

Northwest Community EMSS
Continuing Education
Special patient population: ELDERLY
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Objectives:

Upon completion of the class and independent reading, each participant will independently do the following within their scope of practice with a least an 80% degree of accuracy and no critical errors:

1. Define aging.
2. Identify the physiologic changes that occur as a result of aging.
3. Explain the ways to adapt to an older patient's physical and cognitive deficits when performing a physical exam.
4. Predict the normal assessment findings in older patients taking into account the physiologic changes of aging and adaptive responses to illness and injury.
5. Evaluate the potential for fall risk and polypharmacy in the older adult patient.
6. Identify side effects and drug interactions caused by some of the more commonly used drugs in the older patient population.
7. Discuss common illnesses and injuries experience by elderly patients in the NWC EMSS.
8. Describe the initial evaluation and treatment of an elderly patient including airway management, ventilatory assessment and support; optimizing oxygenation; cardiovascular (CV) support with IV fluids and potentially vasopressors, neurologic assessment and management; pain assessment and management; safe packaging (if transported), and appropriate patient dispensation.
9. Identify ways to prevent or reduce the risk of complications seen in elderly patients.
10. Evaluate a patient case study to determine the patient's problem and sequence her plan of care.
11. Value the need to provide compassionate and competent patient-centered care to aging adults tailored to their unique circumstances.

I. **Introduction**

- A. A geriatric patient is defined as 65 years of age or older. The baby boomer generation, born between January 1, 1946 and December 31, 1964, has begun turning 65 years of age and are rapidly swelling the ranks of over 75 million people entering the retirement years. By 2040, this age group will make up over 20% of the population in the United States (Blumenthal, Plummer & Gambert, 2012).
- B. As technology advances and people are able to live longer, it is important to realize the uniqueness of the elderly population. They often present with significant co-morbid conditions and have limited physiologic reserves. Given these changes, assessment and management of seniors may be drastically different from that of younger persons.
- C. "Geriatric patients are almost three times more likely to be transported to an emergency department by ambulance and three times more likely to be admitted to the hospital. They're also more than twice as likely to be triaged as critical in the ED" (Widmeier, 2013).

I. **Biology of aging - Aging versus disease**

- A. Medical achievements have increased life expectancy, but not the life span.
- B. **Chronological vs Biological age.** *Aging does not affect everyone equally.* People age differently and at disparate rates. However, there are certain physiologic changes that occur in all individuals as a function of aging, although the timing can vary widely. A person can look and act older or younger than their chronological age.
- C. All cells sustain changes as they age. While normal cells have built in mechanisms to repair minor damage, this ability to repair declines with age.
- D. Functional aging is influenced by genetic determinants, disease, and cultural, environmental, occupational, and socio-economic factors. Health behaviors (diet, exercise, tobacco, alcohol/drugs, rest, stress, and attitudes also play a part.
- E. When approaching an elderly patient, one must determine what complaints constitute a medical/trauma emergency, a disease process, or are a normal part of "aging".
- F. A **disease** is an interruption in physiologic function that causes harm to the individual.
 - 1. Diseases can result in generalized disability or functional disruption of the entire person or they can be localized/isolated to one organ system, causing specific failures.
 - 2. Aging is not necessarily accompanied by disease and disability. Although the elderly population has increased, the percentage of older persons residing in nursing homes has decreased.
- G. **Normal aging process:** Just as infants have **no reserve function**, think of elderly patients as lacking those same reserves. The **1% Rule** states that most organ systems lose function at roughly 1%/year, beginning around age 30. Many of these losses cannot be detected until they reach a critical threshold. The higher the demand on the organ, the less loss can be tolerated. Thus, elderly patients poorly tolerate stress and shock states. Once in a low-flow state, they take longer to recover.
- H. **Disease/trauma assessment:** Physiologic responses to illness and injury may differ from those seen in younger individuals due to biological changes associated with aging. Key to managing these patients is assessing the **loss of reserve function. Evaluate each patient for these five points:**
 - 1. Which organ system is involved?
 - 2. How severely impaired is its function?
 - 3. Does this impairment threaten the individual's

- a. life,
 - b. daily activities,
 - c. career activities,
 - d. recreational activities?
4. What is this individual's reasonably expected level of function?
 5. What was this person's level of function earlier today, last week?

II. **Physiologic changes of aging – see chart at end of handout:**

A. **Cardiovascular changes**

1. **Heart rate and rhythm**

a. **SA node functioning**

- (1) Heart rate decreases with age
- (2) In younger hearts, the SA node is made up of about 50% pacing myocytes, but in older persons, less than 10% of pacing myocytes may be present.
- (3) Due to the reduction in myocytes, the aging heart is often unresponsive to autonomic stimulation.

b. **AV node/Bundle branch functioning**

- (1) As the heart ages, distal left ventricular conduction is delayed, accounting for a leftward axis deviation on ECG.
- (2) The leftward shift can be accelerated in earlier years due to hypertension or ischemic heart disease.
- (3) In the presence of disease, left ventricular conduction delay can progress into left anterior hemi-block or complete left bundle branch block.
- (4) RBB conduction can also be affected, but is usually associated with disease states such as pulmonary hypertension.

c. **Rhythm disturbances**

- (1) Conduction defects and cardiac dysrhythmias are more common in the elderly, even in the absence of significant cardiovascular disease
- (2) It is generally felt that about 1/3 of all healthy older adults may be in atrial fibrillation. Conduction changes in the SA node make the older heart more susceptible to atrial fibrillation.

2. **Hemodynamics**

- a. Maximal HR declines after age 40.
- b. Decreased cardiac stroke volume and HR due to myocardial "stiffening". Ventricular diastole is impaired as relaxation occurs more slowly.
- c. Ventricular stiffening + delayed diastole cause an underfilling of the ventricles (most importantly the left ventricle).
- d. Because of these changes, myocardial oxygen consumption increases disproportionately to maintain cardiac output.
- e. In the healthy older adult, there is a balancing of system supply and demand - cardiac output is decreased AND the body's demand for oxygen is also decreased. (This is due to the reduction in lean body mass that occurs with aging.). However, significant blood volume loss may be masked in the absence of early tachycardia (further compromised if the patient is on beta blockers)
- f. Impaired blood flow to lower legs

3. **Vessel stiffening**

- a. Coronary artery disease increases with advancing age. By age 65, 50% of the population has coronary artery stenosis.
- b. The media of vessel walls becomes stiff. Increased aortic resistance (afterload) increases the systolic BP and causes thickening of the left ventricular walls.
- c. Calcifications may occur in the aorta and coronary arteries as well as other vessels. Vascular calcification is associated with the reduced ability to *vasoconstrict*.
- d. Positional/postural vertigo is a result of vascular wall stiffness, the inability to constrict and impaired autonomic/baroreceptor response. This becomes more significant in some patients, especially those taking antihypertensive agents, nitrates, or other vasoactive drugs.
- e. Studies have shown the elderly to be less responsive to catecholamines due to defects at catecholamine receptor sites. During exercise, there is an increased release of catecholamines as compared to younger patients but they don't work as well.

4. **Caveats in elderly care**

- a. Reduced myocardial functioning increases the risk of pump failure in response to physiologic stress, shock and trauma.
- b. Reduced sensitivity to ANS stimulation impairs baroreceptor responses. Therefore, reflex vasoconstriction and tachycardia may not be the "typical response" to instability, hemorrhage, or shock. Early shock may not be recognized, monitor pulse pressure, MAP and EtCO₂ for declining values.
- c. Medications:
 - (1) Medications prescribed for hypertension (beta or calcium channel blockers) may limit the normal tachycardic response in shock and impair the ability to respond to hypotensive events.
 - (2) Coumadin (warfarin), other anticoagulants, and anti-platelet drugs can increase systemic or intracranial hemorrhage. Let OLMC know ASAP that the patient is taking one of those drugs. See SOP page 21 for a listing of drug names).
- d. Hypotension carries significantly higher mortality rates for older patients and is usually considered a rather late and unreliable sign of hemorrhage.
- e. Elderly patients have an increased risk of developing both cerebral and myocardial infarcts due to atherosclerosis. They also have the need for increased perfusion to the brain and coronary arteries during prolonged or severe hypotensive episodes.
- f. Resuscitation for the elderly patient should be early, rapid and aggressive. This includes careful circulatory support to treat occult shock and to identify and optimize cardiovascular functioning to prevent end organ damage.
 - (1) Some literature suggests that elderly patients with a HR >90 or a SBP < 110 should be taken to a trauma center (CDC, 2013; Heffernan et al, 2010).
 - (2) Increasing fluid preload alone does not always increase oxygen delivery. Inotrope support may be needed to provide vasoconstriction. (Think septic shock – need IVF plus vasopressors)

B. Respiratory system

1. Work of breathing

- a. Most respiratory parameters decrease with age
- b. The thoracic cage stiffens and rigidity decreases lung compliance causing an increase in the work of breathing. (This reduced flexibility is a major consideration in patients with chest trauma due to the increased risk of rib fractures.)
- c. The chest may become more barrel-shaped from degeneration of intervertebral discs causing kyphosis.
- d. Respiratory muscles lose strength and become less efficient. If a patient needs more O₂, work of breathing increases dramatically.
- e. The diaphragm changes shape as muscle fibers flatten and become shorter, thus increasing the radius of the diaphragmatic curve. Inhalation becomes less complete and weaker due to the shape of the diaphragm.
- f. These changes cause a decrease in vital capacity, forced expiratory volume, and the functional residual capacity which decreases respiratory reserve and limits the ability to tolerate even minor trauma.

2. Inside the lungs

- a. Larger airways and barrel-shaped thorax increase dead space.
- b. Ciliary action is reduced.
- c. Older adults lose inward elastic recoil of the lungs.
- d. **Gas diffusion changes with aging.** Reduced oxygen diffusion is related to loss of surface area in the alveolar-capillary membrane. Ventilation perfusion mismatching increases by about 4 mmHg per decade after the age of 20. This occurs from closure of smaller airways causing unequal distribution of ventilation.
- e. Weaker muscles cause less efficient inhalation, thus reducing PaO₂.
- f. Because expiration is passive, there are no changes in PaCO₂ levels. This is because there is less O₂ demand by the tissues due to the decreased lean body mass and the reduced metabolic rates in older adults.

3. Pulmonary vulnerability to insult/injury

- a. Cough reflex may be ineffective.
- b. Changes in the structure of the thorax and in pulmonary functioning reduce the ability to resist infections and overcome traumatic insult.
- c. Response to hypoxia, hypercarbia, and acidosis are blunted.

4. Caveats for elderly care

- a. Increased work of breathing in an elderly patient with pulmonary contusion or predisposition to ARDS/MODS is more dramatic than in younger patients.
- b. Elderly patients who have blunt thoracic trauma are more at risk for rib fractures due to thoracic bone brittleness.
- c. Seniors are prone to ventilatory failure due to decreased lung compliance, decreased ability to breathe deeply and efficiently, and an increased work of breathing.
- d. Elderly patients do not usually raise their CO (lack of reserve functioning) to compensate for increased oxygen needs. Because of this, oxygenation for this patient may almost totally be dependent on hemoglobin levels.

- e. For patients in chronic hypercarbic states (COPD), respiratory failure can be devastating. As the body compensates for "normal" hypercarbia, only the additional PaCO₂ of respiratory failure needs to be eliminated. If the patient is intubated and hyperventilated to a PaCO₂ of 35-45 mmHg, the patient may suffer lethal dysrhythmias from calcium binding. It is important to slowly reduce the PaCO₂ (not more than 5 mmHg/hr).

C. **GI**

1. ↓ Saliva production; difficulty chewing and swallowing
2. ↓ Thirst sensation - dehydration
3. ↓ Taste buds
4. Gum atrophy
5. ↓ Esophageal activity
6. ↓ gastric acid production; difficulty with digestion
7. ↓ Intestinal motility
8. ↓ Liver size and function
9. Net effects
 - a. Difficulty with digestion
 - b. Feel full early
 - c. Dry mouth
 - d. ↓ appetite, enjoyment
 - e. Tooth loss
 - f. Risk of toxicity (drugs, alcohol)
 - g. Diminished clotting

D. **Central nervous system changes**

1. **Brain**
 - a. The risk of subdural hemorrhage from head injury increases because the Dura adheres tightly to the inside of the skull and bridging veins become stretched due to decrease in brain mass (intelligence is not altered).
 - b. Brain atrophy increases the space in which blood can accumulate and may delay the appearance of associated signs and symptoms.
2. **Changes in cognition**
 - a. Decreased attention span (the ability to focus on a specific stimulus and screen out distractions)
 - b. Decreased vigilance (sustained attention)
 - c. Decreased ability to shift mentation from one focus to another
 - d. Decreased ability to handle divided attention (focus on competing stimuli)
 - e. Delayed processing speed when performing tasks (verbal or manual)
 - f. Difficulty in learning new skills
 - g. Dabetics are more sensitive to cognitive changes
3. **Changes in memory**
 - a. Mildly impaired with aging; immediate memory remains more intact.
 - b. Performing tasks based on remote memory, discussing information already learned and attention to tasks at hand remain intact.
 - c. Age-related memory changes affect learning complex, long lists, foreign or nonsense words, and language. Logically unassociated tasks are also hard to master.
 - d. At about 70-80 years of age, significant changes in language comprehension and word retrieval occur.
4. All neurologic systems are affected by aging: sensorimotor, perception, and autonomic response.

- a. Decreased sense of smell and taste
 - b. **Vision:** Visual acuity, depth perception, and color discrimination decline due to cataracts, macular degeneration, loss of lens accommodation, consequences of diabetes, narrow angle glaucoma, or other changes that impair visual acuity. Allow them to wear corrective lenses whenever possible.
 - c. Decreased pupil response
 - d. **Decreased hearing:** Altered sensory and perceptual hearing profoundly affects communication. High-pitched tones are lost before lower pitches. Quiet background, clear speech and no distraction will foster communication. Yelling or raising one's voice usually does not aid communication, but increases a patient's frustration and agitation.
 - e. **Somatosensory perception:** The number of skin receptors is reduced. Peripheral nerve conduction slows. Changes occur in touch and vibration sense. All of this affects the ability to receive information from muscle and joint movement, thus affecting mobility.
 - f. **Nerve damage** may result in peripheral neuropathy
 - g. **Motor changes** include mild posture changes, decreased nerve conduction speeds and decreased manual dexterity.
 - h. With all of these changes, it is easy to understand why older adults may have difficulty adapting to unfamiliar tasks, objects or surroundings.
 - i. Diseases, such as Parkinson's, cause cogwheeling and a loss of balance. If severe, patients walk, but have difficulty stopping. It appears as if they were being propelled forward off balance. With other diseases, patients may ambulate well, but have extreme difficulty getting up from a sitting or lying position.
 - j. Older adults are at higher risk for **hypothermia**, even in warm environments due to impaired thermoregulation, reduction in fat stores and slower basal metabolic rate. Reduced mentation and atrial fibrillation may be the only keys to diagnosing hypothermia (without the aid of a thermometer).
5. **Cerebrovascular**
- a. Impairment of cerebral autoregulation occurs
 - b. Cerebral perfusion pressure and cerebral O₂ consumption decreases
6. **Caveats for elderly care**
- a. **Confusion is not normal.** It is important to determine the cause. Confusion can be caused by interactions or reactions with medications (even "benign" drugs such as Tagamet), hypothermia, sepsis, hypoxia, stroke, or other cerebral events. Confusion is usually the first sign that something is wrong and the cause for confusion needs to be discovered.
 - b. The elderly patient's sensory perception, including hearing, smell and vision, may be reduced. Peripheral nerve conduction slows and may be further impaired by the chronic use of analgesics. When combined, an elderly pts' ability to "sense" that they have been injured may be reduced
 - c. As the brain loses mass, more movement is possible within the cranial vault. As an older person's head is thrown back and forth in a car crash or strikes a wall or the pavement during a fall, the brain is given more moveable space. This movement can tear bridging veins, and several days, or even weeks later, the patient may present with gradual changes in mentation. Suspect a **subdural bleed** as subdurals are three times more common in the elderly.

- d. Increased risk of cerebral anoxia/ischemia occurs during hypotension in the elderly, especially if a history of hypertension is present

E. **Renal changes**

1. There is a reduction in renal mass (including nephrons) of 1.5% per year after the age of 30. Decreased glomerular filtration rates occur at age 40 and continue to drop 1 mL/min/year every year thereafter resulting in decreased renal function.
2. The kidneys have a decreased ability to reabsorb and secrete solutes (reduced ability to conserve Na and excrete H and K). Therefore, it takes a larger volume of fluids to clear the same amount of waste product or metabolite from an older patient than from a younger patient.
3. Geriatric patients are unable to concentrate urine.
4. Kidneys are able to maintain normal acid-base balances as long as renal perfusion is maintained and metabolic loads are not excessive.
5. Although the kidneys may require larger amounts of fluids to maintain perfusion, it is important to remember that larger amounts of fluids may push the patient into severe heart failure and careful monitoring of hemodynamic status is vital.

F. **Body composition**

1. Decreased total body water (intracellular and extracellular). The weight of an average person over the age of 60 is normally about 50% (or less) body water. This is assuming there is no pre-existing disease state such as heart failure or ascites to increase total body water content.
2. Decreased # of body cells (~50% loss between age 20-70). Most organs decrease in size (with the exception of the heart, lungs, and prostate).
3. Fat tends to increase and distribution changes; becomes more central than cutaneous.
4. 2-3 inch loss in height
5. **Skin:** Decreased skin elasticity due to diminished collagen causing wrinkles and sagging of the skin. Capillaries are fragile resulting in frequent bruising; loss of thirst mechanism and lack of ready access to fluids makes dehydration common; the epidermis becomes thinner and superficial skin tears are common.

G. **Musculoskeletal**

1. **Joints and ligaments** lose elasticity, increasing the risk for overstretching; degeneration of the joints.
2. **Lean muscle mass decreases with age.** Regular daily exercise helps to increase lean muscle mass in older adults.
3. **Decrease in bone density: Bone mass** is most dense between the ages of 30-40 and declines in the older adult. Postmenopausal women lose bone mass quicker than men. Risk factors for bone mass loss include maternal history of osteoporosis, life-long thinness, sedentary lifestyle, and low calcium and protein intake. Osteoporosis is a major contributing factor to musculoskeletal injury but other diseases such as Paget's disease, infection and metastatic diseases can also increase the risk of fracture.
4. **This results in an increased risk of fractures,** causing prolonged immobility, increasing complications, morbidity, and mortality. **Common fracture sites:** Proximal humerus, radial head, distal radius, single ramus pelvic fractures, hip fractures
5. **Hip fractures** have a mortality ranging from 13%-30%. Common complications for elder patients with hip fractures include sepsis, pneumonia, and GI disorders. Less than one fourth of patients return home within the month and most patients need prolonged rehabilitation.

H. Immunity, infection & sepsis

1. Skin and mucosal integrity are the primary barriers to infection. In the elderly, skin becomes dry, fragile and easier to injure. Mucosal tissues atrophy, becoming susceptible to injury and infection
2. Body's defense
 - a. **Humoral** (B-lymphocyte) immunity is the body's defense against bacteria while **cellular** (T-lymphocyte) immunity is the body's defense against viruses, fungi and mycobacteria.
 - b. In elderly patients, there is a decreased cell-mediated and humoral response to foreign antigens.
 - c. Once bacteria enter the body, macrophages interact with the foreign material and kill bacteria. The quantity of this response does not change with normal aging, but can change depending on pre-existing diseases or medications.
 - d. T-lymphocyte activity changes in the older adult population. T-cell helper activity is reduced and T-cell suppressor activity is increased. This situation allows for re-emergence of dormant diseases such as tuberculosis or herpes zoster (Shingles), especially during times of physiologic stress.

I. Interdependence of function

1. We need the function of all organ systems for optimal health.
2. Each system is interdependent and loss of function in one can result in loss of function in another.
 - a. **People with renal disease may develop:** anemia, hypertension, and atherosclerotic heart disease.
 - b. **People with diabetes** may develop renal failure, ASHD and blindness. They are susceptible to infection and gangrene.
 - c. **People with pulmonary disease** put a strain on the cardiovascular system, are at risk for infection, and hypoxia can cause organ ischemia.
 - d. **People with cardiovascular disease can develop** ischemia of the lungs, liver, intestines, and kidneys causing liver failure, dead bowel, and renal failure. They will also develop TIA's, strokes, phlebitis, dysrhythmias and syncope.

III. Patient assessment in the elderly patient

- A. Elderly patients should be examined with the premise that some degree of functional loss is present in every organ system. In this way, organ compromise may be identified more readily. Improved outcomes are possible if trauma or diseases are found early and organ functions are optimized.
- B. Elderly patients require close monitoring to detect subtle signs of decompensation
- C. Consider the following common, acute, non-traumatic events that could complicate the patient's presentation:
 1. Acute coronary syndrome
 2. Hypovolemia/dehydration
 3. Urinary tract infection
 4. Pneumonia
 5. Acute renal failure
 6. Cerebral vascular event (stroke)
 7. Syncope
- B. **Communicating with the elderly**

1. **Establish effective rapport with every patient**

Introduce yourself and establish trust. Elderly patients expect and deserve your respect and courtesy. Address them initially as sir or ma'am (not grandma or honey) and ask what name they would like you to use. Being overly familiar may offend the patient and erect barriers to trust. Even if you see some of them regularly due to multiple scheduled transports or multiple unscheduled requests for assistance, we have a duty to provide to them safe, comfortable, and competent care.

2. **Establish whether the patient can see and hear you and whether they can speak.**

Due to body changes associated with aging or deficits following trauma or conditions such as a stroke, communicating with them effectively may be frustrating. Accommodate for hearing, visual, cognition, memory, perception, communication and motor deficits. Have the patient insert their dentures when appropriate. They communicate, understand, and comply with your instructions more effectively when they can see, hear, and speak to the best of their ability.

a. **Hearing deficits:** Shouting at a patient with significant hearing loss will not help. Unless a life-threatening situation exists, get close to the patient, look them fully in the face, speak in a normal volume, modulate your voice to a lower tone, ask one question at a time using simple language, and pause between words. Speak slowly. Actively listen to the patient. They may ask you to speak into their "good ear" or ask you to get their hearing aid(s), which must be in the ear and on with a good battery to be effective. In the absence of a hearing aid, put the earpieces of a stethoscope into their ears and you speak into the head of the stethoscope. Instant amplification of speech! If they cannot hear at all, attempt to compensate by writing questions on some readable format and let them nod or answer in a manner that works for them. This may be a challenge based on the patient's degree of English literacy and/or the caregiver's ability to communicate in the patient's preferred language.

b. **Visual deficits:** A patient's inability to see appropriately may increase their anxiety. In addition, patients with sight issues may have decreased cooperation due to increased suspicion. Some disorders may be able to be rectified with corrective lenses. If that's the case, ensure that the patient's glasses travel with them (Widmeier, 2013).

a. **Speech deficits:** Patients with expressive aphasia will be able to understand what you are saying, but may not be able to answer clearly. If the patient's words are coherent, but it takes them time to complete their thoughts, be patient and don't finish their sentences.

Give the patient time to answer. Adapt to their pace. The more demented a patient, the slower his or her response will be. Demented patients are never wrong, so do not argue with them. Do not assume they are hard of hearing and shout at them. Reassure them in a soothing voice and calm demeanor. Clarify what the patient is telling you.

b. **Appropriate touch** is an important part of communication, reassurance, and care giving. Shake or hold their hand when introducing yourself, if possible. Touch is especially important if other forms of communication have failed. If a patient is deaf or blind, touch can signal where you are located and hint that you are gentle and respectful. If patients pull away, give them space. If they have a suspected emotional or behavioral emergency, do not touch them without their permission. Touch may be the only form of communication in those with dementia or other cognitive disabilities.

C. **SCENE SIZE UP: Situational awareness; dynamic risk assessment**

1. Assess/secure scene safety; mitigate/contain immediate environmental hazards

2. Initiate universal blood/body secretion and sharps precautions on all patients. **Be aware of isolation precautions:** Patients in long-term care facilities may have isolation precautions. Read signs posted outside of their room to determine the nature of recommended precautions (droplet, contact, etc.). Apply appropriate PPE prior to entering the space and/or touching the patient, when leaving the space, and while transporting the patient.
 3. Locate all patients and triage if necessary; scan environment for clues to the nature of illness
 4. If potential crime scene, make efforts to preserve integrity of possible evidence
 5. Determine need for additional assistance; resources/mutual aid
 6. **Advance directives:** If a patient is non-decisional, check with family members or caregivers about the presence of advance directives and any limitations on care.
- D. **IMC/ITC** Special considerations: Rapid **airway control and prompt ventilatory support**
1. Check for and remove dental appliances if they pose a risk of airway obstruction.
 2. Use SpO₂ central sensor if poor peripheral perfusion (cold hands) or tremors
 3. **Consider need for CPAP, intubation** and/or ventilation w/ BVM if O₂ via NC or NRM is ineffective. Optimizing oxygenation and hemodynamic status can limit end organ damage and prevent complications.
 4. **Blunt thoracic trauma:** Handle gently. Pain control titrated to ventilations.
 5. **If chronic hypercarbic state** (COPD) respiratory failure with acute respiratory acidosis can be devastating. Manage ventilatory failure w/ acute resp. acidosis carefully. Eliminate only extra CO₂ (above chronic hypercarbic norms) causing acute ventilatory failure. **Don't over-correct.** If intubated and rapidly ventilated to an EtCO₂ of 35-45, pt may suffer lethal dysrhythmias from Ca binding. Slowly reduce PaCO₂ not more than 5 mmHg/hr
 6. **Initial fluid resuscitation and hemodynamic monitoring**
 - a. Need ↑ perfusion to brain & coronary arteries during severe hypotension. Risk of cerebral & myocardial infarcts.
 - b. Anticipate silent MIs, stroke equivalents, GI and glucose emergencies, atypical VS in shock (no tachycardia); sepsis/septic shock.
 - c. Identify, correct shock/acidosis. May appear "stable" yet have perfusion deficit due to low cardiac output.
 - d. Don't withhold IV fluids from a patient who needs volume. The patient is already compromised and withholding fluids may cause further compromise. Equally, **do not volume overload.** Give 1 liter of NS in 200 mL increments depending on their CV status. Continued fluid boluses of NS may cause hyperchloremic acidosis and dilute their clotting factors, especially in pts with impaired renal function, acidosis or hypoperfusion.
 - e. Carefully monitor mental status, SpO₂, capnography, lactate (if available), glucose, breath sounds, skin, VS (MAP & pulse pressure); obtain 12-L ECG.
 - f. If the patient is hemorrhaging, all attempts must be made to control the bleeding before giving large amounts of fluids (the risk of pump failure increases with the administration of large amounts of fluids).
 7. **Neurologic management**
 - a. Level of consciousness should be continuously assessed. Changes in mentation occur from a variety of insults to the elderly patient. Stroke, TIA, cerebral edema, intracranial hemorrhage, hypoxia, hypothermia, sepsis, polydrug interactions, and cardiac arrhythmias are just some reasons for impaired mentation.

- b. **Confusion and mental status changes are not normal** and causes need to be identified and treated.
 - c. Don't assume an elderly patient who is awake after head trauma is OK
 - d. Don't control restlessness by chemical restraint or sedation - **FIND THE CAUSE!**
 - e. Cervical spine injury should **ALWAYS** be suspected in a traumatically injured elderly patient. Degenerative bony changes and arthritic changes can make the clinical assessment difficult. Inelastic joints and ligaments predispose the neck to subluxations and over-stretching of ligaments. May need to pad (creatively) for spine changes when applying spine motion restriction. Pad bony prominences.
 - f. MVCs involving the elderly may be caused by syncopal episodes. Determine events leading to crash with all elderly drivers.
8. **Pain assessment and management:**
- a. Assess if pain is acute, chronic, or acute on chronic for this patient. Is it affecting their activities of daily living?
 - b. Older adults may not quantify pain well using numeric pain scales and may use descriptive words instead (e.g., it's not so bad). Many believe that they should be stoic and not fully report their pain severity; others do not like how they feel when they have been given opiates.
 - c. Look at their body language and assess VS changes. Are they able to talk through the pain?
 - d. For those with dementia, a variety of tools have been created. Region IX adopted the Abbey pain scale that is found on the back cover of the SOP.

Abbey Pain Scale Use to assess pain in people with dementia who cannot verbalize Score each as Absent 0; Mild 1; Moderate 2; Severe 3				Score
Vocalization: Whimpering, moaning, groaning, crying				
Facial expression: Looking tense, frowning, grimacing, looking frightened				
Change in body language: Fidgeting, rocking, guarding part of body, withdrawn				
Behavioral Change: ↑ confusion, combativeness, refusing to eat, alteration in usual patterns, difficulty sleeping, increased wandering, decreased social interactions				
Physiological change: T, P, or BP outside normal limits, perspiring, flushing or pallor				
Physical changes: Skin tears, pressure areas, arthritis, contractures				
0-2 No pain	3-7 Mild	8-13 Moderate	14+ Severe	Total:

- e. It is important to provide pain intervention before moving these patients to reduce the additional physiologic stresses created by the pain.
 - f. **Reduce Fentanyl dosing** in keeping with the SOPs.
Elderly (≥ 65) or debilitated: 0.5 mcg/kg (max single dose 50 mcg)
 IVP/IN/IM/IO. **Additional doses require OLMC:** 0.5 mcg/kg q. 5 min up to a total of 3 mcg/kg (300 mcg) if indicated & available.
 Elderly patient may be more susceptible to adverse effects, e.g. respiratory depression & CV effects. Pts may also have age-related kidney function impairment resulting in lower clearance rates.
- E. **SAMPLE History:** It is critical to get each patient's PMH to place the present complaint into context and to anticipate further deterioration. A good **history** alone will give you the right impression more than 80% of the time. An incomplete history may lead you to a totally incomplete or erroneous assessment.

1. The chance of having significant medical problems increases with age, therefore it is important to obtain information about allergies, medications (BOTH over the counter and prescription – including compliance (especially for anticoagulants and antihypertensive agents), past medical/surgical history, last oral intake/immunizations; and events surrounding this episode (mechanism of injury).
2. Elderly patients are less likely to state a clear chief complaint. They are more likely to complain of vague and non-specific things like fatigue, weakness, dizziness, falls, aches, and GI complaints. Depression is common in the elderly. It is estimated that 25% of suicides occur in those over 65 and the real figure may be 3 times higher (Cahoon, 2012).
3. If clear communication is not possible:
 - a. Look for medic alert jewelry and stickers from programs like Vial of Life on the outside of doors or on the refrigerator. Some may have a medication list placed in a labeled bag.
 - b. If time allows; do an environmental risk assessment for hazards
4. PMH is usually extensive and can be confusing due to changes in their statements or because of a combination of acute and chronic conditions. They may deny a hx of a particular problem but be taking medication for it.
5. **Polypharmacy**
 - a. Polypharmacy (pill burden) is the use of multiple medications concurrently often from different physicians. It can also be defined as a condition in which a patient receives too many drugs, drugs for too long, or drugs in exceedingly high doses.
 - b. Polypharmacy is a common practice among elderly patients. American seniors use an average of five prescription medications at any one time and fill between 12-17 prescriptions yearly. Older adults use ~3½ over-the-counter medications at any one time.
 - c. **Risk factors for polypharmacy**
 - (1) Number and severity of illnesses
 - (2) Placement in long-term care facilities
 - (3) Number of physicians seen (multiple specialists with ineffective integrative communication)
 - (4) # pharmacies used: If prescriptions are filled from a single pharmacy, the medication interactions and incompatibilities can be caught and prevented.
 - d. Seniors are also susceptible to polypharmacy because of incorrect self-administration of drugs, omission of drugs, taking another person's prescriptions, use of over-the-counter medications and medication errors made by physicians prescribing and nurses administering the drugs.
 - (1) Most common prescribed drugs involved in polypharmacy: CV meds, analgesics, NSAIDs, and psychotropic medications.
 - (2) Poor vision can make it difficult to differentiate one pill from the other or one dose of insulin from another, creating drug errors. Prescription drug misuse can also be potentiated by alcohol use or abuse.
 - (3) When on a fixed income, elderly persons may find the high cost of medications to be impossible to absorb and still pay other bills or buy groceries when they've exceeded Medicare thresholds. This leads them to share medications with friends and family, especially if someone has died with a surplus of their prescription drugs. Patients don't appreciate the difference between an ACE inhibitor, ARB, or beta blocker – they just know they're taken for high blood pressure.

- e. This is not to say that senior citizens intentionally abuse drugs. Multiple physicians may be prescribing medications while elderly patients are consuming "benign" over-the-counter medications causing drug interactions and complications.
- f. Mixing drugs is affected by drug absorption (changes in areas where drug uptake occurs), distribution (competition of multiple drugs for receptor sites), protein binding (reduced muscle mass), usage (enhancement or antagonism of drugs), and excretion (impaired kidney or liver function).
- g. Those older than age 70 are 3.5 times more likely than those younger to be admitted to a hospital because of adverse drug reactions to a psychotropic medication.⁷¹ Moreover, some patients may be using herbal remedies instead of or along with prescription medications. Since these can have significant adverse effects and drug–drug interactions, it's important to ask patients about all substances they might be taking (Cahoon, 2012)

Inappropriate Drugs for Use in Older Adults	
Type	Drug
Sedative hypnotic	Diazepam, Chlordiazepoxide, Flurazepam, Meprobamate, Pentobarbital, Secobarbital
Oral hypoglycemic	Chlorpropamide - risk of hyponatremia (Cassel et al, 1997)
Dementia treatments	Isosuxprine, Cyclandelate
Platelet inhibitor	Dipyridamole
Antiemetics	Trimethobenzamine
Antidepressant	Amitriptyline
NSAIDs	Indomethacin, Phenylbutazone - risk of GI bleeding, nephrotoxic renal failure (Cassel et al, 1997)
Analgesics	Darvon or Darvocet-N, Pentazocine
Muscle relaxants	Cyclobenzapine, Methocarbamol, Carisoprodol, Orphenadrine
Drugs causing CNS changes in the elderly (not an all inclusive list)	
Hypnotics (long-acting)	
Histamine-blocking agents	
Alpha-blocking agents	
Drugs with anticholinergic effects (including antihistamines and cimetidine)	

Paradoxical Drug Interactions		
Site of action or physiologic state	Increases action or state	Decreases action or state
Dopamine receptors	Sinemet (levodopa-carbidopa)	Haldol (haloperidol)
Myocardial contractility	Lanoxin (digoxin)	Tenormin (atenolol)
Airway resistance	Inderal (propranolol)	Proventil, Ventolin (albuterol)
Serum triglycerides	Corgard (nadolol)	Lopid (gemfibrozil)
Peripheral circulation	Trental (pentoxifylline)	Inderal (propranolol)
Blood sugar	Phenylpropanolamine	DiaBeta, Micronase (Glyburide)
Colonic motility	Dulcolax (Bisacodyl), Fleet, Dulcagen	Calan, Isoptin (Verapamil)

6. **Patient movement:** It is important to transport elderly patients comfortably without making their current condition/injury worse and not causing any new injuries.
 - a. Packaging and removing an elderly patient from the environment in which they are found can pose challenges. This is especially true if they have frail skin, bone density losses, and/or osteoporosis. Always consider chronic conditions as well as the physiology of aging when transporting these patients (Widmeier, 2013).
 - b. Spend some time helping them to get comfortable on the stretcher. Flex and support legs on pillows, pad bony prominences and voids with blankets, especially if they have deformities like kyphosis. These patients may not express their comfort needs in an effort to be polite or not to be a “burden”, so ask before securing them for transport.
 - c. Be particularly careful with patient transfers as they can cause **skin tears** and **musculoskeletal injuries** (like rotator cuff tears from lifting them up in bed inappropriately). Do not log roll if possible. Use draw sheets, sliders, and/or scoop stretchers to move them onto the cot. Carefully provide selective spine precautions/immobilization following falls.
 - d. Be especially vigilant relative to preventing trauma to limbs that can occur when the arms/hands are fully covered and they are compressed within moving parts of the stretcher. We’ve had several instances of patient injury caused by this within the System. Any time there is to be a change in stretcher position (seated to semi-fowlers, or supine), paramedics must visually check to ensure that all body parts, blankets and any other materials are not in a position that could cause injury to the patient.
 - e. **Plan the path** you will take before determining the conveyance devices that will be used. Take into consideration the location in which the patient is found, the amount of room to maneuver, door and stairway widths, presence of stair lifts and/or elevators and any equipment or peripheral devices that must be transported with the patient.
 - f. **Specialty medical equipment** may need to be transported with the patient; such as insulin pumps, LVADs, wound vacuums, and indwelling urinary (Foley) catheters. Do not alter the equipment without appropriate protocols and OLMC direction to do so.
 - (1) **Wound vacuum assisted closure (VACs)** devices have a fixed unit and disposable circuit. “The fixed unit will generally be set prior to your arrival and will require little oversight. The major responsibility of the providers will be to watch the disposable tubing to ensure that it doesn’t become disconnected from the wound VAC—a common issue that will cause a low-pressure alarm to sound—or becoming disconnected from the wound dressing. In addition, field providers should protect the wound dressing to ensure that it maintains a negative pressure seal” (Widmeier, 2013).
 - (2) **Foley catheters:** EMS personnel may transport a patient with one of these already placed but may not insert one. If possible, empty the collection bag before starting a long transport. Never place the bag on the floor, nor higher than the patient’s bladder.
7. **Thermoregulation during transport:** KEEP WARM! Maintaining appropriate body warmth can be a challenge due to thinning subcutaneous fat; poor circulation, altered thermoregulatory mechanisms and the nature of medications the patient may be taking. Hypothermia in elderly patients is a frequent cause of altered mental status. EMS may need to adjust the ambulance temps to provide

for patient comfort even though it may seem excessively warm to caregivers. Ensure adequate numbers of blankets to insulate them from cold outdoor temperatures.

8. **Selection of receiving hospitals:** Elderly patients may much prefer to be transported to the facility where their primary and/or specialty physicians practice or where their insurance is accepted. In the evolving environment of patient centered-integrated healthcare, EMS should try to accommodate such requests whenever possible based on agency policies and patient condition.
9. All **refusals of patients ≥ 65** must have OLMC contact from scene prior to releasing the patient.
10. **Environmental (risk) assessment if patient is stable**
 - a. Careful evaluation of the patient's living environment; cleanliness, upkeep (dishes and garbage piled high?); trash full?
 - b. Identification of seniors at risk (ISAR)
 - c. Frailty index (FI)
 - d. Do they have challenges in performing activities of daily living (ADLs)?
 - e. EMS observes patient's in their normal environment. Evaluate the entire area as the scene is managed.
 - f. **Floors** in each room
 - (1) Are walkways clear? Must they walk around furniture?
 - (2) Are there papers, books, towels, shoes, magazines, boxes, blankets, or other objects on the floor?
 - (3) Are there throw rugs in high traffic areas that are not secured with double backed tape?
 - (4) Are there fall hazards like cords or buckled carpet?
 - (5) Are there changes in flooring composition, e.g. wood or tile to carpet with uneven surfaces?
 - g. **Stairs and steps**
 - (1) Are there papers, shoes, books, or other objects on the stairs?
 - (2) Are some steps broken or uneven?
 - (3) Are lights missing over the stairway?
 - (4) Is the carpet on the steps loose or torn?
 - (5) Are the handrails loose or broken? Is there a handrail on only one side of the stairs?
 - h. **Kitchen**
 - (1) Are dishes too high and out of reach requiring a step stool?
 - (2) Is a step stool unsteady?
 - i. **Bathrooms**
 - (1) Is the tub or shower floor slippery?
 - (2) Do they need some support when they get in and out of the tub or up from the toilet? Are handholds/grab bars present and secure?
 - j. **Bedrooms**
 - (1) Is the light near the bed easy to reach?
 - (2) Is the path from the bed to the bathroom dark?
 - k. Is access to assistance readily available in the event of a fall where they could not get to a phone? Inform them of injury alert options.
 - l. Provide coaching to the patient at an appropriate time. These steps have shown to reduce falls and injuries.

- m. Consider the room temperature. Is it placing the patient at risk for hypothermia or heat illness?

11. **Social assessment:** conduct on arrival if primary assessment is within normal limits (WNL)

- a. Ask who called EMS if other than the patient. How often does the patient receive a wellness check from caregivers, family or friends? Encourage those without social support to participate in an injury alert program (SafeLink) to access assistance in a timely manner.
- b. It's important for them to have regular social interactions to prevent feelings of loneliness, isolation, and depression.

F. **Outcomes:** Iatrogenic illnesses, or those arising from diagnostic or therapeutic procedures increase with age. These illnesses are commonly referred to as "complications" (i.e., fluid and electrolyte imbalances, nosocomial infections, pressure sores, and adverse drug reactions). Post-injury complications negatively impact survival. **Complications can be prevented.** Implement therapies designed to prevent and/or reduce the occurrence of complications.

IV. Geriatric medical emergencies

A. Acute abdomen

1. What seems like a very minor problem at first can end up being a life-threatening emergency. Always consider abdominal pain in the elderly a serious complaint. Due to their altered sensory perceptions, the most serious presentation of an acute abdomen may not involve pain.
2. Because of their impaired immune response, elderly do not exhibit the classic S&S of acute peritonitis. Peritonitis is based on an inflammatory reaction of the peritoneal lining of the abdomen.

In patients with a normal response, the first symptom is a vague pain that steadily intensifies and localizes. As the area becomes more irritable, they develop point tenderness and then guarding which progressively tightens until muscles are as hard as a board (rigidity). Elderly pts often fail to develop the inflammatory response. Thus, they do not develop S&S of intensifying abdominal pain and guarding.

3. **Rapidly life-threatening causes of abdominal pain or distress in the elderly:**
 - a. **Abdominal aortic aneurysm (AAA) - rupture or dissection**
 - (1) **Incidence:** 1-4% of population > 50 yrs have dilation of abdominal aorta (men > women); typically infrarenal; aneurysms of 8 cm will rupture soon
 - (2) **Causative factors:** Atherosclerosis, elastin and collagen loss
 - (3) **History:** Ask about known aneurysms; known atherosclerotic disease which may take the form of AICS, peripheral vascular disease (intermittent claudication) or HTN.
 - (4) **Symptoms:** The higher the area of disease, the more symptoms may be noted. Assess for abdominal or back pain, dull flank discomfort, loss of appetite, constipation, or vomiting; urologic complaints (signals compromise to renal arteries; lower leg neurologic complaints (due to involvement of vertebral nerve roots); and peripheral ischemic syndrome (poor circulation to legs causing pain, pale color, coolness, and numbness).
 - (5) **Signs**
 - (a) Tachycardia may be blunted due to aging, vagal influences, or medications

- (b) Orthostatic hypotension
 - (c) Hypotension or shock; narrowed pulse pressure
 - (d) Pulsatile midline abdominal mass above the umbilicus. May be obscured by fat or abdominal distention.
 - (e) Absent or asymmetrical femoral pulses; however most have equal pulses because the aneurysm is high and does not extend to the iliac arteries. As long as blood is getting past the aneurysm to the lower abdominal aorta, femoral pulses will be present.
 - (f) Bilateral leg ischemia or leg neurologic symptoms are strongly suggestive of AAA.
- b. **Gastrointestinal hemorrhage** - upper or lower
- (1) GI bleeding most commonly affects those 60-90 yrs of age
 - (2) Increased mortality because older patients are
 - (a) less able to compensate for acute blood loss;
 - (b) less likely to feel any symptoms from ulcer disease and seek treatment at a later stage, if at all;
 - (c) more likely to be taking aspirin or NSAIDs which place them at risk for ulcer disease and upper GI bleeds;
 - (d) at higher risk for colon cancer, angiodysplasia (a malformation of the blood vessels in the GI tract that may result in bleeding), and diverticulitis, which are the major causes of lower GI bleeds; and
 - (e) more likely to be on blood thinners, which make bleeding problems more common.
 - (3) **History**
 - (a) Nature and amount of vomitus, diarrhea, bleeding
 - (b) Chief complaint; history of present illness
 - (c) PMH
 - (i) Does patient have a history of GI bleed?
 - (ii) Risk factors for GI bleed?
 - (iii) History of clotting disorders?
 - (iv) History of cancer?
 - (v) History of anemia?
 - (4) **S&S:** Vomiting blood or coffee ground material; excretion of blood, blood-tinged stools, or black tarry stools; and weakness, syncope, or pain.
- c. **Mesenteric ischemia**
- (1) **Causative factors**
 - (a) **Disruption of arterial blood supply to bowel**
 - (i) Mesenteric artery embolism associated with A-Fib, AMI, other cardiovascular disease
 - (ii) Thrombosis (postprandial pain 25% of cases)
 - (iii) Nonocclusive mesenteric ischemia (in ICU)
 - (iv) Venous thrombosis (uncommon; seen w/malignancy and coagulopathy)

- (2) **Inflammatory process:** As the bowel swells, the vessels that supply it with blood are compressed, causing tissue ischemia and/or necrosis
- (3) Mortality rate 85% if diagnosis is missed
- (4) **S&S:** Pain disproportionate to physical exam. Patient is writhing with pain but there are few objective findings. They may be tachycardic from agitation but vagal effects from severe pain may result in bradycardia as well. Hypotension is a late and ominous finding.
- (5) **Rx:** IV fluids
- (6) **Complications:** Massive GI bleeding and sepsis
- d. **Acute bowel obstruction** (think cancer if totally occluded)
 - (1) Obstruction often begins in patients with prior abdominal surgeries or hernias.
 - (2) **S&S**
 - (a) Complete obstruction: constipation and inability to pass any gas.
 - (b) Abdominal cramping and discomfort, usually no severe pain unless ischemic bowel or rupture.
 - (c) Protracted vomiting; fecal material in vomitus is diagnostic
 - (d) Abdominal distention; tympanic to percussion
 - (e) Abdominal tenderness in all four quadrants; slightly more in the area of obstruction
4. **Other causes of abdominal pain**
 - a. **Renal colic:** Sudden severe onset of abdominal pain associated w/ N/V. Consider possible AAA.
 - b. **Acute cholecystitis:** Most common indication for abdominal surgery in elderly. Can have stones anywhere along biliary tree.
 - c. **Peptic ulcer disease:** 30% are painless; duodenal most common of all types; perforation more common as patient may not know they have an ulcer. S&S: weight loss, GI bleeding, anemia.
 - d. **Diverticular disease:** > 50% of those over age 70 have diverticula (herniation of mucosal layers between gaps in muscles); can cause abscess, perforation, free air, or obstruction. A bleeding diverticula may cause rapid demise; 66% involve right colon. S&S: lower abdominal pain, rectal urgency, bloody stool.
- B. **Myocardial ischemia/infarction** (Acute Coronary Syndromes)
 1. **Elderly have a 4 X increase in mortality from ACS due to**
 - a. vague or absent symptoms;
 - b. delay in seeking treatment;
 - c. the number of pacemaker cells in SA node are decreased, increasing the risk of sinus node dysfunction and dysrhythmias;
 - d. collagen fiber changes reduce ventricular compliance; CO is diminished; so pts have weaker hearts to start with and damage is less tolerated;
 - e. loss of heart cells and an increase in elastic tissue leads to conduction problems and increased risk of dysrhythmias; and
 - f. loss of SNS beta receptors makes heart less sensitive to natural and pharmacologic catecholamines.

2. Prone to **silent ischemia** (without chest pain). By age 85, only 40% have chest pain. They often present with profound weakness and/or shortness of breath. Intermittent periods of weakness should be considered the equivalent of angina in an elderly patient.
3. **S&S of ACS in elderly**
 - a. Weakness or fatigue
 - b. Dyspnea
 - c. Diaphoresis
 - d. Confusion/mental status changes
 - e. Vomiting/GI complaints
 - f. Syncope
 - g. HF or pulmonary edema

C. Shortness of breath

1. Common causes in the elderly

- a. COPD/asthma
- b. HF/pulmonary edema; ACS
- c. Pneumonia
- d. Carcinoma of the lung
- e. Pulmonary embolism
- f. Tuberculosis
- g. Occupational lung damage; pneumoconiosis

2. Treatment variations

Although all management of SOB starts with airway control and oxygen, assessments should be narrowed to determine appropriate further treatment. Beta-agonists may increase myocardial oxygen demand cardiac work and may potentially exacerbate ischemia; therefore, they are contraindicated in patients with acute ACS, HF, or pulmonary edema. Need to obtain a good history to determine the etiology of dyspnea.

- a. Ask about lung or heart problems
- b. HF and emphysema can look similar, but their **histories** are often different. That is not to say that someone with emphysema cannot be experiencing HF now. We need a good appreciation of the classic physical findings of each of the diseases including an analysis of the capnography waveform.

Differential for SOB				
	HF/PE	AMI	COPD	Pneumonia
SOB	+	+	+	+
Cough	-/+	-	early am	+
Sputum	frothy (pink)	-	clear	yellow/green
Fever	-	-	-	+
Chills	-	-	-	-/+
Sweats	+ cold/clammy	+ cold/clammy	-	+/hot
Chest pain	-	+/-	-	+/-
Chest pain character	-	heavy, tight	-	sharp, pleuritic
Chest pain duration	-	varies; usually > 20 min	-	gradually worsening, then constant

Differential for SOB				
	HF/PE	AMI	COPD	Pneumonia
Smoking	+ risk	+ risk	almost always	+/-
Hypertension	+ risk	+ risk	-	-
Cyanosis	+/-	+/-	+	+/-
Air entry to lungs	good upper/worse at bases	good	poor	Patchy
Wheezing	+/-	+/-	must have some air entry to wheeze	+/- patchy
Crackles	+	with CHF/otherwise clear	-	+ patchy; isolated to infected lobes
Fever	-	-	-	+
BP	↑ is a risk factor ↓ if severe S&S	↑ is a risk factor ↓ if severe S&S	usually unaffected ↓ if severe S&S	usually unaffected
Tachycardia	+/-	+/-	+	+
EtCO2 waveform	Likely square	Square	Shark fin	

D. Pneumonia

1. Epidemiology

- a. Community-acquired pneumonias (CAP) accounts for 500,000 adult hospitalizations and 1.2 million ED visits annually. More frequent problem in young children and older adults.
- b. Annual incidence in patients > 65 is 1%.
- c. 4th leading cause of death in the elderly. The overall mortality rate for elderly with pneumonia older than 65 was 15%.

2. Risk factors

- a. Reduced immunity and the presence of pulmonary injury or disease increases the likelihood of pulmonary infections.
- b. Other chronic disease states causing immunocompromise can increase risk for developing pneumonia. Such diseases include: diabetes, renal disease, alcoholism, cancer (receiving chemo-therapeutic drugs), or autoimmune disorders.
- c. The presence of invasive tubes (ET/NT/NG/OG) allows colonization of bacteria toward the lungs and may cause microaspiration of bacteria, thus causing pneumonia.

3. Symptoms/clinical findings

- a. Findings may be obvious or subtle and can be overlooked, especially if the patient has other disease states. Atypical agents or opportunistic infections in immunocompromised patients have a much more subtle presentation.
- b. Elderly may demonstrate mild cough, scant sputum production or possibly a change in sputum production, color or signs of dehydration. They are less likely to have pleuritic chest pain, hemoptysis, cough or dyspnea.
- c. If dehydrated, bronchial breath sounds or crackles may be absent.
- d. **Delirium and confusion may be the only presenting signs**

4. **Pneumonia S&S may be mimicked by many disorders**
 - a. Pulmonary embolism
 - b. Lung cancer
 - c. Tuberculosis
 - d. COPD
 - e. Granulomatosis disease
 - f. Fungal infections
 5. **A variety of drugs can induce pulmonary disease**
 - a. Cytotoxic agents
 - b. NSAIDS
 - c. Some antibiotics including sulfonamides
 - d. Certain antidysrhythmics; amiodarone, tocainide
 6. **Common analgesics can precipitate acute respiratory symptoms**
 - a. Salicylates
 - b. Propoxyphene
 - c. Methadone
 7. **EMS Treatment: Supportive care**
- E. **Sepsis:** Sepsis most commonly occurs from pneumonia or UTIs that have gone untreated. Mortality rates for septic seniors is high. It is vital to recognize the signs of infection early to prevent untoward events.
1. **Symptoms/clinical findings**
 - a. In elderly patients, symptoms may be very vague. Families and caretakers may note only mild confusion, changes in mentation, or subtle changes in vital signs.
 - b. Fever, chills, or dehydration are not dramatic and may be missed. Fever may not be present at all. When fever is present, it usually indicates a bacterial infection.
 2. **Treatment**
 - a. **Optimize oxygenation**
 - (1) The patient should not have to work hard to get O₂ to tissues and cells. Supplemental O₂ may assist in reducing the work of breathing (WOB).
 - (2) If gas exchange is inadequate, anticipate intubation and mechanical ventilation to ↑ oxygenation and decrease WOB.
 - b. Optimize the cardiovascular (CV) and hemodynamic status with IVF and vasopressors.
- F. **Unique headaches in the elderly**
1. **Temporal (giant cell) arteritis**
 - a. Inflammatory process associated with head pain in those > 55 (average 70 yrs)
 - b. Differential includes meningitis, encephalitis
 - c. Involves superficial temporal artery; vertebral ophthalmic and internal and external carotids may also be involved
 - d. 50% with untreated temporal arteritis will ultimately develop blindness
 - e. **S&S:** Gradual onset that peaks over a few hours or may have acute onset. Unilateral pain usually described as dull or boring but can also present with lancinating, sharp increases in pain; pain worsens at night and with exposure to cold. Patient often has a tender scalp or tender pulsating artery that is usually red and swollen but can be warm and pulseless.

f. **Rx:** IMC, analgesia; (steroids at hospital)

2. **Subdural hematomas:** Elderly more likely to have mental status or personality changes than a headache. Look for hx of fall or trauma.
3. Tension headaches most common type in elderly but may also see headache associated with brain tumor, shunt dysfunction, CO intoxication.

G. **Alcohol abuse**

1. Alcohol and drug abuse are an "invisible epidemic" that affects at least 17% of people over 60 years of age. It is difficult for health care providers to recognize abuse issues in the elderly as these patients do not have a previous diagnosis of this problem and do not always have the same issues that face younger persons with similar diagnoses.
2. There are approximately 1.5 million alcoholics over the age of 65.
3. Approximately 15% of male alcoholics report their first symptoms of alcoholism occurred between the ages of 60-69, and 15% state their symptoms occurred between the ages of 70-79. Statistics for women are even worse, with 24% reporting their first symptoms between 60-69, and 28% reporting their first symptoms between the ages of 70-79.
4. Although withdrawal signs may occur within 24-48 hours after last alcohol intake, it can also occur after 7-10 days of abstinence. Signs of delirium tremens include confusion, visual hallucinations, tachycardia, and fever.
5. Management of alcohol withdrawal in older adults may be much different from younger persons. Although many drugs are used for treating alcohol withdrawal, their use is not well studied in elderly patients. Younger patients are treated for alcohol withdrawal with the liberal use of benzodiazepines. Due to changing metabolic rates, risk of excessive sedation and other potentially undesirable effects, short-acting benzodiazepines may need to be used with other adjunctive therapies in older adults. Withdrawal in the older patient is more prone to produce symptoms if drugs are not tapered appropriately. Adjunctive drugs at the hospital may include beta blockers, clonidine, carbamazepine and Haldol (to treat symptoms not controlled by the benzodiazepines).

V. **Traumatic injuries in the elderly**

- A. The most common emergencies seen in the elderly are cardiovascular (ACS and stroke) and trauma. Geriatric trauma accounts for 25% of injury fatalities and is the 5th leading cause of death in people 65 and older. Of the elderly survivors of trauma, as many as 88% require long-term placement or full-time home assistance. Thus these patients consume 33% of healthcare resources on trauma care.
- B. Elderly patients can experience significant injury despite a relatively minor mechanism and they have altered/impaired responses to volume deficits. Thus the **risk for under triage is increased**. Consideration should be given to transporting elderly patients to a Level I trauma center if they appear close to meeting borderline criteria between a Level I and Level II transport. Under triage is associated with a two-fold increase in the risk of death (ACS, 2012).
- C. **Falls:** "Each year, one in every three adults age 65 and older falls but less than half talk to their healthcare providers about it" (CDC, 2013).
 1. Falls are the leading mechanism for fatal and nonfatal injuries in older adults and the second leading cause of death. In 2010, about 21,700 older adults died from unintentional fall injuries. Men are more likely than women to die from a fall. After taking age into account, the fall death rate in 2010 was 40% higher for men than for women.
 2. In 2010, 2.3 million nonfatal fall injuries among older adults were treated in emergency departments and more than 662,000 were hospitalized

3. Falls can cause moderate to severe injuries, such as fractures and head trauma, and can increase the risk of early death. In 2000, 46% of fatal falls among older adults were due to TBI.
 4. The most common fractures are of the hip (95% from falls), spine, forearm, leg, ankle, pelvis, upper arm, and hand.
 5. Fortunately, falls are a public health problem that is largely preventable. In 2010, the direct medical costs of falls, adjusted for inflation was \$30 billion.
- D. **MVCs** account for a large percentage of elderly traumatic deaths.
1. Although the number of MVCs involving the elderly is not large, if one examines the number of MVCs per miles driven, elderly people are more at risk for crashes than younger persons.
 2. Elderly pedestrians injured by motor vehicles usually present with head, chest and leg injuries. Elderly pedestrians account for almost half of all deaths that occur at crosswalks.
 3. Passengers/drivers of motor vehicle crashes more commonly have pelvic and lower extremity injuries.
 - a. Pelvic fractures carry a mortality of 15%-20% in elderly patients related to the hemorrhagic blood losses involved in pelvic fractures.
 - b. Open pelvic fractures have a mortality rate of over 50%.
- E. **Burns** are the 3rd leading cause of trauma death in the elderly. Older patients presenting with burns over 15% of their body have mortality rates of 80% or greater.
- F. Incidence of **elder abuse** is estimated to occur in at least 10% of the senior population with 40% of those patients having experienced moderate to severe abuse. If not suspected, abuse can be easily overlooked. Abuse should be suspected in unusual and unexplained injury patterns, burns in unusual locations, fractures/bruises that are unexplained or in various stages of healing. Unexplained malnutrition, dehydration, poor personal hygiene, depression, withdrawal and misuse of medications should also suggest possible abuse or neglect.
- G. Advanced age is NOT by itself a predictive of poor outcomes following trauma and should NOT be used as the sole criterion for denying or limiting care in this population.
- H. The presence of pre-existing medical conditions adversely affects outcome. This effect becomes progressively less pronounced with advancing age.
- I. **Trauma caveats in the elderly:**
1. Pts injured from same level fall (trip/slip/stumble) w/ TBI have a significantly greater mortality. Incidence of vertebral injury occurs more frequently in people over 60. The most common mechanisms include: falls and MVCs.
 2. Mortality for geriatric pts w/ SBP <100 - = adults w/ SBP <90.
 3. In elderly pedestrians struck by MV, mortality more than doubled (16.6% vs 7.4%).
 4. Significant increase in mortality if multi-system trauma is present
- J. **Specific injury patterns**
1. **Head injury:**
 - a. Elderly patients with a severe head injury have an 80% likelihood of death. Pts older than 70 with a GCS < 15 are at risk for significant in-hospital mortality. Geriatric pt w/ TBI & GCS <15 = same mortality as an adult w/ GCS <10.

- b. The neuro exam can be unreliable for detecting signs of significant intracranial hemorrhage. Alterations in mentation may be attributed to dementia or delirium, leading to the late recognition of shock or traumatic brain injury (ACS, 2012).
- c. **It is important to determine and report to OLMC ASAP if patient is taking anticoagulants.** Ten percent of elderly patients with head trauma are on warfarin.
- d. There is an increased risk of traumatic brain injury with minor mechanisms of injury with a three times higher risk of subdural hematoma. Assess and reassess carefully. Anticipate patient deterioration.

2. **Cervical spine injury**

- a. High cervical fractures such as odontoid (C2) are significantly more common.
- b. Cervical stenosis and degenerative arthritis makes the spine more vulnerable to fracture.
- c. **Central cord syndrome**, a complication of c-spine injury in which motor activity is preserved to the sacral nerves and some lumbar, but lost in the cervical and thoracic nerves so that they can often move their legs but cannot move their hands and arms), is more frequent in elderly trauma patients due to hyperextension injury.

3. **Chest trauma**

- a. Higher risk for rib fractures due to bone brittleness (most common chest injury). Mortality increases by 19% for each rib fractured in patients over age 65.
- b. Blunt chest wall trauma leads to a significant risk of complication (pneumonia, pulmonary contusion, and mortality).
- c. Pulmonary contusions may not be evident until 24-48 hours post-injury. WOB increased with pulmonary contusion. Predisposed to Acute Lung Injury/MODS.

4. **Cardiovascular**

- a. Mortality has been reduced by 50% when early CV issues are addressed.
- b. **Geriatric patients tend to be hypertensive, thus a normal BP may really reflect hypotension.**
- c. Trauma pts may need cardiac clearance for non-cardiac surgery: Unstable coronary syndromes (need 12 L ECG); decompensated heart failure or new onset heart failure (lung sounds, SpO2 & capnography readings); significant arrhythmias (continuous ECG monitoring); and severe valvular disease (hospital work up) require evaluation and treatment pre-op.

5. **Abdominal trauma**

- a. Abdominal injury patterns are similar in older and younger adult patients
- b. Diminished pain sensation and increased laxity of abdominal wall muscles make the abdominal exam less reliable in elderly patients.
- c. Injuries can be difficult to assess so early detection of intraperitoneal hemorrhage is important.

6. **Musculoskeletal injury**

- a. These are the most common types of injuries in the elderly
- b. Hip fractures are the most common injury requiring hospitalization
- c. Pelvis fractures are associated with greater morbidity and mortality with mortality up to 30% with acute or delayed complications. The most common type of pelvic fractures are lateral compression fractures.

Significant pelvic fractures have increased risks of bleeding

- d. If long bone fx from MVC, mortality more than doubles for elderly.
 7. An initial aggressive approach should be pursued as the majority of elderly trauma patients may return home and return to independent function.
 8. In patients ≥ 65 , a RTS < 7 is associated with a 100% mortality.
 9. In patients ≥ 65 , a RR < 10 is associated with a 100% mortality.
- F. **Survivability:** The ability of elderly patients to survive injury, resuscitation, surgery, and rehabilitation is directly influenced by, but not limited to, several key factors:
1. Does the patient respond to treatments if unstable? Was the injury blunt or penetrating? Prehospital cardiac arrests following blunt trauma have very low survival rates regardless of age-related factors.
 2. Does the patient have significant pre-existing disease states/chronic illnesses that can be linked up to potential problems?
 3. How many organ systems are failing?
 4. Does the patient have severe burns or head injuries?
 5. Does the patient have an intra-abdominal bleed or abdominal trauma? Up to one-third of injured geriatric patients have significant intra-abdominal trauma. Older adults cannot tolerate continued intra-abdominal bleeding. A significant issue attached to this type of injury is that physical examination may be unreliable due to fewer peritoneal signs and poorer ability to localize pain. In addition, peritoneal contamination drastically increases morbidity and mortality rates among older adults.
 6. Aggressive trauma care with early identification, resuscitation, timely injury management, and post-trauma rehabilitation can lead to survivable injuries with an acceptable quality of life (East, 2003).

Bottom line

Caring for the geriatric patient can be a challenge. However, with good assessment skills, a high index of suspicion, and the ability to support vital functions appropriately, EMS can significantly improve the outcomes of this special patient population!

My Favorite Things:

When Julie Andrews turned 69, she made a special appearance at Manhattan's Radio City Music Hall for the benefit of the AARP. One of the musical numbers she performed was "My Favorite Things" from the legendary movie "Sound Of Music." Here are the actual lyrics she used:

*Maalox and nose drops and needles for knitting, Walkers and handrails and new dental fittings,
Bundles of magazines tied up in string, These are a few of my favorite things.*

*Cadillacs and cataracts, and hearing aids and glasses, Polident and Fixodent and false teeth in
glasses, Pacemakers, golf carts and porches with swings, These are a few of my favorite things.*

*When the pipes leak, When the bones creak, When the knees go bad, I simply remember my
favorite things, And then I don't feel so bad.*

*Hot tea and crumpets and corn pads for bunions, No spicy hot food or food cooked with onions,
Bathrobes and heating pads and hot meals they bring, These are a few of my favorite things.*

*Back pains, confused brains, and no need for sinnin', Thin bones and fractures and hair that is
thinnin', And we won't mention our short, shrunken frames, When we remember our favorite things.*

*When the joints ache, When the hips break, When the eyes grow dim, Then I remember the great
life I've had, And then I don't feel so bad.*

(Ms. Andrews received a standing ovation from the crowd that lasted over four minutes and repeated encores.)

Case study

History: An 81 y/o female is found down on the icy parking lot of the local supermarket. On initial inspection PMs see an elderly woman lying face down between two parked cars. A bystander put her head on a rolled-up sweater. He reports that he saw the woman "shaking and twitching". Her eyes open when you start talking to her and she is looking around as if very confused and agitated. She initially withdraws her left arm when you touch her hand. Upon questioning, there is a language barrier, she does not remember what happened, her address, or phone number, but she is able to communicate that she has had a stroke in the past, has a headache presently (8/10), feels dizzy, and is on Plavix. There is a bag of groceries, a purse, and car keys on the ground between the cars. The keys open the car door next to the patient.

Physical findings:

PMs report a large, very tender hematoma just above her left ear. She won't let them touch it. There is blood in her hair in that area. There is no blood or drainage from that ear. They note a dent on the rear bumper of one of the cars with some hair on it. This hair matches the patient's. She is able to follow simple commands. Pupils are round, equal, midpoint, and both react to light; smile is symmetrical and she can close both eyes tightly. She c/o of pain and tenderness to palpation in her midline back near the bottom of the rib cage. She is moving all extremities but her right arm demonstrates pronator drift (unclear if this is new or a residual from her previous stroke. There are no reported sensory deficits. Glucose 180.

VS: BP 150/92; P 72 and irregular; R 18; SpO2 98%; EtCO2 35, square waveform, ECG: Atrial fib

Assessment/treatment

1. What is your primary impression of this patient's condition/injury?
2. What are the treatment priorities in sequence?
3. Does she require selective spine motion restriction? How should that be accomplished?
4. What role does her age and medical history play in her current condition?
5. Is this a time-sensitive patient?

Where should she be transported and why?

Outcome: This woman is obviously injured. Apparently, she was able to drive and buy groceries earlier in the day.. Her neurological condition continued to worsen in the ED. She became unresponsive and required intubation. A CT scan revealed:

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Meeting for Lunch

A group of 15-year old boys discussed where they should meet for lunch. It was agreed they should meet at the Dairy Queen next to the Ocean View restaurant because they only had \$6.00 between them and Jennie Johnson, that cute girl in Social Studies, lives on that street and they might see her and they can ride their bikes there.

Ten years later, the group of 25-year-old guys discussed where they should meet for lunch. It was agreed they should meet at the Ocean View restaurant because the beer was cheap, they had free snacks, the band was good, there was no cover and there were lots of cute girls.

Ten years later, at 35 years of age, the group once again discussed where they should meet for lunch. It was agreed they should meet at the Ocean View restaurant because the booze was good, it was right near the gym and if they went late enough, there wouldn't be too many whiny little kids.

Ten years later, at 45 years of age, the group once again discussed where they should meet for lunch. It was agreed they should meet at the Ocean View restaurant because the martinis were big, and the waitresses had nice boobs and wore tight pants.

Ten years later, at 55 years of age, the group once again discussed where they should meet for lunch. It was agreed they should meet at the Ocean View restaurant because the prices were reasonable, the wine list was good and fish is good for your cholesterol.

Ten years later, at 65 years of age, the group once again discussed where they should meet for lunch. It was agreed they should meet at the Ocean View restaurant because the lighting was good and they have an early bird special.

Ten years later, at 75 years of age, the group once again discussed where they should meet for lunch. It was agreed they should meet at the Ocean View restaurant because the food was not too spicy, and the restaurant was handicapped accessible.

Ten years later, at 85 years of age, the group once again discussed where they should meet for lunch. It was agreed they should meet at the Ocean View restaurant because they had never been there before.

Paramedic impression	65-70	70-79	80-89	90-99	100+	Totals
Abdominal Aortic Aneurysm	4	3	5	1	0	13
Abdominal Pain / Problems	156	273	361	115	3	908
Airway Obstruction	6	2	23	10	1	42
Allergic Reaction	19	30	18	7	0	74
Altered Level of Consciousness	96	235	412	201	5	949
Asthma	15	23	30	7	0	75
Back Pain (Non-Traumatic)	44	90	127	44	1	306
Behavioral/Psychiatric Disorder	128	161	180	53	2	524
Bowel Obstruction	6	12	18	6	0	42
Cancer	44	136	24	3	0	207
Cardiac Arrest	45	91	127	53	1	317
Cardiac Rhythm Disturbance	81	144	214	74	2	515
Chest Pain or Discomfort	214	420	518	188	1	1341
CHF (Congestive Heart Failure)	35	78	120	70	1	304
Dehydration	10	26	29	21	2	88
Diabetic Hyperglycemia	22	26	31	14	0	93
Diabetic Hypoglycemia	100	194	129	28	0	451
Diarrhea	12	45	58	22	2	139
Dizziness / Vertigo	78	172	210	78	1	539
Epistaxis (Non-Traumatic)	21	50	91	31	0	193
ETOH Abuse	23	29	9	0	0	61
Fever	41	106	167	65	4	383
G.I. Bleed	15	38	62	19	0	134
General Malaise	14	51	87	37	1	190
Headache	17	36	40	12	0	105
Heat Exhaustion / stroke	0	5	3	0	0	8
Hypertension	19	66	78	27	1	191
Hyperthermia	1	1	1	1	0	4
Hypotension	33	76	89	29	0	227
Hypothermia	1	0	1	1	0	3
Hypovolemic shock	3	0	1	0	0	4
Inhalation injury (Toxic gas)	1	3	0	0	0	4
Invalid Assist / Lifting Assist	40	87	154	63	2	346
Migraine	3	0	1	0	0	4
Nausea/Vomiting (Unknown Etiology)	67	173	233	68	0	541
Near Syncope	26	39	45	12	1	123
No Apparent Illness / Injury	338	729	1049	442	16	2574
Non-Asthma COPD	20	75	60	8	0	163
Not Applicable	5	8	14	6	1	34
OB Pregnancy Complications	0	0	1	0	0	1
Obvious Death	25	78	63	41	0	207

Paramedic impression	65-70	70-79	80-89	90-99	100+	Totals
Other Abdominal/GI Problem	17	41	72	30	1	161
Other Cardiovascular Problem	34	48	57	17	0	156
Other CNS Problem	12	10	20	7	0	49
Other Endocrine/Metabolic Problem	24	161	146	15	1	347
Other G.I. Symptoms	17	47	68	31	2	165
Other GU Problems	19	43	89	37	0	188
Other Illness/Injury	477	1381	1770	715	19	4362
Other OB/Gyne	1	2	2	4	0	9
Pain	348	625	952	416	16	2357
Patient Assist Only	5	11	22	12	0	50
Poisoning / Drug Ingestion	5	4	4	2	0	15
Respiratory Arrest	2	8	7	3	0	20
Respiratory Distress	179	462	593	211	11	1456
Seizure	48	56	27	10	3	144
Sepsis	14	39	45	17	0	115
Sexual Assault	1	0	1	1	0	3
Smoke Inhalation	0	3	0	0	0	3
Stings/Venomous Bites	0	1	1	0	0	2
Stroke/CVA	110	265	373	159	6	913
Substance/Drug Abuse	6	5	2	3	0	16
Syncope/Fainting	68	184	189	70	1	512
TIA (Transient Ischemic Attack)	11	37	48	14	0	110
Toxic Exposure	2	0	2	2	0	6
Traumatic Injury	421	880	1402	643	14	3360
Unconscious (Unknown Etiology)	12	17	55	19	0	103
Unknown Problem	24	76	90	51	2	243
Vaginal Hemorrhage	0	2	5	6	0	13
Weakness	250	715	1212	466	12	2655
Totals	3935	8934	12137	4818	136	29960

2013 NWC EMSS data

67,787 patient encounters; 53,453 transports

- Average response time = 2 min (target 6) ☺
- Average scene time = 21 min
- Age: newborn to elderly
- Average patient age 57
- Large % ≥ 65 yrs (44% of total patient contacts)