connective tissue disease, infection)
4. Baker cyst
5. Infection/Inflammation
  - a. Cellulitis/Soft tissue/Bone
  - b. Chronic dermatitis/Cutaneous mucinosis
6. Infiltrative dermopathy (usually associate with thyroid disease)

### Key Objectives

- ❖ Diagnose proximal lower extremity deep venous thrombosis with accuracy and certainty since untreated it may lead to pulmonary embolus, and treatment with anticoagulation is associated with significant risk.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit history of risk factors for deep vein thrombosis (immobilization, surgery, obesity, previous episode, trauma, malignancy, postpartum or estrogen therapy, family history of thrombosis).
  - Examine extremity for tenderness, pitting or absence of pitting edema, inflammation, discoloration, palpable cord, skin changes, venous ulceration, and especially arterial blood supply.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Since clinical diagnosis of deep vein thrombosis is not sufficiently accurate, diagnostic tests are indicated to confirm or exclude the diagnosis.
  - Select duplex ultrasonography for the diagnosis of chronic venous insufficiency and contrast to venography.
- ❖ Conduct an effective initial plan of management for a patient with edema which is not generalized:
  - Outline primary prevention and management of deep vein thrombosis.
  - Outline the management of cellulitis.
  - Select patients in need of specialized care.

- List indications, complications and management of anti-coagulant therapy.
- Counsel patients about anticoagulant therapy.

## EYE REDNESS

see also [Acute Visual Disturbance/Loss](#)  
see also [Chronic Visual Disturbance/Loss](#)

### Rationale

Red eye is a very common complaint. Despite the rather lengthy list of causal conditions, three problems make up the vast majority of causes: conjunctivitis (most common), foreign body, and iritis. Other types of injury are relatively less common, but important because excessive manipulation may cause further damage or even loss of vision.

### Causal Conditions

1. Lids/Lashes/Orbits/Lacrimal system
  - a. Blepharitis (infectious, allergic)
  - b. Hordeolum (stye)/Chalazion
  - c. Foreign body
  - d. Cellulitis (pre-septal, orbital)
  - e. Naso-lacrimal duct obstruction
2. Conjunctiva/Sclera
  - a. Conjunctivitis (viral, bacterial, chlamydial, allergic, also neonatal)
  - b. Subconjunctival hemorrhage
  - c. Episcleritis/Scleritis
  - d. Pinguecula/Pterygium
3. Cornea (corneal abrasions, contact lens overwear)
  - a. Keratitis, infectious
  - b. Foreign body (refer if not better in 24 hours)
4. Anterior chamber/Iris
  - a. Iritis/Iridocyclitis/Uveitis
  - b. Glaucoma, acute
  - c. Hypopyon
  - d. Hyphema

### Key Objectives

- ❖ Determine whether the condition requires prompt referral.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate causal conditions that are benign from those that require prompt referral.
  - Determine if vision is affected (reading with affected eye), is there foreign body sensation (inability to open and keep eye open is objective evidence), photophobia, trauma, discharge persisting throughout the day, headache and malaise, nausea and vomiting.
  - Determine visual acuity first, then if there is corneal opacity or infiltrate, aversion to light in uninvolved eye, pupil light reaction (not fixed or pin-point), purulent discharge, redness pattern, WBC or RBC in anterior chamber.

- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select investigations for diagnosis and required prior to initiation of therapy.
- ❖ Conduct an effective plan of management for a patient with eye redness:
  - Outline management for two of the three most common causes of eye redness, conjunctivitis and foreign body.
  - Select patients in need of referral.

## Ethics

### **Confidentiality (CLEO 4.2)**

#### **Issues**

- ❖ Trust in doctor patient relationship
- ❖ Patients' right to confidentiality
- ❖ Legal obligation to disclose to public authorities
- ❖ Disclosure to third parties
- ❖ Rights of minors
- ❖ Right to access information (patients under care, with consent)
- ❖ Duty to warn (individuals discovered to be at risk through disclosure made in confidence)

#### **Detailed Objectives**

- ❖ To recognize and seek guidance where harm from disclosure balances harm from maintaining confidentiality.

In a patient with eye redness from chlamydial or gonococcal conjunctivitis, the sexual partners of the patient require identification and treatment.

### **Doctor Patient Relationship (CLEO 4.8)**

#### **Detailed Objectives**

- ❖ The physician will place the best interest of the patient first.

In a patient with eye redness that is painful and associated with diminished or loss of vision, any uncertainty about diagnosis and/or management should lead to early, prompt referral to a specialist.

## Applicable Basic Principles of Law

### **Physician's Legal Liability for Negligence (or, Issues Civil Liability in Québec) (CLEO 5.4)**

#### **Issues**

- ❖ Physicians' civil liability for their actions and omissions
- ❖ Legal foundations for physicians' civil liability
- ❖ Basic elements of physicians' civil liability to a patient

In a patient with eye redness caused by a condition likely to herald a vision-threatening or even life-threatening disorder, failure to recognize and promptly refer such patients may lead to civil liability.

In a patient with eye redness, "shotgun" treatment of the condition prior to diagnosis may delay or confuse accurate diagnosis,

delay or confuse treatment, or exacerbate the condition (e.g., worsening of Herpes simplex keratitis with topical steroids). This type of approach may lead to physician civil liability.

### ***Legal Aspects of Physician Competence and Conduct (CLEO 5.5)***

#### **Issues**

- ❖ Requirement for physician licensure
- ❖ Legal (and ethical) prohibitions (e.g., sexual conduct)
- ❖ Physician's legal (and ethical) obligations of continuity of care, competent and accessible care
- ❖ Physician's obligation to make reports concerning other physician's conduct
- ❖ Conflict of interest
- ❖ Conduct with regards to advertising and soliciting patients

### ***Legal aspects of medical records (CLEO 5.7)***

#### **Issues**

- ❖ The duty to maintain medical records
- ❖ Access to and disclosure of medical records
- ❖ Ownership and transfer of medical records
- ❖ Use in court proceedings

In a patient with ocular trauma, document pre-existing eye disease, safety precautions that were in place or ignored at the location where trauma occurred, condition at presentation, and initial treatment given (or triage and referral).

### **Applied Scientific Principles**

1. Outline the relationship between the anterior chamber angle anatomy and acute angle glaucoma or uveitis; orbit proximity to sinuses and orbital cellulitis.
2. Outline the immune mechanisms of systemic conditions associated with eye redness and determine the rationale of pharmacotherapy of the conditions.
3. List common infectious agents causing eye redness such as blepharitis, keratitis, conjunctivitis, posterior uveitis, orbital cellulitis.



31-1

## **FAILURE TO THRIVE, ELDERLY**

see also [Weight Loss/Eating Disorders/Anorexia](#)

### **Rationale**

Failure to thrive for an elderly person means the loss of energy, vigor and/or weight often accompanied by a decline in the ability to function and at times associated with depression.

### **Causal Conditions**

1. Factors extrinsic to the patient
  - a. Environmental/Social (isolation, loneliness, poverty, elder abuse, neglect)
  - b. Psychologic/Psychiatric (depression)
  - c. Functional (dementia)
2. Somatic causes (intrinsic to the patient)
  - a. Decreased energy (poor dentition, malabsorption, dysphagia)
  - b. Increased energy/Protein requirement (e.g., catabolic state -see [WEIGHT LOSS](#))
  - c. Drugs (adverse effects)
  - d. Medical disease
    - i. Cardiac/Respiratory disease
    - ii. Cancer
    - iii. Chronic infections
    - iv. Metabolic (renal failure, diabetes)
    - v. Changes in visual/Auditory acuity

### **Key Objectives**

- ❖ Calculate the body mass index {BMI = weight (kg)/height (M<sup>2</sup>)}; state that figures outside 22 - 27 constitute a health risk.
- ❖ Conduct an assessment of cognitive function (e.g., using the Folstein mini-mental state examination).

### **Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit information about residence change, loss of independence, evidence of poverty, abusive relationship, etc.; elicit information about number, type, and dosage of medications.
  - Determine whether the gastrointestinal system (starting with mouth problems, to constipation) is a likely cause.
  - Determine status of skin and circulation (e.g., decubitus ulcers, blood pressure).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select a restricted investigation dependent of data available.
- ❖ Conduct an effective plan of management for an elderly patient who fails to thrive:
  - Outline a management plan consistent with the identified cause.
  - List various options available for supplementation of energy intake and discuss advantages and disadvantages.
  - List services available to improve the standard of care at home, including home care nursing, home help services,

- personal care, companion services, and meals on wheels.
- Select patients in need of referral for counseling about financial concerns and education about entitlements.



31-2

## **FAILURE TO THRIVE, INFANT/CHILD**

see also [Weight \(Low\) at Birth/Intrauterine Growth Restriction](#)

### **Rationale**

Failure to thrive is a phrase that describes the occurrence of growth failure in either height or weight in childhood. Since failure to thrive is attributed to children <2 years whose weight is below the 5th percentile for age on more than one occasion, it is essential to differentiate normal from the abnormal growth patterns.

### **Causal Conditions**

1. Prenatal
  - a. Placental insufficiency
  - b. Intrauterine infections
  - c. Genetic (e.g., chromosomal abnormalities and syndromes)
  - d. Maternal
    - i. Pre-existing conditions (diabetes, renal disease, etc.)
    - ii. Use of drugs, tobacco, alcohol abuse
2. Postnatal
  - a. Inadequate calorie intake
    - i. Parent (inadequate parenting/feeding skills, inappropriate food for age, neglect, economic deprivation, insufficient lactation)
    - ii. Infant (sucking/swallowing dysfunction, cleft palate, nasal obstruction, tracheo-esophageal fistula, congenital syndromes, cardiopulmonary disease, hypotonia, chronic infection, HIV, endocrine disorder, CNS tumor, metabolic conditions)
    - iii. Mother/Infant interaction (disturbed mother/child relationship)
  - b. Inadequate calorie absorption (malabsorption, vomiting, GI obstruction, biliary atresia, CNS problems, metabolic problems)
  - c. Increased calorie requirements (hyperthyroid, malignancy, chronic infection/inflammation, respiratory insufficiency, congenital heart disease, anemia, toxins)
3. Social determinants (low income family/child poverty)

### **Key Objectives**

- ❖ Identify psychosocial factors as the predominant reasons giving rise to poor infant and child growth.
- ❖ Although psychosocial problems may predominate (1/3 - 1/2), and organic causes may be more frequent in the first 6 months of life, multiple factors usually contribute (organic, non-organic, and environmental).

### **Objectives**

- ❖ Through efficient, focused, data gathering:
  - Plot growth parameters for any child at regular intervals so as to identify any significant deviation from normal growth curve. Observe infant's behavior.
  - Obtain features on history and physical known to be associated with poor growth, especially diet history.
  - Diagnose the common causes of poor growth at the different age groups; obtain birth history, history of GI



- problems, infections, stools, eating behavior, sleep pattern, amount of time spent alone, family history/size.
- Identify the various social risk factors responsible for poor growth.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Interpret growth parameters to diagnose poor growth.
  - Investigate with minimum but appropriate evaluations the commonly associated problems associated with a child who is failing to thrive.
- ❖ Conduct an effective initial plan of management for a patient who fails to thrive:
  - Conduct a counseling and education program for caregivers of children with poor growth.
  - Conduct an ongoing program to monitor the progress of such children.
  - Appropriately utilize hospitalization, consultation with other health professionals and community resources.
  - Explain the social and psychological impact of failure to thrive on the family and child.

**Rationale**

Falls are common (>1/3 of people over 65 years; 80% among those with 4 risk factors) and 1 in 10 are associated with serious injury such as hip fracture, subdural hematoma, or head injury. Many are preventable. Interventions that prevent falls and their sequelae delay or reduce the frequency of nursing home admissions.

**Causal Conditions**

1. Extrinsic factors (to the patient)
  - a. Accidental, non-accidental (child abuse) and environmental factors
  - b. Medications (?4)/Alcohol
    - i. Neuroleptic/Psychotropic/Sleeping agents (including over the counter)
    - ii. Anticonvulsants
    - iii. Antiarrhythmic medications (class IA)
  - c. Illness (month after hospital discharge, acute/exacerbation of chronic illness)
2. Intrinsic factors (to the patient)
  - a. Orthostasis/Syncope (30%) (see [SYNCOPE/PRE-SYNCOPE/LOSS OF CONSCIOUSNESS \(FAINTING\)](#))
  - b. Age related changes
    - i. Arthritis/Musculo-skeletal/Muscle strength
    - ii. Vision (acuity < 20/60, cataracts, depth perception)
    - iii. Depression/Cortical function/Cognition
  - c. Dizziness/Vertigo (see [DIZZINESS/VERTIGO](#))
  - d. Gait disturbances/Ataxia/Balance (see Gait Disturbance/Ataxia)
3. Other

**Key Objectives**

- ❖ Prevent falls by asking all patients 75 years (70 - 74 with risk factors) old about falls and balance/gait difficulties; observe patients getting into/out of chair without using arms and walking.
- ❖ Identify the potential causes of falls by considering intrinsic or extrinsic factors (or a combination of both).
- ❖ State that only 20% of falls are caused by a single specific cause; the remainder are caused by more than a single factor.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - In a patient with one or more falls, elicit a description of the fall (obtain collateral information if necessary). Determine whether factors extrinsic to the patient may have caused the fall (drugs, alcohol, environmental hazards such as poor illumination, lack of stair rails, rugs, bathmats, footwear, uneven/slippery surface).
  - Determine whether factors intrinsic to the patient may have caused the fall (ataxia, impaired vision, gait disturbance, other disease entities).
  - Conduct a physical and performance evaluation including heart rhythm, postural changes in BP, visual acuity, musculo-skeletal (joints, feet, and range of motion), neurological function, (balance, gait, vibration, cognition),

muscle strength) and footwear. Assess gait and balance.

- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Conduct an environmental assessment for hazards; order tests based on clinical indications.
  - Request CBC, electrolytes, creatinine/urea, glucose; consider vitamin B12, thyroid function.
- ❖ Conduct an effective plan of management for a patient who has a tendency to fall:
  - Counsel for prevention: recommend balance/gait training, muscle strengthening exercises, reduction in home hazards, and gradual discontinuation/dose reduction of medications.
  - Counsel and educate the patient or caregiver about the multifactorial nature of most falls, specific risk factors, and recommended interventions. If patient is alone, educate about what to do if they fall (emergency response system or telephone that is accessible from floor).
  - Outline a management program that includes control of risk factors and provision of an active rehabilitation program that focuses on gait and balance retraining for seniors.
  - List possible modifications in the living environment that reduce the risk of falling.
  - Select patients in need of specialized care.
  - Identify accidental from non-accidental falls.

## Ethics

### *Confidentiality (CLEO 4.2)*

#### Detailed Objectives

- ❖ To recognize situations in which third parties have a legitimate interest and right to information:
  - legal requirements in the interest of public health;
  - legitimate interest of 3rd parties; and
  - duty to warn threatened individuals.

Several studies have attempted to identify specific medical conditions and functional deficits that predict motor vehicle crashes or adverse driving events in the older population. A prior history of falls in the past one to two years represents such a factor.

Patients who have had a fall should be evaluated for ability to drive and then counselled about driving. If identified as unsafe, authorities in charge of driving may need to be informed for on-the-road evaluation.

## Applicable Basic Principles of Law

### *Legal Aspects of Confidentiality (CLEO 5.3)*

#### Detailed Objectives

- ❖ A physician may not disclose patient information (whether about the existence, nature, extent of illness or any other health information) except where expressly authorized by the patient to do so or when the law permits or requires such disclosure.

Some provinces may have mandatory reporting requirements regarding potentially unsafe drivers. However, reporting such patients to licensing authorities may be uncomfortable for many clinicians that consider it a breach of confidentiality and a threat to the clinician-patient relationship.

If the physician has concerns, and talking with the patient who has had a fall does not result in acceptance of the physician's recommendation, resources may be sought in the community (e.g., driving refresher courses, on-the-road evaluation) or other

bodies (Provincial Licensing Authority, CMPA).

## General Organization

### *Medical Records in Office Practice (CLEO 6.5)*

#### Detailed Objectives

The competent physician will be able to demonstrate an understanding:

- ❖ That physicians have a duty to maintain adequate records on each patient.
- ❖ That certain basic elements must be included in that record.

Several studies have attempted to identify specific medical conditions and functional deficits that predict motor vehicle crashes or adverse driving events in the older population. A prior history of falls in the past one to two years represents such a factor.

If the physician has concerns, and talking with the patient who has had a fall does not result in acceptance of the physician's recommendation, resources may be sought in the community (e.g., driving refresher courses, on-the-road evaluation). All issues should be clearly described in the medical record.

**Rationale**

In a primary care setting, 20-30% of patients will report significant fatigue (usually not associated with organic cause). Fatigue <1 month is 'recent'; >6 months, it is 'chronic'.

**Causal Conditions**

1. Psychologic
  - a. Depression
  - b. Anxiety
  - c. Somatization
2. Pharmacologic
  - a. Hypnotic
  - b. Antihypertensives
  - c. Antidepressants
  - d. Drug abuse/Withdrawal (including alcohol)
3. Endocrine-metabolic
  - a. Hypo/Hyperthyroidism
  - b. Diabetes mellitus
  - c. Adrenal insufficiency
  - d. Chronic renal failure
  - e. Chronic liver failure
  - f. Hypercalcemia
4. Cardio-pulmonary
  - a. Chronic congestive heart failure
  - b. Chronic obstructive pulmonary disease
5. Infectious
  - a. Bacterial endocarditis
  - b. Tuberculosis
  - c. Viral (mononucleosis, hepatitis, HIV, CMV)
6. Connective tissue disorders (rheumatoid arthritis, polymyalgia rheumatica)
7. Sleep disturbances/Lack of sleep/Disruption
  - a. Sleep apnea
  - b. Esophageal reflux
  - c. Periodic leg movements
  - d. Bruxism
8. Neoplastic-hematologic
  - a. Occult malignancy
  - b. Anemia
9. Idiopathic
  - a. Idiopathic chronic fatigue
  - b. Chronic fatigue syndrome (fatigue for >6 months + 4 or more associated symptoms)

**Key Objectives**

- ❖ Differentiate from somnolence, dyspnea, and weakness.
- ❖ Although up to 75% of patients will have fatigue from one of the psychologic causes, investigate patients that have the presence of other positive symptoms or abnormal signs.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Contrast fatigue associated with uncompleted activities with that unrelated to exertion, not improved by rest, 'tired all the time', since the latter is less likely to be organ based.
  - Elicit history of sleep (amount, timing, disruption), sexual, eating, and bowel pattern plus other symptoms, since if fatigue is the only symptom, cause is less likely to be found.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select laboratory investigation with care, since absence of other symptoms and presence of a normal physical examination usually indicates that tests will be of value in <5% of patients.
- ❖ Conduct an effective initial plan of management for a patient with fatigue:
  - Perform a complete physical examination (patient will know that the complaint is taken seriously).
  - Outline a plan of management that potentially could assist the patient realize four goals:
    - \* Accomplish activities of daily living.
    - \* Return to work.
    - \* Maintain interpersonal relationships.
    - \* Perform some type of daily exercise.
  - Conduct counseling and education of patients; select patients in need of specialized care.

## Ethics

### *Truth Telling (CLEO 4.4)*

#### Detailed Objectives

- ❖ To recognize reasonable right of patient to know relevant information:
  - purpose and implications of investigations;
  - diagnosis and prognosis of medical condition;
  - risks and benefits of treatment; and
  - health risks to which they are exposed.
- ❖ To recognize and seek guidance in situations of conflict between this and other ethical duties, particularly the duty to do no harm.

Although chronic fatigue syndrome is a relatively infrequent cause of fatigue, it is difficult to know how to manage patients with this diagnosis. A systematic review of several hundred studies revealed that only two interventions had any promise: cognitive behavior therapy and graded exercise. Neither was curative.

Physicians need to inform patients that there is no known specific therapy for chronic fatigue syndrome. Patients with this diagnosis should be advised to be cautious about undertaking high-priced and potentially unsafe courses of therapy. Physicians should guard against the temptation to prescribe empiric treatment of any type.

For physicians to be caring and comforting, they should be comprehensive but truthful, focus on any specific diagnoses suggested by the patient, assure the patient that the symptoms are real and sidestep any consideration of the origin of the symptoms (whether psychogenic or organic).

### Rationale

Fractures and dislocations are common problems at any age and are related to high-energy injuries (e.g., motor accidents, sport injuries) or, at the other end of the spectrum, simple injuries such as falls or non-accidental injuries. They require initial management by primary care physicians with referral for difficult cases to specialists.

### causal conditions

1. High energy injury
  - a. Acute - fracture/dislocation
  - b. Chronic - delayed/nonunion/mal-union
2. Low energy injury
  - a. With exercise - stress fracture
  - b. Without exercise - pathologic fracture
    - i. Metabolic bone disease
    - ii. Tumors (benign, malignant, primary, secondary)
    - iii. Non-accidental injuries (violence)

### Key Objectives

- ❖ In a patient with a fracture or dislocation, determine other aspects of the medical history that might have an impact on and alteration of management (e.g., whether skeleton is child or adult, left or right handed, vocation, previous similar injuries, etc.) and outline initial management.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine the etiologic process underlying the injury. (May impact on therapy.)
  - Determine neurologic and vascular status distal to level of injury.
  - Determine location of pain, closed or open fracture, local soft tissue changes, (swelling, ecchymosis, loss of function, bone or joint malalignment, active and passive range of motion, joint above and below suspected long bone fracture).
  - If minimal trauma causes a fracture, elicit history of conditions associated with pathologic fractures (metabolic bone disease, tumors), or identify activity that involves highly repetitive low-level stress (e.g., running).
  - Determine whether pain increases with exercise, subsides with rest, and usually involves lower 1/3 of tibia, metatarsals, tarsals, fibula, and sesamoid bones of foot.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select skeletal elements to be included in the diagnostic imaging required, special views.
  - List circumstances requiring additional diagnostic imaging such as computerised tomography, imaging of opposite side for comparison, bone scan, MRI.
  - Outline investigation in a patient with a pathologic bone fracture.
- ❖ Conduct an effective initial plan of management for a patient with fractures/dislocations:

- Refer immediately to orthopedic evaluation patients with open, angulated, or displaced fractures, dislocations that cannot be reduced, and patients with neurovascular compromise.
- List methods to obtain and maintain appropriate reduction; instruct patient to return for evaluation in case of numbness, tingling, or increased pain in area distal to splint/cast.
- Determine whether closed or open treatment is required and select patients requiring referral.
- List complications of casting, and other forms of reduction, and means of prevention.
- Outline management of stress fractures.
- Explain why and how treatment necessary for pathologic fractures differs.

### **Applied Scientific Concepts**

1. Briefly outline the process of cell division, regeneration, and differentiation as it pertains to bone healing.
2. Describe the various mechanisms responsible for fractures (i.e., linear, spiral, depressed etc.).



**Rationale**

Abnormalities of gait can result from disorders affecting several levels of the nervous system and the type of abnormality observed clinically often indicates the site affected.

**Causal Conditions**

1. Disorders of balance
  - a. Cerebellar ataxia
    - i. Midline lesions (tumors, hemorrhage, infarct, multiple sclerosis, drugs, toxins)
    - ii. Hereditary
      - A. Catalytic/Inborn errors (childhood) - usually autosomal recessive
        - I. Intermittent (e.g., Hartnup disease)
        - II. Progressive (e.g., Tay-Sachs, Niemann-Pick, Lesch Nyhan, Wilson)
      - B. Progressive degenerative ataxia
        - I. Recessive (e.g., Friedreich, ataxia telangiectasia)
        - II. Dominant - Spinocerebellar ataxia, Prion disorder
        - III. X-linked/Mitochondrial
  - b. Sensory ataxia
    - i. Vestibular (see [DIZZINESS/VERTIGO](#))
    - ii. Proprioceptive (see [NUMBNESS/TINGLING/ALTERED SENSATION](#))
    - iii. Visual (see [ACUTE VISUAL DISTURBANCE/LOSS](#) or [CHRONIC VISUAL DISTURBANCE/LOSS](#))
2. Disorders of locomotion
  - a. Weakness disorders (see [WEAKNESS/PARALYSIS/PARESIS/LOSS OF MOTION](#))
  - b. Parkinsonian gait (see [MOVEMENT DISORDERS, INVOLUNTARY/TIC DISORDERS](#))
  - c. Higher level gait disorders (disorders of frontal lobes, basal ganglia, thalamus, midbrain such as stroke, hydrocephalus, dementia, tumors)
  - d. Antalgic gait (MSK disorders: arthropathies, deformities of legs, spine)
3. Hysterical gait

**Key Objectives**

- ❖ Determine whether the gait disturbance occurs more in the dark or light (sensory), whether giddiness or vertigo (vestibular) accompanies the disturbance, presence or absence and distribution of muscle weakness, and whether there is pain, numbness, or tingling in the limbs (sensory).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate between cerebellar and sensory ataxia.
  - Determine whether there is weakness (difficulty rising from a chair, fatigability of muscles), stiffness, or pain (trauma to legs, pelvis or spine, arthritis).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion,

differentiation, and diagnosis:

- Outline initial investigation for a patient with an abnormal gait.
- Select patients in need of referral for further investigation.
- ❖ Conduct an effective plan of management for a patient with gait disturbance:
  - Select patients in need of specialized care.
  - Outline a management plan for patients with antalgic gait.

### Rationale

Genetics have increased our understanding of the origin of many diseases. Parents with a family history of birth defects or a previously affected child need to know that they are at higher risk of having a baby with an anomaly. Not infrequently, patients considering becoming parents seek medical advice because of concerns they might have. Primary care physicians must provide counseling about risk factors such as maternal age, illness, drug use, exposure to infectious or environmental agents, etc. and if necessary referral if further evaluation is necessary.

### Causal Conditions

1. Chromosome defects
  - a. Numerical (e.g., Down Syndrome)
  - b. Structural-translocations, deletions and inversions (e.g., Cri du Chat)
2. Mendelian
  - a. Dominant
    - i. Huntington chorea
    - ii. Familial hypercholesterolemia
    - iii. Polycystic kidney disease
  - b. Recessive (cystic fibrosis)
  - c. X-linked (hemophilia, Duchenne muscular dystrophy)
3. Multifactorial conditions (neural tube defects)

### Key Objectives

- ❖ Elicit history on the proband or index case (the clinically affected person who brought the family to physician's attention) and of each of the first-degree relatives (parents, siblings, and offspring of the proband). Formulate a three-generation pedigree.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit history regarding prior obstetrical, medical, and family history, exposure or concerns during current pregnancy, age of mother at date of delivery.
  - Determine whether there are relatives with identical, similar, or associated features, or a problem recognized to be genetically determined; is there consanguinity, what is the ethnic origin of the family.
  - Identify/search literature for physical characteristics/hallmark features of genetic conditions.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List diagnostic tests available for prenatal diagnosis (e.g., amniocenteses, fetal blood sampling); discuss sensitivity, specificity, expense, and risk of such testing.
  - Differentiate between screening tests and diagnostic tests for chromosome disorders and list indications.
  - Select patients requiring consultation with a DNA laboratory or geneticist about additional investigation.
- ❖ Conduct an effective plan of management for patients with genetic concerns:

- Counsel pertinent family members by explaining meiosis, mitosis, and errors leading to aneuploidy.
- Select patients for referral to genetics specialists, community resources, social support groups, etc.
- Counsel patients regarding alternative reproductive options (e.g., contraception, therapeutic donor insemination, donor ova, adoption, prenatal diagnosis with/without therapeutic termination of affected fetus).

## Ethics

### *Resource Allocation (CLEO 4.5)*

#### Issues

- ❖ Fair access to health care resources

#### Detailed Objectives

- ❖ To make health care resources available to patients in a manner which is fair and equitable, without bias or discrimination.
- ❖ To be prudent and avoid waste in the utilisation of scarce or costly resources.

In the Canadian social order, considerations include the choice of diseases appropriate for prenatal testing and the extent of control to be exerted over the biologic constitution of future generations. Access to prenatal genetics services for the general population is critical. Unless genetic screening is supported financially, it may become limited to the affluent. This situation creates a risk that genetic disability will become a marker of social class.



36-1

## AMBIGUOUS GENITALIA

### Rationale

Genetic males with 46, XY genotype but having impaired androgen sensitivity of varying severity may present with features that range from phenotypic females to 'normal' males with only minor defects in masculinization or infertility. Primary care physicians may be called upon to determine the nature of the problem.

### Causal Conditions

1. Genetic Males
  - a. Androgen insensitivity
    - i. Complete
    - ii. Incomplete (female phenotype, male phenotype/Reifenstein syndrome)
  - b. Mixed gonadal dysgenesis
  - c. Defective testosterone synthesis/DHT synthesis
2. Genetic Females
  - a. Exogenous progestin or androgen administration
  - b. Ovarian tumors/Cysts (luteoma, theca-lutein cysts, arrhenoblastoma)
  - c. Adrenal tumors/Hyperplasia

### Key Objectives

- ❖ Evaluate newborn infants with ambiguous genitalia and adolescents with abnormal sexual maturation so that appropriate referrals for specialized care can be facilitated.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether females with ambiguous genitalia have inguinal or labial masses.
  - In females with primary amenorrhea, see [AMENORRHEA](#).
  - Examine adolescent females for size of clitoris and virilization; examine males with abnormal puberty for gynecomastia.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective plan of management for a patient with ambiguous genitalia:
  - Counsel parents on the importance of early gender assignment in order to prevent potential harm in psychosocial development; consult pediatric urologists for advice on gender assignment.
  - Select patients for referral to specialists, community resources, social support groups, etc.



## DYSMORPHIC FEATURES

### Rationale

Three out of 100 infants are born with a genetic disorder or congenital defect. Many of these are associated with long-term disability, making early detection and identification vital. Although early involvement of genetic specialists in the care of such children is prudent, primary care physicians are at times required to contribute immediate care, and subsequently assist with long term management of sucklings.

### Causal Conditions

1. Teratogenic disorders (fetal alcohol syndrome, coumarin, Accutane, anticonvulsants)
2. Chromosomal disorders
  - a. Down syndrome
  - b. Turner syndrome
  - c. Fragile X chromosome
  - d. Klinefelter syndrome
3. Genetic Abnormalities with Dysmorphic Features (e.g., Tuberous sclerosis, Neurofibromatosis, Duchenne muscular dystrophy)

### Key Objectives

- ❖ Demonstrate empathy for parents' concern, if diagnosis is known outline probable course/management, and discuss early referral for specialised care if appropriate.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Formulate a phenotype from relevant family history.
  - Determine exposure if any to teratogens in pregnancy.
  - Examine patient and differentiate chromosome disorders or genetic syndromes in the family from other types of dysmorphic features.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List indications for antenatal screening.
  - Determine by seeking the advice of a specialist whether any immediate investigation is required prior to referral.
- ❖ Conduct an effective plan of management for a patient with dysmorphic features:
  - Explain the alternatives for dealing with the risk of recurrence.
  - Counsel families or assist with literature search, or refer for genetic counselling if a genetic disorder is identified concerning future risks and prenatal strategies for the prevention of dysmorphic disorders.
  - Discuss with the parents that the long-term care will depend on the diagnosis and prognosis, but may involve specialised medical care, multidisciplinary services, family support, and if necessary academic support and child placement.

## Ethics

### *Resource Allocation (CLEO 4.5)*

#### Issues

- ❖ Fair access to health care resources

#### Detailed Objectives

- ❖ To make health care resources available to patients in a manner which is fair and equitable, without bias or discrimination.
- ❖ To be prudent and avoid waste in the utilization of scarce or costly resources.

In the Canadian social order, considerations include the choice of diseases appropriate for prenatal testing and the extent of control to be exerted over the biologic constitution of future generations. Access to prenatal genetics services for the general population is critical. Unless genetic screening is supported financially, it may become limited to the affluent. This situation creates a risk that genetic disability will become a marker of social class.



## HYPERGLYCEMIA/DIABETES MELLITUS

### Rationale

Diabetes mellitus is a very common disorder associated with a relative or absolute impairment of insulin secretion together with varying degrees of peripheral resistance to the action of insulin. The morbidity and mortality associated with diabetic complications may be reduced by preventive measures. Intensive glycemic control will reduce neonatal complications and reduce congenital malformations in pregnancy diabetes.

### Causal Conditions

1. Type 1 ( $\beta$ -cell destruction, insulin deficiency)
  - a. Immune-mediated
  - b. Idiopathic
2. Type 2 (insulin resistance)
3. Other specific types
  - a. Genetic defects ( $\beta$ -cell function or insulin action)
  - b. Diseases of the pancreas (e.g., chronic pancreatitis)
  - c. Endocrine/Metabolic (Cushing syndrome, acromegaly, pheochromocytoma)
  - d. Drugs/Chemicals/Infections (glucocorticoids, thiazides)
4. Gestational diabetes mellitus

### Key Objectives

- ❖ Diagnose diabetes mellitus and diabetic ketoacidosis according to established criteria for children and adults.
- ❖ Provide initial management for individuals with diabetic ketoacidosis and treatment-induced hypoglycemia.
- ❖ Provide ongoing management to diabetics and their families.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Diagnose diabetes mellitus and associated complications.
  - Diagnose diabetic ketoacidosis, severe hyperglycemia, and hyperosmolar state; determine the precipitating causes.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select appropriate investigations for diagnosis of diabetes mellitus and its complications.
  - Discuss HbA1c and glycemic monitoring.
  - Discuss urine microalbumin and nephropathy diagnosis.
- ❖ Conduct an effective initial plan of management for a patient with hyperglycemia:
  - Outline the management of ketoacidosis, hyperosmolar state, and severe hypoglycemia.
  - Outline appropriate immediate and long term management of diabetes mellitus, including blood pressure control and primary and secondary prevention of complications, both micro and macrovascular.
  - Select patients in need of specialized care and/or referral to other health care professionals.
  - Conduct education and counseling to patients with diabetes mellitus and their families, including lifestyle modifications, and primary and secondary preventive strategies for the complications of the disease (role of ACEI



and ARBs, lipid control, BP control).

## Ethics

### *Confidentiality (CLEO 4.2)*

#### Detailed Objectives

- ❖ To recognize situations in which third parties have a legitimate interest and right to information:
  - legal requirements in the interest of public health;
  - legitimate interest of 3rd parties (e.g., Insurance companies); and
  - duty to warn threatened individuals.
- ❖ To recognize reasonable limits of disclosure, and reveal only the relevant and necessary information, in a situation requiring disclosure to a third party.
- ❖ To recognize the need to advise patient of obligatory disclosure of information.

Patients with long-standing diabetes may develop diabetic retinopathy that is sufficiently severe to render them potentially dangerous to others when driving a car. If a physician's assessment of the patient reveals impaired vision, the patient should be advised to stop driving. If the patient does not heed the advice against driving, the physician needs to decide whether the harm from disclosure balances the harm of maintaining confidentiality and act according to that decision.

## Applicable Basic Principles of Law

### *Statutory Requirements of Physicians (CLEO 5.6)*

#### Detailed Objectives

- ❖ Physicians are legally required under certain provisions of various provincial and federal laws to report confidential information concerning the health, well being, morbidity, or mortality of a patient to the appropriate authorities.
- ❖ Reporting requirements vary from province to province, and often include areas such as:
  - fitness to drive a vehicle on public highways.

Patients with long-standing diabetes may develop diabetic retinopathy that is sufficiently severe to render them potentially dangerous to others when driving a car. If a physician's assessment of the patient reveals impaired vision, the patient should be advised to stop driving. If the patient does not heed the advice against driving, the physician needs to decide whether the harm from disclosure balances the harm of maintaining confidentiality and act according to that decision. If the patient is not fit to drive a vehicle on public highways, the physician is required to report this fact.

## General Organizational

### *Inter-Professional Issues (CLEO 6.9)*

#### Detailed Objectives

- ❖ The proper inter-professional relationship based on respect and clear communication.
- ❖ The delegation of acts between physicians and other health care workers.
- ❖ The ability to work in a collegial way within a team structure involving other physicians and health care workers.
- ❖ Maintain respect for the role of the other health professions at all times.

The management of patients with diabetes mellitus is a collaborative undertaking. The team of professionals that need to be involved includes family physicians, dieticians, nurses, social workers, pharmacists, podiatrists, ophthalmologists, endocrinologists, cardiologists, nephrologists, etc. It is essential that the inter-professional relationship be based on respect and clear communication. Certain tasks need to be delegated between physicians and other health care workers. All involved must work in a collegial way within the care team structure and maintain respect for the role of the other health professions at all times.

### **Applied Scientific Concepts**

1. Contrast the mechanism of hyperglycemia in Type I and Type II diabetes mellitus.
2. Compare the mechanism of action of insulin to that of various classes of oral hypoglycemic agents.

**Rationale**

Maintenance of the blood sugar within normal limits is essential for health. In the short-term, hypoglycemia is much more dangerous than hyperglycemia. Fortunately, it is an uncommon clinical problem outside of therapy for diabetes mellitus.

**Causal Conditions**

1. Postprandial hypoglycemia
  - a. Alimentary hyperinsulinism (previous gastrectomy, gastrojejunostomy)
  - b. Idiopathic
2. Fasting hypoglycemia
  - a. Secondary to overutilization of glucose
    - i. Associated with hyperinsulinism
      - A. Exogenous insulin, sulfonylureas (including factitious hypoglycemia)
      - B. Insulinoma/Islet hypertrophy
      - C. Miscellaneous drugs (pentamidine, quinine)
    - ii. Associated with normal insulin levels (large extrapancreatic mesenchymal tumors)
  - b. Secondary to impaired glucose production
    - i. Hormone deficiencies
      - A. Adrenal insufficiency
      - B. Hypopituitarism
    - ii. Substrate deficiency (severe malnutrition, muscle wasting, anorexia)
    - iii. Drugs (alcohol, salicylate intoxication, quinine, pentamidine)
    - iv. Enzyme defects (glucose-6-phosphatase)
    - v. Critical illnesses (severe hepatic failure, cardiac disease, sepsis)
    - vi. Autoimmune hypoglycemia
  - c. In infancy (neonates of diabetics, glycogen storage dis., galactosemia)

**Key Objectives**

- ❖ Differentiate the causes of hypoglycemia based on whether it occurs in the postprandial or fasting state.
- ❖ Determine which patients are at risk for being unaware of hypoglycemia.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Identify those patients with true hypoglycemia as opposed to pseudohypoglycemia.
  - Differentiate the cause for hypoglycemia.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Evaluate the blood sugar in patients with symptoms suggestive of postprandial hypoglycemia.
  - Outline the optimal laboratory work-up for a patient with fasting hypoglycemia and conduct the investigations at

the time of the spontaneous hypoglycemia.

- ❖ Conduct an effective plan of management for a patient with hypoglycemia:
  - Outline the management of an acute hypoglycemic episode.
  - Counsel and educate patients with diabetes and hypoglycemia unawareness on methods to prevent hypoglycemia.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Outline the normal homeostatic response to fasting that prevents blood glucose concentrations from falling.
2. Outline the roles of epinephrine, glucagon, growth hormone, and cortisol in the fasting state.

**Rationale**

Although in themselves hair changes may be innocuous, they can be psychologically unbearable. Frequently they may provide significant diagnostic hints of underlying disease.

**Causal Conditions**

1. De-pigmentation (protein, copper deficiency)
2. Alopecia
  - a. Scarring present (associated with fibrosis and scar tissue)
    - i. Infection (severe folliculitis, dissecting cellulitis)
    - ii. Skin conditions (bullous diseases, lichen planopilaris, discoid lupus)
    - iii. Chemical alopecia
    - iv. Tumors
  - b. Scarring absent
    - i. Androgenetic alopecia (most common in 30 - 40% of adult men and women)
    - ii. Telogen effluvium - loss of mature hair (e.g., acute illness, surgery - good prognosis)
    - iii. Anagen effluvium - loss of growing hair (e.g., alkylating, antimitotic, cytotoxic agents)
    - iv. Alopecia areata, alopecia totalis
    - v. Traumatic alopecia
    - vi. Infections (e.g., tinea capitis)

**Key Objectives**

- ❖ In patients with alopecia determine whether scarring is present (scarring precludes hair growth and is indicative of another process).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate between various causes by seeking corroborative evidence.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective plan of management for a patient with alopecia:
  - Outline use of oral (e.g., finasteride) and topical (e.g., minoxidil) solutions.
  - Outline management plan for local hair disorders.
  - Select patients in need of referral.

### Rationale

Nail disorders (toenails more than fingernails), especially ingrown, infected, and painful nails, are common conditions. Local nail problems may be acute or chronic. Relatively simple treatment can prevent or alleviate symptoms. Although in themselves nail changes may be innocuous, they frequently provide significant diagnostic hints of underlying disease.

### Causal Conditions

1. Local nail problems (paronychia, herpetic whitlow, ingrown toenails)
2. Shape changes
  - a. Hour-glass nail/Finger clubbing (lung disease, cyanotic heart disease, colitis, etc.)
  - b. Hollow/Spoon-shaped - koilonychia (iron deficiency, malnutrition, diabetes)
  - c. Hypoplastic (fetal alcohol, nail-patella, and congenital syndromes)
  - d. Onycholysis - separation of nail plate from nail bed (impaired viability of nail bed/impaired circulation - thyroid disease, trauma, fungal)
  - e. Onychogryphosis - thickening of nail plate (chronic inflammation, tinea, psoriasis)
  - f. Onychomycosis - nail plate is friable (tinea)
3. Surface changes
  - a. Transverse grooves (serious acute illness stops nail growth)
  - b. Transverse white lines/bands (hypoalbuminemia, poisons)
  - c. Pitting (psoriasis, paronychia, inflammatory damage)
4. Color changes
  - a. Yellow (tinea, jaundice, tetracycline, hypoplasia/dysplasia of lymphatics)
  - b. Black (hematoma, melanoma, chronic paronychia)
  - c. Brown (nicotine, psoriasis, poisons)
  - d. Splinter haemorrhages (trauma, bacterial endocarditis, blood dyscrasia)
  - e. Blue-green (pseudomonas nail infection)

### Key Objectives

- ❖ In patients with nail changes differentiate between changes in shape, surface, and color.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate local from systemic problems.
  - Differentiate between various causes by seeking corroborative evidence.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective plan of management for a patient with nail complaints:
  - Outline management plan for local nail disorders.
  - Select patients in need of referral.

**Rationale**

The differentiation of patients with headaches due to serious or life-threatening conditions from those with benign primary headache disorders (e.g., tension headaches or migraine) is an important diagnostic challenge.

**Causal Conditions**

1. Migraine (with aura/without aura)
2. Tension-type headache
3. Headache with medication overuse/Chronic daily headaches
4. Cluster headache
5. Headache associated with vascular disorders
  - a. Subarachnoid hemorrhage
  - b. Temporal arteritis
  - c. Venous thrombosis
  - d. Intracranial hematoma (including epidural, subdural)
  - e. Severe arterial hypertension
6. Headache associated with nonvascular intracranial disorder
  - a. Elevated CSF pressure (intracranial mass lesion, or hydrocephalus)
  - b. Intracranial infection (meningitis, abscess, sinusitis)
7. Miscellaneous
  - a. Systemic viral infection
  - b. Psychological disorders
  - c. Medication use (nitroglycerin) or medication withdrawal (analgesic)

**Key Objectives**

- ❖ Differentiate benign headaches from those caused by potentially serious causes. A rapidly progressive headache syndrome suggests a serious cause.
- ❖ Identify patients that require referral/brain imaging (new/explosive onset, change in pattern, jaw claudication, limb girdle pain, worse with stooping over, straining, coughing; neurological signs on exam, temporal artery tenderness).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate between the various causes of headache.
  - Select patients in need of immediate management.
- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - Outline and interpret appropriate and cost-effective laboratory and diagnostic imaging tests used in the assessment of patients with headache.
- ❖ Conduct an effective plan of management for a patient with benign headache syndromes:
  - Contrast symptomatic from prophylactic treatment; give examples of medications in each group (e.g., ASA,

- NSAIDs, codeine, triptans for symptomatic, and tricyclics, beta-blockers, valproic acid for prophylaxis).
- Outline use of analgesics and ergotamine for the purpose of avoiding the development of chronic daily headaches secondary to medication overuse.
  - Select patients in need of specialized care.
  - Provide patient education and counseling regarding the causes and management of headache.
  - Identify patients with complications related to narcotic therapy and addiction.

## Applicable Basic Principles of Law

### *Physicians' Legal Liability for Negligence (or, in Québec, Civil Liability) (CLEO 5.4)*

#### Detailed Objectives

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstances under consideration.

In a patient with headache, the primary care physician may miss a serious headache, such as subarachnoid hemorrhage. The diagnosis is missed most often because of incomplete clinical assessment. Although serious causes for headache are not frequent, failure to diagnose has potentially disastrous consequences. Legal liability may result.

## Applied Scientific Principles

1. List the intracranial structures that are pain-sensitive.
2. Discuss the pathophysiology of migraine (e.g., the role of serotonin, origin of aura, the trigeminoneurovascular system).



**Rationale**

Many hearing loss causes are short-lived, treatable, and/or preventable. In the elderly, more permanent sensorineural loss occurs. In pediatrics, otitis media accounts for 25% of office visits. Adults/older children have otitis less commonly, but may be affected by sequelae of otitis.

**Causal Conditions**

1. Conductive hearing loss
  - a. External ear pathology
    - i. Developmental (microtia, atresia, stenosis)
    - ii. Inflammation or infection (otitis externa, bacterial or fungal)
    - iii. Obstruction of canal (wax, foreign body, tumor, trauma, stenosis)
  - b. Middle ear pathology
    - i. Congenital (atresia, malformation)
    - ii. Otitis media (acute, chronic, with effusion)
    - iii. Cholesteatoma
    - iv. Ossicular pathology (otosclerosis, fracture)
    - v. Tympanic membrane perforation
    - vi. Tumors (glomus, adenoma)
2. Sensory - neural hearing loss (sudden, chronic)
  - a. Cochlear (inner ear) pathology
    - i. Presbycusis
    - ii. Noise (induced hearing loss)
    - iii. Ototoxic drugs (aminoglycosides, chemotherapy, etc.)
    - iv. Trauma (temporal bone fracture, perilymph fistula)
    - v. Inner ear disease (MÃ©niÃ©re disease, autoimmune, barotrauma)
    - vi. Infection - viral cochleitis
  - b. Retro-cochlear/Central pathology
    - i. Cerebello-pontine angle tumors (acoustic neuroma, meningioma)
    - ii. Infection (meningitis)
    - iii. Multiple sclerosis, other autoimmune disease
    - iv. Vascular occlusion
  - c. Congenital
    - i. Hereditary, congenital syndromes (e.g., Alport syndrome)
    - ii. High risk birth (TORCH infections, low birth weight, etc.)

**Key Objectives**

- ❖ Differentiate between conductive and sensory-neural hearing loss by history and tuning fork test.
- ❖ Communicate primary prevention strategy (e.g., ear noise protection).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit history mindful of the nonspecific symptoms of otitis in younger children; examine after wax removal; identify risks of hearing loss (familial, industrial, drugs, at birth).
  - Differentiate conductive and sensorineural hearing loss with a tuning fork (Weber and Rinne tests).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Differentiate conductive and sensorineural hearing loss on audiograms.
- ❖ Conduct an effective plan of management for a patient with hearing loss:
  - Select patients in need of specialized care.
  - Outline management and follow-up plan for patient with otitis, selecting appropriate antibiotics.
  - Counsel and educate patients about primary prevention of hearing loss (e.g., ear noise protection).

## Applied Scientific Concepts

1. List the components of the outer, middle, and inner ear.
2. Outline the transformation of sound waves from the time they are "caught" by the auricle to the fluid waves within the cochlea, the motion of the organ of Corti, depolarization of the auditory nerve, and organization by the brain into complex sounds.

**Rationale**

Hemiplegia/hemisensory loss results from an upper motor neuron lesion above the mid-cervical spinal cord. The concomitant finding of aphasia is diagnostic of a dominant cerebral hemisphere lesion. Acute hemiplegia generally heralds the onset of serious medical conditions, usually of vascular origin, that at times are effectively treated by advanced medical and surgical techniques.

If the sudden onset of focal neurologic symptoms and/or signs lasts <24 hours, presumably it was caused by a transient decrease in blood supply rendering the brain ischemic but with blood flow restoration timely enough to avoid infarction. This definition of transient ischemic attacks (TIA) is now recognized to be inadequate.

**Causal Conditions**

1. Transient brain ischemia (<24 hours - 50% acute infarct) - thrombosis or embolism as below
2. Ischemic stroke (>24 hours) - 80% of strokes
  - a. Thrombosis (atherosclerosis, dissection, fibromuscular dysplasia, vasoconstriction)
    - i. Large artery
    - ii. Small penetrating vessel (lacunar)
  - b. Embolism (cardiac or aortic source)
    - i. Left ventricle/Atrium thrombus/Myxoma
    - ii. Rheumatic/Prosthetic valve
    - iii. Atrial fibrillation
    - iv. Bacterial endocarditis
    - v. Ascending aortic atheromatous disease
  - c. Systemic hypoperfusion
    - i. Cardiac arrest/Arrhythmia
    - ii. Acute myocardial ischemia
    - iii. Pericardial tamponade, pulmonary embolus
3. Hemorrhagic stroke - 20% of strokes
  - a. Intracerebral hemorrhage
    - i. Hypertension
    - ii. Trauma
    - iii. Drugs (amphetamines, cocaine)
    - iv. Bleeding diathesis, bleeding into tumors
  - b. Subarachnoid hemorrhage
    - i. Arterial aneurysm
    - ii. Vascular malformations
4. Other causes of hemiplegia
  - a. Subdural hematoma/Chronic subdural
  - b. Infectious/Inflammatory (e.g., brain abscess, multiple sclerosis)
  - c. Tumors (primary, metastatic, benign)

**Key Objectives**

- ❖ Ensure medical stability (e.g., breathing) and reverse conditions contributing to problem (e.g., treat BP only if hypertension is extreme or patient is in heart failure).
- ❖ Differentiate acute stroke from seizures, syncope, migraine, hypoglycemia, head trauma, brain tumor, etc.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between causes of hemiplegia based on time course (gradual progression during minutes or hours, or stuttering progression over hours or days with periods of improvement, or sudden onset with maximal deficit at onset, or abrupt severe headache) and the presence of risk factors for each of the causes listed above.
  - Identify risk factors for intracerebral hemorrhage such as hypertension, trauma, bleeding diathesis, illicit drugs; determine preceding physical activity, level of alertness.
  - Identify risk factors for thrombosis/embolism such as age, smoking, diabetes, history of TIA, presence of neck bruit, history of heart disease.
  - Determine history of monocular blindness, diplopia, or aphasia to focus vascular lesion.
  - Examine for neck and retro-orbital bruits, pulses in neck, arms, and legs, heart rhythm, skin for signs of endocarditis, cholesterol emboli, purpura, ecchymoses, fundi, signs of trauma, persistent neurologic deficit.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order CBC, electrolytes, urea, creatinine, glucose, liver function tests, toxicology, PT, PTT.
  - List the indications for non-contrast CT, CT angiography, MRI, and trans-thoracic echocardiogram in patients with TIA or stroke.
  - Order neuro-imaging studies; outline use of focused Doppler, MRI, or CT angiography.
- ❖ Conduct an effective plan of management for a patient with hemiplegia, hemisensory loss +/- aphasia:
  - Outline the acute medical management for a patient with TIA or an ischemic stroke.
  - Outline the acute medical and surgical management for a patient with an intracranial hemorrhage.
  - Discuss the primary and secondary preventive measures used in the prophylaxis of ischemic stroke including medications and carotid endarterectomy; discuss the predictive value of a carotid bruit.
  - Select patients in need of specialized care.
  - Counsel and educate patients on the importance of rehabilitation.

## Ethics

### *Consent to Investigation or Treatment (CLEO 4.3)*

#### Detailed Objectives

- ❖ To explain the legal and ethical bases for consent.
- ❖ To demonstrate awareness of process for the assessment of capacity to give consent, and be able to conduct such as assessment.
- ❖ To recognize factors which can alter capacity (e.g., disease, drugs, depression).
- ❖ To identify appropriate substitute decision maker, or the process to determine that individual.
- ❖ To communicate clearly information relevant to informed consent (what a reasonable person would want to know in a given circumstance).
- ❖ To identify reasonable steps to ensure understanding of information: can the patient explain the medical problem and the proposed treatment or test.

Physicians have recognized the right of the patient to participate in medical decision making for the last 25 years. The principle of autonomy, or the right to make choices about one's own life, has now become the centerpiece of modern biomedical ethics. Unfortunately, close to 50 percent of individuals over age 85 have dementia, which usually precludes their understanding of many of the issues involved in choosing among treatment alternatives. In addition, some cognitively intact

elderly are delirious during an acute illness and are incapable of complex discussions about their care at just the time that important decisions must be made. In these situations, a surrogate must be identified to speak on behalf of the older patient.

The commonest causes of neurological death are traumatic brain injury, cerebro-vascular accidents, and hypoxic-ischemic injury after cardiac arrest. A key step in the optimal care of these patients is the understanding that when death is inevitable despite the best possible care, it is important to focus on offering the opportunity for solid organ donation as part of quality end-of-life care. Consequently, it is important to determine whether the patient had expressed intention for such donation through advanced directives. If not, a substitute decision-maker needs to be identified.

## **ASSESSING DECISION-MAKING CAPACITY**

The physician must assess the patient's decision-making capacity before concluding that a given individual cannot speak for himself or herself. Mildly demented patients, for example, may understand the issues involved in a simple surgical procedure well enough to allow them to choose or decline surgery, even if they no longer have the ability to balance their chequebook or live independently. Conversely, superficially intact patients may be unable to understand the pros and cons of a proposed intervention.

An assessment of decision-making capacity can and should be performed by the primary physician; determining decision capacity for a specific medical intervention requires neither legal intervention nor psychiatric expertise. On the other hand, decisions about competence are judicial determinations that involve ruling on the patient's global decision making ability. Competency determinations are necessary when evaluating the capacity of a person to make non-medical decisions, such as financial matters.

There is no "test" of decision capacity; the mini-mental status examination or other quantitative measures of cognitive function do not predict the ability to make medical decisions, except in the case of extreme impairment. Nevertheless, the clinician can be satisfied that a patient is capable of making decisions if he or she has the following abilities, which can be determined at the bedside:

1. The ability to communicate (a translator, a communications board for aphasic patients, writing out questions with a deaf patient, etc. may be essential in clarifying ability to communicate).
2. The ability to understand the proposed treatment and alternative interventions. Often this assessment can be accomplished simply by asking the patient to repeat in his or her own words what the physician has explained.
3. The ability to grasp the consequences of accepting and of declining the suggested treatment.
4. The ability to reason.

Patients who are deemed capable of participating in decisions about their care generally should be involved directly in any discussions of limiting care. An exception may occur in those with depression. Patients who are depressed can meet the criteria for decision capacity, but their preferences are clouded by their mood disorder (see [MOOD DISORDERS](#)).

Medical problems can sometimes be anticipated and a decision made in advance about what approach to use when they develop. As an example, individuals who have had a stroke which impairs swallowing can be expected to develop problems with aspiration; the issue of gastrostomy tube feeding is appropriate to raise in these cases, even before any complications have actually developed.



42-1

## ANEMIA

### Rationale

The diagnosis in a patient with anemia can be complex. An unfocused or unstructured investigation of anemia can be costly and inefficient. Simple tests may provide important information. Anemia may be the sole manifestation of serious medical disease.

### Causal Conditions

1. Normocytic
  - a. Red blood cell loss - Obvious (trauma, metro/menorrhagia) or Occult (polyp, cancer)
  - b. Decreased red blood cell production (retics.<2%)
    - i. Marrow production
      - A. Stem cell disorder (aplastic anemia, leukemia, myelodysplasia)
      - B. Bone marrow replacement (cancer, fibrosis, storage disease, infection)
      - C. Reduced/Resistance erythropoetin, thyroid, androgens (renal failure, pure RBC aplasia)
    - ii. Anemia of chronic disease (malignancy, liver disease, alcohol abuse)
  - c. Increased destruction (retics.>2-3%)
    - i. Inherited
      - A. Hemoglobinopathy (sickle cell anemia, thalassemia, unstable hemoglobin)
      - B. Membrane/Metabolic (spherocytic, HMO shunt, glycolytic path)
    - ii. Acquired
      - A. Immune (Coombs positive, drug related, cold agglutinin)
      - B. Infection, Malaria
      - C. Mechanical, TTP/HUS
2. Microcytic
  - a. Iron deficiency (dietary, blood loss)
  - b. Sideroblastic
  - c. Hemoglobinopathies, Thalassemia
3. Macrocytic (B12/folate deficiency)

### Key Objectives

- ❖ In iron deficiency anemia exclude the possibility of serious gastrointestinal disease.
- ❖ Determine the presence of anemia in the clinical context; all 3-laboratory indices of anemia are concentration measurements (blood loss will decrease hemoglobin, hematocrit, or red blood cell count only after self transfusion of extracellular fluid the following day; 'anemia' of pregnancy actually represents a 50% increase in extracellular fluid volume compared to 25% increase in red blood cell mass).
- ❖ Interpret the signs and symptoms of anemia with the understanding that they are dependent on the rapidity with which anemia developed.

### Objectives

- ❖ Through efficient, focused, data gathering:

- Determine the presence of anemia; differentiate between causes according to the patient's age.
- Select a causal classification of anemias using red cell morphology.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select the examination of a peripheral blood smear as central to the investigation.
- ❖ Conduct an effective plan of management for a patient with anemia:
  - Outline treatment of iron deficiency anemia; outline treatment of vitamin deficiency anemias.
  - Select patients in need of specialized care and/or consultation.
  - Conduct counseling and education of patients with anemia caused by nutritional deficiencies and hemoglobinopathies.

## Ethics

### *Consent to Investigation or Treatment (CLEO 4.3)*

#### Detailed Objectives

- ❖ To demonstrate awareness of process for the assessment of capacity to give consent, and be able to conduct such an assessment.
- ❖ To recognize factors which can alter capacity (e.g., disease, drugs, depression).
- ❖ To identify appropriate substitute decision-maker, or the process to determine that individual.
- ❖ To communicate clearly information relevant to informed consent (what a reasonable person would want to know in a given circumstance).
- ❖ To identify reasonable steps to ensure understanding of information: can the patient explain the medical problem, and the proposed treatment or test.
- ❖ To determine free choice and absence of coercion.

In a patient who is bleeding but refuses a blood transfusion, determine whether the decision can be justified within the context of a relatively stable set of values (i.e. why would the patient be willing to take risks?). If a coherent and consistent justification does not exist, identify a substitute decision-maker. For example, if the patient is delusional as a result of the blood loss, or is psychotic, the capacity to give informed consent should be questioned, and a substitute decision-maker should be identified. However, if the patient refuses because of a lifelong widely shared religious belief that prohibits blood transfusions, the capacity to give consent is probably present, and the decision should be respected.

### *Truth Telling (CLEO 4.4)*

#### Detailed Objectives

- ❖ To recognize reasonable right of patient to know relevant information:
  - risks and benefits of treatment.

A very small proportion of the renal failure patient population receiving erythropoetin for treatment of anemia has developed pure red cell aplasia. Although studies have not identified the cause with certainty, the method of manufacture of the hormone, storage or method of administration, together or singly have been considered a possible cause. Patients receiving this drug need to know about the small risk involved and as a consequence have a choice in changing the type of medication or route/manner of administration pending identification of the cause.

### *Personal and Professional Conduct (CLEO 4.9)*

#### Detailed Objectives

### ***Personal Conduct (CLEO 4.9.1)***

- ❖ To conduct yourself in a professional manner, characterized by dignity, respect, integrity, and honesty.

### ***Professional Responsibilities (CLEO 4.9.2)***

- ❖ To recognize responsibility of the profession in self regulation:
- ❖ maintenance of appropriate standards of the profession.

Blood doping in sport has become a common occurrence. Whereas in the past this was accomplished by means of transfusion, erythropoietin has more recently become the athletes' drug of choice. Physicians' conduct is key in ensuring that erythropoietin is prescribed only when indicated (e.g., chronic renal failure).

### ***Controversial and Evolving Ethical issues in Practice (CLEO 4.10)***

#### **Issues**

- ❖ Maternal-fetal conflict of rights

#### **Detailed Objectives**

- ❖ The candidate will be aware that they may be asked to comment on unresolved or controversial ethical issues, and will be able to name and describe relevant key issues and ethical principles.

Prenatal diagnosis of sickle cell disease and thalassemia has been feasible for over 15 years and raises difficult ethical issues for parents and physicians. The decision to receive prenatal diagnosis is influenced by culture, religion, educational level, and the number of children in the family. Access to prenatal genetics services for the general population is important lest genetic screening become limited to the affluent. This has the potential of creating a situation wherein genetic disability becomes an indication of social class.

In reproductive genetics, there may be ethical obligations to both mother and fetus. Prenatal testing is seldom beneficial to fetal welfare but it may influence a mother's decisions about reproductive options. Prenatal counseling should be non-directive, non-restrictive, (i.e., not restricted to those willing to have an abortion), and reproductive decisions must not be forced by the results of tests. Since the only pragmatic options for mothers are abortion or no children, it is vital that women not be pressured into prenatal diagnosis.

## **General Organization**

### ***Non-Governmental Organizations (N.G.O.) (CLEO 6.7)***

#### ***Community groups offering services or products (e.g., Red Cross, a N.G.O., replaced by Canadian Blood Services) (CLEO 6.7.1)***

#### **Detailed Objectives**

- ❖ The major roles volunteer support groups play in fundraising and in providing direct support for patients in or out of institutions.

### ***Interprovincial Issues: Patient Benefits, Physician Mobility, and Medical Drugs and Devices (CLEO 6.11)***

#### **Issues**



- ❖ The role of the Federal Government in monitoring the health system across provincial borders, certain drugs, devices, and hazards

The findings of the Krever inquiry with respect to the risks of blood transfusions caused the Federal Government to replace the Red Cross with a governmental organization, Canadian Blood Services.

## Applied Scientific Concepts

1. Discuss erythropoiesis within the bone marrow under the influence of the stromal framework, cytokines, and erythropoietin, a hormone produced in the kidney by cells that sense the adequacy of tissue oxygenation relative to need.
2. Outline the life cycle of red blood cells.
3. Discuss the regulation of iron balance, availability of cobalamin and folic acid, and their absorption and anatomical site of absorption.

## POLYCYTHEMIA/ELEVATED HEMOGLOBIN

### Rationale

The reason for evaluating patients with elevated hemoglobin levels (male  $\geq 185$  g/L, female  $\geq 165$  g/L) is to ascertain the presence or absence of polycythemia vera first, and subsequently to differentiate between the various causes of secondary erythrocytosis.

### Causal Conditions

1. Red cell mass increased (absolute polycythemia)
  - a. Polycythemia vera - low or normal erythropoetin
  - b. Secondary erythrocytosis - elevated erythropoetin
    - i. Appropriate EPO elevation
      - A. Hypoxemia, pulmonary (sleep apnea, COPD, pulmonary. hypertension)
      - B. Hypoxemia, cardiac (Eisenmenger)
      - C. RBC defects - abnormal Hb (high O<sub>2</sub> affinity Hb, methemoglobinemia)
      - D. Carbon monoxide poisoning (heavy smoking)
    - ii. Inappropriate EPO elevation
      - A. Erythropoetin secreting tumor (hepato-cellular, renal cell, ovarian, uterine, hemangioblastoma)
      - B. Other (polycystic kidney, post-transplant, hydronephrosis, androgens)
2. Relative polycythemia (decreased plasma volume: burns, diarrhea)

### Key Objectives

- ✦ Since the most common cause of polycythemia is hypoxia secondary to pulmonary disease, elicit symptoms pertaining to altered lung function.

### Objectives

- ✦ Through efficient, focused, data gathering:
  - Differentiate between causes of secondary erythrocytosis in patients without polycythemia related features. Ask about dyspnea, cough, cyanosis, hypersomnolence, long periods at high altitude, home oxygen therapy, history of heart or lung disease, family history, smoking history, exposure to carbon monoxide, or renal transplantation.
  - Determine if drugs are being taken (e.g., androgens, anabolic steroids, self-injection of erythropoetin to improve athletic performance).
  - Determine whether other polycythemia features (e.g., hemorrhagic or thrombotic events) exist.
  - Examine lungs, cyanosis, clubbing, cardiac murmurs or bruits, hepatomegaly, splenomegaly.
- ✦ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order CBC, pulse oxymetry after minimal exertion or during sleep (if indicated, direct arterial hemoglobin oxygen saturation), chest x-ray, and other tests for secondary polycythemia as indicated by the history or physical examination.
  - Order erythropoetin serum concentration when indicated. List indications for bone marrow aspiration and biopsy.
  - Contrast the interpretation of low or normal erythropoetin levels to elevated levels in a patient with polycythemia.

- Contrast arterial oxygen saturation in primary and secondary polycythemia.
- ❖ Conduct an effective plan of management for a patient with polycythemia/elevated hemoglobin:
  - Select patients in need of further investigation and referral for specialized care.

### **Applied Scientific Concepts**

1. Discuss whether the determination of red cell mass and plasma volume is necessary for the diagnosis of polycythemia or do measurements of hemoglobin levels to convey similar information.
2. Outline the physiology of erythropoiesis by starting with the pluripotent hematopoietic stem cell from which RBCs are derived to the hierarchical process of lineage-commitment and differentiation.
3. Outline the role of erythropoietin to differentiation and production of RBC including where it is synthesized and signal(s) leading to stimulation and inhibition.

**Rationale**

Hirsutism, terminal body hair where unusual (face, chest, abdomen, back), is a common problem, particularly in dark-haired, darkly pigmented, white women. However, if accompanied by virilization, then a full diagnostic evaluation is essential because it is androgen-dependent. Hypertrichosis on the other hand is a rare condition usually caused by drugs or systemic illness.

**Causal Conditions**

1. Androgen excess (may be associated with virilization/irregular menses)
  - a. Ovarian source (usually testosterone excess)
    - i. Polycystic ovary syndrome (hyperprolactinemia, hyperthecosis)
    - ii. Idiopathic
    - iii. Ovarian tumor (arrhenoblastoma)
  - b. Adrenal source (usually dehydroepiandrosterone excess)
    - i. Congenital adrenal hyperplasia
    - ii. Cushing syndrome
    - iii. Adrenal tumor (adenoma, carcinoma)
  - c. Drugs - rare (danazol, Ovrál)
2. Hypertrichosis (usually not associated with virilization)
  - a. Idiopathic
  - b. Drugs (phenytoin, minoxidil, cyclosporine)
  - c. Systemic illness (hypothyroid, anorexia/malnutrition, dermatomyositis, CA)

**Key Objectives**

- ❖ Determine whether the pattern or rate of hair growth has changed.
- ❖ Outline the laboratory investigation for patients with signs of androgen excess.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine which patients with recent onset of hirsutism require investigation.
  - Determine which patients with clinical symptoms and signs of defeminization (e.g., amenorrhea/menstrual irregularity) and virilization (hirsutism, acne, male pattern baldness) require investigation.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select appropriate laboratory and imaging studies.
- ❖ Conduct an effective plan of management for a patient with hirsutism/virilization/ hypertrichosis:
  - Outline the management of patients with idiopathic hirsutism.
  - Outline the medical management of patients with polycystic ovary syndrome (oral contraceptives, spironolactone, antiandrogen drugs, etc.).
  - Counsel and educate patients with hirsutism on conservative methods of managing excess hair.

- Select patients in need of specialized care.

### **Applied scientific objectives**

1. Identify the ovaries or adrenal as the site of increased androgen production in patients with hirsutism.
2. Briefly outline steroid hormone metabolism in polycystic ovary syndrome.

## HOARSENESS/DYSPHONIA/SPEECH AND LANGUAGE ABNORMALITIES

### Rationale

Patients with impairment in comprehension and/or use of the form, content, or function of language are said to have a language disorder. Those who have correct word choice and syntax but have speech disorders may have an articulation disorder. Almost any change in voice quality may be described as hoarseness. However, if it lasts more than 2 weeks, especially in patients who use alcohol or tobacco, it needs to be evaluated.

### Causal Conditions

1. Language disorder
  - a. Developmental/Language impairment (mental/learning disability, ADHD)
  - b. Degenerative/Vascular CNS disorders (mucopolysaccharidosis, aphasia)
  - c. Neglect/Abuse, head injury
2. Speech disorder
  - a. Articulation disorder
    - i. Nasal/Badly articulated/Slurred speech
      - A. Dysarthria +/- Dysphagia (stroke/brain tumor/cerebral palsy)
      - B. Hearing impairment
      - C. Soft palate +/- other muscles paralysis (myasthenia, MS, cleft lip/palate)
      - D. Bulbar/Pseudobulbar palsy (amyotrophic lateral sclerosis)
      - E. Tongue paralysis/Macroglossia (cranial polyradiculitis, allergic edema, stroke)
    - ii. Disorders of speech rhythm/Timing/Audibility (Parkinson disease, MS, cerebellar lesions, dementia, developmental, stuttering, etc.)
  - b. Speech apparatus lesions/Hoarseness
    - i. Inflammation (infection, allergy, abuse/misuse, smoking, alcohol, GERD)
    - ii. Neoplasms (laryngeal benign/malignant)
    - iii. Vocal cord function
      - A. Paralysis - recurrent nerve, uni/bilateral (para/thyroidectomy, tumor)
      - B. Hyperfunction - muscle tension/spasmodic dysphonia
  - c. Silent/Non-speaking (catatonia/autism, depression, brainstem encephalitis)

### Key Objectives

- ❖ Determine whether the speech apparatus is intact and the speech disorder is central.
- ❖ Determine whether other neurologic deficits are present.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit information indicative of inflammation/infection, voice abuse or misuse, smoking or alcohol.
  - Determine whether there is dysphagia, cough, hemoptysis, or dyspnea; examine head and neck.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion,

differentiation, and diagnosis:

- Select patients to receive routine investigations or in need for laryngoscopy referral.
- ❖ Conduct an effective plan of management for a patient with speech and language abnormalities:
  - Outline management plan for common causes of speech disorders (e.g., voice rest, fluids and humidity, anti-reflux therapy, no smoking).
  - Select patients in need of referral for specialized care.

## Applied Scientific Concepts

1. Identify the three main functions of the larynx as voice generation, airway protection from ingested material during swallowing, and cough production.
2. Outline the anatomy of the hypopharynx, which extends from the base of the tongue to the upper cervical trachea and includes the larynx.

### Rationale

Major adverse consequences may occur with severe acidemia and alkalemia despite absence of specific symptoms. The diagnosis depends on the clinical setting and laboratory studies. It is crucial to distinguish acidemia due to metabolic causes from that due to respiratory causes; especially important is detecting the presence of both. Management of the underlying causes and not simply of the change in  $[H^+]$  is essential.

### Causal Conditions

1. Metabolic acidosis
  - a. High anion gap
    - i. Increased acid production
      - A. Exogenous (methanol, ethylene glycol, salicylate, early toluene)
      - B. Endogenous acids (ketoacidosis, lactic acidosis)
    - ii. Decreased renal acid excretion (renal failure)
  - b. Normal anion gap
    - i. GI bicarbonate loss (e.g., diarrhea)
    - ii. Renal bicarbonate loss (e.g., renal tubular acidosis, interstitial nephritis)
2. Metabolic alkalosis
  - a. Expanded effective arterial blood volume (e.g., Conn syndrome)
  - b. Contracted effective arterial blood volume
    - i. GI loss of acid (e.g., vomiting)
    - ii. Renal loss of acid (e.g., diuretics)
    - iii. Exogenous ingestion
3. Respiratory acidosis
  - a. Neuromuscular causes (e.g., drugs, encephalitis, bulbar palsy, myasthenia, paralysis)
  - b. Pulmonary causes of decreased alveolar ventilation (e.g., COPD, upper airway obstruction, interstitial disease, fibrosis, kyphoscoliosis, type II respiratory failure, etc.)
  - c. Obesity/Hypoventilation
4. Respiratory alkalosis
  - a. Hypoxemia (type I respiratory failure, high altitude)
  - b. Metabolic (metabolic acidosis, hepatic failure)
  - c. Cardio-Pulmonary disorders (pneumonia, fibrosis, edema, embolism, asthma)
  - d. CNS disorders (e.g., psychogenic, subarachnoid hemorrhage, tumor or infection)
  - e. Drugs (e.g., salicylate, xanthine,  $\beta^2$ -agonists, progesterone)
  - f. Miscellaneous (e.g., fever, pain, pregnancy)
5. Mixed acid-base disturbances

### Key Objectives

- ✦ Determine the nature of an acid/base disorder by analysis of 4 parameters:  $[H^+]$ ,  $PaCO_2$ ,  $[HCO_3^-]$ , and anion gap.

### Objectives



- ❖ Through efficient, focused, data gathering:
  - Diagnose cause of acidemia/alkalemia expeditiously.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret appropriate investigations for patients with acidemia/alkalemia in order to identify the primary abnormality and the adequacy of the associated secondary compensation.
- ❖ Conduct an effective initial plan of management for a patient with acidemia/alkalemia:
  - Outline general supportive measures in the management of patients with acidemia/alkalemia.
  - Outline management for specific acid-base disorders; select patients in need of consultation.

## Applied Scientific Concepts

1. Outline how pulmonary and renal excretion of carbon dioxide and non-volatile acid respectively maintain body acid base balance.
2. Outline the 3 different ways available to buffer secreted  $[H^+]$  in the renal tubule.
3. Explain the meaning of the anion gap.
4. Contrast the value of urinary sodium concentration to that of chloride as a surrogate for volume status.
5. Contrast the generation of metabolic alkalosis to its maintenance.

## Rationale

Infertility, meaning the inability to conceive after one year of intercourse without contraception, affects about 15% of couples. Both partners must be investigated; male-associated factors account for approximately half of infertility problems. Although current emphasis is on treatment technologies, it is important to consider first the cause of the infertility and tailor the treatment accordingly.

## Causal Conditions

1. Infertility (inability to conceive after 1 year of intercourse, no contraception)
  - a. Female
    - i. Ovulatory
      - A. Hypothalamic (functional hypothalamic amenorrhea)
      - B. Pituitary (prolactinoma, medication-induced, hypopit.)
      - C. Polycystic ovary
      - D. Ovarian failure
    - ii. Outflow tract abnormality
      - A. Uterine (agenesis/malformation, Ascherman syndrome, fibroids)
      - B. Tubal factors (tubal occlusion, adhesions, etc.)
    - iii. Endometriosis
  - b. Male
    - i. Central (pre-testicular - hypothalamic/pituitary causes)
      - A. Panhypopituitarism, hemochromatosis (under androgenization)
      - B. Hyperprolactinemia, androgen use (normal virilization)
    - ii. Testicular (viral orchitis, varicocele, radiation, drugs, liver/renal failure)
    - iii. Post-testicular - abnormal sperm transport (obstruction of epididymis, ejaculatory duct, vas deferens, failure/retrograde ejaculation, stricture, vasectomy, sperm motility)
  - c. Unexplained infertility

## Key Objectives

- ❖ Outline the investigation for a couple with infertility.
- ❖ Outline the therapeutic options for couples with infertility.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether woman's cycles are ovulatory based on a careful menstrual history; ask about coital frequency.
  - Identify factors that increase risk of tubal infertility; examine women for signs of endocrinopathy or gynecologic disease (hirsutism, galactorrhea, etc.); examine men for noteworthy signs (varicocele, gynecomastia); determine who likely has an organic cause for their impotence.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:

- Order and interpret a semen analysis.
- Outline 1st phase investigation of female infertility (hysterosalpingogram), test confirming ovulation, (BBT graph, day 21 - 23 serum progesterone, endometrial biopsy, day 2 - 4 FSH determination).
- ❖ Conduct an effective plan of management for a patient with infertility:
  - Counsel regarding pre-conceptual use of folic acid.
  - Outline therapeutic methods available to address ovulatory dysfunction (e.g., clomiphene citrate, gonadotropins, metformin).
  - Outline surgical management of tubal disease (tuboplasty, IVF).
  - Outline management of male infertility (therapeutic donor insemination, IVF/ICSI).
  - Select patients in need of specialized care.
  - Counsel and educate couples with infertility including the option of adoption.

## Ethics

### *Controversial and Evolving Ethical Issues in Practice (CLEO 4.10)*

#### Detailed Objectives

- ❖ The candidate will be aware that they may be asked to comment on unresolved or controversial ethical issues, and will be able to name and describe relevant key issues and ethical principles.
- ❖ When confronted with such a situation, candidates will:
  - discuss in a non-judgmental manner;
  - ensure patients have full access to relevant and necessary information;
  - identify if certain options lie outside their moral boundaries and refer to another physician if appropriate;
  - consult with appropriate ethics committees or boards; and
  - protect freedom of moral choice for students and trainees.

Infertility is a 'couple' issue that demands a non-judgmental discussion. The ethical issues surrounding therapeutic donor insemination in same sex couples, surrogacy, donor egg, and other advanced reproductive technologies are still evolving and remain controversial. Couples require full access to relevant and necessary information. If certain options lie outside the physician's moral boundaries, the infertile couple should be referred to another physician.

## Applied Scientific Concepts

1. Outline the phases of the menstrual cycle from follicular phase, to luteal phase and ovulation.
2. Outline spermatogenesis and its regulation including hormonal control and intratesticular paracrine factors.



## INCONTINENCE, STOOL

### Rationale

Fecal incontinence varies from inadvertent soiling with liquid stool to the involuntary excretion of feces. It is a demoralizing disability because it affects self-assurance and can lead to social isolation. It is the second leading cause of nursing home placement.

### Causal Conditions

1. Pelvic floor intact
  - a. Neurologic conditions
    - i. Age-related (e.g., dementia, strokes)
    - ii. Neuropathy (e.g., diabetes mellitus, congenital megacolon, Hirschsprung Disease)
    - iii. Multiple sclerosis
    - iv. Tumors (brain, cord, cauda equina)
    - v. Trauma (brain, cord, cauda equina)
  - b. Overflow (e.g., impaction, encopresis)
  - c. Diarrheal conditions
2. Pelvic floor affected
  - a. Trauma/Surgery (e.g., pelvic fracture)
  - b. Nerve/Sphincter damage (e.g., vaginal delivery, rectal prolapse)
  - c. Malformation, ano-rectal (congenital)

### Key Objectives

- ❖ Describe fecal incontinence as multifactorial, usually with several abnormalities coexisting (e.g., dysfunction of external anal sphincter and decreased rectal sensation).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate true incontinence from frequency and urgency (e.g., IBS, IBD).
  - Determine onset, duration, frequency, severity, and precipitants.
  - Elicit history of prior vaginal delivery, anorectal surgery, pelvic irradiation.
  - Diabetes, neurologic diseases, or diarrheal conditions.
  - Examine perianal area and test perianal sensation plus anocutaneous reflex; conduct rectal exam.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Determine whether stool studies, endorectal ultrasound, or colonoscopy are indicated.
  - Select patients in need of sigmoidoscopy/anoscopy, anorectal manometry/functional testing.
- ❖ Conduct an effective plan of management for a patient with fecal incontinence:
  - Outline management plan for common causes of incontinence (e.g., disimpact/prevent impaction, diet/bulking agent if stool is liquid or loose, antidiarrheal drugs (e.g., loperamide) in patients with diarrhea, regular defecation program for patients with dementia or physical disability).

- Counsel if appropriate about biofeedback therapy (retraining of pelvic floor muscles).
- Select patients in need of specialized care and consultation.

### **Applied Scientific Concepts**

1. List the anatomic barriers that help preserve continence (rectum, internal and external anal sphincter, and puborectalis muscle).
2. Explain that normal defecation involves a sequence of events initiated by the sensation of urgency in the rectum but also dependent on mental function, stool volume and consistency, colonic transit, rectal distensibility, anal sphincter function, anorectal sensation, and anorectal reflexes.
3. Contrast the voluntary components of fecal continence (external anal sphincter and puborectalis muscle) from the involuntary components.

**Rationale**

Because there is increasing incidence of involuntary micturition with age, incontinence has increased in frequency in our ageing population. Unfortunately, incontinence remains under treated despite its effect on quality of life and impact on physical and psychological morbidity. Primary care physicians should diagnose the cause of incontinence in the majority of cases.

**Causal Conditions**

1. Transient
  - a. Polyuria
  - b. Impaired ability/willingness to reach toilet
  - c. Drugs, alcohol
2. Neurologic/Reflex (transverse paralysis, spinal tumor, syringomyelia)
3. Anatomic
  - a. Stress incontinence (sphincter failure to stay closed)
    - i. Women in menopause (especially multiparae)
    - ii. Post pelvic floor repair
    - iii. Bladder tumour
  - b. Urgency incontinence (detrusor overactivity)
    - i. Cystitis, urethritis
    - ii. Vesical polyps, carcinoma, stones
    - iii. Psychogenic
    - iv. Stroke, Dementia
  - c. Overflow incontinence
    - i. Impaired detrusor contraction (DM, MS)
    - ii. Bladder outlet obstruction (prostatic, urethral stricture)

**Key Objectives**

- ❖ Contrast between the two most common causes of incontinence, stress incontinence and urgency incontinence (insufficient sphincter closure in stress incontinence versus excessive detrusor contraction with urgency).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine duration, characteristics, frequency, timing, and amount; elicit other lower urinary tract symptoms, precipitants, fluid intake patterns, changes in bowel habits or sexual function.
  - Differentiate between stress (small amounts of leakage with exertion), urgency (involuntary associated with urge to urinate), reflex (associated neurologic deficit), and overflow incontinence (associated with urinary retention).
  - Perform an abdominal exam, a pelvic exam, and rectal exam for prostate size.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:

- Perform urinalysis, estimate post-void residual urine.
- Select patients in need of cystoscopy and other specialized tests.
- ❖ Conduct an effective plan of management for a patient with urinary incontinence:
  - Outline a plan of management for cystitis and urethritis.
  - Counsel patients with stress incontinence about possible pelvic muscle exercises.
  - For urge incontinence, discuss trial of anticholinergic medication (e.g., oxybutynin, tolterodine).
  - Select patients for referral (e.g., neurologic conditions, genital prolapse, abnormal post-void).

## Applied Scientific Concepts

1. Describe the anatomical problems leading to urinary incontinence as one of four possible problems: bladder is overactive, bladder is underactive, urethral sphincter does not close, or urethral sphincter is obstructed.



47-3

## INCONTINENCE, URINE, PEDIATRIC (ENURESIS)

### Rationale

Enuresis is the involuntary passage of urine, and may be diurnal (daytime), nocturnal (nighttime), or both. The majority of children have primary nocturnal enuresis (20% of five-year-olds). Diurnal and secondary enuresis is much less common, but requires differentiating between underlying diseases and stress related conditions.

### Causal Conditions

1. Primary enuresis
  - a. Idiopathic/Familial/Bladder dyssynergia
  - b. Anatomic abnormality
2. Secondary enuresis
  - a. Urinary tract infection
  - b. Diabetes mellitus/Insipidus
  - c. Neurologic disorder
  - d. Psychogenic/Stress (rare)

### Key Objectives

- ❖ In a child five years of age or older, determine whether a physical abnormality is causing the involuntary passage of urine.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether medical reasons underlie the enuresis.
  - Determine whether a stressful event preceded the occurrence of enuresis.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients who require any investigation.
- ❖ Conduct an effective plan of management for a patient with enuresis:
  - Counsel, educate, and reassure the parents of a child with primary nocturnal enuresis.
  - Counsel and reassure the child to improve self-esteem.
  - In a child with primary enuresis, discuss treatment options including family education and observation of the problem, reward systems, behavioral strategies, conditioning alarm system, medication (DDAVP).
  - In a child with secondary enuresis, outline a management plan to treat the underlying cause.

### Applied Scientific Concepts

1. Outline child's readiness for toilet training from the point of view of child's own interest (20 - 30 months).
2. Outline child's readiness for toilet training from the physiologic (voluntary coordination and sphincter control plus myelination of pyramidal tracts to sphincters is complete by 12 - 18 months), and developmental/behavioral (can



- ambulate to toilet, sit on it, communicate need to use it, can imitate behaviors, etc.) point of view.
3. Contrast above to processes that are considered associated with enuresis (e.g., involuntary bladder contractions, elevated sleep arousal threshold, poor response to ADH).

### Rationale

Impotence is an issue that has a major impact on relationships. There is a need to explore the impact with both partners, although many consider it a male problem. Impotence is present when an erection of sufficient rigidity for sexual intercourse cannot be acquired or sustained >75% of the time.

### Causal Conditions

1. Psychogenic/Neurologic
  - a. Depression, performance anxiety, somatization
  - b. Autonomic neuropathy (diabetes, M.S.)
  - c. Spinal cord disease
  - d. Polyneuropathy
  - e. Pelvic surgery/Trauma/Prostate cancer treatment
2. Cardiac/Vascular (occlusion of cavernous or pudendal arteries)
3. Pharmacologic/Hormonal
  - a. Drugs (antihypertensive drugs, tricyclics, alcohol)
  - b. Endocrine (testicular failure, hyperprolactinemia)
4. Other (chronic disease such as liver failure, renal failure)

### Key Objectives

- ❖ Recognize that a psychogenic component is present in all cases.
- ❖ Recognize that testosterone deficiency is an uncommon cause of erectile dysfunction.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine if an organic cause for impotence is likely by a medical, sexual, and social history.
  - Exclude decreased libido, ejaculatory disorders, performance anxiety, and depression.
  - Identify reversible causes (recent medications: e.g., anti-hypertensive drugs, antidepressants, etc.).
  - Examine for signs of vascular disease and diabetic complications (BP postural change, ankle-brachial index, pulses); examine for gynecomastia, lack of male hair distribution, small testes.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order screening tests for unrecognized systemic disease (e.g., diabetes).
  - If hormonal cause is likely, order testosterone, LH, prolactin.
- ❖ Conduct an effective plan of management for a patient with infertility or impotence:
  - Treat associated medical conditions; suggest lifestyle changes (smoking cessation, exercise, weight loss, diet, stress reduction).
  - Determine therapy for impotence based on the underlying cause (e.g., if testosterone is low and LH is high, consider testosterone therapy (exclude prostate CA); if prolactin high, pituitary imaging/referral).
  - Outline the effectiveness of inhibitors of phosphodiesterase type V and contraindications.

- > Describe the role of injectable, transurethral, and vacuum devices.
- > Select patients in need of specialized care (e.g., failed medical therapy, penile anatomic disease, pelvic/perineal trauma, vascular/neurologic assessment, endocrinopathies, psychiatric, etc.).
- > Counsel and educate patient (+/- partner).
- > Determine the therapy for impotence based on the underlying cause.
- > Describe the role of specific injectable and oral medications in patients with erectile dysfunction.

### **Applied Scientific Concepts**

1. Outline erectile physiology including role of blood flow and nitric oxide, neural influences, hormonal influences, and psychogenic factors.
2. Outline the pharmacology of some of the agents used in combating impotence.

## Rationale

Jaundice may represent hemolysis or hepatobiliary disease. Although usually the evaluation of a patient is not urgent, in a few situations it is a medical emergency (e.g., massive hemolysis, ascending cholangitis, acute hepatic failure).

## Causal Conditions

1. Unconjugated hyperbilirubinemia (pre-hepatic)
  - a. Over production
    - i. Hemolysis
    - ii. Ineffective erythropoiesis
  - b. Decreased hepatic uptake (congestive heart failure, drugs, sepsis)
  - c. Decreased bilirubin conjugation
    - i. Hereditary glucuronosyltransferase deficiency (Gilbert syndrome)
    - ii. Neonatal jaundice
    - iii. Acquired glucuronosyltransferase deficiency (breast milk, hepatocellular disease)
2. Conjugated hyperbilirubinemia (hepatic)
  - a. Intrahepatic cholestasis
    - i. Cirrhosis
      - A. Alcoholic hepatitis
      - B. Infectious diseases
      - C. Hereditary (alpha-1-antitrypsin deficiency, hemochromatosis, Wilson disease)
      - D. Primary biliary cirrhosis
    - ii. Drugs (erythromycin, oral contraceptive pill)
  - b. Hepatocellular injury (sepsis, hypoperfusion)
  - c. Miscellaneous (infiltrative states, fatty liver, sepsis)
3. Extrahepatic cholestasis (post-hepatic)
  - a. Intraductal obstruction
    - i. Gallstones
    - ii. Sclerosing cholangitis, pancreatitis
    - iii. Biliary malformation (stricture)
    - iv. Malignancy (cholangiocarcinoma)
  - b. Compression of biliary ducts (malignancy)

## Key Objectives

- ❖ Determine which patients have significant liver dysfunction and its cause.
- ❖ In a patient with cirrhosis, identify alcohol as the commonest cause.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between the causes of jaundice and determine if treatable; ask about medications, drugs, alcohol,

hepatitis risk factors and immunization status, past and family history, HIV status, travel, toxic exposure.

- Describe and demonstrate complications related to the presence of liver disease.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret an appropriate investigation for patients with jaundice (e.g., liver enzymes).
  - Order and interpret a blood smear in patients with unconjugated hyperbilirubinemia.
  - List the indications for an abdominal ultrasound, spiral CT, MRI, ERCP, and PTC.
- ❖ Conduct an effective plan of management for a patient with jaundice:
  - Outline a management plan for common causes of jaundice.
  - Outline a management plan for patients with acute hepatic failure.
  - Select patients in need of specialized care and/or in need of urgent hospitalization.

## Ethics

### *Consent to Investigation or Treatment (CLEO 4.3)*

#### Detailed Objectives

- ❖ To demonstrate awareness of process for the assessment of capacity to give consent, and be able to conduct such an assessment.

Patients with liver disease may lack the capacity to give consent to investigate or treat. The primary care physician should be able to conduct an assessment of the patient's competency and capacity to give consent.

### *Doctor Patient Relationship (CLEO 4.8)*

#### Detailed Objectives

- ❖ To accept or refuse patient requesting care:
  - without arbitrary exclusion of any particular group of patients, such as those known to be difficult, or afflicted with serious disease.

There are a number of patients with various types of liver diseases that could be considered 'self-inflicted' or a result of 'life style' (e.g., alcohol or drugs). The physician should maintain a non-judgmental attitude toward such patients and care for their condition in a fashion that does not differ from that of any other type of patient.

## Applied Scientific Concepts

1. Outline 4 stages of bilirubin metabolism by the liver: uptake from the circulation, intracellular storage, conjugation with glucuronic acid, and biliary excretion.



## NEONATAL JAUNDICE

### Rationale

Jaundice, usually mild unconjugated bilirubinemia, affects nearly all newborns. Up to 65% of full-term neonates have jaundice at 72 - 96 hours of age. Although some causes are ominous, the majority are transient and without consequences.

### Causal Conditions

1. Unconjugated hyperbilirubinemia
  - a. Increased bilirubin production
    - i. Hemolytic causes - Coombs positive
      - A. Isoimmune (Rh, ABO, other blood antigens)/Autoimmune (SLE)
      - B. Acquired red cell defects (e.g., drugs)
    - ii. Hemolytic causes - Coombs negative
      - A. Red cell membrane defects (elliptocytosis, pyknocytosis, etc.)
      - B. RBC enzyme deficiencies (pyruvate kinase, glucose-6-phosphate dehydrogenase)
      - C. Hemoglobinopathy (+/- thalassemia)
      - D. Microangiopathy (hemolytic-uremic syndrome)
  - b. Decreased bilirubin conjugation
    - i. Metabolic/Genetic (Gilbert, Crigler-Najjar, hypothyroidism)
    - ii. Physiologic jaundice/Breast milk jaundice
  - c. Gastrointestinal absorption (pyloric stenosis, meconium ileus, sequestered blood)
2. Conjugated hyperbilirubinemia
  - a. Decreased bilirubin uptake
    - i. Infections (sepsis, neonatal hepatitis)/ Toxic (TPN)
    - ii. Metabolic/Genetic (galactosemia, Gaucher, Niemann-Pick, decreased Y protein)
  - b. Decreased bilirubin excretion/Obstructive (biliary atresia, obstruction, choledochal cyst)

### Key Objectives

- ❖ Determine if jaundice presented in the first 24 hours, since it is more likely to be pathologic.
- ❖ Identify rapid onset unconjugated hyperbilirubinemia since it is most threatening. In the relatively immature central nervous system of the neonate, especially in the premature, unconjugated bilirubin may be deposited and can result in severe brain damage.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit a history regarding family history of hematological disorders, previously affected children, maternal blood type, and antibody status, delivery history, how coloration was noticed, vital signs, and any medications.
  - Perform examination of scleral and mucous membranes, skin, liver and spleen, ascites, shock, urine, and stool.
  - Differentiate physiologic from organic causes of neonatal jaundice.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:

- Select investigations that will differentiate conjugated from unconjugated hyperbilirubinemia.
- Select investigations that will differentiate pathologic hyperbilirubinemia from exaggerated physiologic jaundice.
- State that conjugated hyperbilirubinemia is never physiologic and select tests for immediate investigation.
- ❖ Conduct an effective plan of management for a neonate with jaundice:
  - Outline initial monitoring and management in neonatal jaundice.
  - Explain advantages and disadvantages of phototherapy, exchange blood transfusions, and pharmacologic therapy.
  - Select appropriate consultants in the management of neonatal jaundice.



50-1 **JOINT PAIN, MONO-ARTICULAR (ACUTE, CHRONIC)**

**Rationale**

Any arthritis can initially present as one swollen painful joint. Thus, the early exclusion of polyarticular joint disease may be challenging. In addition, pain caused by a problem within the joint needs to be distinguished from pain arising from surrounding soft tissues.

**Causal Conditions**

1. Acute
  - a. Infection (bacterial, mycobacterial, fungal, viral, spirochetal)
  - b. Crystal (gout, pseudogout)
  - c. Hemarthrosis (trauma/fracture, anticoagulants/bleeding disorders)
2. Chronic
  - a. Osteoarthritis
  - b. Internal derangement
  - c. Infection
  - d. Tumor (pigmented villonodular synovitis, osteoma, sarcoma)
  - e. Monoarticular presentation of polyarticular disease (rheumatoid arthritis, SLE)

**Key Objectives**

- ❖ Evaluate patient with mono-articular arthritis first for the possibility of infection, since this relatively common cause of acute pain and swelling in a single joint can result in cartilage destruction within a few days if unrecognized.
- ❖ Since the diagnosis of mono-articular arthritis overlaps with that of poly-articular arthritis initially presenting as a single swollen joint, discriminate between the two.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate articular from non-articular disorders (arthritis is more likely when movement causes pain and there is loss of motion accompanied by swelling or erythema).
  - After considering infection, diagnose other causes of mono-arthritis.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select appropriate investigations including diagnostic joint aspiration and synovial fluid analysis.
- ❖ Conduct an effective plan of management for a patient with mono-articular joint pain:
  - Outline appropriate treatment of septic arthritis.
  - Select appropriate treatment for other causes of mono-articular arthritis.
  - List the indications, contraindications, and adverse effects of drugs commonly used in the treatment of arthritis (e.g., non-steroidal anti-inflammatory agents).
  - Select patients in need of specialized care and/or referral.



## JOINT PAIN, POLY-ARTICULAR (ACUTE, CHRONIC)

### Rationale

Polyarticular joint pain is common in medical practice, and causes vary from some that are self-limiting to others which are potentially disabling and life threatening.

### Causal Conditions

1. Inflammatory
  - a. Acute
    - i. Infectious (Lyme disease, bacterial endocarditis, gonococcus, viral)
    - ii. Post-infectious (reactive) - rheumatic fever, Reiter Syndrome, enteric infections
    - iii. Early connective tissue diseases
  - b. Chronic
    - i. Sero-negative spondyloarthritides (ankylosing spondylitis, psoriatic, IBD)
    - ii. Systemic rheumatic diseases
      - A. Rheumatoid arthritis
      - B. Systemic lupus erythematosus
      - C. Systemic vasculitis/Henoch-Schönlein purpura
      - D. Systemic sclerosis
      - E. Polymyositis/Dermatomyositis
    - iii. Hereditary hemochromatosis
2. Non-inflammatory (osteoarthritis)

### Key Objectives

- ❖ Determine whether the patient has a musculo-skeletal/neurologic emergency (e.g., infection or sepsis), compartment syndrome or acute myelopathy, versus radiculopathy or neuropathy.
- ❖ Differentiate from non-articular pain by clinical criteria (e.g., aggravated by movement, swelling, erythema).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between inflammatory and non-inflammatory arthritis (pain worse with immobility, lasts >1 hour, or relieved by rest and worse with motion).
  - Determine whether the arthritis is migratory or not, if fever is present or absent, symmetric or not.
  - Describe articular and extra-articular manifestations and complications (rash, adenopathy, alopecia, oral/nasal ulcers, pleuritic chest pain, Raynaud phenomenon, dry eyes, fever, etc.).
  - Examine joints for soft tissue swelling, warmth, joint effusion, range of motion (active and passive); examine lymph nodes, parotid, heart, lungs, skin, eyes, spine.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret investigations including synovial fluid analysis.
- ❖ Conduct an effective initial plan of management for a patient with polyarticular joint pain:

- > Outline the principles of multidisciplinary management of rheumatoid arthritis and other inflammatory and non-inflammatory arthritides.
- > Outline a management plan for patients with inflammatory and non-inflammatory arthritis including drug therapy, physiotherapy, occupational therapy, and treatment of joint deformities.
- > Select patients in need of specialized care and/or referral.
- > Conduct counselling and education of patients.

## Applied Scientific Concepts

1. Identify the origin and evaluate the utility of measurement of rheumatoid factors.
2. Patients with SLE (and other connective tissue diseases) synthesize a variety of different autoantibodies, many of which react with nuclear antigens (e.g., anti-single/double stranded DNA, anti-RNP, anti-Ro/SSA). Evaluate the clinical significance of antinuclear antibodies.
3. Outline the anatomy and histology of a normal joint.
4. Outline the process of joint inflammation and damage.



50-3

## PERIARTICULAR PAIN/SOFT TISSUE RHEUMATIC DISORDERS

see also [PAIN](#)

### Rationale

Pain caused by a problem within the joint needs to be distinguished from pain arising from surrounding soft tissues.

### Causal Conditions

1. Generalized pain disorders
  - a. Fibromyalgia, polymyalgia rheumatica
  - b. Hypermobility syndrome/Joint laxity
  - c. Viral myalgia
  - d. Somatoform disorders
2. Localized pain disorders
  - a. Regional myofascial pain disorders
  - b. Degenerative/Repetitive (tendinitis, bursitis, epicondylitis, muscle strain)
  - c. Infection (fasciitis, bursitis, abscess, osteomyelitis)
  - d. Neurovascular entrapment syndromes
  - e. Bone pain (leukemia, cancer, osteoporosis, sickle-cell disease, multiple myeloma, osteomalacia)

### Key Objectives

- ❖ Differentiate from articular pain by clinical criteria (e.g., tenderness, joint motion preserved).
- ❖ Determine whether the patient has a musculo-skeletal/neurologic emergency (e.g., infection), compartment syndrome or acute myelopathy, versus radiculopathy or neuropathy.
- ❖ Differentiate neurologic causes by the burning quality associated with numbness, paresthesia, constancy, worse at night, and unrelated to motion.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate articular from non-articular disorders (arthritis is more likely when movement causes pain and there is loss of motion accompanied by swelling or erythema).
  - Exclude inflammatory connective tissue diseases and other systemic disorders.
  - After excluding infection, diagnose other causes of soft tissue rheumatic disorders.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select appropriate investigations.
- ❖ Conduct an effective plan of management for a patient with peri-articular joint pain:
  - Outline appropriate treatment of sepsis.
  - Select appropriate treatment for other causes of soft tissue rheumatic disorders.
  - Identify and remove aggravating/precipitating factors (e.g., improper working positions, repetitive tasks, structural disorders, psychosocial factors).
  - For acute injuries, recommend "RICE": rest, ice, compression of injured tissue, elevation.

- Select patients in need of specialized care and/or referral.

## Rationale

Hypercholesterolemia is a common and important modifiable risk factor for ischemic heart disease (IHD) and cerebro-vascular disease. The relationship of elevated triglycerides to IHD is less clear (may be a modest independent predictor) but very high levels predispose to pancreatitis. HDL cholesterol is inversely related to IHD risk.

## Causal Conditions

1. Hypercholesterolemia (elevated LDL, LP (a))
  - a. Primary causes
    - i. Familial combined hyperlipidemia
    - ii. Polygenic
    - iii. Familial hypercholesterolemia (rare)
  - b. Secondary causes
    - i. Endocrine (diabetes mellitus, hypothyroidism)
    - ii. Cholestatic liver disease
    - iii. Nephrotic syndrome, chronic renal failure
    - iv. Other (cigarettes, obesity, drugs such as thiazides)
2. Hypertriglyceridemia
  - a. Primary causes (familial hypertriglyceridemia)
  - b. Secondary causes
    - i. Obesity
    - ii. Diabetes mellitus
    - iii. Nephrotic syndrome, chronic renal failure
    - iv. Drugs (estrogen replacement, tamoxifen,  $\beta$ -blockers, glucocorticoids, cyclosporine)
    - v. Moderate ethanol use
3. Low HDL
  - a. Primary
  - b. Secondary
    - i. Obesity/Inactivity/Cigarette smoking
    - ii. Drugs ( $\beta$ -blockers, benzodiazepines, anabolic steroids)
    - iii. Hypoalphalipoproteinemia, LCAT deficiency

## Key Objectives

- ❖ Screen for hypercholesterolemia in those patients who would benefit from serum cholesterol reduction (e.g., those with documented IHD, or first-degree relatives of patients with premature coronary heart disease, those with diabetes or hypertension).

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Identify patients with secondary causes for their lipid abnormalities.

- Select patients at highest risk for subsequent development of IHD for drug therapy.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret the results of a fasting cholesterol panel.
- ❖ Conduct an effective plan of management for a patient with abnormal serum lipids:
  - Communicate that threshold values for treatment and goal LDL cholesterol levels depend on a patient's underlying risk.
  - List common adverse effects expected with usual cholesterol-lowering agents.
  - Discuss risk/benefits of primary vs. secondary prophylaxis with lipid lowering drugs.
  - Select patients in need of specialized care.

## General Organization

### *Support Services in the Community (CLEO 6.3)*

#### Issues

#### *Services in the Community (CLEO 6.3.1)*

- ❖ Provincial support services or institution (Provincial Laboratories)

Communicate the value of standardization of laboratories so that results are reproducible and accurate.

### *Inter-professional Issues (CLEO 6.9)*

#### Detailed Objectives

- ❖ The delegation of acts between physicians and other health care workers.

Allied health personnel are playing a major role in reducing cardiovascular risk. Dietitians, fitness consultants, physiotherapists, etc. are an integral part of the health care team participating in direct management of patients at risk.

## Applied Scientific Concepts

1. Describe dietary fat and cholesterol absorption, transport, and metabolism; list major circulating lipoproteins.
2. The clinical manifestations of atherosclerosis include coronary heart disease, stroke, and peripheral artery disease. Outline the basic aspects of the pathogenesis of atherosclerosis including factors such as endothelial dysfunction, dyslipidemia, inflammation, tissue factor, etc.
3. Explain that the antiatherogenic effect of HDL is mediated by reverse cholesterol transport (a process whereby excess cholesterol in cells and atherosclerotic plaques are removed).
4. Outline the steps involved in the above process.
5. Describe the mechanism of action of drugs that have been shown to lower cholesterol levels (e.g., HMG CoA reductase inhibitors, fibrates, resins, niacin, cholesterol absorption inhibitors).

### Rationale

Appropriate investigation can distinguish benign reversible liver disease requiring no treatment from potentially life-threatening conditions requiring immediate therapy.

### Causal Conditions

1. Isolated hyperbilirubinemia
  - a. Unconjugated or indirect
    - i. Hemolysis and ineffective erythropoiesis
    - ii. Gilbert syndrome
    - iii. Crigler-Najjar syndrome
  - b. Conjugated or direct (Rotor syndrome, Dubin-Johnson syndrome)
2. Hepatocellular
  - a. Acute (may lead to acute liver failure)
    - i. Alcohol, drugs (acetaminophen, isoniazid), toxins (amanita phalloides)
    - ii. Viral hepatitis (A or B)
    - iii. Shock or ischemia
  - b. Chronic (may lead to cirrhosis)
    - i. Chronic alcohol, drugs, or toxins
    - ii. Fatty liver and steatohepatitis
    - iii. Metabolic liver disease (hemochromatosis, Wilson, etc.)
    - iv. Autoimmune chronic hepatitis/Viral hepatitis (B or C)
3. Cholestatic
  - a. Intrahepatic
    - i. Drugs (oral contraceptives)
    - ii. Infiltrative (amyloid, malignant)
    - iii. Congestive (e.g., heart failure)
    - iv. Autoimmune (primary biliary cirrhosis, sclerosing cholangitis)
    - v. Granulomatous disease
  - b. Extrahepatic (cholestasis from stone or neoplasm, stricture, congenital atresia)

### Key Objectives

- ❖ Discuss abnormal liver function tests in the context of the clinical presentation, and select patients requiring medical management.
- ❖ Outline the epidemiology and natural history of viral hepatitis.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between the causal conditions for abnormal liver function tests.
  - Identify complications related to the presence of liver disease.

- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select diagnostic tests appropriate for the identification of acute and chronic liver diseases.
  - List the indications for abdominal ultrasound and ascitic fluid analysis.
  - List indications for liver biopsy.
- ❖ Conduct an effective plan of management for a patient with abnormal liver function tests:
  - Select patients in need of hospitalization.
  - List indications for active and passive prophylaxis against infective hepatitis.
  - Select patients in need of specialized care.
  - Counsel and educate patients about primary and secondary prevention strategies for viral hepatitis (include public health measures).

## Ethics

### *Truth Telling (CLEO 4.4)*

#### **Detailed Objectives**

- ❖ To understand and explain the ethical and legal basis for truth telling:
  - respect for patient's autonomy;
  - situations of inevitable disclosure;
  - provision of support with disclosure of difficult news; and
  - respect patient's need to make realistic life decisions.
- ❖ To recognize reasonable right of patient to know relevant information:
  - purpose and implications of investigations;
  - diagnosis and prognosis of medical condition;
  - risks and benefits of treatment; and
  - health risks to which they are exposed.

Some patients with chronic hepatitis C virus infection (about 4% per year) decompensate with cirrhosis and may become edematous. The risk of transmission of HCV infection between monogamous stable sexual partners is low (approximately 1% annually). As a consequence, the decision whether to inform contacts regarding this potential for infection rests with the physician and patient.

### *Controversial and Evolving Ethical Issues in Practice (CLEO 4.10)*

#### **Issues**

- ❖ Genetic testing

#### **Detailed Objectives**

- ❖ The candidate will be aware that they may be asked to comment on unresolved or controversial ethical issues, and will be able to name and describe relevant key issues and ethical principles.
- ❖ When confronted with such a situation, candidates will:
  - discuss in a non-judgmental manner;
  - ensure patient have full access to relevant and necessary information;
  - identify if certain options lie outside their moral boundaries and refer to another physician if appropriate;
  - consult with appropriate ethics committees or boards; and
  - protect freedom of moral choice for students or trainees.

The medical condition hereditary hemochromatosis is preventable (by phlebotomy) if identified early enough (age 20 - 30



years). The current screening test (iron saturation >45%) is confirmed with genetic testing (HFE gene for homozygosity in C282Y mutation). Once identified to possess the HFE gene, patients are unable to secure life/medical insurance. Ensuring that patients have all relevant information available eases the path to appropriate decision-making for each individual patient.

### **Applied Scientific Concepts**

1. Outline the epidemiology and natural history of viral hepatitis (A, B, and C).
2. Compare the biochemical difference in injury to hepatocytes to that of cholangiocytes (bile duct cells).
3. Contrast tests that detect injury to hepatocytes (e.g., concentration of hepatic enzymes) to tests of the liver's capacity to transport organic anions and metabolize drugs (e.g., bilirubin, bile acids), to tests of the liver's biosynthetic capacity (e.g., albumin concentration, prothrombin time).

## LUMP/MASS, MUSCULOSKELETAL

SEE [SKIN ULCERS/TUMORS](#)

### Rationale

Lumps or masses are a common cause for consultation with a physician. The majority will be of a benign dermatologic origin. Musculoskeletal lumps or masses are not common, but they represent an important cause of morbidity and mortality, especially among young people.

### Causal Conditions

1. Congenital
2. Acquired
  - a. Neoplastic
    - i. Soft tissue
      - A. Benign (desmoids, atypical lipoma, neuroma)
      - B. Malignant (fibro histiocytoma, lipo/leiomyo/rhabdomyo/fibro-sarcoma)
    - ii. Bone
      - A. Benign
      - B. Malignant (osteochondro/Ewing/angiosarcoma)
  - b. Non-neoplastic
    - i. Infectious (pyomyositis, osteomyelitis)
    - ii. Traumatic (muscle contusion, hematoma)
    - iii. Vascular/Other (deep vein thrombosis)

### Key Objectives

- ❖ Identify patients at greatest risk for infectious lesions (e.g., HIV/Immuno-compromised, diabetics, muscle injury, drug injection).
- ❖ Identify the thigh/buttock/groin region as most common site of soft tissue sarcoma and size of lesion as most predictive of metastases (<25-mm, metastases unlikely).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Discriminate between muscle contusion, hematoma, deep vein thrombosis, osteomyelitis/septic arthritis, pyomyositis, or neoplasm.
  - Obtain history about crampy, local muscle pain, swelling, fever, or painless lump, or symptoms secondary to pressure effect on nerves.
  - Examine for induration, fluctuation, tenderness, and lump characteristics.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order CBC, blood cultures, diagnostic imaging for patients suspected to have infectious problems.
  - Select patient needing diagnostic imaging or specialized care (e.g., biopsy) for further investigation.
- ❖ Conduct an effective plan of management for a patient with a lump or mass:

- Select patients in need of specialized care.

### Rationale

Countless potential causes may lead to lymphadenopathy. Some of these are serious but treatable. In a study of patients with lymphadenopathy, 84% were diagnosed with benign lymphadenopathy and the majority of these were due to a nonspecific (reactive) etiology.

### Causal Conditions

1. Localized (reactive and neoplastic)
  - a. Upper
    - i. Cervical (bacterial/myco infections, head/neck malignancies, metastatic cancer)
    - ii. Supraclavicular
      - A. Right (mediastinal, bronchogenic, esophageal cancer)
      - B. Left (gastric, gall bladder, pancreas, renal, testicular/ovarian cancer)
    - iii. Axillary (cat scratch fever, breast, metastatic cancer)
    - iv. Epirochlear (infections, sarcoidosis)
  - b. Lower/Inguinal (STDs, skin, cervix, vulva/penis, rectum/anus cancer)
2. Generalized
  - a. Infectious causes
    - i. Viral (EBV, CMV, infectious hepatitis, measles, rubella, HIV)
    - ii. Bacterial (brucellosis, TB)
    - iii. Fungal (histoplasmosis, coccidioidomycosis)/Parasitic (toxoplasmosis)
  - b. Inflammatory diseases
    - i. Collagen diseases (RA, SLE, dermatomyositis, Sjogren syndrome, vasculitis)
    - ii. Serum sickness
    - iii. Drug hypersensitivity (allopurinol, phenytoin)
    - iv. Sarcoidosis
    - v. Amyloidosis
  - c. Malignant diseases
    - i. Lymphoma
    - ii. Acute or chronic lymphocytic leukemia

### Key Objectives

- ❖ Differentiate the cause of lymphadenopathy based on its location, distribution, and size (abnormal nodes are often >1-cm in diameter).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Obtain history of constitutional symptoms (fever, night sweats, weight loss), medications, exposure (e.g., cat scratch disease, undercooked meat, tick bite, travel), high-risk behavior (sexual, drug use).
  - Determine node location, size, consistency, fixation, and tenderness. Examine spleen.

- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Outline the laboratory investigation for a patient with generalized lymphadenopathy.
  - List the indications for a lymph node biopsy.
- ❖ Conduct an effective plan of management for a patient with lymphadenopathy:
  - Determine which patients require further investigation for their lymphadenopathy.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Outline the anatomy of the lymphatic system (nodes, vessels).
2. Outline the organization and function of the immune system (migration of lymphocytes, lymphocyte populations, antigen specific receptors, immunoglobulins, T cell receptors, initiation of immune responses, humoral immunity, T-cell mediated immunity, etc.).

**Rationale**

The mediastinum contains many vital structures (heart, aorta, pulmonary hila, esophagus) that are affected directly or indirectly by mediastinal masses. Evaluation of such masses is aided by envisaging the nature of the mass from its location in the mediastinum.

**Causal Conditions**

1. Anterior (60% malignant)
  - a. Tumors
    - i. Endocrine (thyroid, parathyroid, thymoma)
    - ii. Other tumors (lymphoma, teratoma, esophageal cancer)
  - b. Cardiovascular (aneurysm, pericardial cyst)
2. Middle (30% malignant)
  - a. Tumors (lymphoma, bronchogenic cancer/cyst)
  - b. Cardiovascular (aneurysm)
3. Posterior (16% malignant)
  - a. Tumors (neurologic, esophageal, bronchogenic, neuroblastoma)
  - b. Cardiovascular (aneurysm)
  - c. GIT (enteric cyst)

**Key Objectives**

- ❖ Differentiate between causes of mediastinal masses based on compartment location and age of patient since most are asymptomatic and are found on x-ray examination.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Obtain history of aching pain or cough in adults, respiratory difficulty, and recurring infections in children. Ask about hemoptysis, dysphagia, and hoarseness.
  - Examine for superior vena cava syndrome, Horner syndrome, and elevated diaphragm.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Outline the laboratory investigation for a patient with mediastinal mass.
  - Outline the radiologic investigation for a patient with mediastinal mass.
- ❖ Conduct an effective plan of management for a patient with mediastinal mass/hilar adenopathy:
  - Determine which patients require further investigation for their mediastinal mass.
  - Select patients in need of specialized care.

**Applied Scientific Concepts**

1. Outline the anatomy of the mediastinal compartments.

## MAGNESIUM CONCENTRATION SERUM, ABNORMAL/HYPOMAGNESEMIA

### Rationale

Although hypomagnesemia occurs in only about 10% of hospitalized patients, the incidence rises to over 60% in severely ill patients. It is frequently associated with hypokalemia and hypocalcemia.

### Causal Conditions

1. Gastro-intestinal
  - a. Marked decrease in dietary intake (alcoholism, malnutrition)
  - b. Diarrhea, acute/chronic; malabsorption and steatorrhea, short gut
  - c. Acute pancreatitis
2. Renal Loss
  - a. Diuretics (loop, thiazide)
  - b. Volume expansion (Conn)
  - c. Tubular dysfunction (alcoholics, aminoglycosides, amphotericin, cisplatin, cyclosporin, ATN in diuretic phase, primary)

### Key Objectives

- ❖ Determine which patients are likely to be hypomagnesemic since magnesium levels are not measured routinely.
- ❖ Evaluate patients with ventricular arrhythmias for possible hypomagnesemia, especially during ischemic events and if diuretics were prescribed.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Examine for tetany, Chvostek, and Trousseau signs.
  - Diagnose the cause of hypomagnesemia.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order serum potassium, calcium, ECG.
  - If no cause is clinically apparent differentiate between gastrointestinal and renal causes by measuring urinary magnesium excretion/fractional excretion.
- ❖ Conduct an effective plan of management for a hypomagnesemic patient:
  - State that cellular uptake of magnesium is slow, and repletion requires sustained correction.
  - Select potassium-sparing diuretics as an adjunct to management in patients with diuretic-induced hypomagnesemia if diuretic therapy cannot be stopped.

### Applied Scientific Concepts



1. Outline magnesium handling in the intestinal tract.
2. Outline magnesium handling by the kidney.

**Rationale**

The average age of onset of menarche in North America is 11 to 13 years and menopause is approximately 50 years. Between these ages, absence of menstruation is a cause for investigation and appropriate management.

**Causal Conditions**

1. Pregnancy (also gestational trophoblastic disease)
2. Central (hypothalamic-pituitary-ovarian axis)
  - a. Hypothalamic dysfunction - 35% (low FSH/LH)
    - i. Anorexia/Athletes/Nutritional deprivation
    - ii. Extreme stress/Systemic illness/Drugs
    - iii. Tumors, infiltrative/Inflammatory/Infective disorders, injury, congenital
  - b. Pituitary dysfunction - 20%
    - i. Brain or pituitary tumors (e.g., prolactin secreting adenoma, other pituitary tumors)
    - ii. Primary hypopituitarism or Sheehan syndrome
  - c. Ovarian dysfunction - 40%
    - i. Premature ovarian failure (infection, radiation/chemotherapy, autoimmune disease)
    - ii. Gonadal dysgenesis, resistant ovary
    - iii. Chronic anovulation, adequate estrogen
      - A. Polycystic ovarian disease
      - B. Ovarian/Adrenal hormone secreting tumors
3. Uterine/Outflow tract anatomic defects - 5%
  - a. Congenital mullerian dysgenesis (absence of vagina/imperforate hymen, transverse vaginal septum)
  - b. Cervical stenosis
  - c. Intrauterine adhesions/Asherman syndrome/Uterine absence/Mal-development

**Key Objectives**

- ❖ Determine whether the woman is pregnant.
- ❖ Differentiate between primary (absence by age 16 years) and secondary amenorrhea (no menses for >3 cycles or 6 months in women who had menstruated previously).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine degree of maturation of breasts, pubic and axillary hair, and external genitalia; consider delay of puberty.
  - Determine current estrogen status and presence or absence of outflow tract anatomic defect.
  - Determine patient's diet, drug intake and stress level; presence of abnormal hormonal effects such as galactorrhea, hirsutism, acne.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:

- List indications for plasma prolactin, gonadotropins, testosterone, glucose, and for administering progesterone as a diagnostic tool.
- List indications for obtaining a chromosomal karyotype.
- ❖ Conduct an effective initial plan of management for a patient with amenorrhea:
  - Outline a management plan in a patient with functional hypothalamic amenorrhea.
  - Outline management of a patient with ovarian failure.
  - Select patients in need of specialized care.

**Rationale**

Approximately 30 - 50% of post-pubescent women experience painful menstruation and 10% of women are incapacitated by pain 1 - 3 days per month. It is the single greatest cause of lost working hours and school days among young women.

**Causal Conditions**

1. Primary/Idiopathic (no pelvic abnormality)
2. Secondary (acquired)
  - a. Endometriosis
  - b. Infections
  - c. Foreign body
  - d. Cervical occlusion
  - e. Congenital abnormalities

**Key Objectives**

- ❖ Differentiate primary (within the first 2 - 3 years of menarche, with regular ovulatory menstruation) from secondary dysmenorrhea (caused by pelvic pathology).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Obtain a history for the quality of pain and timing in relationship to bleeding (e.g. primary dysmenorrhea usually results in pain after bleeding, endometriosis usually will cause pain starting before bleeding).
  - Differentiate between primary and secondary dysmenorrhea.
  - Perform pelvic examination to exclude possible causes of secondary dysmenorrhea.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order Pap smear, wet smear, cultures.
  - Select patients in need of referral for investigation (examination under anaesthesia, laparoscopy).
- ❖ Conduct an effective initial plan of management for a patient with dysmenorrhea:
  - Outline initial management of dysmenorrhea.
  - Select patients in need of specialized care.

## PRE-MENSTRUAL SYNDROME (PMS)

### Rationale

Pre-menstrual syndrome is a combination of physical, emotional, or behavioral symptoms that occur prior to the menstrual cycle and are absent during the rest of the cycle. The symptoms, on occasion, are severe enough to interfere significantly with work and/or home activities.

### Key Objectives

- ❖ Differentiate PMS from normal pre-menstrual symptoms or from other causes of physical and mood changes.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine that the symptoms are absent during the rest of the menstrual cycle (thus differentiating this syndrome from other causes of mood changes).
  - Elicit the severity of mood and physical symptoms.
- ❖ Conduct an effective initial plan of management for a patient with PMS:
  - Outline initial management including counseling on life-style issues (diet, exercise, stress reduction).
  - Outline indications for SSRI in the management of PMS.

**Rationale**

Women cease to have menstrual periods at about 50 years of age, although ovarian function declines earlier. Changing population demographics means that the number of women who are menopausal will continue to grow, and many women will live 1/3 of their lives after ovarian function ceases. Promotion of health maintenance in this group of women will enhance physical, emotional, and sexual quality of life.

**Causal Conditions**

1. Physiologic
  - a. Perimenopause (2-8 years preceding and 1 year after last menses)
  - b. Oocytes do not respond to gonadotropins
2. Premature ovarian failure (before age 40 years)
  - a. Infections of reproductive tract
  - b. Ionizing radiation/Chemotherapy
  - c. Surgery impairing ovarian blood supply
3. Artificial (oophorectomy, radiation therapy)

**Key Objectives**

- ❖ Counsel women with menopause that nothing can prevent physiologic menopause (ovarian function cannot be prolonged indefinitely) and nothing can be done to postpone its onset or slow its progress. Reassure patient that sudden aging will not occur and she remains sexually active.
- ❖ Explain the physiologic events being experienced by a woman in menopause in order to dispel fears and offer support and lifestyle counselling to minimize symptoms such as anxiety, depression, or sleep disturbance.
- ❖ State that osteoporosis is the single most important health hazard associated with the climacteric and that cardiovascular disease is the leading cause of death.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate from other causes of amenorrhea (see [AMENORRHEA/OLIGOMENORRHEA](#));
  - Determine whether there has been a decrease in amount and duration of menstrual flow, determine length of time since onset of amenorrhea (6-12 months is diagnostic).
  - Determine whether there are symptoms associated with vaginal changes (brownish discharge, bleeding with coitus, vaginal pruritus or leukorrhea, excessive vaginal dryness, dyspareunia).
  - Elicit history of urinary tract symptoms, regression of breast size, hot flashes, cardiovascular symptoms, skin and hair changes, or any psychological complaints.
  - Perform a pelvic examination and examine the organ systems mentioned above.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients requiring cytologic smears, hormone measurements (high serum FSH is pathognomonic), ultrasound, or bone density studies.

- ❖ Conduct an effective initial plan of management for a patient with menopause:
  - > Counsel patient regarding prevention of osteoporosis and cardiovascular disease.
  - > Counsel patient regarding advantages and disadvantages of estrogen replacement (e.g., endometrial cancer, breast cancer, hepatic function, hypertension, thromboembolic disease, lipid metabolism, etc.).
  - > Outline risks, benefits, and guidelines for estrogen replacement therapy.
  - > List alternatives to estrogen therapy for some of the symptoms of menopause (e.g., hot flashes, sleep disturbance).

## Applied Scientific Concepts

1. Outline the normal menstrual cycle of stimulatory and inhibitory effects of the major pituitary and gonadal hormones that result in the release of a single mature oocyte from a pool of primordial oocytes.
2. Outline the three main steps in ovarian development (germ cell differentiation, continuous follicular growth, and continuous follicular atresia).



58-1

## COMA

### Rationale

Patients with altered level of consciousness account for 5% of hospital admissions. Coma however is defined as a state of pathologic unconsciousness (unarousable).

### Causal Conditions

1. Brain involvement
  - a. Focal
    - i. Hemispheric (hemorrhage, infarction, mass (neoplastic/abscess), trauma)
    - ii. Brain stem (hemorrhage, infarction, mass (herniation), trauma)
  - b. Diffuse
    - i. Vascular (hypertensive encephalopathy, vasculitis, TTP/DIC, emboli)
    - ii. Infectious (meningitis, encephalitis)
    - iii. Other (concussion, post-ictal)
2. Systemic involvement
  - a. Deficiencies
    - i. Hypoxemia/Hypocarbica
    - ii. Electrolyte abnormalities/Hypoglycemia (sodium, calcium, magnesium)
    - iii. Hypothermia
    - iv. Vitamin B12/Thiamine
    - v. Myxedema
  - b. Excesses
    - i. Uremia/Hepatic encephalopathy/Sepsis
    - ii. CO/CO<sub>2</sub> narcosis
    - iii. Metabolic acidosis/DKA/Hyperosmolar
    - iv. Electrolyte abnormalities (sodium, calcium, magnesium)
    - v. Hyperthermia
    - vi. Thyroid storm
  - c. Drugs/Toxins (alcohols, barbiturates, tranquilizers)

### Key Objectives

- ❖ Diagnosis and management of coma relies on the knowledge of the potential causes, an interpretation of simple clinical signs and the efficient use of diagnostic tests.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine the most likely cause for and seriousness of coma by means of physical examination leading to rational investigation.
  - Conduct a clinical assessment of the level of consciousness.
- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation,



and diagnosis:

- Select and interpret laboratory investigation for patients suspected of metabolic encephalopathy.
- Select diagnostic imaging appropriate for comatose patient.
- ❖ Conduct an effective plan of management for a patient with coma:
  - Select patients in need of immediate therapy and perform initial treatment.
  - Select patients in need of specialized care.
  - Outline potential issues of importance in the ethical management of the incompetent patient, including those of consent for treatment and advanced directives.
  - Conduct assessment for suspected brain death prior to referring patient to neuro specialist for the definitive diagnosis of brain death.

## Ethics

### *Truth Telling (CLEO 4.4)*

#### Detailed Objectives

- ❖ To understand and explain the ethical and legal basis for truth telling:
  - respect for patient's autonomy;
  - situations of inevitable disclosure;
  - provision of support with disclosure of difficult news; and
  - respect patient's need to make realistic life decisions.
- ❖ To recognize reasonable right of patient to know relevant information:
  - purpose and implications of investigations;
  - diagnosis and prognosis of medical condition;
  - risks and benefits of treatment; and
  - health risks to which they are exposed.

Comatose patients provide a number of challenges to both the medical team in charge of their medical care as well as concerned members of their family. Major controversies may arise over their treatment and its utility or futility. These controversies may arise when patients and physicians are not arguing over treatments, but over goals.

Physicians who regard ventilator support of a patient in a persistent vegetative state as futile usually mean that the treatment is extremely unlikely to restore the patient to a communicative, interactive state. If the goal of care were for the patient to wake up and talk, then most would agree that the respirator is futile. However, for some families the goal of treatment is to sustain life; there is little argument that the respirator allows for the maintenance of respiratory and circulatory function. The respirator is hardly a futile treatment from this perspective. When physicians and patients or family disagree about whether a treatment should be viewed as futile, a stepwise approach involving clarifying goals and mediation may be helpful.

## Applied Scientific Concepts

1. Explain that coma is caused either by dysfunction of the reticular activating system above the level of the mid-pons or dysfunction of bilateral cerebral hemispheres.
2. Outline how physical examination permits discrimination between the two types of dysfunction listed above.

**Rationale**

An acute confusional state in patients with medical illness, especially among those who are older, is extremely common. Between 10 - 15% of elderly patients admitted to hospital have delirium and up to a further 30% develop delirium while in hospital. It represents a disturbance of consciousness with reduced ability to focus, sustain, or shift attention (DSM-IV). This disturbance tends to develop over a short period of time (hours to days) and tends to fluctuate during the course of the day. A clear understanding of the differential diagnosis enables rapid and appropriate management.

**Causal Conditions**

1. Systemic deficiencies
  - a. Hypoxemia (global ischemia, severe anemia)
  - b. Endocrine (hypoglycemia, hypothyroid, hypopituitary, thiamine deficiency)
  - c. Electrolytes (hyponatremia, -phosphatemia, -calcemia, -magnesium)
2. Systemic excesses
  - a. Drugs and toxins (opiates, psychotropic, anticholinergic, withdrawal, etc.)
  - b. Organ failure (uremic, hepatic, CHF, hypercarbia, sepsis, post-operative)
  - c. Electrolytes (hypernatremia, -calcemia, -magnesium, acidosis)
3. Local (central nervous system)
  - a. CNS infection
  - b. Acute vascular events/Stroke/Trauma
  - c. Post-ictal, neoplasm

**Key Objectives**

- ❖ Differentiate delirium due to general medical conditions from dementia, drug intoxication or withdrawal, and psychotic disorders.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine which patients are at risk for developing delirium (e.g., dementia, stroke, Parkinson).
  - Determine the individual's cognitive state by screening with the mini-mental state examination.
  - Diagnose delirium with the assistance of the confusion assessment method; diagnose the underlying cause(s) for delirium; obtain collateral history from family, friends, and nurses.
  - Contrast delirium and dementia (a potent risk factor for delirium); categorize a sudden change in behavior in a patient with dementia as possible delirium superimposed on dementia.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret laboratory investigations in a patient with delirium.
  - List the indications for radiological imaging of the brain in a patient with delirium.
- ❖ Conduct an effective plan of management for a patient with delirium:
  - Outline primary preventive interventions for geriatric patients aimed at cognition, sleep deprivation, immobility,

vision, hearing, and dehydration.

- Outline non-pharmacological therapeutic interventions (e.g., elimination of medications, oxygenation, hydration, environmental factors, orienting stimuli, early mobilization, etc.).
- Outline the initial emergency management of patients with delirium including protection of the patient from self-inflicted harm and harm of others.
- Describe the specific management of patients with delirium due to hepatic encephalopathy, metabolic abnormalities, and drugs.
- Select patients in need of specialized care.

## Ethics

### *Consent to Investigation or Treatment (CLEO 4.3)*

#### Detailed Objectives

- ❖ To explain the legal and ethical basis for consent.
- ❖ To demonstrate awareness of process for the assessment of capacity to give consent, and be able to conduct an assessment.
- ❖ To recognize factors which can alter capacity (e.g., disease, drugs, depression).
- ❖ To recognize the duty to provide necessary emergency care where consent is unavailable.

Patients with delirium or confusion may lack the capacity to give consent. It is important to conduct an assessment of the patient's capacity to give consent before seeking a substitute decision-maker. Patients should always be considered to have autonomy. If the physician knows the patient well, it may be appropriate to use "substituted judgement". This requires the physician to recreate the patient's judgement from prior statements or values and beliefs held. If the patient's wishes cannot be reliably ascertained, a substitute decision-maker is sought. In case of emergency, it may be necessary to provide treatment without consent.

## Applied Scientific Concepts

1. Although the physiologic basis of delirium is poorly understood, explain that evidence for disturbance of global cortical and subcortical (thalamus, basal ganglia, pontine reticular formation) function does exist.
2. Outline the role of acetylcholine in the pathogenesis of delirium in terms of anticholinergic drugs causing delirium and reversal of symptoms with cholinesterase inhibitors such as physostigmine as well as such conditions as hypoglycemia, hypoxemia, and thiamine deficiency decreasing acetylcholine production in the CNS.

**Rationale**

Dementia is a problem physicians encounter frequently, and causes that are potentially treatable require identification. Alzheimer disease is the most common form of dementia in the elderly (about 70%), and primary care physicians will need to diagnose and manage the early cognitive manifestations.

**Causal Conditions**

1. Primary dementia (Alzheimer disease)
2. Secondary
  - a. Vascular (multi-infarct, vasculitis)
  - b. Nervous system/Movement disorders
    - i. Parkinson, Lewy body disease, Huntington chorea
    - ii. Brain trauma (boxing, anoxia)
    - iii. Frontal lobe dementia
3. Potentially reversible dementia (10 - 15%)
  - a. Toxic/Medications
    - i. Alcohol, drugs, and narcotics (analgesics, anti psychotropic, sedative-hypnotic)
    - ii. Heavy metals (dialysis dementia), organic toxins
  - b. Mass lesions and/or neoplasms
    - i. CNS neoplasms
    - ii. Chronic subdural hematoma
    - iii. Normal pressure hydrocephalus
  - c. Chronic infections (HIV, syphilis, Creutzfeldt-Jacob, chronic meningitis)
  - d. Endocrine, metabolic, and vitamin deficiency
    - i. Hypothyroidism, hypo and hyperparathyroidism
    - ii. B12 and thiamine deficiency
  - e. Psychiatric (depression)

**Key Objectives**

- ❖ Assess and identify early Alzheimer dementia and differentiate from treatable and irreversible causes of cognitive function loss based on risk (age, family history, diabetes, hypercholesterolemia, etc.), etiology, and pathophysiology.
- ❖ Recent onset of dementia in an alcoholic with some focal neurological signs suggests chronic subdural hematoma, especially if headache is present.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Communicate with patient as appropriate to degree of dementia; obtain additional information from family, and other professional(s) with knowledge of the patient.
  - Determine patient's mental status (e.g., conduct a Folstein mini-mental status exam).
  - Differentiate depression from dementia; categorise causes of dementia.

- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Determine if occupational therapy, assessment, or referral is needed after considering resources available.
  - Determine and assess the role of the family in the support of the patient.
- ❖ Conduct an effective initial plan of management for a patient with dementia:
  - Outline management based on the patient's level of disability, wishes of the patient, wishes of the family, and support available in the community; conduct counselling, and education to patients and families.
  - Determine the functional status of the patient.

## Ethics

### *Confidentiality (CLEO 4.2)*

#### **Detailed Objectives**

- ❖ To recognize situations in which third parties have a legitimate interest and right to information:
  - legal requirements in the interest of public health; and
  - legitimate interest of 3rd parties (e.g., Insurance companies).

### *Consent to Investigation or Treatment (CLEO 4.3)*

#### **Detailed Objectives**

- ❖ To explain the legal and ethical bases for consent.
- ❖ To demonstrate awareness of process for the assessment of capacity to give consent, and be able to conduct such as assessment.
- ❖ To identify appropriate substitute decision maker or process to determine that individual.
- ❖ To communicate clearly information relevant to informed consent (what a reasonable person would want to know in a given circumstance).
- ❖ To identify reasonable steps to ensure understanding of information: can the patient explain the medical problem and the proposed treatment or test.

A number of specific issues may arise in patients with dementia. Some of these are discussed in detail under the "legal aspects of consent". Others involve specific decisions about resuscitation and artificial nutrition and hydration. The physicians must communicate clearly the relevant information. For example, providing the patient, family, or substitute decision-maker with data showing that feeding tubes in patients with advanced dementia are ineffective may simplify the decision-making process. If uncertainty remains, consult the hospital ethics committee.

### *Truth Telling (CLEO 4.4)*

#### **Detailed Objectives**

- ❖ To understand and explain the ethical and legal basis for truth telling:
  - respect for patient's autonomy;
  - situations of inevitable disclosure; and
  - respect patient's need to make realistic life decisions.
- ❖ To recognize reasonable right of patient to know relevant information:
  - purpose and implications of investigations;
  - diagnosis and prognosis of medical condition;
  - risks and benefits of treatment; and
  - health risks to which they are exposed.
- ❖ To respect patients right to not know, and ascertain a patient's wishes:

- identify and respect valid exceptions to truth telling;
- seek consent for disclosure;
- awareness of personal and cultural context and how that may influence a patient's choice; and
- respects a patient's choice above that of family members.

### **Resource allocation (CLEO 4.5)**

#### **Detailed Objectives**

- ❖ To make health care resources available to patients in a manner which is fair and equitable, without bias, or discrimination.

### **Research Ethics (CLEO 4.6)**

#### **Detailed Objectives**

- ❖ To identify reasonable criteria for ethical approval of research involving patients.
- ❖ To recognize the need for fully informed and voluntary consent.

The question may arise about the appropriateness of a demented person's participation in research. If a study for management of patients with dementia were available, communicate all information to the patient in a language that is understandable, or communicate with the legitimate delegate, and obtain voluntary consent.

## **Applicable Basic Principles of Law**

### **Legal Aspects of Consent (CLEO 5.2)**

#### **Detailed Objectives**

- ❖ It is mandatory that the patient's consent be obtained for any medical investigation, treatment, or research.
- ❖ Consent must be freely given and fully informed.
- ❖ Full information must be given, in language that the patient or involved person(s) can understand. This must include information regarding the nature of the proposed treatment or investigation, anticipated effects, material or significant risks, alternatives available, and any information regarding delegation of care, and will be given according to the circumstances of each particular case.
- ❖ The consenting patient must be competent to consent; i.e., sufficiently capable; e.g., if they are young or mentally incapacitated, they must be able to understand the information required for consent and appreciate the reasonable foreseeable consequences. Competence is to be assessed operationally or functionally; i.e., the patient need only be competent to consent to, or refuse the particular choice in question.
- ❖ If the patient is not competent or lacks capacity to consent, then consent may be obtained (according to the law applicable in each province and the specific circumstances) from a court, parent or substitute decision-maker. The law regarding delegation of care is specific to each province and the physician should be fully aware of local requirements in this regard.

Patients have the right to participate in medical decision-making. The principle of autonomy, or the right to make choices about one's own life, is the focus of modern biomedical ethics. Unfortunately, a large proportion of elderly individuals have dementia, which usually prevents their understanding many of the issues involved in choosing among treatment alternatives. In addition, some cognitively intact elderly are delirious during an acute illness and are incapable of complex discussions about their care at just the time that important decisions must be made.

In a patient with the early cognitive manifestations of dementia, there is a need to assess the decision-making capacity of the patient. The physician must assess the patient's decision-making capacity before concluding that a given individual cannot

speak for himself or herself. Mildly demented patients, for example, may understand the issues involved in a simple medical procedure well enough to allow them to choose or decline the procedure, even if they no longer have the ability to make financial decisions or live independently. Conversely, superficially intact patients may be unable to understand the pros and cons of a proposed intervention.

Assessment of decision-making capacity can and should be performed by the primary physician; determining decision capacity for a specific medical intervention requires neither legal intervention nor psychiatric expertise. Decisions about competence are judicial determinations that involve ruling on the patient's global decision-making ability. Competency determinations are necessary when evaluating the capacity of a person to make non-medical decisions, such as financial matters.

There is no "test" of decision capacity; the mini-mental status examination or other quantitative measures of cognitive function do not predict the ability to make medical decisions, except in the case of extreme impairment. Nevertheless, the clinician can be satisfied that a patient is capable of making decisions if he or she has the following abilities, which can be determined at the bedside:

- ❖ The ability to communicate (a translator, a communications board for aphasic patients, writing out questions with a deaf patient, etc. may be essential in clarifying ability to communicate).
- ❖ The ability to understand the proposed treatment and alternative interventions. Simply ask the patient to repeat in his or her own words what the physician has explained.
- ❖ The ability to grasp the consequences of accepting and of declining the suggested treatment.
- ❖ The ability to reason.

Patients who are deemed capable of participating in decisions about their care generally should be involved directly in any discussions of limiting care. An exception may occur in those with depression. Patients who are depressed can meet the criteria for decision capacity, but their preferences are clouded by their mood disorder. Exceptions may also occur in patients of various ethnic groups, in whom decision-making is customarily delegated to other family members. Physicians sensitive to ethnic variability toward decision-making should ask patients whether they wish to be involved.

A surrogate decision-maker should be identified if a patient is deemed incapable of participating in health care decisions. Contemporary biomedical ethics holds the view that physicians should not take on this role. This thinking is based in part upon studies demonstrating that physicians' belief of what their intact patients would have wanted done in the event of serious illness is frequently incorrect. In addition, physicians systematically tend to underestimate the quality of life of their patients and are thereby less likely to favor life-sustaining treatments than are their patients.

A surrogate serves as the patient's representative and ideally should be chosen by the patient for this role when able to make such a choice. The next of kin customarily serves this role in the absence of a formally designated surrogate. The expectation is that the surrogate will make health care decisions based upon substituted judgement, by considering what the patient would have wanted when able to understand the issues. If the surrogate cannot ascertain what the patient would choose, then the decision should be based upon what most people in that condition would want.

Formal guardianship is rarely necessary. A judge, based upon a legal determination that the patient is incompetent, assigns a guardian. Guardianship proceedings are initiated when a physician is faced with a major treatment dilemma in a patient who is incapable of making decisions and has no health care proxy or relatives. Guardianship is also occasionally necessary if multiple first-degree relatives cannot agree on medical care despite mediation by the health care team, or are clearly acting in their own self-interest rather than that of the patient. Advance medical planning may involve the following: health care proxy, living will, instructional directive, values history, or combined directive.

## General Organization

### *Inter-Professional Issues (CLEO 6.9)*

## Detailed Objectives

- ❖ The proper inter-professional relationship based on respect and clear communication.
- ❖ The ability to work in a collegial way within a team structure involving other physicians and health care workers.
- ❖ Maintain respect for the role of the other health professions at all times.



## Rationale

Depression is one of the top five diagnoses made in the offices of primary care physicians. Depressed mood occurs in some individuals as a normal reaction to grief, but in others it is considered abnormal because it interferes with the person's daily function (e.g., self-care, relationships, work, self-support). Thus, it is necessary for primary care clinicians to detect depression, initiate treatment, and refer to specialists for assistance when required.

## causal conditions

1. Depressive disorders
  - a. Major depressive disorder
  - b. Dysthymic disorder
  - c. Atypical depression
2. Depression with associations
  - a. Timing (seasonal, postpartum)
  - b. Mood disorder due to medical condition/therapy
  - c. Substance-induced mood disorder
3. Grief and bereavement
4. Depression with manic episode
  - a. Bipolar disorder
  - b. Cyclothymic disorder

## Key Objectives

- ❖ Distinguish between the normal condition of sadness (e.g., bereavement) and the presence of one of the clinical syndromes (e.g., depressive disorders).

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Diagnose the presence of depression (depressed mood, loss of interest in all activities, change in weight/appetite, sleep, energy, libido, concentration, feeling of hopelessness, worthlessness or guilt, recurrent thoughts of suicide, increase in somatic complaints, withdrawal from others).
  - Determine intensity and duration (weeks or years) of depression, antecedent event, and its effect on function.
  - Determine whether a general medical condition is present, use or abuse of drugs (or withdrawal).
  - Examine for slowness of thought, speech, motor activity or signs of agitation such as fidgeting, moving about, hand-wringing, nail biting, hair pulling, lip biting; examine vital signs, pupils, and skin for previous suicide attempts, stigmata of drug and/or alcohol use, thyroid gland, weight loss.
  - Elicit history of elevated, expansive or irritable mood (for at least 1 week) with impairment in function or without impairment and lasting only 4 days.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients only when high index of suspicion requires further investigation for medical condition or drugs

that affect mood (e.g., thyroid function, toxicology screen, electrolytes, etc.).

- ❖ Conduct an effective initial plan of management for a patient with a mood disorder:
  - Outline and describe treatment available for mood disorders under categories of medications, physical treatment, and psychologic treatment.
  - Select patients in need of specialized care.

## Applicable Basic Principles of Law

### *Legal Aspects of Consent (CLEO 5.2)*

#### Issues

- ❖ Voluntary and informed consent as a fundamental legal requirement
- ❖ The elements and practical aspects of consent to investigation, treatment, or research
- ❖ The right to refuse consent
- ❖ Exceptions to the requirement for consent

#### Detailed Objectives

- ❖ It is mandatory that the patient's consent be obtained for any medical investigation, treatment, or research.
- ❖ Consent must be freely given and fully informed.
- ❖ Full information must be given, in language that the patient or involved person(s) can understand. This must include information regarding the nature of the proposed treatment or investigation, anticipated effects, material or significant risks, alternatives available, and any information regarding delegation of care, and will be given according to the circumstances of each particular case.
- ❖ The obligation of disclosure rests with the physician who is to carry out the treatment. It may be delegated in appropriate circumstances to another qualified physician, but responsibility lies with the delegating physician.
- ❖ The consenting patient must have the legal capacity to consent; i.e., of a legal age to consent (different provinces specify differing ages at which a patient is deemed to be capable of giving consent). The treatment of minors often raises a number of important legal (as well as ethical and practical) issues for physicians.
- ❖ The consenting patient must be competent to consent; i.e., sufficiently capable; e.g., if they are young or mentally incapacitated, they must be able to understand the information required for consent and appreciate the reasonable foreseeable consequences. Competence is to be assessed operationally or functionally; i.e., the patient need only be competent to consent to, or refuse the particular choice in question.
- ❖ If the patient is not competent or lacks capacity to consent, then consent may be obtained (according to the law applicable in each province and the specific circumstances) from a court, parent or substitute decision-maker. The law regarding delegation of care is specific to each province and the physician should be fully aware of local requirements in this regard.
- ❖ The patient has the right to refuse consent to treatment and this decision must be respected, even when this may lead to the death of the patient.

Patients who are deemed capable of participating in decisions about their care generally should be involved directly in any discussions of limiting care. An exception may occur in those with depression. Patients who are depressed can meet the criteria for decision capacity, but their preferences are clouded by their mood disorder. Overriding the wishes of a seemingly capable patient who is depressed is a serious matter and is one situation in which psychiatric involvement should be sought. Decisions to limit care should be deferred if possible until depression has been adequately treated; if time pressures dictate the need to make a prompt choice, the physician should seek surrogate involvement. If the surrogate has previously discussed the patient's wishes at a time when he or she was not depressed, the surrogate will be able to explain whether the patient's choice is consistent with previously stated beliefs or has changed since the onset of depression.

**Rationale**

Although many disease states can affect the mouth, the two most common ones are odontogenic infections (dental caries and periodontal infections) and oral carcinoma. Almost 15% of the population have significant periodontal disease despite its being preventable. Such infections, apart from the discomfort inflicted, may result in serious complications.

**Causal Conditions**

1. Mouth problems in children
  - a. Abnormalities in teeth (caries from bottled sweeteners/insufficient fluoride intake, eruption, number, form, size)
  - b. Gingival overgrowth (idiopathic, genetic, drugs)
  - c. Trauma (accidents, child abuse)
2. Mouth problems in adults
  - a. Periodontal infections
    - i. Dental caries/Endodontic infection/Periapical abscess
    - ii. Gingivitis/Periodontitis/Pericoronitis/Periodontal abscess
    - iii. Fascial space infections/Osteomyelitis
      - A. Oral hygiene
      - B. Systemic factors (hematological disorders, HIV)
      - C. Sexually transmitted/Blood borne infections
  - b. Oral carcinoma
    - i. Pre-malignant (leukoplakia, erythroplakia)
    - ii. Malignant (basal, squamous cell, muco-epidermoid)
  - c. Other (cellulitis, trauma, candida)
  - d. Salivary glands (mumps, bacterial infections, sialolithiasis, tumor)
3. Mouth problems in the elderly
  - a. Receding gingiva/Gums
  - b. Edentulism

**Key Objectives**

- ❖ Select patients for referral to dentist for caries/abscess/cellulitis.
- ❖ Select patients for referral to ENT specialist for any indurated or ulcerative lesions.
- ❖ Recommend regular prophylactic care including flossing and fluoride toothpaste.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit history of tobacco (smoke or chewing) or large quantities of alcohol and perform examination of the mouth including direct visualization and palpation of the entire surface searching for painless plaque, ulcers, or lumps in the mucosa, tongue, mouth, or neck.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.

- ❖ Conduct an effective plan of management for a patient with acute mouth problems:
  - > Outline indications for antibiotic treatment and choice of antibiotics.
  - > Counsel patients about the relationship between plaque and gingivitis (as well as prophylaxis).

### **Applied Scientific Concepts**

1. Outline the pathogenesis, predisposing factors, and progression of odontogenic infections.
2. Outline the route(s) of spread from infections of odontogenic origin locally (intra-oral, extra-oral); describe special concerns related to bacteremic seeding.

**Rationale**

Movement disorders are regarded as either excessive (hyperkinetic) or reduced (bradykinetic) activity. Diagnosis depends primarily on careful observation of the clinical features.

**Causal Conditions**

1. Hyperkinetic
  - a. Tics
    - i. Primary (sporadic and inherited)
      - A. Tourette syndrome
      - B. Huntington disease
    - ii. Secondary
      - A. Infections (encephalitis, Creutzfeldt-Jakob, Sydenham chorea)
      - B. Drugs (stimulants, levodopa, carbamazepine, phenytoin)
  - b. Dystonia
    - i. Primary (sporadic and inherited)
    - ii. Dystonia plus syndromes (medication)
  - c. Stereotypies (typically with mental retardation or autism)
  - d. Chorea/Athetosis/Ballism
  - e. Essential tremor
  - f. Myoclonus
2. Bradykinetic
  - a. Parkinson disease
  - b. Wilson disease
  - c. Huntington disease
3. Tremor
  - a. Resting (Parkinson, Wilson, severe essential)
  - b. Intention (cerebellar disease, MS, midbrain stroke, trauma)
  - c. Postural/Action (enhanced physiologic, essential, peripheral neuropathy)

**Key Objectives**

- ❖ Describe the abnormal movement accurately after careful observation (at rest and in action).
- ❖ Test for Wilson disease in order to avoid missing a treatable disease.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate between various types and causes of movement disorders.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:

- > Select patients in need of referral for investigation.
- > Conduct testing for Wilson disease (serum ceruloplasmin, serum and urine copper).
- ❖ Conduct an effective plan of management for a patient with movement disorder:
  - > Select patients in need of specialized care.
  - > Conduct screening of family members if Wilson disease is diagnosed.

## Applied Scientific Concepts

1. Identify the basal ganglia as the site involved in movement control such as regulating the initiation, scaling, and control of the amplitude and direction of movement as well as involvement in many bradykinetic disorders. Structural or biochemical abnormalities of these ganglia can result in movement disorders.
2. List some of the components of the basal ganglia, including the dopamine-rich substantia nigra (gives rise to the main dopaminergic tract).
3. Outline how motor control is facilitated by the integration of the basal ganglia with the cortex (output of the basal ganglia projects via the thalamus to the cerebral cortex and then to the pyramidal system).

**Rationale**

Although systolic murmurs are often "innocent" or physiological, diastolic murmurs are virtually always pathologic.

**Causal Conditions**

1. Early (beginning immediately after 2nd heart sound)
  - a. Aortic regurgitation
    - i. Leaflet abnormality
      - A. Rheumatic fever
      - B. Endocarditis
      - C. Bicuspid aortic valve
      - D. Rheumatoid arthritis, ankylosing spondylitis
      - E. Trauma
    - ii. Aortic root and ascending aorta
      - A. Systemic hypertension
      - B. Aortitis (syphilis)
      - C. Reiter syndrome
      - D. Ankylosing spondylitis
      - E. Dissecting aneurysm
    - iii. Pulmonary regurgitation
  - b. Mitral stenosis (rheumatic fever, SLE, rheumatoid arthritis, carcinoid)
  - c. Tricuspid stenosis

**Key Objectives**

- ❖ Determine the etiology of the murmur, the acuteness of the presentation, the patient's cardiovascular reserve, and the need for intervention.
- ❖ Select patients in need of prophylaxis for bacterial endocarditis.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine the origin of the murmur.
  - Determine whether heart failure is present, and whether left sided, right sided, or both.
  - Determine whether the heart rhythm is abnormal.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Diagnose abnormal heart rhythm by means of clinical findings and ECG.
  - Select diagnostic imaging for further investigation of the diastolic murmur.
- ❖ Conduct an effective plan of management for a patient with a diastolic murmur:
  - Counsel and educate the patient concerning possible need for endocarditis prophylaxis.

- Outline management of left and right sided heart failure, including side effects of prescribed medications.
- Discuss the need for anticoagulation in patients with atrial fibrillation.
- Select patients in need of specialized care.

## Applicable Basic Principles of Law

### *Physicians' Legal Liability for Negligence (or, in Québec, Civil Liability) (CLEO 5.4)*

#### Detailed Objectives

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstances under consideration.

A physician may be found legally liable to the patient if a significant diastolic murmur, (associated with other cardiac findings) was considered innocent and not investigated or referred for further assessment.

## Applied Scientific Concepts

1. Relate normal and abnormal heart sounds as well as murmurs to hemodynamic events such as changes in left (or right) atrial pressure, left (or right) ventricular pressure, ventricular volume, and aortic (or pulmonary artery) pressure.
2. Outline on a diagram the relationship between such pressure changes to heart sounds (on a phonocardiogram) and ECG waves.



**Rationale**

Pathological heart sounds are clues to underlying heart disease.

**Causal Conditions**

1. Heart sound 1
  - a. Loud (mitral stenosis, hyperthyroidism, short P-R)
  - b. Soft (mitral valve regurgitation, long P-R, COPD)
2. Heart sound 2
  - a. Loud (hypertension, sclerotic aorta)
  - b. Soft (hypotension, left heart failure, aortic valve stenosis)
  - c. No split (Eisenmenger, severe pulmonary embolus, pulmonic stenosis)
3. Split heart sounds
  - a. Delayed pulmonary valve closure (pulmonary embolus/hypertension/stenosis, RBBB, left-right shunt)
  - b. Fixed split (ASD)
  - c. Early aortic closure (mitral regurgitation, VSD)
  - d. Paradoxical split (LBBB, right ventricular pacemaker)
4. Heart sounds 3 and 4
  - a. 3rd heart sound (dilated ventricle with volume overload, hyper-kinetic heart, mitral/tricuspid regurgitation, left/right heart failure)
  - b. 4th heart sound (hypertrophic and ischemic cardiomyopathy, hypertension, aortic stenosis, acute ischemia causing a stiff ventricle)
5. Extra heart sound and clicks
  - a. Ejection sounds (early systolic) - aortic and pulmonary stenosis
  - b. Opening sounds (early diastolic) - mitral stenosis, tricuspid stenosis
  - c. Clicks (midsystolic) - mitral valve prolapse

**Key Objectives**

- ❖ Interpret the origin of heart sounds.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine whether underlying heart disease is present.
  - Select patients in need of specialized care.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select common investigative tools such as chest x-ray, ECG, and echocardiography to assist with diagnosis.
- ❖ Conduct an effective plan of management for a patient with pathological heart sounds:
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Relate normal and abnormal heart sounds to hemodynamic events such as changes in left (or right) atrial pressure, left (or right) ventricular pressure, ventricular volume, and aortic (or pulmonary artery) pressure.
2. Outline on a diagram the relationship between such pressure changes to heart sounds on a phonocardiogram and ECG waves.

**Rationale**

Ejection systolic murmurs are common, and frequently quite 'innocent' (with absence of cardiac findings and normal splitting of the second sound).

**Causal Conditions**

1. Mid-systolic (ejection)
  - a. Aortic stenosis
    - i. Leaflet disease
      - A. Unicuspid, bicuspid, tricuspid
      - B. Rheumatic fever (seldom pure stenosis)
      - C. Degenerative
    - ii. Sub-valvular disease (hypertrophic cardiomyopathy)
    - iii. Supra-valvular disease (aortic narrowing, cong. supra-valvular stenosis, coarctation)
  - b. Pulmonary stenosis
2. Pansystolic (or late systolic)
  - a. Mitral regurgitation
    - i. Leaflet
      - A. Rheumatic fever
      - B. Collagen diseases (SLE, scleroderma)
      - C. Connective tissue diseases (Marfan)/Mitral valve prolapse)
      - D. Endocarditis
      - E. Hypertrophic cardiomyopathy
    - ii. Chordae tendinea
      - A. Rupture (myocardial infarction)
      - B. Mitral valve prolapse
      - C. Endocarditis
      - D. Rheumatic fever
      - E. Trauma
    - iii. Papillary muscle
      - A. Dysfunction (ischemia/infarct, aneurysm, dilated cardiomyopathy)
      - B. Rupture (infarction, trauma)
    - iv. Mitral annulus
      - A. Calcification (rheumatic fever, chronic renal failure)
      - B. Dilatation (dilated cardiomyopathy)
  - b. Tricuspid regurgitation
    - i. Dilatation of right ventricle/Tricuspid annulus
      - A. Right ventricular myocardium (infarction, dilated cardiomyopathy)
      - B. Pulmonary hypertension/Right ventricular dilatation
        - I. Left congestive heart failure
        - II. Mitral stenosis/Regurgitation
        - III. Primary pulmonary disease
        - IV. Left to right shunt/Eisenmenger
        - V. Pulmonary valve/Artery stenosis

- ii. Valve abnormality (rheumatic fever, endocarditis, Ebstein, carcinoid)
- c. Ventricular septal defect
- d. PDA (pansystolic and diastolic murmur)

## Key Objectives

- ❖ Determine whether the systolic murmur is innocent or pathologic.
- ❖ Determine etiology of the murmur.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine the origin of the murmur.
  - Determine whether heart failure is present, and whether left sided, right sided, or both.
  - Determine whether the heart rhythm is abnormal.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Diagnose abnormal heart rhythm by means of clinical findings and ECG.
  - Select diagnostic imaging for further investigation of the systolic murmur.
- ❖ Conduct an effective plan of management for a patient with a systolic murmur:
  - Counsel and educate the patient concerning possible need for endocarditis prophylaxis.
  - Outline management of left and right sided heart failure, including side effects of prescribed medications.
  - Discuss the need for anticoagulation in patients with atrial fibrillation.
  - Select patients in need of specialized care.

## Applicable Basic Principles of Law

### *Physicians' Legal Liability for Negligence (or, in Québec, Civil Liability) (CLEO 5.4)*

#### Detailed Objectives

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstances under consideration.

A physician may be found legally liable to the patient if a systolic murmur, (associated with other cardiac findings) was considered innocent and not investigated or referred for further assessment.

## Applied Scientific Concepts

1. Relate normal and abnormal heart sounds as well as murmurs to hemodynamic events such as changes in left (or right) atrial pressure, left (or right) ventricular pressure, ventricular volume, and aortic (or pulmonary artery) pressure.
2. Outline on a diagram the relationship between such pressure changes to heart sounds (on a phonocardiogram) and ECG waves.

### Rationale

The vast majority of neck lumps are benign (usually reactive lymph nodes or occasionally of congenital origin). The lumps that should be of most concern to primary care physicians are the rare malignant neck lumps. Among patients with thyroid nodules, children, patients with a family history or history for head and neck radiation, and adults <30 years or >60 years are at higher risk for thyroid cancer.

### Causal Conditions

1. Midline (chin to sternal notch)
  - a. Related to thyroid
    - i. Within thyroid (some patients have abnormal thyroid tests without a neck mass)
      - A. Associated with hyperthyroidism (Graves, toxic adenoma, Hashimoto)
      - B. Associated with hypothyroidism (Hashimoto, subacute, post-partum, iodine deficiency)
      - C. Associated with pain (subacute/radiation thyroiditis, hemorrhage, cancer)
      - D. Asymptomatic (cancer, adenoma, cyst, parathyroid tumor, multi-nodular goiter)
    - ii. Thyroglossal cysts
  - b. Dermoid cysts
2. Lateral
  - a. Cystic (branchial cysts, abscess)
  - b. Non-cystic
    - i. Benign lymphadenopathy (infective, inflammatory)
    - ii. Malignant (lymphoma, rhabdomyosarcoma, neuroblastoma, thyroid, salivary, nasopharyngeal cancer)
  - c. Congenital (hemangiomas, lymphangiomas, teratoma, neuroblastoma, cystic hygroma)

### Key Objectives

- ❖ Determine whether the neck mass originates from the thyroid gland (thyroid disorders are the most common cause of a neck mass).
- ❖ Determine the status of thyroid function of the individual.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether the lesion is of rapid onset or insidious.
  - Determine presence of pain, swallowing or systemic symptoms.
  - Determine the presence of hyper/hypothyroidism (including findings typical of Graves disease).
  - Perform examination of the mass, thyroid gland, cervical lymph nodes, and other neck structures.
  - Examine ears, nose, oral cavity and throat, scalp, axillae, groin, liver, spleen, lymph nodes.
- ❖ List and interpret the critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Discuss the utility of TSH determination for screening patients suspected of thyroid abnormalities.
  - Select other thyroid function studies if TSH is abnormal, and outline their utility.

- Discuss the use of fine needle aspiration, thyroid scans, and high-resolution ultrasonography.
- ❖ Conduct an effective plan of management for a patient with a neck mass:
  - Outline management plan for hyperthyroidism, hypothyroidism, thyroiditis, and thyroid nodule.
  - Discuss control of symptoms of hyperthyroidism; advantages/disadvantages of anti-thyroid drugs and radioactive iodine.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Outline the pathway of thyroid hormone metabolism from hypothalamic thyrotropin-releasing hormone relationship to anterior pituitary TSH, thyroid gland release of T4 and T3, feedback in hypothalamus and anterior pituitary, as well as activity in the liver and gut.
2. Outline the role of iodine in thyroid hormone metabolism.

### Rationale

A call requesting assistance in the delivery of a newborn may be "routine" or because the neonate is depressed and requires resuscitation. For any type of call, the physician needs to be prepared to manage potential problems.

### Causal Conditions

1. Respiratory problems (see [CYANOSIS/HYPOXEMIA/HYPOXIA IN CHILDREN](#))
  - a. Hyaline membrane disease/Respiratory distress syndrome (in premature infants)
  - b. Birth asphyxia or CNS depression (maternal drugs)
  - c. Meconium aspiration
  - d. Sepsis
  - e. Pneumothorax
2. Severe anemia (erythroblastosis fetalis and secondary hydrops fetalis)
3. Maternal causes
  - a. Drugs
  - b. Diabetes mellitus
  - c. Pregnancy-induced hypertension
4. Congenital malformations/birth injury
5. Shock/Cyanosis/Congenital heart disease
6. Other (hypothermia, hypoglycemia, etc.)

### Key Objectives

- ❖ Elicit selective maternal history, determine fetal vital signs, rapidly assess for possible causes of a depressed neonate, and initiate supportive measures for the infant and family.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit a maternal history including illnesses, maternal use of drugs (including labor), previous high-risk pregnancies, infections during pregnancy or now, how long have membranes been ruptured, mother's blood type and Rh status, evidence of poly or oligo hydramnios, gestational age, any meconium, etc.
  - Identify significant causes underlying the depressed newborn; obtain Apgar score.
- ❖ List and interpret critical clinical and laboratory findings which were key in the process of exclusion, differentiation, and diagnosis:
  - Outline the appropriate investigation of various causes of a depressed newborn and interpret the results.
- ❖ Conduct an effective plan of management for a depressed newborn:
  - Identify newborn in need of prompt respiratory support, assess need for circulatory support (consider umbilical vein for quick venous access), and avoid hypothermia and hypoglycemia.
  - Select patients that require ongoing specialised care and initiate respiratory and blood pressure support.
  - In the presence of thick meconium, clear from airway prior to ventilation.
  - Counsel and provide explanation and support to family of depressed neonate.

## Ethics

### *Consent to Investigation and Treatment (CLEO 4.3)*

#### **Detailed Objectives**

- ❖ To recognize the duty to provide necessary emergency care where consent is unavailable.

### *Truth Telling (CLEO 4.4)*

#### **Detailed Objectives**

- ❖ To recognize reasonable right of patient to know relevant information:
  - diagnosis and prognosis of medical condition;
  - risks and benefits of treatment; and
  - health risks to which they are exposed.
- ❖ To recognize and seek guidance in situations of conflict between this and other ethical duties, particularly the duty to do no harm.

On occasion, the depressed newborn may be very premature, and the decision to be made will be whether to initiate resuscitation. On other occasions, after resuscitation has already been initiated, continuing or discontinuing resuscitation may become an issue if the depressed newborn infant has multiple congenital malformations or is very premature. In such instances, it may become necessary to seek guidance, since there may be a conflict between initiation and continuation of resuscitation on the one hand and the duty to do no harm on the other.



## NON-REASSURING FETAL STATUS (FETAL DISTRESS)

### Rationale

Non-reassuring fetal status occurs in 5 - 10% of pregnancies. (Fetal distress, a term also used, is imprecise and has a low positive predictive value. The newer term should be used.) Early detection and pro-active management can reduce serious consequences and prepare parents for eventualities.

### Causal Conditions

1. Utero-placental insufficiency
  - a. Placental edema (e.g., secondary to diabetes, hydrops)
  - b. Placental "accidents" (e.g., abruption, previa  $\pm$  accreta)
  - c. Placental senescence (e.g., post-date)
2. Umbilical cord compression
  - a. Umbilical cord accidents (e.g., prolapse, true knots, anomalous insertions)
  - b. Oligohydramnios
3. Fetal conditions/Anomalies
  - a. Infections (maternal, fetal, chorioamnionitis)
  - b. Congenital anomalies
  - c. Intrauterine growth restriction
  - d. Prematurity/Post-date
4. Maternal conditions
  - a. Maternal systemic illness (e.g., hypertension, uncontrolled diabetes)
  - b. Maternal age (very young and very old mothers)

### Key Objectives

- ❖ Identify non-reassuring fetal status by interpreting information such as antepartum risk factors and fetal monitoring during labor (e.g., fetal heart rate).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Identify historical (e.g., hypertension, smoking) and examination risk factors (e.g., fetal size).
  - List indications for fetal monitoring antepartum and intrapartum.
  - Diagnose fetal tachycardia (>160 bpm for >10 minutes) and fetal bradycardia (<120bpm for >10 minutes), grade periodic fetal heart rate patterns.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Describe and interpret biophysical profiles and the parameters scored (e.g., the measurement of fetal acid-base status) and list indications.
- ❖ Conduct an effective initial plan of management for a patient whose fetus is at risk for entering into a non-reassuring state:
  - Outline the management of post term pregnancy.

- Outline management of infectious diseases during pregnancy that may impair fetal development.
- List causes of intrauterine growth restriction.
- List indicators for timing and mode of delivery (induction vs. cesarean section).
- List methods of maintaining surveillance of high-risk fetus during labor.
- Identify the short and long-term consequences of fetal non-reassuring status.
- Describe an approach to counsel parents and provide emotional support to families.
- List immediate steps to take when a fetus is showing non-reassuring status during labor including the selection of patients for referral since in-depth training and experience in obstetrics are required to manage the condition adequately.

### Rationale

Disordered sensation may be alarming and highly intrusive. The physician requires a framework of knowledge in order to assess abnormal sensation, consider the likely site of origin, and recognise the implications.

### Causal Conditions

1. Cerebral (may include hemiplegia, aphasia, apraxia)
  - a. Stroke
  - b. Demyelination
  - c. Tumors
2. Brain stem (may include diplopia, dizziness, dysarthria, dysphagia)
3. Spinal cord or below
  - a. Spinal cord/Radiculopathy (may be associated with back pain)
    - i. Cord infarction, tumor, MS, syringomyelia, B12 deficiency
    - ii. Disc lesion
  - b. Neuropathy
    - i. Mononeuropathy (carpal tunnel syndrome, ulnar neuropathy)
    - ii. Polyneuropathy/Stocking-glove (diabetes mellitus, uremia, vasculitis, B12 deficiency, HIV, Lyme disease, alcohol, paraneoplastic, amyloid)

### Key Objectives

- ❖ Determine whether the sensory complaint is positive, also called parasthesia or dysesthesia (tingling, pins and needles, pricking, burning, knifelike), or negative, termed hypoesthesia or anaesthesia (numbness, diminution or absence of feeling).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine the portion of the neural axis likely causing the symptoms: restricted to distribution of peripheral nerve, nerve root, stocking-glove, both sides of body, half of body, or cape distribution, face involved on same side or opposite side of rest of body, cranial nerve involvement.
  - Contrast peripheral neuropathies, spinal cord or brain stem dysesthesia from cortical sensory dysfunction.
  - State that only negative symptoms or hypoesthesia is detectable on physical examination.
  - Differentiate between possible causes of the lesion.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select initial laboratory investigation including such tests as nerve conduction/EMG and serum vitamin B12 levels.
  - Select patients in need of specialized care for further investigation.
- ❖ Conduct an effective initial plan of management for a patient with numbness and tingling:
  - Outline initial management for mononeuropathy.

- Select patients in need of specialized care.

## **Applied Scientific Concepts**

1. Outline the anatomy of the sensory system from perception of a somatic sensation by receptors to transmission to the central nervous system.

**Rationale**

Because pain is considered a signal of disease, it is the most common symptom that brings a patient to a physician. Acute pain is a vital protective mechanism. In contrast, chronic pain (>6 weeks or lasting beyond the ordinary duration of time that an injury needs to heal) serves no physiologic role and is itself a disease state. Pain is an unpleasant somatic sensation, but it is also an emotion. Although control of pain/discomfort is a crucial endpoint of medical care, the degree of analgesia provided is often inadequate, and may lead to complications (e.g., depression, suicide). Physicians should recognise the development and progression of pain, and develop strategies for its control.

**Causal Conditions**

1. Nociceptive (tissue damage)
  - a. Visceral (acute, chronic)
  - b. Somatic (including somatic complaints)
    - i. Local (upper/lower limb, spine)
    - ii. General (fibromyalgia, associated with physical exercise)
2. Neuropathic (abnormal neural activity)
  - a. Sympathetic
    - i. Complex regional pain syndrome
    - ii. Reflex sympathetic dystrophy
  - b. Central (abnormal central nervous system activity)
    - i. Phantom limb
    - ii. Post spinal cord injury
    - iii. Post stroke
  - c. Non-sympathetic (damage/pressure to peripheral nerve)
    - i. Post herpetic
    - ii. Neuropathy (herniated intervertebral disc, trigeminal neuralgia)
    - iii. Neuroma formation

**Key Objectives**

- ❖ Because some conditions are so painful that rapid and effective analgesia is essential (e.g., postoperative state), and in some conditions it is not possible to remove the cause (e.g., metastatic cancer), recommend the use of analgesic medications as a first line of treatment in these cases.
- ❖ Since the ideal treatment for any pain is to remove the cause, identify the cause if possible.
- ❖ Explain that depression, uncontrolled pain, the adverse effects of opioids, and fear of pain may precipitate suicidal thoughts or requests for aid in dying.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine the evolution of pain, whether any precipitating event existed or spontaneous, whether acute or gradual, location, distribution, superficial and easy to localize or deep and generalized, and then the most likely

cause of the pain (use of provocative maneuvers is key).

- Determine the intensity of the pain; what improves the pain, and impact on patient's life.
- In a patient with chronic pain, perform a complete physical examination regardless of complaint.
- Differentiate primary from secondary psychiatric/ psychological co-morbidity (e.g., depression).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select laboratory investigations to identify cause of pain if required.
  - Select patients in need of specialized care for further investigation.
- ❖ Conduct an effective plan of management for a patient with acute or chronic pain:
  - Categorize and contrast drugs for relief of pain (non-narcotic analgesics, narcotic analgesics, anti-convulsants and anti-arrhythmic, tricyclic anti-depressants, and anti-inflammatory).
  - Contrast respiratory depression caused by opioids to the respiratory rate of six to eight breaths per minute of the dying patient who is not receiving opioids (i.e., the respiratory depression is not caused by opioids but is actually a natural part of the dying process).
  - Explain that the correct use of morphine is more likely to prolong a patient's life (patient is more rested and pain-free).
  - Discuss use of combinations of medications.
  - Outline a multidisciplinary approach which utilizes medications, counseling, physical therapy, nerve block, surgery, etc.
  - Since pain also adds to the discomfort of those caring for the patient with chronic pain, counsel care givers.
  - Select patients in need of referral to a pain clinic or pain specialist.

## Ethics

### *Consent to Investigation or Treatment (CLEO 4.3)*

#### Detailed Objectives

- ❖ To recognize factors which can alter capacity (e.g., disease, drugs, depression).

Although prolongation of life without regard for quality of life is not ideal, consider each patient's assessment of what makes life worth living, and factor in such variables as religious belief, values, fear of death, severity of disease, effect of drugs, and psychiatric co-morbidity.

### *Controversial and Evolving Ethical Issues in Practice (CLEO 4.10)*

#### Issues

- ❖ Euthanasia
- ❖ Physician assisted suicide

#### Detailed Objectives

- ❖ The candidate will be aware that they may be asked to comment on unresolved or controversial ethical issues, and will be able to name and describe relevant key issues and ethical principles.

Prescribe medications that provide appropriate pain control. Physicians may have an inflated perception of the risk of addiction by treating pain with opioids. As a consequence, they may fail to treat pain effectively because of concern with violating ethical and moral standards.

## Applied Scientific Concepts

## PAIN

1. Outline the neural basis of pain including the specialized nociceptors that are the nerve terminals of primary afferent fibers (myelinated A-delta fibers and unmyelinated C fibers).
2. Contrast the first immediate sharp pain of A fibers to the delayed dull pain of C fibers, and the visceral afferents that travel with sympathetic and parasympathetic fibers.



67-1-2-1

## GENERALIZED PAIN DISORDERS

### Rationale

Fibromyalgia, a common cause of chronic musculoskeletal pain and fatigue, has no known etiology and is not associated with tissue inflammation. It affects muscles, tendons, and ligaments. Along with a group of similar conditions, fibromyalgia is controversial because obvious sign and laboratory/radiological abnormalities are lacking.

Polymyalgia rheumatica, a rheumatic condition frequently linked to giant cell (temporal) arteritis, is a relatively common disorder (prevalence of about 700/100,000 persons over 50 years of age). Synovitis is considered to be the cause of the discomfort.

### Causal Conditions

1. Fibromyalgia
2. Polymyalgia rheumatica
3. Overlapping syndromes
  - a. Myofascial pain syndromes
  - b. Chronic fatigue syndrome
  - c. Temporomandibular joint syndrome
  - d. Somatoform/Somatization disorder
  - e. Depression
4. Joint Laxity and Hypermobility
5. Clencher syndrome

### Key Objectives

- ❖ Differentiate between articular and non-articular pain.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Diagnose fibromyalgia, 10 times more common in women, from history of chronic pain, fatigue, and sleep/mood disturbances; examine for multiple tender points (11/18 pre-defined sites).
  - Diagnose polymyalgia rheumatica in patients 50 years or older with bilateral morning stiffness and aching (>30 minutes) for at least one month in neck or torso, shoulders or proximal arms and hips or proximal thighs, and an elevated ESR.
  - Differentiate local from referred pain, acute from chronic, muscle from nerve pain, etc.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - State that laboratory tests in patients with fibromyalgia are normal, and in polymyalgia only the sedimentation rate is usually elevated.
- ❖ Conduct an effective plan of management for a patient with regional pain:
  - Outline management of fibromyalgia including exercise, education, medication, and supportive psychosocial measures.



## GENERALIZED PAIN DISORDERS

- Describe complications of cortico-steroids and non-steroid anti-inflammatory agents.
- List indication and contraindications in management of non-articular conditions of rest, physiotherapy, anti-inflammatory medication, local cortico-steroid injection, and surgery.
- Select patients in need of specialized care.



67-1-2-2

## LOCAL PAIN, SHOULDER/ELBOW/WRIST/HAND

### Rationale

After backache, upper extremity pain is the most common type of musculoskeletal pain.

### Causal Conditions

1. Shoulder (85%)
  - a. Intrinsic
    - i. Injury/Trauma (see [TRAUMA/ACCIDENTS](#))
    - ii. Inflammation
      - A. Peri-articular
        - I. Rotator cuff injury (impingement, tendinitis, tear)
        - II. Frozen shoulder (adhesive capsulitis from rotator cuff tendinitis)
        - III. Biceps tendonitis/Rupture
        - IV. Subcapsular bursitis
      - B. Articular
        - I. Acromioclavicular arthritis
        - II. Glenohumeral arthritis (osteoarthritis, pseudo-gout, gout)
        - III. Shoulder instability
    - b. Referred (shoulder movement normal)
      - i. Cervical spine (disc herniation, spinal stenosis)
      - ii. Medical problems (nerve entrapment, diaphragmatic irritation, hepatic capsule distension, myocardial ischemia)
  2. Elbow
    - a. Intrinsic
      - i. Peri-articular
        - A. Epicondyles (lateral epicondylitis/tennis elbow, medial/golfer's elbow)
        - B. Bursae (olecranon bursitis from sepsis, gout, trauma)
        - C. Nerves (ulnar, radial, median entrapment)
      - ii. Articular
        - A. Sero-negative spondyloarthropathy, gout/pseudo-gout, sepsis
        - B. Osteoarthritis (prior intra-articular fracture, avulsion, osteonecrosis)
    - b. Referred (cervical radiculopathy C6-7, shoulder)
  3. Wrist (most susceptible)
    - a. Trauma (see under [TRAUMA/ACCIDENTS](#))
    - b. Repetitious use (carpal tunnel, DE Quervain tenosynovitis, dorsal ganglion, radiocarpal arthritis)
  4. Hand
    - a. Arthritis (osteoarthritis, rheumatoid arthritis)
    - b. Vascular (embolus, Raynaud, thoracic outlet)
    - c. Other (trigger finger, Dupuytren contracture, carpal tunnel)

### Key Objectives

- ❖ Demonstrate a careful physical examination with implementation of specific manoeuvres for diagnosis, since most

cases can be diagnosed without imaging.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between various causes of upper extremity pain.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - If necessary, select diagnostic imaging and laboratory investigation.
- ❖ Conduct an effective plan of management for a patient with pain in the upper extremity:
  - Outline a plan of management for various types of upper extremity pain.
  - Select patients in need of specialized care.



67-1-2-3

## LOCAL PAIN, HIP/KNEE/ANKLE/FOOT

### Rationale

With the current interest in physical activity, the commonest cause of leg pain is muscular or ligamentous strain. The knee, the most intricate joint in the body, has the greatest susceptibility to pain.

### Causal Conditions

1. Hip
  - a. Articular
    - i. Arthritis (osteoarthritis, septic)
    - ii. Osteonecrosis (steroid, alcohol use, renal failure)
    - iii. Occult hip fracture
    - iv. Aorto-iliac vascular occlusive disease
  - b. Peri-articular
    - i. Bursitis (trochanteric, gluteus medius)
    - ii. Metastatic bone cancer
    - iii. Nerves (lateral femoral cutaneous nerve entrapment)
  - c. Referred (inguinal hernia, abdominal disease, radiculopathy L2-3, L4-5)
2. Knee
  - a. Articular (osteoarthritis, gout/pseudogout, septic)
  - b. Patellar (patella-femoral syndrome, patellar tendonitis, pre-patellar bursitis, Osgood Schlatter disease)
  - c. Periarticular (bursitis, effusion, Baker cyst, ilio-tibial band synd., ligamentous)
  - d. Referred (L5-S1, sacro-iliac joint, hip)
3. Ankle (tendinitis, achilles tendinitis/rupture)
4. Foot (plantar fasciitis, gout, spurs, periostitis, painful heel pad synd., bunions)
5. Other (muscle strain/tear, arterial/venous insufficiency/phlebitis/lymphangitis)

### Key Objectives

- ❖ Determine whether the pain is articular or non-articular and related to exertion or not (constant, night pain suggests inflammatory/neoplastic process).
- ❖ State that degenerative joint disease and arterial insufficiency frequently co-exist.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between different causes of lower extremity pain by eliciting essential information (e.g., precipitating events) and maneuvers which reproduce the pain; determine whether there are inflammatory changes, effusion, change in function, or abnormal noise in joint.
  - Perform examination of lower limb including observation of gait, examination and determination of range of motion of joints, measurement of calves and thighs, and palpation of peripheral arteries.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:

- List radiographic, magnetic resonance imaging; doppler and angiography; arthroscopic examination.
- ❖ Conduct an effective plan of management for a patient with pain in the lower extremity:
  - Outline multidisciplinary management for lower extremity pain caused by degenerative joint disease.
  - Outline a multidisciplinary plan for prevention of peripheral vascular disease.
  - Outline management for exercise-induced injuries which returns patient to physical activity.
  - Select patients in need of specialized care.



67-1-2-4

## LOCAL PAIN, SPINAL COMPRESSION/OSTEOPOROSIS

### Rationale

Spinal compression is one manifestation of osteoporosis, the prevalence of which increases with age. As the proportion of our population in old age rises, osteoporosis becomes an important cause of painful fractures, deformity, loss of mobility and independence, and even death. Although less common in men, the incidence of fractures increases exponentially with ageing, albeit 5 - 10 years later. For unknown reasons, the mortality associated with fractures is higher in men than in women.

### Causal Conditions

1. High turnover osteoporosis (?bone resorption>?bone formation)
  - a. Menopause/Gonadal failure (estrogen/testosterone deficiency male:female =1:6)
  - b. Endocrine (hyperparathyroid/thyroid, hypogonadism, hypercortisolism)
  - c. Drugs (cyclosporine)
2. Low turnover osteoporosis (?bone formation>?bone resorption)
  - a. Age related male:female=1:2 (<50 years)
  - b. Liver disease (primary biliary cirrhosis)
  - c. Diet/Life style/Disuse
    - i. Disuse (lack of weight-bearing activity/inactivity/prolonged bed rest/paralysis/paresis/weightlessness in space)
    - ii. Malnutrition/Anorexia nervosa/Malabsorption/?calcium/Vitamin C, D
    - iii. Alcoholism/Smoking
3. Increased bone resorption and decreased bone formation
  - a. Drugs (increased cortisol, methotrexate, heparin)
  - b. Rheumatoid arthritis/SLE/Psoriatic arthritis
  - c. Genetic (peak bone mass, osteogenesis imperfecta)
  - d. Metabolic acidosis
  - e. Neoplasms (myeloma/lymphoma)

### Key Objectives

- ❖ Define osteoporosis as a metabolic bone disease with decreased density (mass/unit volume; bone is abnormally porous and thin) which weakens the mechanical strength of the bone, thus making it much more likely to break, often with little or no trauma.
- ❖ Outline how osteoporosis and its complications can be prevented or minimised.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - In a patient with spinal compression, vertebral, or other fractures, determine extent of trauma or whether the fracture occurred at rest or routine activity; there is no other clinical manifestation.
  - Determine the presence of spinal deformity (kyphosis), loss of height, and abdominal protrusion.
  - Differentiate osteomalacia (pain common) from osteoporosis (after fracture, pain in only 1/3).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion,

differentiation, and diagnosis:

- Select patients requiring investigation for less common causes of bone loss.
- Select patients in need of bone density assessment to prevent or minimise osteoporosis.
- ❖ Conduct an effective initial plan of management for a patient with osteoporosis and/or spinal fracture:
  - Outline management of pain relief in vertebral compression fractures as well as supportive measures and mobilization.
  - Outline prevention and treatment of osteoporosis including nutrition (dietary counseling pre-disease onset), supplementation, drug (estrogen, biphosphonates) therapy and minimizing/stopping drugs which contribute to osteoporosis, cessation of smoking, and activity (exercise, weight bearing, prescribed).

**Rationale**

Approximately 10 % of the adult population have neck pain at any one time. This prevalence is similar to low back pain, but few patients lose time from work and the development of neurologic deficits is <1 %.

**Causal Conditions**

(see also [HEAD TRAUMA/BRAIN DEATH/TRANSPLANT DONATION](#) for head trauma)

1. Intrinsic to muscles
  - a. Muscle spasm/Cervical strain (awkward posture, certain occupations)
  - b. Whiplash, myofascial pain syndromes
2. Intrinsic to cervical spine
  - a. Degenerative arthritis/Cervical spondylosis
    - i. Disc herniation/Foraminal encroachment (C5-6, C6-7, C7-T1)
    - ii. Diffuse idiopathic skeletal hyperostosis
    - iii. Spinal stenosis
  - b. Systemic disease (rheum. arthritis, polymyalgia rheumatica, metastases)
  - c. Infections (osteomyelitis, soft tissue)
  - d. Tumors
3. Referred
  - a. Angina pectoris
  - b. Meningitis

**Key Objectives**

- ❖ Determine whether the pain is caused by conditions that are intrinsic to the cervical spine or its musculature, systemic conditions or by referred pain from elsewhere.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit a history including age, occupation, trauma, radiation of pain (if not correlated with neuro-anatomic pathways, consider myofascial pain or fibromyalgia).
  - Determine whether pain is nerve root, and which root, or whether it is central disc herniation with bilateral long tract signs.
  - Determine muscle and sensory function, tendon reflexes, neck mobility; palpate neck muscles, trigger points, Spurling maneuver/manual cervical traction.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - State that imaging (CT, MRI, gallium scan) may demonstrate significant lesions in asymptomatic patients.
  - Select diagnostic imaging when indicated (trauma, >50 years, radiculopathy, fail conservative care).
  - List indications for electromyography (EMG).



- ❖ Conduct an effective initial plan of management for a patient with cervical pain:
  - Outline conservative medical management for degenerative disc disease (posture modification, cervical collar, physical therapy, local pain relief, drugs, trigger point injections, etc.).
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Outline the anatomy of the cervical spine, identify C4 - C7 as the sites of greatest wear and tear, with the nerve roots of C5, 6, and 7 passing through these foramina.
2. Since the diaphragm is innervated by C3 - C5, respiratory paralysis may be present with injuries above C4.



67-1-2-6

## LOCAL PAIN, SPINE/LOW BACK PAIN

### Rationale

Low back pain is one of the most common physical complaints and a major cause of lost work time. Most frequently it is associated with vocations that involve lifting, twisting, bending, and reaching. In individuals suffering from chronic back pain, 5% will have an underlying serious disease.

### Causal Conditions

1. No nerve involvement (non-radicular)
  - a. Mechanical low back or leg pain (97%)
    - i. Idiopathic (lumbar strain or sprain) (70%)
    - ii. Disk and facet degeneration
    - iii. Osteoporotic compression fracture
    - iv. Spondylolisthesis
    - v. Congenital disease (kyphosis, scoliosis, transitional vertebrae)
  - b. Non-mechanical spinal conditions (1%)
    - i. Neoplasia (myeloma, metastases/primary, lymphoma/leukemia)
    - ii. Infections (osteomyelitis, septic discitis, abscess, shingles)
    - iii. Inflammatory arthritis (associated with HLA-B27)
      - A. Ankylosing spondylitis
      - B. Psoriatic
      - C. Reiter syndrome
      - D. Inflammatory bowel disease
    - iv. Osteochondrosis
    - v. Paget disease
2. Nerve root involvement (radicular)
  - a. Herniated disk/Cauda equina syndrome (4%)
  - b. Spinal stenosis (3%)
  - c. Compression fracture (4%), traumatic fracture
  - d. Spinal cord tumor/Peripheral nerve neuropathy
3. Referred Pain - visceral disease (2%)
  - a. Pelvic organs (prostate, endometriosis, PID)
  - b. Renal (stones, infection, abscess)
  - c. Aortic aneurysm, retroperitoneal neoplasm/infection
  - d. Gastrointestinal (pancreatitis, cholecystitis, penetrating ulcer)

### Key Objectives

- ❖ Determine whether pain is unremitting and constant at night or abnormal physical exam indicative of systemic disease (fever, weight loss, etc.).
- ❖ State that although the commonest cause of backache in children is lumbosacral sprain, backache represents serious disease more often than in adults.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether there is neurologic deficit, abnormal bladder, bowel, or sexual function, an inciting event exists, pain location, radiation, and effect of rest or leg motion.
  - Determine whether psychosocial distress is amplifying the pain.
  - Perform examination of the back and proximate anatomic areas that could lead to back pain.
  - Determine whether there is loss of sphincter tone or urinary retention, and state that the presence of such signs represent a surgical emergency; are hips or knees affected, any pseudo-claudication.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select diagnostic imaging to confirm a clinical diagnosis, not to make a diagnosis (association between symptoms and imaging results is weak).
- ❖ Conduct an effective plan of management for a patient with pain in the lower back:
  - Outline management of acute back pain without neurologic or other abnormality on examination.
  - Select patients in need of specialized care.



67-2-1

## **SYMPATHETIC/COMPLEX REGIONAL PAIN SYNDROME/REFLEX SYMPATHETIC DYSTROPHY**

### **Rationale**

Following an injury or vascular event (myocardial infarction, stroke), a disorder may develop that is characterized by regional pain and sensory changes (vasomotor instability, skin changes, and patchy bone demineralization).

### **Causal Conditions**

1. Type I (no definable nerve lesion)
2. Type II (definable nerve lesion present)

### **Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine the inciting event (if present), pain description and site, sensitivity to touch or cold.
  - Examine for localized edema, altered color, thickening/brawny skin, muscle wasting, limitation of movement, contractures, or waxy trophic skin changes; cyanosis, mottling, sweating, hair growth.
- ❖ List and interpret the critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List plain radiograph and contrast to bone scintigraphy.
  - Outline response to regional sympathetic nerve block.
- ❖ Conduct an effective plan of management for a patient with reflex sympathetic dystrophy:
  - Recommend prevention such as early mobilization after injury or following infarction or stroke and vitamin C.
  - Once established, refer for specialized care.



67-2-2

## CENTRAL/PERIPHERAL NEUROPATHIC PAIN

### Rationale

Neuropathic pain is caused by dysfunction of the nervous system without tissue damage. The pain tends to be chronic and causes great discomfort.

### Causal Conditions

1. Neuropathic
  - a. Central (phantom limb, post-spinal injury, post-stroke)
  - b. Peripheral nerve
    - i. Diabetic neuropathy
    - ii. Nerve entrapment syndromes
    - iii. Trigeminal neuralgia
    - iv. Post herpetic neuralgia
  - c. Sympathetic (reflex sympathetic dystrophy)
2. Nociceptive

### Key Objectives

- ❖ In diabetics, differentiate neuropathic pain from vascular pain by determining site of pain (feet>calves), quality (sharp, burning, tingling>deep ache), effect of rest/walking, and whether worse in bed.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine how the pain is characterized (sharp, shooting, or burning).
  - Determine whether it is worsened by mild stimuli (light touch, cool air).
  - Examine whether the pain is felt in the area of sensory deficit.
  - In amputees, ask about phantom sensation/pain; ask whether herpetic rash preceded pain (if 4 months or more, it represents post-herpetic neuralgia).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective plan of management for a patient with neuropathic pain:
  - In patients with diabetes and neuropathic pain, outline rationale of tricyclics, topical capsaicin, and carbamazepine.
  - Recommend preventive analgesia prior to amputation to reduce incidence of phantom pain.
  - Discuss role of antiepileptic drugs in the treatment of neuropathic pain.
  - Select patients in need of referral to a pain clinic or pain specialist.

### Applied Scientific Concepts

1. Since axons of damaged nerves grow toward the formerly innervated area directed by intact sheaths, outline the

consequences of damage to this sheath (axon extensions grow without direction, become tangled, and a structure termed neuroma develops) and the manner in which ectopic electrical impulses can occur at the regenerating tips of damaged primary nociceptive afferents.

2. Describe the role of excitatory (e.g., glutamate) and inhibitory (e.g., GABA) neurotransmitters, and the effect of their disruption on excitability of sodium and calcium channels.

## PALPITATIONS (ABNORMAL ECG-ARRHYTHMIA)

### Rationale

Palpitations are a common symptom. Although the cause is often benign, occasionally it may indicate the presence of a serious underlying problem.

### Causal Conditions

1. Cardiac causes - 50%
  - a. Any arrhythmia
    - i. Atrial flutter/Fibrillation (ischemic/hypertensive, valvular, thyrotoxic, electrolyte disorders, drugs)
    - ii. Supraventricular tachycardia (atrial fibrillation/flutter, WPW/concealed bypass tract, multifocal atrial tachycardia)
    - iii. Paroxysmal ventricular tachycardia/Premature ventricular contractions
  - b. Heart defects (cardiac/extracardiac shunts, valvular disease, cardiomyopathy)
2. Psychiatric - 33% (panic/anxiety, somatization, depression, stress)
3. Increase in cardiac output
  - a. Increased demand (anemia, pregnancy, Paget, fever, exercise)
  - b. Medications
    - i. Prescribed (sympathomimetic, vasodilators,  $\beta$ -block stopped)
    - ii. Habits (cocaine, amphetamines, caffeine, nicotine)
4. Metabolic (hypoglycemia, thyrotoxic, pheochromocytoma)

### Key Objectives

- ❖ Select patients in need of urgent treatment; differentiate palpitations due to intrinsic heart disease from those that are a manifestation of anxiety, exercise, or other systemic disease (differentiate from sinus tachycardia).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Contrast benign palpitations to those associated with serious disease; identify risk factors (e.g., male sex, irregular heart beat, history of heart disease, lasting >5 minutes).
  - Diagnose major cardiac arrhythmias; determine whether associated with syncope/presyncope.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Obtain an ECG; select patients in need of ambulatory monitoring.
  - Elicit and interpret signs and symptoms which indicate that a cardiac arrhythmia requires immediate treatment.
  - Select and interpret appropriate investigations for patients presenting with palpitations, including cardiography and Holter monitoring.
- ❖ Conduct an effective initial plan of management for a patient with palpitations:
  - Outline initial management for the patient with an abnormal heart rhythm.
  - Select the patients requiring specialized care and/or consultation, including those with a benign or unknown etiology.

- Describe the indications for anticoagulation and/or antiplatelet therapy for patients with arrhythmias and perform initial and long-term management.

### **Applied Scientific Concepts**

1. Describe the role of the autonomic system (parasympathetic and sympathetic) in the development of arrhythmias.
2. Outline electrophysiologic events in the heart by considering the sinus node, the atria, the AV node, and the specialized intranodal and ventricular conduction system.
3. Relate the electrophysiologic events above to the various waves and segments of an electrocardiogram.



**Rationale**

Panic attacks/panic disorders are common problems in the primary care setting. Although such patients may present with discrete episodes of intense fear, more commonly they complain of one or more physical symptoms. A minority of such patients present to mental health settings, whereas 1/3 present to their family physician and another 1/3 to emergency departments. Generalized anxiety disorder, characterized by excessive worry and anxiety that are difficult to control, tends to develop secondary to other psychiatric conditions.

**Causal Conditions**

1. Panic attack
  - a. Cardiopulmonary symptoms - 40%
  - b. Neurologic symptoms - 40%
  - c. Gastrointestinal symptoms - 30%
  - d. Psychiatric symptoms
  - e. Autonomic symptoms
2. Panic disorder
  - a. With agoraphobia/Without agoraphobia
  - b. With social/Specific phobia
  - c. Trauma/Stress related/Post traumatic stress disorder
3. Associated with other conditions
  - a. Depression
  - b. Obsessive compulsive disorder
  - c. Substance abuse
4. Generalized anxiety disorder

**Key Objectives**

- ❖ In patients with many other medical complaints and/or excessive utilisation of medical health care, determine whether anxiety co-exists.
- ❖ Differentiate situational stress from true anxiety disorder and from drug and physical causes of anxiety.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Review various physical symptoms briefly; elicit history of other non-psychiatric illness, intake of alcohol and caffeine, and a brief history of any major life stresses.
  - Elicit a history of excessive worry about events which is out of proportion to the impact of the event; history present for at least six months (anxiety).
  - Determine whether there is restlessness, fatigue, inability to concentrate, irritability, muscle tension, sleep disturbance.
  - Determine whether social, occupational, or function in general has been affected.
  - Determine whether co-morbid psychiatric disorders exist, stress, substance abuse, past sexual, physical and

emotional abuse, or neglect.

- Determine whether there is a discrete period of intense fear, recurrent panic attacks, >1 month of concern about more attacks, change in behavior in relation to attacks, along with cardiopulmonary, neurologic, psychiatric or other medical symptoms ± agoraphobia.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective initial plan of management for a patient with anxiety or panic:
  - Outline supportive therapy (e.g., psychosocial interventions) and counseling and list indications for drug therapy (e.g., selective serotonin re-uptake inhibitors).
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Explain that although the pathophysiology of panic disorder/attacks is incompletely understood, the amygdala, locus ceruleus, and hippocampus along with several neurotransmitters have been the focus of attention.

### Rationale

Carcinoma of the cervix is a preventable disease. Any female patient who visits a physician's office should have current screening guidelines applied and if appropriate, a Pap smear should be recommended.

### Causal Conditions

(Causes for abnormal Pap smears, other than papilloma virus, are unknown. Below are the appearances of Pap smears.)

1. Normal
2. Benign atypia (infection, reactive changes)
3. Epithelial cell abnormalities - squamous
  - a. ASCUS (atypical squamous cells of uncertain significance)
  - b. Human papilloma virus
  - c. Low grade SIL (squamous intraepithelial lesion)
  - d. High grade SIL
  - e. Invasive carcinoma (micro)
4. Epithelial cell abnormalities - glandular cells - AGUS (atypical glandular cells of uncertain significance)
5. False positive or negative

### Key Objectives

- ❖ Select patients who are in need of a referral for further investigation after the Pap smear report becomes available.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether the patient is at high risk for developing cervical dysplasia or invasive disease.
  - Describe how to obtain a pap smear.
  - Outline the significance of AGUS, ASCUS, Low SIL, and High SIL on a Pap smear report.
  - Identify indications for relevant investigations with a report of abnormal Pap smear.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select additional investigation with a report of an abnormal Pap smear.
- ❖ Conduct an effective initial plan of management for a patient with abnormal Pap smear:
  - List recommendations for prevention of cervical dysplasia/cervical cancer and identify health promotion strategies for young sexually active women.
  - Discuss the role of regular cervical cytology in prevention of invasive disease; also, in Pap smear tests, discuss specificity and sensitivity, and factors leading to false positive and negative results.
  - Discuss the association of human papilloma virus infection with cervical intra-epithelial neoplasia and invasive cancer.
  - Describe the indications for colposcopy.
  - Outline treatment modalities available for treating pre-invasive intra-epithelial neoplasia and invasive cancer.

**Rationale**

Although pediatric emergencies such as the ones listed below are discussed with the appropriate condition, the care of the patient in the pediatric age group demands special skills

**Causal Conditions**

1. Respiratory emergencies
  - a. Upper airway obstruction
  - b. Lower airway disease
2. Infectious emergencies
  - a. Fluid and electrolyte emergencies
  - b. Hypoglycemia
  - c. Hyperkalemia
3. Neurological emergencies
  - a. Seizures/Febrile seizure
  - b. Unresponsive infant/child
4. Cardiovascular emergencies (arrhythmia, congestive heart failure)
5. Abdominal emergencies
  - a. Abdominal pain
  - b. Abdominal distension
6. Trauma (including child abuse)
7. Poisoning
8. Environmental emergencies (hypothermia/heat stroke)

**Key Objectives**

- ❖ Describe the differences between pediatric and adult airways and their effect on airway management; describe the difference between pediatric and adult response to hypovolemia.
- ❖ Describe the usual patterns of injury in infants and children, recognizing the difference between adult and pediatric orthopedic injuries and injuries that warrant investigation of possible abuse.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit symptoms and signs in a focused fashion for the assessment of an infant/child in an urgent/emergent situation.
  - Perform physical examination, with focus on cardio-respiratory, and determine whether the patient is in respiratory failure or shock.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Test for hypoglycemia.
- ❖ Conduct an effective plan of management for an infant/child in an urgent/emergent situation:

- List sites for intravenous access in the pediatric population.
- Select patients in need of referral to intensive care units.
- Outline initial management in a patient with seizures (including febrile seizures), upper and lower respiratory emergencies, and shock.

## Ethics

### ***Confidentiality (CLEO 4.2)***

#### **Detailed Objectives**

- ❖ To recognize situations in which third parties have a legitimate interest and right to information:
  - legal requirements in the interest of public health.

Abused children will sustain injuries as a result of the abuse and will present as pediatric emergencies. When abuse is strongly suspected, there may be legal requirements to report the suspicion in the interest of the child's health.

### ***Consent to Investigation or Treatment (CLEO 4.3)***

#### **Detailed Objectives**

- ❖ To recognize the duty to provide necessary emergency care where consent is unavailable.
- ❖ To recognize and identify ways of determining the appropriate balance between the emerging autonomy of a minor with legitimate interests of parents or child welfare authorities.
- ❖ To recognize legal requirements in such cases.
- ❖ To recognize the role of religious belief in obtaining patient consent and the provision of treatment.

If a pediatric emergency occurs and someone with the capacity to give consent is not available, it is nevertheless the duty of the health care provider to provide emergency care.

In some pediatric emergencies, transfusion of blood products may be indicated. The religious beliefs of some parents may cause them to refuse consent. It is important to identify ways of determining the appropriate balance between the rights of the minor with the legitimate interests of the parents and to identify the legal requirements in such an instance.

## Applicable Basic Principles of Law

### ***Legal Aspects of Consent (CLEO 5.2)***

#### **Issues**

- ❖ There are a number of exceptions to the requirement for consent, such as for:
  - necessary treatment in a medical emergency.

If a pediatric emergency occurs and someone with the capacity to give consent is not available, it is nevertheless the duty of the health care provider to provide emergency care.

#### **Detailed Objectives**

- ❖ The consenting patient must have the legal capacity to consent; i.e., of a legal age to consent (different provinces specify differing ages at which a patient is deemed to be capable of giving consent). The treatment of minors often raises a number of important legal (as well as ethical and practical) issues for physicians.

- ❖ If the patient is not competent or lacks capacity to consent, then consent may be obtained (according to the law applicable in each province and the specific circumstances) from a court, parent or substitute decision-maker. The law regarding delegation of care is specific to each province and the physician should be fully aware of local requirement in this regard.

If a pediatric emergency occurs and someone with the capacity to give consent is not available, it is nevertheless the duty of the health care provider to provide emergency care.

In some pediatric emergencies, transfusion of blood products may be indicated. The religious beliefs of some parents may cause them to refuse consent. It is important to identify ways of determining the appropriate balance between the rights of the minor with the legitimate interests of the parents and to identify the legal requirements in such an instance.

### ***Legal Aspects of Confidentiality (CLEO 5.3)***

#### **Detailed Objectives**

- ❖ A physician may not disclose patient information (whether about the existence, nature, extent of illness or any other health information) except where expressly authorized by the patient to do so, or when the law permits or requires such disclosure.
- ❖ Exceptions to the duty of confidentiality and the requirement of patient consent for its disclosure are provided for in various (provincial and federal) statutes. These require physicians to report certain confidential information for the protection of public health and other purposes, and in some cases provide for penalties for failure to do so.
- ❖ Due to the complexity of the rule/requirements of, and exceptions to, the duty of confidentiality, advice may be sought from provincial licensing authorities or legal counsel, when in doubt.

Abused children will sustain injuries as a result of the abuse and will present as pediatric emergencies. When abuse is strongly suspected, there may be legal requirements to report the suspicion in the interest of the child's health.

In case of unexpected or unexplained death, the coroner may need to be informed.

#### **Applied Scientific Concepts**

1. Pediatric emergencies may include respiratory failure and/or shock, important causes of preventable deaths in small infants and children. Because of both anatomical and physiological differences, infants and children are at increased risk in such circumstances.
2. Describe differences in the upper airway, relative chest size, relative contribution of diaphragmatic breathing, and potential compromise to breathing of a distended large abdomen.
3. Discuss implications of the relative larger head size and larger body surface area in pediatric emergencies.
4. Compare ability to compensate for hypovolemia in pediatric patients (e.g., heart rate increase, vasoconstriction), and the explanation for considering a falling blood pressure a late and ominous sign.



71-1

## CRYING/FUSSING CHILD

### Rationale

A young infant whose only symptom is crying/fussing challenges the primary care physician to distinguish between benign and organic causes.

### Causal Conditions

1. Psychological/Functional/Hunger/Discomfort/Boredom/Irritability/Colic
2. Trauma (neglect/child abuse/fracture)
3. Infections (systemic/local/focal)
4. Gastrointestinal/Intra-abdominal conditions
  - a. Infection
  - b. Inflammation
  - c. Obstruction (intussusception/volvulus/hernia/constipation/anal fissure)
  - d. Diarrhea
5. Cardiac/Respiratory
  - a. Congenital
  - b. Infective
  - c. Obstructive
6. Intracranial process

### Key Objectives

- ❖ Differentiate pediatric emergencies from conditions not requiring emergency treatment.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit a history of patient's previous behavior, oral intake of food and drink, vomiting, diarrhea or constipation, and any medications received.
  - Perform a full physical examination in order to identify the cause of the illness with a focus on searching for infection sites, intra-abdominal conditions, increased intracranial pressure, cardiac and respiratory disorders, and local sources of pain.
  - Differentiate serious from benign causes, and determine if a life threatening situations exists.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select investigations to differentiate between acute and benign disease.
- ❖ Conduct an effective plan of management for a crying/fussing child:
  - Counsel caregivers of fussy/crying children without organic disease.
  - Select children who require follow-up for additional investigation and management.
  - Select patients in need of referral.



71-2

## HYPOTONIA/FLOPPY INFANT/CHILD

### Rationale

Infants/children with decreased resistance to passive movement differ from those with weakness and hyporeflexia. They require detailed, careful neurologic evaluation. Management programs, often life-long, are multidisciplinary and involve patients, family, and community.

### Causal Conditions

1. Amenable to rapid treatment
  - a. Electrolyte/Metabolic (e.g., hypokalemia, hypermagnesemia, acidemia, hypoglycemia, etc.)
  - b. Toxins/Drugs
2. Central causes
  - a. "Benign congenital hypotonia"
  - b. Cerebral malformations (holoprosencephaly); neurodegenerative (leukodystrophy)
  - c. Seizures, trauma (subarachnoid or subdural hemorrhage)
  - d. Hydrocephalus/Increased intracranial pressure
  - e. Infectious causes (e.g., encephalitis, abscess, meningitis)
  - f. Neoplasms
  - g. Hypoxic/Ischemic encephalopathy
3. Neural disease, peripheral
  - a. Anterior horn cell (e.g., progressive spinal muscular atrophy, infarction, infection)
  - b. Peripheral nerves/Polyneuropathies (Guillain Barré, Charcot-Marie Tooth, trauma)
  - c. Myoneural junction (myasthenia gravis, botulism)
4. Muscular disease
  - a. Muscular dystrophy
  - b. Myotonic dystrophy
  - c. Congenital myopathies
5. Other genetic causes (Trisomy 21, Glycogen storage, Niemann-Pick, Tay-Sachs, Prader-Willi)

### Key Objectives

- ❖ Determine the presence of conditions amenable to rapid treatment (electrolyte imbalance, seizure, infection, intracranial bleeding, hydrocephalus).
- ❖ Differentiate infants/children with generalized hypotonia from those with weakness and hyporeflexia.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine birth history, age and rapidity of onset, progression of symptoms, and whether all muscles are involved or just one limb.
  - Determine posture of trunk, whether "frog-leg" position is present, muscle bulk, presence of fasciculation, head lag, examine flexion and extension of the joints.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion,



differentiation, and diagnosis:

- Select investigations to differentiate central from neuromuscular causes (e.g., CT versus serum CK, EMG, muscle biopsy, etc.).
- Determine which children require genetic studies.
- ❖ Conduct an effective plan of management for a floppy infant/child:
  - Determine whether respiratory status is adequate or intubation is required.
  - Counsel families with afflicted children about management, prognosis, and genetic implications.
  - Develop a management plan that involves the family and community resources.
  - Select patients requiring specialized care.

### Rationale

Pelvic masses are common and may be found in a woman of any age, although the possible etiologies differ among age groups. There is a need to diagnose and investigate them since early detection may affect outcome.

### Causal Conditions

1. Gynecologic
  - a. Ovary
    - i. Functional cysts (follicular, corpus lutein cysts, theca lutein cysts)
    - ii. Hyperplastic (polycystic ovary, endometriosal cyst)
    - iii. Neoplastic
      - A. Serous cystadenoma/Carcinoma
      - B. Mucinous cystadenoma/Carcinoma
      - C. Thecomas/Granulosa cell tumors
      - D. Fibromas
      - E. Germ cell tumors (cystic teratoma, teratoma, gonadoblastoma, dysgerminoma)
  - b. Tube (salpinx)
    - i. Ectopic pregnancy
    - ii. Congenital (mesonephric and paramesonephric cysts)
    - iii. Inflammation, cysts (mesonephric, paramesonephric)
  - c. Uterus
    - i. Pregnancy
    - ii. Hematometria/Pyometria
    - iii. Leiomyoma/Adenomyoma
    - iv. Sarcoma
2. Non-gynecologic (bowel, bladder, renal ectopia, other)

### Key Objectives

- ❖ Determine whether the patient may be pregnant, then whether the mass is gynecologic, and its anatomical origin (ovary, tube, or uterus).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit a history including menstrual, fertility, and obstetrical history, sexual activity, and associated symptoms.
  - Perform abdominal and pelvic examination including speculum exam.
  - Describe features suggestive of androgenization in the reproductive age and androgenization/estrogenization in the pre-pubertal age group.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List blood tumor markers (and their reliability) if malignancy is suspected.

- List indications for pregnancy test and/or cultures; list indications for endometrial biopsy.
- Select appropriate diagnostic imaging for mass.
- ❖ Conduct an effective initial plan of management for a patient with a pelvic mass:
  - Outline management of functional ovarian cysts; outline management of tubo-ovarian abscess.
  - Outline management options for uterine leiomyomata and provide counseling for patients.
  - Select patients in need of specialized care.

**Rationale**

Acute pelvic pain is potentially life threatening. Chronic pelvic pain is one of the most common problems in gynecology. Women average 2 - 3 visits each year to physicians' offices with chronic pelvic pain. At present, only about one third of these women are given a specific diagnosis. The absence of a clear diagnosis can frustrate both patients and clinicians. Once the diagnosis is established, specific and usually successful treatment may be instituted.

**Causal Conditions**

1. Pregnancy related
  - a. Ectopic pregnancy
  - b. Aborting pregnancy
  - c. Labor/Preterm labor
  - d. Molar pregnancy
  - e. Abruption placenta
  - f. Gynecological conditions in pregnancy (ovarian cyst rupture, degenerating fibroids)
2. Gynecological
  - a. Endometriosis
  - b. Pelvic inflammatory disease/Adhesions (e.g., salpingitis)
  - c. Adenomyosis, leiomyomata
  - d. Ovarian mass/Cyst complications (torsion, hemorrhage, rupture)
  - e. Other (dysmenorrhea, ovulation pain, dyspareunia)
3. Systemic conditions (gastrointestinal, renal, musculoskeletal)
  - a. Urologic (interstitial cystitis)
  - b. Musculoskeletal (fibromyalgia)
  - c. Gastrointestinal (irritable bowel, diverticulitis, inflammatory bowel disease)
  - d. Mental health issues
    - i. Depression, somatization
    - ii. Sexual, physical, and psychological abuse/domestic violence
    - iii. Substance abuse

**Key Objectives**

- ❖ Determine whether the pain is acute or chronic, pregnancy is likely, and stabilize the patient whose pain is acute and life threatening.
- ❖ Patients with chronic pain require a complete history, physical examination, and counseling that can take 60 to 90 minutes. Given the intense time commitment required, the clinician should proactively schedule accordingly.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine whether the patient's condition is stable hemodynamically and a candidate for possible emergency surgery; perform abdominal and pelvic examination including speculum exam.

- Elicit a history including menstrual, fertility, and obstetrical history, sexual activity; emphasize urinary tract symptoms, bowel disease, substance dependence, depression, fibromyalgia, sexual, physical or psychological abuse, and domestic violence. Ask patient to complete a 'pain map'.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List guidelines for ultrasound in pregnancy; obtain pregnancy test.
  - Select appropriate diagnostic imaging; list indications for laparoscopy.
- ❖ Conduct an effective initial plan of management for a patient with pelvic pain:
  - List indications and contraindications for dilatation and curettage, laparoscopy, and laparotomy.
  - Outline management of endometriosis.
  - Discuss role of NSAIDs, oral contraceptive pills, progestins, and GnRH agonist analogues.
  - Outline management of acute and chronic salpingitis.
  - Counsel for the purpose of preventing sexually transmitted diseases.
  - Outline management of patients with chronic pelvic pain associated with psycho-emotional factors, including counseling; outline management of dyspareunia.
  - Select patients in need of specialized care.

### Rationale

Periodically, patients visit physicians' office not because they are unwell, but because they want a 'check-up'. Such visits are referred to as health maintenance or the PHE. The PHE is an opportunity to relate to an asymptomatic patient for the purpose of case finding and screening for undetected disease and risky behaviour. It is also an opportunity for health promotion and disease prevention. The decision to include or exclude a medical condition in the PHE should be based on the burden of suffering caused by the condition, the quality of the screening, and effectiveness of the intervention.

### Causal Conditions

1. Infant and toddler < 3 years (e.g., delayed growth, development, abuse/neglect)
2. Child 3 - 12 years (visual/hearing deficit, accidents, development, abuse/neglect)
3. Youth 13 - 24 years (MVA, substance abuse, STDs, sedentary, blood pressure)
  - a. Female (rubella immunisation, contraception)
  - b. Male (contraception)
4. Adult 25 - 44 years (substance abuse, eating disorders, family violence)
  - a. Female (cervical cancer, hypertension)
  - b. Male (hypertension, elevated cholesterol, MVA)
5. Middle age 45 - 64 years (lung cancer, colon cancer, skin cancer, obesity)
  - a. Female (osteoporosis, breast cancer)
  - b. Male (prostate cancer, ischemic heart disease)
6. Seniors > 64 years (elderly abuse, falls, hearing, vision, drug related morbidity, nutrition, cancer)

### Key Objectives

- ❖ Determine patient's risks for common gender/age specific conditions.
- ❖ Elicit information about ethnic, family, socio-economic, occupational, lifestyle characteristics that are known to be at high risk for a particular condition.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - In an infant, toddler, or child elicit information about risk factors at conception, pregnancy, and birth, familial factors, and existing signs of illness or environmental risk factors (missed immunization, diet, passive smoke inhalation, skin protection).
  - Determine height, weight, head circumference, medical status, and developmental milestones.
  - For a youth, elicit information about nutrition, physical activity, drug use, sexual/social/peer activities, emotional concerns, and communication with parents.
  - In adults, elicit information about lifestyle patterns, psychological, social, and physical functioning, symptoms of any illness, and situational factors affecting mood.
  - In seniors, elicit information about past illness, lifestyle factors, mental function, drug use, physical and social activity, emotional concerns, social relations, and support systems.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion,

differentiation, and diagnosis:

- Select investigation specific to age and gender concerns (e.g., VDRL for youth, chlamydia screen for high-risk youths, cholesterol for >35 year, fecal occult blood for middle age, tuberculin testing, HIV serology for high-risk group, mammography for >50 year, pap smear for adult women, rubella serology for young women).
- ❖ Conduct an effective plan of management for a patient who is well and without disease, well and with disease, not well and with disease, not well and without disease:
  - Communicate and make recommendations regarding disease prevention (e.g., healthy diet, calcium supplements for women, folic acid for women planning pregnancy, exercise, breast self-exam, avoidance of high-risk sexual behavior, barrier contraceptives, flossing, fluoride toothpaste, balance training and home-based prevention program for elderly).
  - Communicate and make recommendations regarding accident prevention (e.g., recommend helmet use for bicycle injury, smoke detector use, avoid drinking/drugs and driving, seat-belt/air bag use).
  - Encourage patient control over health (e.g., hepatitis immunization for high-risk travel, influenza and pneumococcal immunization for elderly or chronic disease patients, measles/mumps/rubella for youth).
  - Outline intervention(s) that would reduce risk for an existing condition detected (e.g., Amantadine/Rimantadine if high-risk for influenza, sun avoidance/protective clothing, smoking cessation, reduce alcohol, regular condom use for STD).
  - For a frequently encountered risk factor (e.g., colon cancer), outline one intervention that would reduce the risk for the condition.

## Ethics

### *Truth Telling (CLEO 4.4)*

## Detailed Objectives

- ❖ To recognize reasonable right of patient to know relevant information:
  - purpose and implications of investigations;
  - diagnosis and prognosis of medical condition;
  - risks and benefits of treatment; and
  - health risks to which they are exposed.
- ❖ To respect patients right not to know, and ascertain a patient's wishes:
  - identify and respect valid exceptions to truth telling;
  - seek consent for disclosure;
  - awareness of personal and cultural context and how that may influence a patient's choice;

When a patient is sick and seeking help for a specific complaint, the risks for necessary diagnostic tests are to be expected, and are considered reasonable and ethical.

When a person visits a physician's office for a periodic health examination, the presumption is that the person is well. Subjecting such a person to the risk of diagnostic tests when there is no known problem requires that the procedure should be especially safe. For example, although colonoscopy is not a dangerous procedure for a patient with a specific gastrointestinal complaint, the bowel perforation rate of 0.2 % should be re-evaluated if used to screen for cancer. In 50-year-old women almost two perforations would occur for every cancer found. For women in the 70's the ratio would reverse.

There is growing anxiety for a more lucid definition of the criteria that tests should meet before they are incorporated into the periodic health examination. Most importantly, the patient should be involved in the decision about preventive activities.

Another potential danger is 'labelling'. For example, there is the danger of labelling someone 'hypertensive' despite the fact that the only problem is the patient's use of a decongestant at the time. For another example, there are several genes known to be associated with colorectal and breast cancer. However, many people with the genes will not get cancer and many without

these same genes will develop the cancer. People who have been told they have one of the genes will be living with the possibility of an ominous event for a long time. Such labelling is especially troublesome ethically if the test is a false-positive one. In such circumstances, screening might promote a sense of helplessness instead of wellbeing, and might do more harm than good.

For such reasons, a selective approach needs to be taken in the periodic health examination based on a person's age, gender, and clinical characteristics. This same selective approach is needed for testing so that the percentage of false-positive results can be diminished. Again, patients should be involved in decisions about prevention.



**Rationale**

Primary care physicians play a vital role in identifying children at risk for developmental and other disorders that are threatening to life or long-term health before they become symptomatic. In most cases, parents require direction and reassurance regarding the health status of their newborn infant. With respect to development, parental concerns regarding the child's language development, articulation, fine motor skills, and global development require careful assessment.

**Causal Conditions**

1. Developmental surveillance
2. Nutrition (breast-feeding, bottle-feeding, introduction of solid foods)
3. Screening
  - a. Metabolic inborn errors (e.g., phenylketonuria, maple syrup disease, homocystinuria)
  - b. Endocrine disorders (e.g., congenital hypothyroidism)
  - c. Hemoglobinopathies (e.g., sickle cell disease in black newborn)
  - d. Infectious diseases (e.g., hepatitis B surface antigen)
  - e. Neglect
4. Well-newborn care

**Key Objectives**

- ❖ Determine development through ongoing monitoring because new circumstances may interfere (e.g., medical illness, family disruption) or because as children develop, new categories of skills are gained (e.g., language delays cannot be detected before 18-24 months).
- ❖ Provide anticipatory guidance to parents in order to prevent unnecessary demands from health care providers.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Examine newborn within 24 hours of birth and before discharge from hospital; review maternal history.
  - Perform examination of weight, length, head circumference, congenital anomalies or dysmorphic features, birth injuries, jaundice, and cardio-pulmonary disorders.
  - Examine for dermal lesions (e.g., ash leaf macules, café-au-lait spots, and port wine nevi), muscle tone, hearing, vision, and developmental screening tests.
  - Elicit history of parental concerns regarding the child's development, risk factors for developmental delays, and attainment of developmental milestones.
- ❖ List and interpret the critical clinical and laboratory finding which were key in the processes of exclusion, differentiation, and diagnosis.
  - List metabolic tests required by legislation.
- ❖ Conduct an effective plan of management for the newborn:
  - Counsel parents regarding breast-feeding (maternal drug use during lactation, maternal nutrition and rest, breast-feeding technique, feeding frequency and intake), bottle-feeding technique, frequency and intake, formula types, and introduction of solid food, vitamin requirements and the indications for dietary supplements; discuss

- contra-indications to breast-feeding.
- Determine the measurements appropriate for normal infant growth and development.
- Counsel parents about skin care, fontanelles, eye color, strabismus, teeth, umbilicus, genitalia, urination, and defecation.



## INFANT AND CHILD IMMUNIZATION

### Rationale

Immunization has reduced or eradicated many infectious diseases and has improved overall world health. Recommended immunization schedules are constantly updated as new vaccines become available.

### Causal Conditions

1. Viral conditions
  - a. Polio
  - b. Measles-mumps-rubella
  - c. Chicken pox
  - d. Hepatitis B
  - e. Influenza (>6 months yearly for selected populations)
2. Bacterial conditions
  - a. Diphtheria-tetanus-pertussis
  - b. Pneumococcal pneumonia (selected provinces 12 - 18 months + selected populations)
  - c. Haemophilus influenzae type B
  - d. Meningococcal meningitis (selected provinces)

### Key Objectives

- ❖ Discuss the population health benefits of immunization programs.
- ❖ State that a lapse in immunization schedule does not require re-instituting the initial series, merely giving it at the next visit.
- ❖ Communicate to patients and parents about vaccine benefits and risks.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Obtain an immunization history on all children and determine whether child (or family member) is immuno-suppressed or is receiving immuno-suppressive drugs.
  - Determine whether child has had splenectomy (also congenital or functional in sickle cell disease).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Test immune status of susceptible children.
- ❖ Conduct an effective plan of management for children regarding immunization:
  - Discuss misconceptions about immunization contraindications and actual contraindications.
  - List possible complications of immunization.
  - Discuss immunization of immuno-compromised children (e.g., with asplenia, chronic diseases), or seizures.



## PRE-OPERATIVE MEDICAL EVALUATION

### Rationale

Evaluation of patients prior to surgery is an important element of comprehensive medical care. The objectives of such an evaluation include the detection of unrecognized disease that may increase the risk of surgery and how to minimize such risk.

### Causal Conditions

1. Identification of unrecognized diseases/Risk factors (e.g., malignant hyperthermia after anesthesia)
2. Optimal care of recognized diseases/Risk factors
3. Identification/Management of potential complications
  - a. Anesthetic/Post-operative risk
    - i. Myocardial dysfunction
    - ii. Autonomic neuropathy (e.g., diabetes mellitus)
    - iii. Pulmonary risk (upper abdominal/thoracic surgery, duration>3 hours, smoking and/or chronic obstructive lung disease, PaCO<sub>2</sub>>45 mm Hg)
    - iv. Thromboembolism
    - v. Drugs (e.g., anticoagulants)
  - b. Exercise capacity
  - c. Other

### Key Objectives

- ❖ Identify factors likely to influence peri-/post-operative morbidity and mortality, and measures required to reduce the risk.
- ❖ Communicate to the patient and the pre-operative team the level of risk for the proposed surgery compared to average risk for the procedure rather than "clearing" or "not-clearing" patients for surgery.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit evidence of feeling unwell, serious past illnesses and any medications in previous 3 months.
  - Elicit evidence of dyspnea greater than same age individuals (e.g., walk 4 blocks or 2 flights of stairs), exercise tolerance, cough, wheeze, chest pain on exertion (anginal type), ankle edema.
  - Obtain history of allergies, previous anesthetics, problems with anesthetics (including in family); in women, last menstrual period.
  - Examine for serious abnormalities, blood pressure and pulse.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select pre-operative laboratory investigations based on known or clinically suspected disease(s) or risk factor(s) (e.g., cardiac or pulmonary disease, diuretic use, diabetes, hypertension, etc.).
  - Interpret tests<4 months old as pre-operative (unless interim change in clinical status exists).
  - Select baseline hemoglobin routinely, and renal function test in patients>50 - 60 years.
  - Select baseline ECG routinely in men>45 years and women>55 years, and chest X-ray if>60 years.

- Select pregnancy test for women who may be pregnant.
- ❖ Conduct an effective plan of management for a patient with illnesses or risk factors:
  - Recommend deep breathing/incentive spirometry in patients with >1 pulmonary risk factor.
  - Recommend smoking cessation 8 week pre-operatively in smokers.
  - Explain why routine pre-operative investigations are not indicated.
  - Discuss post-operative pain control including various analgesics, epidural analgesia, and intercostal nerve block in patients at risk for pulmonary complications.

## Ethics

### *Resource Allocation (CLEO 4.5)*

#### Detailed Objectives

- ❖ To choose interventions on the basis of best available evidence:
  - known to be effective;
  - anticipated cost benefit; and
  - avoid marginally beneficial investigations or treatments.

Laboratory tests, as part of the pre-operative medical evaluation, should be used selectively. Normal test values are usually defined as occurring within 2 standard deviations from the mean. The more tests are ordered, the greater the likelihood of a false positive test. If 20 tests are ordered in a healthy patient, 64% of the time there will be at least one abnormal test reported. The consequence of such an abnormal test might include not only alarming the patient, but also unnecessary costs and potential delay of surgery.

## Applicable Basic Principals of Law

### *Physicians' Legal Liability for Negligence (or in Québec, Civil Liability) (CLEO 5.4)*

#### Detailed Objectives

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstances under consideration.

Laboratory tests, as part of the pre-operative medical evaluation, should be used selectively. By doing so, the risk for medico-legal action may actually be reduced. For example, screening panels of tests ordered pre-operatively are frequently not acted upon prior to surgery, thereby creating an additional medico-legal risk. Most physicians, as well as hospitals with such policies, now support a selective approach to pre-operative testing, so that random test ordering may actually represent a deviation from the local standard of care.



## WORK-RELATED HEALTH ISSUES

### Rationale

Physicians will encounter health hazards in their own work place, as well as in patients' work place. These hazards need to be recognised and addressed. A patient's reported environmental exposures may prompt interventions important in preventing future illnesses/injuries. Equally important, physicians can not only play an important role in preventing occupational illness but also in promoting environmental health.

### Causal Conditions

1. Disability management and work fitness
2. Public health and surveillance
  - a. Hazard recognition, evaluation, and control
  - b. Occupational and environmental injury/Illness
    - i. Dermatoses
    - ii. Cardio-pulmonary (e.g., asbestos, halogen gases, solvents, fluorocarbons)
    - iii. Hepatitis (viral, halogenated hydrocarbons)
    - iv. Musculo-skeletal (e.g., low back pain)
    - v. Carpal tunnel
  - c. Underlying medical condition/environment (sexual/non-sexual harassment)
3. Clinical preventive services

### Key Objectives

- ❖ Determine whether the work place or environmental conditions are potentially hazardous, the impact on the health of the workers, and recommend preventive strategies.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Ask whether symptoms better/worse at home or work, during week, or weekend.
  - Elicit history of occupation, list of current and longest held jobs, exposure to toxic/hazardous environments (chemicals, fumes, dust, noise, radiation, musculo-skeletal stresses) and identify potential relationship to patient presentation (temporal relationship to work or home activities).
  - Elicit history about workplace/home (e.g., products manufactured, heating sources, clean-up practices, handling of hazardous substances, ventilation, protective clothing/masks, similar illness in others, recent changes in work practice, new materials, etc.).
  - Elicit history of illness in unexpected circumstances (e.g., lung cancer in nonsmoker).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective initial plan of management for a patient with work related health issues:
  - Identify consultative sources for assistance.
  - Select patients in need of specialized care and provide follow up care.
  - Counsel patients about safety issues and report findings to affected patients as well as employers (considering

medical confidentiality issues).

### Rationale

Personality disorders are persistent and maladaptive patterns of behaviour exhibited over a wide variety of social, occupational, and relationship contexts and leading to distress and impairment. They represent important risk factors for a variety of medical, interpersonal, and psychiatric difficulties. For example, patients with personality difficulties may attempt suicide, or may be substance abusers. As a group, they may alienate health care providers with angry outbursts, high-risk behaviours, signing out against medical advice, etc.

### Causal condition

1. Eccentric (odd)
  - a. Paranoid
  - b. Schizoid
  - c. Schizotypal
2. Dramatic (impulsive/emotional)
  - a. Antisocial
  - b. Borderline
  - c. Histrionic/Narcissistic
3. Anxious
  - a. Dependent
  - b. Avoidant
  - c. Obsessive-compulsive

### Key Objectives

- ❖ Differentiate between patients with long enduring patterns of behaviour from repetitive but short-lived episodes of disturbed behaviour.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether the patient is excessively suspicious or jealous, distant or emotionally cool with little need for personal relationships, or has disturbances in thinking and communication.
  - Determine whether there is excessive sensitivity or depression, perfectionism and inflexibility, shyness and withdrawal, or excessive dependence on others.
  - Elicit history of lying, truancy, fights, thefts, drug abuse, illegal activity before age of 15 along with manipulative quality and lack of remorse; unstable affect, mood, self-image.
  - Determine whether there is excessively dramatic, attention-seeking, excitable, grandiose, and emotional behavior.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective initial plan of management for a patient with personality disorder:
  - Outline differences between supportive therapy, insight-oriented therapy, and behavioral or cognitive therapy; family/couple therapy, group therapy.



- Identify patients who will require drug and alcohol counseling.
- Since personality disorders complicate treatment of other medical or psychiatric conditions, coordinate treatment with a psychiatrist.
- Avoid medications that can be abused or can be fatal in overdose.
- Communicate with the patient about how medications fit in with other aspects of treatment plan.
- Select patients in need of specialized care.

## Ethics

### **Resource Allocation (CLEO 4.5)**

- ❖ To make health care resources available to patients in a manner which is fair and equitable, without bias or discrimination.
- ❖ To inform patients of impact of cost restraint in a supportive way.

Personality disorders are usually chronic, difficult to manage, and require extensive resources. Select patients for referral for such treatment in a manner that is fair and equitable, without bias or discrimination. In addition, hospitalization and repeated emergency care are expensive and the resources are limited. For a patient with personality disorder, select the modality of treatment without discrimination or bias.

Describe to the patient the impact of cost restraint in a supportive way.

## Applicable Basic Principles of Law

### **The Patient: A Person with Human and other Legal Rights (CLEO 5.1)**

- ❖ To demonstrate the knowledge that the patient has fundamental legal rights in the medical context, arising under both statutory law and the rulings of the courts that are binding on the physician.

Patients with personality disorders may have problems maintaining an effective doctor-patient alliance because of poor compliance, distrust, irritability, and excessive demands leading to less favorable response to treatment for depression, anxiety disorder, or substance abuse. Women may present with unplanned pregnancy and high-risk sexual behavior. As a group, they may alienate health care providers with late night phone-calls, angry outbursts, repeated admissions, signing out against medical advice, returning to an abusive spouse after being helped with separation, etc.

Like all patients, the patient with a personality disorder is a person with human and legal rights. In the medical context, the same fundamental legal rights that are binding on the physician will apply to a patient who has a personality disorder.

### **Physician's Legal Liability for Negligence (or, in Quebec, Civil Liability) (CLEO 5.4)**

- ❖ The duty of care arises out of the doctor/patient relationship (or, in Quebec, the medical contract and the law of delict). Once such a relationship arises, the physician is required to attend to the patient attentively, with continuity, and to exercise reasonable care, skill, and judgment (until the relationship is ended through an appropriate process).
- ❖ The standard of care expected of a physician is one that would reasonably be expected under similar circumstances of an ordinary, prudent physician of the same training, experience, specialization, and standing.
- ❖ In some circumstances, physicians may be held vicariously liable.

Duty of care for a patient with a personality disorder arises out of the doctor/patient relationship. Once such a relationship has been established, the physician is required to attend to the patient attentively, with continuity, and to exercise reasonable care, skill, and judgment until the relationship is ended through an appropriate process. The standard of such care expected is identical to that of any physician under similar circumstances, with the same training, experience, specialization, and standing.

In some instances, the patient with a personality disorder may be under the care of other persons who are under the physician's delegation, such as psychiatric nurses, social workers, dietitians, etc. The physician may be held vicariously liable for such persons.

## **Organizational**

### ***Inter-Professional Issues (CLEO 6.9)***

### Rationale

Pleural effusions are common and may represent local or systemic disease. An organized method to examination of the fluid in conjunction with the clinical appearance usually leads to a correct diagnosis in at least  $\frac{3}{4}$  of patients.

### Causal Conditions

1. Transudative ([protein]<30 g/L)
  - a. Edema states
    - i. Congestive heart failure, SVC obstruction
    - ii. Cirrhosis
    - iii. Nephrotic syndrome
  - b. Atelectasis
2. Exudative (pleural fluid protein/serum>0.5; pleural fluid LDH/serum>0.6)
  - a. Infectious causes
    - i. Para pneumonic (including viral)
    - ii. Empyema (bacterial, fungal, tuberculous)
  - b. Neoplastic causes (primary, metastatic)
  - c. Cardiac/Vascular
    - i. Coronary artery bypass surgery
    - ii. Pulmonary emboli
    - iii. Collagen-vascular diseases (rheumatoid, lupus pleuritis)
  - d. Gastrointestinal causes (ruptured esophagus, pancreatitis, chylothorax)
3. Other pleural abnormalities
  - a. Pneumothorax (spontaneous, traumatic, tension)
  - b. Pleural thickening (chr. infection, neoplastic, inflammatory)

### Key Objectives

- ❖ Conduct an examination of the thorax and demonstrate how to detect a pleural effusion or a pneumothorax.
- ❖ Differentiate between causes of pleural effusion on the basis of analysis results from pleural fluid.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether the patient has one of the edema states such as congestive heart failure, has evidence of an infectious disease, or neoplastic disease.
  - Examine for jugular venous distension, gallop, right ventricular heave, leg swelling, lymphadenopathy, hepatosplenomegaly, or ascites.
- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - Interpret the findings of a chest x-ray; identify indications for thoracentesis (>10mm, unknown cause, patient does not have congestive heart failure and bilateral pleural effusions).

- Perform and interpret the findings of a thoracentesis.
- Discuss the indications for CT scanning in patients with a pleural effusion.
- ❖ Conduct an effective plan of management for a patient with pleural effusion:
  - Identify patients in need of immediate management for pneumothorax.
  - Discuss the medical and surgical management for patients with pleural effusion.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Provide the theoretical basis for the belief that pleural effusions can be divided into transudative and exudative by comparing measurements of certain parameters in pleural fluid compared to serum. Include the effect of changes in Starling forces in the explanation.

**Rationale**

Exposures to poisons or drug overdoses account for 5 - 10% of emergency department visits, and >5 % of admissions to intensive care units. More than 50 % of these patients are children less than 6 years of age.

**Causal Conditions**

1. Common (30%)
  - a. Cleaning substances (detergents, soaps, shampoos)
  - b. Cough and cold remedies
  - c. Cosmetics
  - d. Plants
2. Potentially lethal
  - a. Excitation/Hypertension/Tachycardia/Tachypnea/Hyperthermia/Mydriasis
    - i. Sympathomimetics/Street drugs (cocaine, amphetamines, methylenedioxymethamphetamine/ecstasy, ephedrine, theophylline)
    - ii. Anticholinergic (antihistamines, tricyclics, phenothiazines, atropine)
    - iii. Hallucinogens (LSD, mescaline, phencyclidine, psilocybin)
    - iv. Serotonin syndrome (MAOI, SSRI, meperidine, TCA, L-tryptophan)
    - v. Tricyclic antidepressants (amitriptyline, doxepin)
    - vi. Drugs inducing metabolic acidosis - BP usually low (ethanol, methanol, ethylene glycol, ASA, NSAID, Tylenol)
  - b. Depression/Hypotension/Hypopnea/Hypothermia/Miosis
    - i. Opiates (heroin, morphine)
    - ii. Sedative/Hypnotic (benzodiazepines, barbiturates, meprobamate, alcohol)
    - iii. Cholinergic (insecticides, nerve agents, nicotine, pilocarpine, urecholine)
    - iv. Cardiovascular drugs ( $\beta$ -blockers, calcium channel blockers)
  - c. Coma
    - i. Anticholinergic (antihistamines, tricyclics, phenothiazines, atropine)
    - ii. Antidepressants/Antipsychotics
    - iii. Cellular (CO, H<sub>2</sub>S, cyanide)/Simple asphyxiants (CO<sub>2</sub>, inert gases)

**Key Objectives**

- ❖ Determine whether poisoning has occurred, the substance involved, how severe the exposure was, how toxic it is likely to become, and the causticity of substance.
- ❖ Perform supportive care, decontamination or prevention of further absorption, give antidote where indicated, and enhance elimination of the poison.
- ❖ Discuss special considerations in the management of poisoning with aspirin, acetaminophen, tricyclic antidepressants, and methanol.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine the drug or poison causing the problem, using patient's vital signs, mental status, pupil size, appearance, smell, etc. as potential clues in addition to history from patient, paramedics, police, physician, pharmacist, friends and relatives (if intentional, history is frequently unreliable).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret drug screen based on clinical information.
  - Select laboratory and diagnostic imaging investigation for toxic effects in addition to diagnosis.
  - Calculate anion and osmolar gap; explain and interpret findings.
- ❖ Conduct an effective plan of management for a poisoned patient:
  - Perform supportive care before or at the same time as data gathering and investigation, such as ensuring airway adequacy, hemodynamic stability and intravenous access, cardiac monitoring and ECG, pulse oximetry, etc.
  - Outline initial management in a patient with poisoning with altered consciousness (give IV 100 mg of thiamine and 50 ml of 50% dextrose solution); if opiates suspected (naloxone 0.4 - 2 mg).
  - Discuss advantages and disadvantages of various strategies for prevention of poison absorption (also termed decontamination) in a patient who is less than one hour after intake of poison.
  - Discuss strategies for enhancing the elimination from the body of various poisons.

## CONCEPTS OF HEALTH AND ITS DETERMINANTS

### Population Health

#### Rationale

Concepts of health, illness, disease and the socially defined sick role are fundamental to understanding the health of a community and to applying that knowledge to the patients that a physician serves. With advances in care, the aspirations of patients for good health have expanded and this has placed new demands on physicians to address issues that are not strictly biomedical in nature. These concepts are also important if the physician is to understand health and illness behaviour.

#### Key Objectives

- ❖ Define and discuss the concepts of health, wellness, illness, disease and sickness.
- ❖ Describe the determinants of health and how they affect the health of a population and the individuals it comprises.

#### Enabling Objectives

- ❖ As defined by Health Canada and the World Health Organization:
  - discuss alternative definitions of health;
  - describe the determinants of health. These include:
    - \* [Income and Social Status](#)
    - \* [Social Support Networks](#)
    - \* [Education and Literacy](#)
    - \* [Employment and Working Conditions](#)
    - \* [Social Environment](#)
    - \* [Physical Environments](#)
    - \* [Personal Health Practices and Coping Skills](#)
    - \* [Healthy Child Development](#)
    - \* [Biology and Genetic Endowment](#)
    - \* [Health Services](#)
    - \* [Gender](#)
    - \* [Culture](#)
- ❖ Discuss the concept of life course, natural history of disease, particularly with respect to possible public health and clinical interventions.
- ❖ Describe the concept of illness behaviour and the way this affects access to health care and adherence to therapeutic recommendations.
- ❖ Discuss how culture and spirituality influence health and health practices, and how they are related to other determinants of health.

# ASSESSING AND MEASURING HEALTH STATUS AT THE POPULATION LEVEL

## Population Health

### Rationale

Knowing the health status of the population allows for better planning and evaluation of health programs and tailoring interventions to meet patient/community needs. Physicians are also active participants in disease surveillance programs, encouraging them to address health needs in the population and not merely health demands.

### Key Objectives

- ❖ Describe the health status of a defined population.
- ❖ Measure and record the factors that affect the health status of a population with respect to the principles of causation.

### Enabling Objectives

- ❖ Know how to access and collect health information to describe the health of a population:
  - Describe the types of data and common components (both qualitative and quantitative) used in creating a community health needs assessment.
  - Be aware of important sources of clinical / population-level health data and recognise the advantages and disadvantages of each of them.
  - Critically evaluate possible sources of data to describe the health of a population including the importance of accurate coding and recording of health information.
  - Describe the uncertainty associated with capturing data on the number of events and populations at risk.
  - Understand surveillance systems and the role of physicians and public health in reporting and responding to disease.
- ❖ Analyze population health data using appropriate measures:
  - Apply the principles of epidemiology in analyzing common office and community health situations.
  - Describe the concepts of, and be able to calculate, incidence, prevalence, attack rates, case fatality rates and to understand the principles of standardization.
  - Discuss different measures of association including relative risk, odds ratios, attributable risk and correlations.
- ❖ Interpret and present the analysis of health status indicators:
  - Demonstrate an ability to use practice-based health information systems to monitor the health of patients and to identify unmet health needs.
  - Understand the appropriate use of different graphical presentations of data.
  - Describe criteria for assessing causation.
  - Demonstrate an ability to critically appraise and incorporate research findings with particular reference to the following elements:
    - \* characteristics of study designs (RCT, cohort, case-control, cross sectional);
    - \* measurement issues (validity, sensitivity, specificity, positive predictive value, negative predictive value; bias, confounding; error, reliability);
    - \* measures of health and disease (incidence and prevalence rates, distributions; measures of central tendency) and sampling.
  - Apply the principles of epidemiology by accurately discussing the implications of the measures.



## INTERVENTIONS AT THE POPULATION LEVEL

### Population Health

#### Rationale

Many interventions at the individual level must be supported by actions at the community level. Physicians will be expected to advocate for community wide interventions and to address issues that occur to many patients across their practice.

#### Key Objectives

- ❖ Understand the three levels of prevention (primary, secondary and tertiary).
- ❖ Describe strategies for community needs assessments, health education, community engagement and health promotion.
- ❖ Appreciate the role that physicians can play in promoting health and preventing diseases at the individual and community level (e.g. prevention of low birth weight, immunization, obesity prevention, smoking cessation, cancer screening, etc.).
- ❖ Understand how public policy can influence population-wide patterns of behaviour and affect the health of a population.

#### Enabling Objectives

- ❖ Be able to both define the concept of levels of prevention at the individual (clinical) and population levels, as well as formulate preventive measures into their clinical management strategies.
- ❖ Name and describe the common methods of health protection (such as agent-host-environment approach for communicable diseases, and source-path-receiver approach for occupational/environmental health).
- ❖ Describe the importance and impact of good, culturally-appropriate communication with the patient, the patient's family and, if necessary, the community as a whole with regard to risk factors and their modification.
- ❖ Apply the principles of screening and be able to evaluate the utility of a proposed screening intervention, including being able to discuss the potential for lead-time bias and length-prevalence bias.
- ❖ Understand the importance of disease surveillance in maintaining population health and be aware of approaches to surveillance.
- ❖ Identify ethical issues with the restricting of individual freedoms and rights for the benefit of the population as a whole (e.g., issues in designating non-smoking areas or restricting movements of person with active tuberculosis).
- ❖ Describe the advantages and disadvantages of identifying and treating individuals versus implementing population-level approaches to prevention.
- ❖ Describe the five strategies of health promotion as defined in the Ottawa Charter and apply them to relevant situations.
- ❖ Describe one or more models of behaviour change, including predisposing, enabling and re-enforcing factors.
- ❖ Identify the potential community social, physical and environmental factors that might promote healthy behaviours, as well as ways to assist communities in addressing these factors.
- ❖ Be aware of the role of, and work collaboratively with, community and social service agencies (e.g. schools, municipalities and non-governmental organizations).
- ❖ Demonstrate awareness of the contribution of allied professionals such as social workers in addressing population health issues.
- ❖ Be able to describe the health impact of community-level interventions to promote health and prevent disease.
- ❖ Describe examples of public policies which have had an effect on population health.

## **ADMINISTRATION OF EFFECTIVE HEALTH PROGRAMS AT THE POPULATION LEVEL**

### **Population Health**

#### **Rationale**

Knowing the organization of the health care and public health systems in Canada as well as how to determine the most cost-effective interventions are becoming key elements of clinical practice. Physicians also must work well in multidisciplinary teams within the current system in order to achieve the maximum health benefit for all patients and residents.

#### **Key Objectives**

- ❖ Know and understand the pertinent history, structure and operations of the Canadian health care system.
- ❖ Be familiar with economic evaluations such as cost-benefit / cost effectiveness analyses as well as issues involved with resource allocation.
- ❖ Describe the approaches to assessing quality of care and methods of quality improvement.

#### **Enabling Objectives**

- ❖ Describe at a basic level:
  - methods of regulation of the health professions and health care institutions;
  - supply, distribution and projections of health human resources;
  - health resource allocation;
  - organization of the Public Health system; and
  - the role of complementary delivery systems such as voluntary organizations and community health centres.
- ❖ Describe the role of regulated and non-regulated health care providers and demonstrate how to work effectively with them.
- ❖ Outline the principles of and approaches to cost containment and economic evaluation.
- ❖ Describe the main functions of public health related to population health assessment, health surveillance, disease and injury prevention, health promotion and health protection.
- ❖ Demonstrate an understanding of ethical issues involved in resource allocation.
- ❖ Define the concepts of efficacy, effectiveness, efficiency, coverage and compliance and discuss their relationship to the overall effectiveness of a population health program.
- ❖ Be able to recognize the need to adjust programs in order to meet the needs of special populations such as new immigrants or persons at increased risk.
- ❖ Participate effectively in and with health organizations, ranging from individual clinical practices to provincial organizations, exerting a positive influence on clinical practice and policy-making.
- ❖ Define quality improvement and related terms: quality assurance, quality control, continuous quality improvement, quality management, total quality management; audit.
- ❖ Describe and understand the multiple dimensions of quality in health care, i.e. what can and should be improved.



78-5  
23 January 2008

## **OUTBREAK MANAGEMENT**

### **Population Health**

### **Rationale**

Physicians are crucial participants in the control of outbreaks of disease. They must be able to diagnose cases, recognize outbreaks, report these to public health authorities and work with authorities to limit the spread of the outbreak. A common example includes physicians working in nursing homes and being asked to assist in the control of an outbreak of influenza or diarrhea.

### **Key Objectives**

- ❖ Know the defining characteristics of an outbreak and how to recognize one when it occurs.
- ❖ Demonstrate essential skills involved in controlling an outbreak and its impact on the public, in collaboration with public health authorities as appropriate.

### **Enabling Objectives**

- ❖ Define an outbreak in terms of an excessive number of cases beyond that usually expected.
- ❖ Describe and understand the main steps in outbreak management and prevention.
- ❖ Demonstrate skills in effective outbreak management including infection control when the outbreak is due to an infectious agent.
- ❖ Describe the different types of infection control practices and justify which type is most appropriately implemented for different outbreak conditions.
- ❖ Demonstrate effective communication skills with patients and the community as a whole.
- ❖ Describe appropriate approaches to prevent or reduce the risk of the outbreak recurring.



## **ENVIRONMENT** **Population Health**

### **Rationale**

Environmental issues are important in medical practice because exposures may be causally linked to a patient's clinical presentation and the health of the exposed population. A physician is expected to work with regulatory agencies to help implement the necessary interventions to prevent future illness. Physician involvement is important in the promotion of global environmental health.

### **Key Objectives**

- ❖ Recognize the implications of environmental hazards at both the individual and population level.
- ❖ Respond to the patients concerns through appropriate information gathering and treatment.
- ❖ Work collaboratively with local, provincial and national agencies/governments as appropriate to address the concerns at a population level.
- ❖ Make appropriate recommendations for patients and exposed populations so as to minimize their health risks and maximize their overall function.

### **Enabling Objectives**

- ❖ Identify common environmental hazards and be able to classify them into the appropriate category of chemical, biological, physical and radiation.
- ❖ Identify the common hazards that are found in air, water, soil and foods.
- ❖ Describe the steps in an environmental risk assessment and be able to critically review a simple risk assessment for a community.
- ❖ Conduct a focussed clinical assessment of exposed persons in order to determine the causal linkage between exposure and the clinical condition.
- ❖ Be aware of local, regional, provincial and national regulatory agencies that can assist in the investigation of environmental concerns.
- ❖ Describe simple interventions that will be effective in reducing environmental exposures and risk of disease (e.g. sunscreen for sunburns, bug spray for prevention of West Nile Virus infection).
- ❖ Communicate simple environmental risk assessment information to both patients and the community.



## HEALTH OF SPECIAL POPULATIONS

### Population Health

#### Rationale

Health equity is defined as each person in society having an equal opportunity for health. Each community is composed of diverse groups of individuals and sub-populations. Due to variations in factors such as physical location, culture, behaviours, age and gender structure, populations have different health risks and needs that must be addressed in order to achieve health equity. Hence physicians need to be aware of the differing needs of population groups and must be able to adjust service provision to ensure culturally safe communications and care.

#### Key Objectives

- ❖ Understand how variation in the determinants of health in different populations promotes or harms their health status.
- ❖ Discuss how populations may have challenges with respect to access to health services, and how members of the population may rely on traditional or alternative sources of health services that are not commonly used by society as a whole.
- ❖ Discuss the implications of the different cultural perspective and how this affects the planning, delivery and evaluation of services (both preventive and curative).
- ❖ Discuss how to provide culturally safe care with different populations.
- ❖ Discuss the unique roles provided by government, social agencies, or special groups (e.g. Aboriginal health centres, Traditional healers) in providing services to the population.

#### Enabling Objectives

##### First Nations, Inuit, Métis Peoples

First Nations, Inuit and Métis peoples are the original inhabitants of Canada. Collectively, they have a special relationship with the federal government due to their treaty status, and many historical events have had a strong impact on their health expectancy.

- ❖ Describe the diversity amongst First Nations, Inuit, and/or Métis communities in your local area in terms of their various perspectives, attitudes, beliefs and behaviours. Describe at least three examples of this cultural diversity.
- ❖ Describe the connection between historical and current government practices towards First Nations, Inuit, Métis peoples (including, but not limited to colonization, residential schools, treaties and land claims), and the intergenerational health outcomes that have resulted.
- ❖ Describe how the medical, social and spiritual determinants of health and well-being for First Nations, Inuit, Métis peoples impact their health.
- ❖ Describe the various health care services that are delivered to First Nations, Inuit, Métis peoples, and the historical basis for the systems as they pertain to these communities.

##### Global health and immigration

Increasing transportation of people, food and consumer goods is breaking down previous geographic boundaries. Diseases such as SARS can travel quickly around the world and events in other parts of the world affect medical practice in Canada.

Canada is also dependent on new immigrants for growth with many locations having a very high proportion of new immigrants and refugees.

- ❖ Identify the travel histories and exposures in different parts of the world as risk factors for illness and disease.
- ❖ Appreciate the challenges faced by new immigrants in accessing health and social services in Canada.
- ❖ Appreciate the unique cultural perspective of immigrants with respect to health and their frequent reliance on alternative health practices.
- ❖ Discuss the impact of globalization on health and how changes in one part of the world (e.g. increased rates of drug-resistant Tuberculosis in one country) can affect the provision of health services in Canada.

### **Persons with disabilities**

Persons with physical, mental, or sensory disabilities have unique needs and may require health and social services to be provided in alternative ways.

- ❖ Identify the challenges of persons with disabilities in accessing health and social services in Canada.
- ❖ Discuss the issues of stigma and social challenges of persons with disabilities in functioning as members of society (link to mental health).
- ❖ Discuss the unique health and social services available to some persons with disabilities (e.g. persons with Down's syndrome) and how these supports can work collaboratively with practicing physicians.

### **Homeless persons**

Homeless persons have unique needs due to their physical lack of basic shelter and ability to bath and prepare food safely. In addition, being homeless is associated with many other conditions such as mental health and may require health and social services to be provided in alternative ways.

- ❖ Identify the challenges of providing preventive and curative services to homeless persons.
- ❖ Discuss the major health risks associated with homelessness as well as the associated conditions such as mental illness.

### **Challenges at the extremes of the age continuum**

The elderly and very young children both share the challenges of being at high risk for certain medical conditions (e.g. Hemolytic Uremic Syndrome) as well as being very vulnerable to changes in the determinants of health. For example, children living in poverty or poor seniors living in isolation are both at high risk for adverse health outcomes.

- ❖ Identify the challenges of providing preventive and curative services to isolated seniors and children living in poverty.
- ❖ Discuss the major health risks associated with isolated seniors and children living in poverty.
- ❖ Discuss potential solutions to these concerns.



## HYPERKALEMIA

### Rationale

Hyperkalemia may have serious consequences (especially cardiac) and may also be indicative of the presence of serious associated medical conditions.

### Causal Conditions

1. Increased intake (usually associated with low excretion)
2. Redistribution
  - a. Decreased entry into cells (e.g., insulin deficiency/hyperglycemia,  $\beta_2$  blockade)
  - b. Increased exit from cells (e.g., non-anion gap metabolic acidosis, hyperosmolarity, exercise)
  - c. Cell lysis (rhabdomyolysis, trauma/crush syndrome, GI bleeding, hemolysis, tumor lysis)
3. Reduced urinary excretion
  - a. Decreased GFR (acute or chronic renal failure)
  - b. Decreased secretion (TTKG $<$ 7)
    - i. Hypoaldosteronism (type 4 renal tubular acidosis, aldosterone deficiency/resistance, adrenal insufficiency, dysfunction of distal renal tubule)
    - ii. Drugs (NSAIDs, ACEI, potassium-sparing diuretics, heparin)
  - c. Decreased tubular flow rate (severe effective arterial volume depletion or cardiomyopathy)

### Key Objectives

- ❖ Differentiate severe, true hyperkalemia, a potentially lethal condition for which treatment is the first consideration, from pseudohyperkalemia, and then assess for causal conditions.
- ❖ Differentiate between potassium redistribution and reduced urinary excretion causes.
- ❖ Outline initial management of patients with hyperkalemia including indications for specialized care.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Distinguish between life-threatening hyperkalemia and pseudohyperkalemia (ECG is essential).
  - Distinguish between causes of hyperkalemia by ruling out redistribution and intake problems quickly, and concentrating on the more common renal causes.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Identify patients with renal failure.
- ❖ Conduct an effective emergency plan of management for a hyperkalemic patient:
  - Outline an initial plan of management for a patient with hyperkalemia consistent with the cause and severity of the rise in potassium concentration.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Outline the relationship between potassium intake, the distribution of potassium between intracellular and extracellular fluid compartments, and urinary potassium excretion.
2. Identify the principal cells of the cortical collecting tubule as the main determinant of potassium secretion; list factors that stimulate potassium secretion (e.g., increased plasma potassium concentration, rise in plasma aldosterone, and increase delivery of tubular fluid and sodium to the collecting tubule).
3. List factors affecting translocation of potassium between the intracellular and extracellular fluid compartments (e.g., insulin,  $\beta_2$ adrenergic stimulation).
4. Describe potassium "adaptation".



**Rationale**

Hypokalemia, a common clinical problem, is most often discovered on routine analysis of serum electrolytes or ECG results. Symptoms usually develop much later when depletion is quite severe.

**Causal Conditions**

1. Decreased intake (e.g., anorexia nervosa)
2. Redistribution (alkalemia, insulin therapy for diabetic ketoacidosis,  $\beta^2$ -adrenergic drugs)
3. Increased loss
  - a. Renal losses
    - i. High tubular flow rate (e.g., diuretics, Bartter, Gitelman)
    - ii. High tubular  $[K^+]$  (TTKG $>4$ )
      - A. Hypovolemic (with secondary hyperaldosteronism, hypomagnesemia)
      - B. Hypervolemic
        - I. Hyperaldosteronism
        - II. Adrenal hyperplasia
        - III. Pseudohyperaldosteronism
        - IV. Cushing syndrome
        - V. Ectopic ACTH, JG tumor
  - b. GI losses
    - i. Vomiting/Tube drainage (associated with renal losses as well)
    - ii. Diarrhea (villous adenoma, laxative abuse)

**Key Objectives**

- ❖ Assess intake and shift of potassium into cells, but select increased loss as the category into which most problems fall.
- ❖ Differentiate between gastrointestinal and renal causes of hypokalemia.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate between gastrointestinal and renal losses (ask about diuretic use, vomiting, diarrhea, whether patient is diabetic).
  - Contrast the hypokalemic conditions associated with hypertension from those associated with hypovolemia.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Outline how urinary electrolytes and patient's acid-base status assist in the elucidation of excess urinary losses of potassium.
- ❖ Conduct an effective plan of management for a hypokalemic patient based on sound principles:
  - Outline a management plan to reduce or stop potassium redistribution or losses (e.g., potassium sparing diuretics).
  - Outline the safe use of oral potassium salts for replacement of potassium losses.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Outline the relationship between potassium intake, the distribution of potassium between intracellular and extracellular fluid compartments, and urinary potassium excretion.
2. Identify the principal cells of the cortical collecting tubule as the main determinant of potassium secretion; list factors that stimulate potassium secretion (e.g., increased plasma potassium concentration, rise in plasma aldosterone, and increased delivery of tubular fluid and sodium to the collecting tubule).
3. List factors affecting translocation of potassium between the intracellular and extracellular fluid compartments (e.g., insulin,  $\beta_2$ adrenergic stimulation).
4. Describe potassium "adaptation".

### Rationale

The purpose of antepartum care is to help achieve as good a maternal and infant outcome as possible. This means that psychosocial issues as well as biological issues need to be addressed.

### Causal Conditions

1. Pre-conception
2. Initial presentation
3. First trimester/Second trimester/Third trimester
4. Pre-labor (counsel for preparation of labor)

### Key Objectives

- ❖ Develop an appropriate relationship and rapport with prenatal patients; if possible, counsel about pregnancy prior to conception; determine whether the patient is pregnant and estimate the date of confinement.
- ❖ Identify physiological changes characteristic of 1st, 2nd, and 3rd trimester of pregnancy, including vital signs, skin changes, breast changes, and uterine changes.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit factors that contribute to estimation of date of confinement (e.g., LMP, date of conception/positive pregnancy test, use of birth control, ultrasound findings, physical exam/size of uterus) as well as factors that might alter the expected date of confinement, or might influence the course of the pregnancy (e.g., maternal age).
  - Identify physiological changes characteristic of pregnancy in the 1st, 2nd, and 3rd trimester; determine whether pregnancy is progressing satisfactorily (normal pregnancy symptoms), or complications are present (hyperemesis, pain, bleeding).
  - In the 2nd trimester, determine maternal weight gain, BP, fetal heart rate and movement, and screening for fetal growth (symphysis - fundus height); whether preterm labor may be present, any bleeding, or urinary symptoms.
  - In the 3rd trimester, determine the presence of fetal movement, BP, fetal heart rate, maternal weight gain, and determine fetal lie and presentation, and screening for fetal growth.
  - Diagnose onset of labor.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Discuss current recommendations for prenatal screening offered at initial presentation (rubella status, group B strep, VDRL, hepatitis B antigen, CBC, urinalysis, HIV, Rh status, chlamydia, pap smear, maternal serum screen).
  - Discuss current recommendations for ultrasound screening in normal pregnancy.
  - List investigations for a patient with Rh negative blood type and list indications for anti-D globulin.
  - Discuss recommendations for gestational diabetes and maternal screening in 2nd trimester.
  - Discuss recommendations for screening for proteinuria and glycosuria in 1st, 2nd, and 3rd trimester.

- ❖ Conduct an effective initial plan of management for a patient who is pregnant:
  - In normal pregnancy, outline nutrition recommendations including for iron and folic acid (pre and post conception).
  - List potential complications associated with smoking, alcohol in pregnancy (maternal and neonatal).
  - Counsel patient on safe and unsafe medications during pregnancy, physical and sexual activity, travel, vaccines.
  - Outline management of urinary tract infections in pregnancy, nausea and vomiting, and constipation.
  - Outline initial management of a woman with symphyseal fundal height measurement significantly larger or smaller than expected.
  - Outline initial management of elevated blood pressure.
  - Outline initial management of bleeding in first, second, or third trimester.
  - Outline initial management if fetal movements are decreased.
  - Outline initial management of post dates pregnancy.
  - Outline initial management of diabetes in pregnancy.
  - Counsel patient regarding breast-feeding; counsel regarding maternal serum screening.
  - Select patients in need of specialized care.

## Ethics

### *Consent to Investigation or Treatment (CLEO 4.3)*

#### Detailed Objectives

- ❖ To communicate clearly information relevant to informed consent (what a reasonable person would want to know in a given circumstance).
- ❖ To identify reasonable steps to ensure understanding of information: can the patient explain the medical problem and the proposed treatment or test.
- ❖ To determine free choice, and absence of coercion.
- ❖ To recognize the patient's right to refuse or revoke consent without prejudice to subsequent treatment.

Non-pregnant women of childbearing age who may become pregnant should receive all clinically indicated immunizations at least three months prior to conception. This included immunity as a result of disease or immunization to measles, mumps, rubella, hepatitis B, tetanus, diphtheria, poliomyelitis, and varicella. Individuals at high risk for hepatitis A or pneumococcal infections should also receive these immunizations.

Immunization during pregnancy may be indicated to protect the mother and fetus. Vaccines may be given to non-immune women during pregnancy when there is a high risk of exposure to infection, the infection is hazardous to mother or fetus, and the immunizing agent is not likely to cause harm. Inactivated virus vaccines, toxoids, and immune globulin are generally considered safe for pregnant women since there is no evidence that they have harmful effects on the fetus or pregnancy. Nevertheless, it is preferable to delay administration of these medications until the second trimester because a theoretical risk to the fetus cannot be excluded.

Genetic testing has ethical obligations to both mother and fetus. Prenatal testing may influence a mother's decision about reproductive options. As a consequence, prenatal counseling must be non-directive, and testing must not be restricted to those willing to have an abortion. Moreover, reproductive decisions must not be coerced on the basis of test results. If the only realistic options for mothers are abortion, selective conception, and childlessness, it is essential that women not be pressured into prenatal diagnosis.

### *Truth Telling (CLEO 4.4)*

#### Detailed Objectives

- ❖ To recognize reasonable right of patient to know relevant information:

- purpose and implications of investigations;
- diagnosis and prognosis of medical condition;
- risks and benefits of treatment; and
- health risks to which they are exposed.

The physical demands of the woman's job should be considered, especially women at higher risk of preterm delivery. Analysis of many studies identified a high cumulative work fatigue score as the strongest (odds ratio of 1.63) work-related risk factor for pre-term birth.

Genetic testing has ethical obligations to both mother and fetus. Prenatal testing may influence a mother's decision about reproductive options. As a consequence, prenatal counseling must be non-directive, and testing must not be restricted to those willing to have an abortion. Moreover, reproductive decisions must not be coerced on the basis of test results. If the only realistic options for mothers are abortion, selective conception, and childlessness, it is essential that women not be pressured into prenatal diagnosis.

## Applicable Basic Principles of Law

### *The Patient: A Person with Human and Other Legal Rights (CLEO 5.1)*

#### Detailed Objectives

- ❖ To identify the patient (rather than the physician or the hospital, for example) as a key focus and central subject of medical practice
- ❖ To identify patients' fundamental human rights relevant to the practice of medicine, such as:
  - the right to security of the person and inviolability; and
  - the right to freedom from discrimination by virtue of age, race, gender, nationality, religion, sexual orientation, financial means, or other status.
- ❖ To demonstrate the knowledge that the patient has fundamental rights in the medical context, arising under both statutory law and the rulings of the courts, which are binding on the physician.

There are several screening procedures that are recommended for pregnancy. Not offering such screening throughout pregnancy may violate the patient's rights.

### *Physicians' Legal Liability for Negligence (or, in Québec, Civil Liability) (CLEO 5.4)*

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstances under consideration.

Failure to act on abnormal results from screening may be considered a cause of harm through failure to meet the standard of care that is applicable in a pregnant woman with an abnormal screening result.

## Applied Scientific Principles

1. Outline maternal cardiovascular adaptation to pregnancy.
2. Outline maternal endocrine and metabolic adaptation to pregnancy.
3. Describe the change in renal function in pregnancy.
4. List some of the physiologic skin changes in pregnancy.

### Rationale

Intrapartum and postpartum care means the care of the mother and fetus during labor and the six-week period following birth during which the reproductive tract returns to its normal nonpregnant state. Of pregnant women, 85% will undergo spontaneous labor between 37 and 42 weeks of gestation. Labor is the process by which products of conception are delivered from the uterus by progressive cervical effacement and dilatation in the presence of regular uterine contractions.

### Causal Conditions

1. Normal labor
2. Abnormal labor
3. Fetal surveillance
4. Postpartum care
  - a. Normal puerperium
  - b. Abnormal puerperium
    - i. Fever
    - ii. Pain
    - iii. Hemorrhage
    - iv. Depression

### Key Objectives

- ❖ Determine whether the patient is in labor and the presence of rupture of membranes.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Examine abdomen for fetal presentation, lie, engagement, vaginal exam for position, station, and cervical dilatation.
  - Determine whether labor is in the latent or active phase, and state the approximate duration of each, as well as the duration of the second stage of labor, expected rate of cervical dilatation.
  - Determine whether physical findings are present which necessitate increased levels of maternal or fetal monitoring.
  - List maternal and fetal signs to be monitored; discuss indications and frequency for pelvic examination in the first and second stages of labor.
  - Diagnose prolonged, protracted, or arrested stages of labor, and factors in mother's history predisposing to them.
  - Diagnose cause of abnormal labor in terms of uterine contraction, fetus, and passage.
  - Determine whether the course of the puerperium is normal or abnormal physically and emotionally.
  - Differentiate between causes of postpartum fever, pain.
  - Determine cause of postpartum hemorrhage (uterine, cervical, vaginal, perineal, DIC).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order routine tests for a woman presenting to the labor and delivery ward.

- List indications for fetal and uterine contractions monitoring; discuss significance of meconium in amniotic fluid.
- Postpartum, in an Rh-negative woman, order maternal and neonatal blood to determine need for Rh immunoglobulin.
- ❖ Conduct an effective initial plan of management for a patient in labor and postpartum:
  - Counsel patient in labor about need for examination, reasons for exam, and permission to go ahead.
  - Describe mechanism of delivery for a fetus; define shoulder dystocia and list risk factors.
  - Describe signs of placental separation and normal duration of third stage of labor; list components of Apgar score.
  - Discuss techniques for pain relief in labor; list indications for and complication of episiotomy.
  - List risk factors for Group B Streptococcal disease in the neonate and discuss use of prophylactic penicillin in labor.
  - List indications and contraindications of active management of third stage of labor with IV oxytocin.
  - Outline initial management of early postpartum hemorrhage.
  - List methods to augment labor; list indications/complications of Cesarean section, forceps, or vacuum extraction.
  - Outline management of puerperal pain, dyspareunia, bladder and bowel dysfunction.
  - Outline the risk factors and management of post partum depression.
  - Outline management of fever postpartum and postpartum hemorrhage.
  - Select patients in need of specialized care.

## Applicable Basic Principles of Law

### ***Physicians' Legal Liability for Negligence (or, in Québec, Civil Liability) (CLEO 5.4)***

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstances under consideration.

Failure to recognize risk factors for group B Streptococcal infection in a pregnant woman is such a circumstance and physicians may be legally liable.

## Applied Scientific Principles

1. Outline the endocrinology of parturition:
  - physiological phases of myometrial activity;
  - fetal factors promoting labor;
  - myometrial factors promoting labor; and
  - hormonal factors promoting labor.
2. Outline the pathogenesis of preterm birth.
3. Outline the etiology of protraction and arrest disorders.

### Rationale

Virtually any maternal medical or surgical condition can complicate the course of a pregnancy and/or be affected by the pregnancy. In addition, conditions arising in pregnancy can have adverse effects on the mother and/or the fetus. For example, babies born prematurely account for >50% of perinatal morbidity and mortality; an estimated 5% of women will describe bleeding of some extent during pregnancy, and in some patients the bleeding will endanger the mother.

### Causal Conditions

1. Pre-existing maternal conditions
  - a. Late maternal age
  - b. Hypertension (see [PREGNANCY ASSOCIATED HYPERTENSION](#))
  - c. Diabetes
  - d. Cardiac disease
  - e. Chronic renal disease
  - f. Other (thrombosis, SLE, drug use)
2. Maternal conditions arising in pregnancy
  - a. Pregnancy induced hypertension (see [PREGNANCY ASSOCIATED HYPERTENSION](#))
  - b. Gestational diabetes
  - c. Gestational thrombocytopenia
  - d. Thrombosis
  - e. Viral infections (TORCH, rubella, varicella, HIV)
  - f. Other (drug use, physical/emotional abuse/trauma)
3. Fetal conditions
  - a. Large for gestational age/Small for gestational age
  - b. Structural abnormality of fetus/ABO
  - c. Alloimmune disease (Rh isoimmunization)
4. Complications inherent to pregnancy
  - a. Antepartum hemorrhage (see [VAGINAL BLEEDING, EXCESSIVE/IRREGULAR/ABNORMAL](#))
  - b. Preterm labor/Preterm premature rupture of membranes

### Key Objectives

- ❖ Determine the risk factors that increase chances of complication during the pregnancy at the initial visit for prenatal care.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit history of pre-existing maternal medical conditions, history of maternal or fetal problems in previous pregnancies, or any other complication inherent to pregnancy.
  - Elicit family history, nutrition, alcohol, smoking, obesity, drug use including recreational drugs, maternal age, viral infections, previous fetal congenital abnormalities, genetic disorders, bleeding, leakage of fluid.



- Perform physical examination of mother, uterine height, amount of amniotic fluid, and other fetal parameters.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List indications and timing for ultrasound; select and order ultrasound and list parameters of the biophysical profile (amniotic fluid, fetal movement, fetal tone, fetal breathing, non-stress-test electronic fetal monitoring).
  - List indications for amniocentesis or chorionic villous sampling.
  - List investigations for specific maternal conditions including maternal blood type and antibody screen.
- ❖ Conduct an effective initial plan of management for a patient with obstetrical complications:
  - Outline preventive/'improving outcome of pregnancy' program (e.g., smoking cessation, folic acid, betamethasone to mother for threatened tocolysis when preterm delivery imminent, screen for gestational diabetes, Rh immunoglobulin to Rh negative women).
  - Outline immediate management of preterm labor and premature rupture of membranes; diabetes, hypertension.
  - Select patients in need of specialized care.

## Applicable Basic Principles of Law

### *The Patient: A Person with Human and Other Legal Rights (CLEO 5.1)*

#### Detailed Objectives

- ❖ To identify the patient (rather than the physician or the hospital, for example) as a key focus and central subject of medical practice.
- ❖ To identify patients' fundamental human rights relevant to the practice of medicine, such as:
  - the right to security of the person and inviolability; and
  - the right to freedom from discrimination by virtue of age, race, gender, nationality, religion, sexual orientation, financial means, or other status.
- ❖ To demonstrate the knowledge that the patient has fundamental rights in the medical context, arising under both statutory law and the rulings of the courts, which are binding on the physician.

Failure to counsel a pregnant woman 35 years of age or older about prenatal diagnosis may violate the patient's rights.

### *Physicians' Legal Liability for Negligence (or, in Québec, Civil Liability) (CLEO 5.4)*

#### Detailed Objectives

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstances under consideration.

Failure to recognize Rh isoimmunization in a pregnant woman may be considered a cause of harm through failure to meet the standard of care that is applicable in a pregnant woman with Rh isoimmunization.

## Applied Scientific Principles

1. Outline the physiology of amniotic fluid regulation:
  - sources of amniotic fluid;
  - amniotic fluid composition; and
  - regulation of amniotic fluid volume.
2. Outline the pathogenesis of pregnancy induced hypertension.

### Rationale

A miscarriage or abortion is a pregnancy that ends before the fetus can live outside the uterus. The term also means the actual passage of the uterine contents. It is very common in early pregnancy; up to 20% of pregnant women have a miscarriage before 20 weeks of pregnancy, 80% of these in the first 12 weeks.

### Causal Conditions

1. Abortion, spontaneous
  - a. Threatened/Inevitable
  - b. Incomplete
  - c. Complete
  - d. Missed
2. Recurrent abortion
3. Induced
  - a. Medical
  - b. Surgical
  - c. Non therapeutic

### Key Objectives

- ❖ Identify a nonviable pregnancy early and counsel the patient about management strategies so that timely referral can be achieved.
- ❖ List potential complication (hemorrhage, sepsis, retained products, subsequent pregnancy complications such as Asherman, incompetent cervix, etc.).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine gestational age and viability.
  - Assess hemodynamic stability for surgery.
  - Determine whether a threatened/inevitable abortion exists.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order maternal antibody screen, CBC; order ultrasound for gestational age.
  - If appropriate, order cervical swab for gonococcus, chlamydia.
  - If recurrent pregnancy loss, order auto-immune screen, karyotype, hystero-salpingogram or hysteroscopy to rule out uterine malformation.
- ❖ Conduct an effective initial plan of management for a patient requiring pregnancy termination:
  - If ultrasound confirms viable intrauterine pregnancy, missed abortion, or inevitable abortion, counsel patient regarding management options (parenting, adoption, expectant management, medical termination such as misoprostol, surgical D&C).
  - Counsel patient about risks and complications of each management option.

- If patient management option is therapeutic abortion, advise an appropriately safe method according to gestational age.
- In patients with fetal anomalies, refer for genetic/obstetric/pediatric counseling and provide follow-up later regarding risk reduction and surveillance in subsequent pregnancies.
- After pregnancy loss, if appropriate, provide contraceptive counseling.

## Ethics

### *Truth Telling (CLEO 4.4)*

#### Detailed Objectives

- ❖ To understand and explain the ethical and legal basis for truth telling:
  - respect for patient's autonomy.

Disagreement about abortion persists despite all the discussion that has occurred because there are no specific "facts" upon which everyone agrees. This does not mean that it is impossible for people to reach agreement. It simply indicates that there is no absolutely rational means by which they must do so. Trying to hide dissenting opinion on either side ultimately limits patient autonomy. Good patient communication can lead to the best conclusion for what is right for each individual patient.

### *Doctor Patient Relationship (CLEO 4.8)*

#### Detailed Objectives

- ❖ The physician will place the best interest of the patient first.
- ❖ To disclose the limitations to the patient where personal beliefs or inclinations that limit the treatment a physician is able to offer.

In a patient who is pregnant but pregnancy termination is under consideration, referral in a timely fashion is essential if it offers the outcome most consistent with the patient's best interest.

### *Controversial and Evolving Ethical Issues in Practice (CLEO 4.10)*

#### Issues

- ❖ Maternal-fetal conflict of rights

#### Detailed Objectives

- ❖ The candidate will be aware that they may be asked to comment on unresolved or controversial ethical issues, and will be able to name and describe relevant key issues and ethical principles.
- ❖ When confronted with such a situation, candidates will:
  - discuss in a non-judgmental manner;
  - ensure patients have full access to relevant and necessary information;
  - identify if certain options lie outside their moral boundaries and refer to another physician if appropriate;
  - consult with appropriate ethics committees or boards; and
  - protect freedom of moral choice for students or trainees.

In a patient who is pregnant but pregnancy termination is under consideration, option counseling must be complete.

## Applicable Basic Principles of Law

## ***Physicians' Legal Liability for Negligence (or, in Québec, Civil Liability) (CLEO 5.4)***

### **Detailed Objectives**

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstances under consideration.

If a pregnant woman has vaginal bleeding, failure to recognize fetal tissue on pathologic examination or take appropriate action in such a circumstance and the physician may be legally liable.

### **Applied Scientific Principles**

1. Discuss possible causes of miscarriage and factors that increase the risk of having a miscarriage.

## Rationale

The impact of premature birth is best summarized by the fact that <10% of babies born prematurely in North America account for >50% of all perinatal morbidity and mortality. Yet outcomes, although guarded, can be rewarding given optimal circumstances.

## Causal Conditions

1. Fetal
  - a. Multiple gestation
  - b. Fetal hydrops (immune and non-immune)
  - c. Congenital/Genetic anomalies
2. Placental
  - a. Placenta praevia
  - b. Abruption placenta
  - c. Placental insufficiency
3. Uterine
  - a. Incompetent cervix
  - b. Excessive enlargement (hydramnios)
  - c. Malformations (leiomyomas, septate)
4. Maternal
  - a. Pre-eclampsia
  - b. Premature rupture of membranes
  - c. Smoking, substance abuse
  - d. Chronic medical illnesses
  - e. Infections (urinary, cervical, amniotic)-group B streptococcus, herpes, TORCH, etc.
5. Iatrogenic (indicated induction of labor)

## Key Objectives

- ❖ Identify risk factors for prematurity.
- ❖ Develop a management plan for initial stabilization of the premature neonate.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - List the immediate and long-term health problems faced by premature infants.
  - Contrast low birth weight and prematurity.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Investigate the maternal and fetal factors which may precipitate a premature birth.
- ❖ Conduct an effective initial plan of management for a premature baby:
  - Resuscitate and anticipate the initial health problems encountered by premature infants.

## PREMATURITY

- Outline the nutritional requirements of premature infants.
- Select patients in need of referral and/or specialized care for premature infants.
- Counsel parents about immediate and long-term health problems encountered by premature infants.
- Coordinate health care facilities for the short and long term care of premature infants.

## PROLAPSE/PELVIC RELAXATION

see also [Incontinence, Urine](#)

### Rationale

Patients with pelvic relaxation present with a forward and downward drop of the pelvic organs (bladder, rectum). In order to identify patients who would benefit from therapy, the physician should be familiar with the manifestations of pelvic relaxation (uterine prolapse, vaginal vault prolapse, cystocele, rectocele, and enterocele) and have an approach to management.

### Causal Conditions

1. Damage to vagina and pelvic support system
  - a. Multiparity/Difficult vaginal birth
  - b. Prior pelvic surgery/Disruption of support (e.g., hysterectomy)
  - c. Chronic increase in intra-abdominal pressure
    - i. Obesity
    - ii. Chronic cough, constipation
    - iii. Pelvic tumors
    - iv. Ascites
  - d. Hypo-estrogenic atrophy/Advanced age
2. Neurogenic dysfunction of pelvic floor/Connective tissue disease
3. Genetic predisposition

### Key Objectives

- ❖ Differentiate between different types of pelvic relaxation according to the associated symptoms (pelvic pressure, stress incontinence, problems with defecation), identify the structure that is prolapsing during physical examination, and explain the findings to the patient.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine the severity of symptoms, effect on activity, predisposing factors, and risk factors for surgery.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - State that there are no specific tests for the assessment of prolapse, but discuss importance of renal function testing if cystocele is part of the pelvic relaxation.
- ❖ Conduct an effective initial plan of management for a patient with pelvic relaxation or prolapse:
  - Counsel the patient on benefit and risks of no intervention, conservative measures, and surgery.
  - Select patients requiring referral for specialized care.

### Applied Scientific Concepts

1. Describe the progression of genital prolapse from grade one to "procidentia" and the relationship to the anatomy of pelvic support (uterosacral/cardinal ligament complex, levator ani muscle, endopelvic fascia).
2. Outline the impact of increased intra-abdominal pressure and hormone replacement therapy.



## Rationale

Urinalysis is a screening procedure used frequently for insurance and routine examinations. Proteinuria is usually identified by positive dipstick on routine urinalysis. Persistent proteinuria often implies abnormal glomerular function.

## Causal Conditions

1. Transient proteinuria (<5%)
2. Orthostatic proteinuria (5% of adolescents)
3. Persistent proteinuria
  - a. Overflow (abnormal proteins)
  - b. Tubulointerstitial (low molecular weight proteins)
  - c. Glomerular (including nephrotic syndrome)
    - i. Active urine sediment
      - A. Primary
        - I. Focal segmental glomerulosclerosis
        - II. IgA nephropathy
        - III. Mesangio-capillary glomerulonephritis
      - B. Secondary (SLE, post-infectious)
    - ii. Non-active urine sediment
      - A. Primary
        - I. Minimal change disease
        - II. Membranous glomerulonephropathy, etc.
      - B. Secondary
        - I. Diabetes mellitus
        - II. Secondary focal segmental glomerulosclerosis
        - III. Amyloid

## Key Objectives

- ❖ Differentiate between benign, and common or uncommon causes of proteinuria that require consultation.
- ❖ Interpret the significance of microalbuminuria.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Exclude transient and orthostatic proteinuria; reassure patients about benign nature of conditions.
  - Differentiate between overflow and tubulointerstitial proteinuria, and glomerular proteinuria.
  - Diagnose common primary or secondary glomerular diseases.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective plan of management for a proteinuric patient:

## PROTEINURIA

- > State referral indications for a patient with proteinuria.
- > Outline an initial management plan to delay progression to chronic renal failure in patients with primary glomerular diseases.
- > Formulate the most appropriate management plan to delay diabetic nephropathy in patients with type I or II diabetes mellitus.
- > Contrast the prognostic significance of light and heavy proteinuria.

### **Applied Scientific Concepts**

1. Identify the location and characteristics of the glomerular filtration barrier to macromolecules.
2. Explain the four major possible mechanisms that could lead to increased urinary protein excretion (altered transglomerular passage of proteins, increased plasma concentration of proteins normally filtered, decreased tubular reabsorption, and addition of proteins by urinary epithelial cells).

**Rationale**

Itching is the most common symptom in dermatology. In the absence of primary skin lesions, generalised pruritus can be indicative of an underlying systemic disorder. Most patients with pruritus do not have a systemic disorder and the itching is due to a cutaneous disorder.

**Causal Conditions**

1. Skin lesions
  - a. Primary skin disease
    - i. Skin blisters (papular/vesicular)
      - A. Dermatitis herpetiformis
      - B. Bullous pemphigoid
    - ii. Skin rash (papula-squamous)
      - A. Mycosis fungoides
      - B. Psoriasis
      - C. Lichen planus
  - b. Parasitosis (scabies, pediculosis)
  - c. Allergy (atopic dermatitis/eczema, urticaria, allergic dermatitis)
  - d. Arthropod bites
  - e. Factitious dermatitis
2. No skin lesions
  - a. Senile pruritus
  - b. Drugs/Foods
  - c. Obstructive biliary disease
  - d. Uremia/Renal failure
  - e. Haematological
    - i. Polycythemia vera/Microcytic anemia
    - ii. Leukemia
    - iii. Lymphoma
  - f. Carcinoma/Carcinoid syndrome
  - g. Endocrine (diabetes, thyroid disease)
3. Psychiatric/Emotional disorders

**Key Objectives**

- ❖ Differentiate excoriations due to scratching from primary skin lesions; in the absence of primary skin lesions, identify the underlying cause of pruritus.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Contrast pruritus associated with skin lesions and that without primary skin disease.

- Categorize primary skin lesions associated with pruritus.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - In the absence of skin lesions, select investigations to diagnose systemic disorders.
- ❖ Conduct an effective plan of management for a patient with pruritus:
  - Outline local and other therapy for pruritus.
  - Treat underlying systemic disease identified as the cause of pruritus.
  - Select patients in need of specialized care.

### Rationale

Psychosis is a general term for a major mental disorder characterized by derangement of personality and loss of contact with reality, often with false beliefs (delusions), disturbances in sensory perception (hallucinations), or thought disorders (illusions). Schizophrenia is both the most common (1% of world population) and the classic psychotic disorder. There are other psychotic syndromes that do not meet the diagnostic criteria for schizophrenia, some of them caused by general medical conditions or induced by a substance (alcohol, hallucinogens, steroids). In the evaluation of any psychotic patient in a primary care setting all of these possibilities need to be considered.

### Causal Conditions

1. Psychotic disorder (uncertain time frame/mixed features)
  - a. Brief psychotic disorder (>1day,<1 month)
  - b. Schizophreniform disorder (<6 months)
  - c. Schizophrenia (>6 months)
    - i. Undifferentiated
    - ii. Disorganized
    - iii. Residual
    - iv. Paranoid
    - v. Catatonic
  - d. Schizo-affective disorder
2. Psychotic disorder due to medical condition
3. Substance induced psychotic disorder

### Key Objectives

- ❖ Differentiate a psychotic patient from one with delirium (see [DELIRIUM/CONFUSION](#)).
- ❖ Determine the possibility of the psychotic disorder being caused by a medical condition or substance induced episode.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit a history of psychotic symptoms, extent, duration, associated mood disturbances (if any), and any relationship to illness, drugs, or medications; risk of harm to others or self.
  - Differentiate between patients with psychotic symptoms who have insight and are aware of their symptoms from those who do not have insight and are of concern to others.
  - Determine the presence and duration of delusions, hallucinations, disorganized speech, disorganized or catatonic behavior, negative symptoms (affective flattening, alogia, or avolition).
  - Examine mental status, and perform general physical exam.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients for investigation of medical condition if high index of suspicion exists.
- ❖ Conduct an effective initial plan of management for a patient with psychosis:

- Outline management principles, including pharmacological, psychosocial, and role of hospital.
- Counsel and support patient/caregiver/family about nature and natural history of the psychosis.
- Select patients in need of specialized care.

## Ethics

### **Consent to Investigation or Treatment (CLEO 4.3)**

- ❖ To demonstrate awareness of process for the assessment of capacity to give consent, and be able to conduct such an assessment.

Psychotic patients will require treatment with psychotropic medications. Evaluate the patient's beliefs on this issue.

### **Truth Telling (CLEO 4.4)**

- ❖ To recognize reasonable right of patient to know relevant information:
  - purpose and implications of investigations;
  - diagnosis and prognosis of medical condition;
  - risks and benefits of treatment; and
  - health risks to which they are exposed.

For a patient who is psychotic, state and provide support with disclosure of difficult news. When informing about possible pharmacological intervention(s), interpret side effects and health risks with the use of the medication(s) being recommended.

### **Resource Allocation (CLEO 4.5)**

- ❖ To make health care resources available to patients in a manner which is fair and equitable, without bias or discrimination.
- ❖ To inform patients of impact of cost restraint in a supportive way.

Psychotic conditions are usually chronic, difficult to manage, and require extensive resources. Select patients for referral for such treatment in a manner that is fair and equitable, without bias or discrimination. In addition, hospitalization and repeated emergency care are expensive and the resources are limited. For a psychotic patient, select the modality of treatment without discrimination or bias.

Describe to the patient the impact of cost restraint in a supportive way.

## Applicable Basic Principles of Law

### **The Patient: A Person with Human and other Legal Rights (CLEO 5.1)**

- ❖ To demonstrate the knowledge that the patient has fundamental legal rights in the medical context, arising under both statutory law and the rulings of the courts that are binding on the physician.

Like all patients, the psychotic patient is a person with human and legal rights. In the medical context, the same fundamental legal rights that are binding on the physician will apply to a patient who is psychotic.

### **Legal Aspects of Consent (CLEO 5.2)**

- ❖ It is mandatory that the patient's consent be obtained for any medical investigation, treatment, or research.
- ❖ Consent must be freely given and fully informed.
- ❖ Full information must be given, in language that the patient or involved person(s) can understand, anticipated effects, material or significant risks, alternatives available, and any information regarding delegation of care, and will be given according to the circumstances of each particular case.

It is mandatory that a patient who is psychotic consent to any medical investigation, treatment, or research. The consent

should be obtained (freely given and fully informed) after discussion with the patient or involved person(s) in language that is understood. The discussion concerning the proposed treatment or investigation should include anticipated effects, risks, alternatives available, and information about delegation of care.

Necessary treatment without consent is to be provided to a psychotic patient only in a medical emergency.

### ***Legal Aspects of Confidentiality (CLEO 5.3)***

- ❖ A physician may not disclose patient information (whether about the existence, nature, extent of illness or any other health information) except where expressly authorized by the patient to do so, or when the law permits or requires such disclosure.

For a patient who is psychotic, information disclosure may be permitted by law (e.g., ability to drive), but if uncertain, discuss the complexity of the situation with provincial licensing authorities or legal counsel.

### ***Physician's Legal Liability for Negligence (or, in Québec, Civil Liability) (CLEO 5.4)***

- ❖ The duty of care arises out of the doctor/patient relationship (or, in Québec, the medical contract and the law of delict). Once such a relationship arises, the physician is required to attend to the patient attentively, with continuity, and to exercise reasonable care, skill, and judgment (until the relationship is ended through an appropriate process).
- ❖ The standard of care expected of a physician is one that would reasonably be expected under similar circumstances of an ordinary, prudent physician of the same training, experience, specialization, and standing.
- ❖ In some circumstances, physicians may be held vicariously liable.

Duty of care for a psychotic patient arises out of the doctor/patient relationship. Once such a relationship has been established, the physician is required to attend the patient attentively, with continuity, and to exercise reasonable care, skill, and judgment until the relationship is ended through an appropriate process. The standard of such care expected is identical to that of any physician under similar circumstances, with the same training, experience, specialization, and standing.

In some instances, the psychotic patient may be under the care of other persons who are under the physician's delegation, such as psychiatric nurses, social workers, dietitians, etc. The physician may be held vicariously liable for such persons.

## **General Organization**

### ***Inter-professional Issues (CLEO 6.9)***

- ❖ The proper inter-professional relationship based on respect and clear communication.

Management of psychotic patients often involves many physicians (family physicians, ER physicians, psychiatrists) and other allied health professionals (nurses, social workers, psychologists). Communicate with all of them in a respectful and clear manner.

### ***Impact of Particular Laws on Practice (CLEO 6.10)***

- ❖ The duty to report to specified government agencies under certain circumstances.

Patients with psychotic disorders may choose to discontinue medication, therapy, or both. In certain instances, the use of relevant provisions of the Mental Health Act may need to be implemented to enforce observation or treatment. Discuss these issues with the patient and with those that act on behalf of the patient.

**Rationale**

Arterial pulse characteristics should be assessed as an integral part of the physical examination. Carotid, radial, femoral, posterior tibial, and dorsalis pedis pulses should be examined routinely on both sides, and differences, if any, in amplitude, contour, and upstroke should be ascertained.

**Causal Conditions**

1. Unequal or delayed pulses
  - a. Obstructive arterial disease
  - b. Aortic disease (dissection, aneurysm, coarctation, supra/valvular aortic stenosis)
  - c. Takayasu disease (arteritis)
2. Abnormal volume pulses
  - a. Alternans (e.g., left ventricular dysfunction)
  - b. Paradoxus (e.g., inspiratory decrease >20 mmHg in cardiac tamponade)
  - c. Biferiens (e.g., combined aortic stenosis/regurgitation)
  - d. Corrigan (e.g., aortic regurgitation)
  - e. Dicrotic (e.g., decreased arterial pressure/decreased arterial resistance)
  - f. Pulses in aortic stenosis (anacrotic, tardus, parvus, shudder)
3. Rhythm too fast/Slow/Irregular
  - a. Tachycardia, sinus (>100/minutes) (fever/sepsis, hyperthyroid, volume depletion/hypotension/shock/heart failure, anemia, hypoxemia, drugs)
  - b. Bradycardia (<45/minutes)
    - i. Normal heart (during sleep, well-conditioned athletes, some elderly)
    - ii. Intrinsic to heart (infiltrative diseases, collagen diseases, open heart surgery)
    - iii. Extrinsic (vagal activity, drugs, hypothyroid, hypothermia, potassium abnormal)
  - c. Arrhythmia [see [PALPITATIONS \(ABNORMAL ECG-ARRHYTHMIA\)](#)]

**Key Objectives**

- ✦ Identify unequal or delayed pulses and differentiate between causes.

**Objectives**

- ✦ Through efficient, focused, data gathering:
  - Examine brachial arterial pulse to assess rhythm, volume and consistency of peripheral vessels.
  - Examine popliteal pulses when lower leg arterial disease is suspected.
  - Differentiate between the various abnormal pulses suggestive of systemic, pericardial, myocardial, and valve disease.
  - Measure blood pressure in both arms and legs if coarctation of the aorta is suspected from pulses.
- ✦ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select diagnostic imaging tests to identify pericardial, myocardial, and valve conditions which are associated with



abnormalities in the peripheral pulses.

- ❖ Conduct an effective initial plan of management for a patient with pulse abnormalities:
  - Outline preventive measures for peripheral vascular disease.
  - Outline the plan of initial management.
  - Select patients who require specialized care and/or consultation.
  - Conduct counseling for patients with pulse abnormalities.

## Applied Scientific Concepts

1. Define laminar and turbulent flow and explain that turbulence may be produced by an increase in velocity (due to either geometric changes such as narrowing or increased flow rate).
2. Relate Poiseuille Law to flow through vessels.

### Rationale

Pupillary disorders of changing degree are in general of little clinical importance. If only one pupil is fixed to light, it is suspicious of the effect of mydriatics. However, pupillary disorders with neurological symptoms may be of significance.

### Causal Conditions

1. Local disorder of iris
2. Anisocoria (unequal/asymmetric pupils)
  - a. Post eye surgery
  - b. Impaired pupil constriction (third nerve palsy, tonic pupil, mydriatics)
  - c. Impaired pupil dilatation (Horner syndrome) (hypothalamus/brain stem/spinal cord lesions)
3. Impairment of pupil constriction (without anisocoria)
  - a. Unilateral (optic nerve or retinal lesion)
  - b. Bilateral (diabetes, syphilis, midbrain lesion, hydrocephalus, factitious)

### Key Objectives

- ❖ Determine whether there has been previous ocular inflammation, trauma, loss of vision, or eye pain in order to begin ruling out local disorders.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate clinically between the various mechanisms of pupil abnormalities.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients in need of referral for further investigation.
- ❖ Conduct an effective plan of management for a patient with pupil abnormalities:
  - Select patients in need of referral for management.

### Applied Scientific Concepts

1. Outline function of cranial nerves and demonstrate how to examine them.
2. Describe the mechanism of pupillary constriction.



## 89-1 **ACUTE RENAL FAILURE (ANURIA/OLIGURIA/ARF)**

### **Rationale**

A sudden and rapid rise in serum creatinine is a common finding. A competent physician is required to have an organised approach to this problem.

### **Causal Conditions**

1. Pre-renal causes
  - a. Selective renal hypo-perfusion (e.g., hepato-renal syndrome, ACEI + bilateral renal artery stenosis)
  - b. Systemic hypo-perfusion
    - i. Hypovolemia (e.g., hemorrhage, volume loss, third space loss)
    - ii. Distributional shock (e.g., sepsis, anaphylaxis, drug overdose)
    - iii. Cardiac causes of hypotension
      - A. Myocardial dysfunction (e.g., infarction, dysrhythmia)
      - B. Obstructive hypotension (e.g., pulmonary embolus)
2. Renal causes
  - a. Tubular and interstitial
    - i. Ischemic ATN, nephrotoxic ATN
    - ii. Acute interstitial nephritis (e.g., drugs)
    - iii. Cast nephropathy (e.g., multiple myeloma)
  - b. Glomerular (e.g., crescentic/proliferative glomerulonephritis, TTP/HUS, malignant hypertension)
  - c. Vascular (e.g., cholesterol emboli)
3. Post-renal/Obstruction
  - a. Below bladder (e.g., prostatic, cervical cancer, urethral valves/stricture)
  - b. Above bladder (e.g., bilateral calculi, retroperitoneal fibrosis, UPJ/VUJ)
  - c. Bladder (e.g., bladder calculus)

### **Key Objectives**

- ❖ Contrast the clinical findings of acute from chronic renal failure, and determine whether the serum creatinine rise is primarily an acute, chronic, or an acute problem superimposed on a chronic one.
- ❖ Differentiate pre- from intra- and post-renal causes of acute renal failure (ARF).

### **Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine disease duration, recent onset of discoloured urine, decrease or no urine output, history of fluid loss, history of urinary tract obstruction, medications.
  - Examine patient for volume status (e.g., vital signs, postural changes in pressure or pulse, skin temperature, jugular venous pressure), chest, heart, abdomen for enlarged kidneys or bladder.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select appropriate laboratory tests (e.g., urinalysis, serum/urine electrolytes, serum creatinine).

- Select appropriate diagnostic imaging (e.g., ultrasound for renal size, renal isotope scan).
- ❖ Conduct an effective initial plan of management for a patient with acute renal failure:
  - In a patient suspected to have post-renal failure, select the insertion of a urinary catheter as an initial investigative as well as therapeutic measure.
  - Outline initial management of fluid and dietary restrictions in a patient with acute renal failure.
  - Select initial intervention(s) in the management of complications of acute renal failure.
  - Select patients in need of specialized care (outline indications for dialysis).

## Applied Scientific Concepts

1. Identify the determinants of single nephron glomerular filtration rate (surface area/permeability of glomerular basement membrane, hydrostatic pressure gradient between glomerular capillary and Bowman space, oncotic pressure gradient between glomerular capillary and Bowman space).
2. Contrast tubulo-glomerular feedback and glomerulo-tubular balance.
3. Outline the main features of the renal portal circulation and the effect of counter-current flow in the vasa recta on medullary PO<sub>2</sub>.



## CHRONIC RENAL FAILURE

### Rationale

Although specialists in nephrology will care for patients with chronic renal failure, family physicians will need to identify patients at risk for chronic renal disease, will participate in treatment to slow the progression of chronic renal disease, and will care for other common medical problems that afflict these patients. Physicians must realise that patients with chronic renal failure have unique risks and that common therapies may be harmful because kidneys are frequently the main routes for excretion of many drugs.

### Causal Conditions

1. Pre-renal causes
  - a. Renal vascular disease (occlusion)
  - b. Cholesterol/Clot emboli
2. Renal causes
  - a. Glomerular diseases, primary (FSGS, IgA nephropathy)
  - b. Glomerular, diseases, secondary (diabetic, hypertensive nephropathy, SLE)
  - c. Tubulo-interstitial
    - i. Chronic interstitial nephritis (drug toxicity, infection)
    - ii. Cystic kidney disease (e.g., adult polycystic kidney disease/medullary kidney disease)
  - d. Vascular/Ischemic nephropathy
  - e. Congenital dysplasia
3. Post-renal causes (obstructive nephropathy)

### Key Objectives

- ❖ Determine which patients with elevated serum creatinine levels have chronic rather than acute renal failure, and communicate as early as possible to such patients that progression to chronic renal failure may be avoided or delayed with conservative management. Select such patients for referral.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Identify patients at risk for chronic renal failure; ask about diabetes, hypertension, heart failure, past renal findings, and family history of kidney disease.
  - Diagnose chronic renal failure, its etiology, and complications (e.g., anemia); ask of symptoms during urination, recent infections, skin rash or arthritis, risk for parenterally transmitted disease (HIV, hepatitis).
  - Examine for hypertension, edema, retinopathy, malnutrition, and neuropathy.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Order urinalysis, microalbumin in patients at risk, CBC, serum creatinine and electrolytes, protein/creatinine ratio, renal imaging (e.g., ultrasound).
- ❖ Conduct an effective initial plan of management for a patient with chronic renal failure:
  - Outline secondary prevention management for chronic renal failure in diabetics and non-diabetics (e.g.,

- ACEI/ARBs, strict BP control, glycemic control, cholesterol control).
- List indications and contraindications for dialysis.
- Counsel and educate patients about secondary and tertiary prevention strategies.
- Counsel and educate patients about choosing to start chronic dialysis or undergo renal transplantation.
- Select patients in need of specialized care.

## Ethics

### **Truth Telling (CLEO 4.4)**

- ❖ To understand and explain the ethical and legal basis for truth telling:
  - Respect patient's need to make realistic life decisions.

Primary care physicians may be part of the process of withholding dialysis by not referring patients to nephrologists for evaluation for possible dialysis. For example, in one study, it was found 25% of primary care physicians had effectively withheld dialysis for at least one patient because of non-referral to a nephrologist. The most common reasons cited by the physicians were end-stage heart, liver, or lung disease, old age, and patient refusal.

Ethical principles supporting the right of individuals who are competent to withdraw from dialysis or to refuse the initiation of dialysis include the principle of autonomy and the rights of self-determination and privacy. For example, continued life on dialysis for some patients (such as those in intractable pain) would impose an unfavorable balance between benefit and burden.

All patients have the personal and legal right to refuse treatment, since any such informed decision involves the expression of self-determination, independence, and autonomy. Informed consent emanates from the right to privacy and holds that patients may refuse medical care. This right is not absolute; however, since the government's right to preserve the life of its citizens must balance it. Nevertheless, the law generally upholds a patient's right to refuse medical care. This right is based upon the presumption of full and honest informed consent, which includes:

1. Full disclosure about the nature of the illness and all aspects of the therapy;
2. Complete understanding of all consequences of the decision; and
3. An open and voluntary decision-making process.

A sequential approach to the possible withholding or withdrawal of dialysis involves:

1. Assessment of the patient's decision-making capacity;
2. Identification of the presence of proper advance directives;
3. Assessment of possible reversible factors;
4. If necessary, the institution of a trial period of dialysis;
5. Assessment of patient's motives through in depth dialogue;
6. Involvement of the dialysis team;
7. Full family involvement;
8. Possible appointment of a surrogate; and
9. Full post withdrawal or post withhold support.

### **Resource allocation (CLEO 4.5)**

#### **Detailed Objectives**

- ❖ To make health care resources available to patients in a manner which is fair and equitable, without bias or discrimination.

## Applicable Basic Principles of Law

## ***The Patient: A Person with Human and Other Legal Rights (CLEO 5.1)***

### **Detailed Objectives**

- ❖ To identify patient's fundamental human rights relevant to the practice of medicine, such as:
  - the right to freedom from discrimination by virtue of age, race, gender, nationality, religion, sexual orientation, financial means, or other status.

## ***Legal Aspects of Consent (CLEO 5.2)***

### **Issues**

- ❖ Voluntary and informed consent as a fundamental legal requirement
- ❖ The elements and practical aspects of consent to investigation, treatment, or research
- ❖ The right to refuse consent
- ❖ Exceptions to the requirement for consent

### **Detailed Objectives**

- ❖ It is mandatory that the patient's consent be obtained for any medical investigation, treatment, or research.
- ❖ Consent must be freely given and fully informed.
- ❖ Full information must be given, in language that the patient or involved person(s) can understand. This must include information regarding the nature of the proposed treatment or investigation, anticipated effects, material or significant risks, alternatives available, and any information regarding delegation of care, and will be given according to the circumstances of each particular case.
- ❖ The obligation of disclosure rests with the physician who is to carry out the treatment. It may be delegated in appropriate circumstances to another qualified physician, but responsibility lies with the delegating physician.
- ❖ The consenting patient must have the legal capacity to consent; i.e., of a legal age to consent (different provinces specify differing ages at which a patient is deemed to be capable of giving consent). The treatment of minors often raises a number of important legal (as well as ethical and practical) issues for physicians.
- ❖ The consenting patient must be competent to consent; i.e., sufficiently capable; e.g., if they are young or mentally incapacitated, they must be able to understand the information required for consent and appreciate the reasonable foreseeable consequences. Competence is to be assessed operationally or functionally; i.e., the patient need only be competent to consent to, or refuse the particular choice in question.
- ❖ If the patient is not competent or lacks capacity to consent, then consent may be obtained (according to the law applicable in each province and the specific circumstances) from a court, parent or substitute decision-maker. The law regarding delegation of care is specific to each province and the physician should be fully aware of local requirements in this regard.
- ❖ The patient has the right to refuse consent to treatment and this decision must be respected, even when this may lead to the death of the patient.

Although dialysis/renal transplantation is life saving for patients with end-stage renal disease, there are patients who have other medical problems that draw into question the appropriateness/continuation of such therapy. Thus, not every patient benefits from renal replacement therapy to the same degree. The universal availability of renal replacement therapy in Canada may compel physicians to consider its application in every patient in whom it might be indicated. Each patient and clinical setting must be judged individually (e.g., a 55-year-old adult with polycystic kidney disease compared to a 85 year-old blind patient with diabetes mellitus, ischemic heart disease, and bilateral amputation of legs).

Ethical issues relating to renal replacement therapy are drawing increasing attention since the decision-making process near the end of life, or at a time when the patient realizes the presence of an end-stage disorder, has a social and psychological intensity that clearly differentiates it from routine clinical encounters. If each patient (and family) and physician had clear and effective avenues of communication and full understanding of the medical situation, reaching appropriate decisions would become easier. This could be assisted by proper advance directives and/or duly appointed surrogates. In addition, health care

facilities are required to provide patients with full information about advance directives and how to determine their own course of therapy.

There are important differences between a living will and a health care proxy. A "living will" is evidence of an individual's wishes concerning future care in the event he or she becomes incompetent. A health care proxy appoints an agent (surrogate) to act on the patient's behalf should he or she become incompetent; this agent knows the principal's wishes and desires. Living wills and health care proxies are referred to as advance directives.

All medical information should be communicated to the patient and family if the patient desires. If the individual is mentally competent, the physician's primary responsibility is to the patient. The family's opinions and feelings are important, but they should never supplant the patient's desires. It is therefore important for the clinician to realize the family can have desires that are identical to, totally different from, or the same but with a different time frame (asynchronous) as that of the patient.

## General Organization

### *Inter-Professional Issues (CLEO 6.9)*

#### Issues

- ❖ Concept and process of delegation of medical acts to other health care professionals
- ❖ Definition of lines of authority
- ❖ The physician-nurse or other health care workers working professional relationship
- ❖ Professional communications and interaction with other health care workers
- ❖ Concept of team management and shared care

#### Detailed Objectives

- ❖ The proper inter-professional relationship based on respect and clear communication.
- ❖ The ability to work in a collegial way within a team structure involving other physicians and health care workers.
- ❖ Maintain respect for the role of the other health professions at all times.

### *Impact of Particular Laws on Practice (CLEO 6.10)*

#### Detailed Objectives

- ❖ The need to respect advanced directives or acting on behalf of the patient.

Chronic renal failure patients may choose to discontinue dialysis. If your opinion is sought, discuss the issues with respect for advanced directives and decision(s) of those acting on behalf of the patient.

## Applied Scientific Concepts

1. Outline the role of the kidney in the homeostasis of the volume of extracellular fluid and its composition.
2. Identify the role of the kidney in erythropoiesis.
3. Identify the role of the kidney in calcium metabolism.
4. Explain the potential mechanisms involved in slowing the progression of chronic renal disease.



### Rationale

In children and adolescents, scrotal masses vary from incidental, requiring only reassurance, to acute pathologic events. In adults, tumors of the testis are relatively uncommon (only 1 - 2 % of malignant tumors in men), but are considered of particular importance because they affect predominantly young men (25 - 34 years). In addition, recent advances in management have resulted in dramatic improvement in survival rate.

### Causal Conditions

1. Inguino-scrotal hernia
2. True scrotal swelling
  - a. Cystic/Soft
    - i. Epididymal cyst (spermatocele), hydrocele
    - ii. Varicocele (98% of left side)
  - b. Solid
    - i. Testicular malignancy
      - A. Seminoma
      - B. Teratoma
      - C. Mixed
      - D. Lymphoma
      - E. Other
    - ii. Chronic epididymitis
    - iii. Granulomatous orchitis/Testicular abscess
3. Idiopathic scrotal edema

### Key Objectives

- ❖ Differentiate testicular tumor from a mass of inguinal origin (not possible to get above it, may reduce), cystic lesion (trans-illuminates), and a varicocele (easier to palpate with patient erect).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - In boys, ask about pain, trauma, change in scrotal size, difficulty voiding.
  - Elicit history of un-descended testicle, infertility, previous testicular tumor, and breast enlargement/tenderness.
  - Differentiate from condition that presents primarily with pain (see [SCROTAL PAIN](#)).
  - Perform abdominal exam including inguinal areas, and an examination of the male genitalia (erect and supine, testes, epididymis, cord, scrotal skin) including rectal examination to assess the prostate and seminal vesicles, transilluminate.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients requiring ultrasound, CT and explain reason; order beta human chorionic gonadotrophin and alpha-fetoprotein.

- Select patients for CT scanning of chest, abdomen, and pelvis.
- ❖ Conduct an effective initial plan of management for a patient with a scrotal mass:
  - Outline management options for masses which are not testicular tumors.
  - Select patients who require specialized care.

## Applied Scientific Concepts

1. Outline the descent of the testicles from the abdomen into the scrotum with the anatomical structures in this path of descent (e.g., tunica vaginalis, epididymis).

## Rationale

In most scrotal disorders, there is swelling of the testis or its adnexae. However, some conditions are not only associated with pain, but pain may precede the development of an obvious mass in the scrotum.

## causal Conditions

1. Torsion
  - a. Torsion of testicle, spermatic cord
  - b. Torsion of testicular appendage
2. Inflammation (acute epididymitis, orchitis, trauma)
3. Complications
  - a. Incarcerated/Strangulated hernia
  - b. Hemorrhage into testicular tumor

## Key Objectives

- ❖ In a boy with sudden onset of pain in the scrotum, exclude testicular torsion first, which is an emergency situation.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Contrast testicular torsion from acute epididymitis (e.g., rapidity of onset in minutes versus hours).
  - Elicit history of previous similar episodes or of dysuria, sexual activity.
  - Perform abdominal exam including inguinal areas, and an examination of the male genitalia (erect and supine) including rectal examination to assess the prostate and seminal vesicles.
  - Examine for 'bell-clapper' deformity (testis long axis is transverse from shortening of spermatic cord from torsion), 'blue dot sign' (infarction of appendix testis), epididymal tenderness, cremasteric reflex.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select CBC, urinalysis, and culture.
  - Select patients requiring nuclear medicine testicular blood flow or ultrasound with Doppler.
- ❖ Conduct an effective initial plan of management for a patient with scrotal pain:
  - Explain natural history of testicular torsion and time limit for re-establishing blood flow to prevent infarction.
  - Outline management of epididymitis.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Outline the descent of the testicles from the abdomen into the scrotum with the anatomical structures in this path of descent (e.g. tunica vaginalis, epididymis).

**Rationale**

Seizures are an important differential diagnosis of syncope. A seizure is a transient neurological dysfunction resulting from excessive/abnormal electrical discharges of cortical neurons. They may represent epilepsy (a chronic condition characterized by recurrent seizures) but need to be differentiated from a variety of secondary causes.

**Causal Conditions**

1. Epileptic seizures (electrical hyper-synchronization of neuronal networks)
  - a. No identifiable cause (presumed genetically determined ->50%)
  - b. Identifiable cause
    - i. Young (congenital brain malformations, inborn errors of metabolism, high fever)
    - ii. Adult (intra-cranial infection, tumors, stroke, withdrawal, trauma)
    - iii. Elderly (cerebral degeneration, vascular, tumors, drug reactions)
2. Non-epileptic seizures
  - a. Physiological (sudden alteration of neuronal function)
    - i. Metabolic/Endocrine derangement
      - A. Hypo/Hyperthyroid
      - B. Electrolyte derangement (hyponatremia, hypocalcemia)
      - C. Hypoglycemia/Nonketotic hyperglycemia
      - D. Uremia, malignant hypertension
    - ii. Hypoxemia
  - b. Psychogenic/Psychiatric (fugue state, amnesia, conversion disorder)
3. Partial (focal, local) seizures
  - a. Simple partial (consciousness not impaired)
    - i. With motor symptoms
    - ii. With somato-sensory or special sensory symptoms
    - iii. With autonomic symptoms/signs
  - b. Complex partial (with impairment of consciousness)
  - c. Partial seizures (simple or complex) evolving to generalized seizures
4. Generalized seizures
  - a. Non-convulsive/Absence (typical, atypical)
  - b. Convulsive (myoclonic, clonic, tonic, tonic-clonic, atonic)

**Key Objectives**

- ❖ Perform emergency treatment for a patient with status epilepticus and generalized tonic-clonic seizure.
- ❖ Differentiate syncope from other treatable systemic processes from intrinsic dysfunction of cerebral function.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate between a true seizure and pseudoseizure; differentiate between partial seizures and generalized

- seizures; determine which seizures may be secondary to co-existing medical problems.
- Obtain history of circumstances leading to seizure or seizure trigger, ictal behavior, postictal state, prior seizures, febrile seizures in infancy, etc.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Contrast findings in patients with focal seizures, complex partial seizures, generalized seizures, and petit mal seizures.
  - Compare findings in syncope with cerebral seizures.
- ❖ Conduct an effective plan of management for a patient with seizures:
  - Formulate a plan of management for a patient with status epilepticus.
  - Contrast the plan of management of petit mal seizures with grand mal and partial seizures.
  - Outline indications and contraindications of anticonvulsant medication.
  - Select the patients in need of specialized care and/or referral to other health care professionals.
  - Outline educational and /or supportive counseling for patients with seizure disorders including concerns for psychosocial impact, considerations for employment, and driving.

## Ethics

### **Confidentiality (CLEO 4.2)**

#### **Detailed Objectives**

- ❖ To recognize situation in which third parties have a legitimate interest and right to information:
  - legal requirement in the interest of public health.
- ❖ To recognize reasonable limits to disclosure, and reveal only the relevant and necessary information, in a situation requiring disclosure to a third party.

Although specifics may vary across jurisdictions, the duty to notify relevant authorities about ability to drive if seizure control is incomplete may be an exception to the duty of confidentiality. Explain to the patient with a seizure disorder how this may apply in the case of driving a car.

## **Applied Scientific Concepts**

1. Briefly outline the cellular theories of epileptogenesis (e.g., role of voltage-dependent sodium channels, GABA metabolism, calcium currents).
2. List some antiepileptic drugs and their respective mechanisms of action showing the correlation between the in vitro cellular action of the antiepileptic drugs and the types of human seizures against which they are most effective (e.g., phenytoin inhibits voltage-dependent neuronal sodium channels, predictive of efficacy against tonic seizures).



## SEXUAL MATURATION, ABNORMAL

### Rationale

Sexual development is important to adolescent perception of self-image and wellbeing. Many factors may disrupt the normal progression to sexual maturation.

### Causal Conditions

1. Delayed puberty (stage II failure: males by 14, females by 12 years or menarche < 5 years of breast budding)
  - a. Growth failure/Delayed puberty overlap
    - i. Multiple endocrine disorders
    - ii. Variants of normal/Constitutional
    - iii. Systemic diseases
  - b. Central causes
    - i. Congenital (hypothalamic/pituitary - low gonadotropins or low GnRH)
      - A. Syndromes (Prader-Willi, Laurence-Moon-Biedl)
      - B. Malformations (midline development defects)
      - C. Isolated deficiency of gonadotropins/Panhypopituitarism
    - ii. Acquired
      - A. Infection/Trauma/Tumors (craniopharyngioma, pituitary adenoma)
      - B. Malnutrition/Chronic systemic disease
  - c. Primary gonadal disorders
    - i. Congenital
      - A. Chromosomal (Turner syndrome, Klinefelter syndrome)
      - B. Gonadal differentiation/Biosynthetic defects
    - ii. Acquired
      - A. Infection (orchitis, oophoritis)
      - B. Trauma, torsion
      - C. Neoplasms/Neoplasia therapy (irradiation, cytotoxic drugs)/Surgery
  - d. Interruption/Lack of completion
    - i. Testicular feminization
    - ii. Absent/Hypoplastic uterus/Vagina
2. Precocious puberty (female before 7 years [6 years in black girls]; male before 9 years)
  - a. Incomplete precocity
  - b. Central (puberty due to early but normal activation of hypothalamic-pituitary-gonadal function)
    - i. Constitutional (gonadotropin dependent/gonadotropin independent)
    - ii. Central nervous system (neoplasms, post-inflammatory, neurofibromatosis, hydrocephalus)
  - c. Pseudo-precocious puberty (gonadal steroids produced for other reasons)
    - i. Autonomous ovarian function (follicular cysts, tumor, McCune-Albright)
    - ii. Autonomous testicular function (Leydig cell tumor)
    - iii. Gonadotropin-secreting tumor (testicular, pituitary)
    - iv. Adrenal pathology
    - v. Hypothyroidism

### Key Objectives

- ❖ Counsel patients and families about needing immediate or delayed screening, referral, or follow-up.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between the principal causes of abnormal sexual development.
  - Identify features of delayed/precocious puberty; differentiate between delayed puberty and growth failure.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Evaluate patients with suspected abnormal sexual development with a minimum of investigations.
- ❖ Conduct an effective plan of management for a patient with abnormal sexual maturation:
  - Outline initial management and counsel both caregivers and patients with abnormal sexual development.

**Rationale**

The social appropriateness of sexuality is culturally determined. The physician's own sexual attitude needs to be recognised and taken into account in order to deal with the patient's concern in a relevant manner. The patient must be set at ease in order to make possible discussion of private and sensitive sexual issues.

**Causal Conditions**

1. Sexual dysfunction (male and female)
  - a. Arousal/Desire problems (inhibition of sexual desire)
  - b. Coital pain problems (e.g., dyspareunia)
  - c. Orgasm related (e.g., premature ejaculation/ejaculatory failure/anorgasmia)
  - d. Erectile dysfunction (impotence)
  - e. Vaginismus and sexual phobias
2. Sexual paraphilias (exhibitionism, voyeurism, transvestism, trans-sexuality, pedophilia)
3. Sexual identity disorders (transgender states)
4. Lesbian and gay patients
5. Disability and sexuality
6. Child/Adolescent sexuality
7. Ageing and sexuality

**Key Objectives**

- ❖ Elicit factors precipitating and maintaining the sexual concern(s), up to date effort to deal with the concern, and relevant medical history to rule out reversible organic conditions.
- ❖ Determine the patient's social and physical sexual development and behavior as well as the patient's sexual orientation and comfort with it.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate between mutual or normal sexuality from dysfunctional sexuality, sexual abuse or assault, and incest.
  - Determine whether there is correlation between experiential desire and physiological response.
  - Perform focused examination including neurologic exam with emphasis on peripheral neuropathy and examination of genitalia.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients who require hormone assays.
- ❖ Outline an effective initial plan of management for patients who have sexual concerns:
  - Select patients in need of specialized care.



## Ethics

### *Ethics in Medicine (CLEO 4.1)*

Medicine is an ethical profession. It is based on ethical principles and bound by codes, both explicit and implicit, regarding the relationship between physicians and their patients, their profession, and society at large.

The key ethical principles that provide the basis of ethical codes, and may be invoked in the resolution of ethical dilemmas include: autonomy, justice, beneficence, and non-maleficence, among others.

For an adolescent patient, provide the necessary anticipatory guidance to maintain optimal sexual health and to help the adolescent avoid behaviors that place them at risk for having negative consequences for their sexual behavior and expression.

### *Confidentiality (CLEO 4.2)*

#### Detailed Objectives

- ❖ To explain the basis for the physician's obligation to maintain confidentiality.
- ❖ To explain reasonable precautions to maintain confidentiality.

Since most adolescents require absolute privacy to talk candidly about their sexuality, ask partners, friends, or parents to leave the interview room before taking a history. Assure the patient of complete confidentiality in order to establish trust and respect between yourself and the adolescent patient. Assure the patient of complete confidentiality if the patient is a gay, lesbian, or bisexual adolescent in order to establish trust and respect between yourself and the adolescent patient. Assure gay, lesbian, or bisexual adolescents or adults that you will not inadvertently "out" them to parents or peers. Before providing assurances about confidentiality, explain provincial and institutional boundaries surrounding this issue, especially concerning the treatment of adolescents without parental consent.

### *Doctor Patient Relationship (CLEO 4.8)*

#### Detailed Objectives

- ❖ The physician will place the best interest of the patient first.
- ❖ To establish a relationship of trust between physician and patient.
- ❖ To follow through on undertakings made to the patient in good faith.
- ❖ To accept or refuse patients requesting care:
  - without consideration of race, gender, age, sexual orientation, financial means, religion, or nationality.

Respect the diversity and difference inherent in adolescents, including gender, race/ethnicity, sexual orientation, and physical appearance. Advise office staff on appropriate, welcoming behavior. Ask open non-judgmental questions, and avoid pejorative terms.

### Rationale

Skin problems are among the most common reasons for which patients seek medical attention (5 - 10% of outpatients have a skin complaint). Physicians other than dermatologists handle some of the most prevalent skin problems (primary care physicians see >½ of dermatological complaints).

### Causal Conditions

1. Tumors, benign (skin tag, callus/corn, cherry angioma, hemangioma, dermatofibroma, epidermal inclusion cyst, nevus, pyogenic granuloma, sebaceous hyperplasia, seborrheic keratosis, liver spots, venous lake)
2. Tumors, malignant
  - a. Basal cell carcinoma
  - b. Squamous cell carcinoma
  - c. Melanoma
  - d. Lymphomas (e.g., mycosis fungoides, anaplastic large cell lymphoma)

### Key Objectives

- ❖ State that if there is any uncertainty about whether a skin lesion is malignant, it should be biopsied.
- ❖ Identify risk factors and promote prevention (excessive sun exposure, light skin, exposure to ionizing radiation, organ transplantation, oral corticosteroid treatment).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine areas of involvement, type of patient, and associated findings.
  - Differentiate between types of lesion.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients in need of specialized care or further investigation.
- ❖ Conduct an effective plan of management for a patient with skin tumors:
  - Select patients in need of specialized care.

## Rationale

Skin problems are among the most common reasons for which patients seek medical attention (5 - 10% of outpatients have a skin complaint). Physicians other than dermatologists handle some of the most prevalent skin problems (primary care physicians see >½ of dermatological complaints).

## Causal Conditions

1. Erythematous macules
  - a. Viral exanthems
  - b. Drug eruption
  - c. Other (secondary syphilis, rheumatic fever)
2. Photo-distributed macules
  - a. Drugs
    - i. Phototoxic (NSAIDs, quinolones, tetracycline, amiodarone, phenothiazines)
    - ii. Photoallergy (topical agents such as soaps and fragrances)
  - b. Collagen/Vascular (SLE, dermatomyositis)
  - c. Other (porphyria)
3. Hypopigmented macules
  - a. Tinea versicolor
  - b. Immune reactions (vitiligo, halo nevus)
  - c. Systemic (sarcoidosis, tuberous sclerosis, T cell lymphoma, leprosy)
4. Hyperpigmented macules
  - a. Purpura (solar, ASA, anti-coagulants, steroids, hemosiderin stain)
  - b. Postinflammatory
  - c. Melasma
  - d. Melanoma
  - e. Fixed drug eruption

## Key Objectives

- ❖ Describe macules as non-palpable, non-raised, non-atrophic lesions that are different in coloring from the surrounding skin.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine areas of involvement, type of patient, whether pruritus is present, whether patient is taking medications, (including herbal and over-the-counter) and other associated findings.
  - Differentiate between types of lesion; determine distribution (e.g., photo-distribution or face, "V" of upper chest, back of hands and forearms) of lesion, whether there is erythema, hypo/ hyperpigmentation, a blanching, and are there secondary characteristics such as scale.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion,

differentiation, and diagnosis:

- Select patients in need of specialized care or further investigation.
- ❖ Conduct an effective plan of management for a patient with skin rash:
  - Outline management for common skin conditions.
  - Select patients in need of specialized care.

## Rationale

Skin problems are among the most common reasons for which patients seek medical attention (5 - 10% of outpatients have a skin complaint). Physicians other than dermatologists handle some of the most prevalent skin problems (primary care physicians see >½ of dermatological complaints).

## Causal Conditions

1. Small papules (≤5-mm palpable, discrete lesions)
  - a. Isolated
    - i. Tumors (dermatofibroma, basal cell, hemangioma, melanoma, nevus, squamous cell, wart)
    - ii. Infections (fungal, pyogenic granuloma,)
    - iii. Keratoses (actinic, keratoacanthoma, seborrheic keratosis, milia)
  - b. Eruptions
    - i. Acne (rosacea, vulgaris)
    - ii. Dermatitis (seborrheic, contact, latex, dyshidrotic, atopic)
    - iii. Other dermatologic (psoriasis, pityriasis, perioral dermatitis, miliaria, lichen planus)
    - iv. Infections (bacillary angiomatosis, folliculitis, molluscum contagiosum, syphilis, viral exanthem, warts)
    - v. Systemic conditions (dermatomyositis, SLE, lymphoma, neurofibromatosis, sarcoidosis, sarcoma, urticaria, vasculitis, xanthoma)
    - vi. Arthropod bites (scabies, pediculosis)
    - vii. Drug eruptions
2. Plaques (≥5-mm flat lesions, confluence of papules)
  - a. Infections (candidiasis, cellulitis, fungal, tinea, lyme disease, syphilis)
  - b. Systemic conditions (acanthosis nigricans, neutrophilic dermatoses, myositis, granuloma annulare, SLE, lymphoma, scleroderma, myxedema, necrobiosis, Paget, sarcoid, vasculitis)
  - c. Other dermatologic (atopic dermatitis, eczema, ichthyosis, lichen planus/sclerosus, pityriasis, psoriasis, seborrheic dermatitis)
3. Blisters
  - a. Vesicles (≤5-mm papules with serous material) and bullae (>6-mm vesicles)
    - i. Infections (cong. syph., fungal, herpes simplex/zoster, enterovirus, impetigo, strep. septic shock, staph. scalded skin, varicella)
    - ii. Immune/Allergic/Drugs (derm. herpetiformis/atopic, contact, pemphigus/pemphigoid, SLE, vasculitis, Stevens-Johnson, toxic epidermal necrolysis, erythema multiforme)
    - iii. Other (diabetes, burns, scabies, insect bite reactions)
  - b. Pustules (papules with purulent material)
    - i. Face (acne/vulgaris/rosacea, perioral dermatitis, tinea barbae, Staph. folliculitis/impetigo)
    - ii. Trunk (bacterial/fungal infections, of sweat glands, follicles, arthropod bites, steroid cream)
    - iii. With fever (varicella, syph., GC, drugs, pyoderma gang., psoriasis)

## Key Objectives

- ❖ Categorize skin problems by lesion (primary and secondary) type, configuration, and the distribution of the lesion.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine areas of involvement, type of patient, and associated findings.
  - Differentiate between types of lesion (primary and secondary); describe primary lesions by type (papules, macules, plaques, nodules, tumors, cysts, telangiectasias, pustules, vesicles, bullae, wheals) as well as secondary lesions (excoriations, lichenification, edema, scale, crust, fissure, erosion, ulceration, atrophy, scar, hypo/hyper/depigmentation).
  - Describe also the shape, arrangement, distribution, color and feel of lesions.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients in need of specialized care or further investigation.
- ❖ Conduct an effective plan of management for a patient with skin rash:
  - Outline a management plan for a patient with acne.
  - Outline management for common skin conditions.
  - Select patients in need of specialized care.



## CHILDHOOD COMMUNICABLE DISEASES

### Rationale

Communicable diseases are common in childhood and vary from mild inconveniences to life threatening disorders. Physicians need to differentiate between these common conditions and initiate management.

### Causal Conditions

1. Presenting with a rash
  - a. Viral (measles, rubella, roseola, varicella zoster, herpes simplex, parvovirus)
  - b. Bacterial (scarlet fever, staphylococcal skin syndrome, impetigo, meningococemia)
  - c. Other (mycoplasma infection)
2. Presenting with sore throat
  - a. Viral (infectious mononucleosis)
  - b. Bacterial (diphtheria, streptococcal)
3. Presenting with diarrhea

### Key Objectives

- ❖ Describe the principles of immunization procedures and list those mandated by law.
- ❖ Determine the incubation period and possible route of communication.
- ❖ Outline measures of prevention to contain the spread of communicable disease.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Identify the presenting features of the infection: rash, sore throat or diarrhea.
  - Determine the immunization status of the infants/children.
  - Determine history of contacts, travel, farm visits, ingestion of un-pasteurized milk or uncooked meat, source of water supply.
  - Elicit a history of the pregnancy and delivery, maternal history of fever, rash, flu-like illness, genital herpes, cleaning cat litter, etc.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Evaluate fully the individual and contacts of individuals with sexually transmitted diseases.
  - Describe rapid viral testing, stool tests, and viral serology.
- ❖ Conduct an effective initial plan of management for a patient with a childhood communicable disease:
  - Outline the procedure for immunization and for immunizing an incompletely immunized child.
  - Outline management of specific communicable diseases.

### Applicable Basic Principles of Law

#### *Statutory Requirements of Physicians (CLEO 5.6)*

## Detailed Objectives

- ❖ Reporting requirements vary from province to province, and often include areas such as:
  - communicable/infectious and certain environmental/occupational diseases.

Certain communicable diseases/infectious diseases require statutory reporting to the Public Officer of Health. It is important to become informed about the diseases that require reporting in your province.



## URTICARIA/ANGIOEDEMA/ANAPHYLAXIS

see also [Anaphylaxis](#)

### Rationale

"Hives" or urticaria is a common disorder affecting 1/4 of the population. Significant disability has been reported in the quality of life of patients with chronic urticaria. Angioedema may coexist in almost 1/2 of people with urticaria. In some instances, it may be disfiguring if it involves the face and lips, or life threatening if airway obstruction occurs from laryngeal edema or tongue swelling.

### Causal Conditions

1. Acute urticaria (>2/3 of cases, self-limited, recurrence lasts <6 weeks)
2. Chronic urticaria (1/3 of cases, recurrence lasts >6 weeks)
  - a. Associated with triggers - IgE-dependent (up to 90% unidentified etiology)
    - i. Drugs (antibiotics, hormones, local anesthetics)
    - ii. Physical contact (animal saliva, plant resins, latex, metals, lotions, soap)
    - iii. Insect stings - risk of anaphylaxis (bees, wasps, hornets)
    - iv. Aeroallergens (oral allergy syndrome)
    - v. Foods and additives (only 10% if placebo controlled)
    - vi. Parasitic infections
  - b. Direct mast cell release (opiates, muscle relaxants, radio-contrast agents)
  - c. Complement-mediated
    - i. Serum sickness, transfusion reactions
    - ii. Infections, viral/bacterial (>80% of urticaria in pediatric patients)
    - iii. Urticarial vasculitis
  - d. Arachidonic acid metabolism (ASA, NSAIDs)
  - e. Physical (dermatographism, cold, cholinergic, solar, delayed pressure)
  - f. Other (mastocytosis, urticaria pigmentosa)

### Key Objectives

- ❖ Determine whether the condition is acute, chronic, or a manifestation of a systemic illness based on lesion resolution, length of recurrence, and clinical picture.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit a detailed history and physical examination including timing of symptom onset, duration of lesions, identification of precipitants (easier in acute urticaria because onset is <30 minutes and duration is limited).
  - Determine if associated symptoms may be indicative of systemic disease.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - State that laboratory investigation in acute urticaria is normal and therefore not necessary.
  - State that only 20% of patients with chronic urticaria have abnormal laboratory findings, but that CBC with

differential and ESR is cost effective.

- ❖ Conduct an effective plan of management for a patient with urticaria:
  - Outline management in a patient with urticaria including identification and discontinuation of offending trigger and pharmacologic therapy.
  - List common medications used in the management of urticaria (along with their side effects).
  - Contrast first generation and second generation H1receptor antagonists
  - List indications for steroids and  $\beta$  agonists.

## Applied Scientific Concepts

1. Outline the process involving cutaneous mast cells in the superficial dermis leading to urticaria, and contrast this with the process involving the deeper dermis and subcutaneous tissues leading to angioedema.
2. Outline the process leading to angioedema that occurs in the absence of urticaria by non-mast cell-mediated mechanisms such as abnormalities of the complement cascade and the use of ACEI.

## SLEEP AND CIRCADIAN RHYTHM DISORDERS/SLEEP APNEA SYNDROME/INSOMNIA

### Rationale

Insomnia is a symptom that affects 1/3 of the population at some time, and is a persistent problem in 10 % of the population. Affected patients complain of difficulty in initiating and maintaining sleep, and this inability to obtain adequate quantity and quality of sleep results in impaired daytime functioning.

### Causal Conditions

1. Transient and short-term insomnia
  - a. Change in sleeping environment/Excessive noise/Temperature
  - b. Jet-lag
  - c. Change in work shift
  - d. Stressful life events/Acute illness
  - e. Stimulant and other medication (theophylline, steroids,  $\beta$ -agonists, thyroxine, amiodarone)
2. Chronic insomnia (>3 weeks)
  - a. Psychiatric disorders (depression, anxiety disorders, schizophrenia)
  - b. General medical disorders
    - i. Cardiac (heart failure, coronary artery disease)
    - ii. Respiratory (COPD, asthma)
    - iii. Gastro-intestinal (reflux, peptic ulcer disease)
    - iv. Arthropathies/Fibromyalgia/Lyme disease
    - v. AIDS
    - vi. Chronic fatigue syndrome
  - c. Neurologic
    - i. Strokes/Neuro-degenerative (Alzheimer, Parkinson)
    - ii. Brain tumors
    - iii. Neuromuscular (painful neuropathies)
    - iv. Headaches (see [HEADACHE](#))
    - v. Fatal familial insomnia
    - vi. Post-traumatic insomnia
  - d. Drug/Alcohol insomnia
  - e. Primary sleep disorders
    - i. Primary or idiopathic
    - ii. Psycho-physiologic
    - iii. Sleep state misperception
    - iv. Circadian rhythm disorders
      - A. Delayed sleep phase syndrome
      - B. Advanced sleep phase syndrome
      - C. Hypnnycthemeral syndrome
    - v. Restless leg syndrome/Periodic limb movement disorder
    - vi. Altitude insomnia
    - vii. Insufficient sleep syndrome
    - viii. Central sleep apnea insomnia syndrome

## Key Objectives

- ❖ Elicit a history of sleep habits involving the entire 24-hour cycle, including history from bed partner or care giver (sleep habits, drug/alcohol consumption, medical or psycho-neurologic disease, psycho-social stressors, etc.).

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Conduct an examination of the patient to detect concomitant medical conditions which can adversely affect sleep.
  - Describe a "sleep log" to the patient and request one.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - State that laboratory investigation is not required in the routine evaluation of insomnia.
  - List situations for which polysomnography may be indicated.
- ❖ Conduct an effective plan of management for a patient with insomnia:
  - State that management depends on the underlying cause.
  - Outline some non-pharmacologic strategies for management of idiopathic chronic insomnia.
  - State that pharmacologic therapy is generally not the treatment of first choice and should always be combined with non-pharmacologic therapies (e.g., sleep hygiene).



99-1

## HYPERNATREMIA

### Rationale

Although not extremely common, hypernatremia is likely to be encountered with increasing frequency in our ageing population. It is also encountered at the other extreme of life, the very young, for the same reason: an inability to respond to thirst by drinking water.

### Causal Conditions

1. Sodium gain (1° hyper aldosterone, hypertonic solutions e.g., tube/IV feeding)
2. Water depletion (dehydration)
  - a. Decreased thirst, intake of water
  - b. Increased loss
    - i. Renal loss (diabetes insipidus, osmotic diuresis)
    - ii. GI loss (diarrhea, infants)
    - iii. Insensible loss (unconscious or diminished capacity patients)

### Key Objectives

- ❖ Since hypernatremia is seldom caused by sodium gain, consider water loss first.
- ❖ Identify inability to obtain or request water, or impaired thirst mechanism as the reasons for this problem occurring primarily at the extremes of age.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine the underlying cause of water loss and/or diminished thirst.
  - Determine the severity of the problem by assessment of patient's volume status.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Evaluate urinary osmolarity results in order to differentiate between causes of water loss.
- ❖ Conduct an effective plan of management for a patient with hypernatremia:
  - Outline a therapeutic approach based on the underlying process.
  - Discuss potential side effects of rapid replacement of water losses.
  - Select the patients with hypernatremia in need of specialized care or consultation.

**Rationale**

Hyponatremia is detected in many asymptomatic patients because serum electrolytes are measured almost routinely. In children with sodium depletion, the cause of the hyponatremia is usually iatrogenic. The presence of hyponatremia may predict serious neurologic complications or be relatively benign.

**Causal Conditions**

1. Hyperosmolar (hyperglycaemia) or normal osmolarity (hyperlipidemia)
2. Hypo-osmolar hyponatremia (exclude low GFR)
  - a. ADH Suppressed (Effective arterial blood volume [EABV] minimally elevated)
    - i. Primary polydipsia
    - ii. Beer drinkers (solute deficiency)
  - b. ADH Elevated
    - i. EABV (Effective arterial blood volume) contracted
      - A. Hypovolemia
        - I. Renal loss (diuretics, mineralocorticoid deficiency, tubular defect)
        - II. Extra-renal loss
          1. GI loss
          2. Third space, skin, etc.
      - B. Edema states
      - C. Hormonal (hypothyroidism, pregnancy)
    - ii. SIADH (tumors, CNS lesions, pain, pulmonary lesions, drugs) (EABV minimally elevated)

**Key Objectives**

- ❖ Hyponatremia may mean water gain, sodium depletion, or often both. Identification of the main process is important because it will affect choice of therapy and rate of correction.
- ❖ Determine whether the intracellular edema has affected the patient's mental status or caused other neurologic dysfunction.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine whether an increase in water relative to sodium exists thereby expanding volume of cells or the change in sodium concentration is artifactual or caused by hyperglycemia.
  - Determine whether ADH is suppressed or elevated; differentiate between sodium depletion and water gain by assessment of volume status and/or the presence of an edema state.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Interpret plasma and urinary osmolarity.
  - Interpret urinary electrolyte concentrations.
- ❖ Conduct an effective plan of management for a patient with hyponatremia:

- > Outline a therapeutic approach based on the underlying process.
- > Select the patients with hyponatremia in need of specialized care or consultation.

N.B. When serum sodium concentration is measured by flame photometry or other methods requiring major dilution of plasma, hyperlipidemia or hyperproteinemia may cause pseudo-hyponatremia (iso-osmotic). If sodium concentration is measured with a sodium selective electrode on undiluted plasma (most laboratories today), a true sodium concentration is obtained, and this type of 'pseudo-hyponatremia' no longer exists.

### **Applied Scientific Concepts**

1. Explain how serum sodium concentration represents the major determinant of extracellular osmolarity and how its level of 135 - 145 mmol/L is controlled.
2. Outline the manner in which the human body maintains water balance.
3. Contrast the mechanism of water retention when water intake is great enough to overwhelm the excretory capacity of the kidney to water retention caused by impaired renal water excretion.
4. List causes of inability to suppress ADH.

## SORE THROAT (RHINORRHEA)

### Rationale

Rhinorrhea and sore throat occurring together indicate a viral upper respiratory tract infection such as the "common cold". Sore throat may be due to a variety of bacterial and viral pathogens (as well as other causes in more unusual circumstances). Infection is transmitted from person to person and arises from direct contact with infected saliva or nasal secretions. Rhinorrhea alone is not infective and may be seasonal (hay fever or allergic rhinitis) or chronic (vaso-motor rhinitis).

### Causal Conditions

1. Infections
  - a. Viral (rhinovirus, influenza/para, coxsackie, H. simplex, EBV, CMV, HIV)
  - b. Bacterial (Streptococci A, C, G, gonococcus, C. diphtheria)
  - c. Other (mycoplasma, chlamydia, candidiasis)
2. Non-infectious chronic rhinitis and allergic rhinitis
3. Other (trauma, f.b., neoplasms)

### Key Objectives

- ❖ Discuss that making a clinical diagnosis of streptococcal tonsillo-pharyngitis is difficult, but excluding the diagnosis is easier in the presence of rhinorrhea, cough, hoarseness, and normal temperature. Such patients usually have a viral upper respiratory infection and do not require diagnostic tests or treatment.
- ❖ Discuss the benefit of antibiotic treatment in group A streptococcal pharyngitis with respect to prevention of acute rheumatic fever and acute glomerulonephritis.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether further testing for group A streptococci is indicated (or other investigation).
  - Determine if an allergy or more unusual cause for rhinorrhea is present.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select throat culture of the posterior pharynx in patients suspected of having streptococcal infection (an imperfect test but superior to clinical diagnosis), or rapid antigen detection test if clinically indicated.
- ❖ Conduct an effective plan of management for a patient with rhinorrhea and/or sore throat:
  - Outline the management of contacts of patients with proven streptococcal infections.
  - Outline management in patient with streptococcal, non-streptococcal upper respiratory tract infection or other causes for symptoms.
  - Select patients in need of specialized care.

### General Organization

#### *Hospitals/Medical Care Institutions (CLEO 6.2)*



## Detailed Objectives

- ❖ The statutory authority for public hospitals/institutions.
- ❖ The nature and power of management in public hospitals.
- ❖ The nature and power of the medical advisory committee or equivalent.
- ❖ The nature and role of the Chief of Staff or equivalent (e.g., Director of Professional Services).
- ❖ The duties of the Chief of Department/Service.

## *Self-Regulation of the Profession (CLEO 6.6)*

### Detailed Objectives

- ❖ The role and authority of the provincial licensing authority to regulate and govern all members of the profession in the public interest by setting and maintaining standards.

Sore throat is one of the commonest conditions found by physicians in office practice and emergency departments. Although the major treatable pathogen is group A streptococcus, this organism is the cause of the sore throat in <10% of adults who present with this complaint. Unfortunately, the majority of patients continue to receive presumptive antibiotic therapy for this complaint. Almost ¾ of adults presenting to family physicians in office practice are prescribed antibiotics. In many of these instances, the antibiotics are the more expensive broad-spectrum agents despite the fact that such practice is not consistent with recommended practice guidelines. In other words, over-treatment of this condition represents one of the major causes of antibiotic abuse.

## Applied Scientific Concepts

1. List some of the common infectious agents causing sore throat.
2. Outline the rationale for testing for any of these organisms and indicate the tests currently available.
3. If the specificity and sensitivity of rapid tests for these agents were given, indicate how it would/would not influence your decision regarding therapy.
4. List tests available to determine whether the sequel to one of these infections has developed.

**Rationale**

In order to evaluate patients with smell or taste disorders, a multi-disciplinary approach is required. This means that in addition to the roles specialists may have, the family physician must play an important role.

**Causal Conditions**

1. Conductive (obstruction prevents odor from reaching olfactory epithelium)
  - a. Inflammatory (bacterial, allergic, vaso-motor, fungal rhinitis, polyposis)
  - b. Neoplasms (benign, malignant)
  - c. Congenital and other (septal deformity, choanal atresia, vestibular stenosis, foreign body)
2. Sensory-neural
  - a. Degenerative (stroke, Alzheimer, Parkinson, multiple sclerosis)
  - b. Endocrine/Metabolic
    - i. Diabetes mellitus
    - ii. Adrenal hypo/hyperfunction
    - iii. Pseudo hypoparathyroid
    - iv. Hypothyroid
    - v. Renal/Liver failure, vitamin deficiency
  - c. Other (neoplasia benign/malignant, chemicals, drugs)

**Key Objectives**

- ❖ Before initiating an extensive evaluation, confirm the fact that the subjective complaint of smell or taste loss truly represents a derangement of smell (total loss of taste is rarely seen because of the anatomy of the taste system).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine whether the loss of smell/taste is sudden (head injury, viral) or gradual (allergic rhinitis, nasal polyps, neoplasms), intermittent (allergic rhinitis, topical drugs), associated with other symptoms such as headache or change in behavior (CNS lesions).
  - Determine whether there has been occupational exposure (chemicals, toxins), tobacco, or alcohol, other medications.
  - Examine the mouth, nasal cavity and paranasal sinuses in addition to neurologic evaluation that includes the cranial nerves.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select laboratory/imaging studies consistent with clinical findings.
  - Select patients in need of investigation by specialists.
- ❖ Conduct an effective plan of management for a patient with smell/taste dysfunction:
  - Outline initial management of conditions treatable in office (e.g., allergic rhinitis with anti-histamines, intra-nasal corticosteroids, antibiotics for infections).

- Select patients in need of specialized care.

## STATURE ABNORMAL (TALL STATURE/SHORT STATURE)

### Rationale

To define any growth point, children should be measured accurately and each point (height, weight, and head circumference) plotted. One of the more common causes of abnormal growth is mis-measurement or aberrant plotting.

### causal conditions

1. Tall stature (children develop pituitary gigantism; adults are not taller, but have acromegaly)
  - a. Non-endocrine (familial, Marfan, Klinefelter, neurofibromatosis)
  - b. Endocrine
    - i. Excess growth hormone (GH)
      - A. Pituitary adenoma (98%)
      - B. Excess GH releasing hormone secretion/Growth factor activity
    - ii. Excess other Hormones (precocious puberty [tall early, later short], thyroid)
    - iii. Other (MEN type I, McCune-Albright)
2. Short Stature
  - a. Intrinsic shortness (familial, Turner syndrome)
  - b. Delayed growth (constitutional, under-nutrition, underlying disease)
  - c. Attenuated growth
    - i. Chronic renal failure/Metabolic acidosis
    - ii. Cancer/Chemotherapy/Glucocorticoid excess
    - iii. Pulmonary/Cardiac/Gastrointestinal disease
    - iv. Metabolic/Endocrine
      - A. Vitamin D deficiency/Resistance
      - B. Growth hormone deficiency
      - C. Hypothyroidism
      - D. Cushing syndrome
    - v. Intrauterine growth restriction [See [WEIGHT \(LOW\) AT BIRTH/INTRAUTERINE GROWTH RESTRICTION](#)]
  - d. Accelerated early growth, more accelerated epiphyseal closure (precocious puberty)

### Key Objectives

- ❖ Determine whether growth progressively deviates from previously defined percentiles.
- ❖ Determine whether the child has dysmorphic features.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit history of uterine growth rate, intrauterine infections, maternal exposure to toxins, smoking, alcohol, or systemic illness.
  - Determine the presence of underlying medical problems (e.g., rickets, hypothyroidism).
  - Calculate growth velocity, and relationship between chronological age, height age, and bone age.

- > In patients with tall stature, determine the presence of soft tissue overgrowth (macrognathia, swollen hands and feet, nose, frontal bones).
- > Elicit information about joint symptoms (hypertrophic arthropathy), headaches, visual problems.
- > Determine whether there is hypertension, LVH, cardiomyopathy, cancer (gastrointestinal).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - > Select diagnostic imaging for bone age and diagnosis of causes of altered growth.
- ❖ Conduct an effective plan of management for a patient with abnormal growth:
  - > Select patients in need of specialized care; counsel families and children with abnormal stature.

**Rationale**

Parental concern about children with a wandering eye, crossing eye, or poor vision in one eye makes it necessary for physicians to know how to manage such problems.

**Causal Conditions**

1. Esotropia (convergent, internal, cross-eye) - congenital and acquired
2. Exotropia (divergent, external, wall-eye) - congenital and acquired
3. Vertical strabismus
4. Mechanical restriction
5. Convergence insufficiency
6. Amblyopia without strabismus

**Key Objectives**

- ❖ Determine the type of strabismus and the necessary timing of intervention.
- ❖ Counsel parents about need for timely referral to manage strabismus in order to prevent the development of amblyopia.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate pseudo strabismus (lid configuration or negative angle kappa or markedly positive angle kappa) from true strabismus; obtain relevant family history.
  - Conduct an examination of visual function, ocular movement, and failure of alignment by the cover/uncover test.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients in need of referral for further investigation.
- ❖ Conduct an effective plan of management for a patient with strabismus and/or amblyopia:
  - Select patients in need of specialized care.

**Rationale**

Alcohol and nicotine abuse is such a common condition that virtually every clinician is confronted with their complications. Moreover, 10 - 15% of outpatient visits as well as 25 - 40% of hospital admissions are related to substance abuse and its sequelae.

**causal conditions**

1. Stimulants
  - a. Smoking (usually)
    - i. Nicotine
    - ii. Marijuana/Cannabis
  - b. Hallucinogens
    - i. LSD, mescaline
    - ii. Psilocybin
  - c. Other stimulants
    - i. Amphetamines
    - ii. Cocaine
    - iii. Phencyclidine
    - iv. Designer drugs
2. Depressants
  - a. Sedative-Hypnotics
    - i. Alcohol
    - ii. Benzodiazepines
    - iii. Barbiturates
    - iv. Rohypnol
  - b. Opioids (heroin, morphine, codeine)
3. Volatile Inhalants (glue, amyl nitrite, NO)
4. Other (ketamine)

**Key Objectives**

- ❖ Determine whether the patient is in need of emergency care because of withdrawal symptoms or other complications.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine past and recent quantity and frequency of abuse, severity of abuse and dependence, readiness to change or denial, complications of use, family history, past treatment history, support network, and withdrawal symptoms; identify social problems such as assault and impaired driving.
  - Define limits of non-hazardous alcohol; differentiate social from problem drinking/dependence.
  - Examine for mental function, weight loss, route of administration, neurologic exam, signs of use.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion,

differentiation, and diagnosis:

- Select patients for toxicology screening, liver function if suspected of alcohol abuse. Contrast sensitivity and specificity with CAGE-AID questions. (CAGE questions Adapted to Include Drugs: have you felt the need to Cut down on your alcohol and drug use, Annoyed by criticism of drinking or drug use, Guilty about things you have done while using alcohol or drugs, do you feel the need for an Eye opener in the morning?).
- ❖ Conduct an effective initial plan of management for a patient with substance abuse:
  - Outline spectrum of treatment options including mutual/self-help, low intensity outpatient treatment, non-medical detoxification and residential treatment, medically supervised detoxification and intensive inpatient treatment.
  - Outline office counseling for mild to moderate alcohol dependence (reviewing assessment findings, set drinking goals, conduct of periodic follow-up).
  - Outline alcohol withdrawal management, indications and contraindications for disulfiram, and naltrexone, methadone; outline management of withdrawal from opioids and benzodiazepines.
  - Outline management for stopping nicotine including advice to quit, nicotine replacement therapy, setting quitting dates, behavioral counseling, information about community resources.
  - Discuss guidelines for safe prescription writing for benzodiazepines and opioids.
  - Outline management of cardiovascular complications of cocaine and alcohol.
  - Outline prevention, detection, and management of infectious complications of IV drugs use including Hepatitis B, C, and HIV.
  - Select patients in need of specialized care.



## SUDDEN INFANT DEATH SYNDROME(SIDS)/ACUTE LIFE THREATENING EVENT(ALTE)

### Rationale

SIDS and/or ALTE are a devastating event for parents, caregivers and health care workers alike. It is imperative that the precursors, probable cause and parental concerns are extensively evaluated to prevent recurrence.

### Causal Conditions

1. True SIDS (exclude Munchausen by proxy)
  - a. Non-modifiable possible risks (abnormal arousal/sleep pattern, long QT, upper airway obstruction)
  - b. Modifiable risk factors
    - i. Maternal (smoking, illicit drugs, no/late prenatal care, anemia, infections)
    - ii. Neonatal (premature, IUGR, prone sleep position, GI illness)
2. Mimicking SIDS
  - a. CNS (encephalitis, trauma, AV malformation)
  - b. Oxygen delivery
    - i. Cardiac (subendocardial fibroelastosis, myocarditis, congenital heart)
    - ii. Pulmonary (pneumonia/bronchiolitis/bronchitis, pulm. hypertension)
    - iii. Sickle cell anemia
  - c. Other (sepsis, asphyxiation, hyperthermia, metabolic decompensation, poisoning, hepatitis, adrenal disease, GI disease)

### Key Objectives

- ❖ Evaluate fully the possible causes of an infant with history of ALTE or SIDS.
- ❖ Counsel the parents and families of such children.
- ❖ Provide management of children who are at risk for ALTE or SIDS.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether there is evidence of possible risk factors or causes known to be associated with SIDS or ALTE.
  - Diagnose the infant presenting with ALTE or SIDS.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Evaluate fully, but with compassion and empathy, the possible causes of the infant presenting with ALTE or SIDS.
- ❖ Conduct an effective plan of management for a patient with ALTE or SIDS:
  - Perform immediate resuscitative measures.
  - Conduct short/long term bereavement management for parents/family.
  - Select patients in need of referral and/or consultation for infants and families at risk, i.e., bereavement issues, genetic counseling.

- Select patients who are in need of child protection (if appropriate).

**Rationale**

Psychiatric emergencies are common and serious problems. Suicidal behaviour is one of several psychiatric emergencies which physicians must know how to assess and manage.

**causal conditions**

1. Psychiatric disorder
  - a. Depression
  - b. Substance abuse
  - c. Schizophrenia
  - d. Personality disorder
  - e. Panic/Anxiety disorder
  - f. Delirium
2. Psychosis (delusions, paranoia, command hallucinations)
3. Previous suicide attempts
4. Socio-cultural factors
  - a. Marital status (never married, widow, separated, divorced)
  - b. Other (older, women/abused women, previously abused children, unemployed/unskilled, physical illness, family history of suicide, Native Canadians, live alone, lost loved one, anniversary of loss)

**Key Objectives**

- ❖ Determine whether suicide attempt is likely by assessing risk factors for suicide and patient's state of mind (suicide prediction has a low degree of sensitivity and specificity).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit history of risk factors, suicidal thoughts, content and duration, frequency, plan, and rehearsal.
  - Determine whether support system is available, recent stresses and life events.
  - Identify imminent possible suicide if plan is present, means is available, or patient is psychotic, depressed, or intoxicated.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective initial plan of management for a patient with suicidal thoughts:
  - Outline immediate management of patient at imminent risk for self harm (e.g., crisis psychiatric services, urgent hospitalization, contacting mental health provider) including continuous observation while arrangements are being made.
  - Outline management if patient demands to leave.
  - Outline management of patient whose risk for suicide is not imminent.
  - Discuss antidepressant medications for patients at risk for suicide because of a treatable psychiatric disorder.
  - Inform and counsel family and friends.

- Select patients in need of referral to a specialist.

## Ethics

### *Controversial and Evolving Ethical Issues in Practice (CLEO 4.1)*

#### Issues

- ❖ Euthanasia
- ❖ Physician-assisted suicide

#### Detailed Objectives

- ❖ The candidate will be aware that they may be asked to comment on unresolved or controversial ethical issues, and will be able to name and describe relevant key issues and ethical principles.

Physicians may be requested under certain circumstances to provide assistance toward ending a patient's life. There are several ethical principles that some will argue to justify physician-assisted suicide or euthanasia, while others will provide counter arguments.

Autonomy is the first principle that has been used to justify euthanasia. It can be argued that it is for the patient to decide whether they wish to end their own life. The counter argument is that autonomy does not permit the voluntary ending of the conditions necessary for autonomy. Since death would end the possibility of autonomy, it cannot justify euthanasia or physician assisted suicide.

A second justification is beneficence or furthering of well being. However, research indicates that most patients requesting euthanasia are not the ones suffering unbearable pain. Moreover, with the improvement in end of life care, it is extremely rare that pain or other forms of suffering cannot be controlled. As a consequence, it is difficult to justify a general approach such as euthanasia to furthering well-being when in fact this well-being would apply to extremely few and many others, because of the marked improvement in end of life care, are no longer suffering.

Another argument in favor of euthanasia is that there is no difference between stopping life-sustaining treatment and euthanasia. Others will argue that what is different is the intention: removal of invasive treatment rather than ending of life.

Finally, an argument against physician assisted suicide and euthanasia is the so-called "slippery slope" argument. Evidence for this is not very convincing, but the Netherlands experience should be considered.

In summary, if a physician is requested to provide assistance toward ending life, the physician should reassure the patient that under no circumstance is the patient going to be abandoned. The physician should tell the patient that continuous care will be provided indefinitely. The physician should also consider early psychiatric referral since patients interested in euthanasia are more likely to be depressed than suffering unbearable pain.

## Applicable Basic Principles of Law

### *The Patient: A Person with Human and Other Legal Rights (CLEO 5.1)*

#### Detailed Objectives

- ❖ To identify patients' fundamental human rights relevant to the practice of medicine, such as:
  - the right to security of the person and inviolability.

A clear distinction must be made between terminating life-sustaining treatment(s), which is legal, and active euthanasia or physician-assisted suicide which is not legal anywhere in Canada.

**Rationale**

Syncopal episodes, an abrupt and transient loss of consciousness followed by a rapid and usually complete recovery, are common. Physicians are required to distinguish syncope from seizures, and benign syncope from syncope caused by serious underlying illness.

**Causal Conditions**

1. Cardiovascular (80%)
  - a. Cardiac arrhythmia # electrical (20%)
    - i. Bradyarrhythmias
    - ii. Tachyarrhythmias
    - iii. Carotid sinus syndrome
  - b. Reduced cardiac output - mechanical
    - i. Outflow obstruction (aortic stenosis, hypertrophic cardiomyopathy, myxoma)
    - ii. Inflow obstruction (to venous return)
    - iii. Myocardial
  - c. Reflex/Under fill (60%)
    - i. Vasovagal (micturition, deglutition, cough, defecation)
    - ii. Orthostatic/Postural hypotension
    - iii. Situational
2. Cerebrovascular causes (15%) (carotid artery disease, TIAs, vertebra-basilar, high intra-cranial pressure)
3. Other
  - a. Metabolic (hypoxia, hypoglycemia, drugs, alcohol)
  - b. Psychiatric (panic disorder, hysteria, hyperventilation)

**Key Objectives**

- ❖ Differentiate syncope from disturbances of cerebral function caused by a seizure (patients with seizure rarely have an abrupt and complete recovery).
- ❖ Determine complaint severity and categorize syncope according to underlying cause (e.g., single episode or multiple episodes over many years suggests benign cause; multiple episodes over short time likely associated with serious disorder).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate between cardiac and non-cardiac causes.
  - Determine volume status.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Diagnose disturbances of cardiac rhythm with the assistance of electrocardiography and Holter monitoring.
  - Select laboratory investigations most useful in assessment of volume status and interpret the results.

- ❖ Conduct an effective initial plan of management for a patient with syncope:
  - Outline the plan of initial management.
  - Select patients who require specialized care and/or consultation.
  - List patients who may require cardiac pacing.
  - Evaluate patients for fitness to drive or work.
  - Conduct counseling for patients with syncope.

## Applied Scientific Concepts

1. Since consciousness in part depends on perfusion of the brain, discuss autoregulation of cerebral blood flow.
2. Outline the relationship between blood pressure, cardiac output, and systemic vascular resistance; the relationship between cardiac output, stroke volume and heart rate; the relationship between stroke volume, contractility, preload, and afterload; the relationship between preload, intravascular volume and vascular capacitance.



107-1

## HYPERTHERMIA

### Rationale

Hyperthermia is an elevation in core body temperature due to failure of thermo-regulation (in contrast to fever, which is induced by cytokine activation). It is a medical emergency and may be associated with severe complications and death. The differential diagnosis is extensive (includes all causes of fever).

### Causal Conditions

1. Increased heat load
  - a. Heat absorption from environment
    - i. Heat stroke
      - A. Exertional (heavy exercise + high ambient temperature and humidity)
      - B. Classic (non-exertional)
        - I. Persistent environment exposure (age extremes, psychiatric disorders)
        - II. Impaired thermoregulation, neurologic (hypothalamic/cerebral stroke, status epilepticus)
  - b. Metabolic heat
    - i. Thyroid storm, pheochromocytoma
    - ii. Malignant hyperthermia/Genetic, increased myocyte metabolism after anesthetic
    - iii. Neuroleptic malignant syndrome, increased myocyte metabolism + altered thermoregulation (anti-psychotics:phenothiazines,haloperidol)
2. Diminished heat dissipation
  - a. Obesity, anhidrosis
  - b. Drugs (anticholinergic, sympathomimetic, diuretic, salicylate toxicity, serotonin syndrome)
3. Sepsis (encephalitis, brain abscess, meningitis, tetanus, etc.)

### Key Objectives

- ❖ Determine the context in which the symptoms developed (e.g., malignant hyperthermia after anesthetic, NMS after anti-psychotics).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit a history of chronic medical conditions that either impair thermoregulation or prevent removal from a hot environment, heavy exercise in high ambient temperatures, anesthetics, or anti-psychotics.
  - Perform examination including rectal temperature, vital signs, presence of pulmonary edema, cardiac examination, evidence of bleeding, CNS dysfunction, and muscle tone.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select investigations for the determination of disseminated intravascular coagulation, renal or hepatic failure, arrhythmias, pulmonary edema, rhabdomyolysis, and nervous system disease.
- ❖ Conduct an effective an effective plan of management for a patient with severe hyperthermia:
  - Outline various available methods of cooling a hyperthermic patient, advantages and disadvantages, and indicate



when to stop the cooling process.

- Outline initial management; explain the mechanism of action of dantrolene in malignant hyperthermia.

### **Applied Scientific Concepts**

1. Describe the manner in which temperature is regulated in the human body.
2. Contrast increased heat load to diminished heat dissipation; contrast heat load absorbed from environment to metabolic heat.



107-2

## FEVER OF UNKNOWN ORIGIN

### Rationale

Unlike acute fever (<2 weeks), which is usually either viral (low-grade, moderate fever) or bacterial (high grade, chills, rigors) in origin, fever of unknown origin is an illness of three weeks or more without an established diagnosis despite appropriate investigation.

### Causal Conditions

1. Infections (approximately 1/3 of cases)
  - a. Systemic
    - i. Endocarditis
    - ii. Tuberculosis
    - iii. Bacteremia
    - iv. Miscellaneous rare infections (patients with HIV, travel abroad)
  - b. Localized
    - i. Abscess
      - A. Contiguous spread (e.g., liver, sub-phrenic from hepato-biliary, bowel, retro-peritoneal abscess)
      - B. Hematogenous spread (e.g., splenic)
      - C. Perinephric/Renal
    - ii. Osteomyelitis
    - iii. CNS infections (meningitis, cerebritis)
2. Neoplasms (approximately 1/3 of cases)
  - a. Lymphoma/Leukemia
  - b. Solid (renal cell, hepatoma/metastases)
3. Multi-system
  - a. Collagen disease (SLE, rheumatoid arthritis, vasculitis)
  - b. Granulomatous (sarcoidosis, giant cell arteritis, other vasculitis)
  - c. Miscellaneous (drug, factitious)

### Key Objectives

- ❖ Perform repeated clinical assessments searching for unusual presentations of common conditions.
- ❖ Elicit a history of travel, animal exposure, whether the patient may be immuno-suppressed, or is taking any type of medications (e.g., antimicrobial drugs) or has had contact with toxins or high-risk patients/contact or high-risk behaviours.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Perform a detailed history and physical examination, especially searching for localizing symptoms and signs, history of past exposure (e.g., tuberculosis), travel, drug/toxin/immunosuppression.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:

- Conduct the minimum diagnostic investigation based on causal conditions most frequently associated with fever of unknown origin (CBC, blood chemistry, hepatitis serology if liver tests abnormal, urinalysis, chest X-ray, blood cultures).
- List indications for nuclear medicine tests, lumbar puncture, CT of head, spine, or abdomen, serologic testing, ANA/rheumatoid factor, or biopsy.
- ❖ Conduct an effective plan of management for a patient with fever of unknown origin:
  - State reasons why therapeutic trials without a firm diagnosis are generally counterproductive.
  - Outline a management plan consistent with the underlying cause.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Identify fever as a feature of most infectious conditions but also in non-infectious processes.
2. Outline the pathophysiology of fever, role of cytokines, and mechanism of antipyretic agents.
3. Contrast fever, hyperthermia, and hyperpyrexia; contrast exogenous pyrogens and pyrogenic cytokines.



## 107-3 FEVER IN A CHILD/FEVER IN A CHILD LESS THAN THREE WEEKS

### Rationale

Fever in children is the most common symptom for which parents seek medical advice. While most causes are self-limited viral infections (febrile illness of short duration) it is important to identify serious underlying disease and/or those other infections amenable to treatment.

### Causal Conditions

1. Febrile illness of short duration (<2 weeks)
  - a. Viral
    - i. With rash
    - ii. Without rash (common cold, adenoviral, enteroviral)
  - b. Bacterial
    - i. With rash (meningitis)
    - ii. Without rash (streptococcal pharyngitis, pneumonia, urinary, meningitis, septicemia, skin)
  - c. Other infectious agents (mycoplasma pneumonia)
2. Prolonged febrile illness (>2-3 weeks) #see [FEVER OF UNKNOWN ORIGIN](#)
  - a. Familial-hereditary diseases
  - b. Other

### Key Objectives

- ❖ Determine whether the febrile illness is of short duration or is prolonged.
- ❖ Differentiate between acute viral or pyogenic infections, and contrast to prolonged febrile illness.
- ❖ Identify a child with septic shock and initiate immediate therapy.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate infectious from non-infectious causes of fever.
  - Identify the common causes and risk factors of fever in the various age groups.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Use relevant and cost effective measures to investigate causes of fever and exclude more serious problems.
- ❖ Conduct an effective plan of management for a patient with fever:
  - Outline the principles of managing a septic child and initiate immediate resuscitation measures if necessary.
  - Outline the management of a specific febrile illness (e.g., streptococcal pharyngitis).
  - Select patients in need of referral or specialized care.
  - Perform specific technical procedures to diagnose the cause of fever (e.g., outline indications and contraindications of a lumbar puncture).
  - Counsel parents, family, or caregivers about the care of children with febrile illnesses.
  - Discuss use of aspirin in children with acute febrile illness and influenza vaccination complications.
  - Discuss the relevant features of pandemic, epidemic, and endemic influenza, populations at highest risk of

infection and/or complications of influenza, and measures taken to modify the illness and prevent the predictable excess mortality of influenza.

## **Applicable Basic Principles of Law**

### ***Statutory Requirements of Physicians (CLEO 5.6)***

#### **Detailed Objectives**

- ❖ Reporting requirements vary from province to province, and often include areas such as:
  - > communicable/infectious and certain environmental/occupational diseases.

Depending on the province, certain communicable/infectious diseases require statutory reporting to MOH/Public Officer of Health.



## 107-4 FEVER IN THE IMMUNE COMPROMISED HOST/RECURRENT FEVER

### Rationale

Patients with certain immuno-deficiencies are at high risk for infections. The infective organism and site depend on the type and severity of immuno-suppression. Some of these infections are life threatening.

### Causal Conditions

1. Host defense defects
  - a. Cellular
    - i. Lymphocytes ('benign' viruses, opportunistic pathogens, fungi)
      - A. Acquired cell mediated immunity defect
        - I. Primary - HIV/AIDS
        - II. Secondary - Hodgkin, immuno-suppressive therapy, lymphocytic leukemia
      - B. Inherited cell mediated immunity defect
      - C. Natural killer cell deficiency (suppurative otitis media, herpes)
    - ii. Phagocytes (skin infections, focal abscesses)
      - A. Phagocytosis
        - I. Primary
        - II. Acquired (granulomatous disease, uremia, cirrhosis)
      - B. Neutropenia (see clinical presentation [WHITE BLOOD CELLS, ABNORMALITIES OF](#))
  - b. Defects in humoral immunity (sino-pulmonary infections, bacteremia, meningitis)
    - i. Immunoglobulins
      - A. Loss (e.g., nephrotic syndrome)
      - B. Decreased production (in infancy, transient; myeloma, lympho-proliferative)
    - ii. Complement deficiencies (upper/lower respiratory tract infections, suppurative lymphadenitis) (collagen dis. - not always associated with infection)
  - c. Asplenia (splenectomy, congenital absence, sickle cell disease, SLE, etc.)
2. Anatomic barriers abnormal (surgery, foreign bodies, burns, desquamating rash)

### Key Objectives

- ❖ Determine if patients with fever have isolated febrile episodes or recurrent ones, single or multiple anatomic sites involved in infections, past history of infections, and frequent infections in relatives.
- ❖ Determine whether exposure or activities leading to possible exposure to HIV occurred, or blood transfusions were received prior to November 1985.
- ❖ Determine if immuno-suppressive or anti-infective medications are being taken, or have recently been administered.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether it is likely the patient with fever is immuno-compromised (e.g., persistent lymphadenopathy); ask about HIV infection, cirrhosis, nephrotic syndrome, hemoglobinopathy, IBD, neurologic disease, autoimmune disease, malignancy, splenectomy, saphenous vein harvesting, radiation therapy, immunosuppressive therapy

- including steroids.
- Determine whether the site of infection is single/local (anatomic predisposition more likely) or multiple, and which body system(s) is/are involved (e.g., upper respiratory tract, lungs, skin, urinary tract, nervous system, etc.).
- Determine if possible the type of infection and/or organism isolated in previous infections.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Interpret an absolute phagocyte count of  $>1.5 \times 10^9/L$  as not associated with risk of infection.
  - Select serum protein electrophoresis in a patient suspected of hypogammaglobulinemia.
  - Select sites from which cultures should be obtained and interpret results.
  - Select investigation in a patient suspected to have HIV (e.g., CD4/CD8 counts, HIV serology).
  - Select appropriate diagnostic imaging.
  - Contrast the type of organisms likely to cause infection in patients with asplenia or hypogammaglobulinemia compared to organisms in cell mediated immune defect.
- ❖ Conduct an effective plan of management for an immuno-compromised patient with fever:
  - Discuss post-splenectomy prevention of sepsis (prophylactic vaccination for *S. pneumoniae*, *H. influenzae* type B, and *N. meningitidis* and antibiotic prophylaxis).
  - Outline the initial management of a febrile patient who has severe neutropenia.
  - Discuss indications for IV gamma globulin replacement therapy.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Describe the manner in which temperature is regulated in the human body.
2. Identify T cells as the mediators of specific cellular immunity, and outline how antibody production requires intact T cell number and function; discuss humoral immunity and relationship to serum immunoglobulins and measurement of specific antibody titers.
3. Define phagocytosis and chemotaxis.
4. Outline role of complement in immune dysfunction.
5. Explain the role of the spleen in host defence.



107-5

## HYPOTHERMIA

### Rationale

Hypothermia is the inability to maintain core body temperature. Although far less common than is elevation in temperature, hypothermia (central temperature  $\approx 35^{\circ}\text{C}$ ) is of considerable importance because it can represent a medical emergency. Severe hypothermia is defined as a core temperature of  $<28^{\circ}\text{C}$ .

### Causal Conditions

1. Decreased heat production
  - a. Endocrine (hypopituitarism, hypothyroidism, adrenal insufficiency)
  - b. Insufficient fuel (hypoglycemia, malnutrition)
  - c. Neuromuscular inactivity (age, impaired shivering)
2. Increased heat loss
  - a. Accidental/Immersion hypothermia (exposure to cold air, water)
  - b. Vasodilatation (drugs, alcohol, toxins, sepsis)
  - c. Skin disorders (burns, exfoliative dermatitis)
  - d. Iatrogenic (cold infusion)
3. Impaired thermoregulation
  - a. Central
    - i. Metabolic (cirrhosis, uremia)
    - ii. Drugs/Overdose (e.g., barbiturates, phenothiazines, tricyclics, insulin)
    - iii. CNS (stroke, trauma, subarachnoid hemorrhage, Parkinsonism, hypothalamic dysfunction, MS)
  - b. Peripheral (spinal cord transection, neuropathy, diabetes mellitus, neuromuscular disease)

### Key Objectives

- ❖ Since hypothermia is a potential medical emergency, provide urgent therapy if necessary.
- ❖ Determine the accurate core temperature.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - In patients with hypothermia secondary to acute illness, determine whether alcohol or other drugs were ingested.
  - Determine whether previous illnesses may have precipitated the hypothermia.
  - Conduct neurologic, cardiovascular, and respiratory assessment.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select, list, interpret, and continue monitoring investigations immediately after therapy is initiated (e.g., arterial blood gases, CBC, electrolytes, glucose, amylase, PT/PTT, ECG, chest x-ray).
  - Select patients in need of specialized care.
- ❖ Conduct an effective plan of management for a patient with hypothermia:
  - Outline an emergency management plan.
  - Contrast the advantages and disadvantages of active/passive external re-warming and active core re-warming.



## Applicable Basic Principles of Law

### *Physicians' Legal Liability for Negligence (or, in Quebec, Civil Liability) (CLEO 5.4)*

#### Detailed Objectives

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstances under consideration.

At very low core temperatures, a number of serious arrhythmias can occur (heart block, J wave, atrial and ventricular fibrillation). These changes resolve more readily with increases in core temperature. Consequently, active treatment of the hypothermic patient should not be prematurely stopped (i.e., while the patient is still hypothermic). Failure to resuscitate until re-warming has been achieved could be viewed as a "failure to meet the standard of care".

#### Applied Scientific Objectives

1. Explain the mechanism of body temperature homeostasis by describing the balance between heat production and heat loss including heat generation by cellular metabolism (heart and liver) and heat loss (skin and lungs). Include a description of the role of the hypothalamic response to cold stress in order to stimulate heat production (shivering, increased thyroid/catecholamine/adrenal activity).
2. Define the various types of heat loss: evaporation, radiation, conduction, and convection (convective heat loss to cold air and conductive heat loss to water are the most common mechanisms of accidental hypothermia).

**Rationale**

Tinnitus is an awareness of sound near the head without an obvious external source. It may involve one or both ears, be continuous or intermittent. Although not usually related to serious medical problems, in some it may interfere with daily activities, affect quality of life, and in a very few be indicative of serious organic disease.

**Causal Conditions**

1. Auditory
  - a. External/Middle ear
    - i. External otitis, wax, f.b.
    - ii. Otitis media, otosclerosis, trauma
  - b. Cochlear-vestibular end organ
    - i. Presbycusis
    - ii. Drugs (ASA, Aminoglycosides, loop diuretics)
    - iii. Otosclerosis
    - iv. Meniere disease
    - v. Noise, trauma, infections, idiopathic
  - c. Cochlear nerve
    - i. Tumor compression
    - ii. Acoustic neuroma
    - iii. Cerebellar-pontine angle
  - d. Brainstem/Cortex
    - i. Vascular ischemia, Chiari malformation
    - ii. Infections (meningitis)
    - iii. Endocrine/Metabolic (Paget, thyroid)
2. Para-auditory
  - a. Pulse-synchronous
    - i. Vascular (arterial bruits, hyperdynamic states, aneurysm, venous hum)
    - ii. Glomus tumor
  - b. Non-pulse synchronous (TMJ dysfunction, palatal myoclonus, whiplash)
3. Psychogenic (anxiety, depression)

**Key Objectives**

- ❖ Interpret for patients with tinnitus that any condition of the ear associated with the ear canal (wax, otitis media), cochlear hearing loss, or central nervous system hearing loss can cause tinnitus.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine whether or not the tinnitus is related to an ear condition or hearing loss.
  - Determine whether the tinnitus is pulsatile or non-pulsatile (vascular causes tend to be pulsatile).

- > Determine whether tinnitus is unilateral or bilateral.
- > Differentiate between drug related causes, disease related causes, and tinnitus caused by noise.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - > Select patients for further investigation based on clinical findings.
- ❖ Conduct an effective plan of management for a patient with tinnitus:
  - > Select patients in need of specialized care.
  - > Identify and counsel patients with causes of tinnitus which are relatively benign (e.g., stop medication, remove wax or foreign body, treat depression/anxiety, etc.).

## Applied Scientific Concepts

1. Explain that the perception of tinnitus is likely related to the loss of input to neurons in the central auditory pathways resulting in abnormal firing. Thus, damage or injury to the cochlea is associated with increased activity of auditory canal neurons leading to the belief that CNS is the '#generator' of tinnitus.

**Rationale**

Management of patients with traumatic injuries presents a variety of challenges. They require evaluation in the emergency department for triage and prevention of further deterioration prior to transfer or discharge. Early recognition and management of complications along with aggressive treatment of underlying medical conditions are necessary to minimise morbidity and mortality in this patient population.

**causal conditions**

1. Blunt trauma
  - a. Motor vehicle accidents
  - b. Closed bony and soft tissue trauma
    - i. Occupational
    - ii. Sport
    - iii. Domestic
2. Penetrating
  - a. Knives
  - b. Bullets
  - c. Lacerations and wounds from other causes

**Key Objectives**

- ❖ Evaluate patient according to Advanced Trauma Life Support guidelines so that airway is established and breath sounds are evaluated, the cardiovascular status is stable and peripheral and central lines are secured, neurologic status is fully documented, and with the patient completely exposed (but temperature controlled), all evidence of external injury is evaluated (secondary survey).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit history from patient or collateral sources about past medical history, medications, allergies, and drug or alcohol use (present in over 30 % of patients admitted with complications of trauma).
  - Determine whether undiagnosed traumatic injuries have been missed in the initial assessment (intracranial hemorrhage, traumatic aortic disruption, intra-abdominal injury, rhabdomyolysis).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select diagnostic imaging (head, chest, abdomen) and other laboratory investigations (e.g., serum lipase, creatine kinase) to detect undiagnosed trauma even in the absence of external evidence.
  - List indications for diagnostic peritoneal lavage.
- ❖ Conduct an effective initial plan of management for a patient with trauma:
  - Outline management of potential complications of resuscitative measures (e.g., transfusion associated complications, deep vein thrombosis).
  - Outline strategies for prevention of accidents.

- Outline preventive management of stress ulcers.
- Select patient who require specialized or ICU care or transfer to another facility.

## Applied Scientific Concepts

1. Briefly outline the process of cell division, regeneration and differentiation as it pertains to wound healing.
2. Explain that shock is associated with systemic reduction in tissue perfusion, thereby resulting in decreased tissue oxygen delivery.
3. List the effects of inadequate tissue perfusion (initially reversible, but if oxygen deprivation is prolonged, generalized cellular hypoxia leads to derangement of biochemical processes):
  - ion pumps in cell membrane malfunction
  - cells become edematous
  - intracellular content leaks into ECF
  - intracellular pH regulation becomes inadequate (Once the presence of these abnormalities becomes irreversible, cells die, organs fail, and death is the consequence).
4. Contrast pre-shock (warm or compensated shock) from distributive or low afterload shock.
5. Explain how SVR (systemic vascular resistance) and CO (cardiac output) can be utilized to distinguish the different forms of shock.



109-1

## ABDOMINAL INJURIES

### Rationale

The major causes of blunt trauma are motor vehicles, auto-pedestrian injuries, and motorcycle/all terrain vehicle injuries. In children, bicycle injuries, falls, and child abuse also contribute. Assessment of a patient with an abdominal injury is difficult. As a consequence, important injuries tend to be missed. Rupture of a hollow viscus or bleeding from a solid organ may produce few clinical signs.

### Causal Conditions

1. Blunt trauma (generally leads to higher mortality rates than penetrating wounds)
  - a. Motor vehicle/All-terrain vehicles/Bicycles (direct blow or deceleration)
  - b. Falls
  - c. Child abuse
2. Penetrating trauma
  - a. Stab wounds
  - b. Missile wounds

### Key Objectives

- ❖ In the emergency room a definitive diagnosis is seldom possible (especially with blunt trauma). Identify the mechanism of injury and use it to guide management decisions.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Identify region(s) of the abdomen injured and use anatomical localization of organs in various areas to determine organs potentially injured; examine for tensely distended abdomen (potential for increased intra-abdominal pressure and abdominal compartment syndrome).
  - Use the mechanism of injury to determine the structures most likely to be injured.
  - List indications for early surgical consultation.
  - Outline possible causes of unexplained hypotension in a patient with abdominal injury.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select appropriate laboratory investigations; order serial CBC and urinalysis.
  - Select appropriate diagnostic imaging.
  - Outline the role of diagnostic peritoneal lavage.
- ❖ Conduct an effective management plan for the patient with an abdominal injury:
  - Determine the most appropriate intravenous fluid regimen.
  - Outline the indications for gastric tubes and urinary catheters.
  - Contrast outcomes of conservative versus operative management in the injury.
  - Select the patient requiring a period of observation.
  - Communicate effectively with the surgical team.

## Applied Scientific Concepts

1. Outline hemodynamic and other changes to be anticipated in a person with ongoing hidden blood loss.
2. List physiologic considerations relevant to anemic patients important in deciding whether blood transfusion is indicated (degree to which oxygen delivery to tissues is adequate and compensatory mechanisms for maintaining oxygen delivery are overwhelmed or deleterious).

**Rationale**

Since so many households include pets, animal bite wounds are common. Dog and cat bites account for about 1% of emergency visits, the majority in children. Some can be serious and lead to limb damage, and at times permanent disability.

Insect bites in Canada most commonly cause a local inflammatory reaction that subsides within a few hours and is mostly a nuisance. In contrast, mosquitoes can transmit infectious disease to more than 700 million people in other geographic areas of the world (e.g., malaria, yellow fever, dengue, encephalitis and filariasis among others), as well as in Canada. Tick-borne illness is also common. On the other hand, systemic reactions to insect bites are extremely rare compared with insect stings. The most common insects associated with systemic allergic reactions were blackflies, deerflies, and horseflies.

**Causal Conditions**

1. Dog bites
2. Cat bites
3. Human bites
4. Insect bites/Stings
5. Snake bites

**Key Objectives**

- ❖ Examine the patient completely to document the presence/absence of more than one wound.
- ❖ Search for evidence of infection (e.g., fever, cellulitis, discharge), or joint penetration.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit history from patient or family about type of animal, owner of animal, and review circumstances of attack, including whether the animal is available for observation.
  - In all cases of human bites, elicit information about HIV status, hepatitis status.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select wounds which require culture, especially puncture wounds.
  - Select patients whose HIV and hepatitis status requires investigation.
  - Obtain cultures only after topical decontamination.
  - Select diagnostic imaging of underlying bones, and search for foreign material.
- ❖ Conduct an effective plan of management for a patient with an animal/insect bite:
  - Select patient whose wounds should not be closed primarily (puncture wounds, hand bites, extensive crush injury, requiring extensive debridement, etc.).
  - Select patients in need of rabies prophylaxis (consult health department).
  - Select patients in need of tetanus immunization.
  - Select patients in need of antibiotic prophylaxis (hand bites, deep puncture wounds, wounds requiring debridement, older/immunocompromised patients, prosthetic joints, etc.).



- Select appropriate antibiotics against polymicrobial infections that occur with animal bites.
- Outline management of a human bite if the assailant is HIV/hepatitis positive; if the puncture is caused by a syringe needle or contaminated knife.
- Select patients in need of specialized care.

## Applicable Basic Principles of Law

### *Applicable Basic Principles of Law (CLEO 5)*

#### Issues

- ❖ Principles and provisions of law also apply to the practice of medicine.

#### Detailed Objectives

- ❖ Charter of Rights, statutes, regulations, by-laws, and the rulings of courts (the #common law#) are applicable in various ways to the practice of medicine and are binding on physicians.
- ❖ Canada is a federal state, in which the federal government has jurisdiction in certain areas (e.g., criminal law and the Canada Health Act) and the provincial governments in others (e.g., administration of health care and the regulation of professions).

### *The Patient: A Person with Human and Other Legal Rights (CLEO 5.1)*

#### Detailed Objectives

- ❖ To demonstrate the knowledge that the patient has fundamental legal rights in the medical context, arising under both statutory law and the rulings of the courts that are binding on the physician.

Physicians should consider potential medico-legal issues once treatment of patients with human bites (or animal) has been undertaken. Infection can complicate wounds received in fights/bites that can result in litigation involving both parties. Photographs of the injuries should be obtained at presentation and then throughout treatment. It may also be appropriate for the physicians to contact appropriate authorities such as law enforcement or employee health, depending upon the setting of the clash. Risk of blood-borne pathogen transmission should be analyzed and local regulations or laws should be consulted so that if appropriate, serologic screening of the individuals involved is undertaken. Individual case consideration should be made for screening all parties for serologic evidence of hepatitis B virus, hepatitis C virus, human immuno-deficiency virus, and syphilis. The physician may also be called upon to serve as an expert medical witness in the case.



109-3

## **BONE/JOINT INJURY**

see also [Fractures/Dislocations](#)

### **Rationale**

Major fractures are at times associated with other injuries, and priorities must be set for each patient. For example, hemodynamic stability takes precedence over fracture management, but an open fracture should be managed as soon as possible. On the other hand, management of many soft tissue injuries is facilitated by initial stabilization of bone or joint injury. Unexplained fractures in children should alert physicians to the possibility of abuse.

### **Key Objectives**

- ❖ Reduce fracture so that normal alignment and length are restored and retain such reduction until healing occurs; encourage early restoration of function and continued rehabilitation.
- ❖ List method of management of a fracture according to circumstances (e.g., supportive sling, closed reduction and cast immobilization, closed reduction and continuous traction, internal skeletal fixation, or operative reduction and internal fixation).

**Rationale**

Injury to the chest may be blunt (e.g., motor vehicle accident resulting in steering wheel blow to sternum, falls, explosions, crush injuries) or penetrating (knife/bullet). In either instance, emergency management becomes extremely important to the eventual outcome.

**causal conditions**

1. Heart injury
  - a. Pericardial trauma (pericarditis, acute/delayed tamponade)
    - i. Blunt (steering wheel, falls, explosions, crush)
    - ii. Sharp (knife, bullet, iatrogenic)
  - b. Myocardial trauma (contusion, coronary vessel injury)
  - c. Aortic rupture
2. Chest wall/Lung (see [ACUTE DYSPNEA](#))
  - a. Pulmonary contusion
  - b. Flail chest
  - c. Hemothorax
  - d. Pneumothorax (open, closed)
  - e. Rib fracture

**Key Objectives**

- ❖ Since such patients frequently present in shock and/or respiratory distress, assess with urgency, resuscitate, and stabilize patient; suspicion of specific injury should lead to immediate diagnostic imaging/other investigative procedures.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit history of chest pain with latent period between injury and pain.
  - Differentiate between hypotension/shock from hypovolemia and from tamponade.
  - Determine if aortic rupture may be present (chest or mid-scapular pain, dyspnea, hoarseness, dysphagia) although it may be asymptomatic.
  - In patients with lung contusion after blunt injury to the chest, examine lungs for edema from acute respiratory distress syndrome.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select diagnostic imaging of the chest as indispensable for accurate diagnosis.
- ❖ Conduct an effective initial plan of management for a patient with chest trauma:
  - Select patients in need of specialized care in an ICU.



109-6

## DROWNING (NEAR-DROWNING)

### Rationale

Survival after suffocation by submersion in a liquid medium, including loss of consciousness, is defined as near drowning. The incidence is uncertain, but likely it may occur several hundred times more frequently than drowning deaths (150,000/year worldwide).

### Causal Conditions

1. Inability to swim (or overestimation of capability)
2. Risk-taking behavior/Boat accidents
3. Substance abuse (>50% of adult drowning deaths)
4. Inadequate adult supervision
5. Concomitant clinical difficulties
  - a. Trauma
  - b. Seizures
  - c. CVA
  - d. Cardiac event
6. Hyperventilation
7. Hypothermia

### Key Objectives

- ❖ Explain that the differentiation between salt and fresh water near drowning is more apparent than real since the amount of water needed to be inhaled for such differences to occur is more than five times the amount inhaled in near drowning (3-4 ml/Kg). Both types of near drowning result in hypoxemia and diffuse organ dysfunction.
- ❖ The temperature of the water and presence of contaminants have an effect on patient outcomes.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine which organs and the extent of dysfunction caused: pulmonary, neurologic, cardiovascular, plasma composition, renal function.
  - Examine for the presence of ARDS.
  - Examine for the presence of cerebral edema.
  - Examine for abnormal heart rhythm (bradycardia, atrial fibrillation).
  - Determine urinary output in order to assess renal function.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select diagnostic imaging, arterial blood gas, ECG, electrolytes, and urinalysis and interpret results.
- ❖ Conduct an effective plan of management for a patient who has nearly drowned:
  - Prior to hospital admission, if indicated, conduct CPR as soon as possible and continue until temperature is 32o-35o (because hypothermia is neuroprotective, prolonged resuscitation, up to several hours, may lead to complete recovery), after ensuring the safety of the rescuer and removing the victim from the water.

## DROWNING (NEAR-DROWNING)

- Administer oxygen by mask if patient is breathing or after intubation if patient is apneic.
- If patient is hypothermic, re-warm (either by passive or active means).
- Manage the patient in a manner similar to one with head or cervical spine injury.
- If symptoms or deterioration occurs, recommend hospitalization (observe for at least 8 hours).



109-8

## FACIAL INJURIES

### Rationale

Facial injuries are potentially life threatening because of possible damage to the airway and central nervous system.

### Key Objectives

- ❖ Assess and control vital functions (airway, breathing, and cardiovascular status) and give management priority to life threatening injuries. Definitive treatment of the facial trauma is relatively less urgent but of major cosmetic importance.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit a history about the nature of the injury.
  - Evaluate airway, cardiopulmonary and neurologic status.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List the most appropriate investigations used to determine the nature and severity of facial injuries.
- ❖ Conduct an effective initial plan of management for a patient with facial injury:
  - Outline the priorities in the management of a patient with facial injury.
  - Outline and provide the initial management of patients with facial injuries.
  - List indications for specialized care.



109-9

## HAND/WRIST INJURIES

### Rationale

Hand injuries are common problems presenting to emergency departments. The ultimate function of the hand depends upon the quality of the initial care, the severity of the original injury and rehabilitation.

### Causal Conditions

1. Damage to tendons
2. Damage to nerves
3. Damage to bones and/or joints

### Key Objectives

- ❖ Demonstrate the assessment of hand injuries.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit history of antecedent trauma and type, and assess the nature and extent of injury.
  - Determine active and passive range of motion, inspect and palpate joints for deformity, and differentiate between radial, ulnar, and median nerve sensory and motor deficit.
  - Determine whether tendons are damaged or ruptured as a result of trauma.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patient whose trauma suggests risk of fracture for radiograph(s) of the affected bone(s) and joint(s).
- ❖ Conduct an effective initial plan of management for a patient with hand injury:
  - Outline initial management for injuries of the hand/wrist.
  - Select patients in need of splints, conservative management such as NSAIDs, referral for occupational or physiotherapy, or surgery.
  - Demonstrate proper "position of safety" hand splinting technique.

**Rationale**

Most head trauma is mild and not associated with brain injury or long-term sequelae. Improved outcome after head trauma depends upon preventing deterioration and secondary brain injury. Serious intracranial injuries may remain undetected due to failure to obtain an indicated head CT.

**Causal Conditions**

1. Skull fracture/Penetrating injury
2. Hemorrhage/Hematoma (subdural, epidural, subarachnoid, shaken baby syndrome)
3. Cerebral contusion
4. Edema (midline shift)

**Key Objectives**

- ❖ Select CT and MRI scan of the head in a patient whose mental status is depressed or worsening, has focal neurologic deficit, depressed skull fracture, or penetrating head injury.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit history on more than one occasion to detect change in mental status; ask about temporary loss of consciousness, vomiting, seizure, headache, lethargy, etc.
  - Perform neurological examination on more than one occasion; examine for tenderness, palpable bone depression, ecchymosis behind ear, or blood behind eardrum; examine for other injuries.
  - Determine time elapsed since the injury (if asymptomatic, after 6 or more hours, serious complications are less likely).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Contrast time course for appearance of abnormal findings on head CT for epidural hematoma from middle meningeal artery injury from epidural or subdural hematoma resulting from venous injury.
  - Order repeat head CT for patient whose neurologic condition deteriorates or fails to improve as expected.
- ❖ Conduct an effective initial plan of management for a patient with head injury:
  - Select patients in need of specialized care.
  - In a patient whose head injury has caused brain death but the heart is beating, communicate this information to the transplantation team (or equivalent) if the deceased patient or the family have indicated a desire to donate organ(s).
  - If there is no indication that organ donation has been considered, counsel the family about the possibility.

**Ethics*****Consent to Investigation or Treatment (CLEO 4.3)***



## Detailed Objectives

- ❖ To demonstrate awareness of process for the assessment of capacity to give consent, and be able to conduct such an assessment.
- ❖ To recognize factors which can alter capacity (e.g., disease, drugs, depression).
- ❖ To identify appropriate substitute decision-maker, or the process to determine that individual.
- ❖ To communicate clearly information relevant to informed consent (what a reasonable person would want to know in a given circumstance).
- ❖ To identify reasonable steps to ensure understanding of information: can the patient explain the medical problem, and the proposed treatment or test.
- ❖ To determine free choice and absence of coercion.

## Applicable Basic Principles of Law

### *Legal Aspects of Consent (CLEO 5.2)*

#### Detailed Objectives

- ❖ It is mandatory that the patient's consent be obtained for any medical investigation, treatment, or research.
- ❖ Consent must be freely given and fully informed.
- ❖ Full information must be given in language that the patient or involved person(s) can understand. This must include information regarding the nature of the proposed treatment or investigation, anticipated effects, material or significant risks, alternatives available, and any information regarding delegation of care, and will be given according to the circumstances of each particular case.
- ❖ The obligation of disclosure rests with the physician who is to carry out the treatment. It may be delegated in appropriate circumstances to another qualified physician, but responsibility lies with the delegating physician.
- ❖ The consenting patient must have the legal capacity to consent; i.e., of a legal age to consent.
- ❖ The consenting patient must be competent to consent; i.e., sufficiently capable; e.g., if they are young or mentally incapacitated, they must be able to understand the information required for consent and appreciate the reasonably foreseeable consequences. Competence is to be assessed operationally or functionally; i.e., the patient need only be competent to consent to, or refuse the particular choice in question.
- ❖ If the patient is not competent or lacks capacity to consent, then consent may be obtained (according to the law applicable in each province and the specific circumstances) from a court, parent, or substitute decision-maker. The law regarding delegation of care is specific to each province and the physician should be fully aware of local requirement in this regard.
- ❖ The patient has the right to refuse consent to treatment and this decision must be respected, even when this may lead to the death of the patient.

An intoxicated patient with a large head laceration, the result of a fall down a flight of stairs, is examined and then prepared for suturing prior to further investigation. The patient admits to being unconscious for a period of time, and does not remember much of what happened prior to the fall except a considerable amount of alcohol being consumed at a party. As you warn the patient that the administration of local anesthetic will cause some discomfort, the patient sits up and decides to go home.

After explaining your concern about possible serious head injury, the patient replies that the risks are understood, repeats the risks verbally, and is willing to accept the risks. Moreover, if not allowed to leave, there will be a lawsuit.

In such a patient:

## Applied Scientific Concepts

1. List the secondary effects and respective mechanisms that may lead to brain injury in addition to head trauma (e.g., brain swelling/edema, thrombi, hyponatremia/SIADH, bleeding, etc.).
2. Explain the consequences of increased intra-cranial pressure.



109-11

## NERVE INJURY

### Rationale

Peripheral nerve injuries often occur as part of more extensive injuries and tend to go unrecognized. Evaluation of these injuries is based on an accurate knowledge of the anatomy and function of the nerve(s) involved.

### Causal Conditions

1. Compression/Stretch
2. Contusion
3. Laceration

### Key Objectives

- ❖ Identify the peripheral nerve involved, the level and type of involvement.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit and interpret information from the history and physical examination to distinguish a peripheral nerve injury from other non-traumatic neuropathies or central lesions.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Outline the investigation used to diagnose the presence of a traumatic peripheral neuropathy.
- ❖ Conduct an effective initial plan of management for a patient with nerve injury:
  - List indications for specialized care.

### Applied Scientific Concepts

1. Contrast three different types of peripheral nerve injury (e.g., Grade I is neurapraxia, a disruption of nerve function involving demyelination. Axonal integrity is preserved, and remyelination follows within three weeks; Grade II is axonotmesis, in which axonal damage and Wallerian degeneration occur. Grade III is complete nerve transection (neurotmesis), or permanent nerve damage).
2. Outline three mechanisms of nerve injury: traction injury, a direct blow or a percussive/contusion injury, nerve compression, and laceration or division.

**Rationale**

Skin and subcutaneous wounds tend to be superficial and can be repaired under local anesthesia. Animal bite wounds are common and require special consideration. Since so many households include pets, dog and cat bites account for about 1% of emergency visits, the majority in children. Some can be serious and lead to limb damage, and at times permanent disability.

**Causal Conditions**

1. Lacerations (usually considered "tidy" wounds)
2. Avulsions
3. Puncture wounds
  - a. Bite wounds
    - i. Human (indirect, direct)
    - ii. Domestic animal
    - iii. Non-domestic animal
  - b. Other (knife, needles, missiles)
4. Crush injuries (avulsions, bites, and crush injuries are usually "untidy" widespread tissue damage, severe or prolonged contamination)

**Key Objectives**

- ❖ Prior to wound closure, examine all patients thoroughly for evidence for injuries involving important underlying structures (tendon, nerve, vessel, foreign body).
- ❖ In patients with bite wounds, clean wound meticulously, examine completely to document more than one wound, and search for evidence of infection (e.g., fever, cellulitis, pain, discharge), or joint penetration.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit and interpret information from history and physical examination to determine the nature and severity of the skin wound, time since injury (>24 hours or <24 hours), presence of infection.
  - In all cases of human bites, elicit information about HIV status, hepatitis status; with animal bites, elicit history from patient or family about type of animal, owner of animal, and review circumstances of attack, including whether the animal is available for observation.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients whose HIV and hepatitis status requires investigation.
  - Select wounds requiring culture (e.g., puncture wounds; cultures after topical decontamination).
  - Select diagnostic imaging of underlying bones, and search for foreign material.
- ❖ Conduct an effective initial plan of management for a patient with skin injury:
  - Provide definitive care of superficial wounds involving the skin and subcutaneous tissues.
  - Identify wounds which require specialized care; list indications for specialized care.
  - Discuss prophylaxis to prevent infection.

- Outline principles of wound management.
- List indications and contraindications of primary versus delayed closure.
- Select patient whose wounds should not be closed primarily (puncture wounds, hand bites, extensive crush injury, requiring extensive debridement, etc.).
- Select patients in need of rabies prophylaxis (consult health department).
- Select patients in need of tetanus immunization.
- Select patients in need of antibiotic prophylaxis (hand bites, deep puncture wounds, wounds requiring debridement, older/immunocompromised patients, prosthetic joints, etc.).
- Select appropriate antibiotics directed against the polymicrobial infection that frequently occurs with animal bite wounds.
- Select the appropriate suture material and closure technique.
- Outline management of a human bite if the assailant is HIV/hepatitis positive; if the puncture is caused by a syringe needle or contaminated knife.

**Rationale**

Most spinal cord injuries are a result of car accidents, falls, sports-related trauma, or assault with weapons. The average age at the time of spinal injury is approximately 35 years, and men are four times more likely to be injured than are women. The sequelae of such events are dire in terms of effect on patient, family, and community. Initial immobilization and maintenance of ventilation are of critical importance.

**causal conditions**

1. Trauma (fracture dislocation of vertebral column, penetration injury)
2. Acute disc rupture
3. Ruptured arterio-venous malformation
4. Spontaneous epidural hematoma

**Key Objectives**

- ❖ Contrast the impairment of ventilatory muscle strength in complete or incomplete cervical spinal cord injury, and explain the effect of denervation of abdominal musculature.
- ❖ State that respiratory impairment and susceptibility to respiratory complications are greater with more cephalad injuries of the spinal cord.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine whether there is any impediment of respiratory function.
  - Elicit history about mechanism of injury and examine structures in the spine which have been damaged.
  - Perform examination of spine, motor power in arms and legs, sensation, superficial and deep tendon reflexes.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select diagnostic imaging for assessment of spinal stability.
  - Outline diagnostic imaging of the lungs in patients with spinal cord injury (e.g., upright films are often contraindicated).
- ❖ Conduct an effective initial plan of management for a patient with spinal injury:
  - Conduct education of people at risk for prevention of spinal injuries (diving into shallow water, skiing out of control, cross checking from behind in hockey, drinking and driving, etc.).
  - List indications for immobilization; for bladder catheterization.
  - Initiate and maintain "spinal precautions" and log rolling of patients; outline methods available for stabilizing the spine.
  - Discuss controversies regarding indications for steroid (Solu-medrol) treatment.
  - List analgesic drugs to use.
  - Counsel and support patient and family including access to rehabilitation programs.
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Define spinal cord injuries as either complete or incomplete (complete injury occurs when functional motor output and sensory feedback are absent below the spinal cord injury level, while some neurological activity persists below the site of injury in the case of an incomplete injury. Ventilatory muscles innervated below the level of a complete spinal cord injury are completely nonfunctional, while the degree of ventilatory muscle compromise is variable in patients with incomplete injuries).
2. Explain that the extent of ventilatory muscle impairment depends upon the degree and location of the spinal cord injury.
3. Explain that spinal cord injury affects ventilatory control in that individuals with tetraplegia have blunted perceptions of dyspnea and an abnormally small increase in ventilatory drive in response to hypercapnia (ventilatory response to hypercapnia among quadriplegics was approximately one-fourth that of normal controls).

## Rationale

Urinary tract injuries are usually closed rather than penetrating, and may affect the kidneys and/or the collecting system.

## Causal Conditions

1. Kidney (see [BLOOD IN URINE/HEMATURIA](#))
2. Bladder and urethra
  - a. Anterior urethra (e.g., straddle injuries bicycle riding, monkey bars)
  - b. Posterior urethra/Bladder (e.g., pelvic fracture, abdominal injury)

## Key Objectives

- ❖ Suspect trauma to bladder or posterior urethra in patients with pelvic fracture.
- ❖ Examine for bleeding at the external urethral meatus after trauma; urethral injury necessitating urgent ascending urethrogram may be present.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit history about the nature of the injury, difficulty voiding, and blood in urine or at meatus; differentiate straddle injury from sexual abuse (straddle injuries typically are unilateral and superficial and involve the anterior portion of the genitalia in both boys and girls).
  - Examine for swelling, bruising, in males' displacement of prostate on rectal.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List the most appropriate investigations used to determine the nature and severity of urinary tract injuries (e.g., retrograde urethrogram for urethral injury, CT scan for renal injury).
- ❖ Conduct an effective initial plan of management for a patient with urinary tract injury:
  - Outline initial management of anterior urethral injury (e.g., 7 to 10 days of urethral catheterization and antibiotic therapy).
  - Select patient in need of specialized care.





109-15

## VASCULAR INJURY

### Rationale

Vascular injuries are becoming more common. Hemorrhage may be occult and require a high index of suspicion (e.g., fracture in an adjacent bone).

### Causal Conditions

1. Laceration
2. Contusion/Spasm
3. Compression
4. Foreign body

### Key Objectives

- ❖ Provide initial management and obtain consultation when indicated.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit and interpret information from the history and physical examination to diagnose an arterial injury.
  - Elicit and interpret information from the history and physical examination to diagnose compartment syndromes.
  - Examine for vital signs, hematoma, and pulse deficit, distal ischemia; differentiate occlusive from hemorrhagic injury.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List the most appropriate investigations used in the diagnosis of vascular injury (e.g., ultrasound, imaging with and without contrast, CBC, etc.).
- ❖ Conduct an effective initial plan of management for a patient with vascular injury:
  - List risks in the use of tourniquets and clamps.
  - Outline the initial management of arterial injuries.
  - List indications for specialized care.

**Rationale**

Patients with urinary tract infections, especially the very young and very old, may present in an atypical manner. Appropriate diagnosis and management may prevent significant morbidity. Dysuria may mean discomfort/pain on micturition or difficulty with micturition. Pain usually implies infection whereas difficulty is usually related to distal mechanical obstruction (e.g., prostatic).

**Causal Conditions**

1. Urinary frequency (volume > 2 ml/minute or 2ml/kg/hour)
2. Urinary frequency (normal or decreased volume) associated with dysuria and/or pyuria
  - a. External to urinary tract (infectious vulvo-vaginitis)
  - b. Urinary tract involved
    - i. Urethritis (e.g., gonococci, acute urethra syndrome, trichomonas)
    - ii. Prostatitis
    - iii. Urinary tract infections
      - A. Cystitis
      - B. Pyelonephritis
  - c. Irritable bladder (bladder dissynergia)

**Key Objectives**

- ❖ Differentiate between urinary tract infections and conditions outside the urinary tract with similar presentation; determine which infections require treatment, and select the appropriate treatment.
- ❖ In patients with recurring urinary tract infections, determine whether a predisposing condition may be present (e.g., stasis from obstruction, reflux).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Interpret urinalysis and clinical findings in order to diagnose problems external to urinary tract.
  - Evaluate examination findings so that problems involving the urethra or prostate are identified.
  - Determine whether cystitis or pyelonephritis is the more likely diagnosis.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Outline significance of patient's age, gender, and life style on diagnostic possibilities.
  - Select findings which are best for differentiating cystitis from pyelonephritis.
  - Describe the collection of samples to be sent for culture and sensitivity; interpret results.
- ❖ Conduct an effective plan of management for a patient with urinary frequency, dysuria, and/or pyuria:
  - Determine which patients require additional investigation and/or referral.
  - Determine which patients require hospitalization.
  - Determine which patients should be on prophylactic treatment and the type of treatment.
  - Select the most appropriate treatment for the underlying condition.

DYSURIA AND/OR PYURIA

- List conditions which predispose to urinary tract infections.
- Outline strategies for prevention of recurrent urinary tract infections.

**Rationale**

Urinary frequency, a common complaint, can be confused with polyuria, a less common, but important complaint. Diabetes mellitus is a common disorder with morbidity and mortality that can be reduced by preventive measures. Intensive glycemic control during pregnancy will reduce neonatal complications.

**Causal Conditions**

1. Urinary frequency (volume > 2 ml/minute or 2ml/kg/hour)
  - a. Water diuresis
    - i. Excessive intake (polydipsia)
    - ii. Excessive loss - diabetes insipidus (central or nephrogenic)
  - b. Osmotic diuresis
    - i. Sugar - diabetes mellitus
    - ii. Urea - chronic renal disease
    - iii. Salts, organic anions
2. Urinary frequency (normal/decreased volume) associated with dysuria and/or pyuria

**Key Objectives**

- ❖ Evaluate diabetic patients and determine whether diabetic ketoacidosis or hypoglycemia is present; formulate a management plan for diabetic emergencies.

**OBJECTIVES**

- ❖ Through efficient, focused, data gathering:
  - Differentiate urinary frequency from polyuria.
  - Contrast water diuresis and osmotic diuresis.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select and interpret laboratory tests which distinguish between water and osmotic diuresis.
- ❖ Conduct an effective plan of management for a patient with polyuria:
  - Select patients in need of specialized care.

### Rationale

Urinary tract obstruction is a relatively common problem. The obstruction may be complete or incomplete, and unilateral or bilateral. Thus, the consequences of the obstruction depend on its nature.

### Causal Conditions

1. Child (anatomic abnormalities)
  - a. Urethra (stricture, valve)
  - b. Junctions (uretero-vesical, uretero-pelvic)
2. Adult
  - a. Calculi
  - b. Post-sexually transmitted disease stenosis
3. Elderly
  - a. Prostatic (benign hyperplasia, cancer)
  - b. Retroperitoneal neoplasm
  - c. Pelvic neoplasm
  - d. Calculi
  - e. Post-instrumentation/Surgery scarring

### Key Objectives

- ❖ Determine whether a patient has an acute obstruction any time the complaint is complete anuria or unexplained renal insufficiency (other causes of anuria or renal insufficiency such as shock, Rapidly Progressive Glomerulonephritis (RPGN) and Hemolytic Uremic Syndrom (HUS) are relatively rare).

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether the obstruction is acute or chronic, duration, complete or partial, and unilateral or bilateral, and site.
  - Ask whether pain is present, site of pain (e.g., suprapubic for bladder distention, flank for renal capsule), whether it is colicky and radiates to ipsilateral testicle or labia (renal or ureteral colic), or occurs after a fluid load that increases urine output (e.g., beer drinking).
  - Examine for tenderness, hydronephrosis, hypertension, and palpable bladder.
- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - Select ultrasonography as the diagnostic imaging tool to diagnose obstruction.
  - List indications for other types of diagnostic imaging.
  - Select and interpret tests of renal function; outline indications for prostate cancer screening.
- ❖ Conduct an effective plan of management for a patient with urinary tract obstruction:
  - Perform catheterization of the bladder for both therapeutic and diagnostic reasons.
  - Select patients for referral to specialized care.

## Applied Scientific Concepts

1. Contrast mechanism of hypertension in unilateral obstruction (vasoconstriction secondary to elevated rennin-angiotensin) to bilateral obstruction (volume expansion).
2. Contrast the lack of hydronephrosis with obstruction within the first 1 - 3 days (the collecting system is relatively uncompliant) to that in more chronic obstruction (collecting system encased by retroperitoneal tumor or fibrosis).

**Rationale**

Vaginal bleeding is considered abnormal when it occurs at an unexpected time (before menarche or after menopause) or when it varies from the norm in amount or pattern (urinary tract and bowel should be excluded as a source). Amount or pattern is considered outside normal when it is associated with iron deficiency anemia, it lasts >7 days, flow is >80ml/clots, or interval is <24 days.

**Causal Conditions**

1. Pre-menarchal
  - a. Precocious puberty
  - b. Trauma, sexual abuse, foreign body
  - c. Infection
  - d. Other (e.g., ovarian tumor, urethral prolapse)
2. Pre-menopause (test for pregnancy)
  - a. Ovulatory
    - i. Inter-menstrual (exclude oral contraceptives, trauma)
      - A. Infection (cervicitis, endometritis, vaginitis, STD)
      - B. Benign growths (cervical/endometrial polyps, fibroids, ectropion)
      - C. Malignant tumors (uterine, cervical, vaginal, vulvar, ovarian)
    - ii. Menorrhagia
      - A. Neoplasms, malignant/benign (endometrial cancer, uterine sarcoma, fibroids, adenomyosis)
      - B. Coagulopathies
      - C. Other (endometritis, hypothyroidism)
  - b. Anovulatory
    - i. Age related (immature hypothalamic-pituitary-ovarian axis, menopausal ovarian decline)
    - ii. Endocrine/Metabolic
      - A. Thyroid disease (hyper/hypo)
      - B. Chronic liver/Renal disease
      - C. Neoplasms (prolactinoma, adrenal tumor, ovarian tumor)
    - iii. Other (polycystic ovary, weight loss/exercise/stress, structural disease)
3. Post-menopause - structural/systemic
  - a. Genital tract disease (exclude trauma)
    - i. Upper (fallopian tube, ovarian cancer)
    - ii. Lower (uterus/cervix, vagina, vulva, benign/malignant tumor, infection)
  - b. Systemic disease
    - i. Coagulation disorders
    - ii. Endocrine disorders (thyroid disease, adrenal tumor, ovarian tumor)
    - iii. Vulva (Crohn, Behcet, pemphigus)
  - c. Drugs (hormone replacement, contraception, anticoagulants, chemotherapy, steroids)

**Key Objectives**

- ❖ Determine whether the patient is hemodynamically stable prior to any other task.

- ❖ Determine whether the bleeding is related to pregnancy or not related to pregnancy.
- ❖ State that history is important, but diagnosis depends on hormonal/cytologic studies.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Differentiate between bleeding related to or unrelated to pregnancy first.
  - If age or clinical information makes pregnancy unlikely, differentiate between causes of gynecologic bleeding: ask about precipitating factors, temporal pattern duration, quantity, associated symptoms, bleeding disorder, medical and drug history, and any weight change.
  - Perform pelvic and rectal exam; exclude gastrointestinal and urinary tract bleeding.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select CBC, pregnancy test and in woman with recent pregnancy, -HCG.
  - Determine ovulatory status and order clinically indicated diagnostic tests.
  - List indications for ultrasonography.
  - List indications for cytologic/biopsy studies, hysteroscopy, and select patients to be referred for investigation.
- ❖ Conduct an effective initial plan of management for a patient with vaginal bleeding:
  - Select patients in need of specialized care.
  - Outline management of patient with threatened miscarriage.
  - Outline follow-up of patient after treatment of ectopic pregnancy; gestational trophoblastic disease.
  - Where sexual abuse is suspected, outline legal implications and requirement for support.
  - Discuss the use of oral contraceptives, cyclic progestins, and NSAIDs for control of abnormal vaginal bleeding.

## Applicable Basic Principles Of Law

### *Legal Aspects of Confidentiality (CLEO 5.3)*

#### Detailed Objectives

- ❖ A physician may not disclose patient information (whether about the existence, nature, extent of illness or any other health information) except where expressly authorized by the patient to do so, or when the law permits or requires such disclosure.
- ❖ Due to the complexity of the rule/requirements of, and exceptions to, the duty of confidentiality, advice may be sought from provincial licensing authorities or legal counsel, when in doubt.

In a patient with vaginal bleeding, where sexual abuse is suspected, legal definitions may be needed. In most provinces, health care providers must report abuse of children or elders. Otherwise, reporting is at the discretion of the victim. Victims are not usually required to report to police immediately.

Victims should be asked to sign consent forms prior to collection of any samples for evidence. Such samples, if consent is given, should be collected at the time of the initial evaluation and stored securely even if the patient eventually decides against reporting the abuse.

### *Physicians' Legal Liability for Negligence (or, in Quebec, Civil Liability) (CLEO 5.4)*

#### Detailed Objectives

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstances under consideration.



A physician's failure to recognize that pelvic examination is contraindicated in a woman >20 weeks pregnant with bleeding until ultrasound has excluded placenta previa could be viewed as a failure to meet the standard of care applicable to this circumstance.

### **Applied Scientific Concepts**

1. Outline the anatomy of the female genital tract.
2. Contrast ovarian function during menstruation to peri-menopause/menopause (intermittent anovulation as ovarian function declines to chronic anovulatory cycles and progesterone deficiency with unopposed estrogen exposure).

**Rationale**

Vaginal discharge, with or without pruritus, is a common problem seen in the physician's office.

**Causal Conditions**

1. Physiologic discharge and cervical mucus production
2. Non-Physiologic
  - a. Genital tract infections vulvo-vaginitis
    - i. Polymicrobial superficial infection
    - ii. Moniliasis (candidiasis), trichomoniasis
    - iii. Bacterial vaginosis
    - iv. Herpes genitalis, human papilloma virus
  - b. Genital tract inflammations (vulvo-vaginitis - non infectious)
    - i. Local causes
      - A. Chemical irritants, douches, sprays, foreign body, trauma
      - B. Atrophic/Hypertrophic vulvar dystrophy/Vaginitis
    - ii. Neoplasia (vulvar/vaginal/cervical/endometrial neoplasia)
    - iii. Systemic (toxic shock syndrome, Crohn, collagen disease, dermatologic)
  - c. Other genital tract causes (vaginitis/cervicitis/uterine/tubal)
    - i. Gonorrhea, chlamydia
    - ii. IUD
    - iii. Pyosalpinx, salpingitis
  - d. Desquamative inflammatory vaginitis/Focal vulvitis

**Key Objectives**

- ❖ Determine the appearance of the discharge, but state that appearance may be misleading, and up to 20% of patients may have two coexistent infections.
- ❖ Differentiate between urinary tract infections and vaginal infections (dysuria is a symptom of both, so determine whether vaginal discharge is present).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Differentiate between 'external' and 'internal' dysuria.
  - Elicit information about precipitating or aggravating factors (oral contraceptives, antibiotics, pregnancy, sexual activity, diabetes, genital hygiene, chemical irritants, etc.).
  - Perform genital and pelvic examination; determine whether pelvic inflammatory disease is present.
  - Identify cause and site of the discharge.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Contrast pH and wet or KOH smear findings in yeast, bacterial, trichomonas, or atrophic vaginitis.

- Select patients with purulent discharge for a Gram stain and cervical culture.
- Obtain Pap smear.
- ❖ Conduct an effective initial plan of management for a patient with vaginal discharge:
  - List screening of populations at high risk for sexually transmitted diseases.
  - List types of vulvo-vaginitis associated with sexual activity and discuss risk reduction.
  - Outline preventive measures for sexually transmitted diseases (e.g., limiting number of sexual partners, barrier contraceptives, especially condoms); for prevention of non-infectious vaginitis.
  - Outline a management plan for moniliasis, trichomoniasis, and for vaginitis due to gonorrhea and/or chlamydia including role of local hygiene in prevention.

**Rationale**

There are a number of major psychiatric emergencies and social problems which physicians must be prepared to assess and manage. Domestic violence is one of them, since it has both direct and indirect effects on the health of populations. Intentional controlling or violent behavior (physical, sexual, or emotional abuse, economic control, or social isolation of the victim) by a person who is/was in an intimate relationship with the victim is domestic violence. The victim lives in a state of constant fear, terrified about when the next episode of abuse will occur. Despite this, abuse frequently remains hidden and undiagnosed because patients often conceal that they are in abusive relationships. It is important for clinicians to seek the diagnosis in certain groups of patients.

**Causal Conditions**

1. Pre-existing vulnerabilities
  - a. Women/Pregnant (trauma victims, chronic abdominal pain/headaches)
  - b. Elders with injuries
  - c. Children with injuries
  - d. Other (former victim of abuse, intellectual functioning, family and cultural influences, impulsivity)
2. Psychiatric disorders
  - a. Psychosis (with paranoia, with command hallucinations)
  - b. Delusional disorder (e.g., morbid jealousy, depression with delusions)
  - c. Substance abuse (intoxication, withdrawal)
  - d. Personality disorder (antisocial, borderline, conduct disorder)
  - e. Bipolar disorder (manic phase)
  - f. Cognitive disorders (delirium, dementia)

**Key Objectives**

- ❖ Diagnose family violence if one partner (usually male) is excessively controlling, (will not allow the other to speak); specious excuses for bruises or rumors of many falls or injuries are suggestive of family violence.
- ❖ List signs of imminent violence: threats, paranoid ideas, yelling, pacing, agitated behavior.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit a history of frequent emergency room visits, previous violence, violence against animals, recent violence, current violent thoughts, legal history, insight into (or absence of) ability to maintain control (most deny premeditation, claim impulse).
  - Determine whether explanation of injuries is inconsistent, there is delay in seeking treatment, late for prenatal care, chronic pelvic pain, abdominal pain, headaches, fatigue, or eating disorder.
  - In a postpartum depressed woman, elicit history of thoughts of harming the baby.
  - Determine whether there are support systems, recent stresses, substance abuse, depression, and anxiety.
  - Determine ability to cooperate, detail reactions to interview.

- Examine location of injuries (usually central, breasts, abdomen, genitals), forearm defensive wounds, bruises of different ages; partner refuses to leave examination room, answers questions for the patient; patient avoids eye contact, looks fearful, evasive, or hostile, may have flat affect.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective initial plan of management for a patient who may be violent or the victim of violence:
  - Provide validation, support, and counseling; offer referral (e.g., hospital social worker, local domestic hotline, domestic violence advocates) to discuss options/safety; involve institutional and community resources.
  - Educate patient about what to do in case of emergency and range of support services available.
  - Leave the room and obtain assistance from security or police if partner is violent.
  - Outline how to conduct the initial interview with a potentially violent patient.
  - Explain physician's legal responsibility to potential victims of violent patients in contrast to patient-physician confidentiality; carefully document details of abuse.
  - Select patients in need of referral to a specialist; prepare safety plans and offer referral to community services.

## Applicable Basic Principles Of Law

### *Legal Aspects of Confidentiality (CLEO 5.3)*

#### Detailed Objectives

- ❖ A physician may not disclose patient information (whether about the existence, nature, extent of illness or any other health information) except where expressly authorized by the patient to do so, or when the law permits or requires such disclosure.
- ❖ Exceptions to the duty of confidentiality and the requirement of patient consent for its disclosure are provided for in various (provincial and federal) statutes. These require physicians to report certain confidential information for the protection of public health and other purposes, and in some cases provide for penalties for failure to do so.

### *Statutory Requirements of Physicians (CLEO 5.6)*

#### Detailed Objectives

- ❖ Physicians are legally required under certain provisions of various provincial and federal laws to report confidential information concerning the health, well being, morbidity, or mortality of a patient to the appropriate authorities.
- ❖ Reporting requirements vary from province to province, and often include areas such as:
  - suspected child abuse or abandonment.

Physicians need to be aware of situations requiring mandatory reporting. Domestic violence involving a child generally has to be reported (e.g., if the child is under the age of 18, is suffering as a result of abuse, or has witnessed his/her mother being abused). The report usually is made to the local police or Social Services. Abuse of disabled persons or abuse of patients age 60 or older must also be reported (to police or director of institution).

Provinces do not currently require mandatory reporting of domestic violence against competent adult women.



114-1

## **CHILD ABUSE, PHYSICAL/EMOTIONAL/SEXUAL/NEGLECT/SELF-INDUCED**

### **Rationale**

Child abuse is intentional harm to a child by the caregiver. It is part of the spectrum of family dysfunction and leads to significant morbidity and mortality (recently sexual attacks on children by groups of other children have increased). Abuse causes physical and emotional trauma, and may present as neglect. The possibility of abuse must be in the mind of all those involved in the care of children who have suffered traumatic injury or have psychological or social disturbances (e.g., aggressive behavior, stress disorder, depressive disorder, substance abuse, etc.).

### **CAUSAL CONDITIONS**

1. Physical (pushing, hitting, biting, burning, locking out of home, abandoning in an unsafe place)
2. Sexual (forced unwanted sexual activity: rape, sex with objects, friends, animals, mimic pornography, wear more provocative clothes, etc.)
3. Emotional or psychological (rejecting, isolating, terrorizing, ignoring, corrupting, verbal assault, over-pressuring, etc.)
4. Neglect (more than half of instances of child maltreatment is neglect; this includes physical neglect such as failure to provide food, clothing, shelter, etc., emotional neglect such as failure to provide love, affection, security, etc., educational and medical neglect)
5. Other
  - a. Munchausen by proxy
  - b. Other caregivers

### **Key Objectives**

- ❖ Identify the characteristics of families at risk of abusing their children (physical, sexual or emotional abuse) and screen.

### **Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine the family dynamics, parental characteristics; differentiate abuse by commission from abuse by omission and determine social correlation; recognize potential signs such as refusal by parent to have child interviewed alone, inconsistent or implausible history, vague or lacking in detail history, changing history, no history at all offered, attribution of injuries to siblings.
  - Determine whether the child has signs of physical, sexual, or other abuse (e.g., cutaneous markings, burns, etc.), or emotional and behavioral signs of abuse.
  - Identify the manifestations of abuse such as non-organic failure to thrive, developmental delay, starvation/dehydration, poor hygiene, dental caries, school truancy, dysfunctional social relationships, speech and language difficulties, emotional and behavioral problems, etc.
  - Differentiate child abuse from cultural therapy such as "cupping", "coining", "spooning", etc.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List investigation for a child with abuse (bleeding evaluation if "easy bruising" is an issue, toxicology if exposure suspected, diagnostic imaging, urinalysis, biochemistry, electrolytes).

- ❖ Conduct an effective initial plan of management for a child who may have been abused:
  - Outline strategies for securing the child's safety.
  - List indications for reporting to appropriate social service department or referral to child welfare.
  - List potential physical and psychological sequelae of physical and sexual abuse.
  - Outline treatment options for victims and perpetrators and outline outcomes of treatment.
  - Work with interdisciplinary team (involve mental health worker, social worker, nutritionist, behavior/developmental specialist, education specialist, visiting nurse, etc.) and access community services.
  - Outline strategies for prevention of child abuse.

**Rationale**

Abuse of the elderly may represent an act or omission that results in harm to the elderly person's health or welfare. Although the incidence and prevalence in Canada has been difficult to quantitate, in one study 4 % of surveyed seniors report that they experienced abuse. There are three categories of abuse: domestic, institutional, and self-neglect.

**Causal Conditions**

1. Physical (pushing, hitting, biting, burning, locking out of home, abandoning in an unsafe place)
2. Sexual (forced unwanted sexual activity: rape, sex with objects, friends, animals, mimic pornography, wear more provocative clothes, etc.)
3. Emotional or psychological (constant criticism, threats to hurt, kill, extreme jealousy; denying friendships, outside interests or activities, time accounting, etc.)
4. Economic (not allowing money, denying improvement in earning capacity, taking money out of account, etc.)
5. Abandonment, neglect, and self-neglect

**Key Objectives**

- ❖ Identify abused elderly patients and differentiate abuse from other possible diagnoses such as dementia.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Elicit history from the elderly person alone, especially if the caregiver insists on providing history.
  - Determine the period of time between the injury and accessing the medical system, since long delays are usual with elderly abuse; examine for bruises, bites, burns, lacerations, and other injuries.
  - Determine whether the explanations for illnesses or injuries are implausible.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective initial plan of management for an elderly person who may have been abused:
  - Outline initial management of an abused elderly person including deciding whether hospitalization is necessary or alternative accommodation (if there is concern for patient safety).
  - Outline the legal implications of elderly abuse.
  - Counsel and assist caregiver; provide information and education in accessing community services.
  - Outline the multidisciplinary approach to intervention and identify local resources.



**Rationale**

The major problem in spouse abuse is wife abuse (some abuse of husbands has been reported). It is the abuse of power in a relationship involving domination, coercion, intimidation, and the victimization of one person by another. Ten percent of women in a relationship with a man have experienced abuse. Of women presenting to a primary care clinic, almost 1/3 reported physical and verbal abuse.

**CAUSAL CONDITIONS**

1. Physical (pushing, hitting, biting, burning, locking out, abandoning in an unsafe place) resulting in pain, injury, sleep deprivation, disablement, and murder
2. Sexual (forced unwanted sexual activity: rape, sex with objects, friends, animals, mimic pornography, wear more provocative clothes, etc.)
  - a. Rape of wives
  - b. Rape of women (may be associated with other crimes or non-sexual abuse)
    - i. Sexual sadists
    - ii. Exploitive predators
    - iii. Inadequate men
    - iv. Men with displaced expression of anger and rage
3. Emotional or psychological (constant criticism, threats to hurt, kill, extreme jealousy; denying friendships, outside interests or activities, time accounting, etc.)
4. Economic (not allowing money, denying improvement in earning capacity, detailed accounting of spending, etc.)

**Key Objectives**

- ❖ Diagnose wife abuse and assess the role in etiology of other health concerns; assess immediate and short-term risk to victim.
- ❖ Determine whether the husband comes from a violent home or was abused himself, feels threatened at home, work, or with peers.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine whether there were previous experiences of sexual assault, family violence, or child sexual abuse.
  - Elicit a history of hyper-alertness, sleeping or eating disturbances, fatigue, mood swings, phobias, somatization, startle response; ask about abuse in a generic fashion (e.g., "other patients with similar complaints I have asked about abuse, so I would also like to ask you about the possibility?").
  - Determine level of danger for the patient; document carefully and in detail all abuse.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis.
- ❖ Conduct an effective initial plan of management for an adult who may have been abused:
  - Outline prevention strategies and discuss multidisciplinary approach to intervention and create a safety plan.
  - Select patients in need of referral to community services.



115-1

## ACUTE VISUAL DISTURBANCE/LOSS

### Rationale

Loss of vision is a frightening symptom that demands prompt attention; most patients require an urgent ophthalmologic opinion.

### Causal Conditions

1. Glaucoma (acute angle closure)
2. Haemorrhage (diabetic retinopathy, may be traumatic, penetrating, hyphema)
3. Nervous system/Vascular
  - a. Retinal artery/Vein occlusion (TIA/CVA)
  - b. Migraine (see [HEADACHE](#))
  - c. Occipital infarction/Haemorrhage (TIA/CVA)
4. Trauma
  - a. Blunt (global rupture, corneal abrasion, choroidal rupture, lens dislocation)
  - b. Penetrating (globe penetration ( intra-ocular foreign body, corneal/lens perforation, optic nerve injury)
  - c. Haemorrhage (may be traumatic, penetrating)
  - d. Other (carotid-cavernous sinus fistula, chemical splash)
5. Retinal/Macular/Optic disc problems
  - a. Optic neuritis/Optic nerve injury
  - b. Retinal detachment (may be traumatic)
  - c. Anterior ischemic optic neuropathy/temporal arteritis
  - d. Acute macular lesion
6. Infectious/Inflammatory (see [EYE REDNESS](#))
7. Other (drug toxicity, functional visual loss)

### Key Objectives

- ❖ Determine whether the loss of vision is acute or chronic (at times, the loss of monocular vision is noted incidentally when the other eye is covered so that a chronic loss presents acutely).
- ❖ Examine the eye with external, direct ophthalmoscope, visual fields, and pupils.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether the loss is monocular or binocular, and if binocular, is it hemianopic, any exposure to agents or trauma.
  - Determine character of visual loss, since important associated systemic conditions (diabetes, hypertension, temporal arteritis) or similar past events may suggest cause.
  - Differentiate causes of visual loss by examination of cornea, pupil, lens, retina, optic disc, and visual fields (listen for murmurs, carotid bruits).
  - Determine the presence of a foreign body, abnormal extraocular musculature, pupillary reflex.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion,

differentiation, and diagnosis:

- Since vast majority of cases will be referred urgently, all tests will be arranged by specialist.
- ❖ Conduct an effective plan of management for a patient with acute loss of vision:
  - Select patients in need of specialized care.

**Rationale**

Loss of vision is a frightening symptom that demands prompt attention on the part of the physician.

**Causal Conditions**

1. Pre-retinal conditions
  - a. Corneal disorders (dystrophy, scarring, edema)
  - b. Lens disorders (age related, traumatic, steroid-induced)
  - c. Glaucoma (primary, secondary)
2. Retinal dysfunction
  - a. Diabetic (retinal edema, retinopathy)
  - b. Vascular insufficiency
  - c. Tumors
  - d. Macular degeneration or dystrophy
3. Post-retinal lesions
  - a. Optic chiasm lesions (pituitary adenoma)
  - b. Lesions anterior to the optic chiasm (optic nerve/monocular)
    - i. Compressive optic neuropathy
      - A. Intracranial (masses)
      - B. Orbital (thyroid disease)
    - ii. Toxic/Nutritional (nutritional deficiencies, tobacco-alcohol amblyopia, methanol)
    - iii. Hereditary optic neuropathies

**Key Objectives**

- ❖ Determine whether the loss of vision is acute or chronic (at times, the loss of monocular vision is noted incidentally when the other eye is covered so that a chronic loss presents acutely).
- ❖ Perform direct ophthalmoscope examination of the eye.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine whether the visual loss is monocular or binocular.
  - Differentiate causes of visual loss by examination of cornea, lens, retina, and optic disc.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Perform visual acuity and field-testing.
  - List indications for fluorescein angiography.
- ❖ Conduct an effective plan of management for a patient with chronic visual loss:
  - Select patients in need of specialized care.

## Applied Scientific Concepts

1. Outline the anatomical pathways involved in vision (pre-retinal structures, retina, optic nerve and its pathway through the chiasm, occipital optic cortex).
2. Explain potential visual field defects with lesions at various areas in this pathway.

**Rationale**

Nausea may occur alone or along with vomiting (powerful ejection of gastric contents), dyspepsia, and other GI complaints. As a cause of absenteeism from school or workplace, it is second only to the common cold. When prolonged or severe, vomiting may be associated with disturbances of volume, water and electrolyte metabolism that may require correction prior to other specific treatment.

**Causal Conditions**

1. Gastro-intestinal system
  - a. Esophagus/Stomach/Duodenum
    - i. Gastro-Esophageal reflux disease (including infancy)
    - ii. Acute gastroenteritis
    - iii. Acid peptic disease
    - iv. Gastric outlet obstruction (pyloric stenosis)
    - v. Neoplasm
    - vi. Gastro paresis/Post-operative/Non-ulcer dyspepsia
  - b. Small bowel/Colon
    - i. Acute infectious enteritis
    - ii. Obstruction
    - iii. Inflammatory bowel disease
    - iv. Neoplasm
  - c. Hepato-biliary disease/Pancreatic disease (acute hepatitis/pancreatitis/cholecystitis)
  - d. Peritoneal irritation
2. Central nervous system
  - a. High intracranial pressure (infections, tumors)
  - b. Vestibular nerve lesions
  - c. Brain stem lesions
  - d. Psychiatric/Psychological problems
3. Endocrine-metabolic (diabetes, uremia, hypercalcemia, pregnancy)
4. Cancer (paraneoplastic syndromes, ovarian, hypernephroma, gastric)
5. Systemic
  - a. Sepsis (pyelonephritis, pneumonia)
  - b. Acute inferior wall myocardial infarction
  - c. Drugs (chemotherapy)
  - d. Food poisoning

**Key Objectives**

- ❖ Contrast vomiting and regurgitation, which is return of esophageal contents into the hypo-pharynx with little effort, such as with gastro-esophageal reflux.
- ❖ Determine severity of volume and electrolyte abnormalities in a patient with vomiting.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether there is a secondary cause for the vomiting, delayed gastric emptying is present, or the vomiting is in response to other agents.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients requiring investigation since laboratory testing may be unnecessary in many.
  - Select patients in need of endoscopic examination.
- ❖ Conduct an effective plan of management for a patient with vomiting and nausea:
  - Outline management plan for patients with vomiting caused by documented diseases, as contrasted to delayed gastric emptying, or other causes (e.g., chemotherapeutic drugs).
  - Calculate volume and electrolyte deficit and outline management.

## Applied Scientific Concepts

1. Outline anatomical pathways involved in vomiting.
2. Explain the basis for pharmacological interventions in the management of nausea and vomiting.

**Rationale**

Many patients who complain of weakness are not objectively weak when muscle strength is formally tested. A careful history and physical examination will permit the distinction between functional disease and true muscle weakness.

**Causal Conditions**

1. Loss of active motion
  - a. Objective muscle weakness (unable to perform certain tasks)
    - i. Generalized (cachexia, functional)
      - A. Myopathies
        - I. Genetic (muscular dystrophy)
        - II. Inflammatory/Infectious (polymyositis, vasculitis, collagen-vascular, HIV, CMV, influenza)
        - III. Toxic/Drug (steroids, HMG-CoA reductase inhibitors, alcohol)
        - IV. Metabolic/Endocrine (hypothyroid, Cushing, electrolyte disorders)
      - B. Neuromuscular junction
        - I. Genetic (myasthenia gravis)
        - II. Inflammatory/Infectious (myasthenia, botulism)
        - III. Neoplastic (Eaton Lambert)
        - IV. Toxic/Drug (organophosphate poisoning)
    - ii. Localized
      - A. Upper motor neuron
        - I. Genetic (leukodystrophy)
        - II. Inflammatory/Infectious (vasculitis, abscess)
        - III. Neoplastic (brain tumor)
        - IV. Metabolic/Endocrine (B12 deficiency)
      - B. Anterior horn cell
        - I. Genetic (spinal muscular atrophy)
        - II. Inflammatory/Infectious (ALS, polio)
        - III. Paraneoplastic
        - IV. Toxic/Drugs (e.g., lead)
      - C. Peripheral neuropathies
        - I. Genetic (peroneal muscle atrophy)
        - II. Inflammatory/Infectious (Guillain-Barre, leprosy)
        - III. Neoplastic (amyloid, myeloma)
        - IV. Metabolic/Endocrine (diabetes mellitus)
        - V. Toxic/Drug (lead)
  - b. Muscle weakness absent (no loss of power)
    - i. Chronic illness (cardio-pulmonary, anemia, infection, malignancy)
    - ii. Depression, deconditioning
2. Loss of passive motion
  - a. Intra-articular (loose body, effusion, hemarthrosis, surface incongruity)
  - b. Peri-articular (scar, contracted capsule/ligaments)
  - c. Extra-articular (muscle/tendon contracture/spasticity, tight skin/fascia)



## Key Objectives

- ❖ Differentiate between patients who complain of generalized weakness (usually functional) compared to patients who complain of inability to perform specific tasks.
- ❖ Differentiate between weakness due to an upper motor neuron lesion and weakness due to a disturbance affecting the lower motor neuron or motor unit.
- ❖ Determine the cause of the lesion.

## Objectives

- ❖ Through efficient, focused, data gathering:
  - Determine whether the weakness is localized or generalized, assess muscle strength, tone, bulk/atrophy, fasciculation, tremor, myoclonus, tendon reflexes, and plantar reflexes.
  - Determine whether the weakness occurred as a result of an abnormality in the cerebral cortex, descending motor pathways, brain stem, spinal cord, anterior horn cells, nerve roots and plexuses, peripheral nerves, neuromuscular junction, or skeletal muscle.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List the physiologic principles and indications for electromyography (EMG), muscle enzymes.
  - List indications for muscle biopsy.
- ❖ Conduct an effective plan of management for a patient with weakness, paresis, or paralysis:
  - Outline an initial plan of management for Guillain-Barré syndrome.
  - Outline an initial plan of management for myasthenia gravis.
  - Outline an initial plan for rehabilitation of patients with hemiplegia and paraplegia.



118-1

## WEIGHT GAIN/OBESITY

### Rationale

Obesity is a chronic disease that is increasing in prevalence. The percentage of the population with a body mass index of  $>30$  kg/m<sup>2</sup> is approximately 15%.

### Causal Conditions

1. Exogenous
  - a. Increased energy intake
    - i. Dietary (progressive hyperphagic, frequent eating, high fat diet, overeating)
    - ii. Social and behavioral (socioeconomic, ethnicity, psychological, etc.)
    - iii. Iatrogenic (drugs, hormones, hypothalamic surgery)
  - b. Decreased energy expenditure (sedentary lifestyle, smoking cessation)
2. Endogenous
  - a. Neuroendocrine
    - i. Hypothalamic syndrome
    - ii. Cushing syndrome
    - iii. Hypothyroidism
    - iv. Polycystic ovary syndrome
    - v. Hypogonadism
    - vi. Growth hormone deficiency
  - b. Genetic
    - i. Dysmorphic (e.g., Prader-Willi)
    - ii. Family history of obesity

### Key Objectives

- ❖ Since the risk of being over weight (body mass index of 25 - 29.9 kg/m<sup>2</sup>) is related to the amount of extra body fat, its distribution, and age of the patient, determine the degree and type of obesity (waist-to-hip ratio), whether there is a treatable cause, and the risk of morbidity and mortality.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Assess risk of morbidity and mortality by determining age at onset of obesity, duration, and weight gain after 18 years of age, amount of central adiposity, and gender.
  - Perform a measurement of waist to hip ratio and determine body mass index.
  - Determine whether co-morbid conditions are present (hypertension, diabetes mellitus, dyslipidemia, sleep-apnea, hirsutism, anovulatory).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select patients who require investigation for neuroendocrine cause of obesity.
- ❖ Conduct an effective plan of management for a patient with weight gain:

- Formulate a management plan consistent with the reality that the great majority of patients require long term treatment since obesity cannot be cured (multidisciplinary team including nutritionist).
- List the modalities of treatment for obesity including increased energy expenditure through exercise, decreased energy intake through healthy diets, and behavior modification.
- Contrast advantages and disadvantages of anorectic drugs and surgery for the treatment of obesity.

**Rationale**

Although voluntary weight loss may be of no concern in an obese patient, it could be a manifestation of psychiatric illness. Involuntary clinically significant weight loss (>5% baseline body weight or 5 kg) is nearly always a sign of serious medical or psychiatric illness and should be investigated.

**Causal Conditions**

1. Involuntary weight loss
  - a. Decreased energy intake
    - i. Malignancy
    - ii. HIV (despite fever, predominantly anorexia and decreased intake)
    - iii. Endocrinopathies (adrenal insufficiency, hypercalcemia, diabetes mellitus)
    - iv. Chronic illness (COPD, CHF)
    - v. Gastrointestinal disease (dysphagia, abdominal pain, distension, nausea)
    - vi. Psychiatric disease (bipolar disorder, personality disorder, paranoia/delusion)
    - vii. Drugs (alcohol, opiates, cocaine, amphetamines, anticancer)
  - b. Increased energy expenditure
    - i. Hyperthyroidism
    - ii. Pheochromocytoma
    - iii. Chronic illness (COPD, CHF)
    - iv. Malignancy (hyper catabolic)
    - v. Infection (presence of fever indicative of hyper catabolic state)
  - c. Energy loss
    - i. Urine (uncontrolled diabetes mellitus)
    - ii. Stool (malabsorption)
2. Voluntary weight loss
  - a. Decreased intake
    - i. Diet for treatment of obesity
    - ii. Anorexic drugs
    - iii. Anorexia/Bulimia
  - b. Increased energy expenditure (distance runners, models, ballet dancers, gymnasts)

**Key Objectives**

- ❖ Determine extent of weight loss in relation to previous weight, whether voluntary or involuntary, whether with increased appetite or decreased appetite, and if fluctuations in weight are usual or unusual.

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Contrast involuntary weight loss from voluntary, weight loss associated with increased appetite (very few conditions: hyperthyroidism, diabetes, pheochromocytoma, malabsorption, and increased physical activity) from

that with decreased appetite (many conditions).

- Determine whether the patient had fear of being fat, lack of satisfaction with body image, menstrual history, eating habits including bingeing, purging and fasting, increased physical activity.
- Examine for effects of starvation (bradycardia, hypotension, dry skin, etc.) and signs of purging.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Conduct an investigation of involuntary weight loss, whether appetite is decreased or increased.
- ❖ Conduct an effective plan of management for a patient with weight loss:
  - State that management is dependent on underlying condition.
  - Counsel patients with voluntary weight loss on healthy diets and life-style changes.
  - Select patients in need of specialized care.



## 118-3      **WEIGHT (LOW) AT BIRTH/INTRAUTERINE GROWTH RESTRICTION**

### **Rationale**

Intrauterine growth restriction (IUGR) is often a manifestation of congenital infections, poor maternal nutrition, or maternal illness. In other instances, the infant may be large for the gestational age. There may be long-term sequelae for both. Low birth weight is the most important risk factor for infant mortality. It is also a significant determinant of infant and childhood morbidity, particularly neuro-developmental problems and learning disabilities.

### **Causal Conditions**

1. Newborn infant small for gestational age (SGA)
  - a. Maternal
    - i. Socio-economic status
    - ii. Drugs (cigarettes, alcohol, narcotics, cocaine)
    - iii. Illness (gestational hypertension/HELLP, diabetes, malnutrition)
  - b. Fetal
    - i. Multiple gestation
    - ii. Intrauterine infections (e.g., TORCHS)
    - iii. Chromosomal abnormality
  - c. Placental insufficiency
2. Newborn infant large for gestational age (LGA)
  - a. Maternal (familial, diabetes)
  - b. Fetal (e.g., Beckwith syndrome, transposition of great vessels)

### **Key Objectives**

- ❖ Determine the most probable diagnosis by clinical means.

### **Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine whether a SGA/LGA infant is present by accurately measuring and plotting weight, length, and head circumference in relation to gestational age, on a growth chart.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - List indications for investigations such as fetal ultrasound, and blood biochemistry.
  - Select blood glucose (hypoglycaemia is commonly associated with growth aberrant infants).
- ❖ Conduct an effective initial plan of management for an infant with intrauterine growth retardation:
  - Discuss the complications associated with intrauterine growth restriction and outline the management of such an infant.
  - Outline management and complications that can occur in large for gestational age infants.
  - Outline preventive strategies of large for gestational age infants.

### Rationale

Individuals with episodes of wheezing, breathlessness, chest tightness, and cough usually have limitation of airflow. Frequently this limitation is reversible with treatment. Without treatment it may be lethal.

### Causal Conditions

1. Obstructive lung disease
  - a. Asthma
  - b. COPD
  - c. Bronchiectasis
  - d. Cystic fibrosis
2. Small airway disorder
  - a. Aspiration
  - b. Bronchiolitis
  - c. Cystic fibrosis
3. Cardiovascular
  - a. Pulmonary edema
  - b. Pulmonary embolism

### Key Objectives

- ❖ Determine the severity of the airway obstruction and use this to guide therapy.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - Elicit information about intermittency, seasonal waxing and waning, nocturnal episodes, exacerbation on exposure to exercise, cold air, allergens, air pollutants, or upper respiratory tract infections (suggestive of asthma, but also found in COPD and bronchiectasis).
  - Determine whether the wheezing is polyphasic (multiple pitches, start and stop at various points in respiratory cycle).
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion, differentiation, and diagnosis:
  - Select spirometry and FEV1 to quantify severity of airway narrowing; pulmonary function tests are key to diagnosis of asthma (also management).
  - Discuss the use of provocative testing for diagnosis of asthma if lung function is normal.
  - Select diagnostic imaging to detect complications of asthma and to exclude alternative diagnoses.
  - List indications for allergy testing for asthma.
- ❖ Conduct an effective plan of management for a patient with wheezing:
  - Outline an initial plan of management for a patient with asthma.
  - Select patients in need of specialized care.

## Applicable Basic Principles of Law

### *Physicians' Legal Liability for Negligence (or, in Quebec, Civil Liability) (CLEO 5.4)*

#### Detailed Objectives

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstance under consideration.
- ❖ The standard of care expected of a physician is one that would reasonably be expected under similar circumstances of an ordinary, prudent physician of the same training, experience, specialization, and standing.

A physician may fail to properly assess and ascertain the severity of a patient's asthma. As a consequence, the appropriately aggressive treatment for this potentially lethal illness is not initiated in a timely fashion. This could be viewed as a "failure to meet the standard of care applicable under the circumstance" and lead to legal action against the physician.

#### Applied Scientific Concepts

1. Outline the role of the many different types of cells in the chronic inflammatory condition of the airways associated with asthma (mast cells, eosinophils, T cells).
2. Explain how the pharmacological interventions used in this disease relate to the cells identified above.



**Rationale**

Wheezing, a continuous musical sound >1/4 seconds, is produced by vibration of the walls of airways narrowed almost to the point of closure. It can originate from airways of any size, from large upper airways to intrathoracic small airways. It can be either inspiratory or expiratory, unlike stridor (a noisy, crowing sound, usually inspiratory and resulting from disturbances in or adjacent to the larynx).

**Causal Conditions**

1. Extrathoracic upper airway obstruction
  - a. Postnasal drip (almost half of patients)
  - b. Vocal cord dysfunction
  - c. Epiglottitis
  - d. Hypertrophied tonsils
  - e. Laryngeal edema/Stenosis/Laryngomalacia
  - f. Retropharyngeal abscess/Neoplasms
  - g. Anaphylaxis
  - h. Obesity
  - i. Vocal cord paralysis (bilateral)/Hematoma
2. Intrathoracic upper airway obstruction
  - a. Tracheal stenosis/Tracheomalacia
  - b. Foreign body aspiration
  - c. Tracheal/Bronchial tumors/Benign/Malignant
  - d. Tracheobronchitis/Laryngotracheobronchitis (croup)
  - e. Intrathoracic goitre

**Key Objectives**

- ❖ Determine whether the wheezing is associated with chronic dyspnea and cough, because this triad is highly suggestive of asthma; in the absence of this triad, determine whether postnasal drip, the commonest cause of wheezing, is present.
- ❖ Consider the possibility that the wheezing may be psychogenic (approx. 10%).

**Objectives**

- ❖ Through efficient, focused, data gathering:
  - Determine whether the wheezing is polyphonic, since it is more likely to originate from more central airways.
  - Differentiate between wheezing and stridor; in children, ask about previous upper respiratory tract infection, brassy cough, symptoms worse at night, initially inspiratory stridor (croup is the most common form of upper respiratory obstruction in children).
  - Determine the most likely site of obstruction, whether large or small intrathoracic airway or extrathoracic airway; determine urgency of management.
- ❖ List and interpret critical clinical and laboratory findings which were key in the processes of exclusion,

differentiation, and diagnosis:

- Select pulmonary function studies as one means to differentiate between causes once diagnostic possibilities have been narrowed by clinical means.
- List indications for diagnostic imaging.
- ❖ Conduct an effective plan of management for a patient with wheezing:
  - Outline the use of bronchodilator therapy for diagnostic purposes.
  - Select patients in need of specialized care.

## Applicable Basic Principles of Law

### *Physicians' Legal Liability for Negligence (or, in Quebec, Civil Liability) (CLEO 5.4)*

#### Detailed Objectives

- ❖ Physicians are legally liable to their patients for causing harm through a failure to meet the standard of care that is applicable under the particular circumstance under consideration.
- ❖ The standard of care expected of a physician is one that would reasonably be expected under similar circumstances of an ordinary, prudent physician of the same training, experience, specialization, and standing.

A physician may fail to recognize that wheezing does not equate to asthma. In an acute situation, where other life-threatening illnesses should have been considered in the differential diagnosis (epiglottitis, mechanical airway obstruction), such omission could be viewed as a "failure to meet the standard of care applicable under the circumstance" and as a consequence lead to legal action against the physician.

## Applied Scientific Concepts

1. Identify the anatomy of the three potential areas of obstruction. The three areas are the extrathoracic upper airways (nose to extrathoracic trachea), intrathoracic upper airways (intrathoracic trachea) and the lower airways (intrathoracic airways below carina).
2. Outline the distinguishing physiological and pathophysiological characteristics of the three potential areas of obstruction, reflected clinically by salient historical and pulmonary function testing features.

### Rationale

Because abnormalities of white blood cells (WBCs) occur commonly in both asymptomatic as well as acutely ill patients, every physician will need to evaluate patients for this common problem. Physicians also need to select medications to be prescribed mindful of the morbidity and mortality associated with drug-induced neutropenia and agranulocytosis.

### Causal Conditions

1. Neutropenia (absolute neutrophil count [ANC]<1500/ $\mu$ L, isolated)
  - a. Increased destruction
    - i. Post\_infectious (bacterial, viral, parasitic)
    - ii. Drug-induced (anti-thyroid, anti-inflammatory, psychotropic)
    - iii. Primary immune disorders
      - A. Transfusion
      - B. Iso-immune (neonatal)/Auto-immune (Rh. arthritis, SLE, infants)
      - C. Pure WBC aplasia (thymoma)
      - D. Complement activation (hemodialysis, apheresis)
  - b. Decreased/Ineffective production (two or more lines may be depressed)
    - i. Drug-induced (alkylating agents, antimetabolites)
    - ii. Nutritional deficiency (vitamin B12, folate, alcoholism)
    - iii. Marrow infiltration (e.g., acute and chronic leukemia, myelodysplastic synd.)
    - iv. Aplasia (congenital neutropenia)
  - c. Shift/Redistribution/Segregation (Hypersplenism, infections, immune disorders)
2. Neutrophil dysfunction (chronic granulomatous disease, renal failure)
3. Neutrophilia (ANC > 7700/  $\mu$ L) (Leukocytosis) (WBC > 11000/  $\mu$ L)
  - a. Reactive
    - i. Infection
    - ii. Stress (physical, emotional, cigarette smoking, heatstroke)
    - iii. Drugs (glucocorticoids, lithium, epinephrine)
    - iv. Inflammation (myocardial infarction, collagen diseases, necrotic tissue)
  - b. Neoplastic (acute/chronic leukemia, myeloproliferative disorders)
  - c. Other (non-hematologic malignancy, marrow stimulation as in hemorrhage/ hemolysis, leukemoid reaction, asplenia/hyposplenism, hereditary, idiopathic)

### Key Objectives

- ❖ Interpret the clinical setting in which the leukocyte abnormality occurs (including repeat testing) since it will often suggest the correct diagnosis and direct further investigation.

### Objectives

- ❖ Through efficient, focused, data gathering:
  - > Distinguish between conditions requiring non-urgent evaluation and acute life threatening illnesses such as

overwhelming sepsis (fever, hypotension, tachycardia, hypothermia; at times there may be few clinical signs of infection) requiring hospital admission; examine for abscess, abdominal rebound tenderness, signs of pulmonary consolidation or pleural effusion, joint swelling, erythema, tenderness, hepatosplenomegaly, lymphadenopathy. Examine oral cavity, teeth, peri-rectal area, genitals, skin, for signs of infection. In evaluating a patient with leukemoid reaction, rule out chronic myelogenous leukemia.

- ❖ List and interpret critical clinical and laboratory findings which are key in the processes of exclusion, differentiation, and diagnosis:
  - Interpret a leukocyte differential, for example:
    - \* Spurious neutrophilia may be caused by platelet clumping or cryoglobulinemia;
    - \* Severity of neutropenia predicts risk of infection, e.g., <500;
    - \* Band count  $\geq 20$  percent of the total WBC and the left shift;
    - \* Dohle bodies, toxic granulation, and cytoplasmic vacuoles from smear examination; and
    - \* Left-shift
  - Interpret combined abnormalities on the complete blood count (e.g., anemia, polycythemia, thrombocytopenia, nucleated RBCs).
  - List the indications for blood culture, bone marrow aspiration, and biopsy.
- ❖ Conduct an effective plan of management for a patient with leukocyte abnormalities:
  - Diagnose/exclude infection as the cause of neutropenia/leukocytosis.
  - Select patients for specialized care (WBC > 250,000/ $\mu$ L, leukemias, overwhelming sepsis).
  - Counsel and educate patients with chronic leukocyte abnormalities.
  - Recommend effective infection preventing strategies (e.g., dental care) and avoid those without benefit (e.g., reverse isolation since, origin of infection is usually endogenous).

## Applied Scientific Concepts

1. Explain that neutrophils are derived from a common progenitor that also gives rise to erythrocytes, megakaryocytes, eosinophils, basophils, and monocytes. Proliferation of the common progenitor is stimulated by interleukin (IL)-3 and granulocyte-macrophage colony stimulating factor (GM-CSF), while later differentiation is regulated by granulocyte colony-stimulating factor.
2. Identify the content of PMN granules, their putative function, and neutrophil interactions with endothelial cells during recruitment to sites of infection or inflammation.
3. Describe leukemoid reaction as leukocytosis exceeding 50,000/ $\mu$ L along with an increase in neutrophil precursors in peripheral blood. The differential count has a marked "left shift". Proliferation of all the normal myeloid elements is seen in the bone marrow in leukemoid reactions, in contrast to acute leukemia, in which the immature elements predominate.
4. Outline the interplay of factors regulating the production of granulocytes and their movement from one pool to another, a movement from marrow to blood to tissue. Thus, the peripheral neutrophil count reflects equilibrium between several compartments. The white blood cell (WBC) count and differential measures only neutrophils in the circulating pool during their brief 3 - 6 hour period of transit from the bone marrow to tissue.