Respiratory Care for the Geriatric Patient

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This Presentation is Approved for
1 CRCE Credit Hour

Learning Objectives

- Describe the prevalence of cardiopulmonary disease among the aging population
- 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 & diseases of old age & aging people
- Gerontology: the scientific study of aging & problems of the aged

Aging Population

- Prominent researchers discovered a significant correlation between the passage of time & 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

See links below for illustration of 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)

FYI see links below for article on aging & the cardiovascular system

Aging Systems

- Pulmonary
  - Loss of alveoli & capillaries
  - Loss of elastic tissue & recoil - lung compliance increases
  - Decreased costovertebral joint mobility - thoracic compliance decreases
  - Expiratory flow decreases, due to
    - Increased lung compliance
    - Airway collapse

FYI see links below for link to aging & the lung

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 & hypoxemia

Aging Systems

- Pulmonary
  - Decreased diffusing capacity
  - PaO_2 decreases to 80 mm Hg at 75 YO
  - Aging accelerated by smoking

Aging Systems

- Pulmonary
  - Decreased numbers of $beta_2$ 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

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

FYI see links below for article on pneumonia & elderly patients

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

See links below to view pneumonia risk scoring system
FYI see links below for clinical pulmonary infection score (CPIS) calculator

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

FYI see links below for information on vaccines

Asthma

- Underdiagnosed & 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)

FYI see links below for article on asthma in elderly patients

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

FYI see links below for article on drug-induced pulmonary toxicity

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 &/or right ventricular pump failure
- Prominent cause of disability & nursing home admissions

Congestive Heart Failure

- Causes
  - Pulmonary disease - cor pulmonale
  - Hypertension
  - Cardiomyopathy
  - Valve disease
  - Ischemic heart disease
  - Myocytic apoptosis - programmed myocardial cell death

FYI see links below for article on myocardial apoptosis

Congestive Heart Failure

- Manifestations
  - Cheyne-Stokes breathing
  - Tachypnea, dyspnea
  - Hypoxemia
  - Orthopnea
  - Wheezes, rhonchi, crackles
- Admission picture - is it?
  - CHF
  - Pneumonia
  - COPD exacerbation
  - All of the above

Cerebrovascular Disease

- Common cause of death & 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 & 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
- 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 & 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

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 (PaO_2 < 55 mm Hg, SpO_2 < 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

Aerosol Therapy

- Breath-actuated inhalers
  - Airmax GOLD - budesonide
  - Autohaler GOLD - albuterol, beclomethasone, fenoterol/atrovent
  - Easi-breathe GOLD - albuterol, beclomethasone

Respiratory Therapeutics

- Pulmonary clearance
  - Incentive spirometry
    - Many patients can not cooperate
    - Most never taught correctly
    - No evidence of benefit
  - Percussion & 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

FYI see links below for article on mechanical ventilation & elderly patients

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

Summary & Review

- Effects of aging
  - Central nervous system
  - Musculoskeletal system
  - Renal system
  - Gastrointestinal system
  - Circulatory system
  - Pulmonary system

Summary & Review

- Prevalent conditions
  - Pneumonia
  - Asthma
  - COPD
  - Interstitial lung disease
  - Sleep related breathing disorders
  - Congestive heart failure
  - Cerebrovascular disease
  - Cancer
  - End-stage renal disease

Summary & Review

- Problems in diagnosis
- Barriers to care
  - Symptomatology
  - Nutrition
  - Immobility
  - Pharmacology
  - Mental status
  - Sensory impairment
  - Finances
  - Psychosocial problems

Summary & Review

- Attitude of caring
- Care sites
- Respiratory therapeutics
  - Supplemental oxygen
  - Aerosol therapy
  - Pulmonary clearance techniques
  - Mechanical ventilation