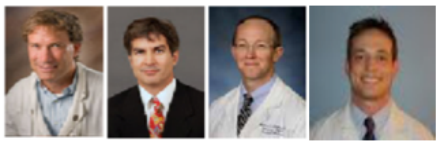
critical care perspectives in emergency medicine



Top 10 Pearls for Managing the Critically-Ill Elderly Patient

1. **Recognize that the patient population is increasing, and be prepared for managing the critically ill geriatric patient (Angus, 2000).**
    - Patients > 65 yrs old are the fasting growing patient population in the US
    - Increasing percentage
        - 2000's: 65 – 85 years old: 11% → 16% of the US population by 2050
        - ≥ 85 years old 1.5% → 5%
    - Older patients account for approximately 50% of ICU admissions
    - Single organ failure in patients ≥ 85 years old have a mortality rate of 30-70%, rapidly increasing to > 80% with 2 or more
    - Major considerations in the elderly: Physiologic changes, polypharmacy, pharmacokinetic and pharmacodynamics changes, decreased physiologic reserve, increased risk for sepsis, delirium, and obviously higher risk for poor outcomes.

2. **Delayed recognition of time-sensitive critical illness is common (Lamantia, 2006).**
    - It is clear that there is a discrepancy in timeliness and intensity of care in the elderly, as treatments for acute MI, sepsis, and, and acute renal failure are often delayed.
    - Nonspecific presentations including altered mental status, delirium, weakness, anorexia, malaise, falls, and urinary incontinence are common in the elderly.
    - Simple things like relative hypotension and blunted febrile response can often mask common red flags of critical illness.
    - **Pearl: Abnormal triage vital signs in adults 75 and over have poor sensitivity for predicting death or ICU admission (sensitivity 73%, specificity 50%)**

3. **The elderly have a high risk of delirium in general, and particularly critical illness**
    - Delirium is a common diagnosis in elderly patients admitted to the ICU
    - Early interventions and therapeutics that commonly induce delirium in the elderly, include antihistamines, sedatives such as benzodiazepines, meperidine, high noise levels, frequent auditory alarms, and bright lights in the ICU.
    - An ounce of prevention goes a long way: Establish a sleep-wake cycle, minimizing noise pollution, reorientation, and other adjunctive therapies can prevent delirium.

- Atypical antipsychotics are often preferred over benzodiazepines for intermittent agitation and delirium treatment.

4. **Cardiac output is more often maintained through changes in preload and stroke volume rather than heart rate. Even minor hypovolemia can result in a significant hemodynamic compromise.**
    - **Decreased cardiac reserve:** With age, maximal heart rate, stroke volume and consequently cardiac output all decrease with age.
    - "Hyposympathetic state": Elderly are often less responsive to sympathetic stimulation by traditional vasopressor agents, often compounded by chronic beta-blocker use.
    - Intravascular volume status can be challenging
    - Renal dysfunction often compounds intravascular volume issues:
        i. Renin-angiotensin system dysfunction, and decreased responsiveness to ADH
        ii. High risk for dehydration

5. **Both systolic and diastolic dysfunction are common (Pirracchio, 2007).**
    - Elderly are particularly at risk for diastolic dysfunction due to cardiovascular changes with age.
    - Left ventricular hypertrophy and diastolic dysfunction are commonly found, due to chronic hypertension and deceased arterial elastance.
    - Unopposed tachycardia with inadequate ejection can rapidly lead to congestive heart failure.

6. **The elderly have a significant alteration in respiratory mechanics (Nielson, 2004).**
    - Decreased respiratory reserve: With age, changes in chest wall compliance, thoracic anatomy (kyphosis), lung compliance, respiratory muscle strength all impact respiratory mechanics.
    - Change in mechanics, can cause up to a 50% decrease in maximal inspiratory and expiratory force
    - Increased reliance on diaphragm for breathing over thoracic muscles
    - Blunted response to hypoxia and hypercapnea: Altered chemoreceptor responses and reduced mechanical capability diminish responses to hypoxia or hypercapnea, with the consequence that physiologic abnormalities cannot be corrected.

7. **In general, age alone should not determine utilization of mechanical ventilation (Ely, 1999).**
    - Controversial topic – common scenario where clinicians are very hesitant to intubate an elderly patient, having a good intention that the patient will, "unlikely ever get off the vent".
    - Elderly have an increased mortality risk that may be partially age-related but is more likely related to frailty/pre-morbid state, functional deficits, nutritional deficiency, comorbidities, and characteristics of the presenting illness.
    - After adjusting for severity of illness, age does not appear have an independent effect on patient outcomes – patients had a comparable mortality, & duration.

- General mechanical ventilation strategies should be employed, including lung protective ventilation strategies as much as possible.

8. **Normal creatinine, does not guarantee normal renal function in the elderly (Corsonello, 2005).**
    - Glomerular filtration rate (GFR) decreases by approximately 45% by the age of 80
    - Serum creatinine often remains unchanged, as a result of decreased lean body mass
    - *Almost 15% of the elderly will have "concealed" renal insufficiency, with a reduced GFR, but normal creatinine.*
    - ***Creatinine clearance (estimated or measured) should be used in medication dosage calculations for medications that are renally eliminated.***

9. **Pharmacokinetics & pharmacodynamics are significantly altered in the elderly (Bowie, 2007).**
    - Diminished renal function, first-pass metabolism, and a decrease in gastric absorption all have effects on pharmacologic effectiveness.
    - **Be particularly cautious of anticoagulants, hypoglycemics, antibiotics, and antihypertensive medications in the elderly.**
    - Barbiturates, benzodiazepines, propofol, and warfarin often have a prolonged clinical effect.
    - Lipid soluble drugs are more likely to have a prolonged effect, secondary to increased % of body fat content with age.
    - Protein bound drugs (i.e. warfarin, dilantin, and digoxin) have plasma concentrations of active drug due to decreased altered or reduced protein binding.

10. **Pre-morbid state is probably the best predictor of surviving critical illness in the elderly. (Mcdermid, 2011).**
    - Frailty is a multidimensional syndrome characterized by loss of physiologic and cognitive reserves that confers vulnerability that predisposes to the accumulation of deficits as well as adverse outcomes from acute stressors.
    - Frailty affects ~10% of those aged >65y, and ~25+% of those aged >85y
    - Important to consider pre-morbid state when deciding on aggressiveness of resuscitation and projected critical care needs.
    - **ICU Prognosis:** Patients who are independently able to perform activities of daily living, have a good nutritional status and few comorbid conditions have a favorable prognosis regardless of age.

Selected reviews & references

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