Chapter 7

Life Span Development

Unit Summary

After students complete this chapter and the related course work, they will have a fundamental understanding of the physiological and psychosocial differences of each phase of human development. The students will be able to discuss adaptations and strategies that they might apply to better assess and manage patients.

National EMS Education Standard Competencies

Preparatory

Applies fundamental knowledge of the emergency medical services (EMS) system; safety/well-being of the emergency medical technician (EMT); and medical/legal, and ethical issues to the provision of emergency care.

Life Span Development

Applies fundamental knowledge of life span development to patient assessment and management.

Knowledge Objectives

1. Know the terms used to designate the following stages of life: infants, toddlers, preschoolers, school-age children, adolescents (teenagers), early adults, middle adults, and older adults. (pp 241–251)

2. Describe the major physical and psychosocial characteristics of an infant’s life. (pp 241–244)

3. Describe the major physical and psychosocial characteristics of a toddler’s and preschooler’s life. (pp 245–247)

4. Describe the major physical and psychosocial characteristics of a school-age child’s life. (p 247)

5. Describe the major physical and psychosocial characteristics of an adolescent’s life. (pp 247–249)

6. Describe the major physical and psychosocial characteristics of an early adult’s life. (p 249–250)

7. Describe the major physical and psychosocial characteristics of a middle adult’s life. (pp 250–251)

8. Describe the major physical and psychosocial characteristics of an older adult’s life. (pp 251–255)

Skills Objectives

There are no skills objectives for this chapter.

Readings and Preparation

Review all instructional materials including ***Emergency Care and Transportation of the Sick and Injured***, **Eleventh Edition**, Chapter 7, and all related presentation support materials.

Support Materials

• Lecture PowerPoint presentation

• Case Study PowerPoint presentation

Enhancements

• Direct students to visit Navigate 2.

• **Content connections:** Many age-related issues may be raised during discussions and activities from this chapter’s lessons. Inform students that some topics can be addressed in more depth in specific chapters including Chapter 34, “Pediatric Emergencies” and Chapter 35, “Geriatric Emergencies.” Material learned in this chapter will be directly applied in Chapter 9, “Patient Assessment”; chapters covering specific medical conditions; Chapter 32, “Environmental Emergencies”; and other chapters.

• **Cultural considerations:** Help students express their own and/or familial views of age-related issues. Open these discussions up to the whole group to share cultural beliefs and help dispel myths. Some cultures have great respect for elders while other cultures may tend to marginalize or minimize the input of the very young or very old, preferring instead to have a family spokesperson.

Teaching Tips

• Many people, particularly young people, may have preconceived ideas about development ages. Discuss ageism and other notions with students to increase awareness of misconceptions so that these can be addressed and dispelled during lectures and activities of this chapter.

Unit Activities

**Writing assignments:** Assign students a topic to compare between two distinct developmental groups. For example: Research and prepare a poster or short paper comparing and contrasting falls among toddlers and falls among the elderly. How do the possible causes differ? What types of injuries are more likely to be seen after a fall of a 16-month-old female compared to an 85-year-old female? Remind students to take several aspects of both physical and psychological/social development into account.

**Student presentations:** Have students research or interview someone who has been injured or ill. What direct connections can they infer based on the patient’s age/developmental stage? Present findings to the class. For additional group-to-group interaction, do not have each group reveal the patient’s age. Open up discussion at the end of each presentation and allow groups to determine the age of each “patient.”

**Group activities:** Every group has a patient with the same general complaint, but the patient’s age in every group is different. Give the groups a set amount of time (15 minutes suggested) to prepare their project in which they create a skit to show how speaking to and examining the patient might differ. Each group member should have one of the following roles: patient, EMT, caregiver/parent or friend, and narrator or reporter. Roles can be combined to suit group size. Present each skit to the class.

**Visual thinking:** Collect or have students collect pictures of people at all different developmental stages and organize them into categories of similar ages. Prepare a PowerPoint slide series of the pictures or attach each group of pictures to a poster board. Based on students’ general impression of age in each photo, have groups compile lists of expected behaviors and possible illnesses/conditions/injuries of each “patient.”

Pre-Lecture

### You are the Provider

“You are the Provider” is a progressive case study that encourages critical thinking skills.

### Instructor Directions

**1.** Direct students to read the “You are the Provider” scenario found throughout Chapter 7.

**2.** You may wish to assign students to a partner or a group. Direct them to review the discussion questions at the end of the scenario and prepare a response to each question. Facilitate a class dialogue centered on the discussion questions and the Patient Care Report.

**3.** You may also use this as an individual activity and ask students to turn in their comments on a separate piece of paper.

Lecture

I. Introduction

A. Humans develop throughout their lives.

1. Newborns and infants

2. Toddlers and preschoolers

3. School-age children

4. Adolescents

5. Three stages of adulthood: early, middle, and older

B. EMTs must be aware of the physical changes a person undergoes at various stages of life.

1. They may alter the approach to patient care.

II. Neonates and Infants

A. Infants (ages 1 month to 1 year) develop at a startling rate.

B. Neonates (birth to 1 month) are covered in Chapter 33, “Obstetrics and Neonatal Care.”

 1. The leading cause of death for this age group is congenital abnormalities, according to the Centers for Disease Control and Prevention.

C. Physical changes

1. Vital signs

a. The younger the person, the faster the pulse rate and respirations.

i. At birth, a pulse rate of 90 to 180 beats/min and a respiratory rate of 30 to 60 breaths/min are normal.

ii. Shortly after birth, the pulse often drops to 120 beats/min and the respiratory rate falls to between 30 to 40 breaths/min.

iii. By 1 year, the respiratory rate slows to 20 to 30 breaths/min.

b. Blood pressure directly corresponds to the patient’s weight, so it typically increases with age.

i. The average systolic blood pressure is 50 to 70 mm Hg for a neonate, and 70 to 95 mm Hg for a 1-year-old.

2. Weight

a. A neonate usually weighs 6 to 8 lb (3 to 3.5 kg) at birth.

b. The head accounts for 25% of its body weight.

c. After week 2, infants grow at a rate of about 1 oz (30 g) per day, doubling their weight by 4 to 6 months and tripling it by the end of the first year.

3. Cardiovascular system

a. At birth, the neonate makes the transition from fetal to independent circulation.

4. Pulmonary system

a. Infants younger than 6 months are particularly prone to nasal congestion.

b. The rib cage is less rigid and the ribs sit horizontally.

 i. Explains diaphragmatic breathing in infants

c. Infants have proportionately larger tongues and proportionally shorter, narrower airways.

 i. Airway obstruction is more common in infants than older children or adults.

d. For bag-mask ventilation, remember that an infant’s lungs are fragile. Too forceful ventilations can result in trauma from pressure, or barotrauma.

e. Respiratory problems can quickly become life threatening.

i. Infants who are struggling to breathe can quickly tire, become overheated, and even become dehydrated.

5. Nervous system

a. The nervous system’s evolution continues after birth.

b. A neonate is born with certain reflexes.

i. Moro reflex (startle reflex): when a neonate is caught off guard, it opens its arms wide, spreads its fingers, and seems to grab at things.

ii. Palmar grasp: occurs when an object is placed into the neonate’s palm

iii. Rooting reflex: when something touches a neonate’s cheek, it will turn its head toward the touch.

iv. Sucking reflex: occurs when a neonate’s lips are stroked

c. A neonate’s fontanelles allow the head to be molded.

i. Spaces between the bones that eventually fuse to form the skull

ii. The posterior fontanelle fuses by 3 months.

iii. The anterior fontanelle fuses between 9 and 18 months of age.

iv. If either of the fontanelles is depressed, the infant is most likely dehydrated.

v. A bulging fontanelle is indicative of increased intracranial pressure.

6. Immune system

a. Infants maintain some of the mother’s immunities.

b. Infants can also receive antibodies via breastfeeding, further bolstering their immune system.

D. Psychosocial changes

1. Begin at birth and evolve as the infant interacts with, and reacts to, the environment

2. Crying is the main method of communicating distress.

a. Parents can often tell what is wrong just by the tone of their infant’s crying.

3. Infants develop relationships with their parents or caregivers at different rates.

a. Bonding, or the formation of a close, personal relationship, is based on a secure attachment.

i. A secure attachment occurs when an infant understands that parents or caregivers will be responsive to his or her needs.

4. Anxious-avoidant attachment is found in infants who are repeatedly rejected.

a. Children show little emotional response to their parents or caregivers and treat them as they would strangers.

5. Separation anxiety is common in older infants.

a. It involves clingy behavior and fear of unfamiliar places and people.

6. Trust and mistrust refers to a stage of development from birth to about 18 months, which involves an infant’s needs being met by his or her parents or caregivers.

a. If the environment is not perceived as secure by the infant, a sense of mistrust will develop.

III. Toddlers and Preschoolers

A. Physical changes

1. Toddlers (ages 1 to 3 years)

a. Pulse rate is normally 90 to 150 beats/min.

b. Respiratory rate is 20 to 30 breaths/min.

c. Systolic blood pressure is 80 to 100 mm Hg.

d. Average temperature is 96.8°F (36° C) to 99.6°F (38° C).

e. A toddler’s lungs continue to develop more terminal bronchioles and alveoli.

2. Preschoolers (ages 3 to 6 years)

a. Pulse rate is 80 to 140 beats/min.

b. Respiratory rate is 20 to 25 breaths/min.

c. Systolic blood pressure is 80 to 100 mm Hg.

d. Weight gain should level off.

e. Although toddlers and preschoolers have more lung tissue, they do not have well-developed lung musculature.

i. Prevents them from sustaining deep or rapid respirations for an extended period of time

3. The loss of passive immunity is possibly the most obvious development at this stage of human life.

a. Colds often develop that may manifest as gastrointestinal distress or upper respiratory tract infections.

b. Toddlers acquire immunity as their bodies are exposed to various viruses and germs.

4. Neuromuscular growth also makes considerable progress at this age.

a. Toddlers and preschoolers spend time exploring by walking, running, jumping, and playing catch.

b. Preschoolers will have a brain that weighs 90% of its final adult weight.

c. Muscle mass and bone density increase.

5. Physiologically, toddlers have the neuromuscular control capable for bladder control by 12 to 15 months of age.

a. However, the child may not be psychologically ready until 18 to 30 months of age.

b. The average age for completion of toilet training is 28 months of age.

6. The leading cause of death for this age group is unintentional injuries (accidents).

B. Psychosocial changes

1. Toddlers or preschoolers learn to speak and express themselves.

2. At 36 months of age, basic language is mastered.

3. Interaction and playing games with other children begin.

4. By 18 to 24 months, cause and effect begin to become understood.

6. Children learn to recognize gender differences by observing role models.

IV. School-Age Children

A. Physical changes

1. From ages 6 to 12 years, a school-agechild’s vital signs and body gradually approach those observed in adulthood.

a. Pulse rate is approximately 70 to 120 beats/min.

b. Respiratory rate is 15 to 20 breaths/min.

c. Blood pressure is 80 to 110 mm Hg.

2. Obvious physical traits and body function changes become apparent.

a. Growth of 4 lb (2 kg) and 2.5" (6 cm) each year

3. Permanent teeth come in.

4. Brain activity increases in both hemispheres.

5. Unintentional injuries are the leading cause of death in this age group.

B. Psychosocial changes

1. Children learn various types of reasoning.

a. Preconventional reasoning: children act almost purely to avoid punishment and get what they want.

b. Conventional reasoning: children look for approval from their peers and society.

c. Postconventional reasoning: children make decisions guided by their conscience.

2. Children begin to develop their self-concept and self-esteem.

a. Self-concept is our perception of ourselves.

b. Self-esteem is how we feel about ourselves and how we “fit in” with our peers.

V. Adolescents (Teenagers)

A. Physical changes

1. In adolescents (ages 12 to 18 years), vital signs begin to level off within the adult ranges.

a. Pulse rate is 60 to 100 beats/min.

b. Respiratory rate is 12 to 20 breaths/min.

c. Systolic blood pressure is between 90 and 110 mm Hg.

2. Adolescents experience a 2- to 3-year growth spurt (an increase in muscle and bone growth) and body changes.

a. Growth begins with hands and feet, then moves to the long bones of the extremities, and finishes with growth of the torso.

b. Girls generally finish their growth spurt by 16 years and boys by 18 years.

i. When this growth spurt finishes, boys are generally taller and stronger than girls.

ii. Muscle mass and bone density are nearly at adult levels.

3. The reproductive system matures.

a. Secondary sexual development takes place.

i. The external sex organs enlarge.

ii. Pubic hair and axillary hair begin to appear.

iii. Voices start to change.

iv. In girls, the breasts and thighs increase in size as fat tissue is deposited there.

v. Menstruation begins.

b. By the middle of adolescence, boys are able to produce sperm and eggs begin to develop in girls.

i. Acne can also occur due to hormonal changes.

 4. Unintentional injuries are the leading cause of death for adolescents.

B. Psychosocial changes

1. Adolescents and their families often deal with conflict as adolescents try to gain control of their lives from their parents.

 a. Privacy becomes an issue.

 b. Self-consciousness increases.

2. Adolescents may struggle to create their own identity.

3. They often want to be treated like adults, yet cared for like younger children.

4. Antisocial behavior and peer pressure tend to peak at age 14 to 16 years.

a. Smoking, illicit drug use, and unprotected sex are problems that may arise.

b. Eating disorders can arise in adolescents from an attempt to gain self-control through what they eat.

5. Adolescents may show a greater interest in sexual relations.

a. A code of personal ethics develops, based partly on parents’ ethics and values and partly on the influence of the adolescent’s environment.

b. Many adolescents are fixated on their public image and are terri­fied of being embarrassed.

c. Adolescents are at a higher risk than other populations for suicide and depression.

VI. Early Adults

A. Early adults range in age from 19 to 40 years.

B. Physical changes

1. Their vital signs do not vary greatly from those seen through adulthood.

a. Pulse rate will average around 70 beats/min and range between 60 and 100 beats/min.

b. Respiratory rate will stay in the range of 12 to 20 breaths/min.

c. Systolic blood pressure will be between 90 and 140 mm Hg.

2. From age 19 years to shortly after 25 years, the body should be functioning at its optimal level.

a. Lifelong habits are solidified.

b. The body is working at peak efficiency, but, as early adulthood continues, subtle erosion begins.

i. Disks in the spine begin to settle, and height sometimes “shrinks.”

ii. Fatty tissue and weight increase.

iii. Muscle strength decreases, and reflexes slow.

C. Psychosocial changes

1. Life centers on work, family, and stress.

2. During this period, adults strive to create a place for themselves in the world, and many do everything they can to “settle down.”

a. Along with this comes marriage and family.

3. Despite all of this stress and change, this is one of the more stable periods of life.

VII. Middle Adults

A. Middle adults are ages 41 to 60 years.

B. Physical changes

1. Vital signs remain the same.

a. Average pulse rate remains 70 beats/min, with a range between 60 and 100 beats/min.

b. Respiratory rate continues at 12 to 20 breaths/min.

c. Blood pressure remains between 90 and 140 mm Hg.

2. Middle adults are vulnerable to vision and hearing loss.

3. Cardiovascular health becomes an issue.

4. Cancer incidence increases.

5. Menopause takes place in the late 40s or early 50s.

6. Diabetes, hypertension, and weight problems are common.

7. Exercise and a healthy diet can diminish the effects of aging.

8. Unintentional injuries are the leading cause of death in ages 41 to 44 years; cancer is the leading cause of death in ages 45 to 60 years.

C. Psychosocial changes

1. Focus is on achieving life goals

2. Middle adults must readjust their lifestyle as children leave home.

3. Finances become a worrisome issue.

4. Generally, people of this age have the physical, emotional, and spiritual reserves to handle life’s issues.

5. Middle adults may find themselves caring for children leaving for college and caring for their aging parents as well.

VIII. Older Adults

A. Older adults include those ages 61 years and up.

B. Physical changes

1. Life expectancy is constantly changing.

a. In the early 1900s, life expectancy was 47 years.

b. It is now approximately 78 years.

c. The age to which a person will live is based on many factors, including:

i. Year of birth and country in which the person lives

ii. Public heath advances, changes within diets, attitudes regarding exercise, advances in and access to medical care, and personal behaviors

d. Cancer is the leading cause of death in ages 61 to 65 years; heart disease is the leading cause of death in ages 65 years and older.

2. Vital signs depend on the patient’s:

a. Overall health

b. Medical conditions

c. Medications taken

3. Older adults are often able to overcome numerous medical problems but may need multiple medications.

4. Cardiovascular system

a. Cardiac function declines with age largely due to atherosclerosis.

i. Cholesterol and calcium build up inside the walls of blood vessels, forming plaque.

ii. Accumulation of plaque eventually leads to partial or complete blockage of blood flow.

iii. More than 60% of people older than 65 years have atherosclerotic disease.

b. Heart rate and cardiac output decrease.

i. Cardiac output can no longer meet the demands of the body.

c. The vascular system becomes stiff.

i. Diastolic blood pressure increases with age.

ii. The heart must work harder to move the blood effectively.

d. The ability to produce replacement blood cells declines, as does the blood volume.

5. Respiratory system

a. The size of the airway increases and the surface area of the alveoli decreases.

b. The natural elasticity of the lungs also decreases.

i. Intercostal muscles are used more to breathe.

ii. Breathing becomes more labor intensive.

c. The changes in the respiratory system are often gradual and go unnoticed until a severe, life-threatening condition occurs.

d. Within the mouth and nose, there is a gradual loss of the mechanisms that protect the upper airway.

i. This leads to a decreased ability to clear secretions as well as decreased cough and gag reflexes.

ii. Aspiration and obstruction become more likely.

e. As the smooth muscles of the lower airway weaken with age, strong inhalation can make the walls of the airway collapse inward and cause inspiratory wheezing.

i. The cells of the immune system are less functional.

f. By age 75 years, the vital capacity may amount to only 50% of the vital capacity of a young adult. Factors include:

i. Loss of respiratory muscle mass

ii. Increased stiffness of the thoracic cage

iii. Decreased surface area available for the exchange of air

g. Residual volume increases with age.

i. A lifetime of breathing, especially breathing air with high levels of pollution, causes the accumulation of pollutants in the lungs.

6. Endocrine system

a. Insulin production drops off and metabolism decreases.

b. People tend to slow down their physical activity.

i. But they tend not to decrease their food intake.

ii. The pancreas may not be able to produce enough insulin for the person’s body size, which can lead to diabetes mellitus.

c. The reproductive system changes to some extent.

i. Men are able to produce sperm long into their 80s, but the rigidity of the penis tends to decrease over time.

ii. Women have a decrease in the size of their uterus and vagina.

iii. Hormone production for both sexes gradually decreases as they age.

iv. Sexual desire may diminish with age but does not cease.

7. Digestive system

a. Changes in gastric and intestinal function may inhibit nutritional intake and utilization in older adults.

i. Taste sensations decrease.

b. Saliva secretion decreases, and this reduces the body’s ability to process complex carbohydrates.

c. The ability of the intestines to contract and move food diminishes.

d. Gastric acid secretion diminishes.

e. Gallstones become increasingly common.

f. Anal sphincter changes can produce fecal incontinence.

8. Renal systems

a. The filtration function declines by 50% from age 20 to 90 years.

b. Kidney mass decreases 20% over the same span.

i. Due in part to the decreased effectiveness of the blood vessels that supply blood to the nephrons

c. There is a decreased ability to clear wastes from the body.

d. There is a decreased ability to conserve fluids when needed.

9. Nervous system

a. In the central nervous system, the brain weight may shrink 10% to 20% by age 80 years.

i. Motor and sensory neural networks become slower.

b. Neurons are lost.

i. But there is not a loss of knowledge or skill.

ii. Sleep patterns change.

c. In younger adults, the brain, which is surrounded by the meninges, takes up almost all of the space in the skull.

i. Age-related shrinkage creates a void between the brain and the outermost layer of the meninges, which provides room for the brain to move when stressed.

d. Peripheral nerve sensation is diminished.

i. Increased reaction times cause longer delays between stimulation and motion.

ii. The resulting slowdown in reflexes and decreased kinesthetic sense may contribute to the incidence of falls and trauma.

10. Sensory changes

a. Most older adults can see and hear well.

i. They may need glasses or hearing aids.

ii. It is wrong to assume that older patients are blind or deaf.

iii. Visual distortions are common.

b. Hearing loss is four times more common than vision loss.

C. Psychosocial changes

1. Until about 5 years before death, most people retain high brain function.

a. In the 5 years preceding death, mental function is presumed to decline, a theory referred to as the terminal drop hypothesis.

2. As the elderly population continues to grow, we have the responsibility to accommodate their needs during their last 20 to 40 years of life.

a. Statistics indicate that 95% of the elderly live at home.

b. The increasing number of elderly in the United States as a result of the baby boom of the 1940s to 1960s has produced a need for additional assisted living facilities.

3. Financial limits may restrict access to health care or medications.

a. Today, more than 50% of all single women in the United States who are 60 years of age or older are living at or below the poverty level.

4. One of the important issues that the elderly need to face is their own mortality.

a. Isolation and depression can be challenges.

Post-Lecture

This section contains various student-centered end-of-chapter activities designed as enhancements to the instructor’s presentation. As time permits, these activities may be presented in class. They are also designed to be used as homework activities.

## Assessment in Action

This activity is designed to assist the student in gaining a further understanding of issues surrounding the provision of prehospital care. The activity incorporates both critical thinking and application of basic EMT knowledge.

### Instructor Directions

**1.** Direct students to read the “Assessment in Action” scenario located in the Prep Kit at the end of Chapter 7.

**2.** Direct students to read and individually answer the quiz questions at the end of the scenario. Allow approximately 10 minutes for this part of the activity. Facilitate a class review and dialogue of the answers, allowing students to correct responses as may be needed. Use the quiz question answers noted below to assist in building this review. Allow approximately 10 minutes for this part of the activity.

**3.** You may wish to ask students to complete the activity on their own and turn in their answers on a separate piece of paper.

### Answers to Assessment in Action Questions

**1.** **Answer:** A Hypertension

**2.** **Answer**: A Slower pupillary reaction

**3.** **Answer**: C. It may take older adult patients more time to respond to your questions.

**4. Answer:** A. Nervous

**5.** **Answer**: B Overall health of the patient.

**6.** **Answer**: C Family members.

**7.** **Answer**: Side effects of certain medications may cause weakness, dizziness, and/or hypotension. Knowing what medications the patient takes and the side effects of those medications makes you better able to understand what caused a fall.

**8.** **Answer**: The year you were born and the country you live in can affect your life expectancy. These two factors are based on public health advances, changes within diets, attitudes regarding exercise, advances in medical care, access to that medical care, and personal behaviors. Overall health, medical conditions, and medications taken also contribute.

**9.** **Answer**: Rising costs of health care, mortality, death of friends and loved ones, isolation, depression

**10.** **Answer**: The increasing number of older adults in the United States as a result of the baby boom of the 1940s through the 1960s has produced a need for additional extended care facilities.

## Assignments

A. Review all materials from this lesson and be prepared for a lesson quiz to be administered (date to be determined by instructor).

B. Read Chapter 8, “Lifting and Moving Patients,” for the next class session.