



SOCIETY OF TRAUMA NURSES

THE ELECTRONIC LIBRARY OF

**TRAUMA LECTURES**



THE ELECTRONIC LIBRARY OF

# TRAUMA LECTURES

## Geriatric Trauma



SOCIETY OF TRAUMA NURSES

# Objectives

**At the conclusion of this presentation  
the participant will be able to:**

- List the most common mechanisms of injury in the elderly
- Discuss four physiological changes that make the elderly trauma patient vulnerable to complications
- Identify three factors that increase the likelihood of geriatric ground level falls
- Describe issues with pain control in the elderly
- Describe the process for rapid reversal of anticoagulants in head injured patients
- Discuss the importance of aligning goals of care
- Discuss safe discharge in the elderly population

# Causes of Death – Top 10

## Age 55 - 64 years

1. Malignant Neoplasms
2. Heart Disease
- 3. Unintentional injuries**
4. Chronic lower respiratory disease
5. Diabetes Mellitus
6. Chronic Liver disease and cirrhosis
7. Cerebrovascular diseases
8. Suicide
9. Kidney Disease
10. Septicemia

## Age 65 and over

1. Heart Disease
2. Malignant neoplasms
3. Chronic lower respiratory diseases
4. Cerebrovascular diseases
5. Alzheimer's disease
6. Diabetes mellitus
- 7. Unintentional injuries**
8. Kidney Disease
9. Influenza and Pneumonia
10. Parkinson's Disease

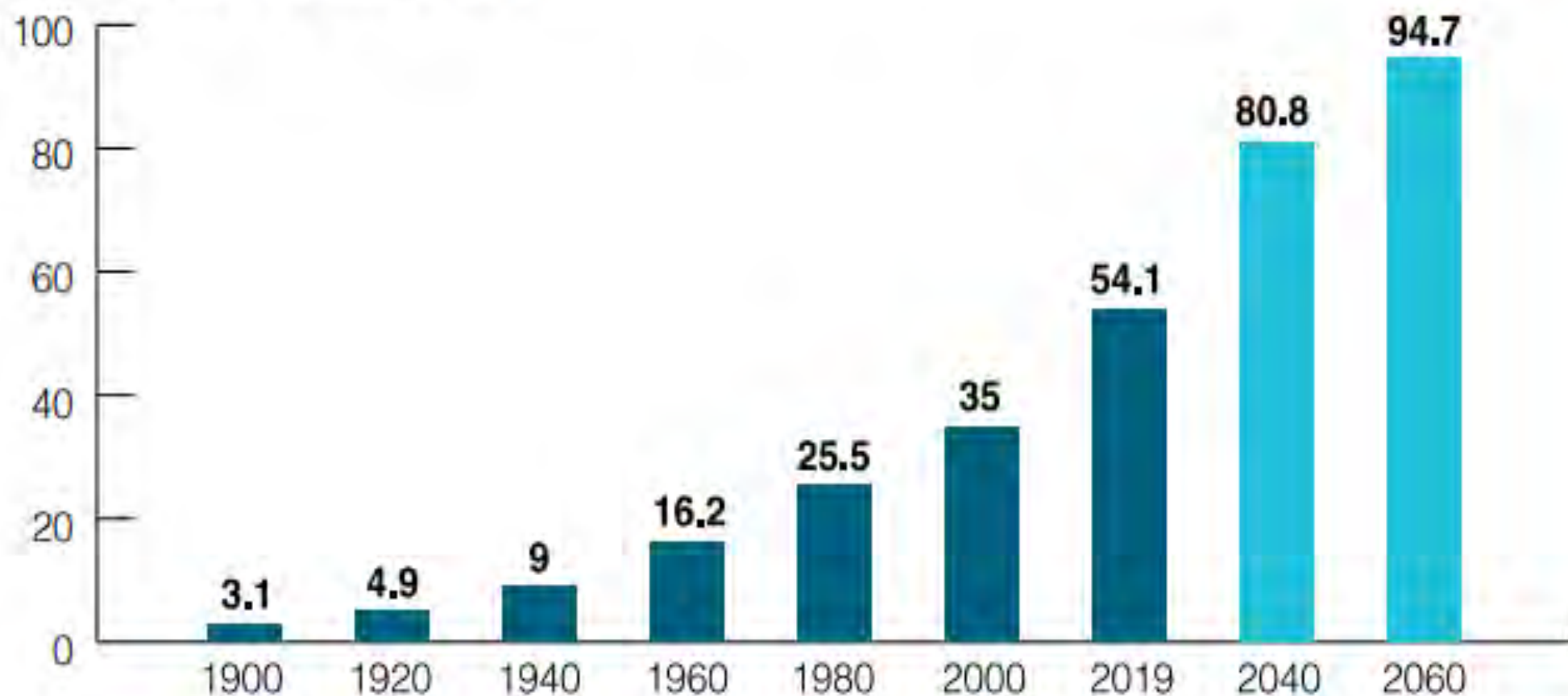
Heron, J., 2021

# Epidemiology

- Average American life span has increased by over 31.5 years in the past century
  - 1900's = 47.3 year old
  - 2019 = 78.8 years old
- Percent US population age  $\geq 65$ 
  - Since 1900, quadrupled from 4.1% to 16% in 2019
  - Since 2009, increased by 14.4 million or 36%
  - 2019 = 54.1 million, 16% of the population
  - By 2040 = expected to be 21.6%



## Number of Persons Age 65 and Older, 1900 - 2060 (numbers in millions)



*Note: Increments in years are uneven. Lighter bars (2040 and 2060) indicate projections.*

*Source: U.S. Census Bureau, Population Estimates and Projections*

# Demographics and Trauma

## 2005

- 18% of trauma victims were aged 65 years or older

## 2015

- 30% of trauma victims were aged 65 years or older

\*The mortality rate for the geriatric trauma population is significantly higher than the younger trauma population\*

# What is Geriatric?

Age  $\geq$  65 (young-old, 65-74)

Age  $\geq$  75 (middle-old, 75-85)

Age  $\geq$  85 (oldest Old)

Centenarians (100 +)

Physiologic age is more important than chronologic age.







# Most Common Mechanisms of Unintentional Injury

1. Falls
2. Motor vehicle crash
3. Pedestrian vs vehicle
4. Thermal injuries
5. Elder abuse

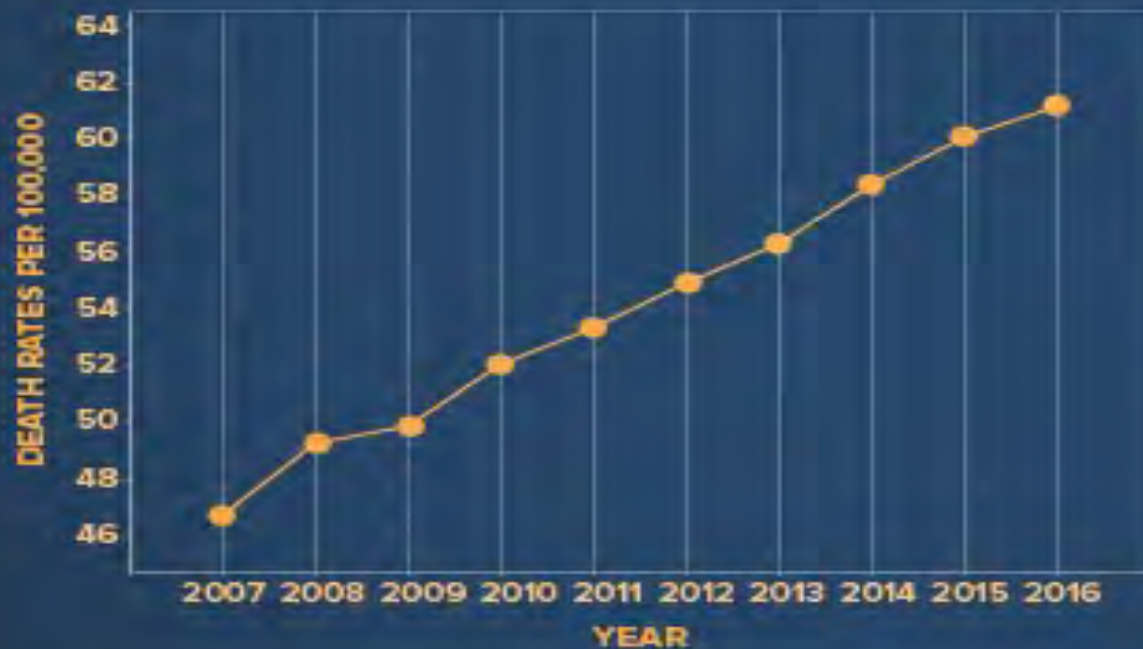
# Falls

- Anticipate seven fall deaths every hour by 2030.
- Each year about 3 million older adults will be treated in ED for injuries related to a fall.
- In the next 30 minutes, an older adult will die from injuries sustained in a fall.
- One out of four people 65 and older fall each year.



# Fall Death Rates in the U.S. **INCREASED 30%**

FROM 2007 TO 2016 FOR OLDER ADULTS



Learn more at [www.cdc.gov/HomeandRecreationalSafety](http://www.cdc.gov/HomeandRecreationalSafety).

If rates continue to rise,  
we can anticipate

**7 FALL  
DEATHS**  
EVERY HOUR  
BY 2030





# Common Causes of Geriatric Falls

<b>Syncope/ Positive loss of Consciousness</b>	<b>Near-Syncope/Vasodilation/ Positional Change</b>
Seizures	Blood Pressure Medications (beta-blockers, calcium channel blockers)
Dysrhythmias	Dehydration, diuretics
Acute Coronary Syndrome	Hemorrhage (GI bleed, AAA)
Hypoglycemia	Hot bath/Shower
Pulmonary Embolism	Sepsis Anemia

# Common Causes of Geriatric Falls

<b>Non-syncopal/Mechanical</b>	<b>Conditions</b>
Deconditioned	Lower Body weakness
Decreased Vision	Vitamin D deficiency
Unsafe home conditions (poor lighting, loose rugs)	Foot pain/poor footwear
ETOH	Broken/uneven steps
Sedating Medications	Throw Rugs or clutter in home
Neurologic Disease (CVA, Parkinson's disease)	Gait & balance

# Risk Factors in Falls

## Intrinsic

- Advanced age
- History of previous falls
- Muscle weakness
- Gait/Balance problems
- Vision problems
- Postural hypotension
- Chronic conditions (arthritis, stroke, dementia, etc.)
- Fear of falling

## Extrinsic

- Lack of stair handrails
- Poor stair design
- Lack of bathroom grab bars
- Dim light or glare
- Obstacles & tripping hazards
- Slippery or uneven surfaces
- Psychoactive medication
- Improper use of assistive devices



# Medications Most Likely to Cause Falls

Anticonvulsants	Antidepressants	Antipsychotics	Benzodiazepines
Opioids	Sedative-hypnotics	Anticholinergics	Antihistamines

## RECOMMEND

**STOP:** any medications if able

**SWITCH:** to an alternative medication that may be safer

**REDUCE:** medications to the lowest effective dose



# Clinical Work-Up Post Geriatric Fall

- Determine frequency of falls
- EKG
- Orthostatic vital signs
- Consider Zio patch
- Safe discharge plan
- Evaluation by PT/OT
- Bone health referral

STEADI Algorithm for Fall Risk Screening, Assessment, and Intervention among Community-Dwelling Adults 65 years and older



# Evidenced-Based Fall Assessment Tool

- Screen
- Prevent
- Assess
- Intervene
- Follow-up







# Motor Vehicle Crashes

2nd most common cause of unintentional injury in the elderly

Older adults (>65):

- 60% increase in drivers since 2000
- 20 fatalities daily
- 700 injured daily





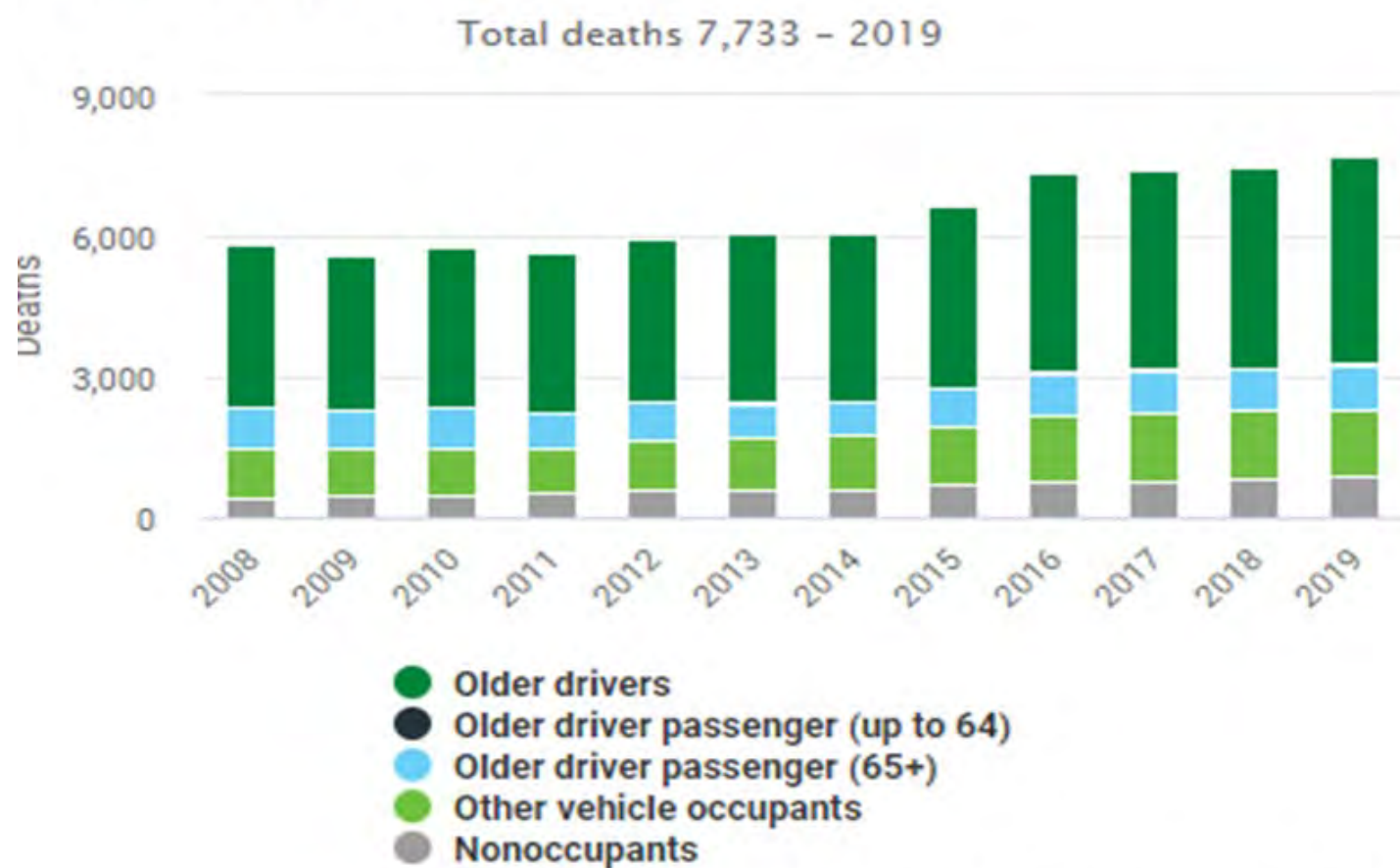
# How Do Crashes Involving Older Drivers Differ From Crashes of Other Drivers?

- In 2019, multiple vehicle crashes at intersections were 40% in drivers 80 years and older, compared to 20% for drivers ages 16-59
- Failure to yield right-of-way
- Failure to look both ways or not seeing





## Deaths in traffic crashes involving drivers 65 and older, 2008–2019



# Why These Common Patterns?

- Older adults were half as likely to execute secondary glances than middle-aged drivers in intersections.
- Tend to look in front of vehicle rather than sides
- Increased difficulties with large head movements, psychomotor coordination, multitasking, scanning complex intersections; vision



# Increased Effort of Self Protection

- Decrease daily driving
- Avoid driving at night
- Avoid driving at peak hours
- Avoid driving on freeways
- Drive at lower speeds
- Drive larger vehicles
- Carry fewer passengers



# Next Most Common Mechanisms of Injury

## Pedestrian

- 26% of deaths at a crosswalk
- Females > males
- 80% at night
- Lowest on Tuesday and peak on Saturdays

## Burns

- 25% of all burn deaths occur in ages > 65
- Elderly have the highest fatality rate among burns



# Intentional Elderly Trauma

## Elder Maltreatment

- Classified as: physical, sexual, emotional, neglect, abandonment, and financial
- Often a caregiver
- Frequently underreported
- Frequently undiagnosed
- True incidence unknown





# Suicide: Preventable Tragedy

- Males aged 65 years and older have highest rate of suicide in the U.S.
- 1 per 4 attempts by older adults successful
- 1 per 200 attempts by younger adults successful
- Risk Factors





# Co-morbidities

## Older adults

- 80% with at least one comorbidity
- 50% with at least two co-morbidities

## Worst outcomes noted with:

- Chronic Heart Disease
- Cancer/blood disorders

# Unique Anatomic and Physiologic Considerations

- Brain Atrophy/Cognition
- Pulmonary Capacity
- Renal/Genitourinary
- Gastrointestinal
- Musculoskeletal/Skin
- Endocrine
- Cardiac





# Neurologic Considerations

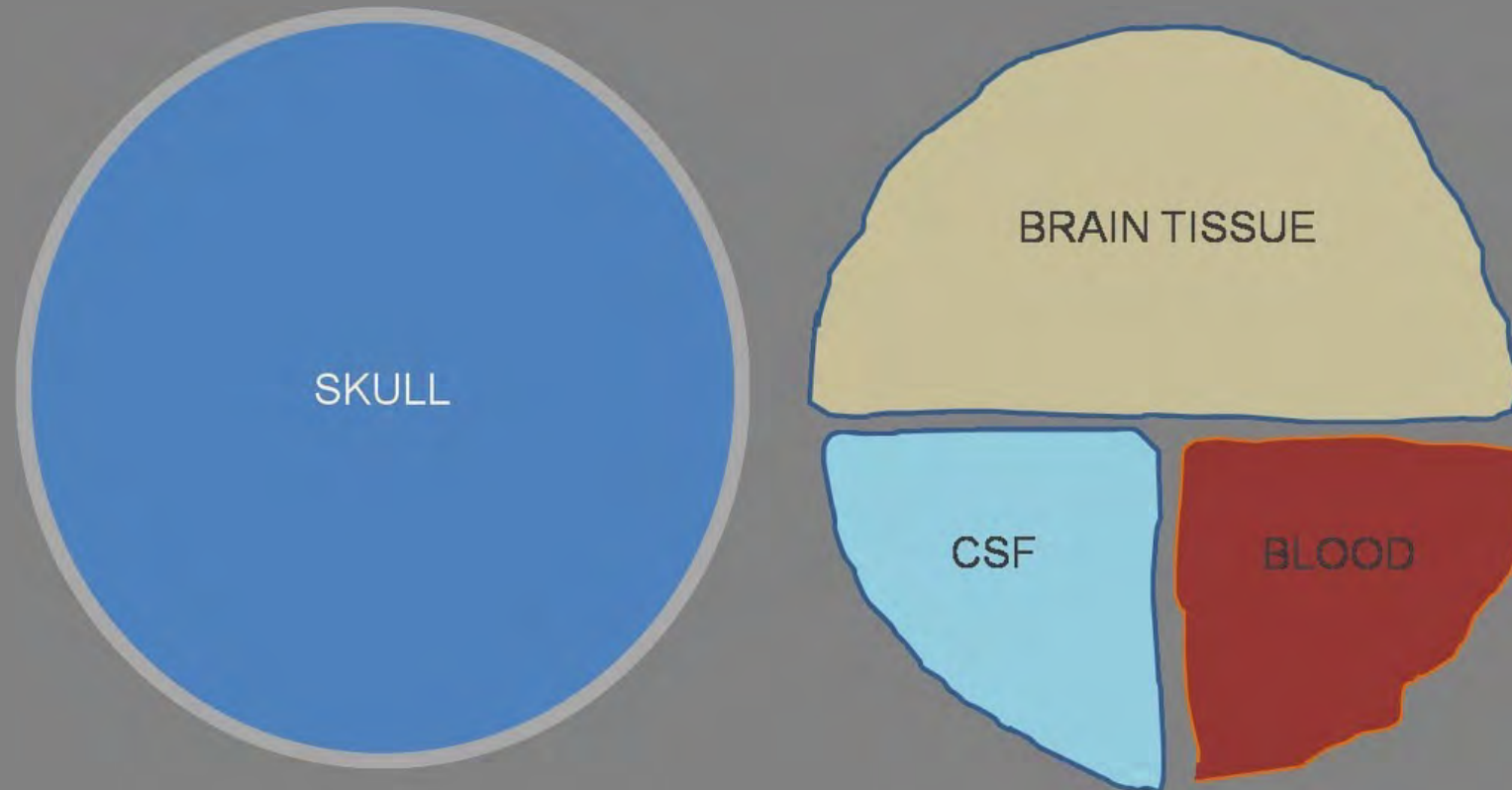


- Declining:
  - Perceptual motor skills
  - Concept formation
  - Complex memory tasks
  - Quick decision tasks
  - Slower reflex times
- Alters response to:
  - Drugs
  - Pain
  - Environment

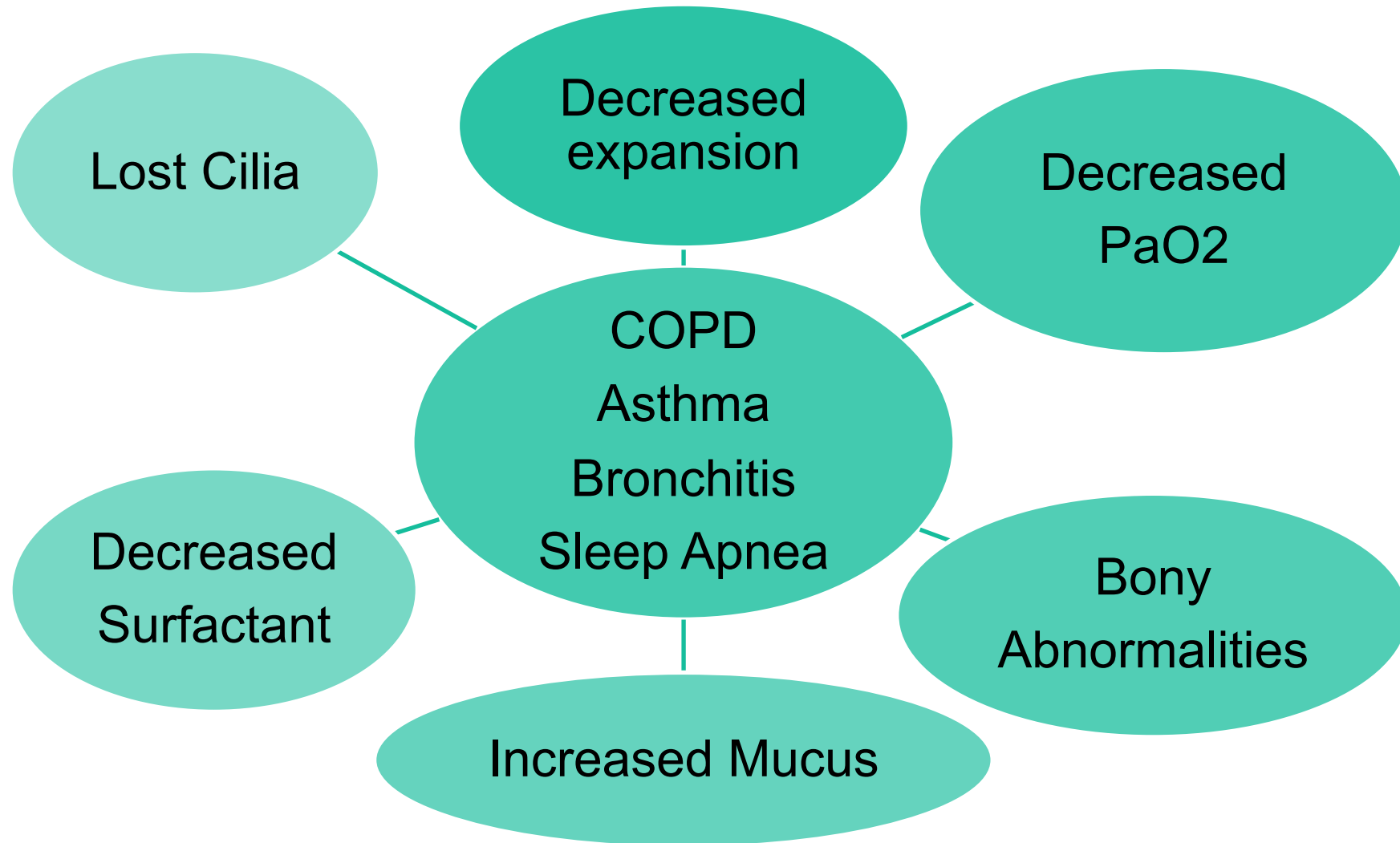


# Neurologic Considerations

## Parenchymal Volume of the Elderly Patient: Monro-Kellie Hypothesis

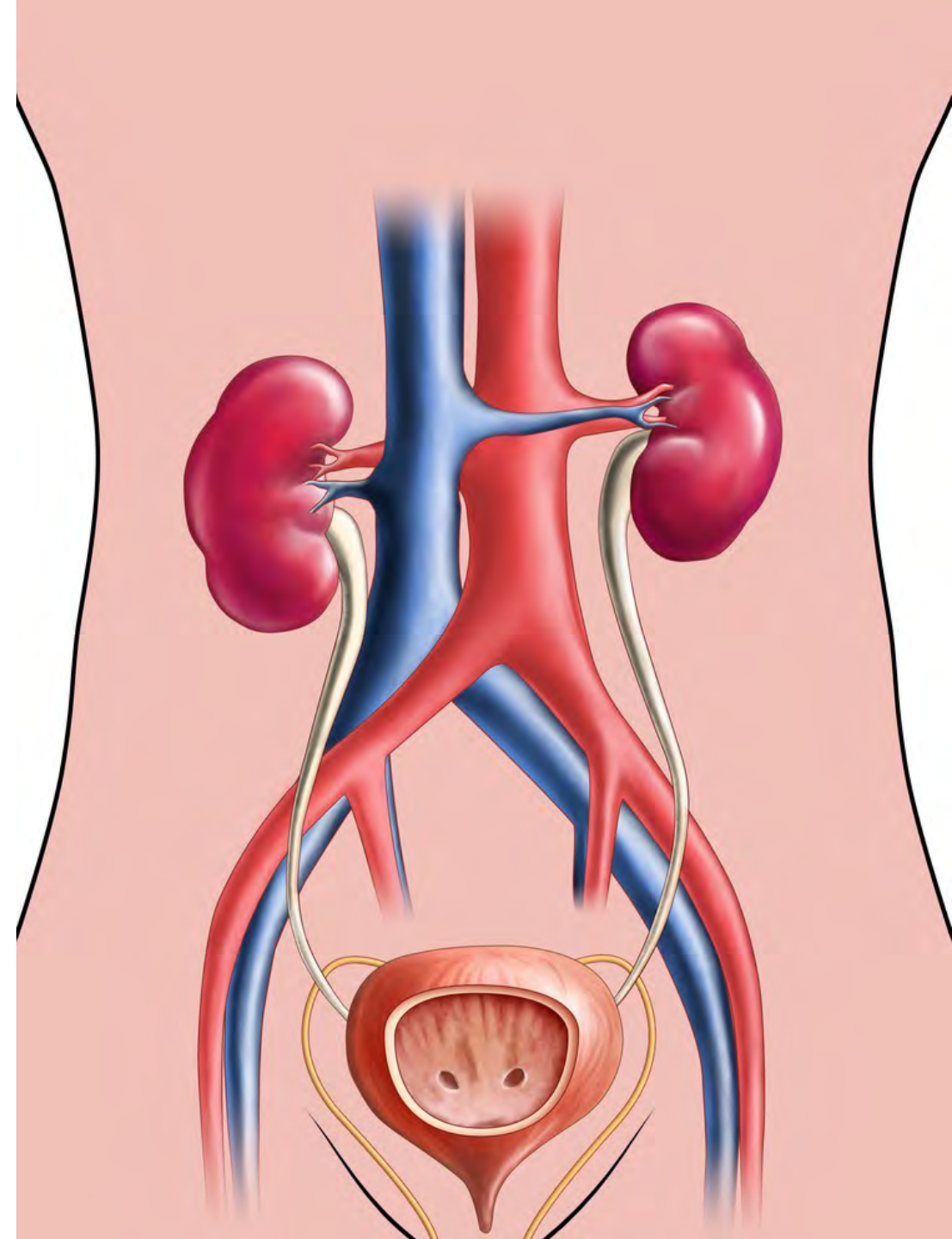


# Pulmonary Considerations



# Renal Considerations

- Renal blood flow decreases 10% per decade
- Steady decline in functioning nephrons leads to:  
**Reduced ability to filter & clear drugs**





# Renal Considerations

ALP

BUN

Creatinine

Uric acid

Cholesterol

Triglyceride

## Caution

Even with normal kidneys:

- hypotension
- hypovolemia
- acute kidney injury from IV contrast
- pharmaceuticals (ACE, NSAIDS, etc.)
- rhabdomyolysis

# Causes of Hospital Acquired Renal Failure

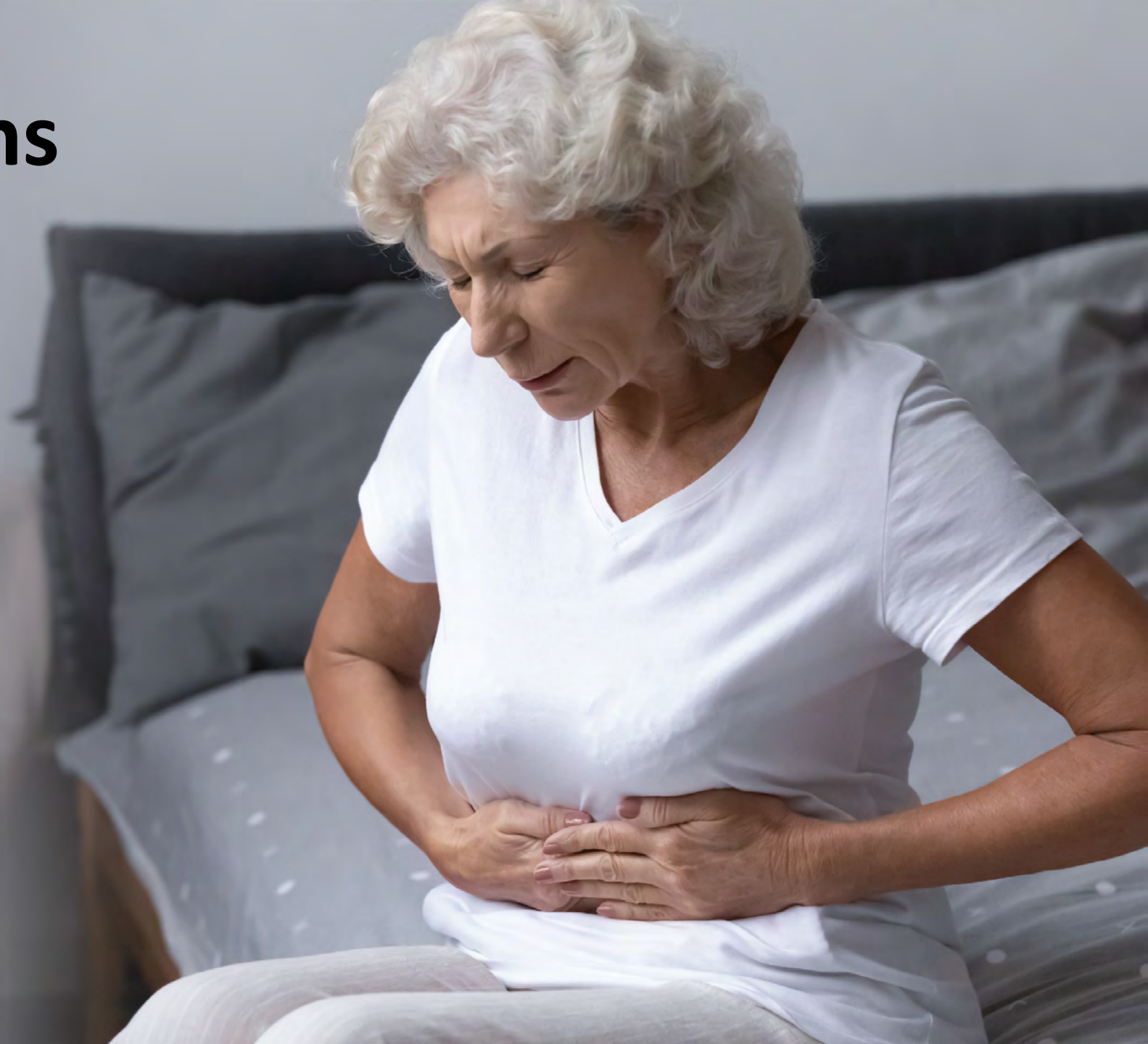
1. Surgery
2. Hypotension
3. Contrast Induced Nephropathy





# GI Considerations

- Slowing peristalsis
- Laxative dependence
- Proton Pump Inhibitors (PPIs) and H2 Blockers
  - Decrease gastric acid
- Pernicious anemia
  - Common in elderly





# Musculoskeletal Considerations

- ↓ muscle fibers
- ↑ connective tissue
- ↓ bone mass



# Endocrine Considerations

- Increase in glucose tolerance
- Hypothyroidism
- Menopause
- Continue supplements
- Monitor glucose

# Cardiovascular Considerations

## Primary Concern:

- Limited cardiac reserve
- Unable to increase O<sub>2</sub> delivery to meet demands

## In the Presence of:

- Previous MI
- Heart Failure
- Beta blockers
- Bradyarrhythmias
- Loss of atrial kick



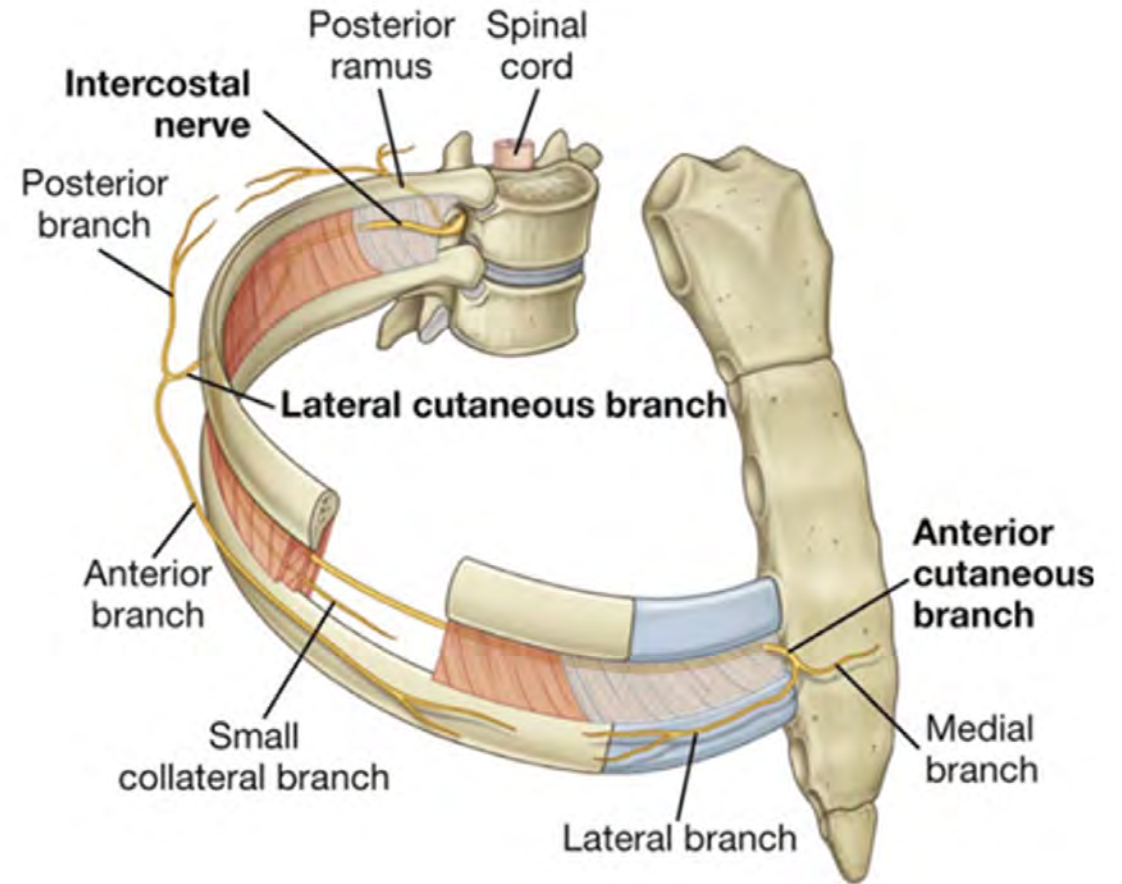
# More CV Considerations

- Multiple medications
- Electrical Therapies
- Previous vascular surgery
- IVC filter



# Common Injuries

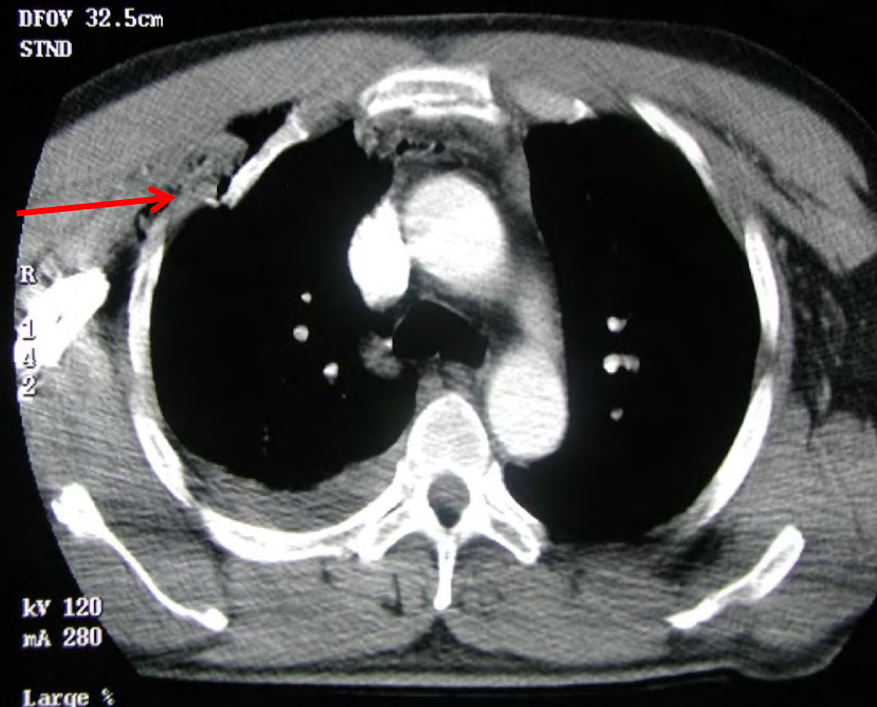
- Rib Fractures
- Hip Fractures
- Cervical-spine
- Head Injury



# Rib Fractures

## Most Common Injury in Elderly Blunt Trauma

Advanced Age	Doubles risk of death
Three or more rib fractures	Doubles risk of death
Cardiopulmonary Disease (ex. CHF)	About 2.5 increased risk of death
Development of Pneumonia	Increases risk of death by over 5 times

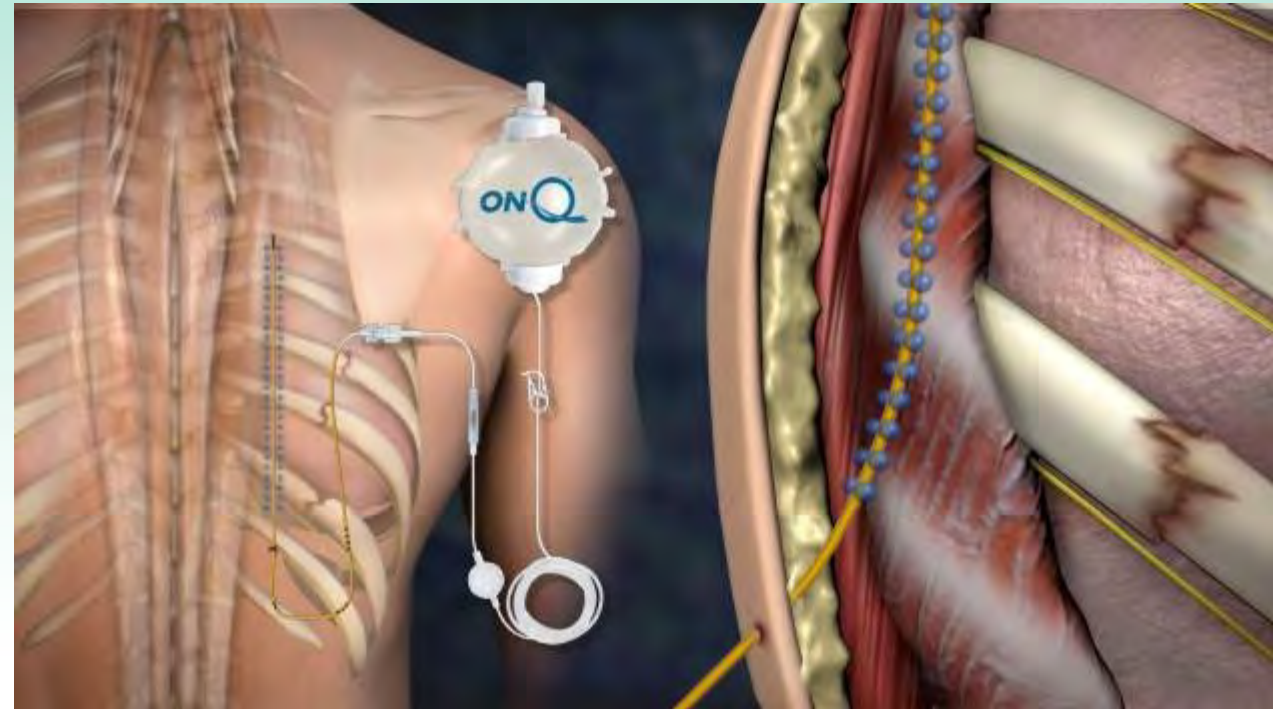




# Rib Fracture Care

**“The Odds Ratio of Death Decreases by 40% with Adequate Pain Control”**

- Pain block
- Minimize opioid dosage
- PRN muscle relaxers
- Aggressive pulmonary hygiene
- Out of bed for all meals if not contraindicated



Courtesy of Dr. Michael Truitt, Methodist Dallas Medical Center

# Intervention for Isolated Rib Fractures

## In nonelderly patient:

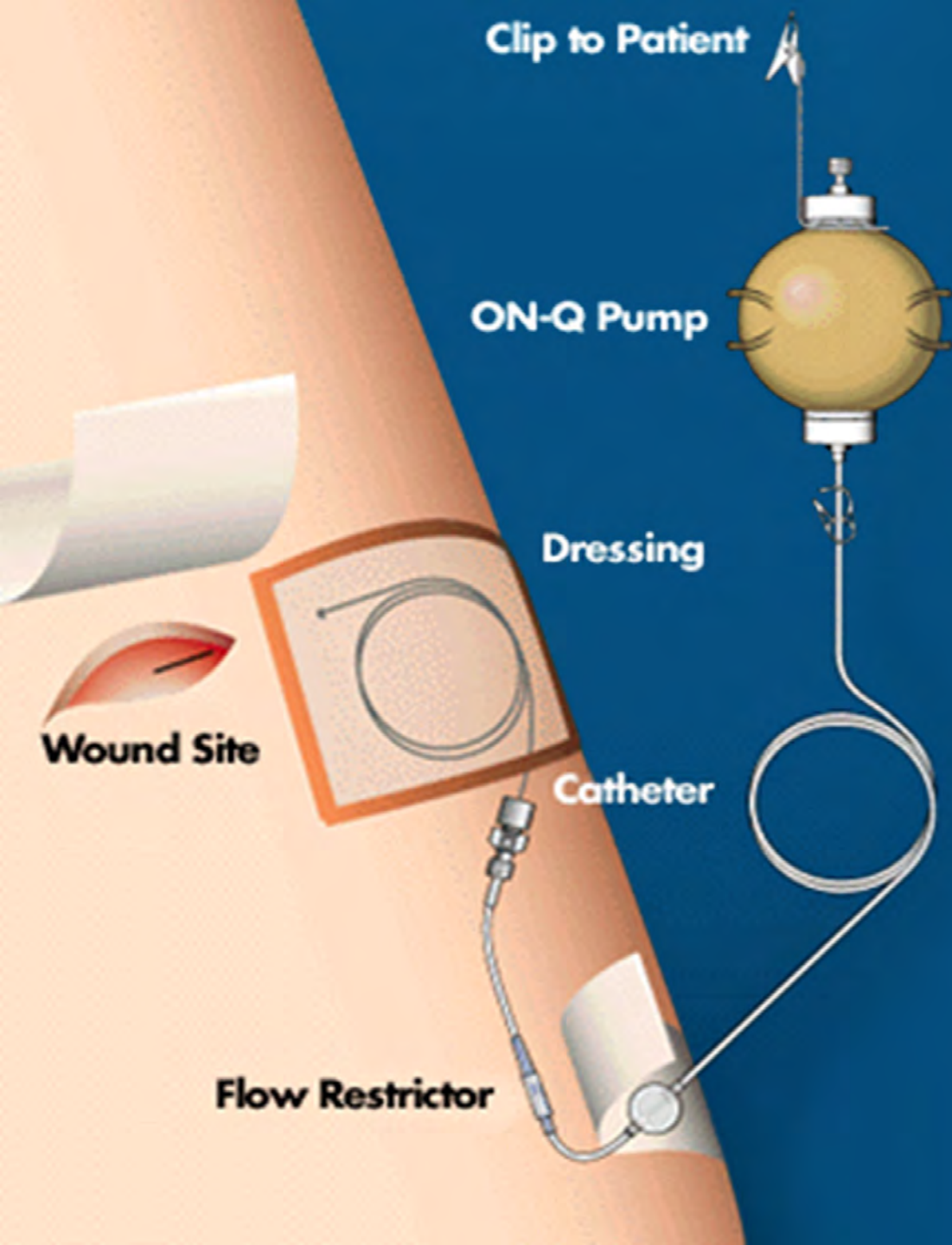
- Isolated rib fx with minor mechanism: discharge
- Isolated rib fx with major mechanism: observe

## Isolated rib fx in elderly

- Trauma consultation
- Observe or admit
- Pain control
- Incentive spirometry



# Continuous Peripheral Nerve Block or Epidural

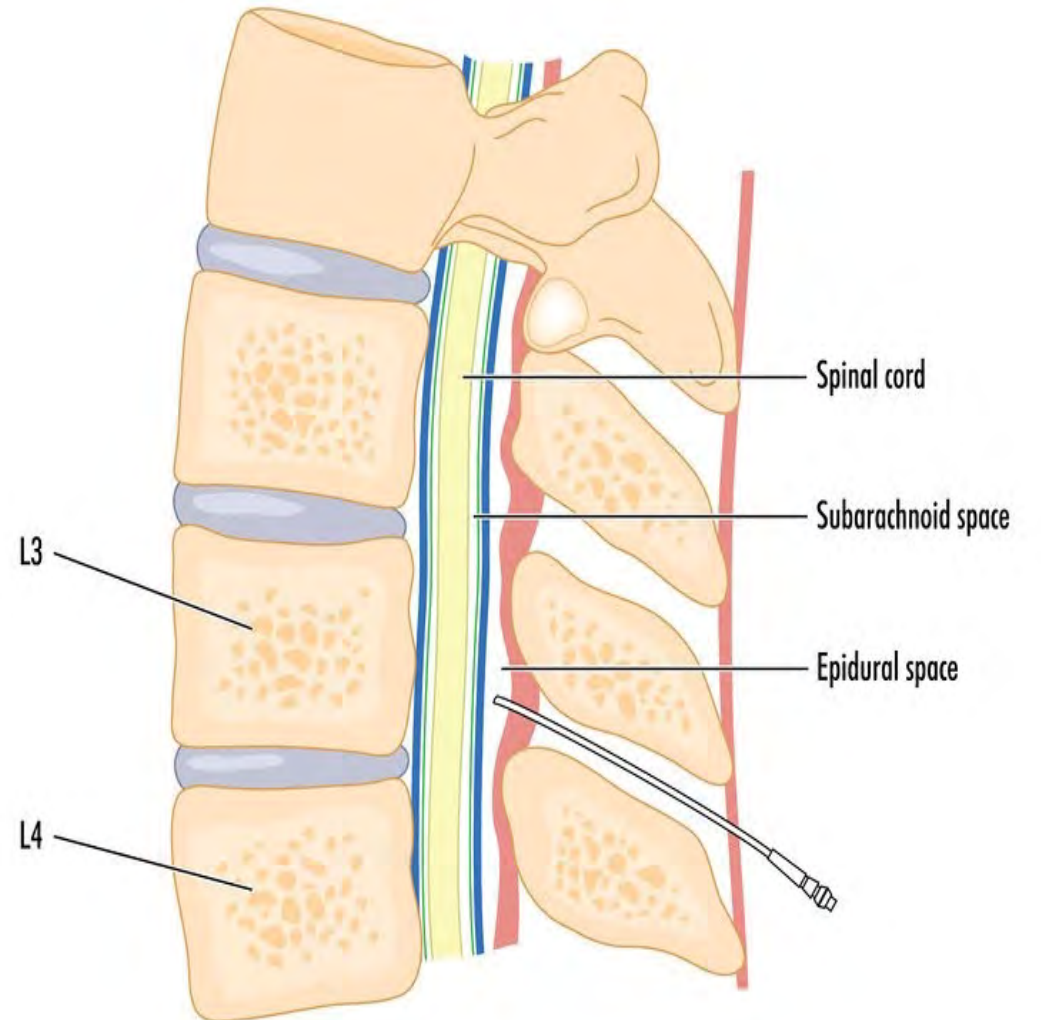


- Superior pain relief than narcotics alone
- Management for pain control with rib fractures includes:
  - Epidural
  - Paravertebral Block
  - Serratus Block
  - Erector Spinae

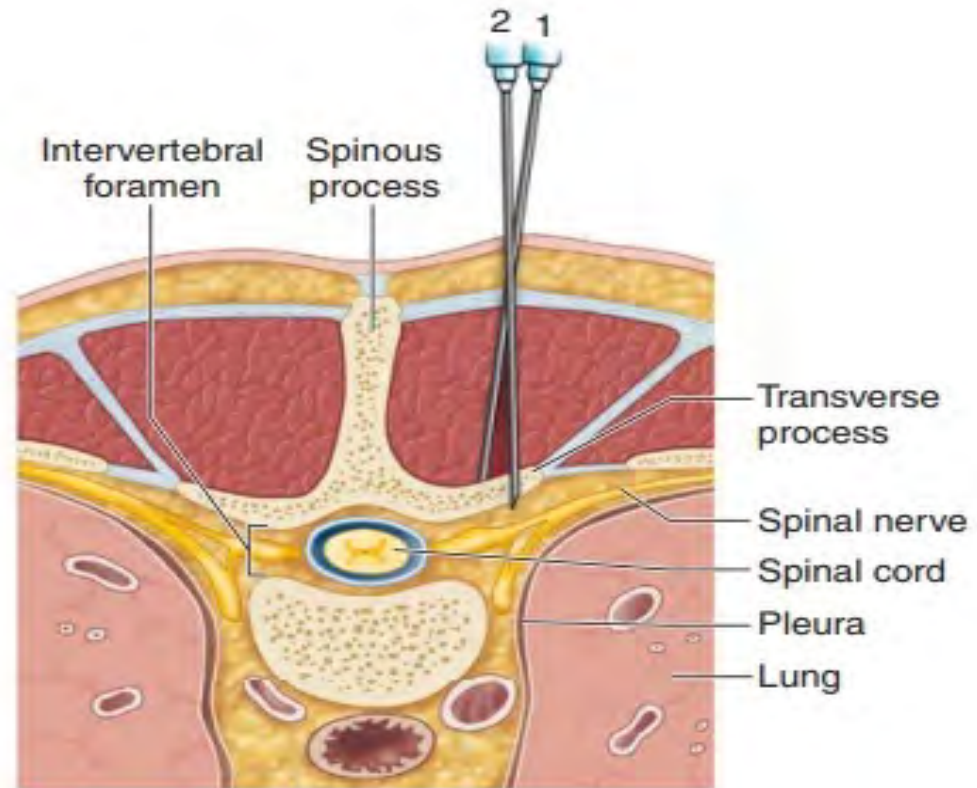
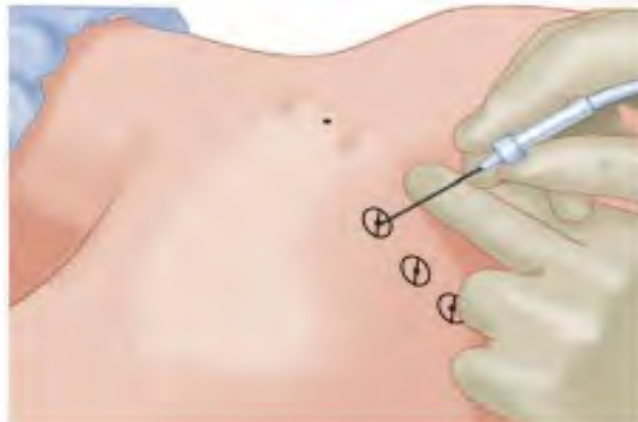
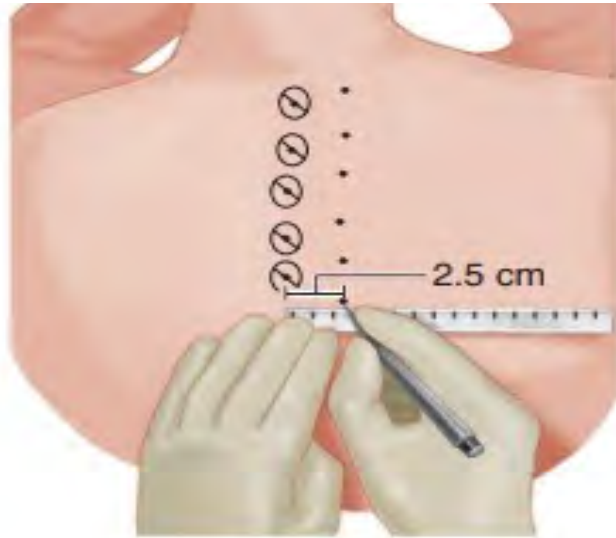


# Epidural

- Receives ongoing medication through catheter inserted in epidural space tunneled through the skin
- Inserted into the area between dura mater (a membrane) and the vertebral wall, containing fat and small blood vessels
- Stops nerves in spinal cord from sensing pain



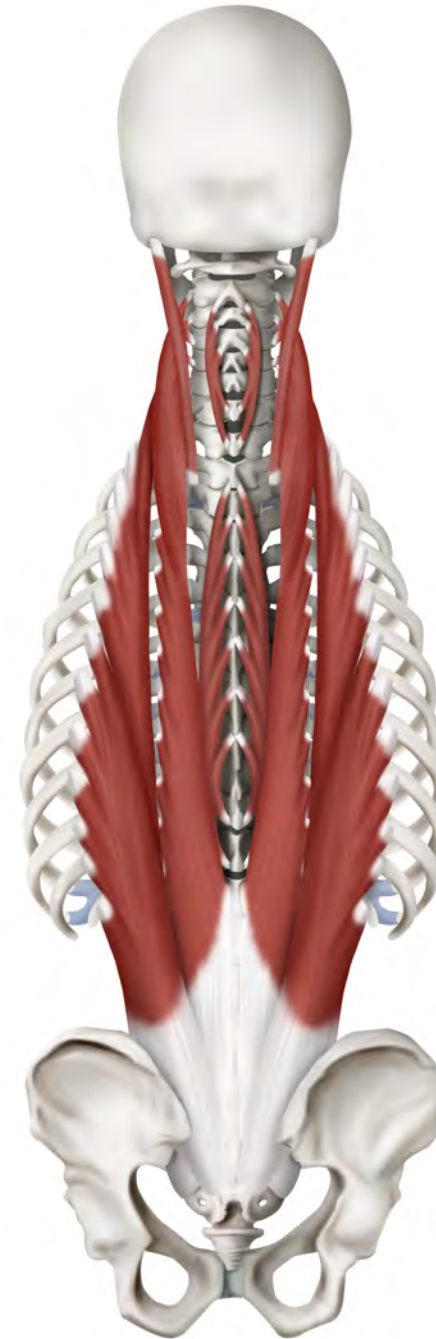
# Para-Vertebral Block



Paravertebral anatomy and traditional approach. Contact transverse process (1), then redirect the needle caudally (2) and advance 1 cm.

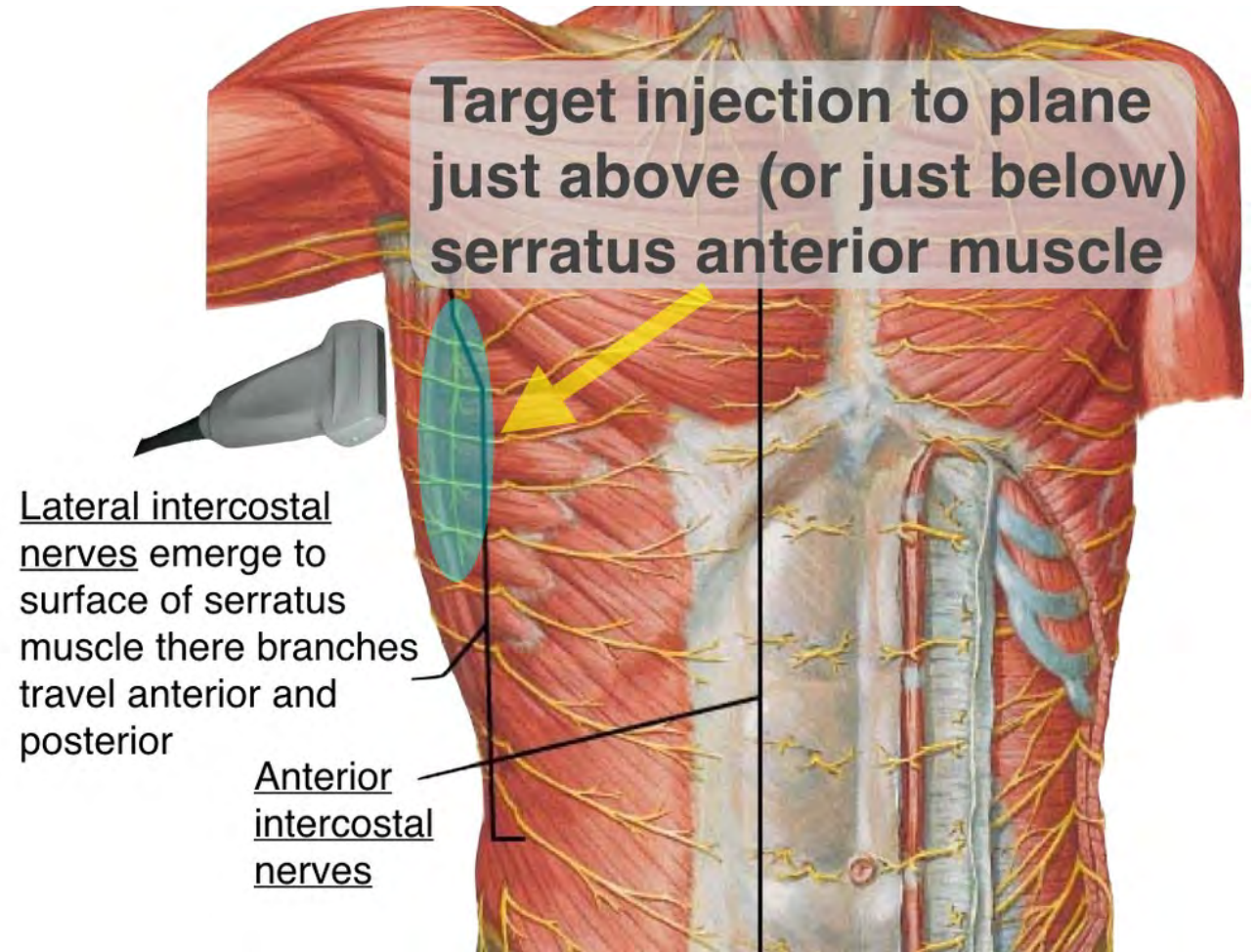
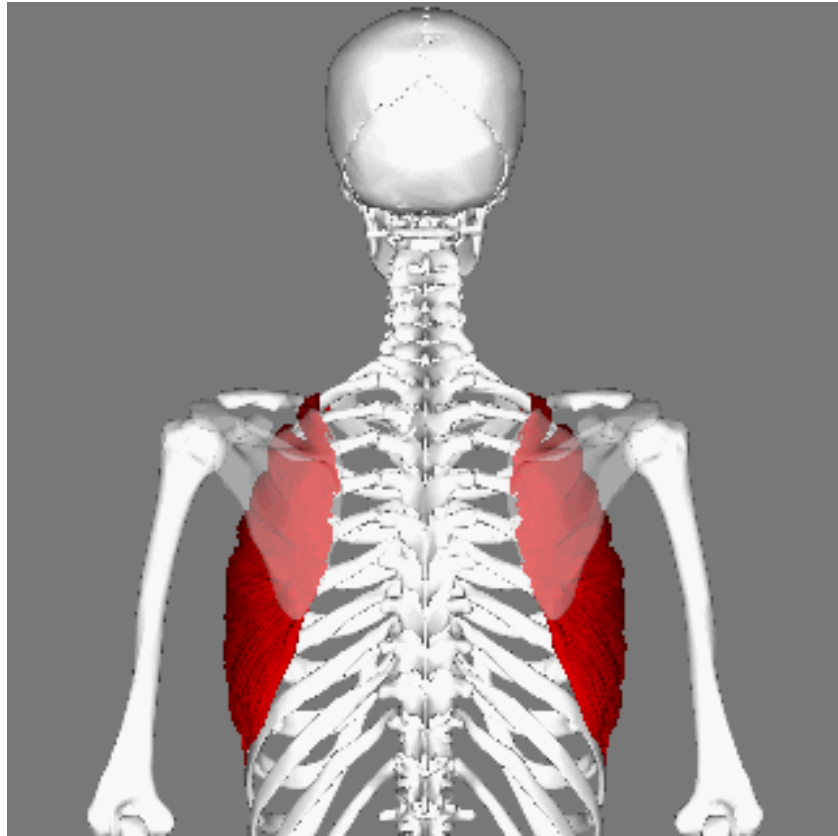
# Erector Spinae

- Local anesthetic injected in erector spinae
- Into the group of muscles & tendons that run length of spine on left and right side from sacrum and hips to base of skull
- Work at origin of spinal nerves





# Serratus Block



# Operative Rib Fixation

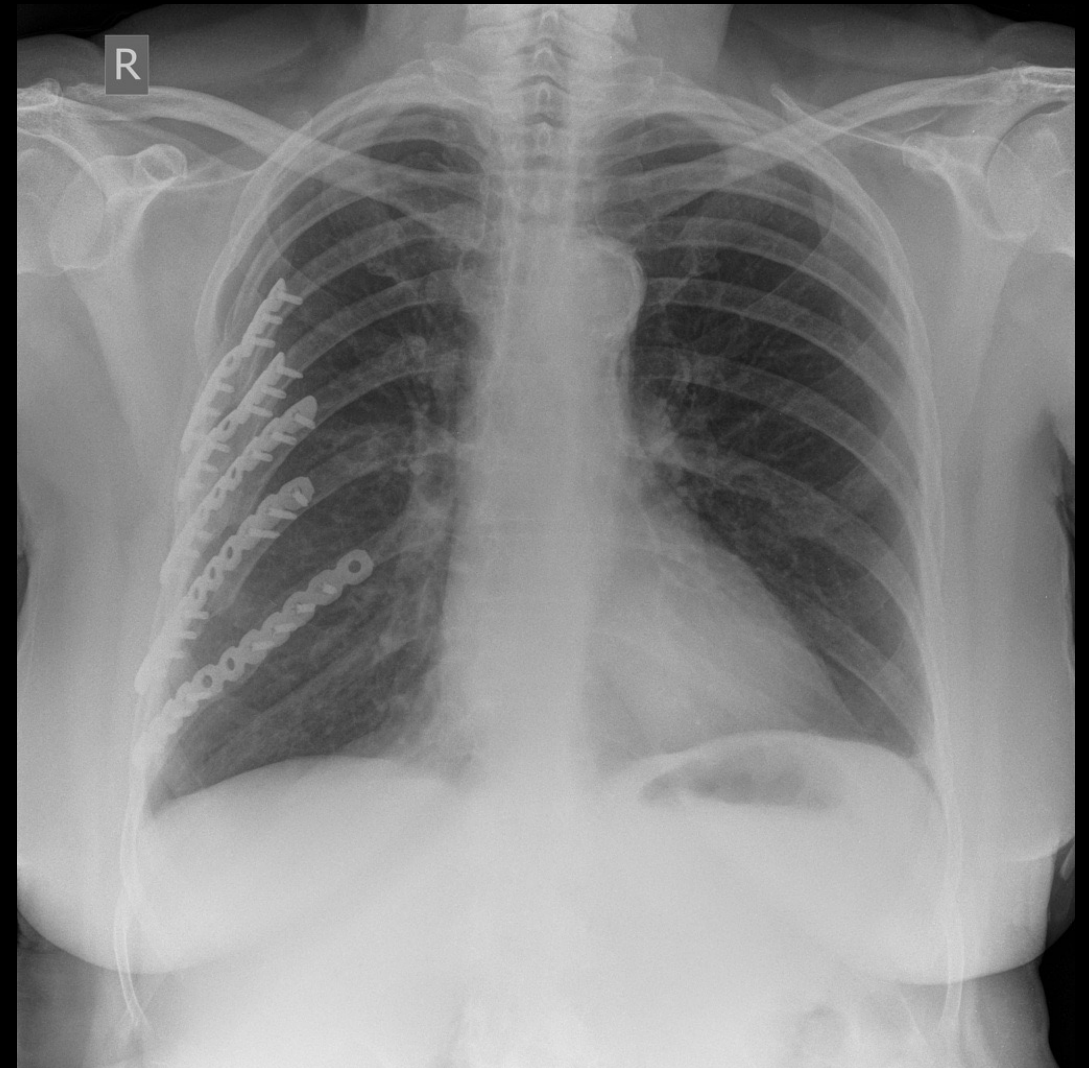
Limited number of surgeons perform surgical rib fixation.

## Benefits:

- Faster return of lung function
- Fewer complications
- Shorter vent/ICU/hosp LOS

## Indicated:

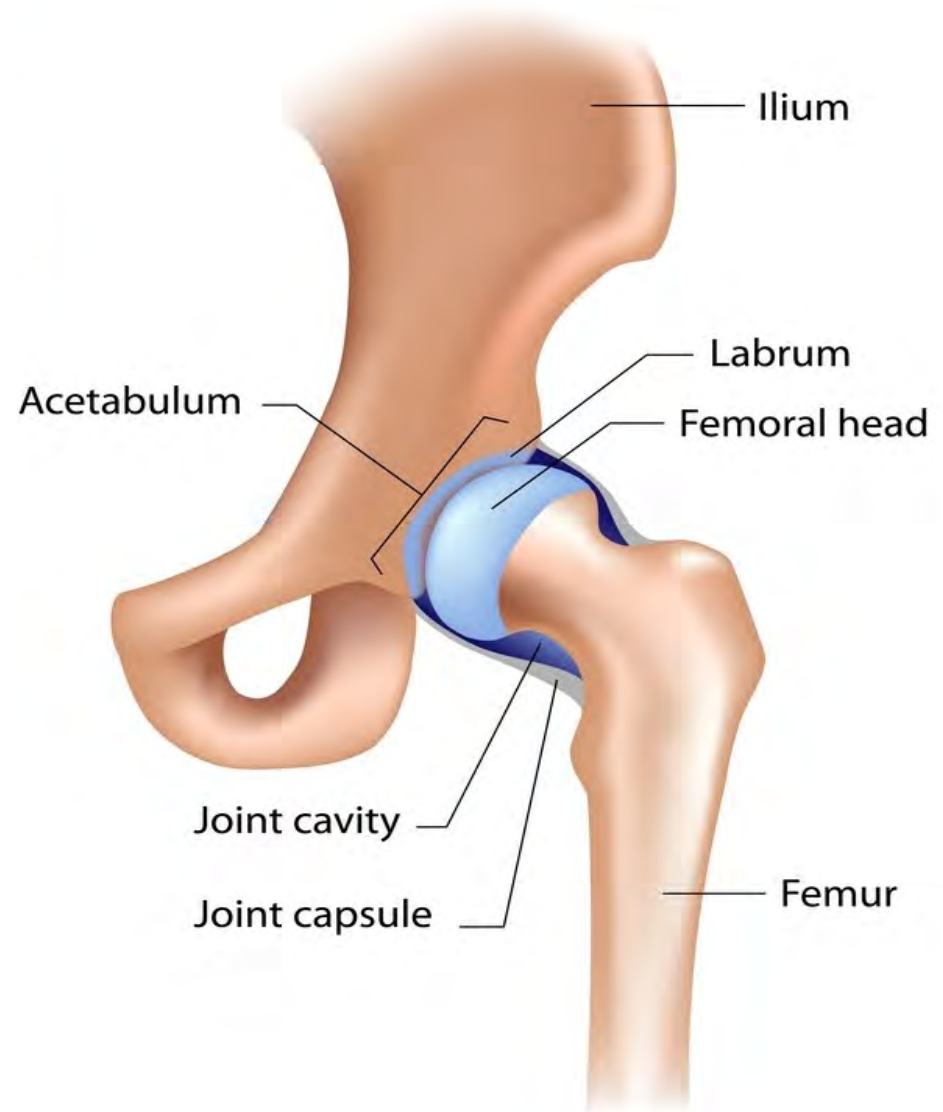
- Flail chest and respiratory failure without pulmonary contusion (early fixation)
- Symptomatic mal- and non-unions (later fixation)
- Further research needed



# Hip Fractures

- Epidemiology
- Types
  - Prognosis varies by location
- Assessment
- Management

The Hip Joint





# Epidemiology of Hip Fractures

- Common worldwide and predicted to surpass 6 million by the year 2050
- Increase risk of morbidity and mortality in the older adult
- Higher risk for hemorrhage
- About 61% of patients with hip fractures experience delirium

# Typical Clinical Presentation

- History of ground level fall
- Pain in the groin area/hip
- Inability to bear weight
- On physical exam, shortened leg
- Pain on axial loading and motion



# Intertrochanteric Fracture

- Extracapsular Fracture Type
  - Intertrochanteric
  - Subtrochanteric
    - (nail and rods for repair)
- Good supply of blood
- Large amount of cancellous bone
- Require proper reduction and fixation to heal well
  - Can easily displace





# Femoral Neck Fracture

- Intracapsular Fracture
  - Femoral neck and head
- Minimal cancellous bone
- Poor blood supply  
(easily disrupted by injury)
- High complication rate
  - Avascular necrosis
  - Degenerative changes

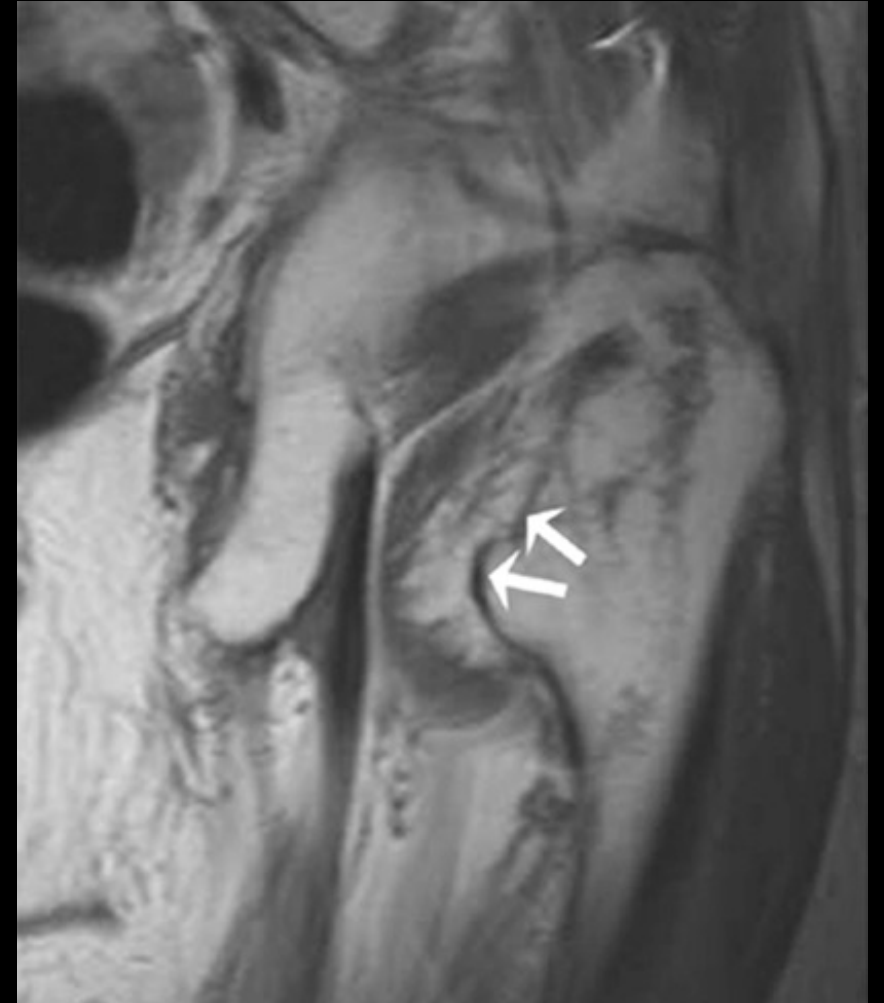


# Assessment of Hip Fractures

- Type and Screen or Type and Crossmatch due to high risk for bleeding
- Assess cognitive function: poor cognitive function can hinder recovery
- Identify cause of fall (syncopal, cardiac, etc.)
- Assess for additional traumatic injuries

# Imaging for Hip Fractures

- X-ray Film radiographs
- Computed Tomography (CT)
- Magnetic Resonance Imaging (MRI)

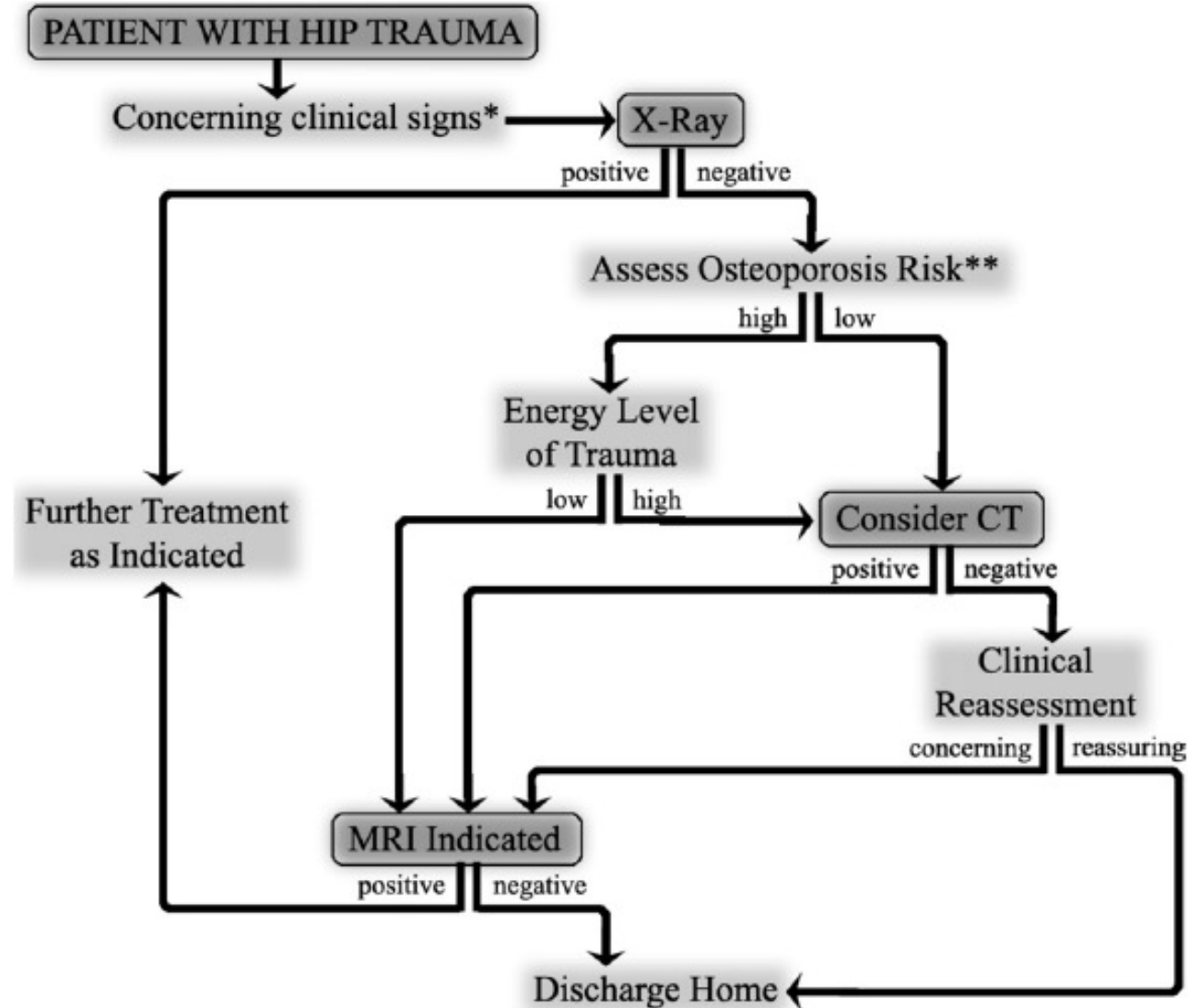




# Management of Hip Fractures

- Pain management
  - Regional nerve blocks
- Orthopedic surgeon consult
- Timely operative repair
- Continue B-blocker if home medication
- Osteoporosis treatment

# Algorithm for Work Up in ED of Hip Pain Patient



Low energy  
+  
Osteoporosis  
Calls for  
MRI

# Cervical Spine Injuries

- Prevalence in the elderly:  
2.6% to 4.7%
- Low impact mechanisms  
such as falls from standing  
account for greater than 60%  
of these cervical injuries.
- Most common injured part of  
the spinal column

Cervical Vertebrae [C2-T1], Assembled  
Right Lateral View





# Unique Situations Impacting Care

- Head Injury
  - On anticoagulants/  
platelet inhibitors
- C Spine Injury
  - Diagnostic & treatment  
challenges
- Blunt Chest Injury
  - Pain control



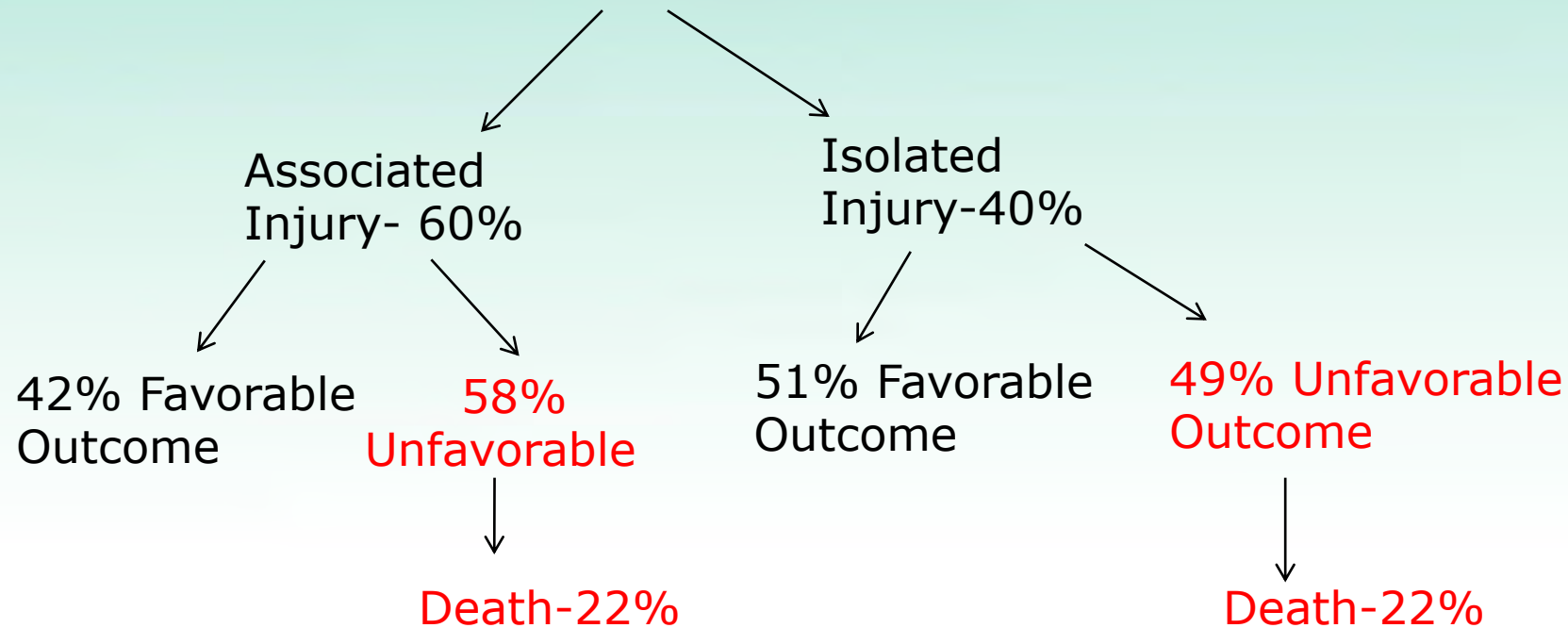


# Chin-On-Chest Deformity: Trauma Patient with Ankylosing Spondylitis: The IMPOSSIBLE AIRWAY



# Low Impact Isolated Cervical Spine Injuries (LISCI) in Elderly

138 elderly patients with LICSI and no Spinal Cord Injury





# Compression Fractures



# Flexion Injuries

Teardrop Fracture



Compression Fracture



# Flexion Injuries

## Anterior Subluxation

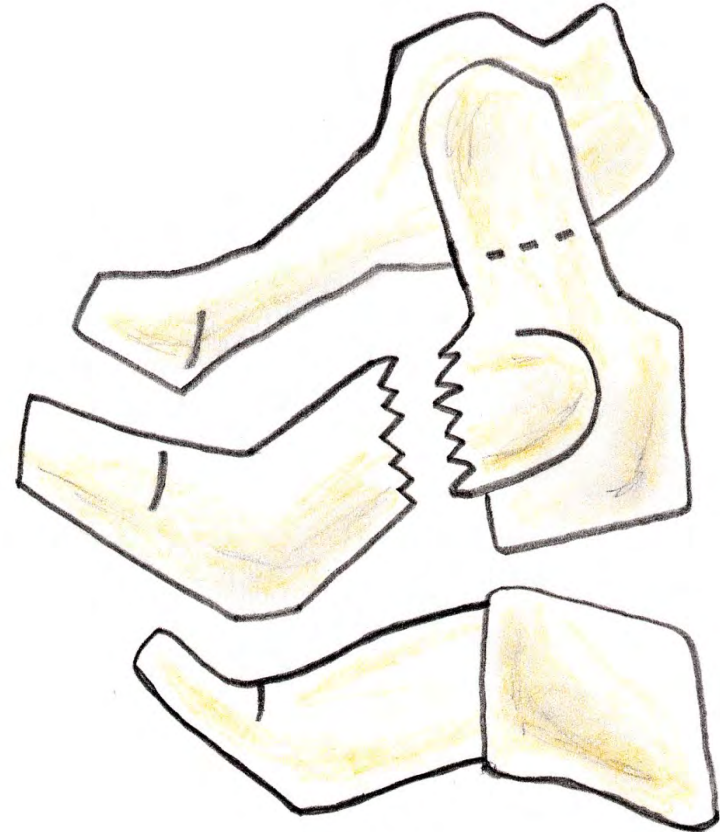




# Extension Injuries

## Hangman Fracture

- Name derived from the typical fracture that occurs with hanging
- Commonly caused by motor vehicle collisions and entails bilateral fractures through the pedicles of C2 due to hyperextension

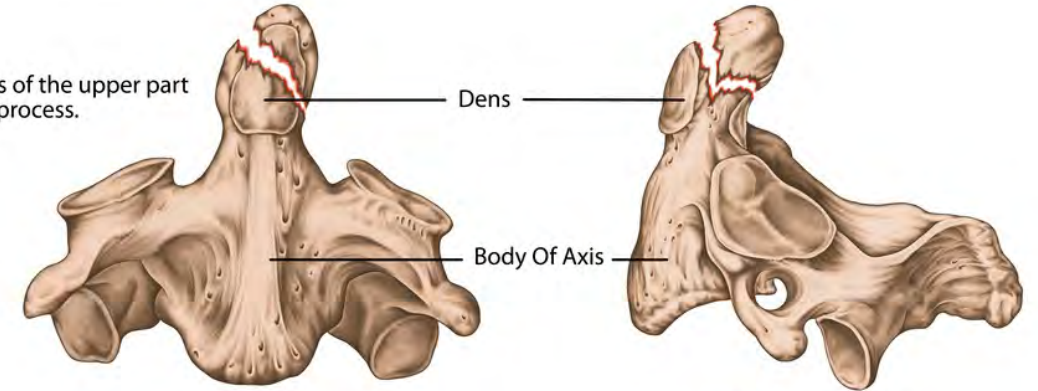


# Odontoid Fractures

- Most common cervical spine fracture in the elderly
- Comorbidities and ubiquitous presence of degenerative changes in the C-spine predispose the elderly to complications and poorer outcomes.

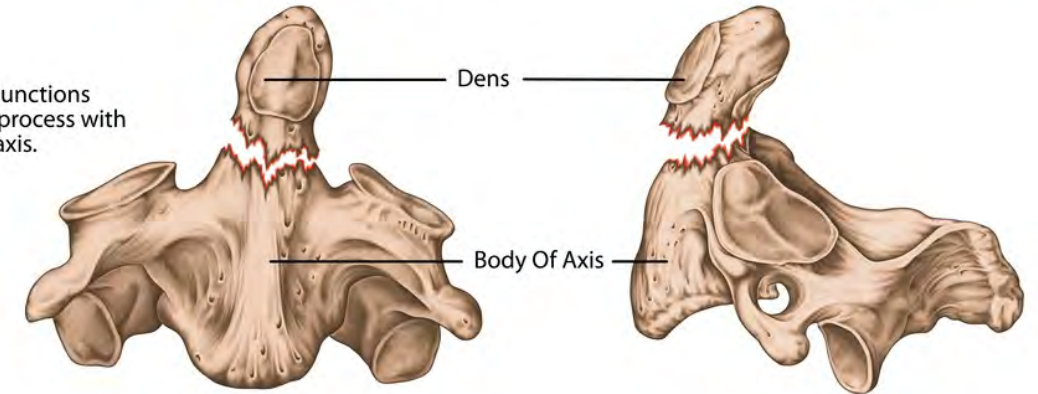
## TYPE I

Oblique fractures of the upper part of the odontoid process.



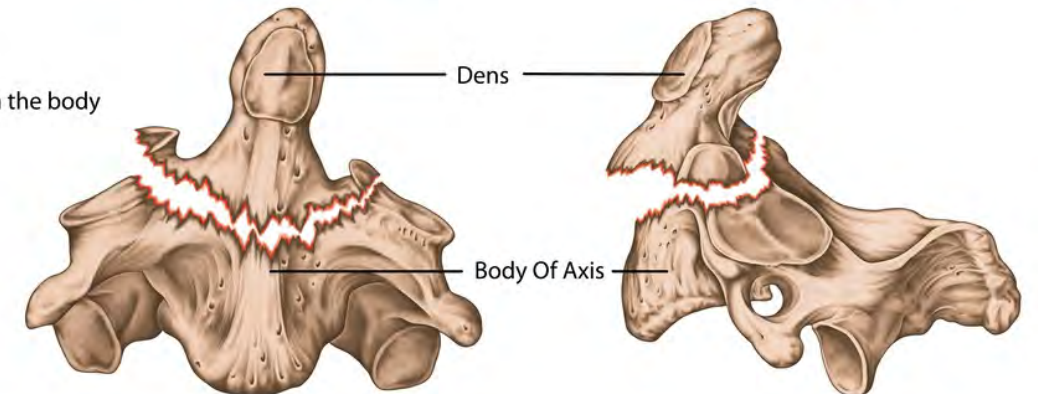
## TYPE II

Fractures at the junctions of the odontoid process with the body of the axis.



## TYPE III

Fracture through the body of the axis.



# 89 Year Old Female With Odontoid Fracture





# Cervical Collars

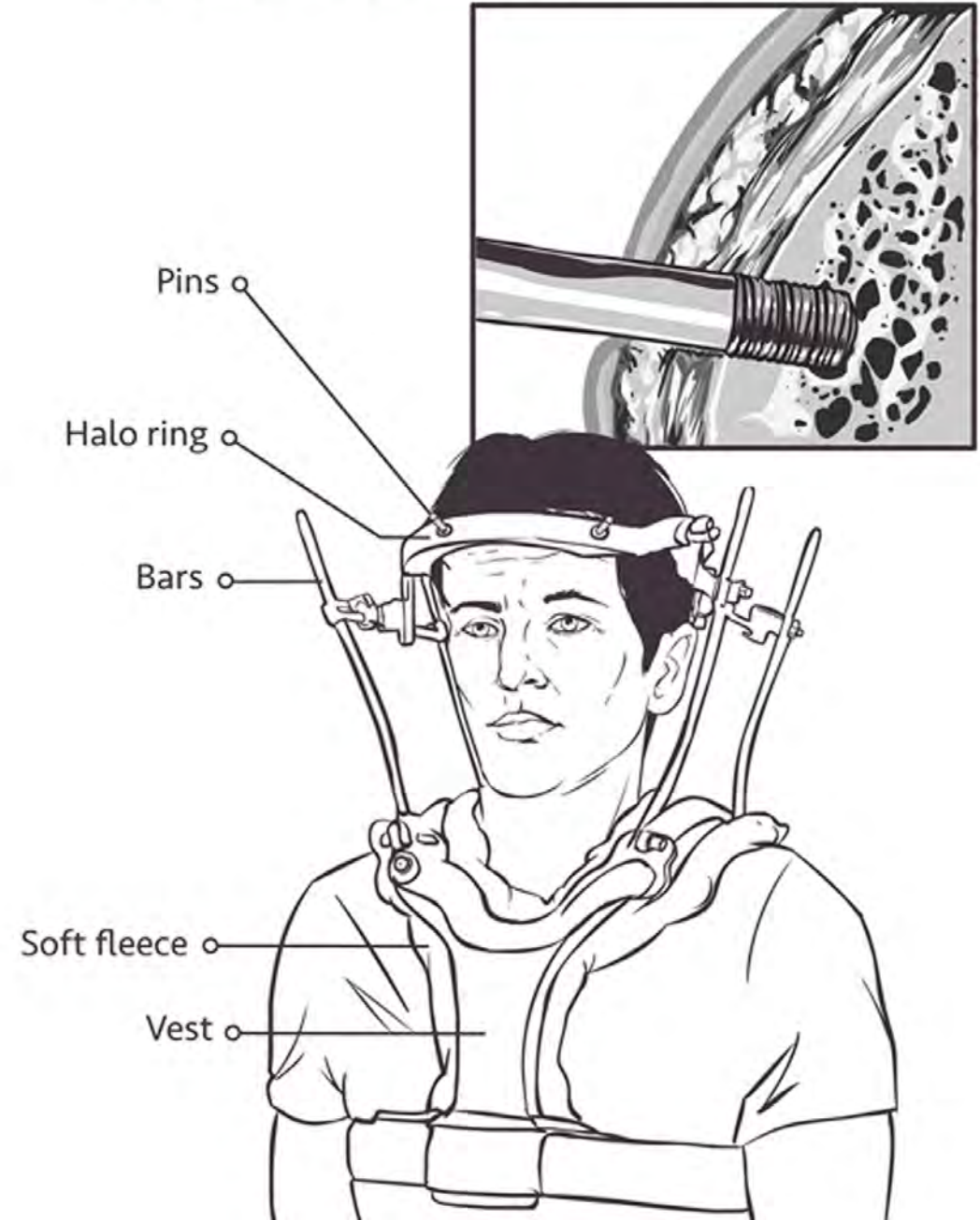
- Assess for pressure ulcers
- Dysphagia (SLP eval)
- Minimize delirium
- Hydration, hydration, hydration
- 1:1 feeds



# Halo Vest

- Designed to provide immobilization of cervical and upper thoracic spine
- Associated with increased complications and death in the elderly

## Surgical Stabilization with Halo



# Sensory Considerations

Decreased:

- Hearing
- Vision
- Taste
- Smell
- Tactile sensation



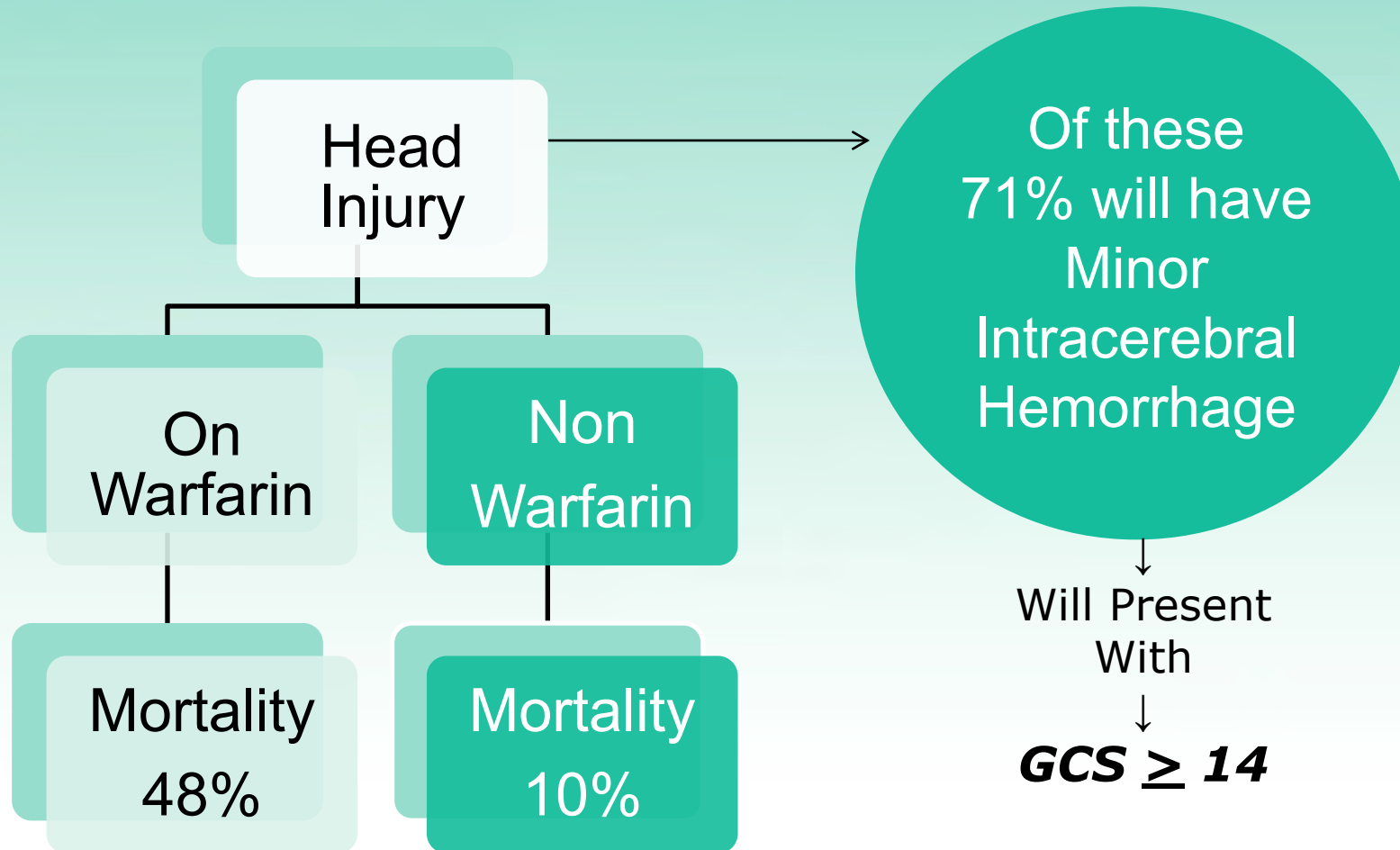


A photograph showing a person lying on a stretcher. The person's head and neck area are heavily covered in bright red blood, indicating a severe head injury. The person is wearing a white shirt and dark pants. The stretcher has a red and black striped pattern. The background is a light blue wall.

## Head Injury

Older adults with GCS <9 have about an 80% likelihood of death or major disability.

# Pre Rapid-Reversal Era



# Principles of Warfarin Rapid Reversal in Head Injured Patients

**1st Principle:** recognition of the high-risk patient

Any patient with **known or suspected** TBI while on warfarin is considered AT RISK regardless of GCS

If GCS  $\leq$  13



Trauma Activation

If GCS  $\geq$  14



Stat ED consult

**2nd Principle:** is rapid reversal of elevated INR

This provides higher priority to immediate INR and CT Scan



## Emergency reversal of anticoagulation from warfarin for life-threatening hemorrhage in adults: Suggested approaches based upon available resources

### A. If 4-factor prothrombin complex concentrate (4F PCC) is available (preferred approach):

1. Give 4F PCC\* 1500 to 2000 units<sup>¶</sup> IV over 10 minutes. Check INR 15 minutes after completion of the infusion. If INR is not  $\leq 1.5$ , give additional 4F PCC (refer to topic or drug reference for details).
2. Give vitamin K 10 mg IV over 10 to 20 minutes.

### B. If 3-factor prothrombin complex concentrate (3F PCC) is available but 4F PCC is not available:

1. Give 3F PCC\* 1500 to 2000 units<sup>¶</sup> IV over 10 minutes. Check INR 15 minutes after completion of the infusion. If INR is not  $\leq 1.5$ , give additional 3F PCC (refer to topic or drug reference for details).
2. Give Factor VIIa 20 mcg/kg IV **OR** give FFP 2 units IV by rapid infusion. Factor VIIa may be preferred if volume overload is a concern.
3. Give vitamin K 10 mg IV over 10 to 20 minutes.

### C. If neither 3F PCC nor 4F PCC is available:

1. Give FFP 2 units IV by rapid infusion. Check INR 15 minutes after completion of infusion. If INR  $\geq 1.5$ , administer 2 additional units of FFP IV rapid infusion. Repeat process until INR  $\leq 1.5$ . May wish to administer loop diuretic between FFP infusions if volume overload is a concern.
2. Give vitamin K 10 mg IV over 10 to 20 minutes.

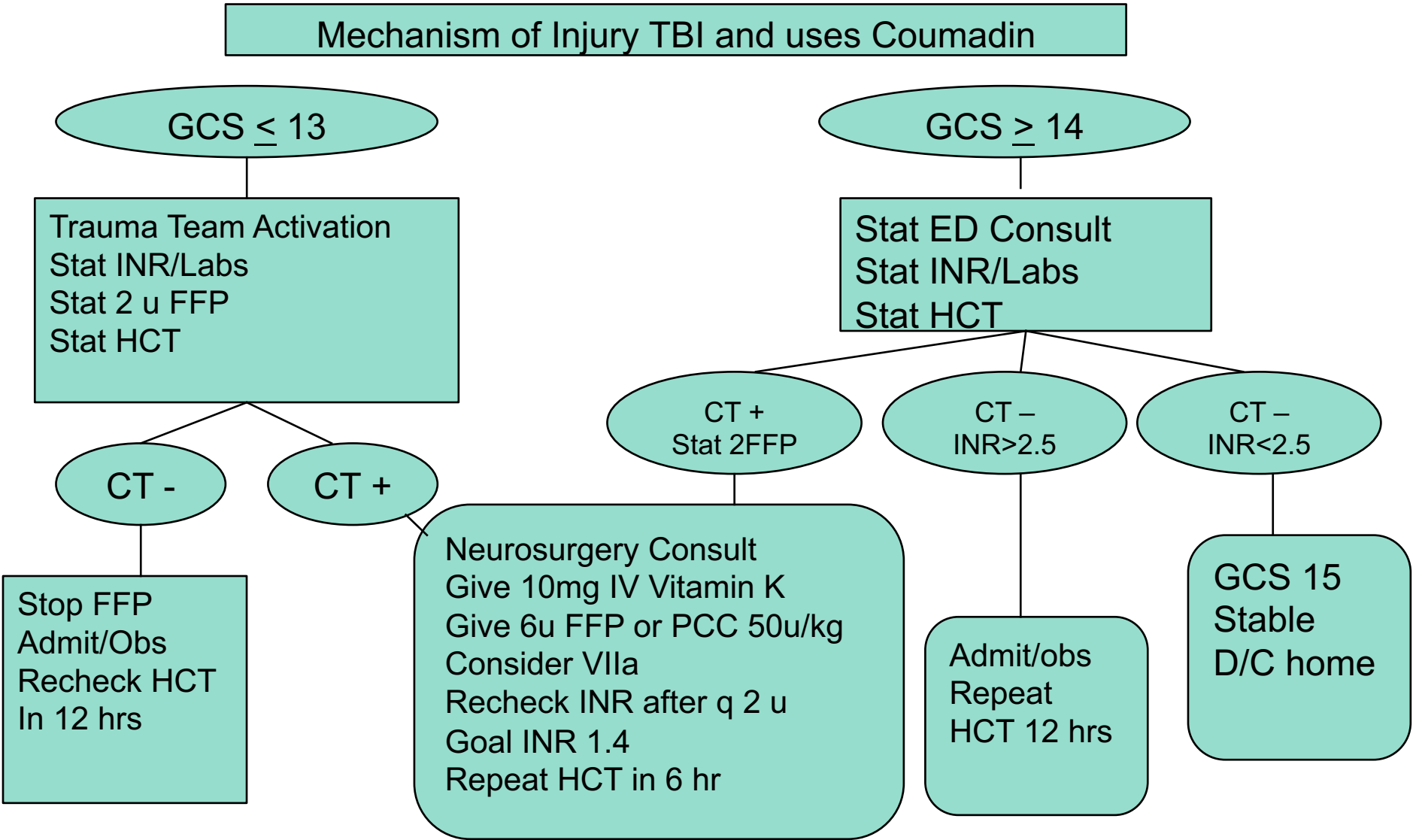
# Reversal Products

## Prothrombin Complex Concentrate (PCC)

- Promising new product from Europe
- Contains:
  - Vitamin K-dependent coagulation factors II, VII, IX, and X
- Advantages over FFP:
  - Faster correction
  - No volume overload
  - More complete correction



# Sample Warfarin Reversal Guideline for TBI





# Clopidogrel (Plavix)

## Action:

- Inhibits platelet aggregation
- This action is irreversible.
- Long half life (totally clears in 33 hours)

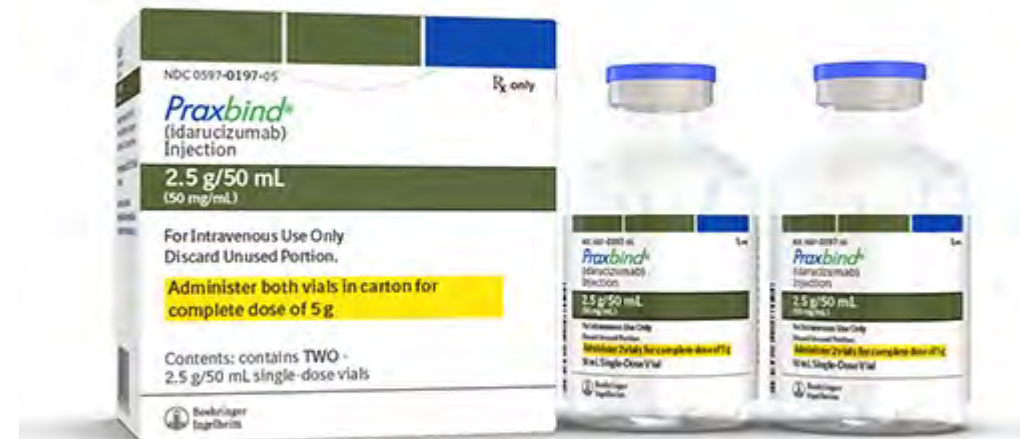
## To counteract:

- Repeated platelets required
- But the infused platelets are inhibited by remaining drug
- Requires repeated platelets to get meaningful clot formation



# Dabigatran (Pradaxa)

- Oral direct thrombin inhibitor
- Half life is 12-17 hours
- Praxbind is reversal agent
- The recommended dose of PRAXBIND is 5 g, provided as two separate vials each containing 2.5 g/50 mL idarucizumab



# Factor 10a Inhibitor Reversal

Xarelto (rivaroxaban)

Eliquis (apixaban)

Arixtra (fondaparinux)

Savaysa (edoxaban)

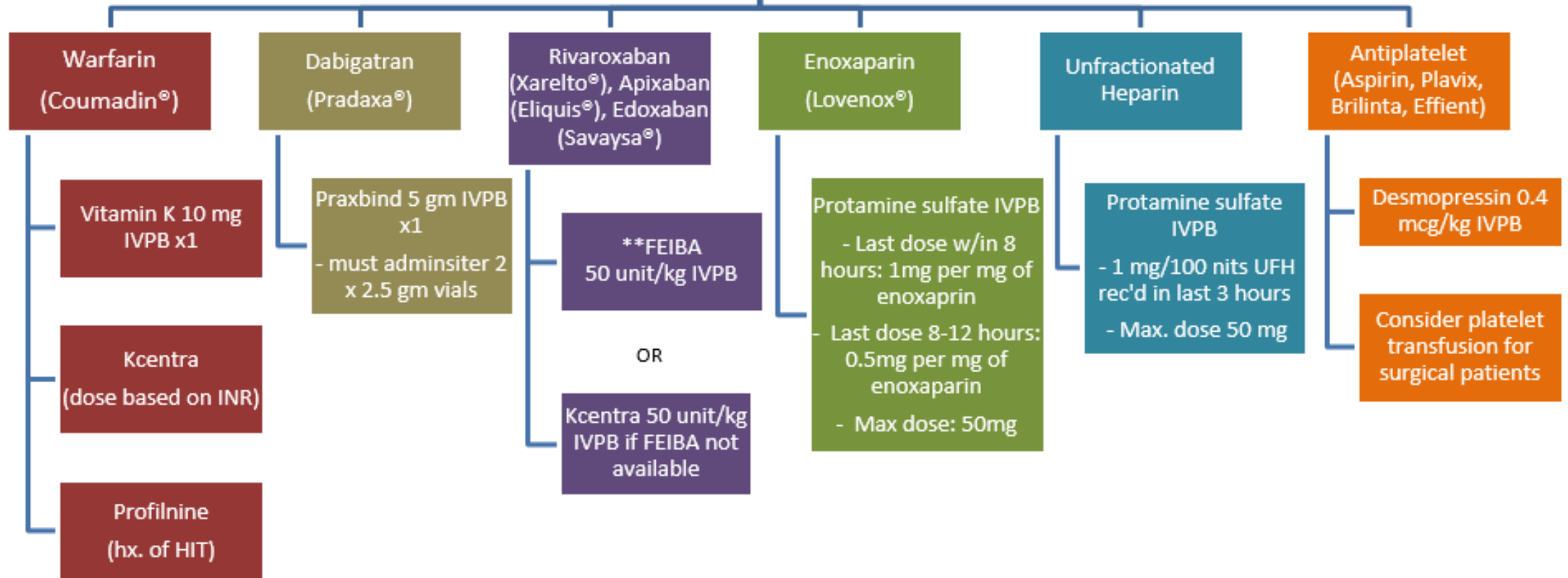
Bevyxxa (betrixaban)





**Patient with LIFE-THREATENING  
hemorrhage or requiring EMERGENT  
procedure**

**REVERSE WITH CAUTION IN PATIENTS WITH  
MECHANICAL HEART VALVE**



# Pharmacology and Older Adults

According to the American Geriatric Society (AGS):

- 90% used at least 1 prescription drug
- 66% used 3 or more





A close-up photograph of an elderly person's hands. The left hand holds a clear glass of water, while the right hand is open, palm up, holding a small pile of various pills and capsules in different colors (white, pink, green, brown, yellow). In the background, a blister pack of red pills is visible on a surface.

# Pharmaceutical Considerations in Trauma

- Start Low and Go Slow with everything
- BEERS criteria – drugs to avoid
- Available from the American Geriatrics Society
- Common side effects:
  - Constipation
  - Balance issues
  - Postural hypotension



# BEERs Criteria

Attempt to communicate with the patient's immediate family and physician.

Document the patient's complete medical list, including over the counter and complementary/alternative medication.

Use Beers Criteria in decision making about pharmacotherapy.

Discontinue nonessential medications in coordination with PCP/hospitalists.

Continue medications with withdrawal potential, including selective serotonin reuptake inhibitors (SSRIS), tricyclic antidepressants, benzodiazepines, antipsychotics, monoamine oxidase inhibitors (MAOIs), Beta-blockers, clonidine, statins and corticosteroids.

Adjust doses of medications for renal function based on glomerular filtration rate.

# Crystalloid Resuscitation in Elderly



ED volume replacement of  $\geq 1.5$  L

- Independent risk factor for mortality

## Caution:

- High-volume resuscitations are associated with particularly high mortality in the elderly trauma patient.

# Age as Criteria for Trauma Activation?

- Under triage often lethal
- Injuries often occult
- Initial vital signs unreliable
- Error attributing confusion/pain to pre-existing disease
- Small margin of error
- Increasingly age is being added as a criterion by individual trauma centers



# Guidelines for Acute Pain Management

- Thorough assessment of pain
  - History and Physical
  - Self report using appropriate scale for individual
- Schedule:
  - Opioid & NSAID's pain meds around the clock
- Select least invasive and safest route
- Multi-modality therapy now the norm
  - Options: PCA, epidural, and peripheral nerve block

# Pain Management

Medication	Benefit	Risks	Misc.
<b>NSAIDS</b>	-preferred over opioids -beneficial for patients without heart or renal issues	-interfere with blood disorders, heart problems, renal problems, or interact with other medications (ASA, SSIRs, BP medications) -increased risk for GI toxicity, peptic ulcers	-Commonly used to treat musculoskeletal pain -Limit IV-NSAID (Toradol) therapy to < 5 days
<b>Adjuvant Analgesics</b>	-medications not used to treat pain but side effects help with pain (SSRIs over TCAs)	-TCAs can cause risks with loss of equilibrium, increased falls & injuries, hypotension, problems with sleep, and even arrhythmias	-The elder patient is 73% more likely to have a TCA prescribed over an SSRI
<b>Opioids</b>	-opioids such as morphine, oxycodone, fentanyl, methadone can be used for acute and chronic pain	-Constipation, nausea, GI complications, respiratory depression, increased falls, sleep disturbances, delirium -benzodiazepines and opioids together can increase respiratory depression -misuse and addiction is concerning	-avoid consuming opioids and alcohol together, can increase respiratory depression -Avoid use of: Methadone Propoxyphene Meperidine Due to toxicity of metabolites

# Pain Management

## EAST Guidelines 2016

New guidelines recommend:

- Epidural analgesia in combination with other methods of analgesia vs. use of opioids alone
- Preferred for severe blunt thoracic trauma
- New guidelines place strong emphasis on patient preferences and values.
- Some studies show limited usefulness of epidural anesthesia in **trauma**.



# What Matters Most

Patient's preferences and priorities regarding treatment options (including operative and non-operative alternatives)

Post-injury risks of complications, mortality, and temporary/permanent functional decline

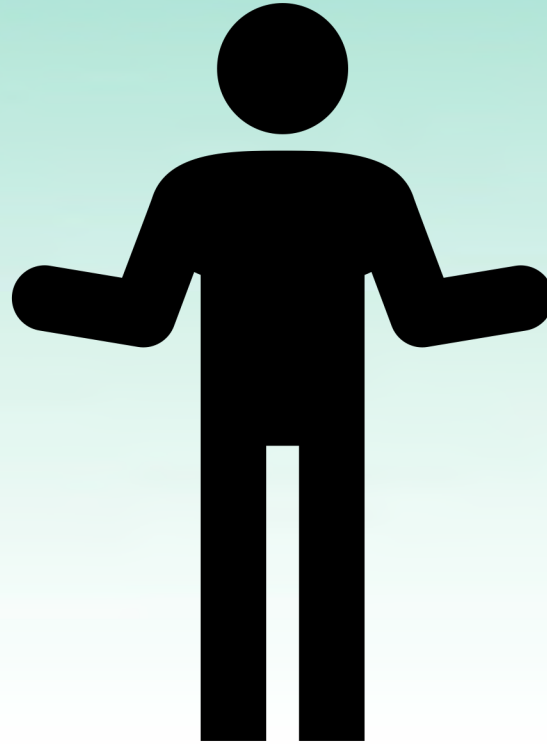
Advance directives or living will and how these will affect initial care and life-sustaining preferences inclusive of: mechanical ventilation, cardiopulmonary resuscitation, hemodialysis, blood transfusion, permanent enteral feeding, and transitions to comfort care

Identify DPOAH

Hold family meeting within 72 hours of admission to discuss goals of care

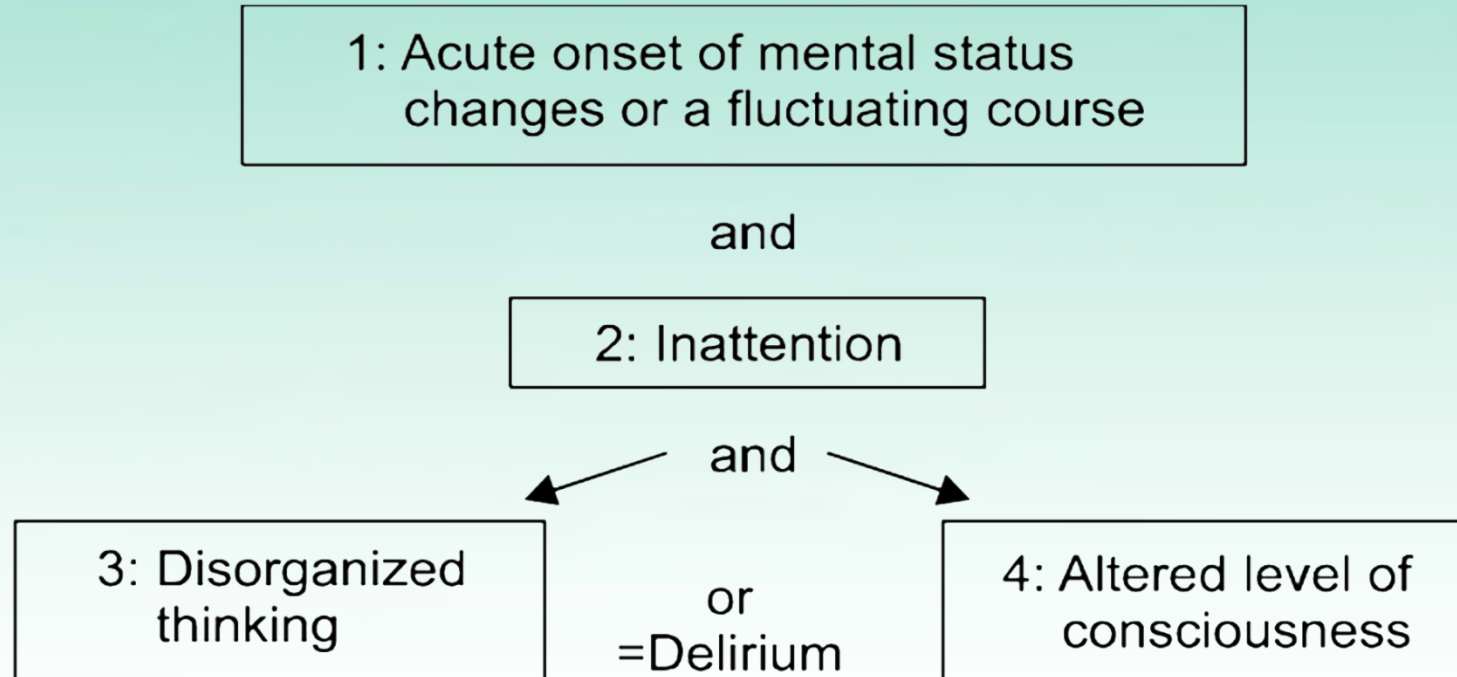
# Common Cognitive Findings- Mentation

- Dementia
- Delirium



**What is the difference?**

# Delirium





# Delirium Risk Factors

Cognitive impairment and dementia

Depression

Alcohol use

Polypharmacy and psychotropic medications

Poor nutrition

Hearing and Vision Impairment

# Delirium Interventions

Cognition

Sleep

Mobility

Vision

Hearing

Dehydration

Observation












# FRAIL Scale

- Fatigue** Does the patient fatigue easily?
- Resistance** Can the patient walk up one flight of stairs?
- Ambulation** Can the patient walk one block?
- Illnesses** Does the patient have multiple (>5) illnesses?
- Loss of Weight** Has the patient lost more than 5% of her/his body weight in the past 6 months to a year?

Clinical Frailty Scale

**"Do you go outdoors independently?"**

Outdoor: **NOT** frail (1-4)

	1	Very fit	Outdoor	Exercise	Regularly	
	2	Well	Outdoor		Sometimes	
	3	Managing Well	Outdoor		Never	
	4	Vulnerable	Outdoor		Independent but slow	Walking Stick
<hr/>						
	5	Mildly Frail	Indoor	Help @ home?	Never	
	6	Moderately Frail	Indoor		Sometimes	
	7	Severely Frail	Indoor		Regularly	Wheelchair
	8	Very Severely Frail	Indoor		Bedbound, Completely dependent	Bed
	9	Terminally Ill	Indoor	Approaching End-of-Life		

Rockwood K, Song X, MacKnight C, et al. A global clinical measure of fitness and frailty in elderly people. *CMAJ*. 2005;173(5):489-495. doi:10.1503/cmaj.050051.

Indoor: **FRAIL** (5-9)



# Collaboration

- PT/OT
- Respiratory Therapy
- RNs
- Nurse Tech
- Care Managers
- MSW
- Trauma Team
- ICU Team
- Neuropsych
- Patient
- Family



# Assessment on Day 1 of Hospitalization

Home environment, social support, and possible needs for medical equipment and/or home services

Patient acceptance/denial of nursing home or SNF placement

Discharge Diagnosis

Medications and clear dosing instructions and possible reactions

Documentation of reconciliation between out and inpatient medications

Directions for wound care if applicable

Instructions for diet (nutrition plan) and mobility

Needs for physical and occupational therapy

Contact information for the patient's continuity physician or clinic

Establish an appointment for follow up with continuity physician and other specialty physicians

Clear documentation of incidental findings that mandate a follow-up

Documentation of follow-up appointment/telephone contact with surgeon 6 weeks after surgery

Documentation of pending lab tests or diagnostics

# Case Study

- 76 year old male, fell 6-8 feet from ladder while cleaning leaves from gutters
- Witnessed by neighbor who found him lying on back, moaning in pain



# Pre-Hospital

- He did not recognize his neighbor, who related that he is a widower with out-of-state children.
- BP 180/75
- Pulse 120 and irregular
- Respirations 28 with wheezing
- Pulse ox 89% prior to application of O2
- GCS 14-15



# ED Physical Exam

- Left frontal contusion, odor of alcohol
- Tenderness to palpation left lateral chest with crepitus, equal breath sounds and bilateral wheezing, heart sounds distant

# Physical Exam

- Abd ok, pelvis stable, no blood at the meatus and good rectal tone
- Pain, swelling and ecchymosis left wrist, upper arm, shoulder and left proximal thigh with shortening and internal rotation

# Vital Signs

- BP 118/60
- P120 irregular
- R 28 with audible wheezing
- T 36 c (96.8f)
- Pulse ox 92% on 100% O2

# Neuro Status

- PERLA, oriented only to person, speech slurred, obeys inconsistently
- GCS 13-14



# Additional Info

- He is on Glucophage (Metformin)
- Metoprolol (Lopressor)
- Warfarin (Coumadin)
- Alupent (metaproterinol) inhaler tucked in a half-empty cigarette pack

# Labs

- ABG: 7.30 50 180 19 94% NRB
- H&H: 33.5 11.2
- WBC: 12,500
- LYTES: OK
- GLUCOSE: 275
- BAC: 0.125
- INR 1.2

# X-rays

- Rib fractures 7,8,9
- Wide mediastinum, torturous aorta
- C-spine multiple degenerative changes difficult to interpret
- Comminuted intratrochanteric femur fracture and Colles fracture
- CT head, neck, and abdomen ok

# Summary



- The elderly are not able to compensate as quickly or as efficiently as a younger adult.
- Co-morbidities in the elderly trauma patient can have deleterious effects on their outcome.
- They will be us...



## Geriatric Trauma

1. What is the leading cause of injury for those aged > 65 years?
  - a. MVC
  - b. Suicide
  - c. Pedestrian vs. Car
  - d. Fall
2. Possible causes of falls include:
  - a. Polypharmacy
  - b. Alcohol
  - c. Dizziness
  - d. All the above
3. Age-related decline in which of the following systems can have a negative impact on recovery from trauma in the elderly:
  - a. Neurologic
  - b. Renal
  - c. Cardiac
  - d. All of the above
4. Diminished pulmonary reserve causes:
  - a. Less oxygen available for extraction during times of increased need
  - b. Pneumonia
  - c. ARDS
  - d. Hypotension
5. The gold standard for imaging choices in the majority of occult hip fractures is:
  - a. Plain-film x-ray
  - b. MRI
  - c. CT
  - d. Bone scan
6. Rapid warfarin reversal protocols:
  - a. Significantly decrease mortality in patients with intracranial bleeds who are on warfarin
  - b. Are difficult to implement
  - c. Do not change outcomes
  - d. Are effective in patients on anti-platelet medications

7. The most common cause of cervical spine injuries in the elderly is:

- a. Same level falls
- b. MVC
- c. Fall down stairs
- d. Pedestrian vs. car

8. Halo vests as a treatment option in elderly patients with cervical fractures are associated with:

- a. Improved outcomes
- b. Increased risk of complications and death
- c. Increased transfers to Level 1 Trauma Centers
- d. Improved nutrition

9. Treatment modalities associated with improved outcomes in elderly patients with rib fractures are:

- a. Pain control
- b. Trauma consultation
- c. Incentive spirometry
- d. All the above

## Geriatric Trauma

1. What is the leading cause of injury for those aged > 65 years?
  - a. MVC
  - b. Suicide
  - c. Pedestrian vs. Car
  - d. Fall**
2. Possible causes of falls include:
  - a. Polypharmacy
  - b. Alcohol
  - c. Dizziness
  - d. All the above**
3. Age-related decline in which of the following systems can have a negative impact on recovery from trauma in the elderly:
  - a. Neurologic
  - b. Renal
  - c. Cardiac
  - d. All of the above**
4. Diminished pulmonary reserve causes:
  - a. Less oxygen available for extraction during times of increased need**
  - b. Pneumonia
  - c. ARDS
  - d. Hypotension
5. The gold standard for imaging choices in the majority of occult hip fractures is:
  - a. Plain-film x-ray
  - b. MRI**
  - c. CT
  - d. Bone scan
6. Rapid warfarin reversal protocols:
  - a. Significantly decrease mortality in patients with intracranial bleeds who are on warfarin**
  - b. Are difficult to implement
  - c. Do not change outcomes
  - d. Are effective in patients on anti-platelet medications

7. The most common cause of cervical spine injuries in the elderly is:

- a. **Same level falls**
- b. MVC
- c. Fall down stairs
- d. Pedestrian vs. car

8. Halo vests as a treatment option in elderly patients with cervical fractures are associated with:

- a. Improved outcomes
- b. **Increased risk of complications and death**
- c. Increased transfers to Level 1 Trauma Centers
- d. Improved nutrition

9. Treatment modalities associated with improved outcomes in elderly patients with rib fractures are:

- a. Pain control
- b. Trauma consultation
- c. Incentive spirometry
- d. **All the above**



## References

### Geriatric Trauma

5<sup>th</sup> Edition

Abdrabou, A. Femoral neck fracture (impacted). Case study, Radiopaedia.org. (accessed on 27 Dec 2021) <https://doi.org/10.53347/rID-22641>

Ajam, T., (2020) CHADS2 Score for Stroke Risk Assessment in Atrial Fibrillation. Retrieved from <https://emedicine.medscape.com/article/2172597-overview>

American Geriatric Services. (2021). For older people, medications are common; updated AGS BEER criteria AIMS to make sure they're appropriate, too. Retrieved from <https://www.americangeriatrics.org/media-center/news/older-people-medications-are-common-updated-ags-beers-criteriar-aims-make-sure>

Arias, E, Xu JQ. United States life tables, 2018. National Vital Statistics Reports; vol 69, no 12. Hyattsville, MD: National Center for Health Statistics, 2020. Retrieved from <https://www.cdc.gov/nchs/data/nvsr/nvsr69/nvsr69-12-508.pdf>

Arslan, B. (2018). Geriatric trauma. Retrieved from Geriatric Trauma | IntechOpen. <https://www.intechopen.com/chapters/61857>

Batra, R. K., Krishnan, K., & Agarwal, A. (2011). Paravertebral block. Journal of Anaesthesiology Clinical Pharmacology, 27(10), 5-11. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3146159/>

Besdine, R. W. (2019). Introduction to geriatrics. Retrieved from Introduction to Geriatrics - Geriatrics - Merck Manuals Professional Edition. <https://www.merckmanuals.com/professional/geriatrics/approach-to-the-geriatric-patient/introduction-to-geriatrics>

Bickle, I. Internal fixation of rib fractures. Case study, Radiopaedia.org. (accessed on 27 Dec 2021) <https://doi.org/10.53347/rID-33585>

Campanelli, C. & The American Geriatrics Society 2012 Beers Criteria Update Expert Panel. (2012). American Geriatrics Society Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults. Journal of the American Geriatric Society, 60(4), 616-631. <https://pubmed.ncbi.nlm.nih.gov/22376048/>

Cannon, J., Silvestri, S., Munro, J. (2009). Imaging choices in occult hip fracture. Journal of Emergency Medicine, 37(2): 144-152. <https://pubmed.ncbi.nlm.nih.gov/18963720/>

Carrier, F.M., Turgeon, A.F., Nicole, P.C., et al. (2009). Effect of epidural analgesia in patients with traumatic rib fractures: a systematic review and meta-analysis of randomized controlled trials. *Canadian Journal of Anaesthesiology*, 56(3):230-242.

<https://pubmed.ncbi.nlm.nih.gov/19247744/>

Centers for Disease Control and Prevention. (2017). Falls are serious and costly. Retrieved from Important Facts about Falls | Home and Recreational Safety | CDC Injury Center

<https://www.cdc.gov/homeandrecreationsafety/falls/adultfalls.html>

Centers for Disease Control (2017). Fact Sheet: Risk factors for falls. Retrieved from <https://www.cdc.gov/steady/pdf/STEADI-FactSheet-RiskFactors-508.pdf>

Centers for Disease Control (2017). Fact Sheet: Medications linked to falls. Retrieved from Fact Sheet Medications Linked To Falls. <https://www.cdc.gov/steady/pdf/STEADI-FactSheet-MedsLinkedtoFalls-508.pdf>

Center for Disease Control (2019). Algorithm for fall risk screening, assessment, and intervention. Retrieved from Resource Algorithm for Fall Risk Screening, Assessment, and Intervention. <https://www.cdc.gov/steady/pdf/steady-algorithm-508.pdf>

Centers for Disease Control and Prevention. (2021). Transportation safety: Older adult drivers. Retrieved from Older Adult Drivers | Motor Vehicle Safety | CDC Injury Center.

[https://www.cdc.gov/transportationsafety/older\\_adult\\_drivers/index.html](https://www.cdc.gov/transportationsafety/older_adult_drivers/index.html)

Clinical Anesthesiology: Regional Anesthesia & Pain Management: Peripheral Nerve Blocks. Retrieved from: [https://www.brainkart.com/article/Peripheral-Nerve-Blocks-of-the-Trunk--Paravertebral-Block\\_27251/](https://www.brainkart.com/article/Peripheral-Nerve-Blocks-of-the-Trunk--Paravertebral-Block_27251/)

Colwell, C. (2021). Geriatric trauma: Initial evaluation and management. In: UpToDate, Grayzel, J. UpToDate, Waltham, MA. <https://www.uptodate.com/contents/geriatric-trauma-initial-evaluation-and-management> Accessed on January 12, 2022.

Department of Transportation (2015). Retrieved from <https://www.fhwa.dot.gov/policyinformation/statistics/2015/pdf/dl20.pdf>

Foster, K. W. (2021). Overview of common hip fractures in adults. In: UpToDate, Post, TW (Ed), UpToDate, Waltham, MA, 2021. <https://www.ncbi.nlm.nih.gov/books/NBK557514/>

Galvagno, S.M., Smith, C.E., Varon, A.J., Hasenboehler, E.A., Sultan, S. Shaefer, G., To, K.B., Fox, A.D., Alley, D.E.R., Ditillo, M., Joseph, B.A., Robinson, B.R.H., Haut, E.R. (2016). Pain management for blunt thoracic trauma: A joint practice management guideline from the Eastern Association for the Surgery of Trauma and Trauma Anesthesiology Society. *Journal of Trauma and Acute Care Surgery*, 81(5), 936-951.

Gogio, B., Fang, X. (2021). Differentiating delirium versus dementia in the elderly. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK570594/>

Heflin, M. 2021, Geriatric health maintenance. In: UpToDate, Givens, J. (Ed). UpToDate, Waltham, MA. (Accessed on January 12, 2022)

Heron, M. Leading causes for 2019. National Vital Statistics Reports; vol 70 no 9. Hyattsville, MD <https://www.cdc.gov/nchs/data/nvsr/nvsr70/nvsr70-09-508.pdf>

Hulla, R., Vanzini, N, Salas, E., Bevers, K., Garner, T., & Gatchel, RJ. (2021). Pain management and the elderly. Retrieved from <https://www.practicalpainmanagement.com/treatments/pain-management-elderly>

Insurance Institute for Highway Safety (2021): Retrieved from Older drivers. <https://www.iihs.org/topics/older-drivers>

Jeanmonod, R. (2021). Geriatric cervical spine injury. Retrieved from <https://www.statpearls.com/ArticleLibrary/viewarticle/38689>

Jiang, L., Zheng, Z., & Zhang, M. (2020). The incidence of geriatric trauma is increasing and comparison of different scoring tools for the prediction of in-hospital mortality in geriatric trauma patients. World Journal of Emergency Surgery, (59). Retrieved from <https://wjeb.biomedcentral.com/articles/10.1186/s13017-020-00340-1>

Jude, CM., Modarresi, S. (2021). Imaging evaluation of the painful hip in adults. In:UpToDate, Ramirez, M. (Ed), UpToDate, Waltham, MA, 2021. <https://www.uptodate.com/contents/imaging-evaluation-of-the-painful-hip-in-adults>

Kochaneck KD, XU JQ, Arias, E. Mortality in the United States, 2019. NCHS Data Brief, no 395. Hyattsville, MD: National Center for Health Statistics. 2020. Retrieved from 2020 Profile of Older Americans. <https://www.cdc.gov/nchs/data/databriefs/db395-H.pdf>

Ley, EJ., Clond, MA., Srour, MK., Barnajian, M., Mirocha, J., Margulies, DR., and Salim, A. (2011). Emergency department crystalloid resuscitation of 1.5L or more is associated with increased mortality in elderly and nonelderly trauma patients. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/21307740/>

Mayo Clinic. (2016). Reversing NOACs presents challenges. Retrieved from <https://www.mayoclinic.org/medical-professionals/trauma/news/reversing-noacs-presents-challenges/mac-20431007>

Milling, T. J., Jr, & Ziebell, C. M. (2020). A review of oral anticoagulants, old and new, in major bleeding and the need for urgent surgery. Trends in cardiovascular medicine, 30(2), 86–90. <https://doi.org/10.1016/j.tcm.2019.03.004>

Morley, J. E., Malmstrom, & Miller, D. K. (2012). A simple frailty questionnaire (FRAIL) predicts outcomes in middle aged African Americans. Journal Nutrition Health Aging, 16(7), 601-608. doi: 10.1007/s12603-012-0084-2

Morrison, R. S., Siu, AL. (2021). Hip fracture in adults: Epidemiology and medical management. In: UpToDate, Schmader, K. (Ed), UpToDate, Waltham, MA, 2021.

<https://www.uptodate.com/contents/hip-fracture-in-adults-epidemiology-and-medical-management>

National Safety Council. (2021). Road users: Older Drivers. Retrieved from Older Drivers - Injury Facts <https://injuryfacts.nsc.org/motor-vehicle/road-users/older-drivers/>

National Center for Health Statistics. 2021. Doi: <https://dx.doi.org/10.15620/cdc:1107021>  
National Cancer Institute. (2021). Rate of suicides related to cancer is declining. Retrieved from Rate of Suicides Related to Cancer Is Declining - National Cancer Institute.

<https://www.cancer.gov/news-events/cancer-currents-blog/2021/cancer-related-suicide-rate-declining>

National Council on Aging. (2021). Suicide and older adults: What you should know. Retrieved from Understanding and Preventing Suicide in Older Adults

<https://www.ncoa.org/article/suicide-and-older-adults-what-you-should-know>

National Highway Traffic Safety Administration. Traffic Safety Facts 2015 Data – Pedestrians. Washington, DC: US Department of Transportation, National Highway Traffic Safety Administration; 2017. Publication no. DOT-HS-812-375. Available

at <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication>

National Center for Health Statistics (2017). Retrieved National Center for Health Statistics. Health, United States, 2019. Hyattsville, Maryland. 2021.

DOI: <https://dx.doi.org/10.15620/cdc:100685>. external icon

National Institute on Aging. Elder Abuse. Retrieved from <https://www.nia.nih.gov/health/elder-abuse>

Reed M, Tadi P, Nicolas D. Andexanet Alfa. [Updated 2021 Sep 29]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from:

<https://www.ncbi.nlm.nih.gov/books/NBK519499/>

Rockwood K, Song X, MacKnight C, Bergman H, Hogan DB, McDowell I, Mitnitski A. A global clinical measure of fitness and frailty in elderly people. CMAJ. 2005;173(5):489-495.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1188185/>

Sarani, B. (2021). Inpatient management of traumatic rib fractures. In:UpToDate, Collins, K. (Ed). UpToDate, Waltham, MA (Accessed January 12, 2022).

<https://www.uptodate.com/contents/inpatient-management-of-traumatic-rib-fractures>

Shenvi, C. (2015). Rib fractures in older adults- What's the big deal? Retrieved from Rib Fractures in Older Adults - What's the Big Deal? <https://www.aliem.com/rib-fractures-in-older-adults-whats-the-big-deal/aliem.com>



Southern AP, Lopez RA, Jwayyed S. Geriatric Trauma. [Updated 2022 Jan 9]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK442020/>

Southgate, S. J., & Herbst, M. K. (2019). Ultrasound guided serratus anterior blocks. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK538476/>

Thibault, N., Morrill, A. M., & Willett, K. C. (2018). Idarucizumab for Reversing Dabigatran-Induced Anticoagulation: A Systematic Review. *American journal of therapeutics*, 25(3), e333–e338. e <https://pubmed.ncbi.nlm.nih.gov/27175894/>

Yamani, Y. (2018). Extending Analysis of Older Drivers' Scanning Patterns at Intersections. *Transportation Research Record: Journal of the Transportation Research Board*. 2602(2602), 10-15. <https://journals.sagepub.com/doi/abs/10.1177/0361198119844244>