Chapter 7, Life Span Developement

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1. Introduction to Lifespan Development in Emergency Care

- Welcome to chapter 7 on lifespan development [1].
- Understanding physiological and psychosocial differences is fundamental [2].
- This chapter covers each phase of human development [2].
- EMTs must be aware of physical changes across stages [5].
- These changes alter the approach to patient care [5].
- Discuss adaptations and strategies for patient assessment [3].
- These strategies can improve patient management [3].

2. Neonates and Infants (Birth to 1 Year)

- neonates are from birth to one month [6].
- infants are from one month to a year [6].
- They develop at a startling rate [6].
- neonates weigh six to eight pounds at birth [7].
- The head is 25% of their body weight [8].
- infants grow about one ounce per day after week two [9].
- They double their weight by four to six months [9].
- Weight triples by the end of the first year [9].

- At birth, neonates transition to independent circulation [10].
- Prior to birth, lungs have never been inflated [11].
- The first breath is facilitated by chest passage [11].
- This increases inner thoracic pressure [11].
- infants younger than six months are prone to nasal congestion [12].
- infants have proportionately larger tongues [13].
- They have proportionately shorter, narrow airways [13].
- Airway obstructions are more common in infants [13].
- The rib cage is less rigid [13].
- Ribs sit horizontally for bag valve mask ventilation [13].
- infant lungs are very fragile [14].
- Forceful ventilations can result in trauma from pressure [14].
- This is called barotrauma [14].
- Respiratory muscles are immature [15].
- There are fewer alveoli in the lungs [15].
- Respiratory problems can quickly become life-threatening [15].
- The nervous system evolves after birth [16].
- neonates are born with certain reflexes [16].
    - moro reflex is a startle reflex [16].
    - They open arms wide and spread fingers [16].
    - They seem to grab at things [16].
    - palmer grasp occurs when an object is placed in palms [17].
    - rooting reflex: turns head towards touch on cheek [18].
    - sucking reflex occurs when lips are stroked [19].
- fontanelles are spaces between skull bones [19].
- The posterior fontanelle fuses at about three months [20].
- The anterior fontanelle fuses at nine to 18 months [20].
- A depressed fontanelle may indicate dehydration [21].
- A bulging fontanelle indicates increased intracranial pressure [21].
- By two months, infants track objects with eyes [24].
- They can recognize familiar faces [24].
- At six months, they can sit upright [25].
- They begin making cooing and babbling sounds [25].

- By 12 months, infants can walk with minimal assistance [26].
- They know their name [26].
- The immune system maintains some mother's immunities [27].
- infants receive antibodies via breast milk [28].
- Breast milk fosters further immune system boosters [28].
- Psychosocial changes begin at birth [29].
- Changes evolve as the infant interacts with the environment [29].
- Crying is the main method of communicating distress [30].
- Bonding is based on a secure attachment [30].
- anxious avoidant attachment is seen in repeatedly rejected infants [30].
- These children show little emotional response to caregivers [31].
- They treat caregivers as strangers [31].
- separation anxiety is common in older infants [32].
- Trust and mistrust is a stage from birth to 18 months [33].
- This involves infant's needs being met by caregivers [33].

Characteristic	Description	Source
Weight	Birth: 6-8 lbs; Doubles by 4-6 mos; Triples by 1 yr	[7]
Head Size	25% of body weight at birth	[8]
Cardiovascular	Transition from fetal to independent circulation at birth	[10]
Pulmonary	Fragile lungs, less rigid rib cage, immature muscles, fewer alveoli	[14]
Nervous System	Born with Moro, Palmer grasp, Rooting, Sucking reflexes; Fontanelles fuse over time	[16]
Immune System	Maintains mother's immunities; Receives antibodies via breast milk	[27]
Communication	Crying is main method	[30]

Attachment	Secure attachment is key; Anxious avoidant attachment from rejection	[30]
Trust	Developed from needs being met by caregivers (birth to 18 mos)	[33]

3. Toddlers and Preschoolers (1 to 6 Years)

- Toddlers are about one to three years old [35].
- Preschoolers are three to six years old [35].
- Cardiovascular system is not dramatically different from adults [35].
- Pulse rate is 80 to 140 beats per minute [36].
- Respiratory rate is 20 to 25 breaths per minute [36].
- Systolic blood pressure is 80 to 100 mmHg [36].
- Lung musculature is not well-developed [37].
- They cannot sustain deep or rapid respirations long [37].
- Weight gain should level off [38].
- Loss of passive immunity is impactful [38].
- Neuromuscular growth makes considerable progress [39].
- Toilet training is usually completed around 28 months [39].
- The psychosocial challenge is autonomy versus shame and doubt [40].
- Basic language is mastered around 36 months [41].
- Interaction and playing games with others begins [41].
- Cause and effect starts to be understood by 18 to 24 months [41].
- Children recognize gender differences by observing role models [42].

4. School-Age Children (6 to 12 Years)

- School-aged children are from 6 to 12 years [43].
- Physical traits and functions mature rapidly [44].
- They grow four pounds each year [45].
- They grow two to five inches each year [45].
- Permanent teeth come in [45].
- Brain activity increases in both hemispheres [45].

- Children learn various types of reasoning [46].
- Three types of reasoning exist [46].
  - pre-conventional reasoning: acting to avoid punishment and get wants [47].
  - conventional reasoning: looking for approval from peers and society [48].
  - Post-conventional reasoning: making decisions guided by consequences [48].
- Children begin developing self-concept at this age [48].
- They also develop self-esteem [48].

Type of Reasoning	Description	Source
Pre-conventional	Actions based on avoiding punishment and getting desires	[47]
Conventional	Seeking approval from peers and society	[48]
Post-conventional	Decisions guided by consequences	[48]

5. Adolescents (12 to 18 Years)

- Adolescents are from 12 to 18 years [50].
- Vital signs level off within adult ranges [51].
- Pulse rate is 60 to 100 beats per minute [51].
- Respiratory rate is 12 to 20 breaths per minute [52].
- Systolic blood pressure is 90 to 110 mmHg [52].
- Adolescents experience a two to three year growth spurt [53].
- Muscle and bone growth increases [53].
- Girls generally finish their growth spurt around 16 [54].
- Boys generally finish their growth spurt around 18 [54].
- The endocrine and reproductive system matures [55].
- Secondary sexual development takes place [55].
- Pubic and axillary hair appear [55].

- Voices start to change [55].
- Menstruation begins [55].
- Conflict with parents often occurs as adolescents gain control [56].
- Privacy becomes an issue [56].
- Self-consciousness increases [56].
- They may struggle to create their own identity [57].
- Multiple options for gender exist [57].
- Many are fixated on their public image [58].
- They often want to be treated like adults [58].
- Yet, they want to be cared for like younger children [58].
- Anti-social behavior and peer pressure peak at 14 to 16 [59].
- Smoking, illicit drug use, and unprotected sex may arise [59].
- Eating disorders can arise from attempts to gain self-control [59].
- A code of personal ethics develops [60].
- Ethics are based on parents' values, peers, and experience [60].
- Adolescents have a high risk for suicide [61].
- They also have a high risk for depression [61].

6. Early Adults (19 to 40 Years)

- Early adults are from 19 to 40 years [62].
- Vital signs do not vary from those in adulthood [62].
- Pulse rate averages around 70 beats per minute [62].
- The range is 60 to 100 beats per minute [62].
- Respiratory rate stays in the range of 12 to 20 [63].
- Systolic blood pressure is between 90 to 120 mmHg [63].
- From 19 to shortly after 23, the body functions optimally [64].
- Lifelong habits are solidified [65].
- The body is working at peak efficiency [65].
- In latter years of early adulthood, aging effects become evident [65].
- Life centers on work, family, and stress [65].
- Adults strive to create a place for themselves [65].
- Many do everything to settle down [65].

- Despite stress and change, this is a stable period [65].

7. Middle Adults (41 to 60 Years)

- Middle adults are between 41 to 60 years [66].
- Vital signs remain about the same [66].
- Middle adults are vulnerable to vision loss [67].
- They are also vulnerable to hearing loss [67].
- Cardiovascular health becomes an issue [67].
- The incidence of cancer increases [67].
- menopause takes place in the late 40s and early 50s [67].
- Diabetes is common [68].
- Hypertension is common [68].
- Weight problems are common [68].
- Exercise and a healthy diet can diminish aging effects [69].
- There is a focus on achieving life's goals [69].
- Middle adults readjust lifestyle as children leave home [70].
- Finances can become a worrisome issue [70].
- Generally, people have physical, emotional, spiritual reserves [70].
- These reserves help handle life's issues [70].
- They may care for children leaving for college [71].
- They may also care for their aging parents [71].

Common Health Issues	**Source**
Vision Loss	[67]
Hearing Loss	[67]
Cardiovascular Problems	[67]
Cancer (increased incidence)	[67]
Diabetes	[68]

Hypertension	[68]
Weight Problems	[68]

8. Older Adults (61 Years and Up)

- Older adults include ages 61 years and up [72].
- Life expectancy is constantly changing [73].
- Currently, it is about 78 years old [73].
- Life expectancy is determined by birth year and country [73].
- They often overcome numerous medical conditions [74].
- They may need multiple medications [74].
- Cardiac function declines with age [75].
- This is largely due to atherosclerosis [75].
- Heart rate and cardiac output decrease [75].
- Cardiac output may not meet body demands [76].
- The vascular system becomes stiff [76].
- The heart works harder to overcome vascular resistance [77].
- Ability to provide replacement blood cells declines [77].
- Blood volume also declines [77].
- The size of airways may decrease or increase [78].
- Surface area of alveoli decreases [78].
- Elasticity and strength of intercostal muscles and diaphragm decrease [78].
- Breathing becomes more labor intensive [78].
- By age 75, vital capacity may be 50% of a young adult [79].
- The chest becomes more rigid and fragile [80].
- Cough and gag reflexes diminish [80].
- Ability to clear secretions diminishes [80].
- Older adults are at greater risk of aspiration [80].
- They are also at greater risk of airway obstruction [80].
- Smooth muscles of the lower airway weaken [81].
- This causes airway collapse on inhalation [81].
- This produces inspiratory wheezing [82].

- Lower flow rates and air trapping in alveoli occur [82].
- Older adults are more susceptible to lung infections [83].
- Insulin production drops off [84].
- Metabolism decreases [84].
- Reproductive system changes occur [85].
- Hormone production for both sexes decreases gradually [86].
- Sexual desire may diminish but does not cease [86].
- Changes occur in gastric and intestinal function [87].
- This may inhibit natural intake and utilization [87].
- Tooth loss may make chewing difficult [87].
- Taste and sensations decrease [87].
- Saliva secretion decreases [87].
- This reduces ability to produce complex carbohydrates [87].
- Intestines' ability to contract and move food diminishes [88].
- Gastric acid secretion diminishes [88].
- Gallstones become increasingly common [88].
- Decreased elasticity of anal sphincter causes fecal incontinence [88].
- Renal filtration function declines by 50% from 20 to 90 [89].
- Kidney mass decreases 20% over the same span [90].
- Blood supply reduction occurs in the kidneys [90].
- Ability to remove waste decreases [91].
- Ability to conserve fluids decreases when needed [91].
- Brain weight may shrink 10 to 20% by age 80 [92].
- Motor and sensory neural networks become slower [93].
- Neurons are lost [94].
- This does not mean loss of knowledge or skill [94].
- Sleep patterns change [94].
- Age-related shrinkage creates a void between brain and meninges [95].
- This void provides room for the brain to move when stressed [95].
- Peripheral nerves slow with age [96].
- Sensations become diminished and may be misinterpreted [96].
- Increased reaction time causes longer delays between stimulation and motion [97].

- Prolonged reaction times and slower reflexes contribute to falls [97].
- Pupillary reaction and ocular movements become restricted [98].
- Visual distortions are common [98].
- Peripheral fields of vision narrow [98].
- Hearing loss is four times more common than vision loss [98].
- Loss of high frequency hearing or deafness occurs [98].
- Most people retain high brain function until about five years before death [99].
- 95% of the elderly live at home [100].
- They may need assistance from family, friends, or home health care [100].
- Increased need exists for assisted living facilities [100].
- Financial limits may restrict healthcare access or medications [100].
- Over 50% of single women 60 or older live at or below poverty [101].
- Facing their own mortality is an important issue [102].
- Isolation and depression are also issues [102].
- These changes can be challenges [103].

System	Changes	Source
Cardiovascular	Declining function, atherosclerosis, decreased cardiac output, stiff vascular system, reduced blood volume	[75]
Respiratory	Airway size changes, decreased alveoli surface area, reduced muscle elasticity, more labor intensive breathing, reduced vital capacity, rigid chest, diminished reflexes	[78]
Endocrine	Decreased insulin production, decreased metabolism	[84]
Reproductive	Gradual decrease in hormone production, sexual desire may diminish	[86]
Digestive	Changes in function, inhibited intake/utilization, tooth loss, decreased taste/sensations, reduced saliva, decreased intestinal contraction, diminished	[87]

	gastric acid, common gallstones, fecal incontinence	
Renal	50% filtration function decline (20-90), 20% kidney mass decrease, reduced blood supply, decreased ability to remove waste/conserve fluids	[89]
Nervous	Brain weight shrinks, slower neural networks, neuron loss, altered sleep patterns, void between brain/meninges, slowed peripheral nerves, diminished/misinterpreted sensations, increased reaction time, slower reflexes	[92]
Sensory	Restricted pupillary/ocular movements, visual distortions, narrowed peripheral vision, hearing loss (especially high frequency)	[98]

9. Conclusion and Review

- Review questions test understanding of chapter concepts [105].
  - Bag valve mask ventilation in infants requires remembering lungs are fragile [106].
  - An infant reaching out and drooling is likely four months old [107].
  - A repeatedly rejected infant experiences anxious avoidant attachment [108] .
  - Colds develop easily in toddlers/preschoolers due to loss of passive immunity, less developed lung musculature, and time around playmates [109].
  - The pulse rate of a toddler is slightly higher than adults at 90 to 150 bpm [111].
  - A school-aged child seeking peer/society approval shows conventional reasoning [112].
  - self-concept is how we perceive ourselves [114].
  - Be concerned about a depressed 16-year-old because adolescents have a higher suicide rate [114].
  - Finances become an issue in middle adulthood due to supporting children and aging parents [115].

    - Breathing is more labor-intensive for the elderly due to decreased intercostal muscle/diaphragm strength, decreased alveoli surface area, and reduced elasticity of lung tissue [117].
- This concludes chapter seven on lifespan development [119].