Acute Musculoskeletal Trauma

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Learning Objective

- *Describe common mechanisms of injury for musculoskeletal trauma.*
- *Describe pathophysiologic changes as a basis for signs and symptoms.*
- *Describe management of the patient with musculoskeletal trauma.*

Definition

- Injuries that affect the human body's movement or musculoskeletal system (i.e. muscles, tendons, ligaments, nerves, discs, blood vessels, etc.)

Emergent Condition

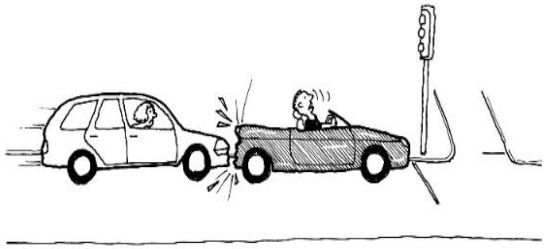
Injury result in significant hemodynamic instability

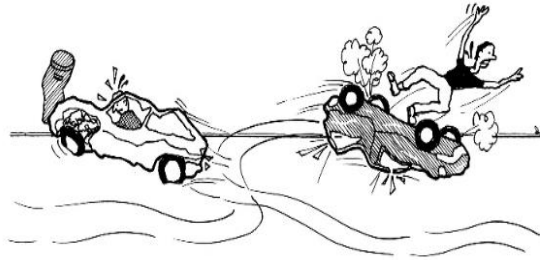
(Jones, 2013)

Mechanism Trauma

Mechanisms of Trauma	Predictable pattern of injuries
Frontal Automotive Collision	Cervical spine fracture; Sternal and Hip fractures; Posterior hip dislocation and fracture; Knee fractures and dislocation (ligament knee injuries); Ankle fractures and sprain; Long bones fractures;
Lateral Automotive Impact	Cervical spine fracture; Pelvic fracture; Acetabulum fractures; Upper and lower limb fractures;
Rear Lateral Automotive Impact	Cervical spine injuries; Neck soft-tissue injuries;
Ejection from Vehicle	The pattern of injury can be unpredictable as it depends on how the occuapnt lands.High overall mortality rate when comparing to any other mechanism of injury;
Auto *vs.* Pedestrian Collisions	Pelvic fractures; Lower limb fractures;
Rapid Vertical Deceleration (falls)	Pelvic fractures; Lower limb fractures; Acetabulum fractures; Lumbar spine fractures;
Penetrating Trauma by Firearms	The pattern of injury can be unpredictable.

Table 1: Mechanisms of trauma and the predictable pattern of injuries that may result.





How?

What?

Where?

When?

Common types of fracture

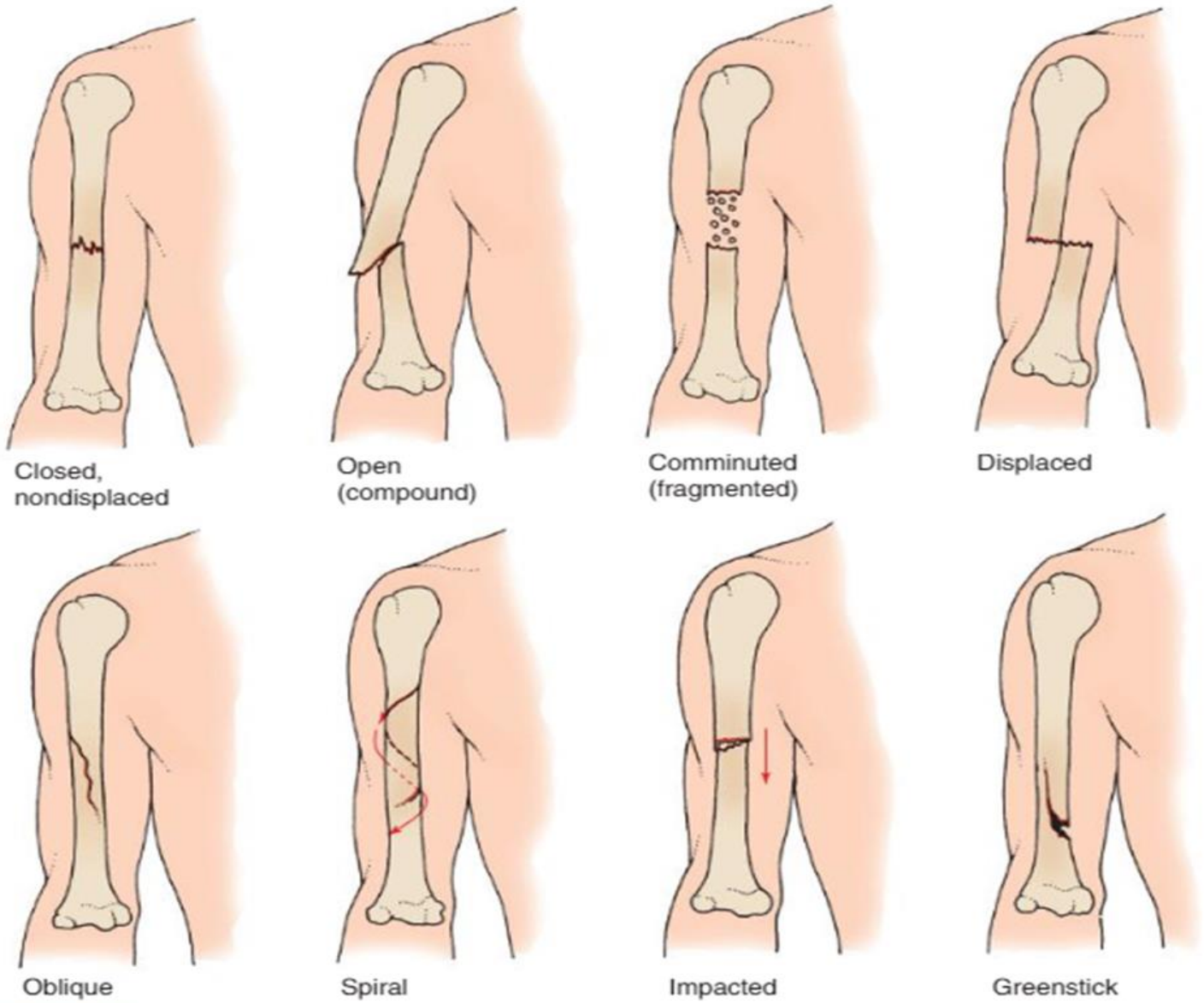


FIGURE 19-3 Common types of fractures. (From Murray CA. Care of patients with musculoskeletal trauma. In Ignatavicius D, Workman ML, eds. *Medical-Surgical Nursing: Critical Thinking for Collaborative Care*. 6th ed. Philadelphia: Saunders. 2010.)

Amputation

Replantation

Open Fracture Classification

Type	Woundsize	Contamination	Soft tissueinjury	Boneinjury
I	<1cm	Clean	Minimum	Simple
II	>1cm	Moderate	Moderate	Moderate
IIIA	<10cm	Extensive	Severepossiblecoverage	Comminutedfracture
IIIB	>10cm	Extensive	Severe, impossiblecoverage	Comminutedfracture
IIIC	>10cm	Extensive	Vascular injury requiring repair reparo	Comminutedfracture

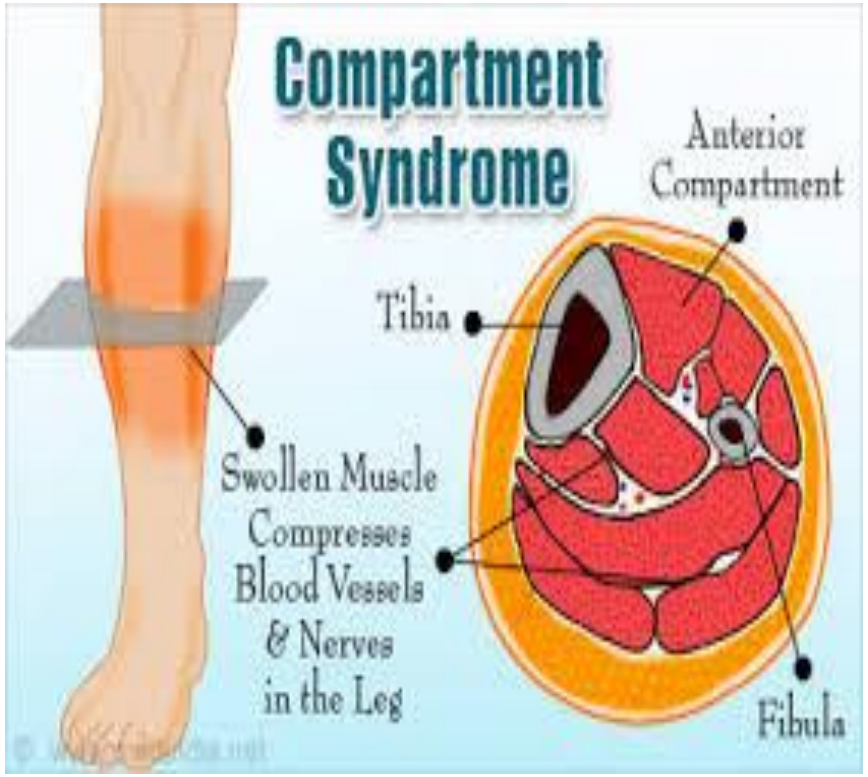
Table 2: Open fracture classification (Gustilo & Anderson).

Risk of infection

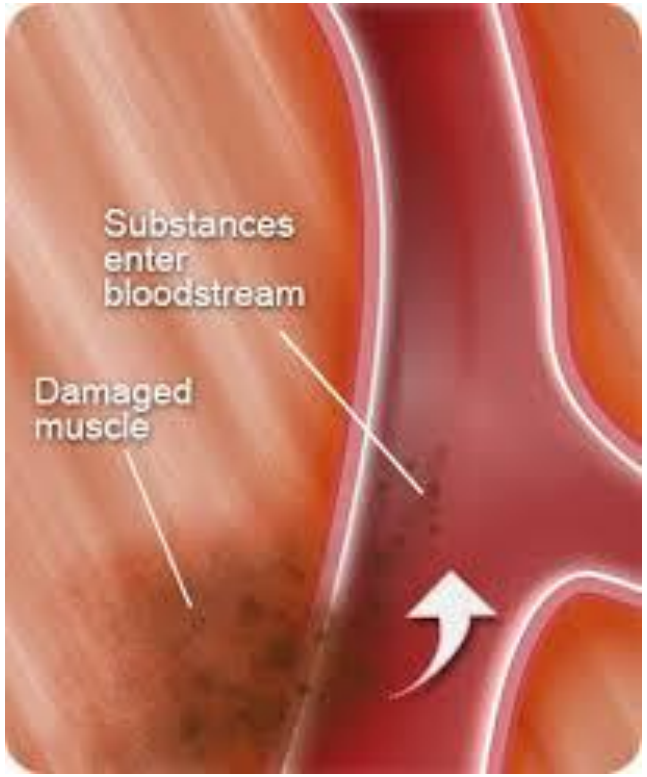
- Poor Wound healing
- Osteomyetilis
- Sepsis

Complication

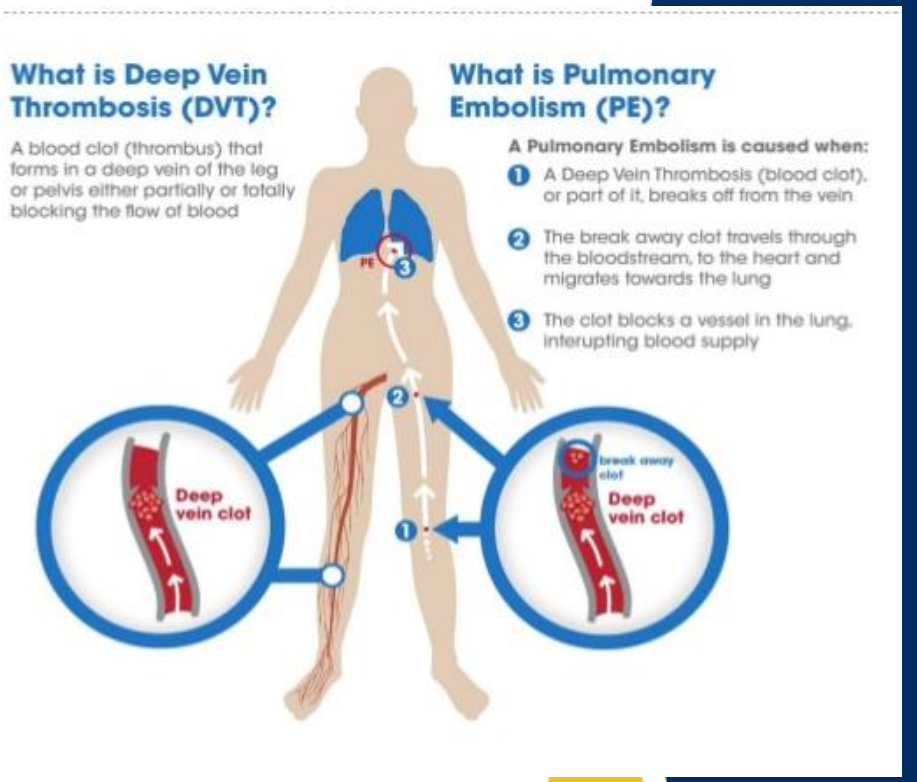
Compartment Syndrome



Rhabdomyolysis



Venous Thromboembolism



Compartment Syndrome

- “6 P” Signs and Symptoms

1. Pain disproportionate to injury
2. Pallor
3. Pulses
4. Paresthesia →numbness, tingling, loss of sensation
5. Paralisis
6. Pressure → compartment feels tenses and swollen on palpation

- Intervention

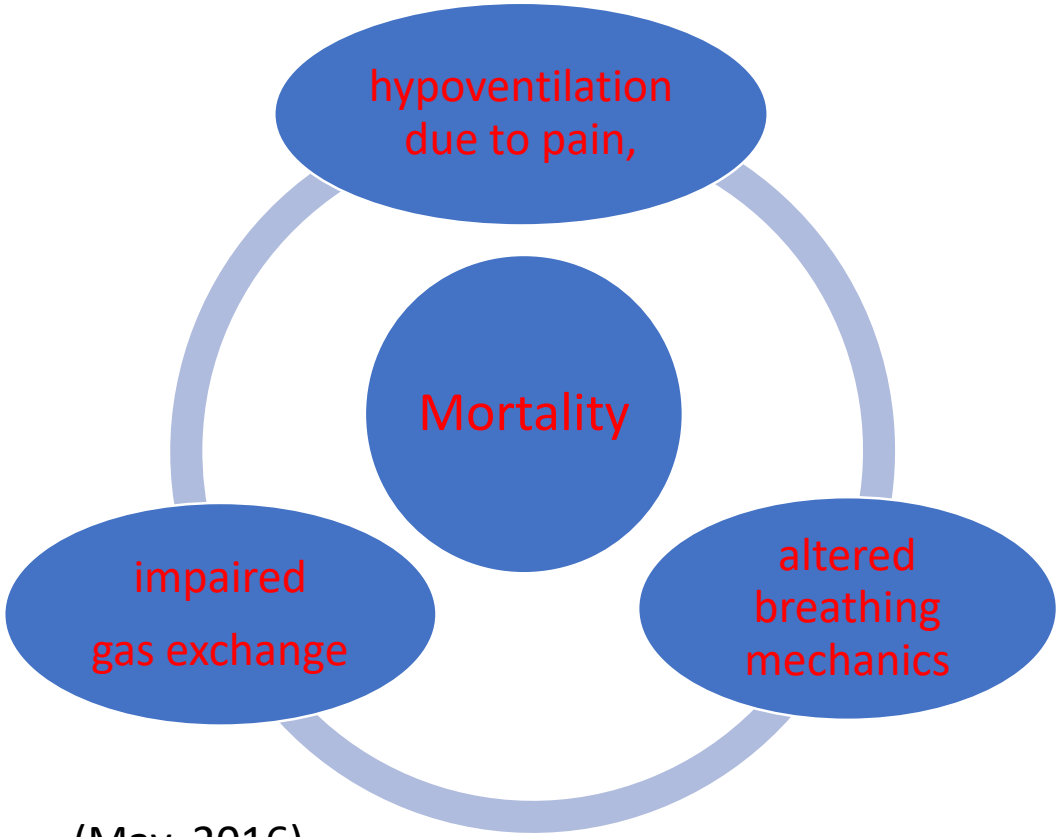
1. Elevate limb to level of the heart
2. Assist with measuring of compartment pressure

Normal 0-8 mmHg

30-40 mmHg → Fasiotomy

3. Reasses neurovascular status

Ribs Fracture

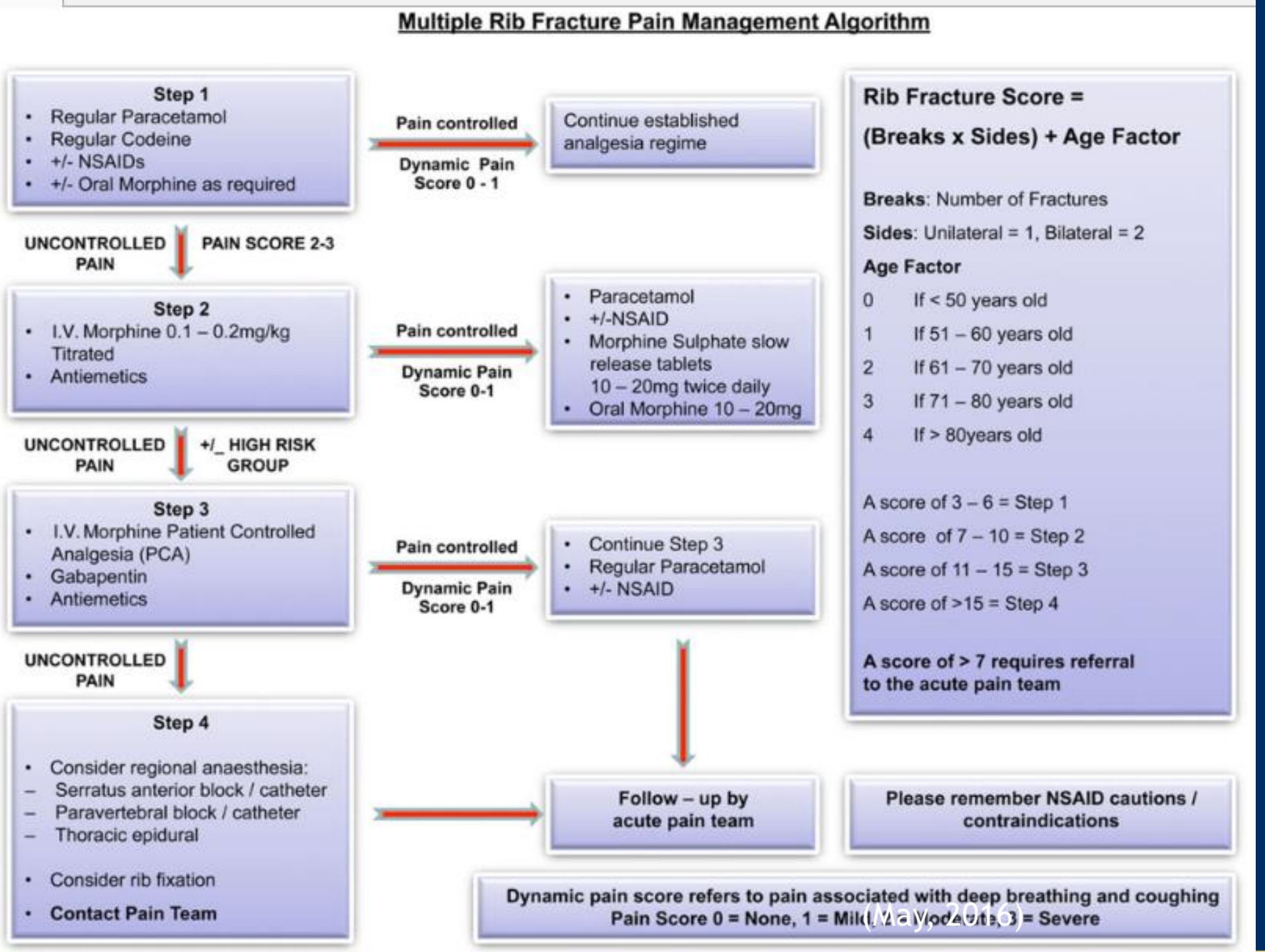


(May, 2016)

Pain Management Ribs Fracture

Management:

1. ABC
2. Hemodynamic
3. Pain Management
4. Ventilatory management
5. Surgery



Pelvic and Femur Fracture

Blood Loss

-humerus→Up to 750 ml

-Femur → Up to 1.500 ml

-Pelvis → Over 1.500 ml

Pelvic fracture

-Assist with stabilization – sheet, external fixator

-Diagnostic tests X-ray, Cystogram, Angiogram, CT scan, Embolization

(Pereira, 2015)

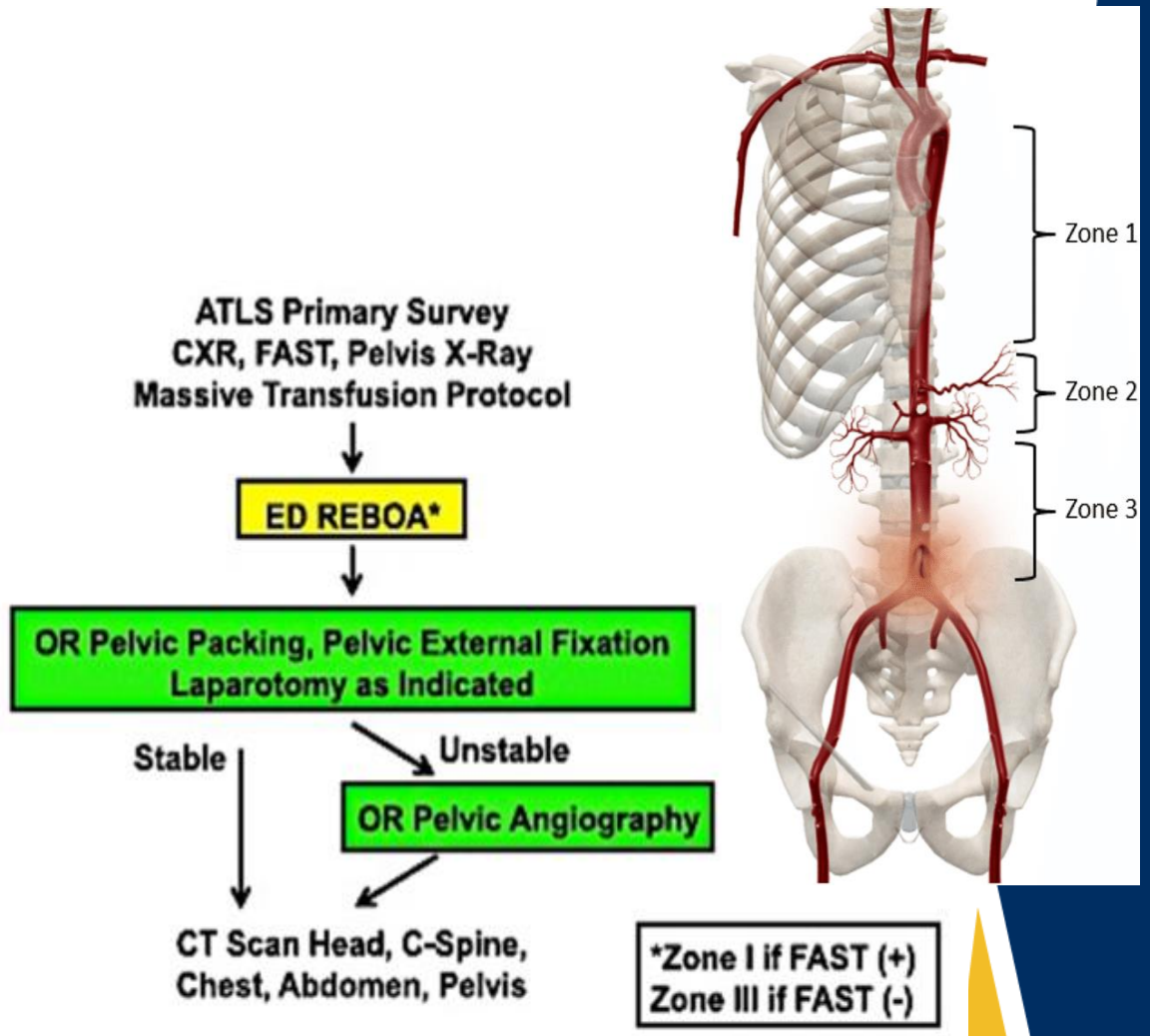
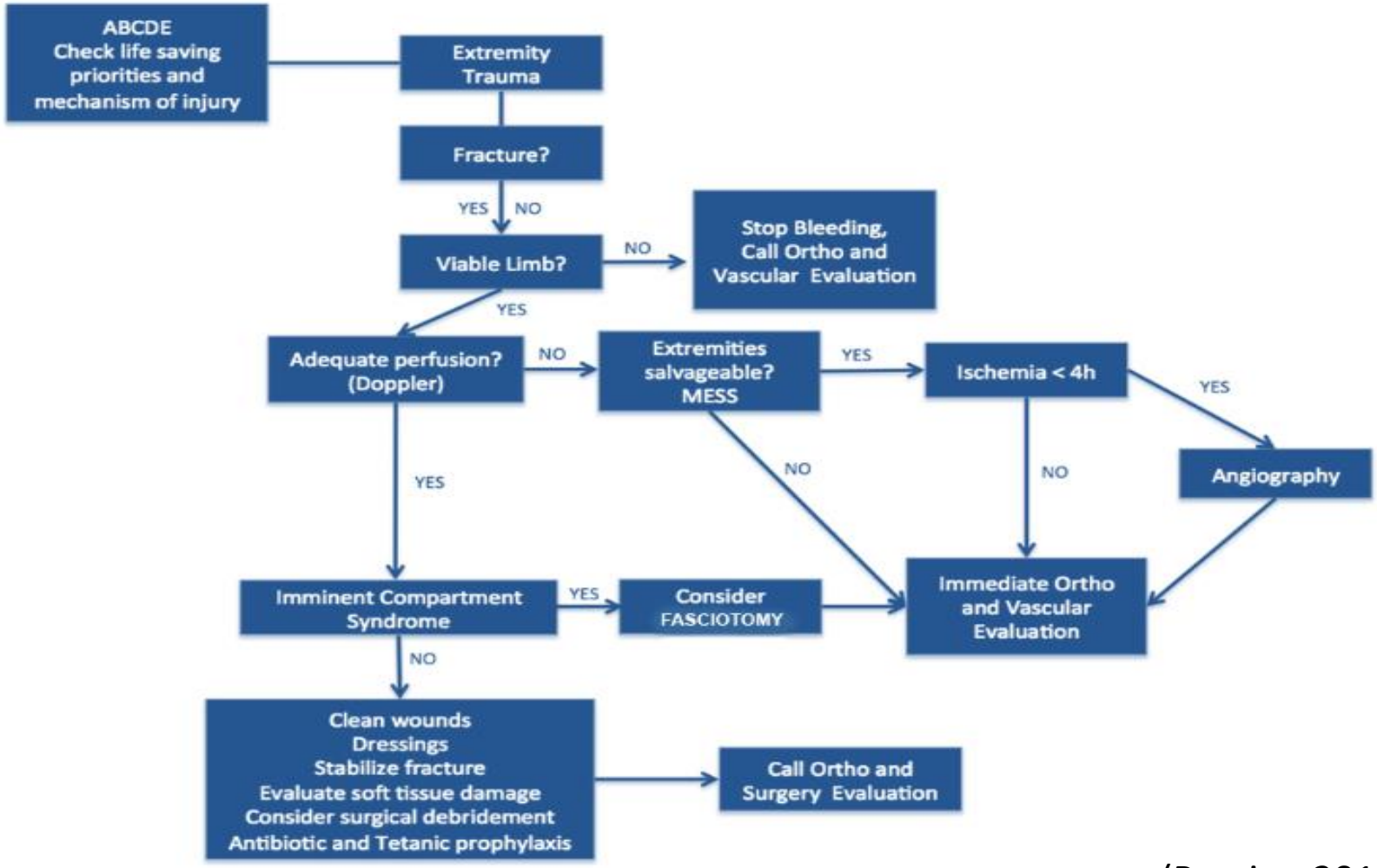
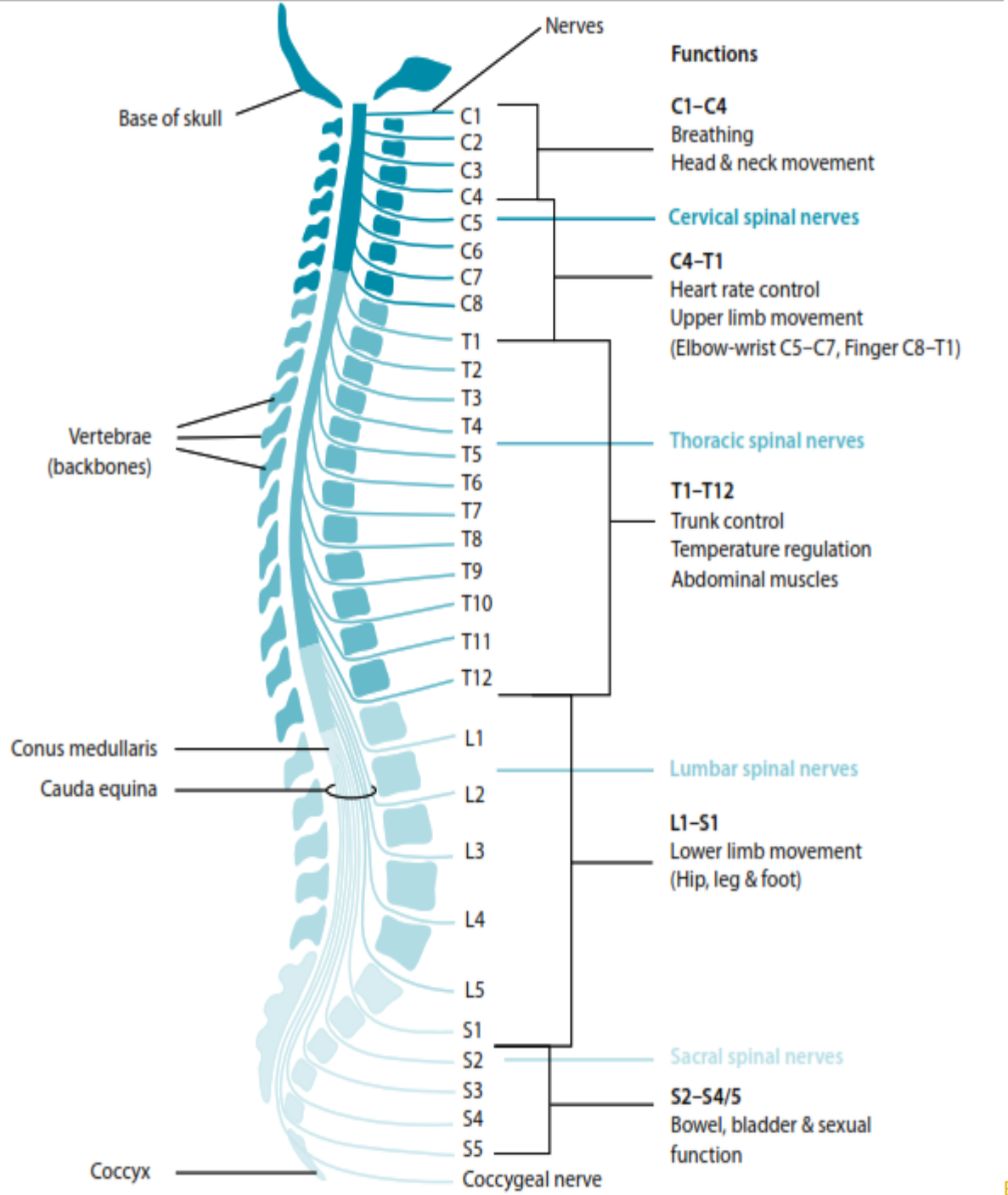


Figure 1: Management of Patient with Unstable Pelvic Fractures and Severe Hemorrhagic Shock (Revised Denver Health Medical Center Algorithm).[23]

Extremity Trauma Algoritm



(Pereira, 2015)



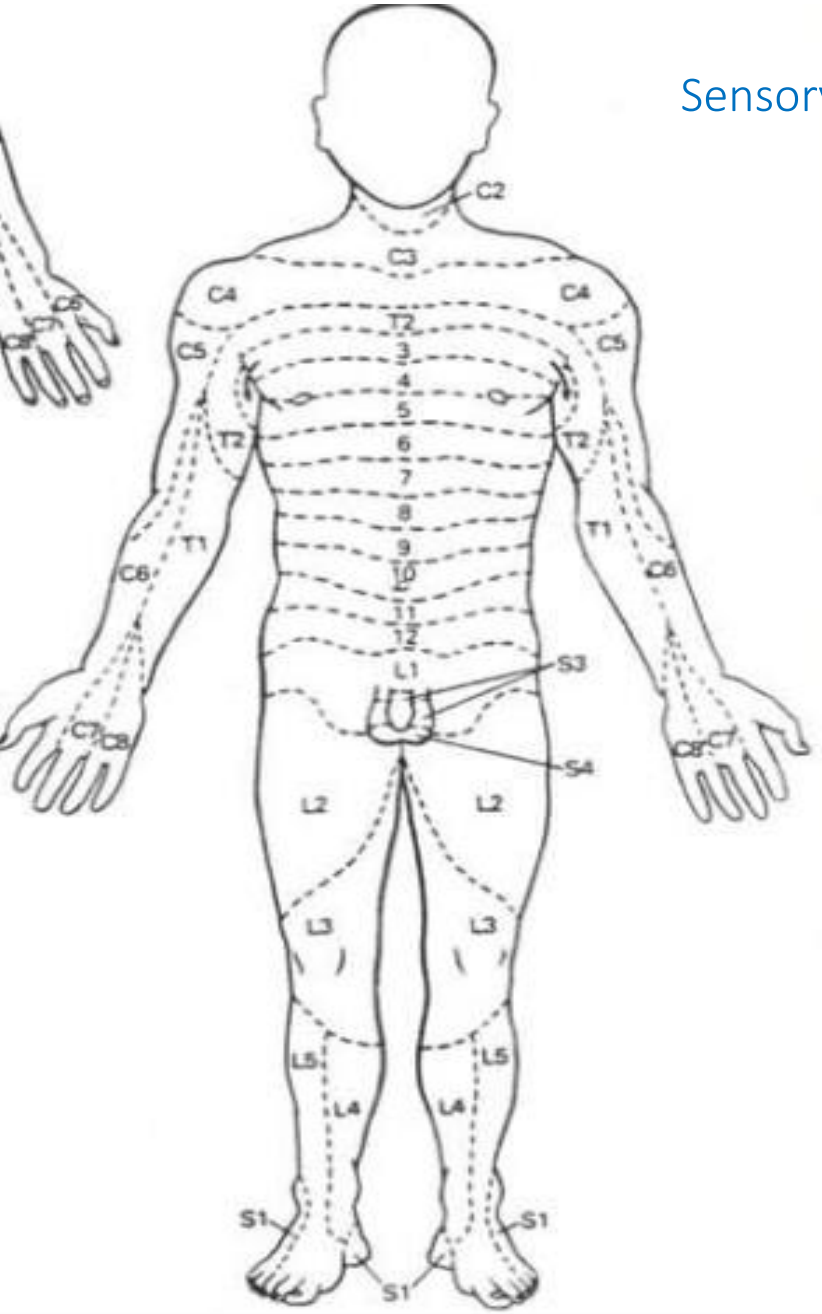
Spinal Cord Injury

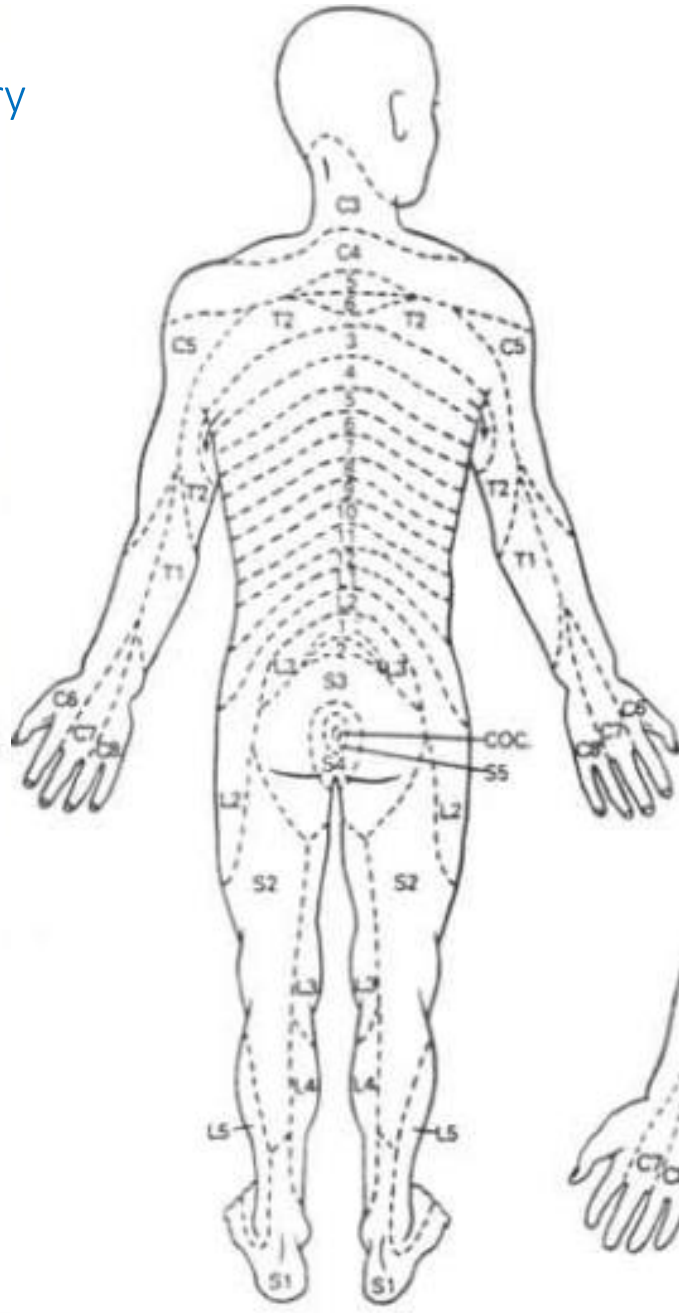
General Principles

1. ABCD is priorities → use jaw trust to release air way.
2. Be suspicious of spinal cord injury when there is weakness, numbness, spine pain, heat injury, high velocity injury and multisystem injuries until an x-ray analysis is obtained and a fracture is ruled out.
3. Because 10%-15% of patient with spinal injury will have a second injury of spine at another leve → carefully immobilized and assess the entire spine.

Sensory and motoric assessment

Sensory





Motor Examination Chart

Motor Function	Nerve Root Level
• Curl toes or push foot down (plantar flex)	S1
• Bend great toe toward head (dorsiflex)	L5
• Extend leg or straighten and lock knee	L3, L4
• Flex leg at hip or raise knee to chest	L1, L2
• Spread fingers	T1
• Flex wrist	C8
• Extend forearm or straighten elbow (triceps)	C7
• Flex forearm or bend elbow (biceps)	C6
• Raise elbow to shoulder level (deltoid)	C5

Reflex Chart

Biceps	C5–C6
Triceps	C6–C7
Patellar	L4
Achilles	S1

Reference

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