

## Life Cycle Learning Objectives (draft 2 March 09)

The student will be able to:

### **A. Clinical Medicine**

*1. Apply knowledge of the normal life cycle to the physician-patient interview and physical examination across the lifespan; includes cognitive, motor, and behavioral assessment*

#### ***a. Prenatal and infant***

1. review and record the maternal history and delivery records as they pertain to a normal newborn
- ii. perform and record a physical examination of an infant
- iii. list and describe methods for measuring infantile growth and development
- iv. perform and record a neurodevelopmental examination of an infant

#### ***b. Children and adolescents***

- i. perform and record a physical examination of a preschool child
- ii. perform and record a physical examination of a latency age child
- iii. perform and record a neurodevelopmental examination of an infant
- iv. perform and record a physical examination of an adolescent
- v. perform and record a neurodevelopmental examination of an adolescent
- vi. recognize gender-based differences in puberty

#### ***c. Geriatric***

- i. perform and record a functionally-oriented examination of a geriatric patient (standardized geriatric patient volunteer session with feedback from patient interpreted by geriatrician, followed by OSKI evaluation)
- ii. understand how a functionally-oriented geriatrics assessment differs from a standard medical evaluation

- iii. identify the major domains of functional assessment (cognition, affect, physical mobility, gait)
- iv. identify the key activities for geriatric patients that constitute basic (physical) and instrumental activities of daily living
- v. assess geriatric patients regarding usual vs. successful aging
- vi. perform a screening cognitive assessment in an older patient for whom there are concerns regarding memory or function\*
- vii. Ask all patients >65 years old, or their caregivers, about falls in the last year, watch the patient rise from a chair and walk (or transfer), then record and interpret the findings\*

2. *Atypical presentation of disease across the lifespan*

- a. Recognize parallels in atypical presentations of temperature regulation and dehydration in ***pediatric and geriatric*** patients, including (case presentations of):
  - i. fever and nuchal rigidity in meningitis
  - ii. hypothermia
  - iii. dehydration\*

3. *Medication management across the lifespan.*

- a. Document a ***pediatric*** patient's complete medication list, including prescribed, herbal, and over-the counter medications, and for each medication provide the dose, frequency, indication, benefit, side effects, and an assessment of adherence\*
  - i. list strategies to improve adherence (these 2 are building on phase 1)
  - ii. evaluate for drug interactions
- b. Document a ***geriatric*** patient's complete medication list, including prescribed, herbal, and over-the counter medications, and for each medication provide the dose, frequency, indication, benefit, side effects, and an assessment of adherence\*
  - i. list strategies to improve adherence
  - ii. evaluate for drug interactions

4. *Environmental safety and self-care capacity across the lifespan*

a. Identify and assess safety risks in the home environment, including vehicles, that specifically pose a threat to *pediatric* patients, and make recommendations to mitigate these

b. Identify and assess safety risks in the home environment, including vehicular operation, that specifically pose a threat to *geriatric patients*, and make recommendations to mitigate these\*

c. assess and describe baseline and current functional abilities (instrumental activities of daily living, activities of daily living, and special senses) in an *older patient* by collecting historical data from multiple sources and performing a confirmatory physical examination\*

d. develop a preliminary management plan for *geriatric* patients presenting with functional deficits, including adaptive interventions and involvement of interdisciplinary team members from appropriate disciplines, such as social work, nursing, rehabilitation, nutrition, pharmacy, and governmental assistance programs available in Utah\* (too advanced for Life Cycle? Or good to introduce them to multidisciplinary approach early?)

#### 5. *Health care planning and promotion*

a. define and differentiate among types of code status, health care proxies, and advanced directives in Utah\*

b. list in proper order the individuals who may legally give consent for care of *pediatric and geriatric* patients

c. accurately identify clinical situations where life expectancy, functional status, preference of the patient or next of kin, or goals of care should override standard recommendations for screening tests or treatment in *pediatric and geriatric patients*\*

d. define continuum of care and list relevant resources for homeless patients and their families in Utah

e. describe the clinical relevance and appropriate patient populations for medicaid, medicare, CHIP and variants

#### 6. *Hospital care across the lifespan*

a. identify potential hazards of hospitalization for *pediatric and geriatric* patients, (including immobility, delirium, medication side effects, malnutrition, pressure ulcers, procedures, peri and post operative periods, hospital acquired infections, and effects of prolonged hospitalization on family members) and identify potential prevention strategies\*

b. explain the risk, indications, alternatives, and contraindications for indwelling (Foley) catheter use in the *geriatric* patient\*

c. explain the risks, indications, alternatives, and contraindications for physical and pharmacological restraint use in *pediatric and geriatric* patients\*

d. communicate the key components of a safe discharge plan for *pediatric and geriatric* patients (eg. Accurate medication list, plan for follow-up), including comparing/contrasting potential sites for discharge\*

e. in a *geriatric* patient, conduct a surveillance examination of areas of the skin at high risk for pressure ulcers and describe existing ulcers\*

### 7. Palliative and end of life care

a. assess and provide initial management of pain and key non-pain symptoms based on the goals of care of the patient or next of kin\*

b. identify the psychosocial, social, and spiritual needs of *pediatric and geriatric* patients with advanced illness, as well as the needs of their family members, and link these identified needs with the appropriate interdisciplinary team members\*

c. discuss how to talk with *pediatric* patients and their families about illness and loss  
(note- is there a correlate about how to talk to *geriatric* patients with cognitive impairment and their families?)

d. present palliative care (including hospice) as a positive, active treatment option for a patient with advanced disease\*

e. explain the steps involved in obtaining permission for an autopsy, the basic steps of the autopsy procedure and its effects on funeral plans, and the potential value of an autopsy for patients across the lifespan

## B. Medical Science

### 1. Embryology

a. describe the origin of human gametes and how the process of fertilization results in the formation of a genetically distinct human individual

b. describe the events occurring prior to implantation, including the cleavage of the one-cell embryo (the zygote), progression through the morula and blastula stages, and the differentiation of the first two embryonic cell types: inner cell mass and trophoctoderm

c. describe the events that occur following implantation, including how the process of gastrulation establishes the body plan and forms the three primary germ layers that subsequently generate embryonic organ systems and structures

d. describe the formation of the major organ systems and structures of the embryo, including the placenta, cardiovascular system, respiratory system, nervous system, gastrointestinal system, urinary system, female and male reproductive systems, skin/muscle/bone, limbs, and craniofacial development (overview, then disperse through later units of Phase 2?).

e. discuss clinical consequences of errors in embryonic development, including fetal and neonatal abnormalities, genetic abnormalities, and specific anomalies of the cardiovascular system, respiratory system, nervous system, gastrointestinal system, urinary system, female and male reproductive systems, limbs, and craniofacial region (Life Cycle to concentrate on normal, so move this to Phase 2?)

## 2. *Neurodevelopment and developmental milestones across the lifespan*

a. describe normal developmental stages and milestones for patients in the following age brackets:

i. fetus

ii. infant

iii. preschool

iv. latency age child

vi. adolescent

b. list common features of of autism spectrum disorder, attention-deficit hyperactivity disorder, depression, and eating disorders in pediatric patients

c. list common causes of acute mental status change in pediatric patients

(note-there is currently a psychiatry lecture series on development in various age groups- need input from pediatricians and geriatricians on which are the most important basic topics for Life Cycle, and which should be deferred to brain and behavior)

## 3. *Body composition and nutrition across the lifespan*

a. describe normal body composition across the lifespan (review)

- b. calculate maintenance fluid replacement for an **infant, child, and geriatric adult**
- c. discuss principals of optimal nutrition for patients across the lifespan
- i. understand aspects of normal **fetal** growth and causes of abnormal or insufficient growth during fetal gestation
  - ii. understand nutritional requirements during pregnancy and effects of insufficient nutrition on the **fetus** and mother
  - iii. understand aspects of infant nutrition and effects of insufficient nutrition on the **infant**, including the benefits of breastfeeding
  - iv. define the syndrome of failure to thrive
  - v. list risk factors for the syndrome failure to thrive
  - vi. list organic and non-organic causes of failure to thrive in **pediatric and geriatric** patients
  - vii. appreciate the similarities and differences of failure to thrive when it presents in **infants compared to geriatric patients**
  - viii. list potential causes of nutritional and feeding problems in **school aged children, adolescents, and geriatric patients**, including behavioral causes
  - ix. list strategies to develop good eating habits in **children** (on-line module)
  - x. recognize the current epidemic of **childhood** obesity and list common causes
  - xi. discuss the metabolic changes associated with aging and their effect on the nutritional requirements of **older adults** (on-line module)
  - xii. appreciate the complexity of the energy balance problem, describe the component of energy expenditure, and link these concepts to obesity
  - xiii. list the complications of malnutrition, including obesity, in **pediatric and geriatric patients**

#### 4. *Biology of prematurity and aging*

- a. list and describe the major age-associated changes in physiology that occur in transitions to **infancy, childhood, adolescence, and in geriatric patients**

b. define the physiologic changes of aging in the kidney, liver, cardiovascular system, central nervous system, and body composition, and recognize their impact on the **geriatric** patient, including their contribution to homeostenosis (the age-related narrowing of homeostatic reserve mechanisms)\*

c. define the physiologic features of prematurity in the kidney, liver, cardiovascular system, central nervous system, and body composition, and recognize their impact on the **premature infant**, including their contribution to homeostenosis.

d. recognize parallels at **opposite ends of the life span** with respect to physiology, specifically impaired homeostasis and limitations in functional reserve (eg. immunity, temperature regulation, failure to thrive, iatrogenic complications of bedrest/inpatients)

e. list features of the physiology of successful aging in **geriatric** patients

f. understand the effect of extrinsic factors in the development of age-associated changes in physiology (clarification?)

g. list and describe the general biochemical and molecular mechanisms of ageing, including

i. DNA damage/repair

ii. decreased cellular replication/telomere shortening

iii. reduced regenerative capacity of tissue stem cells

iv. accumulation of metabolic damage (ex. oxidation, glycation)

v. potential role of ILGF

vi. amyloid and protein misfolding

h. understand the ways in which similar processes lead to **aging in different species**, and can select for very long-lived species under certain circumstances (which discipline would teach- geriatrics?)

i. understand the ways in which the aging process is regulated by genetic and environmental factors and itself leads to diseases later in life (which discipline would teach- geriatrics?)

j. assess geriatric patients regarding usual vs. successful aging

k. list common features of delirium, dementia, and depression in geriatric patients\*

l. list common causes of acute mental status changes, including delirium, in a geriatric patient\*

m. discuss neuroscenescence (suggested by Drs. Jan Terpstra/ David Renner- need more details)

n. discuss the biology of neurologic degeneration and regeneration (Jan / David)

#### 5. Medication management across the lifespan.

a. Explain the impact of age-related changes on drug selection and dose based on knowledge of age-related changes in renal and hepatic function, body composition, and central nervous system sensitivity\*

b. Recognize that certain drugs should be avoided or used with caution in **pediatric and/or geriatric patients** and due to variations in renal function, hepatic function, neurosensitivity, and/or body composition that may affect pharmacokinetics, and give one example of a drug that should be used with caution or avoided in a) **infants** and b) **the elderly**.

#### 6. Demographics and environmental safety

a. Recognize the demographics and current trends related to childbirth and adoption in the United States, including the survival and prognosis of premature infants

b. discuss the demographics and current trends related to aging in the United States, especially related to longevity, independent living, and cognitive functioning, and including gender-based differences

c. List potential safety risks in the home environment, including vehicles, that specifically pose a threat to **pediatric** patients, and make recommendations to mitigate these

d. describe the major health threats, including vehicular operation, to contemporary **adolescents**

e. Identify and assess safety risks in the home environment, including vehicular operation, that specifically pose a threat to **geriatric patients**, and make recommendations to mitigate these\*

f. list features of abuse/neglect in **pediatric** and **geriatric** patients and recognize the parallels in both age groups (case presentation)

#### 7. Palliative and end of life care, death, and bereavement

- b. list the features of normal and pathologic grief reactions
- c. list and describe the 5 stages of dying described by Kubler-Ross
- d. describe the typical understanding of illness and death in *pediatric* patients
- e. list criteria for brain death

### **C. Medical Arts**

#### *1. Cultural and religious diversity as it applies to various stages of the life cycle*

a. give examples of different cultural practices pertaining to *pediatric* patients that could be misinterpreted as non-accidental trauma

b. explain different cultural and religious approaches to birth, death and dying

#### *2. Legal and ethical considerations in treatment of vulnerable populations*

a. discuss parallels at opposite ends of the life span with respect to vulnerable populations

#### *3. Legal and ethical considerations in death and dying*

a. discuss the ethics of non-provision of life-prolonging treatment vs. duty of care

b. discuss the legal aspects of withholding and withdrawing life-prolonging treatment

c. discuss the legal and ethical arguments for and against euthanasia and variants

#### *4. Legal and ethical considerations in research*

a. stem cell research

b. research using vulnerable populations such as *pediatric or geriatric* patients

\*Adapted from Minimum Geriatric Competencies for Medical Students, AAMC and John A. Hartford Foundation Consensus Conference on Competencies in Geriatric Education, close to verbatim except where I adjusted the wording to include pediatric patients or change "state where one is training" to "Utah".

AAMC Geriatric competencies deferred to later in curriculum- either in later units in Phase 2 (ex. Brain and behavior, Circulation), or Phase 3:

1. *define and distinguish among* the clinical presentations of delirium, dementia, and depression in geriatric patients\* (*list and recognize only* for Life Cycle)
2. Formulate a differential diagnosis and implement initial evaluation in a patient who exhibits dementia, delirium, or depression\*
3. In a geriatric patient with acute mental status changes, including delirium, *urgently initiate a diagnostic work-up to determine the root cause (etiology)\** (*list common causes only* for Life Cycle)
4. Develop an evaluation and non-pharmacologic management plan for agitated, demented, or delirious patients\*
5. Perform and interpret a cognitive assessment in an older patient for whom there are concerns regarding memory or function\* (*perform a screening assessment only* for Life Cycle)
6. Ask all patients >65 years old, or their caregivers, about falls in the last year, watch the patient rise from a chair and walk (or transfer), then record and interpret the findings\* (*record findings only* for Life Cycle)
7. In a geriatric patient who has fallen, construct a differential diagnosis and evaluation plan that addresses the multiple etiologies identified by history, physical examination and functional assessment\*
8. Generate a differential diagnosis based on recognition of the unique presentations of common conditions in geriatric patients, including acute coronary syndrome, dehydration, urinary tract infection, acute abdomen, and pneumonia\*
9. Identify medications, including anticholinergic, psychoactive, anticoagulant, antibiotic, analgesic, antipyretic, hypoglycemic, and cardiovascular drugs and over-the-counter cold remedies that should be avoided or used with caution in ***pediatric and/or geriatric patients*** and explain the potential problems associated with each\* (will discuss general pharmacokinetic features that may be altered by renal function, hepatic function, neurosensitivity and/or body composition in pediatric and geriatric patients in Life Cycle, but will only use one or two drugs as examples)

Perinatal topics moved to Repro/Metabolism (or Phase 3- currently these were taught in 1st and 2nd year, so I think they are OK for Repro/Metab)

### *Perinatal pathology*

a. classify single congenital abnormalities as a malformation, deformation, or abruption and determine the etiology and recurrence risk.

b. classify multiple congenital abnormalities as a syndrome, sequence, or association, and determine the etiology and recurrence risk

c. indicate the most likely consequences of injury to the developing embryo or fetus during (1) 0-3 weeks post fertilization, (2) 3-9 weeks post fertilization and (3) 10 weeks post-fertilization to birth

d. indicate the relative importance, depending on the trimester, of (1) chromosomal abnormalities, (2) infection and (3) maternal-placental factors as causes of perinatal morbidity and mortality

e. list 3 categories of genetic and environmental factors that may cause developmental abnormalities

### *3. Placenta - Science*

a. recognize the gross appearance of a normal placenta, including the appearance of the umbilical cord and blood vessels, fetal membranes, chorionic plate, maternal surface, and cut surface of the umbilical cord and placental disk

b. recognize and describe the clinical significance of the following gross findings of the placenta: single umbilical artery, long or short umbilical artery, hyper- or hypocoiled umbilical artery, velamentous umbilical artery, nuchal cord, opaque fetal membranes, green fetal membranes, nodules on the fetal surface, incomplete maternal surface, depressed maternal surface, mass of placental disk parenchyma

c. recognise and describe the clinical significance of the following microscopic findings of the placenta: necrotizing funisitis, peripheral funisitis, acute chorioamnionitis, squamous metaplasia, amnion nodosum, villous maturity, acute villitis, chronic villitis, infarction

d. define monozygotic twin and dizygotic twin

e. describe the gross and microscopic features and clinical significance of (1) dichorionic, diamnionic, (2) monochorionic diamnionic and (3) monochorionic monoamnionic placentation

f. understand the pathophysiology of complications of twinning, including (1) conjoined twins and (2) twin transfusion syndrome

g. recognise the pathologic features and describe the clinical significance of complete vs. partial molar pregnancy

### *3. Placenta - Clinical*

a. Describe 4 scenarios in which the clinical features or findings in the delivery room indicate that a placenta should be sent for pathologic examination, and describe the limitations of placental examination

b. List 3 gross placental findings which are best evaluated in the delivery room

Embryology - introduce in Life Cycle and address individual organ systems in more detail in later units or present all in Life Cycle? I have listed general embryology objectives here, but not organ system-related objectives, since there are so many and I would first like to be sure we know where they belong. I have met with some of the embryologists, and will meet with Dr. Schoenwolf next week (3/10).

Miscellaneous:

Recommended optional reading:

The Spirit Catches You and You Fall Down