**The Silver Tsunami: Are You Prepared?**

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**Objectives**

- Better understand the “geriatric imperative.”
- Review basic physiology of the aging patient
- Review the current data for anesthesia in hip fracture patients and how we can impact outcomes.

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**What is the Silver Tsunami?**

- 1950-2005: 8-12% increase in Seniors
- 2013: 13% of population (40 million)
- 2011-2030: Baby boomers!!!
- “Old” old is fastest growing:  
  - 2010: 5 mil over 85  
  - 2050: 21 million!

(Data from US Census Bureau)

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**Geriatric Imperative’s Healthcare Impact**

- ≥65 year olds made up 13% of the population in 2013, but  
  - 25% of medications  
  - 33% of hospital admissions  
  - 44% of hospital bed days  
  - Majority of nursing home beds

**What will happen in 2030 when % of population doubles?!?!?**

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**The Effects of Time . . .**

**Weight**

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**The Effects of Time . . .Body Composition**

100%  
90%  
80%  
70%  
60%  
50%  
40%  
30%  
20%  
10%  
0%  

Age 25  
Age 70  

- Other  
- Bone  
- Cell Mass  
- Fat
Physiologic Decline with Aging

CNS Changes

- Decrease in number of nerve cells in the CNS
- Accumulation of metabolic products that may play a role in increased sensitivity to sedatives
- Decreased dopamine and increased muscular rigidity
- Increased reaction time
- Increased risk for postoperative delirium
- Decrease in MAC (6% per decade after age 40)

Musculoskeletal System

- Osteoarthritis
- Osteopenia

Renal System

- GFR decreased 30-46%
- Not always manifested in creatinine (dependent on muscle mass and body weight)
- Decreased renal plasma flow by about 50%

Pulmonary System

- Loss of elastic recoil and collagen matrix (increased compliance)
- Prolonged expiratory phase, decreased maximal expiratory flow
- Decreased diffusion capacity
- Increased dead space
- Decreased FRC
- Increased alveolar-arterial gradient (A-a)
- Increased work of breathing

Cardiovascular System

- Maintenance of resting LV function
- Less cardiomyocytes → less myocardial contractility
- Decreased response to beta-receptor stimulation → lower max heart rate (requires compensatory increase in stroke volume to increase CO)
- Increased vessel stiffness → higher systolic pressure and increased LV afterload.
- Decreased VO2 Max

**Summary of Physiologic Changes**

- Loss of functional reserve capacity
- Loss of ability to compensate in the face of stress
  
  *Surgery = Stress*

**When Should We be Operating?**

*Predictors of Mortality in Elderly Patients With an Intertrochanteric or a Femoral Neck Fracture*

Jesper Kiminno, MD, Egrene Artan, MD, Inbal C. Usha, MD, Ari Ilevi, MD, and Suffolk Kariuk, MD

The effect of early surgery after hip fracture on 1-year mortality

Paola Colaianni, M.P. Di Marzio, E. Delfino, C. Alberto Pescioli, and M. M. D. Pavone

**Hip Fractures in the Elderly**

- 1-year mortality is estimated to be 14-58%
- Most studies on morbidity/mortality done in Scandinavia
- In US: White men most likely to die
- Morbidity
- Loss of independence
- $$$$$$$

Jacobsen SJ et al. Race and sex differences in mortality following fracture of the hip.

**When Should We be Operating?**

Meta-analysis of 16 observational studies
- Delays >48 hours associated with increase in 30-day mortality and 1-year mortality

**Comparative Effectiveness of Regional versus General Anesthesia for Hip Fracture Surgery in Adults**

Mark G. Nauman, M.D., M.Sc., Jeffrey H. Sillar, M.D., Ph.D.,† Nadia M. Elhassarany, M.D.,‡ Justin M. Ludvig, M.A.,§ Lee A. Flexner, M.D.¶

- 2012 Retrospective cohort of 18,000 hip fracture surgery patients in NY state.
- Lower odds of in-hospital mortality & pulmonary complications with regional anesthesia.

**2014 AAOS: “Doesn’t Matter!”**

**2014 UK/Ireland Anesthesia Association: “Try to do neuraxial!”**
Mode of Anesthesia in Hip Fracture: Does it Matter?

- Clinical/administrative databases lack specific info—type of block, amount of sedation, or meds used for GETA.
- Outcomes are also limited—no patient centered outcomes.

REGAIN

- Regional vs. General Anesthesia for Promoting Independence after Hip Fracture Surgery
- University Pennsylvania, Enrollment Spring ‘16
- 1600 patient multicenter randomized trial
- Primary outcome: Recovery of ambulation
- Secondary outcomes: Chronic pain, ability to return to prefracture residence, overall health, cognitive function

www.clinicaltrials.gov ID # NCT02507505

Hip Fractures in the Elderly

- Denmark 1977-2001
- >169,000 fracture cases compared with >500,000 controls followed for 20 years.
- Excess mortality of 19% within first year and then 1.8% per year for every additional year following the fracture.
- Major causes longitudinally were due to complications to the fracture event, not premorbid conditions

Hip Fractures in the Elderly

- Retrospective study; 2009-2013; patients with proximal femoral fracture
- Follow-up for at least 1 year
- 115 patients after exclusions
- Things relating to mortality: type of surgery—THAs & hemiarthroplasty mortality >60% vs 24% in proximal femoral nail


Hip Fractures in the Elderly

- 114 patients age 65+ undergoing hip fracture repair with SAB and propofol.
- Excluded severe dementia and preop delirium
- BIS of ~50 for deep sedation group, BIS of 8+ for light sedation group. Standardized postop analgesia.
- Prevalence and mean days of delirium significantly greater in deep sedation group.

Controversies in anaesthesia for noncardiac surgery in older adults

- 2015 Review of most recent hip fracture data
- Reviews info and risk factors of postop delirium
- Discusses frailty & impact on outcome