

**Optum**

# **Catastrophic Claims Series Part 1:**

Types of catastrophic injuries



# Presenters



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## Learning objectives

1. Review several types of catastrophic injuries encountered in workers' compensation and auto-related claims.
2. Discuss the classification of catastrophic injuries based on their severity.
3. Describe the medical and functional impact catastrophic injuries can have on injured persons and their caregivers.

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# Spinal cord injuries



## Case study 1: Spinal cord injury

Patient sustained gun shot injuries on 06/15/2021 as result of mass shooting when disgruntled employee opened fire at work.

### Diagnosis:

- Paraplegia
- Unspecified, Quadriplegia C1-C4 Complete
- Respiratory Failure
- Neurogenic Bowel and Bladder
- Cervicalgia
- Recurrent UTI
- Unspecified Convulsions
- Arthrodesis Status

### Unrelated/co-morbid conditions:

- Gastroesophageal Reflux Disease
- Attention Deficit/Hyperactivity Disorder

## Case study 1: Spinal cord injury

- Patient suffered a **C5 ballistic fracture** of vertebral body compromising the vertebral canal, which led to **quadriplegia**, intracranial hemorrhage, left carotid bulb and proximal internal carotid artery injury and left internal jugular vein injury.
- Patient subsequently underwent **posterior lateral fusion arthrodesis** at C3-C6. He later developed neurogenic bladder and bowel, seizures, dysphagia, respiratory failure, spasticity and depression. Patient required a tracheostomy, colostomy, and gastrointestinal tube PEG placement.
- Transferred to inpatient rehabilitation and treatment continued with multiple physician follow ups, diagnostic studies, PT (Physical Therapy), OT (Occupational Therapy), ST (Speech Therapy), psychotherapy, intermittent urinary catheterizations, a bowel program, oxygen use, and medications.
- Patient suffered recurrent urinary tract infections and required suprapubic catheter placement. He developed great right toe infection and was seen by podiatrist. Patient weaned to a Trilogy ventilator and ordered a cough assistive device. His PEG tube was removed. Continued care includes follow up with physicians including physical medicine, neurosurgeon, neurologist, urologist, infectious disease, pulmonologist, cardiologist, psychotherapist, and ongoing treatment with PT, OT, ST.

# Case study 1: Spinal cord injury

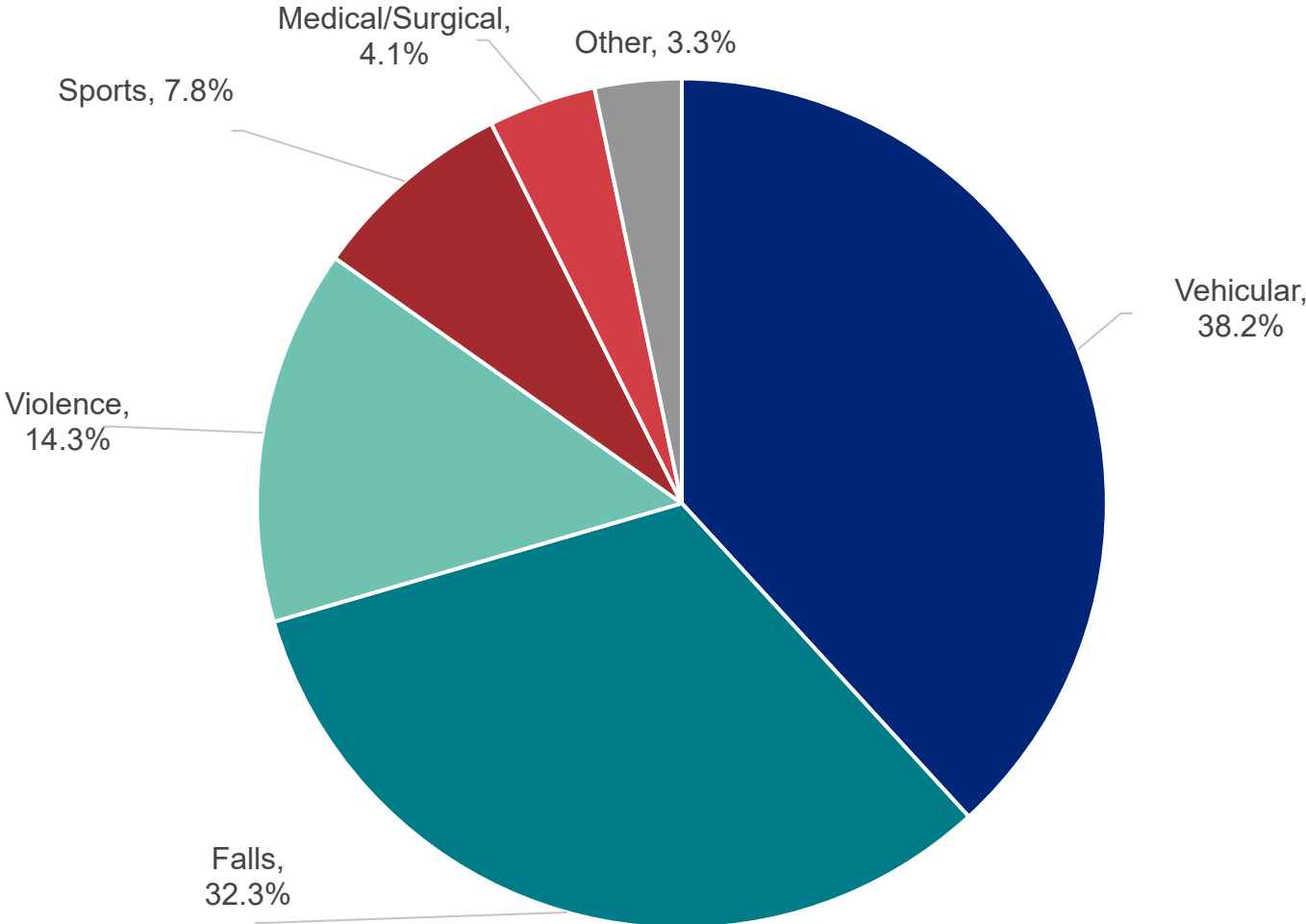
## DME:

- Power chair and equipment
- Nebulizer and supplies
- Suction equipment
- Cough assist device
- Oxygen
- Chest percussion Vest
- Hoyer lift and sling
- Hospital bed
- Lumbar orthosis
- Catheter care equipment
- Ostomy care Supplies

## Medications:

- Baclofen
- Gabapentin
- Pantoprazole Sodium
- Midodrine HCL
- Levetiracetam

# Causes of spinal cord injuries (since 2015)



Source: National SCI Statistical Center - 2021



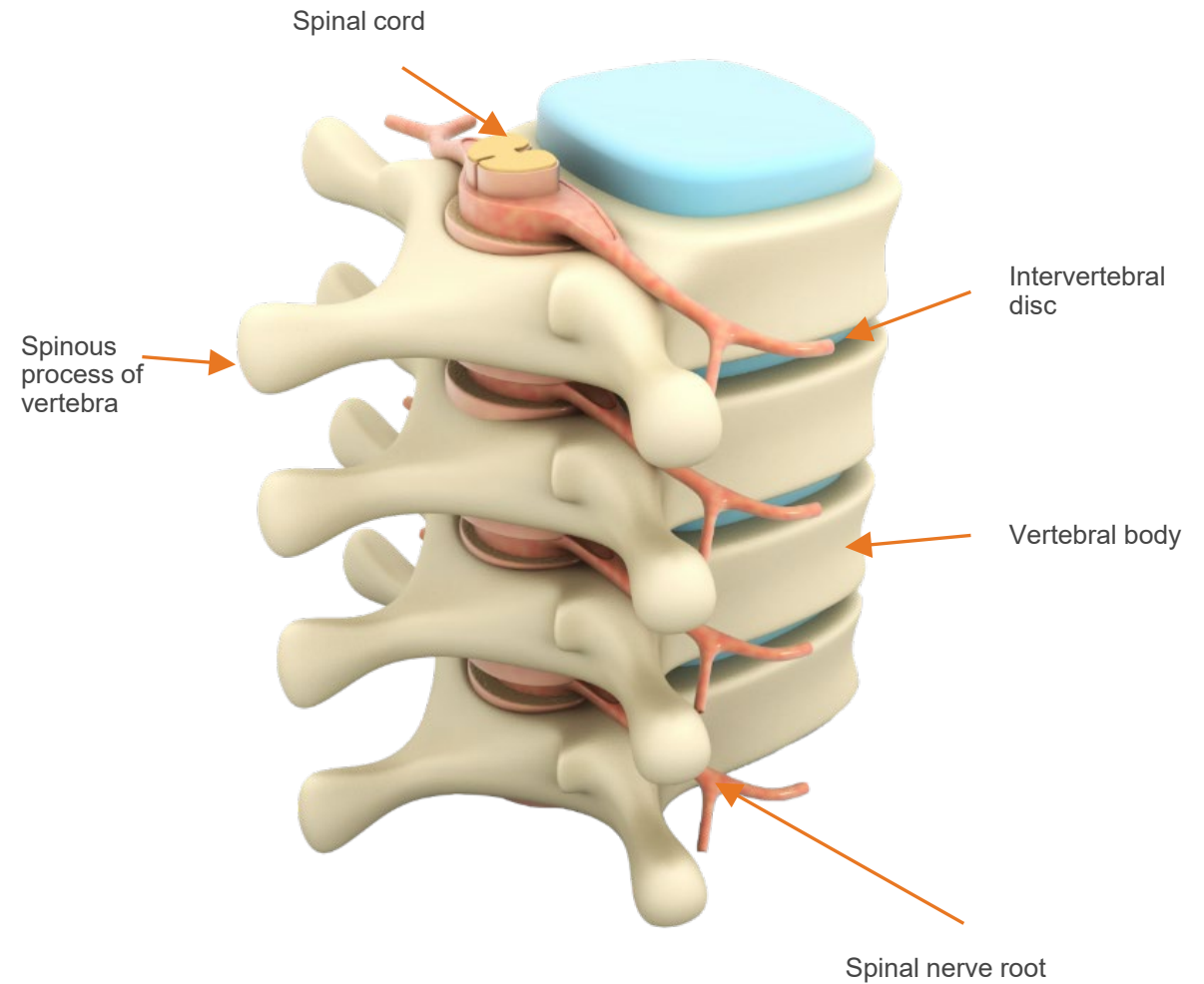
# Demographics

		<1980s	Since 2015
<b>Average age</b>		28.7 years	43 years
<b>Gender</b>	Males	81.8%	78%
	Females	18.2%	22%
<b>Race/Ethnicity</b>	Caucasian	76.8%	58.1%
	African American	14.2%	24.2%
	Hispanic	6.0%	13.3%
	Asian	0.9%	2.5%
	Native American		0.5%
	Other	2.1%	1.4%
<b>Marital status</b>		N/A	44.3% Single

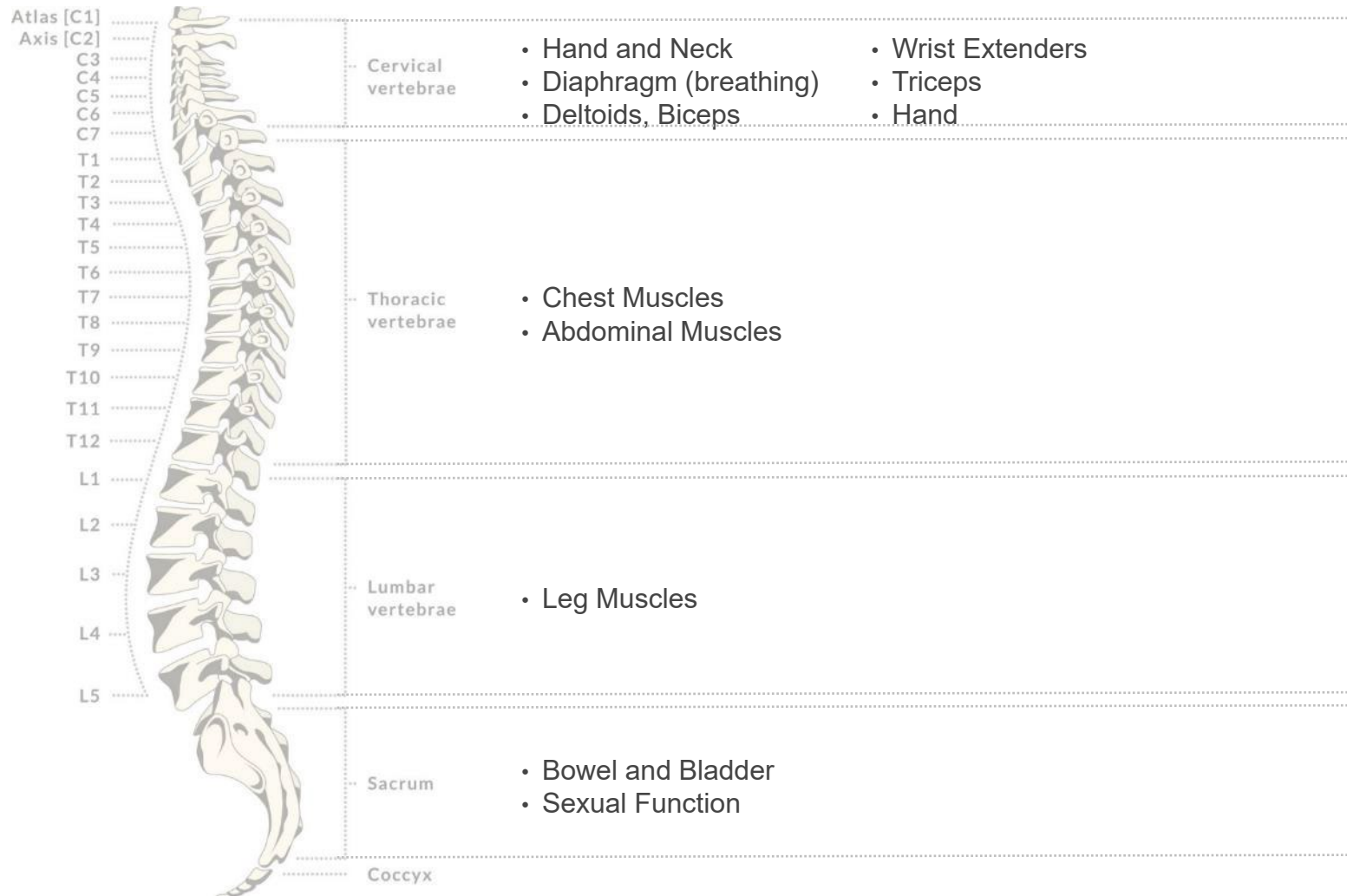
Source: National SCI Statistical Center - 2021

# Spinal cord anatomy, physiology, and function

# Spinal cord anatomy



# Functions of the spinal cord by level



# Spinal cord injury (SCI) classification

## Tetraplegia (Quadriplegia)

Injury of the spinal cord in the cervical region

vs.

## Paraplegia

Injury of the spinal cord in the thoracic or lumbar regions

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## Complete

No sensory or motor function is preserved in the S4-S5 area

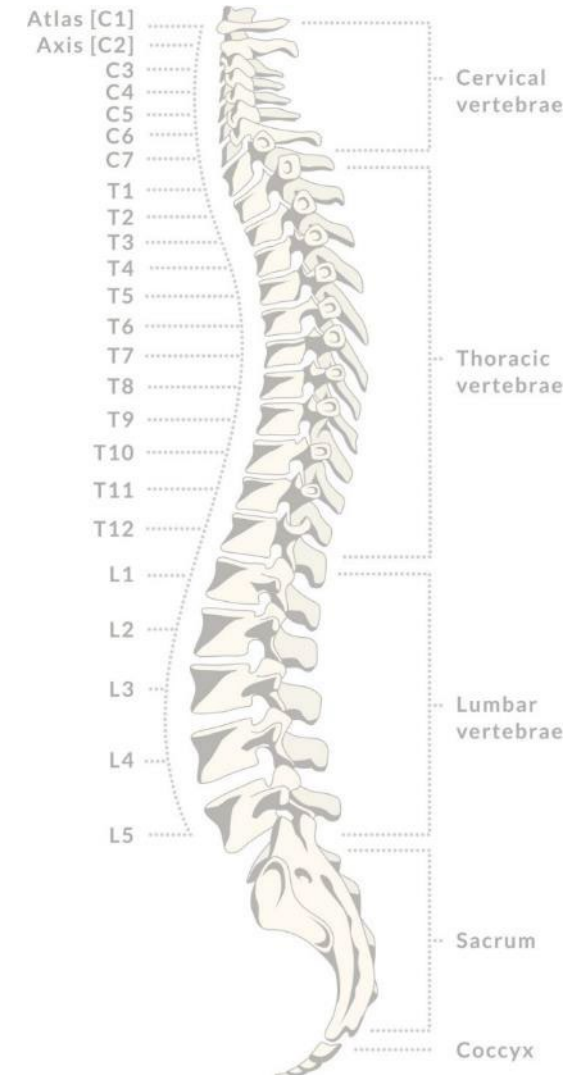
vs.

## Incomplete

Sensory or motor function is preserved below the injury level and includes the S4-S5 area

### C4 injury

Quadriplegia/Tetraplegia, results in complete paralysis below the neck



## Functional abilities based on level of injury

<b>C1 – 4</b>	Power wheelchair use with chin or “sip and puff” controls
<b>C5</b>	Feeding and grooming
<b>C6</b>	Transfer from bed and chair with slide board
<b>C7</b>	Manual wheelchair use in the community (not curbs)
<b>C8</b>	Typing, writing, using computers

## Average yearly expenses

The average yearly expenses (health care costs and living expenses) and the estimated lifetime costs that are directly attributable to SCI vary greatly based on education, neurological impairment, and pre-injury employment history.

Severity of Injury	First Year after SCI	Each Subsequent Year
High Tetraplegia (C1-4)	\$1,163,425	\$202,032
Low Tetraplegia (C5-8)	\$840,676	\$123,938
Paraplegia	\$567,011	\$75,112
Incomplete Motor	\$379,698	\$46,119

Source: National SCI Statistical Center - 2021

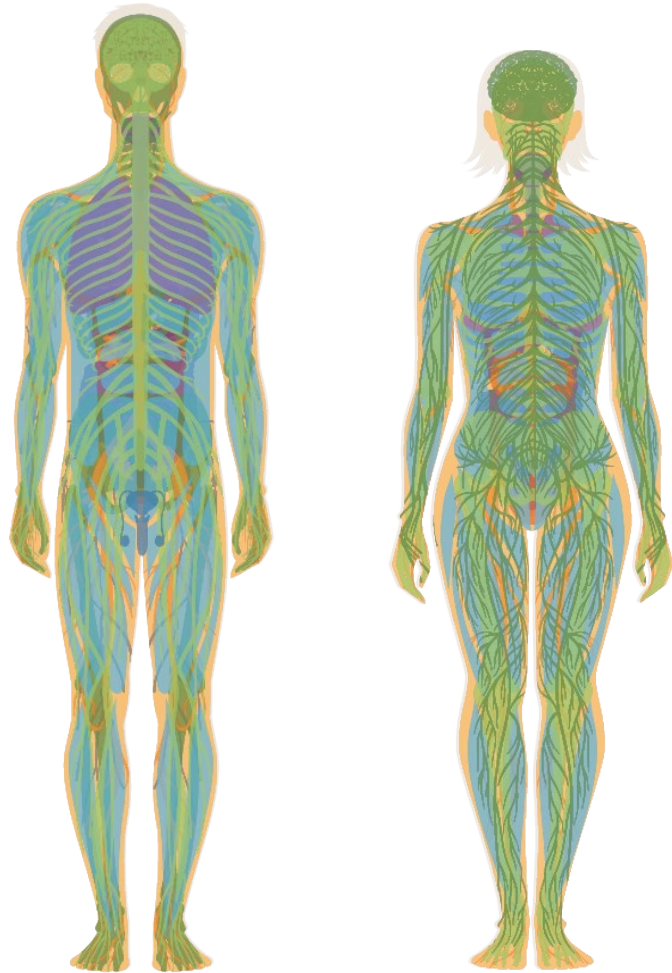
## Estimated lifetime costs by age at injury

Severity of Injury	25 years old	50 years old
High Tetraplegia (C1-4)	\$5,162,152	\$2,837,031
Low Tetraplegia (C5-8)	\$3,771,791	\$2,319,988
Paraplegia	\$2,524,270	\$1,656,602
Incomplete Motor	\$1,724,594	\$1,217,266

Source: National SCI Statistical Center - 2015



# Spinal cord injuries can affect every major body system



# Poll #1

- You must answer **all three poll questions** to qualify for CE credit.
- If you cannot see the poll question, **it will be read aloud multiple times.**
- After the poll question, you may need to refresh your screen

## To submit your poll question answer:

Use the Submit button on your screen



Example poll question?

A. Option 1

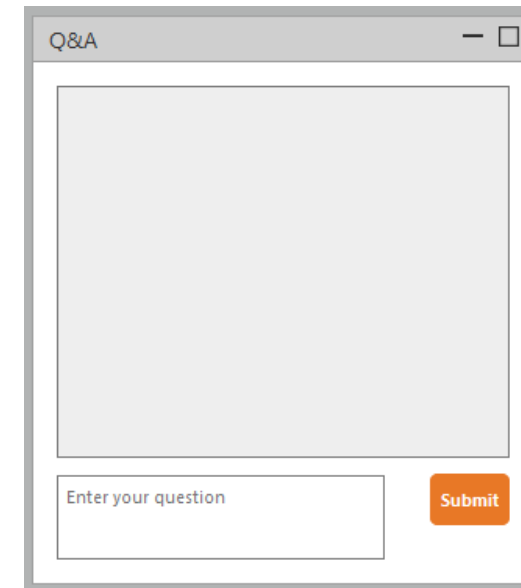
B. Option 2

C. Option 3

Submit

OR

Send your answer in the Q&A panel



Q&A

Enter your question

Submit

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# Traumatic brain injuries



## Case study 2: Traumatic brain injury

Patient fell 40 feet from a crane on 12/20/2005

### Diagnosis:

- Traumatic Brain Injury with Loss of Consciousness
- Left Tibia Fracture
- Left Leg Crushing Injury
- Multiple Rib Fractures
- L1-2 Transverse Process Fracture
- L2-3 Burst Fracture
- Post Traumatic Seizures
- Major Neurocognitive Disorder with Irritability and Anger
- Paralytic Gait
- Bowel Incontinence
- Neurogenic Bladder
- Gastroesophageal Reflux Disease (GERD)

### Unrelated/co-morbid conditions:

- Congenital Hydrocephalus Status Post Shunt Placement
- Hyperlipidemia
- Onychomycosis

## Case study 2: Traumatic brain injury

- Patient underwent surgery for external fixator placement for left leg crush injury. Inpatient rehabilitation stays from 2/2006 through 10/2006 and moved to different facility 2010 through 2017.
- Patient suffered a fall at home in 2019 and was subsequently readmitted to a SNF (skilled nursing facility) and is currently pending permanent placement at an ALF (assisted living facility)
- Treatment includes physician follow up including neurology, urology, PCP (Primary Care Provider), orthopedic, OT, PT, DME, medications, skilled assistance.

## Case study 2: Traumatic brain injury

### DME:

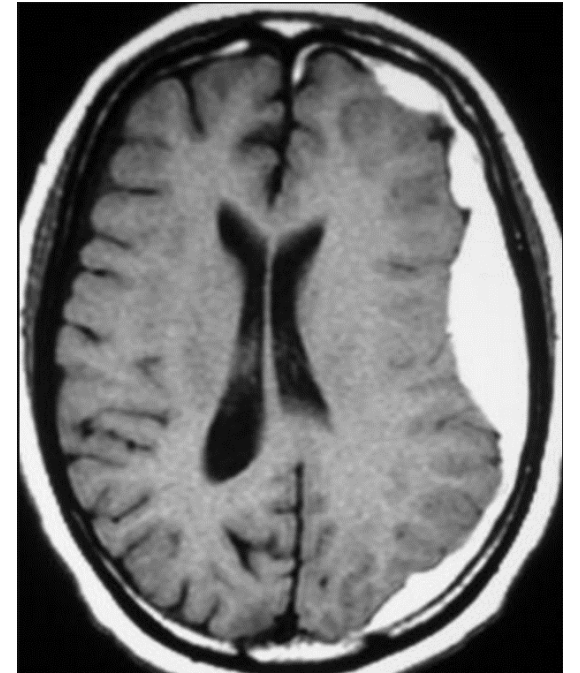
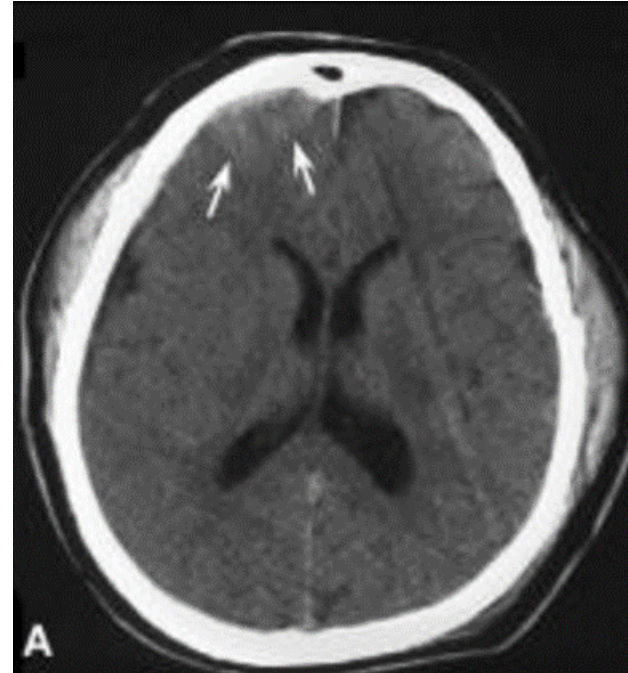
- Wheelchair
- Rolling Walker
- Depends
- Safety Equipment

### Medications:

- Divalproex Sodium
- Omeprazole
- Escitalopram Oxalate
- Baclofen
- Trazodone HCL
- Guaifenesin
- Ipratropium-albuterol Solution via Nebulizer
- Metoprolol
- Ondansetron
- Valproate
- Xarelto

# What is a traumatic brain injury?

- Pathophysiology
  - Primary injury: Impact, Immediate intracranial bleeding
  - Secondary injury: Swelling, Neuroinflammatory response
- Differences between traumatic and anoxic brain injuries



# Causes and prevention of TBIs



## Causes

- Motor vehicle accidents
- Falls
- Self-inflicted wounds
- Assault
- Sports



## Prevention

- Seat belts, air bags, not driving while intoxicated
- Harness, helmet, safe surroundings
- Early identification, psychological screening
- Safe surroundings
- Safe technique, helmet

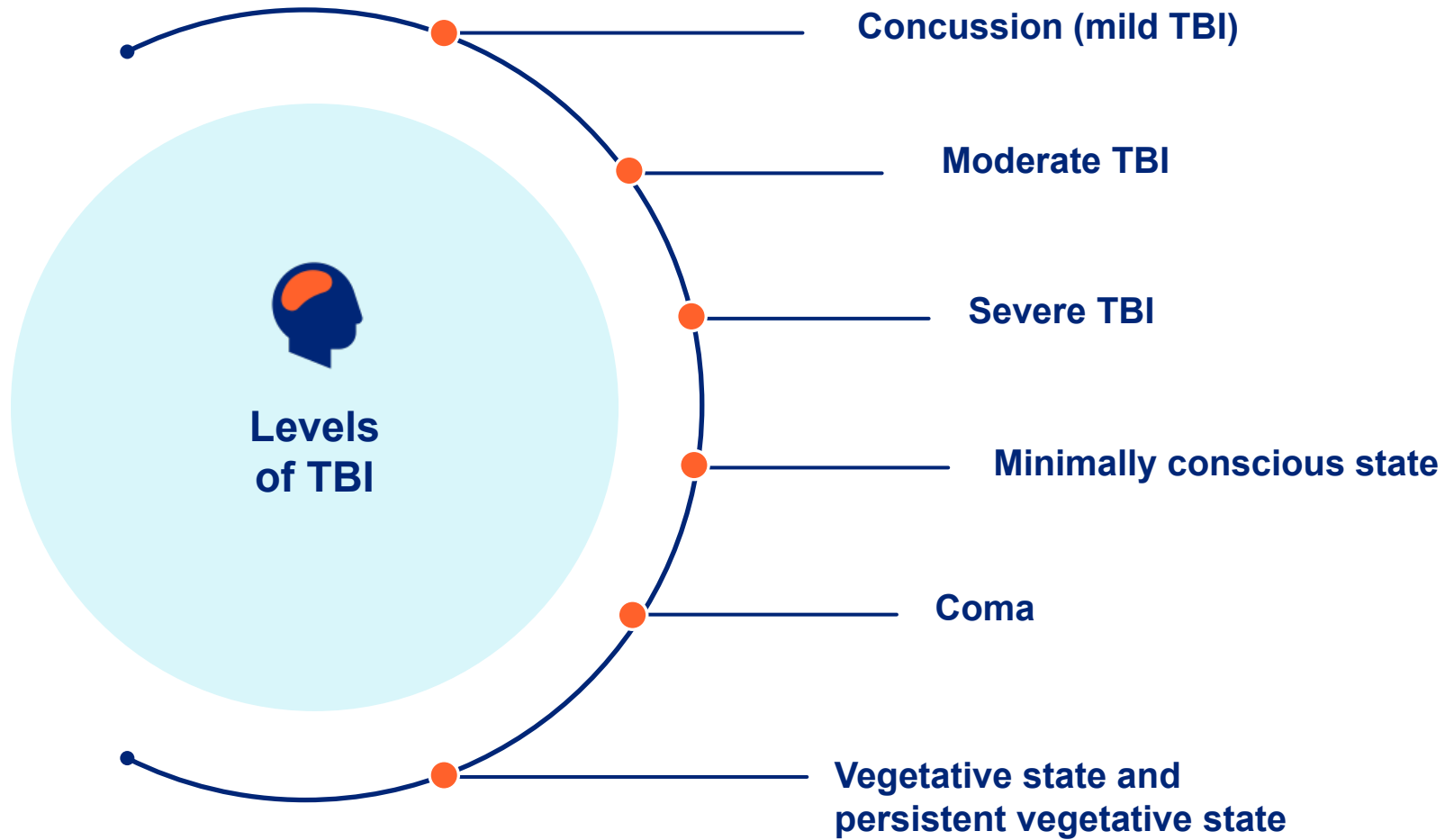
Source: [https://www.cdc.gov/traumaticbraininjury/get\\_the\\_facts.html](https://www.cdc.gov/traumaticbraininjury/get_the_facts.html)



# Classification systems and terms

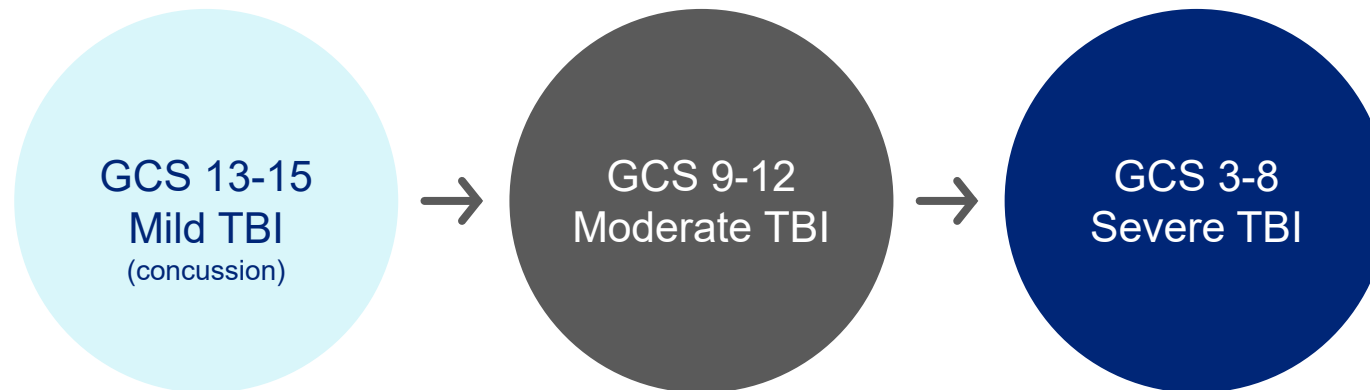
to describe brain injury and severity

# TBI terminology



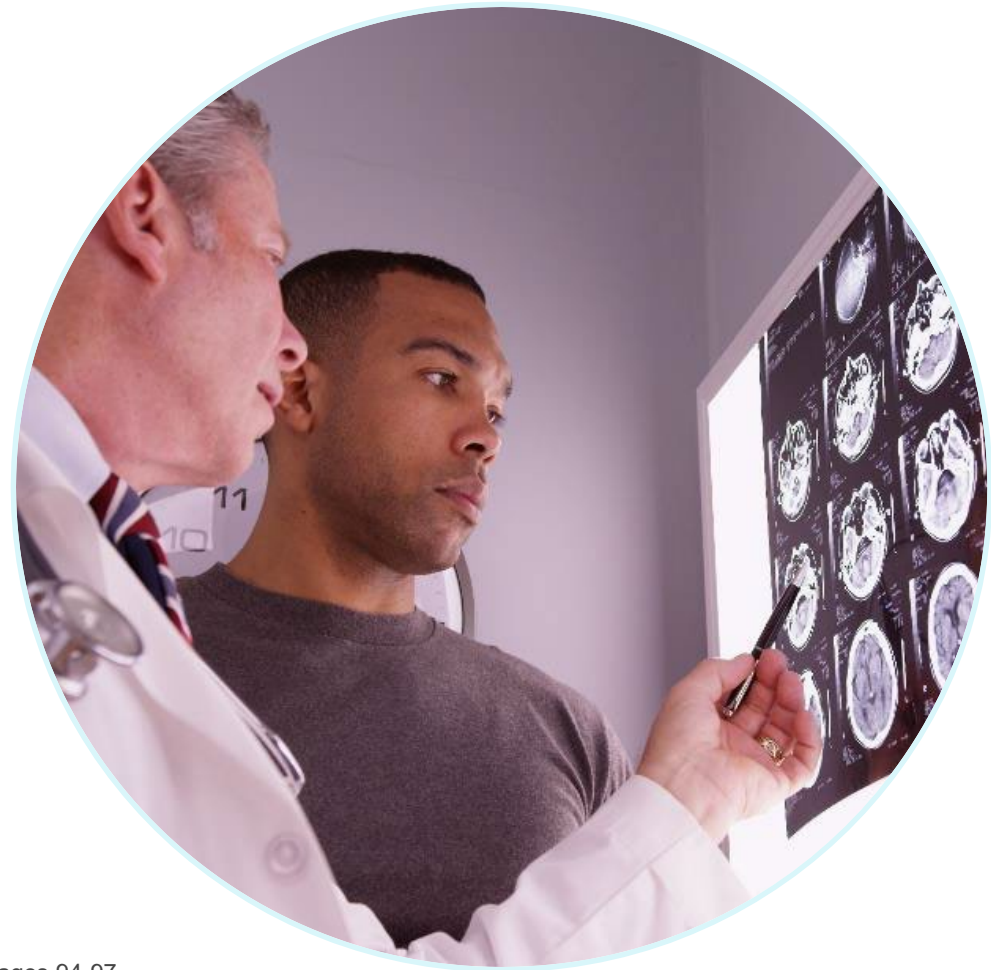
# Glasgow Coma Scale (GCS)

Eye Opening Response	Verbal Response	Motor Response
4 = Spontaneous 3 = To verbal stimuli 2 = To pain 1 = None	5 = Oriented 4 = Confused 3 = Inappropriate words 2 = Incoherent 1 = None	6 = Obeys commands 5 = Localizes pain 4 = Withdraws form pain 3 = Flexion to pain or decorticate 2 = Extension to pain or decerebrate 1 = None



## Concussion (mild TBI)

- **No visible abnormalities on imaging studies of the skull and brain**
  - Skull X-rays
  - Head CT
  - Brain MRI
- **Injury does not exceed the following**
  - Loss of consciousness > 30 minutes
  - Post-traumatic amnesia > 24 hours
- **Initial GCS 13-15**



Cuccurullo, Sara J. *Physical Medicine and Rehabilitation Board Review*. 3rd ed. New York: Demos Medical, 2015. Pages 94-97.

# Concussion (mild TBI)



## Acute signs and symptoms

- Disorientation/confusion
- Impaired balance
- Increased reaction time
- Headache (most common symptom)
- Dizziness
- Memory problems



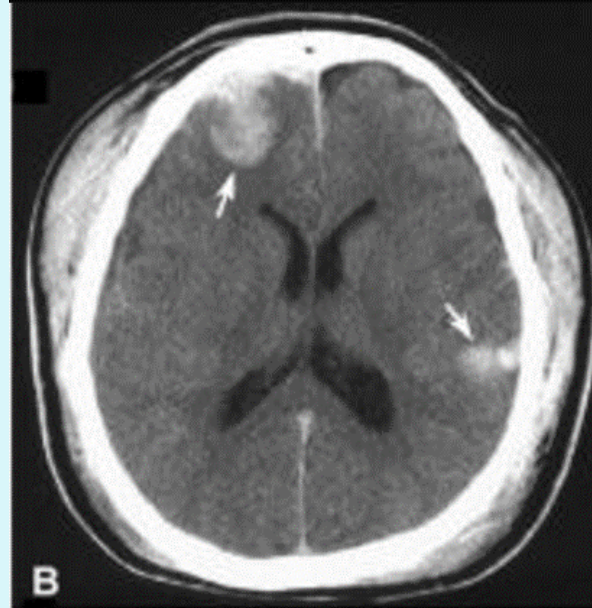
## Symptoms that may develop

- Irritability
- Sleep disturbance
- Fatigue
- Depression and/or anxiety
- Concentration problems

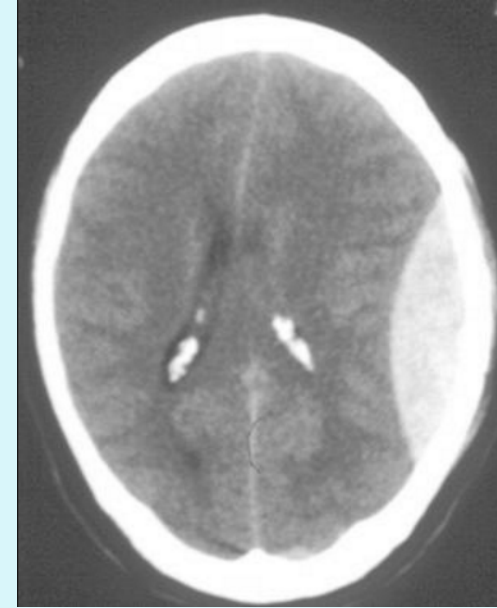
## Other types of traumatic brain injuries



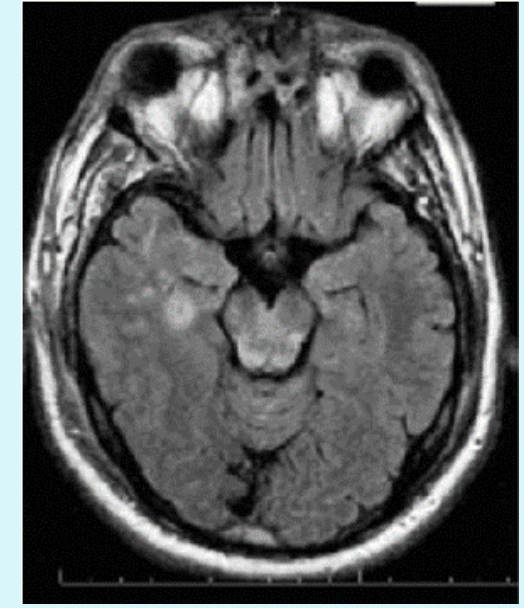
**Penetrating injuries**



**Cerebral or cortical contusions**



**Intracranial hemorrhage**

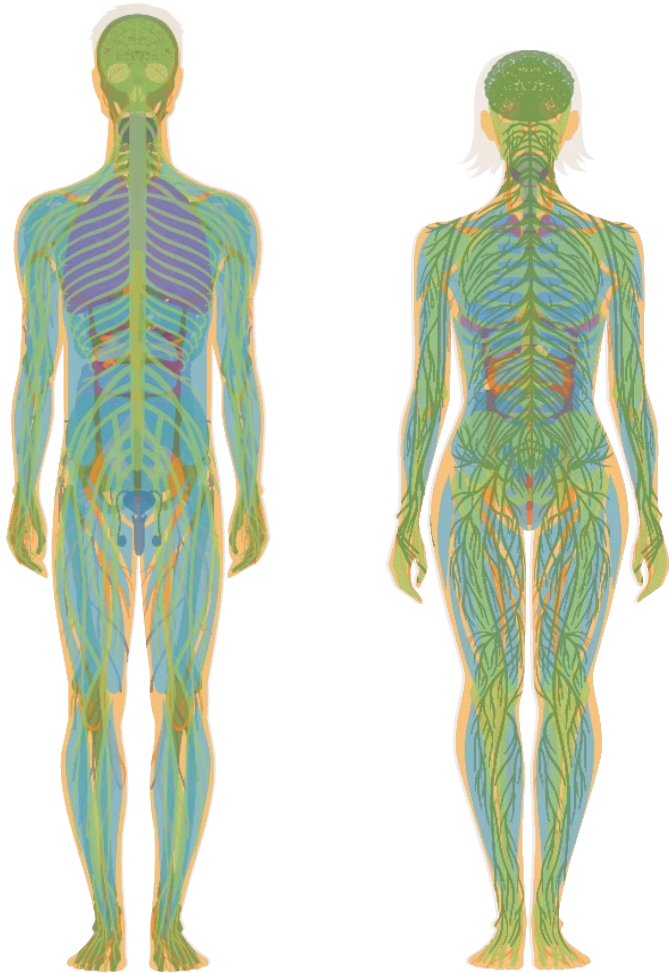


**Diffuse axonal injury**

## Diagnostic studies

X-ray	Skull fracture
Head CT	Intracranial hemorrhage
Brain MRI	Diffuse axonal injury
Other injuries	<ul style="list-style-type: none"><li>• Other fractures (arms, legs, ribs, spine, etc.)</li><li>• Organ injury (heart, lung, liver, spleen, kidney, etc.)</li><li>• Spinal cord injury</li></ul>

# Traumatic brain injuries can affect every major body system





# Poll #2

- You must answer **all three poll questions** to qualify for CE credit.
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## To submit your poll question answer:

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Example poll question?

A. Option 1

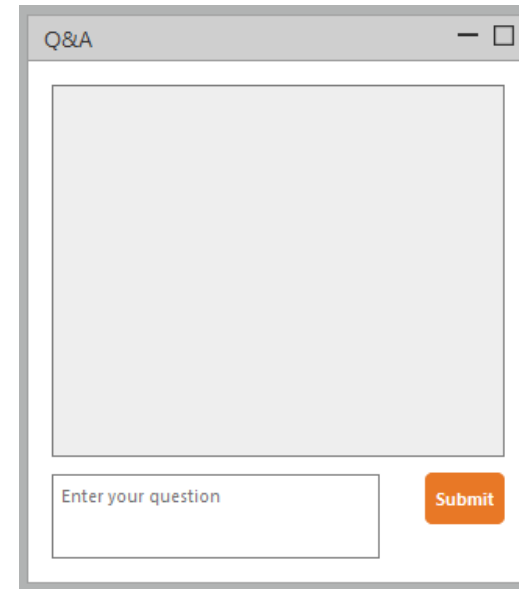
B. Option 2

C. Option 3

Submit

OR

Send your answer in the Q&A panel



Q&A

Enter your question

Submit

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**Amputations**



## Case study 3: Amputation

Patient is a 58-year-old male who suffered a right-hand amputation when his hand was caught in machinery at work on 10/25/22.

### Diagnoses include:

- Chronic Pain Syndrome
- Complete Traumatic Amputation Right Forearm
- Right Arm Pain
- Phantom Limb Syndrome
- Post Traumatic Stress Disorder
- Major Depressive Disorder
- Generalized Anxiety Disorder

### Unrelated/co-morbid conditions:

- Kidney Stones
- Low Testosterone
- Pneumonia
- Smoker
- Hypertension

## Case study 3: Amputation

- He underwent surgery for completion of the traumatic **right below elbow amputation (BEA)** with later revision of right BEA stump in 2013.
- He was fitted with a myoelectric prosthetic which improved ability to perform ADL. Ongoing pain developed with stellate ganglion blocks administered with some relief noted.
- He developed sympathetic nerve pain, and he became unable to use his current prosthesis. As a result, compensatory issues in his left upper extremity developed. Psychiatric issues and pain worsened with some decline; however, improved with further treatment and ongoing medications. New myoelectric prosthetic evaluation and fitting.
- Treatment includes follow up with physician's pain management, psychiatric care, urology, orthopedics, prosthetist, PT, OT, as well as prosthetic and maintenance/replacement care.

## Case study 3: Amputation

### Medications:

- Dextroamphetamine-amphetamine
- Diclofenac
- Doxepin
- Gralise
- Oxycodone/APAP
- Lactulose
- Prazosin
- Tadalafil
- Trazadone
- Venlafaxine



# Effects of comorbid conditions on amputations

## Comorbid conditions

- Diabetes
- Tobacco use
- Vascular disease
- Heart disease
- Depression
- Obesity
- Arthritis
- Substance abuse
- Aging claimant

## Complications

- Infection
- Impaired wound healing
- Contractures
- Deconditioning
- Pain
- Worsening depression
- Sedation
- Falls

## Impact on use of prosthesis

- Weakness
- Impaired cognition
- Decreased endurance
- Lack of motivation

# Hospital course

<b>Post-operative care</b>	<b>Discharge planning</b>
<ul style="list-style-type: none"><li>• Pain control</li><li>• Minimize blood loss</li><li>• Adequate nutrition</li><li>• Control swelling</li><li>• Falls prevention</li><li>• Early range of motion and mobilization</li><li>• Prosthetic vendor referral</li></ul>	<ul style="list-style-type: none"><li>• Home</li><li>• Subacute nursing facility</li><li>• Acute inpatient rehabilitation</li><li>• DME</li><li>• Follow-up<ul style="list-style-type: none"><li>– Providers</li><li>– Physical medicine</li><li>– Prosthetic vendor</li></ul></li></ul>

# Post-discharge recovery and rehabilitation

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## Pain control

- Postsurgical pain
- Phantom limb pain
  - Sensations
  - Pain
    - Anticonvulsants and antidepressants
    - Desensitization techniques
    - Mirror therapy
    - “Movement” of the missing limb

## Wound care

- Surgical wound management
  - Compression (wrap / shrinker)
  - Precautions with elevation
  - Weight-bearing limitations
  - Nutrition and hydration
  - Scar mobilization
-



# Post-discharge recovery and rehabilitation

## Residual limb shaping

- Elastic bandages (ACE wrap)
- Shrinker socks

## Mobilization

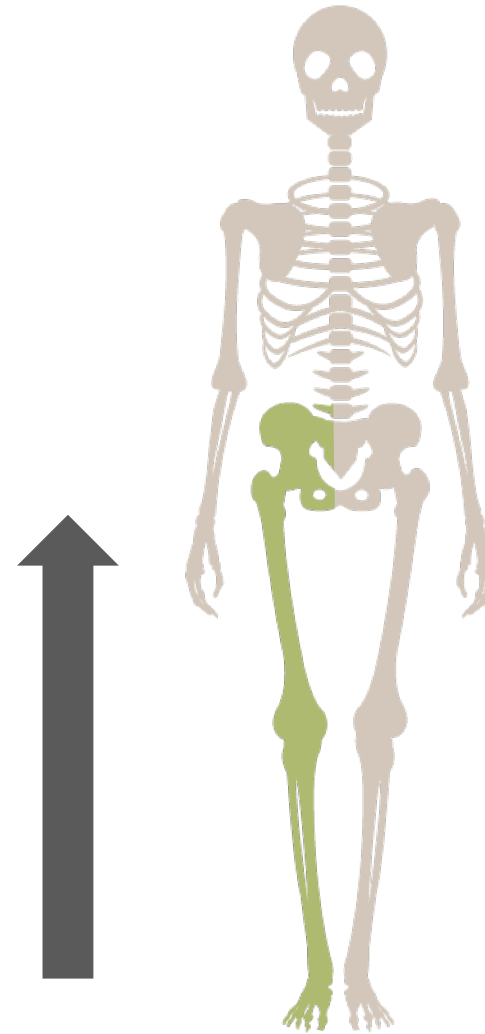
- Range of motion
- Strengthening of other limbs
- Ambulation
- Stair climbing

## Endurance

- Cardiovascular fitness
- Energy conservation techniques
- Joint protection

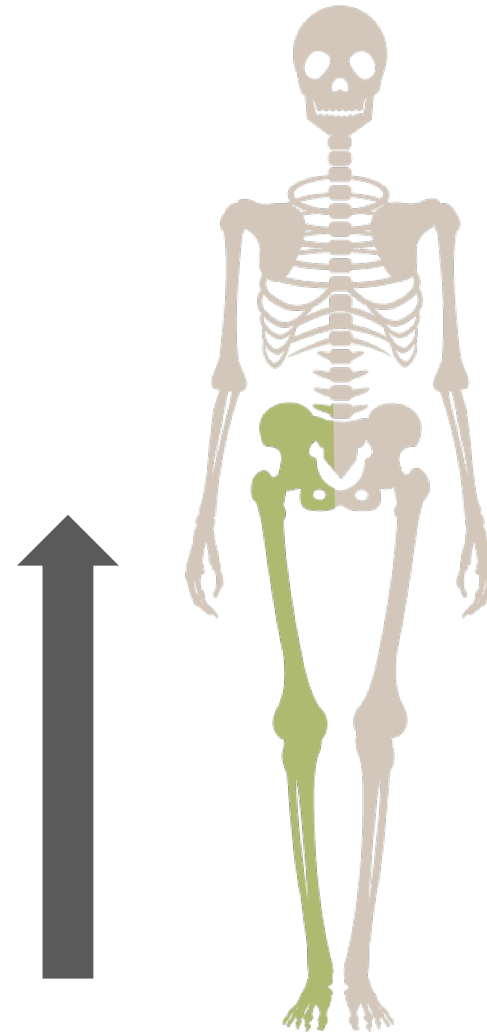
## Amputation site selection (lower limb)

- Hemicorporectomy
- Hemipelvectomy
- Hip disarticulation
- Transfemoral (above-the-knee)
- Knee disarticulation
- Transtibial (below-the-knee)
- Ankle disarticulation (Syme's)
- Midtarsal (Chopart)
- Tarsometatarsal junction (Lisfranc)
- Transmetatarsal
- Partial foot/partial toe



## Amputation site selection (lower limb)

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- Ankle disarticulation (Syme's)
- Midtarsal (Chopart)
- Tarsometatarsal junction (Lisfranc)
- Transmetatarsal
- Partial foot/partial toe



## Amputation site and additional energy required for walking

<b>SINGLE BELOW-THE-KNEE</b>	25%
<b>BILATERAL BELOW-THE-KNEE</b>	41%
<b>SINGLE ABOVE-THE-KNEE</b>	60-70%
<b>BILATERAL ABOVE-THE-KNEE</b>	>200%

Cuccurullo, Sara J. *Physical Medicine and Rehabilitation Board Review*. 3rd ed. New York: Demos Medical, 2015. Page 477.

# Lower limb prosthesis components are determined by claimant's K-level

Medicare defines K-levels based on the ability or **potential** to ambulate and navigate the environment.

K-LEVEL	FUNCTIONAL POTENTIAL OF AMPUTEE
<b>K0</b>	<b>No ability or potential</b> to ambulate or transfer safely with or without assistance and a prosthesis does not enhance quality of life or mobility.
<b>K1</b>	Ability or potential to use a prosthesis for transfers or ambulation on level surfaces at <b>fixed cadence</b> .
<b>K2</b>	Ability or potential for ambulation with the ability to traverse <b>low-level environmental barriers</b> such as curbs, stairs, or uneven surfaces.
<b>K3</b>	Ability or potential for ambulation with <b>variable cadence</b> - a typical community ambulatory with the ability to traverse most environmental barriers may have activity that demands prosthetic use beyond simple locomotion.
<b>K4</b>	Ability or potential for ambulation that <b>exceeds basic ambulation</b> skills, exhibiting high impact, stress, or energy levels.

[http://www.oandp.org/olc/course\\_extended\\_content.asp?frmCourseId=ACA066EC-443A-4822-822C-89BC1CBD684E&frmTermId=k-levels](http://www.oandp.org/olc/course_extended_content.asp?frmCourseId=ACA066EC-443A-4822-822C-89BC1CBD684E&frmTermId=k-levels)

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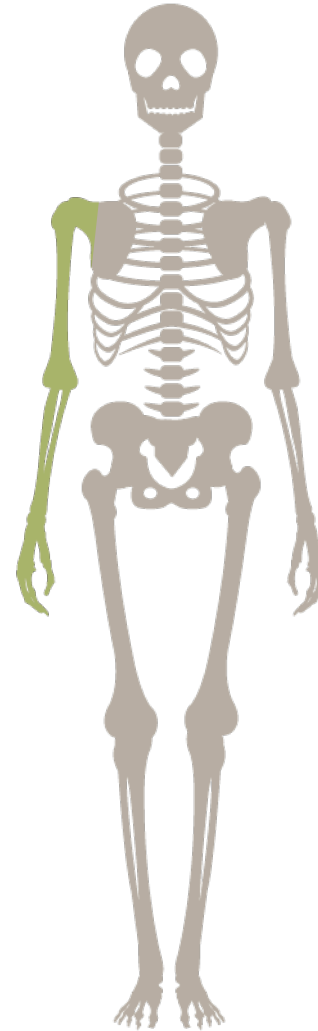
Medicare defines K-levels based on the ability or **potential** to ambulate and navigate the environment.

K-LEVEL	FUNCTIONAL POTENTIAL OF AMPUTEE	TYPE OF PROSTHESIS
<b>K0</b>	No <b>ability or potential</b> to ambulate or transfer safely with or without assistance and a prosthesis does not enhance quality of life or mobility.	Not eligible for prosthesis
<b>K1</b>	Ability or potential to use a prosthesis for transfers or ambulation on level surfaces at <b>fixed cadence</b> .	External keel, SACH feet or single axis ankle/feet, single-axis, constant friction knee
<b>K2</b>	Ability or potential for ambulation with the ability to traverse <b>low-level environmental barriers</b> such as curbs, stairs, or uneven surfaces.	Flexible-keel feet and multi-axial ankle/feet, single-axis, constant friction knee
<b>K3</b>	Ability or potential for ambulation with <b>variable cadence</b> - a typical community ambulatory with the ability to traverse most environmental barriers may have activity that demands prosthetic use beyond simple locomotion.	Flex foot and flex-walk systems, energy storing feet, multi-axial ankle/feet, or dynamic response feet, fluid and pneumatic control knee, microprocessor knee
<b>K4</b>	Ability or potential for ambulation that <b>exceeds basic ambulation</b> skills, exhibiting high impact, stress, or energy levels.	Any ankle foot system appropriate, any ankle knee system appropriate, including microprocessor

[http://www.oandp.org/olc/course\\_extended\\_content.asp?frmCourseId=ACA066EC-443A-4822-822C-89BC1CBD684E&frmTermId=k-levels](http://www.oandp.org/olc/course_extended_content.asp?frmCourseId=ACA066EC-443A-4822-822C-89BC1CBD684E&frmTermId=k-levels)

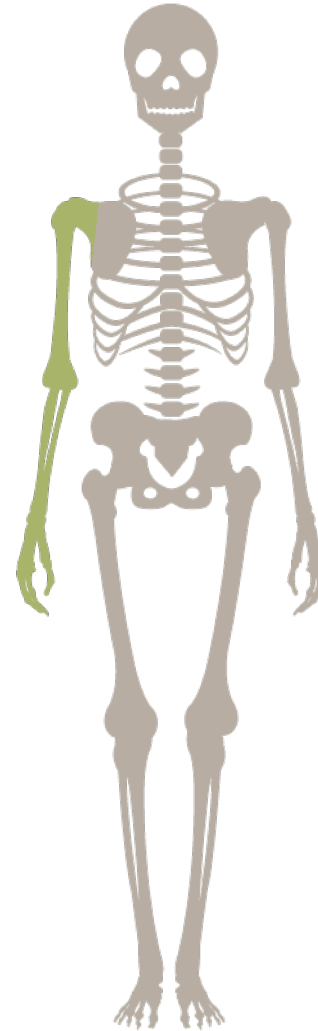
## Amputation site selection (upper limb)

- Forequarter
- Shoulder disarticulation
- Transhumeral (above-the-elbow)
- Elbow disarticulation
- Transradial (below-the-elbow)
- Wrist disarticulation
- Transcarpal
- Transmetacarpal
- Transphalangeal



## Amputation site selection (upper limb)

- Forequarter
- Shoulder disarticulation
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# Poll #3

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Example poll question?

A. Option 1

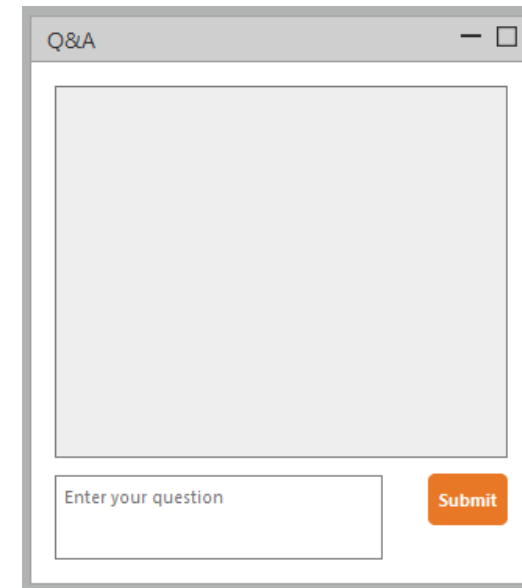
B. Option 2

C. Option 3

Submit

OR

Send your answer in the Q&A panel



Q&A

Enter your question

Submit

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**Major multiple  
trauma**



## Case study 4: Major multiple trauma

Patient is a 23-year-old with gunshot injuries on 06/15/2021 as result of mass shooting at workplace.

### Diagnosis:

- Cervical C2-C5 Fracture with Quadriplegia
- Neurogenic Bladder and Bowel
- Left Shoulder/Clavicle Fracture
- Left Acromion Fracture
- Acute Respiratory Failure

### Unrelated/co-morbid conditions:

- Autism

## Case study 4: Major multiple trauma

- Patient underwent multiple surgeries:
  - C1-C4 Posterior Fusion And Decompression
  - Irrigation/Debridement And Open Reduction Internal Fixation Left Acromion And Scapula
  - Diverting Colostomy For Neurogenic Bowel
- Complications during hospitalization:
  - Respiratory Failure
  - Neurogenic Shock
  - Dysphagia
  - Hematuria

Treatment continued with multi-physician follow-up (PM, PMR, ortho, urology, GI, neuropsychologist), diagnostic studies, PT, OT, ST, psychotherapy, foley catheter care and bowel program, DME and medications. Neurogenic bladder improved with voiding spontaneously. Colostomy reversal was considered.

## Case study 4: Major multiple trauma

### DME:

- Rolling Walker
- Wheelchair
- Supplies Ostomy

### Medications:

- Pregabalin
- Omega 3 Acid Ethyl Esters
- Nitro-bid
- Baclofen
- Famotidine
- Lubriprostone
- Nitrofurantoin
- Buprenorphine
- Oxybutynin Chloride

## Major multiple trauma injuries

- Occurs when there is more than one simultaneous injury
- Multiple broken bones, damage to internal organs (liver, spleen, kidney etc.)
- Medical treatment is usually longer – more ventilator days, ICU days, overall hospital stay
- Common features include: closed head injuries, blunt penetrating chest/abdominal injury, multiple long bone/pelvic fractures
- Comprehensive examination and emergency management takes place within the first hour
- Multiple interdisciplinary specialists

# Types of traumatic injuries

- Traumatic brain injury
- Spinal cord injury
- Spine fractures
- Amputation
- Facial trauma
- Acoustic trauma
- **Crush injury**
- Concussion
- Broken bone
- Jaw – broken or dislocated
- Skull fracture
- **Cuts and puncture wounds**
- **Collapsed lung**
- **Myocardial contusion**
- **Burns**
- Electrical injury
- Subarachnoid hemorrhage
- Subdural hematoma
- **Multiple fractures**

## Summary

- Multiple types of catastrophic injuries are encountered in workers' compensation and auto-related claims.
- The classification and treatment of catastrophic injuries is based on their severity and their complications.
- Catastrophic injuries can have significant medical and functional impact on injured persons and their caregivers.



# Optum

## **About Optum Workers' Comp and Auto No-fault Solutions**

Optum Workers' Comp and Auto No-Fault Solutions collaborates with clients to lower costs while improving health outcomes for the injured persons we serve. Our comprehensive pharmacy, ancillary, medical services, and settlement solutions, combine data, analytics, and extensive clinical expertise with innovative technology to ensure injured persons receive safe, appropriate and cost-effective care throughout the lifecycle of a claim. For more information, email us at [expectmore@optum.com](mailto:expectmore@optum.com).

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