

Geriatric Respiratory Care

Arthur Jones, EdD, RRT

Learning Objectives

- ^ Describe the effects of aging on organ systems.
- ^ Describe cardiopulmonary diseases among the aging population.
- ^ Explain changes in symptomatology of cardiopulmonary diseases due to aging.
- ^ Explain special problems among geriatric patients, as well as accommodations respiratory therapists can implement in caring for them.

Aging

Sciences of Aging

- ^ Geriatrics - a branch of medicine that deals with the problems and diseases of old age and aging people.
- ^ Gerontology - the scientific study of aging and problems of the aged.

Aging population

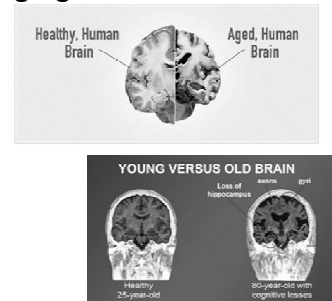
- ^ Prominent researchers discovered a significant correlation between the passage of time and aging.

Aging population

- ^ What is old??
 - ◆ baby boomers define old age as greater than 79 YO
 - ◆ people define their degree of aging by limitations, or lack thereof

Aging systems**^ Central nervous system**

- ◆ natural changes
 - loss of neurons
 - nerve transmission slows
- ◆ memory loss
- ◆ reflexes slower
- ◆ sensory loss
 - hearing - accelerated by noise
 - vision

Aging systems**^ Aging brain****Aging systems****^ Musculoskeletal system**

- ◆ decreased bone density - predisposition to fractures
- ◆ decreased muscle mass
- ◆ arthritic changes
- ◆ decreased mobility

Aging systems**^ Renal**

- ◆ some loss of nephrons
- ◆ kidney function relatively normal, except:
 - damage from urethral blockage; e.g., prostatic
 - diabetic end-stage renal disease

Aging systems**^ Gastrointestinal**

- ◆ most common geriatric complaints are those involving the GI tract
 - reflux
 - constipation
 - incontinence

^ Hepatic

- ◆ prolonged exposure to toxins, free radicals
- ◆ causes slower drug metabolism

Aging systems**^ Circulatory**

- ◆ heart
 - increased endocardial thickness
 - increased LV wall thickness
 - left atrial hypertrophy
 - decreased sinoatrial cell numbers

Aging systems**^Circulatory**

- ◆ Atherosclerotic vascular changes
- ◆ Increased risk for:
 - ▶ hypertension
 - ▶ ischemic heart disease
 - ▶ congestive heart failure (CHF)

Aging systems**^Pulmonary**

- ◆ loss of alveoli and capillaries
- ◆ loss of elastic tissue and recoil - lung compliance increases
- ◆ decreased costovertebral joint mobility - thoracic compliance decreases
- ◆ expiratory flow decreases, due to:
 - ▶ increased lung compliance
 - ▶ airway collapse

Aging systems**^Pulmonary**

- ◆ net effects of altered mechanics
 - ▶ decreased total compliance
 - ▶ increased work of breathing
 - ▶ decreased cough effectiveness

Aging systems**^Pulmonary**

- ◆ impaired mucociliary clearance
- ◆ decreased numbers of alveolar macrophages
- ◆ blunted ventilatory response to hypercapnia and hypoxemia

Aging systems**^Pulmonary**

- ◆ decreased diffusing capacity
- ◆ PaO₂ decreases to 80 mm Hg at 75 YO
- ◆ aging accelerated by smoking

Aging systems**^Pulmonary**

- ◆ decreased numbers of beta₂ receptors - unresponsiveness to bronchodilators
- ◆ declining immunity predisposes to infections
- ◆ dysphagia & reflux predispose to aspiration

Prevalent Conditions

Pneumonia

- ^ Before antibiotics (circa 1945), infections, like pneumonia, were leading cause of death
- ^ Currently, pneumonia is the fourth leading cause of death in elderly
- ^ Microorganisms developed resistant strains; e.g., MRSA
- ^ Elderly are most vulnerable to COVID19

Pneumonia

- ^ Non-pulmonary factors increasing susceptibility
 - ◆ poor nutrition
 - ◆ immobility
 - ◆ comorbidity
 - ◆ institutional residence (nursing homes)
 - ◆ dysphagia - risk for aspiration

Pneumonia

- ^ Manifestations in elderly
 - ◆ change in mental status
 - ◆ tachypnea
 - ◆ tachycardia

Pneumonia

- ^ Usual manifestations that are unreliable in elderly patients:
 - ◆ fever
 - ◆ cough
 - ◆ dyspnea
 - ◆ auscultatory signs
 - ◆ chest radiograph

Pneumonia

- ^ Community acquired pneumonia risk score (see link below)
- ^ Risk is classified as I-V based on points
- ^ Determines likelihood of a given patient's risk for pneumonia

Pneumonia

- ▲ **Pneumococcal vaccine**
 - ◆ 65 YO or high risk; e.g., nursing home residence
 - ◆ booster after five years
- ▲ **Influenza vaccine**
 - ◆ prevent viral pneumonia
 - ◆ prevent secondary pneumonia from influenza

Asthma

- ▲ **Underdiagnosed and undertreated in elderly patients**
- ▲ **Presentation types:**
 - ◆ late onset (>65 YO)
 - ▶ non-allergic
 - ▶ associated with hormone replacement
 - ◆ long-standing
 - ▶ allergic manifestations
 - ▶ sometimes remission during mid-life

Asthma

- ▲ **Confounding factors among geriatric patients**
 - ◆ patient may not be able to cooperate with spirometry
 - ◆ impaired response to beta agonists can mask reversibility
 - ◆ manifestations resemble:
 - ▶ COPD
 - ▶ CHF (AKA cardiac asthma)

COPD

- ▲ **primary or contributing admission diagnosis for 18% patients > 65 YO**
- ▲ **aging of lung accelerated by smoking**
- ▲ **smoking cessation is most important intervention**

COPD

- ▲ **Pathology**
 - ◆ airway inflammation
 - ◆ bronchoconstriction
 - ◆ airway remodeling
 - ◆ parenchymal (alveolar) destruction

COPD

- ▲ **Complications**
 - ◆ systemic inflammation - multiple organ systems
 - ◆ pulmonary hypertension - cor pulmonale
 - ◆ congestive heart failure
 - ◆ secondary polycythemia
 - ◆ atrial dysrhythmias - predispose to pulmonary emboli
 - ◆ pneumonia - major cause of exacerbations

Interstitial lung diseases

- ^ interstitial pulmonary fibrosis - progressive, terminal
- ^ drug-induced lung disease; e.g., amiodarone
- ^ occupational lung diseases - hazardous work environments prior to regulations
- ^ connective tissue disease; e.g. rheumatoid arthritis

Sleep related breathing disorders

- ^ Prevalence increases with age
 - ◆ diminished ventilatory drive
 - ◆ altered sleep patterns
 - ◆ greater number of central apneas

Sleep related breathing disorders

- ^ Complications
 - ◆ increased cardiovascular deaths in elderly, especially females
 - ◆ hypertension
 - ◆ diabetes
- ^ Implication - more CPAP/BiPAP in nursing homes

Congestive heart failure

- ^ Left and/or right ventricular pump failure
- ^ Prominent cause of disability and nursing home admissions

Congestive heart failure

- ^ Causes:
 - ◆ pulmonary disease - cor pulmonale
 - ◆ hypertension
 - ◆ cardiomyopathy
 - ◆ valve disease
 - ◆ ischemic heart disease
 - ◆ myocytic apoptosis - programmed myocardial cell death

Congestive heart failure

- ^ Manifestations:
 - ◆ Cheyne-Stokes breathing
 - ◆ tachypnea, dyspnea
 - ◆ hypoxemia
 - ◆ orthopnea
 - ◆ wheezes, rhonchi, crackles

Congestive heart failure

- ^ Admission picture -- is it?
 - ◆ CHF
 - ◆ pneumonia
 - ◆ COPD exacerbation
 - ◆ all of the above

Cerebrovascular disease

- ^ Common cause of death and disability
- ^ Complications:
 - ◆ paralysis - often unilateral
 - ◆ dysphagia - predisposes to aspiration
 - ◆ dysphonia
 - ◆ coma - extreme cases

Cerebrovascular disease

- ^ Cerebrovascular accidents
 - ◆ embolus - ischemic stroke
 - ◆ hemorrhage
 - ◆ transient ischemic attack (TIA)
- ^ Often trauma admission - did the fall cause the stroke or did the stroke cause the fall?

Cancer

- ^ Increased longevity has increased incidence of cancer
- ^ Longer duration of exposure to carcinogens of all types
- ^ Age-related types:
 - ◆ pancreas
 - ◆ stomach
 - ◆ colon
 - ◆ prostate
 - ◆ breast

Cancer

- ^ Symptoms may be masked by comorbidities
- ^ Fear of diagnosis may prevent patients from seeking care
- ^ Benefits, vs. risks for interventions must be considered

Cancer

- ^ Example: An 85 YO is diagnosed with lung cancer
 - ◆ Comorbidities: CHF, COPD
 - ◆ Lobectomy is best option for cure
 - ◆ Survival without surgery - 1 year
 - ◆ Strong likelihood of ventilator dependence post-operatively
 - ◆ To cut, or not to cut.....??
 - a year with palliation, comfort measures
 - possible ventilator dependence

Other predispositions

- △ End-stage renal disease
 - ◆ especially in diabetics
 - ◆ many geriatric dialysis patients
- △ Trauma - osteoporosis increases risk for fractures
- △ Increased risk for postoperative complications
 - ◆ comorbidities
 - ◆ deconditioning, due to immobility
 - ◆ malnutrition

Problems in Diagnosis

- △ Symptomatology
 - ◆ cough
 - ▶ angiotensin converting enzyme (ACE) inhibitors; e.g. captopril (Capoten)
 - ▶ postnasal drip
 - ▶ reflux
 - ▶ asthma
 - ◆ dyspnea - patients may believe it normal condition with aging
 - ◆ wheezing - may be caused by CHF

Problems in Diagnosis

- △ Medical imaging - positioning can be problematic, especially supination
- △ Pulmonary function testing
 - ◆ inability to cooperate
 - ▶ cognitive impairment
 - ▶ physical impairment
 - ◆ age range for normal results

**Accommodating
Geriatric Patients****Barriers to care**

- △ Symptomatology
 - ◆ may change with aging
 - ◆ may be unable to relate them
- △ Nutrition
 - ◆ elderly can forget to eat
 - ◆ malnutrition predisposes to:
 - ▶ immunosuppression
 - ▶ delayed healing

Barriers to care

- △ Decreased mobility
 - ◆ impairs access to care
 - ◆ causes deconditioning - vicious cycle; e.g., deconditioning ==> impaired mobility ==> deconditioning ==>

Barriers to care**^ Pharmacology**

- ◆ adherence to dosage schedule
- ◆ multiple medications from multiple physicians - increased risk for interactions
- ◆ impaired drug clearance - liver and kidney function

Barriers to care**^ Pharmacology**

- ◆ decreased beta sensitivity - impaired response
- ◆ increased risk for adverse effects
 - ▶ corticosteroids; e.g., osteoporosis
 - ▶ xanthines - drug interactions

Barriers to care**^ Pharmacology**

- ◆ impaired ability for aerosolized drugs
 - ▶ hand mobility; e.g., arthritis
 - ▶ coordination, palsy; e.g., Parkinsonism
 - ▶ generation of inspiratory flow for dry powder inhaler (DPI)

Barriers to care**^ Mental status**

- ◆ difficult to assess changes in presence of:
 - ▶ dementia
 - ▶ dysphonia (inability to speak)
- ◆ may impair adherence to therapeutics

Barriers to care**^ Sensory**

- ◆ hearing impairment
- ◆ visual impairment

^ Bi-directional communication barriers**Barriers to care****^ Finances**

- ◆ ability to pay for services, medications
- ◆ worry over ability to pay
- ^ Families - help or hindrance

Barriers to care

- ^ **Surgical risk**
 - ◆ multiple system failure
 - ◆ least invasive procedures as possible
- ^ **Psychosocial - devaluation of elderly**
 - ◆ by themselves
 - ◆ by caregivers

Attitude of Caring

- ^ **Respect the patient and treat them with respect (first names??)**
- ^ **Accommodate for sensory impairment**
- ^ **Take time with patient - enjoy it**
- ^ **Encourage patient's taking personal control - they are patients, not children**

Geriatric Gentleman

- ^ **An extremely modest, elderly gentleman was in the hospital for a series of tests, the last of which had left his system upset. Upon making several false alarm trips to the bathroom he decided the latest was another so he stayed in his bed. This was a terrible mistake. He suddenly filled his bed with diarrhea and was embarrassed beyond his ability to remain rational.**
- ^ **Losing his presence of mind, he jumped up, gathered up the bed sheets, and threw them out the hospital window.**

Geriatric Gentleman

- ^ **A drunk was walking by the hospital when the sheets landed on him. He started yelling, cursing, and swinging his arms wildly, which left the soiled sheets in a tangled pile at his feet. As the drunk stood there staring down at the sheets, a security guard who had watched the whole incident walked up and asked, "What the hell was that all about?"**
- ^ **Still staring down, the drunk replied: "I think I just beat the crap out of a ghost!"**

Care Sites

- ^ **Acute care hospitals**
 - ◆ most expensive alternative
 - ◆ discharging sicker patients
- ^ **Home**
 - ◆ least expensive alternative
 - ◆ caregivers
 - family - require respite
 - home healthcare personnel
 - home care RCPs play significant role

Care Sites

- ^ **Long-term care facilities; e.g., nursing homes**
 - ◆ patients
 - majority of patients admitted for dementia
 - trend toward sicker patients
 - greater female population

Care Sites

- ▲ Long-term care facilities; e.g., nursing homes
 - ◆ functions
 - ▶ rehabilitation - restoration of activities of daily living (ADLs)
 - ▶ caring, not curing
 - ▶ terminal care (hospice)

Care Sites

- ▲ Relocation, transfer trauma
 - ◆ high death rate among elderly patients first 90 days after nursing home admission
 - ◆ causes
 - ▶ environmental change
 - ▶ loss of personal control
 - ▶ loss of will to live

Respiratory therapeutics

- ▲ Supplemental oxygen
 - ◆ indication - chronic hypoxemia (PaO₂ < 55 mm Hg, SpO₂ < 88%)
 - ◆ benefits
 - ▶ increases survival
 - ▶ improves quality of life - enables activities
 - ▶ reverses polycythemia
 - ▶ reverses pulmonary hypertension
 - ◆ utilization of home oxygen will increase

Respiratory therapeutics

- ▲ Aerosol therapy
 - ◆ Patient education adapted for sensory impairment
 - ▶ large print
 - ▶ repetition
 - ▶ follow-up, follow-up, follow-up
 - ◆ minimize frequency of medications to improve adherence

Aerosol therapy

- ▲ Administration devices
 - ◆ nebulizers - new generation, non-pneumatic
 - ◆ spacer, with mask
 - ◆ breath-actuated inhalers
 - ▶ Airmax GOLD
 - ▶ Autohaler GOLD
 - ▶ Easi-breathe GOLD
 - ▶ MicroDose DPI system - lots of potential

Respiratory therapeutics

- ▲ Pulmonary clearance
 - ◆ incentive spirometry
 - ▶ many patients can not cooperate
 - ▶ most never taught correctly
 - ▶ no evidence of benefit
 - ◆ percussion and postural drainage
 - ▶ trauma from percussion
 - ▶ vomiting from drainage positions
 - ▶ no evidence of benefit

Respiratory therapeutics

- ^ Pulmonary clearance
 - ◆ positive expiratory pressure with vibration (Acapella™) - with mask
 - ◆ percussion vest

Mechanical ventilation

- ^ Two studies found that given similar severity of illness, elderly patients:
 - ◆ similar time on ventilator
 - ◆ lower cost of care
 - ◆ conclusion - ventilation should not be restricted on the basis of age

Mechanical ventilation

- ^ Precautions
 - ◆ Risk for ventilator-associated pneumonia increased in patients from nursing homes
 - ◆ Patients may have weakened lung parenchyma - prevent volutrauma
 - ◆ Likelihood of comorbidities; e.g., CHF

Review & Summary

- ^ Effects of aging
 - ◆ central nervous system
 - ◆ musculoskeletal system
 - ◆ renal system
 - ◆ gastrointestinal system
 - ◆ circulatory system
 - ◆ pulmonary system

Review & Summary

- ^ Prevalent conditions
 - ◆ pneumonia
 - ◆ asthma
 - ◆ COPD
 - ◆ interstitial lung disease
 - ◆ sleep related breathing disorders
 - ◆ congestive heart failure
 - ◆ cerebrovascular disease
 - ◆ cancer
 - ◆ end-stage renal disease

Review & Summary

- ^ Problems in diagnosis
- ^ Barriers to care
 - ◆ symptomatology
 - ◆ nutrition
 - ◆ immobility
 - ◆ pharmacology
 - ◆ mental status
 - ◆ sensory impairment
 - ◆ finances
 - ◆ psychosocial problems

Review & Summary

^ **Attitude of caring**

^ **Care sites**

^ **Respiratory therapeutics**

◆ **supplemental oxygen**

◆ **aerosol therapy**

◆ **pulmonary clearance techniques**

◆ **mechanical ventilation**