

Combat-Related Polytrauma (non-live)

Goals and Objectives

Course Description

"Combat-Related Polytrauma" is an online recorded video of a previously presented live CE webinar for physical therapists and physical therapist assistants. This course presents contemporary information about somatic trauma and comorbidities in combat veterans. This course includes a review of current literature relating to the pathophysiology, clinical presentation, and medical management.

Course Rationale

The purpose of this course is to provide participants with contemporary information about conflict-related multiple trauma. Occupational therapy professionals can use this information to develop and implement effective treatment programs that address the specific needs of individuals effected by these disorders.

Course Goals and Objectives

Upon completion of this course, participants will be able to:

1. List common combat-related traumatic injuries and conditions.
2. Detail comorbidities contributing to polytrauma.
3. Identify and define the roles of all health care professionals providing comprehensive care to individuals with combat-related polytrauma.
4. List the Department of Defense Standard Case Definitions for traumatic brain injury.
5. Identify the mechanism of injury, pathophysiology, and medical management of blast related traumatic brain injury.
6. Identify the mechanism of injury and rehabilitation considerations related to dismounted complex blast injury.
7. List common pain syndromes associated with combat-related polytrauma.
8. Identify rehabilitation considerations for non-somatic disorders presenting post-deployment.
9. Identify and select appropriate screening tools to assess physical and psychosocial function.
10. Identify the clinical presentation and rehabilitative management of individuals presenting with polytrauma.

Course Provider – Innovative Educational Services

Provider Contact Information – information@cheapceus.com

Course Instructor – Jodi Gootkin, PT, Med, CEAS

Financial/Non-financial Disclosure - Neither the Provider nor the instructor have any financial or non-financial conflict of interest related to the presentation of this CE program.

Target Audience – Physical Therapists, Physical Therapist Assistants

Course Educational Level – This course is applicable for introductory learners.

Course Prerequisites – None

Instructional Method – Distance Learning – Independent; Asynchronous online video-based home study

Location - Cheapceus.com

Date – Continuously available on-demand

PD Activity Completion Requirements / Criteria for Issuance of CE Credits – Completion of viewing of 3 hour recorded video, and a score of 70% correct or greater on the course post-test.

Continuing Education Credits – Three (3) contact hours

Course Fee - \$34.95

Registration Information – No pre-registration required; available on-demand at Cheapceus.com

Special Needs Requests – Email: information@cheapceus.com or phone: 954-663-4101

Cancellation by the Learner – Learners may cancel their participation at any time and receive a full refund of all paid fees.

Cancellation by the Provider – Registrants for the cancelled activity will be contacted by an IES staff member via phone call or email within 12 hours of the cancellation decision. If the decision to cancel is made less than 14 hours prior to the event, each participant will be contacted no later than 2 hours prior to the scheduled start time of the activity. Registrants will receive a full refund if an activity is cancelled by the Provider. The refund will be processed back to the Registrant within 12 hours of the cancellation.

Complaint Resolution – Please call 954-663-4101 (24 hours/day, 7 days/week) to speak with a live customer service agent. Our goal is to work with our customers to resolve all issues to the customer's satisfaction with just one phone call whenever possible.

Refund Policy - Unrestricted 100% refund upon request. The request for a refund by the learner shall be honored in full without penalty or other consideration of any kind. The request for a refund may be made by the learner at any time without limitations before, during, or after course participation.

COMBAT RELATED POLYTRAUMA

1

Presented By:

Jodi Gootkin, PT, MEd, CEAS

jodiemail@comcast.net

Copyright Jodi Gootkin

1

Course Overview

2

“Combat Related Polytrauma” presents contemporary information about somatic trauma and comorbidities in combat Veterans. This course includes a review of current literature relating to the pathophysiology, clinical presentation, and therapeutic management.

Copyright Jodi Gootkin

2

Course Rationale

3

The purpose of this course is to provide participants with contemporary information about conflict-related multiple trauma. Rehabilitation professionals can use this information to develop and implement effective treatment programs that address the specific needs of individuals effected by these disorders.

Copyright Jodi Gootkin

3

Goals and Objectives

4

1. Detail comorbidities contributing to polytrauma.
2. List and describe common battlefield exposures that result in combat-related trauma injuries.
3. Identify the mechanism of injury, pathophysiology, and medical management of blast related injury.
4. Detail considerations for successful therapeutic interactions with a veteran transitioning to civilian rehabilitation settings.
5. Identify medical management and research advances for combat related amputations and spinal cord injuries.
6. Detail the Department of Defense Standard Case Definitions for traumatic brain injury.
7. Describe the clinical presentation and interaction strategies for an individual with post traumatic stress disorder.
8. Identify common pain syndromes associated with combat-related polytrauma.
9. Identify rehabilitation considerations for non-somatic disorders presenting post-deployment.
10. Identify appropriate screening tools to assess physical and psychosocial function.

Copyright Jodi Gootkin

4

Disclaimer


5

Application of concepts presented in this webinar is at the discretion of the individual participant in accordance with federal, state, and professional regulations.

Copyright Jodi Gootkin

5

Course Outline and Schedule



Topic	Time
Defining Combat-Related Polytrauma	0:00 - 0:05
Exposure Risks	0:06 - 0:10
Burn Pits and Infections	0:11 - 0:15
Vibration, Noise, and Depleted Uranium	0:16 - 0:20
Blast Injury and Toxic Embedded Fragments	0:21 - 0:25
Tactical Combat Casualty Care	0:26 - 0:30
Care Setting and Tourniquet Use	0:31 - 0:35
Echelons of Care	0:36 - 0:45
Stateside Medical Care	0:46 - 0:50
Interactive Discussion of Clinical Applications	0:51 - 1:00
Transitioning to Civilian Rehabilitation	1:01 - 1:10
Comprehensive Screening Considerations	1:10 - 1:20
Military Service History	1:20 - 1:25
System Specific Assessment	1:26 - 1:35
Amputations Medical Management and Prosthetics	1:36 - 1:45
Spinal Cord Injury and Mobility Research	1:46 - 1:50
Interactive Discussion of Clinical Applications	1:51 - 2:00
Traumatic Brain Injury Mechanism Of Injury	2:01 - 2:10
Classification and Clinical Presentation	2:11 - 2:15
Post Traumatic Stress Disorder	2:16 - 2:20
Screening Tools and Managing Interactions	2:21 - 2:30
Pain Syndromes	2:31 - 2:35
Screening Tools and Management	2:36 - 2:40
Non-somatic Disorders -Anxiety and Sleep Disturbance	2:41 - 2:50
Interactive Discussion of Clinical Applications	2:51 - 3:00

Copyright Jodi Gootkin

6

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

How To Obtain CEUs For This Course

7

- ❑ After watching the video go to www.cheapceus.com
- ❑ Complete the post test with score of at least 70%
 - ❑ May be retaken multiple times
- ❑ Submit online payment for course
- ❑ Print certificate
- ❑ Course review and summary for post test at the end of the webinar.

Copyright Jodi Gootkin



Consider This

7

“And I will always do my duty
No matter what the price
I've counted up the cost
I know the sacrifice”

~Chuck Cannon and Toby Keith
American Soldier Lyric

Copyright Jodi Gootkin

8

United States Military Conflicts

9



Copyright Jodi Gootkin

https://www.va.gov/vetsinworkplace/docs/em_datesnames.asp

9

Impact of Military Conflicts

10

“The legacy of this conflict will not only be what we have learned, but also how rapidly we were able to disseminate, educate, and change practice on the battlefield in nearly “real-time”

Brian Eastridge, MD, FACS

Colonel, MC, US Army

Trauma Consultant, US Army Surgeon General

<http://www.cs.amedd.army.mil/borden/book/ccc/UCLAFrontMatter.pdf>

Copyright Jodi Gootkin

10

Survivorship

11

- ❑ Improved body armor, surgical care in proximity to the battlefield, and faster evacuation have contributed to a greater than 90% combat survival rate.

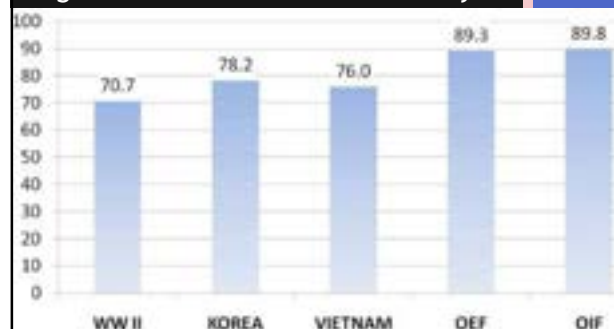
Copyright Jodi Gootkin

<http://www.apta.org/TBI/WoundedWarriors/>
<http://specialoperationsmedicine.org/Pages/tccc.aspx>

11

The casualty survival rate in Iraq and Afghanistan is the best in US history.

12



Copyright Jodi Gootkin

<http://armymedicine.mil/Documents/DCBI-Task-Force-Report-Redacted-Final.pdf>

12

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Our Veterans

13

- Since 2002 1.97 million Veterans have become eligible for VA benefits.
 - 61% Former Active Duty
 - 39% Reserve and National Guard
- Most common out-patient diagnoses
 - Musculoskeletal ailments
 - Mental disorders
 - Ill defined conditions

Epidemiology Program, Post-Deployment Health Group, Office of Patient Care Services, Veterans Health Administration, Department of Veterans Affairs. (2017). Analysis of VA Health Care Utilization among Operation Enduring Freedom, Operation Iraqi Freedom, and Operation New Dawn Veterans, from 1st Qtr FY 2002 through 3rd Qtr FY 2015. Washington, DC: Author

Copyright Jodi Gootkin

13

Combat Related Polytrauma Definition

14

- The US Veterans Administration (VA) defines Polytrauma as injury to two or more body systems resulting in physical, cognitive, psychological, or psychosocial impairments and functional disability.
- Management requires a high level of integration and coordination of clinical care and with additional support services.

<https://www.polytrauma.va.gov/news-and-resources/terminology-and-definitions.asp>

Copyright Jodi Gootkin

14

Combat Related Injuries and Conditions

15

- Injuries are sustained during active combat or duty from Explosive Weapons and Improvised Explosive Devices resulting in physical, cognitive, psychological or psychosocial impairments.
 - Traumatic Brain Injury (TBI)
 - Amputation
 - Spinal Cord Injury (SCI)
 - Visual and hearing impairment
 - Burns
 - Musculoskeletal injuries
 - Post-Traumatic Stress Disorder

VA, Polytrauma Rehabilitation Center Design Guide 2014
<https://www.cfm.va.gov/tl/dGuide/dgPRC.pdf>

Copyright Jodi Gootkin

15

Exposure Risks

16

- A variety of environmental and chemical exposures carry potential health risks contributing to casualties in combat.

- Sand, Dust, Particulate Matter
- Burn Pits
- Infectious Diseases
- Vibration
- Noise
- Depleted Uranium
- Blast Injuries and Toxic Embedded Fragments

Copyright Jodi Gootkin

16

Exposure: Burn Pits

17

- Toxins released from burning waste may affect the skin, eyes, respiratory, cardiovascular, gastrointestinal, and other body systems.
- Effects are primarily temporary with limited evidence of association between exposure and reduced pulmonary function.

Baird, C. P. (2012). Review of the Institute of Medicine report: long-term health consequences of exposure to burn pits in Iraq and Afghanistan. ARMY PUBLIC HEALTH COMMAND ABERDEEN PROVING GROUND MD.

Copyright Jodi Gootkin

17

Exposure: Infectious Disease

18

Copyright Jodi Gootkin

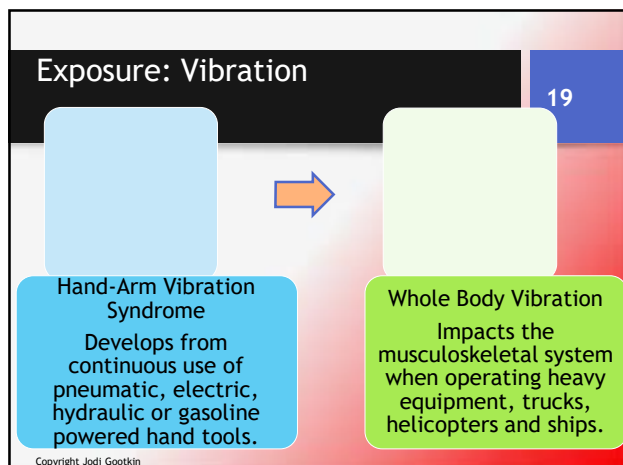
<https://www.publichealth.va.gov/exposures/infectious-diseases/index.asp>

18

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.



19

Hand Arm Vibration Syndrome (HAVS)

20

- ❑ Vibration trauma damages the endothelial layer of hand capillaries, nerves, and tendons.
- ❑ Symptoms include
 - ❑ Blanching of one or more fingers with cold exposure
 - ❑ Tingling, numbness, decreased sensation in fingers
 - ❑ Hand pain
 - ❑ Decrease grip strength and dexterity

Copyright Jodi Gootkin

20

Whole Body Vibration

21

- ❑ Low frequency vibration is transmitted through the body while sitting, standing, or reclined on a surface results in amplification of the vibration.
- ❑ Voluntary and involuntary muscular contraction occurs in response inducing fatigue and musculoskeletal damage particularly in the spine.

Copyright Jodi Gootkin

21

Exposure: Noise

22

- ❑ Gunfire, explosions, rockets, heavy weapons, aircrafts, and machinery create high intensity noise and vibrations leading to hearing loss and tinnitus.
- ❑ Sound waves are directed into the cochlea and can't stop crushing the hair cells that are responsible for high-itched hearing such as voices.

Impulse Noise	Less than ½ a second	Explosions, weapon fire, grenades	Sudden or gradual hearing loss
Steady State Noise	Longer than ½ a second	Tactical vehicles, generators, aircraft	Gradual loss worsening over time

Image: http://www.public.navy.mil/navsafcen/Pages/acquisition/vibration_acquisition.aspx

Copyright Jodi Gootkin

22

Exposure: Depleted Uranium

23

- ❑ Manufacturing of enriched uranium for nuclear reactors or weapons yields depleted uranium (DU) as a byproduct.
- ❑ It possesses 60% the radioactivity and same chemical toxicity as natural uranium.
- ❑ DU is utilized in tank armor and some bullets for better penetration of armored vehicles.
- ❑ When this type of projectile penetrates the vehicle some of the pieces of DU can become embedded in soft tissue, inhaled or swallowed.

Image https://www.publichealth.va.gov/exposures/toxic_fragments/index.asp

Copyright Jodi Gootkin

23

Depleted Uranium

24

- ❑ VA currently reports no health complications in Veterans.
- ❑ WHO notes that further research is needed to determine the extent, reversibility, and thresholds for organ damage with exposure.

Inhaled	Embedded Fragments
<ul style="list-style-type: none"> • Lung irradiation damage • Lung cancer in high doses 	<ul style="list-style-type: none"> • Uranium detectable in urine without accompanying medical compromise • Possible kidney damage if high doses

https://www.publichealth.va.gov/docs/depleted-uranium/du_factsheet.pdf
http://www.who.int/ionizing_radiation/pub_meet/en/DU_Eng.pdf

Copyright Jodi Gootkin

24

Exposure: Blast Injury

25

- ❑ Improvised Explosive Devices create violent explosions containing metal or composite foreign material projectiles spread over a large radius.

Plastic	Ceramic	Glass	Wood
Cement	Nails	Metal	Rocks

- ❑ Heat, pressure waves, and fragments cause large zones of soft tissue injury and damage to multiple body systems.

Copyright Jodi Gootkin

25

Classifications of Blast Injury

26

Primary Injury

Barotrauma Damage

- Initial shock wave damages hollow organs.
- Lungs, ears, gastrointestinal tract, eyes, brain, traumatic amputation

Secondary Injury

Fragmentation Injuries

- Penetrating wounds from debris propelled by shock waves.
- Any region of the body, soft tissues, eyes

Tertiary Injury

Impact Injuries

- Displacement of victim by blast force.
- Fractures, amputation, head/neck trauma

Quaternary Injury

Indirect Trauma

- Thermal burns, inhalation of gas/debris, crush injuries, exacerbation of pre-existing conditions

Quinary Injury

Contamination

- Biological, chemical, radioactive contamination

Copyright Jodi Gootkin

26

Dismounted Complex Blast Injury

27

- ❑ During counter-insurgency efforts, increased use of foot patrols led to the emergence of multiple limb amputations, complex pelvic/perineal wounds, spin injuries, and multiple penetrating fragment wounds.
- ❑ By 2010, massive transfusion requiring 16 to over 25 units of bloods, major limb amputation, genitourinary injuries and traumatic brain injury rates increased drastically.

Wallace, D. (2012). Trends in traumatic limb amputation in Allied Forces in Iraq and Afghanistan. *Journal of Military and Veterans Health*, 20(2), 31.
<http://armymedicine.mil/Documents/DCBI-Task-Force-Report-Redacted-Final.pdf>

Copyright Jodi Gootkin

27

Exposure: Toxic Embedded Fragments

28

- ❑ Improvised Explosive Device and blast shrapnel, bullets, or other projectiles cause injury where they enter the body.
- ❑ Secondary pathology results as the chemicals embedded in the fragment that has not been removed from the body dissolve traveling to distant regions through the bloodstream inducing pathology.
- ❑ According to the VA "No one knows the specific health problems that might happen because of the fragments"

Copyright Jodi Gootkin

<https://www.publichealth.va.gov/docs/exposures/TEFSC-Veterans-fact-sheet.pdf>
Image https://www.publichealth.va.gov/exposures/toxic_fragments/index.asp

Consider
This

28

Tactical Combat Casualty Care

29

- ❑ Initial battle field treatment to manage the effects of the various exposure risks is focused on temporary measures and evacuation.
- ❑ Suppression of enemy fire and moving casualties to cover are the major concerns.

Copyright Jodi Gootkin

29

Tactical Trauma Care Setting

30

- ❑ Care is initially provided by non-medical combatant or combat lifesaver in the field.

Copyright Jodi Gootkin

30

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Tourniquets Save Lives 31

Timeline of tourniquet use:

- WW II 1945:** Strap and buckle rarely controlled bleeding.
- Vietnam 1970:** 2500 deaths from preventable hemorrhage.
- Gulf War 2004:** Still using makeshift tourniquets.
- Today:** Tourniquet carried on battle gear.

□ Appropriate placement of a tourniquet in the field before the onset of shock has been identified as a primary factor to minimize preventable death from hemorrhage.

Copyright Jodi Gootkin <http://www.cs.amedd.army.mil/borden/book/ccc/UCLAFrontMatter.pdf>

31

Modern Tourniquet 32

- **Combat Application**
Tourniquet is now standard issue equipment.
- **Removal within 6 hours** saves lives without increased incidence of secondary amputation due to ischemia.

Copyright Jodi Gootkin <https://ia902709.us.archive.org/25/items/CombatCasualtyCare/CCCFull.pdf>

32

Echelons of Care 33

- The Echelon structure refers to the level of command and control that is available to provide increasing levels of medical care.
- The goal is for the patient to be evacuated from the battle field and reach surgical care within one hour of injury.

Copyright Jodi Gootkin

33

Continuum of Care 34

Continuum of Care:

- Point of Injury** (Orange)
- Echelon I** (Blue): Care Under Fire, Tactical Field Care, Tactical Evacuation Care
- Echelon II** (Red): Forward Surgical Team
- Echelon III** (Green): Combat Support Hospital
- Echelon IV** (Light Green): Facility Outside Combat Zone
- Echelon V** (Pink): Stateside (CONUS) Facilities
- VA and Civilian Rehabilitation** (Dark Blue)

Copyright Jodi Gootkin

34

Level I Care Under Fire 35

In battlefield with limited resources

Copyright Jodi Gootkin

35

Level II Forward Surgical Team 36

Care facility removed from direct conflict with lab, imaging technology, surgical team.

Copyright Jodi Gootkin

36

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.
Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Level III Combat Support Hospital

37

Field hospital with highly trained providers, labs, blood bank, operating rooms, imaging capabilities

Copyright Jodi Gootkin

37

Level IV Critical Care Aeromedical Transport Team (CCAT) to Out of Combat Zone Medical Center

38

Major medical centers with capacity to diagnose and treat complex injuries. Example: Landstuhl, Germany

Copyright Jodi Gootkin

38

Level V - US Based Medical Facility

39

Fixed military medical facility close to home base or delivering most appropriate specialty care center.

Copyright Jodi Gootkin

39

Stateside Medical Care Veterans Administration (VA) Service Networks

40

- For soldiers not returning to active duty, services are provided through the VA System.
- The country is subdivided into regions where various hospitals and outpatient service centers are located.

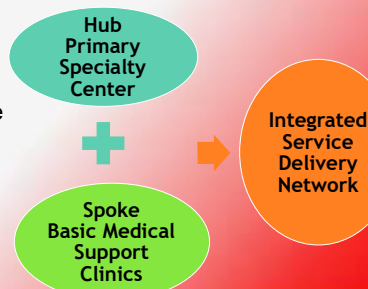
Copyright Jodi Gootkin

40

VA Hub and Spoke Model of Care

41

- This model emphasizes rehabilitation and a comprehensive continuum of care with full interdisciplinary teams of experts to manage specific chronic diagnoses.



Copyright Jodi Gootkin

41

Veterans Choice Program

42

- The Veterans Choice Program enacted in 2014 with extended funding in 2017 expands the availability of medical services for eligible Veterans with community providers as opposed to waiting for an appointment with or traveling to a VA facility.
- VA cannot schedule appointment within 30 days
- Veteran resides more than 40 miles from closest VA facility.

Consider becoming a provider!

Copyright Jodi Gootkin

42

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Benefits of Veterans Choice Participation

43

- Veterans Choice community health providers have access to the VA electronic health record (EHR) that integrates all elements of a patient's health history, including medications, lab work, x-rays, scans, EKGs, medical diagnoses, and more to allow comprehensive coordinated care.

Copyright Jodi Gootkin

43

Healthcare Team

44

- Determine the other members of the healthcare team who are providing care for comorbidities and recognize opportunities for additional referrals.
- Case Manager is typically the primary point of contact to coordinate services resources, and communication among the patient, family, military and VA.
- Benefits Counselor identifies VA system resources to help with education, employment, health, and financial support.

Copyright Jodi Gootkin

44

Transitioning to Civilian Rehabilitation Settings

45

- Providing therapy to Veterans is a balance of managing their expectations with working through rehab ensuring clinical interactions are tailored to this unique community of patients.

Copyright Jodi Gootkin

45

Military Cultural Competency

46

- Community providers must understand basic military culture to understand the unique needs of Veterans and build a strong therapeutic alliance.

70% VA providers

24 % Community providers

8 % General practitioners

Tanielian, Terri, Coreen Farris, Caroline Batka, Carrie M. Farmer, Eric Robinson, Charles C. Engel, Michael Robbins and Lisa H. Jaycox. Ready to Serve: Community-Based Provider Capacity to Deliver Culturally Competent, Quality Mental Health Care to Veterans and Their Families. Santa Monica, CA: RAND Corporation, 2014. Copyright Jodi Gootkin

46

Military Ethos

47

- "The overarching values of military culture set aside personal needs in favor of: teamwork, selflessness, shared goals, and perhaps most central, being of service to others - measuring one's worth by how well one serves others selflessly."

https://www.mentalhealth.va.gov/communityproviders/military_culture.asp

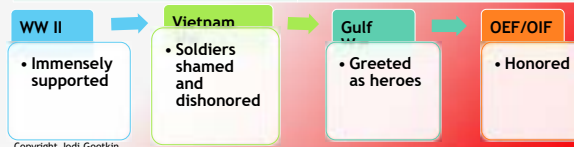
Copyright Jodi Gootkin

47

War Zone vs. Civilian Life Culture Influences

48

War Zone	Civilian Life
Physically unsafe	Physically safe
Act, then think	Think, then act
Unpredictable	Predictable with routines
Follow orders	Cooperation and compromise
Numb or control emotions	Express feelings
Avoid closeness	Create intimacy and trust



Copyright Jodi Gootkin

48

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Transitioning Considerations for the Clinician

49

- Military service members transitioning into work, home life, medical and social interactions are negotiating many relationships and new situations.
- Consider military identity during your interactions.

Strength	Courage
Commitment	Loyalty
Accountability	Discipline
Persistence	Punctuality
Respect	

Copyright Jodi Gootkin

49

Managing Clinical Interactions

50

- When integrating into civilian life hypervigilance, irritability, difficulty concentrating, and stress from personal relationships impacts interactions.
- Consider emotional health when determining treatment setting, scheduling, intervention selection, and home exercise program compliance.
- Building a strong therapeutic alliance fosters a relationship that encourages openness to additional resources for support.

Copyright Jodi Gootkin

50

Do

- Thank Veteran for their service
- Ask about branch of service
- Talk about life outside the military
- Let Veteran share their experiences when they feel ready

51

Don't

- Discuss politics
- Ask about deaths or killing or "how it was over there"
- Assume they experienced combat
- Act like you know about their military career and experiences

Copyright Jodi Gootkin

51

Social Services Referrals

52

- During our time with patients we have the opportunity for them to share multiple aspects of their personal circumstances that may lead to referrals for other services in addition to medical care.
 - Home Situation
 - Employment
 - Mental Health

Copyright Jodi Gootkin

52

Social Service: Mental Health

53

- Encouraging Veterans to tracking their own psychological status and response to daily events aids in understanding symptoms and directing treatment.
- Department of Defense National Center for Telehealth and Technology developed the T2 MoodTracker App for service members to track behavior changes after combat deployments.
- Maintain an open dialogue and refer to mental health providers and self-help resources.

Copyright Jodi Gootkin

<http://t2health.dcoe.mil/apps/t2-mood-tracker>

53

Social Services: Homelessness

54

- US Housing and Urban Development (HUD) estimates that on any single night in January 2016 40,000 Veterans were homeless and 13,000 were unsheltered or on the street.
- As of August 28, 2017 3 states and 50 communities have ended Veteran homelessness.

Copyright Jodi Gootkin

https://www.va.gov/homeless/Homeless_Programs_General_Fact_Sheet_JAN_2017.pdf
<https://www.va.gov/HOMELESS/endingVetshomelessness.asp>

54

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Homelessness Resources

55

- ❑ VA provides free resources for community outreach and education.
- ❑ Consider hanging poster in your waiting room.

https://www.va.gov/HOMELSS/get_involved.asp

Copyright Jodi Gootkin

55

Social Services: Return to Employment

56

- ❑ Our interactions may highlight challenges the Veteran is experiencing in securing employment to provide for their family financially in addition to overall well being with personal satisfaction.
- ❑ Specific organizations are dedicated to assisting Veterans transition into the civilian workforce by offering career services, computer skills training, transition support, and job placements.

Copyright Jodi Gootkin

<http://www.projecthired.org/jobseekers/Veterans>

56

Comprehensive Screening Considerations in Rehabilitation

57

- ❑ In addition to traditional initial evaluation procedures include questions and assessments to provide additional context to current injuries, promote a stronger therapeutic relationship, increase awareness of additional health conditions that may contribute to rehabilitation outcomes.
 - ❑ Military Service History
 - ❑ Respiratory Disease
 - ❑ Acoustic Trauma
 - ❑ Visual Impairments

Copyright Jodi Gootkin



57

Military Service History Interview

58

- ❑ The American Medical Association urges clinicians to obtaining information regarding military service that will help understand the unique medical conditions and potential concerns of Veterans.
- ❑ VA Healthcare provides guiding questions on the Military Health History Pocket Card.
 - ❑ Would it be ok if I talked with you about your military experience?
 - ❑ Were you or wounded, injured, or hospitalized?
 - ❑ Would it be ok to talk about your living situation?
 - ❑ Would it be ok if I asked about some things you may have been exposed to during your service?

Copyright Jodi Gootkin

<https://www.va.gov/oaa/pocketcard/Military-Health-History-Card-for-print.pdf>



58

Military Terms

59

Awareness of some basic terminology a Veteran may use to describe their military experience will enhance communication.

Term or Acronym	Meaning
MOS Military Occupational Specialty	Job or career (infantryman, intelligence analyst, military police, etc.)
OCONUS	Outside Continental United States
CONUS	Inside Continental United States
Boots on the ground	To physically be in a location
Down range	Physically in a combat zone
In-country	Physically in a war zone
Theater	Geographic area directly involved in major operations involving combat

Copyright Jodi Gootkin

59

Medical Surveillance of Embedded Fragments

60

- ❑ Superficial fragments that may work their way out of the body should be monitored and if removed sent to the VA Toxic Embedded Fragments Registry for analysis.
- ❑ Patients with suspected toxicity from fragments and depleted uranium should be referred for urine biomonitoring to assess concentrations of metals.

Arsenic	Cadmium	Chromium	Cobalt	Copper
Iron	Lead	Manganese	Nickel	Tungsten
Uranium	Zinc	Molybdenum		

Copyright Jodi Gootkin

<http://www.cs.amedd.army.mil/FileDownloadpublic.aspx?docid=0781075c-f914-4600-9b98-66e52e9af4d7>

60

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Respiratory Disease Assessment 61

- Combined exposures to dust storms, burn pits, and toxic chemicals may increase post deployment respiratory illness.
 - Asthma
 - COPD
 - Interstitial Lung Disease
- Suspected Tuberculosis requires chest x-ray.
- Monitor patients for decreased endurance and functional capacity.
 - Two or Six Minute Walk Test

Pugh, M. J., Jaramillo, C. A., Leung, K. W., Faverio, P., Fleming, N., Martensen, E., ... B. Norris, M. J. (2016). Increasing Prevalence of Chronic Lung Disease in Veterans of the Wars in Iraq and Afghanistan. *Military medicine*, 181(5), 476-481. Sharkey, J. M., Abraham, J. H., Clark, L. L., Rohrbeck, P., Ludwig, S. L., Hu, Z., & Baird, C. P. (2016). Postdeployment respiratory health care encounters following deployment to Kabul, Afghanistan: a retrospective cohort study. *Military medicine*, 181(3), 265-271.

Copyright Jodi Gootkin

61

Asthma vs. Tuberculosis (TB) 62

Asthma	Tuberculosis
Bilateral	Unilateral
Wheezing	Rales on auscultation
Non-productive cough	Productive cough >3 weeks
Triggers	Malaise and Fever
Relief with treatment	Night sweats

Copyright Jodi Gootkin

62

Acoustic Trauma 63

- Barotrauma can rupture the tympanic membrane with small perforations healing spontaneously.
- Noise exposure or blast injury can cause vestibular impairment, otalgia, balance deficits, and hearing loss.

Distance from Blast	Primary Blast Injury	Secondary Blast Injury
0 - 50 feet	Fatal, eardrum rupture	Fatal
50 - 80 feet	Eardrum rupture	Fatal
80 - 130 feet	Temporary hearing threshold shift	Injury
130 - 1800 feet	None	Injury

<https://ia902709.us.archive.org/25/items/CombatCasualtyCare/CCCCFull.pdf>

Copyright Jodi Gootkin

63

Auditory Impairments 64

- Assess patient for symptoms of compromise to the auditory system with referral to audiologist or otolaryngologist for additional evaluation.
 - Loss of ability to hear speech when background noise is present.
 - Diminished localization of hearing to distinguish direction sounds are coming from.
 - Tinnitus
 - Vertigo

Copyright Jodi Gootkin

64

Visual Impairments 65

- Visual impairments range from low vision to total blindness from direct combat injuries or age-related diseases including macular degeneration, diabetic retinopathy, and glaucoma.
- Refer to VA Blind Rehabilitation Services for training in visual motor and perceptual skills, instruction in optical and electronic devices, and sensory training classes to promote safety and independence.

https://www.prosthetics.va.gov/blindrehab/BRS_Coordinated_Care.asp

Copyright Jodi Gootkin

65

Vision Assessment 66

- Common complaints include blurred vision, photosensitivity, and accommodative problems.

```

graph LR
    A[Self Reported Problems] --> B[Far-Near Acuity]
    B --> C[Reading]
    C --> D[Accommodation]
    D --> E[Convergence]
    E --> F[Eye Alignment and Bi-ocular Vision]
    F --> G[Saccades]
    G --> H[Pursuits]
    H --> I[Visual Fields]
  
```

Radomski, M. V., Finkelstein, M., Llanos, I., Scheiman, M., & Wagener, S. G. (2014). Composition of a Vision Screen for Servicemembers With Traumatic Brain Injury: Consensus Using a Modified Nominal Group Technique. *The American Journal of Occupational Therapy*, 68(1), 1-11.

Copyright Jodi Gootkin

66

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.
Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Vision Assessment: Convergence Insufficiency Symptom Survey

67

- ❑ Patients may have difficulty describing symptoms or may not realize fatigue, poor attention, dizziness, headache, balance deficits are related to vision impairment.
- ❑ Self assessment of how eyes feel when reading and doing close work.
- ❑ Score greater than 21 can indicate impairment requiring referral to ophthalmologist or optometrist

Copyright Jodi Gootkin

<http://www.sankaranethralaya.org/pdf/patient-care/Convergence-Insufficiency-Symptom-Survey.pdf>

67

Vision Assessment: Snellen Eye Chart

68

- ❑ Widely used test of visual acuity.
- ❑ Patient is 20 feet away from chart
- ❑ Cover one eye
- ❑ Score is best line that they can read.
- ❑ Numbers on left side of chart indicate distance someone with normal vision can see that line at.
- ❑ Vision 20/40 or worse warrants referral to optometrist.

Copyright Jodi Gootkin

68

Vision Assessment: Chronister Pocket Acuity Chart

69

- ❑ Small packet of numbers that are viewed from close distances too assess visual acuity from 20/200 to 20/10.
- ❑ Contains conversion chart to convert to Snellen values from multiple distances.
- ❑ Pediatric version available with image targets.
- ❑ Vision 20/40 or worse warrants referral to optometrist.

Copyright Jodi Gootkin

69

Vision Assessment: Amsler Grid

70

- ❑ Tests metamorphopsia to detect alterations to central visual field requiring referral to ophthalmologist.
- ❑ Determines regions of visual field deficit by marking areas of wavy, distorted, broken or missing lines.

Copyright Jodi Gootkin

70

Low Vision Patient Education

71

- ❑ Promote safety by recommending effective lighting, removal of clutter, installation of grab bars to avoid hazards.
- ❑ Modify the activities with education, training, and adaptive equipment.
 - ❑ Use contrast to improve visibility
 - ❑ Use overhead lighting to decrease shadows
 - ❑ Sit with back toward window or lamp

Copyright Jodi Gootkin

<https://www.aota.org/-/media/Corporate/Files/AboutOT/consumers/Adults/LowVision/2019/2019Vision2019p1205sheet.pdf>

71

Technology Research to Assist Mobility for the Blind

72

- ❑ Smart Phone App - uses phone GPS, compass, accelerometers to provide highly accurate location information to locate crosswalks and building entrances
- ❑ Radiofrequency Identification (RFID) - technology may be incorporated into Braille signs to send information automatically to smartphones to read tags.
- ❑ HandSight will utilize a tiny camera embedded connected to a smartwatch to read text which is spoken out loud.

Copyright Jodi Gootkin

Image <https://www.research.va.gov/currents/fall2014/fall2014-16.cfm>

72

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Rehabilitation from Polytrauma Conditions

73

- ❑ Therapists may be involved in the management of musculoskeletal, neurologic, and mental health conditions as a result of combat or across the lifespan of the Veteran.
- ❑ Amputation
- ❑ Spinal Cord Injury
- ❑ Traumatic Brain Injury
- ❑ Post Traumatic Stress Disorder
- ❑ Chronic Pain

Copyright Jodi Gootkin

73

Understanding Combat Related Amputations

74

- ❑ Analysis of injury patterns and deaths during OEF and OIF indicates that most combat-related injuries occur as a result of injury from explosions, followed by gunshot wounds.
- ❑ 78% Explosions
- ❑ 18% Gunshot

Copyright Jodi Gootkin

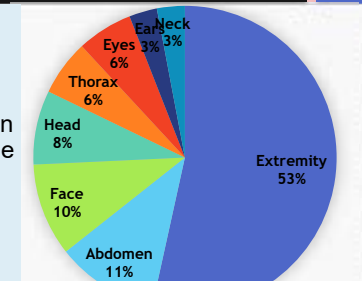
<https://ia902709.us.archive.org/25/items/CombatCasualtyCare/CCCFull.pdf>

74

Blast Casualty Injury Patterns

75

- ❑ Because of current advances in body armor, injury distribution is primarily to the extremities



Copyright Jodi Gootkin

<https://ia902709.us.archive.org/25/items/CombatCasualtyCare/CCCFull.pdf>

75

Extremity Injury Resulting in Amputation

76

- ❑ Blast waves can shatter bones, avulse an extremity, cause extensive soft tissue damage, and flying debris create fragmentation or penetrating extremity injuries.

Copyright Jodi Gootkin

76

Traumatic Amputation Immediate Medical Management

77

- ❑ Managing hemorrhaging with a proximal tourniquet while in the battlefield is critical to preserve life and avoid the need for massive transfusion.
- ❑ For high injuries with pelvic fracture, application of a Junctional Emergency Treatment Tool (JETT) is used to apply direct pressure.

Copyright Jodi Gootkin

<https://ia902709.us.archive.org/25/items/CombatCasualtyCare/CCCFull.pdf>



77

Battlefield Management of Amputations

78

- ❑ Procedure is to ligate vascular structures proximal to the bone resection, preserve bone length in absence of viable soft tissue, preserve atypical skin and tissue flaps, and leaving traumatic amputation wound open.
- ❑ Splints and bivalve casts stabilize the region with skin traction to avoid soft tissue retraction through the evacuation chain.

Copyright Jodi Gootkin

78

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Follow-up Medical Management of Amputation

79

- ❑ Negative Pressure Wound Therapy (NPWT) is used as a bridge to delayed closer, flap coverage, or coverage with a split thickness skin graft.
- ❑ It contributes to increased granulation rate, decreased bacterial colonization, and effective closure of the wound.

http://www.usasr.amedd.army.mil/cpgs/Amputation_01Jul2016.pdf

Copyright Jodi Gootkin

79

Residual Limb Wound Closure Techniques

80

- ❑ After staged wound debridement suturing or vessel loops can be stapled in a zig-zag pattern across the wound with some pressure applied.
- ❑ This aids closure by keeping the skin from passively retracting while also allowing granulation and mild drainage before grafting.

Copyright Jodi Gootkin

80

Residual Limb Wound Closure Continued

81

- ❑ Scar patterns may be different and more extensive than traditional civilian amputations.

Copyright Jodi Gootkin

81

Rehabilitation Outcomes

82

- ❑ Veterans with upper extremity amputations reported lower psychosocial adjustment, physical abilities, and prosthetic satisfaction than those with lower extremity amputations.

	Upper Extremity Amputation	Lower Extremity Amputation
Agree "life is full"	80%	91%
Agree "had gotten used to wearing an artificial limb"	23%	55%
Functional Outcome	Quick DASH 36.6/100	TUG 10.5 seconds

Copyright Jodi Gootkin

<https://www.va.gov/oig/pubs/VAOIG-11-02138-116.pdf>

82

Upper Extremity Prosthetics Advances

83

- ❑ 2017 the VA unveiled LUKE – Life Under Kinetic Evolution – Arm that allows movement as one unit as opposed to traditional UE prosthetics where each joint is controlled individually through isolated movements.

Copyright Jodi Gootkin

<https://www.aptcenr.research.va.gov/programs/ortho/natural-sensation-for-amputees/>

83

Lower Extremity Prosthetics Advances

84

- ❑ Osseointegration - A titanium coated implant is firmly anchored in living bone.
- ❑ The bone of the residual limb grows into the implant, and the prosthetic is attached directly to the metal connector of the implant without the need for a socket.

Copyright Jodi Gootkin

Images https://www.amputation.research.va.gov/prosthetic_engineering/prosthetic_engineering_overview.asp

84

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Lower Extremity Prosthetics Advances

85

- ❑ Powered Ankle Foot Prosthesis - ankle uses tendon like springs and an electric motor to replace lost muscle power and ankle/foot movement for propulsion during gait.
- ❑ Benefits include
 - ❑ Decreased energy expenditure
 - ❑ Improved balance
 - ❑ Decreased proximal joint damage
 - ❑ Improved gait pattern and walking speed

Au, S. K., Herr, H., Weber, J., & Martinez-Villalpando, E. C. (2007, August). Powered ankle-foot prosthesis for the improvement of amputee ambulation. In *Engineering in Medicine and Biology Society, 2007. EMBS 2007. 29th Annual International Conference of the IEEE* (pp. 3020-3026). IEEE.

Herr, H. M., & Grabowski, A. M. (2012, February). Bionic ankle-foot prosthesis normalizes walking gait for persons with leg Image

85

Prosthetics Research

86

- ❑ Compliant Torque Adapter – located in transtibial pylon to allow easier maneuvering around obstacles.
- ❑ Stochastic Resonance – subthreshold vibration sensors in the socket may enhance peripheral sensation to improve postural stability and locomotion.
- ❑ Distributed Sensing – A flexible array built into the socket to measure moisture, temperature, pressure, and shear stress.

Images https://www.amputation.research.va.gov/prosthetic_engineering/prosthetic_engineering_overview.asp

Copyright Jodi Gootkin

86

Prosthetic Research Continued

87

- ❑ Natural Sensation feedback is being investigated where sensors in the prosthetic hand control stimulation to nerves in the residual limb for tactile perception.

Copyright Jodi Gootkin <https://www.aptcenr.research.va.gov/programs/ortho/natural-sensation-for-amputees/>

<https://www.research.va.gov/pubs/varqu/winter2016/11.cfm>

87

Smart Cane Research

88

- ❑ A cane equipped with a microprocessor and biofeedback control can measure cane contact with ground, gait cycle, and load phasing.
- ❑ Providing the user a sound or vibration signal from the cane will help them apply the optimal amount of force on the cane to reduce pain, decrease joint loading, and improve gait.

Copyright Jodi Gootkin

88

Spinal Cord Injury (SCI)

89

- ❑ Gunfire, explosions, motor vehicle accidents and falls are the primary mechanisms of spinal cord injury in war zone.
- ❑ Spinal stabilization in the combat setting becomes challenging due to tactical considerations, body armor, and moving the injured thorough the evacuation chain.
- ❑ Main goal is spinal immobilization and spinal cord resuscitation to minimize secondary injury.
- ❑ Medial and surgical management mirrors civilian care

Copyright Jodi Gootkin

89

SCI Mobility Research

90

- ❑ Advanced Lower Extremity Neuroprosthesis (LE-IST) involves surgical implantation of neural stimulation technology with nerve or muscle electrodes activating muscles to allow standing.
- ❑ Similar technology is aimed at improving ambulation for individuals with incomplete spinal cord injury.

Copyright Jodi Gootkin https://www.aptcenr.research.va.gov/studies/standing_transfer/index.asp

<https://www.aptcenr.research.va.gov/studies/walking/index.asp>

90

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

SCI Mobility Research Continued

91

- Clinical trials are underway of an implanted trunk neuroprosthesis to control seated posture and balance for improved bed mobility and pulmonary function.

Copyright Jodi Gootkin [himages https://www.apcenter.research.va.gov/studies/trunk_control/index.asp](https://www.apcenter.research.va.gov/studies/trunk_control/index.asp)

91

SCI Mobility Research Continued

92

- **BrainGate** -uses implanted microelectrodes in the portions of the cortex that control voluntary movement.
 - Neural signals are transmitted to an external decoder that translates the into commands for electronic or robotic devices to restore movement.

Copyright Jodi Gootkin <https://www.research.va.gov/currents/1015-3.cfm>

92

SCI Mobility Research Continued

93

- Weight bearing is important for bone integrity, bowel function, and cardio-metabolic health.
- **ReWalk** - wearable robotic exoskeleton that provides powered hip and knee motion for standing, gait, and stair negotiation.

<https://www.research.va.gov/pubs/varqu/winter2016/14.cfm>

Copyright Jodi Gootkin

93

Traumatic Brain Injury

94

- “Signature Injury” of the current military conflict.

Copyright Jodi Gootkin

dvbic.dcoe.mil/dod-worldwide-numbers-tbi

94

Blast Related TBI Mechanism of Injury

95

- Kinetic energy from blast explosions create massive wave that induce atmospheric pressure changes theorized to result in shearing of the axons, air embolism, hemorrhages, chromatolysis, and impaired vascular homeostasis.
- With closed head injury coup-counter coup injuries creates shearing forces and injury to the brain in regions deep and opposite to the site of impact.

Copyright Jodi Gootkin <https://ia902709.us.archive.org/25/items/CombatCasualtyCare/CCCFull.pdf>

95

Penetrating TBI Mechanism of Injury

96

- Damage can also occur from ballistic trauma where objects penetrate the skull.

Copyright Jodi Gootkin <https://ia902709.us.archive.org/25/items/CombatCasualtyCare/CCCFull.pdf>

96

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

TBI Medical Management

97

□The immediate goal is to minimize secondary brain injury by optimizing cerebral blood flow, mitigating elevations in intracranial pressure (ICP), and addressing intracranial hemorrhage and cerebral edema.

□The goal of the first 72 hours of care is to provide clinical stability, arrest ongoing injury, preserve neurological function, and prevent secondary medical complications.

□Poor outcomes associate with systolic BP below 90 mm Hg and ICP over 25 mm Hg.

Copyright Jodi Gootkin

<https://ia902709.us.archive.org/25/items/CombatCasualtyCare/CCCFull.pdf>

97

Department of Defense
TBI Case Definitions

98

Severity	Criteria
Penetrating TBI	Scalp, skull and dura mater are penetrated.
Severe TBI	Confused/disoriented more than 24 hours or LOC more than 24 hours or memory loss more than 7 days.
Moderate TBI	Confused/disoriented more than 24 hours or LOC more than 30 minutes but less than 24 hours or memory loss greater than 24 hours but less than 7 days.
Concussion/Mild TBI	Confused/disoriented less than 24 hours or loss of consciousness up to 30 minutes or memory loss lasting less than 24 hours.

Copyright Jodi Gootkin

Consider This

98

TBI Clinical Presentation
Glasgow Coma Scale (GCS)

99

□ Assesses level of consciousness through eye opening, verbal response, and motor.

BEST EYE OPENING (E)	BEST VERBAL RESPONSE (V)	BEST MOTOR RESPONSE (M)	Score
Spontaneously	Oriented, alert	Obeys commands	15
Spontaneously	Confused, appropriate	Localizes to pain	14
Spontaneously	Disoriented, inappropriate	Withdraws to pain	13
Spontaneously	Incomprehensible speech	Flexor posturing	12
Spontaneously	No response	Extensor posturing	9
No response	No response	No response	3

Mild TBI
13 or greater

Moderate TBI
9 to 12

Severe TBI
8 or less

Copyright Jodi Gootkin

<https://ia902709.us.archive.org/25/items/CombatCasualtyCare/CCCFull.pdf>

99

Mild TBI (mTBI)
Clinical Presentation

100

Physical	Headache, fatigue, dizziness, lethargy
Cognitive	Easily confused/distracted, difficulty with memory, attention, concentration, and problem solving.
Sensory	Impaired vision, hearing, taste, smell, or touch
Behavioral	Depression anxiety, agitation, irritability, anger, sleep disturbance

Copyright Jodi Gootkin

100

mTBI Return to Activity Progression

101

Stage 1 Rest

Stage 2 Light Routine Activity
30 mins physical activity then 4 hours rest
Max 30 mins cognitive activity then 60 mins rest

Stage 3 Light Occupation Activity
60 mins physical activity then 4 hours rest
Max 30 mins cognitive activity then 60 mins rest

Stage 4 Moderate Activity
Max 90 mins activity at 12-16 RPE
20 mins cognitive activity then 40 mins rest

Stage 5 Intensive Activity
Resume usual exercise PRE 16+
50 mins cognitive activity at a time

Stage 6 Unrestricted Activity

Progress every 24 hrs if asymptomatic

Copyright Jodi Gootkin

Department of Defense. (2014). Progressive return to activity following acute concussion/mild TBI: guidance for the rehabilitation provider in deployed and non-deployed settings Clinical Recommendation. *Clinical Recommendation January 2014*.

101

mTBI Post-Concussive Syndrome

102

□Residual symptoms of headache, dizziness, irritability, decreased concentration, photosensitivity, fatigue, sleep disturbance, attention/concentration impairments and forgetfulness following mild traumatic brain injury for greater than three months.

□Management is typically symptom based with majority of individuals reporting headache as the primary persistent symptom.

Copyright Jodi Gootkin

102

TBI Rehabilitation

103

- ❑ For mTBI, treatment is symptom specific and multi-modal monitoring for various system involvement and directing referral to the appropriate medical professional for additional assessment.
 - ❑ Concussion monitoring
 - ❑ Post-traumatic headaches
 - ❑ Sensory Impairments
 - ❑ Neuroendocrine dysfunction

Copyright Jodi Gootkin

103

Rehabilitation Concussion Self Monitoring

104

- ❑ Developed by the VA National Center and National Center for Telehealth & Technology, the Concussion Coach app allows tracking of TBI symptoms and resources.
 - ❑ Self-assessment of emotional changes, cognitive issues and physical problems
 - ❑ Relaxation exercises to manage symptoms
 - ❑ Immediate access to crisis resources, personal support and professional mental health care.

Copyright Jodi Gootkin

<http://t2health.dcoe.mil/apps/ConcussionCoach>

104

Rehabilitation Post-traumatic Headaches

105

	Tension	Cervicogenic	Migraine
Pain	Mild -moderate Tighten, pressure	Mild -moderate Tighten. burn	Severe- debilitating Throbbing, pulsing
Location	Bilateral frontal and posterior cervical	Unilateral cervical and occipital	Unilateral frontotemporal or retro-orbital
Duration	30 mins - 7 days	Variable	4-72 hours
Phono/ photophobia	No	No	One or both
Function	Normal	Normal	Impaired
Nausea	No	No	Yes
Tenderness	Facial and neck	Posterior neck	Not typical
Medication	Abortive NSAID OTC analgesic	Abortive NSAID	Abortive or Prophylactic

Copyright Jodi Gootkin

105

Rehabilitation Sensory Impairments

106

- ❑ Visual acuity is typically intact, but ocular misalignment, and poor eye coordination are associated with patient reports of difficulty focusing, blurred or double vision impairing reading and gait.
- ❑ Despite normal audiology testing, Veterans report problems hearing speech in difficult listening environments indicating damage to the central auditory system.

Copyright Jodi Gootkin

<https://www.research.va.gov/topics/tbi.cfm>

106

Rehabilitation Neuroendocrine Dysfunction

107

- ❑ With brain injury vascular damage, pituitary inflammation, or a biochemical response to blast exposure may interfere with normal hormone production and regulation by the pituitary and hypothalamus.
- ❑ Example: In female symptoms may include excessive fatigue, low muscle mass, increased body fat around the waist, low blood pressure, and amenorrhea.
- ❑ Referral to endocrinologist for hormonal screening is warranted.

Copyright Jodi Gootkin

http://dvbic.dcoe.mil/files/resources/DCoE_TBI_NED_Training_Slides.pdf



107

Traumatic Brain Injury Research

108

- ❑ Cerebellar Trauma – Repeated blast exposures ruptures part of the blood-brain barrier leading to loss of neurons and damage to the cerebellum.
- ❑ Chronic Traumatic Encephalopathy (CTE) – Similar to athletes, post-mortem analysis of Veterans who sustained repetitive concussions revealed degenerative CTE.

<https://www.research.va.gov/topics/tbi.cfm>

Copyright Jodi Gootkin

108

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

TBI Research Continued

109

- **Alzheimer's Disease** – Veterans 55 and older with a past diagnosis of TBI had a 60% greater risk of developing dementia.
- **Brain Aging** – Exposure to blasts without resulting concussion may still lead to fraying of brain white matter with premature brain aging.

Copyright Jodi Gootkin

<https://www.research.va.gov/topics/tbi.cfm>

109

Post-Traumatic Stress Disorder (PTSD)

110

- PTSD is a psychological condition that affects those who have experienced a traumatizing or life-threatening event such as combat, natural disasters, serious accidents, or violent personal assaults.

Copyright Jodi Gootkin

<https://www.ptsd.va.gov/>
<https://ia902709.us.archive.org/25/items/CombatCasualtyCare/CCCFull.pdf>

110

Psychological First Aid (PFA)

111

- Appropriately supporting individuals in the immediate aftermath traumatic experiences helps reduce the initial stress they are experiencing and assists in developing long and short term adaptive functioning skills.

Response	What to day and do
Concern, shame, guilt, fear	Reminders that you are not "going crazy". If feelings persist for a month seek care.
Overwhelmed by tasks	Identify priorities, make lists, rely on others
Fears of recurrence and reactions to reminders	Triggers can be sounds, smells, time of day, media coverage.

Copyright Jodi Gootkin

111

Disaster and Terrorism PFA

- The goal is to protect survivors from further harm, reduce psychological arousal, provide information and foster communication, keep families together and facilitate reunion with loved ones.

https://www.ptsd.va.gov/professional/materials/apps/pfa_mobile_app.asp

112

PTSD Progression

113



If the body's stress and coping systems do not manage the trauma, a complex cluster of symptoms results.

Copyright Jodi Gootkin

Department of Defense (2010) Clinical Practice Guideline for the Management of Post Traumatic Stress Disorder. *Guideline Summary 2010.*

113

PTSD Symptoms

114

- Last more than one month after trauma and lead to significant impairment in ability to interact in social, occupational, or other important areas of function.
- Individual demonstrates a combination of physical, mental, and behavioral symptoms in addition to changes in functioning.

Copyright Jodi Gootkin

114

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

PTSD Common Presenting Symptoms 115

- Physical**
 - Chronic Pain, Migraines, Vague Somatic Complaints
- Mental**
 - Poor Attention and Abstract Thinking, Anxiety, Depression
- Behavioral**
 - Irritability, Guilt, Avoidance, Anger, Noncompliance, Self-risk, Aggression, Threatening Behavior

Copyright Jodi Gootkin

115

PTSD Symptom Clusters 116

- Re-Experiencing**
 - Intrusive memories, images, perceptions
 - Exaggerated emotional and physical reactions
- Avoidance & Emotional Numbing**
 - Activity avoidance
 - Detached
 - Restricted Emotion
- Increased Arousal**
 - Sleep disturbance
 - Irritability
 - Hypervigilance
 - Difficulty Concentrating

Copyright Jodi Gootkin

116

PTSD Screening Tools 117

- Referral to a mental health provider may be necessary if symptoms persist and interfere with function and relationships.
- Only specifically trained mental health professionals can use advanced assessment tools.
 - Evaluation of Lifetime Stressors (ELS)
 - Life Events Checklist for DSM-5 (LEC-5)
 - Combat Exposure Scale (CES)

Copyright Jodi Gootkin

117

PTSD Screening Tool Evaluation of Lifetime Stressors (ELS) 118

- Self-report questionnaire and interview assessing perceptions and emotional response to disaster, illness, accident, violence, combat and other trauma.
- The interview provides a way to explore dimensions of each trauma including trauma type, perpetrators/victims, duration, frequency, perceptions of threats and emotional response, and others.

Copyright Jodi Gootkin

118

PTSD Screening Tool Life Events Checklist for DSM-5 (LEC-5) 119

- Self-report measure designed to screen for potentially traumatic events in a respondent's lifetime.
- Specifically assesses exposure to 16 events known to potentially result in PTSD or distress.

Copyright Jodi Gootkin

119

PTSD Screening Tool Combat Exposure Scale (CES) 120

- 7-item self-report measure that assesses wartime stressors and exposures experienced by combatants. Items are rated on a multiple scales.
- Frequency
 - 1 = "no" or "never" to 5 = "more than 50 times"
- Duration
 - 1 = "never" to 5 = "more than 6 months"
- Degree of loss
 - 1 = "no one" to 4 = "more than 50%"

Copyright Jodi Gootkin

120

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.
Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

PTSD Management

121

- Ensure basic physical needs are met
- Interventions to preserve life if individual is unstable or dangerous to self or others.
- Medical and Psychological Care
- Cognitive Behavioral Therapies
- Social and Spiritual Support
- Medications
- Cognitive Fitness and Psychological Resilience Strategies
- Relaxation and Stress Management

Copyright Jodi Gootkin

121

Rehabilitation Considerations for Patients with PTSD

122

- Patients diagnosed with PTSD may be participating in therapy for rehabilitation from musculoskeletal, general medical, and neurologic conditions or to promote health and wellness to manage their PTSD symptoms.
- Therapists should perform basic assessment to understand the patients status and recognize how to manage therapeutic interactions.

Copyright Jodi Gootkin

122

Screening Tool Primary Care PTSD (PC-PTSD)

123

Designed for healthcare professionals outside the mental health fields.

- *Would it be ok to talk about stress?*
In your life, have you ever had an experience so horrible, frightening, or upsetting that, in the past month you...
- Have had nightmares about it or thought about it when you did not want to?
- Tried hard not to think about it or went out of your way to avoid situations that reminded you of it?
- Were constantly on guard, watchful, or easily startled?
- Felt numb or detached from others, activities, or your surroundings?

Veterans Crisis Line 1-800-273-8255 (Press 1)
<https://www.va.gov/oa/pocketcard/Military-Health-History-Card-for-print.pdf>

Copyright Jodi Gootkin

123

PTSD Managing Interactions

124

- Do not approach the individual from behind or sneak up on them
- When interviewing the patient focus on establishing a strong therapeutic alliance.
 - Ensure privacy.
 - Make no assumptions about feelings or meaning.
 - Show interest and concern.
- If patient is resistant to referrals, emphasize value of evaluation and treatment and suggest resources they can explore first on their own.

Copyright Jodi Gootkin

124

PTSD Managing Interactions Continued

125

- Acknowledge distress offering empathy and validating patient's feelings.
- Example statements include:
 - "I am so sorry that you are struggling with this."
 - "I can appreciate how difficult this is for you."
 - "You are not the only patient I have who is struggling with this."
 - "It's not easy, is it?"

Copyright Jodi Gootkin

125

PTSD Managing Interactions Continued

126

- If the patient experiences PTSD symptoms during therapy, the clinician should speak in a calm, matter of fact voice.
- Reassure the patient that everything is okay.
- Remind the patient that they are in a safe place and their care and well being are a top priority.
- Explain medical procedures and check with the patient (e.g., "Are you ok?").
- Ask (or remind) the patient where he or she is right now.
- If the patient is experiencing flashbacks, remind him or her that they are in XYZ office at a specific time in a specific place (grounding).
- Offer the patient something that will make them feel more like their usual self.

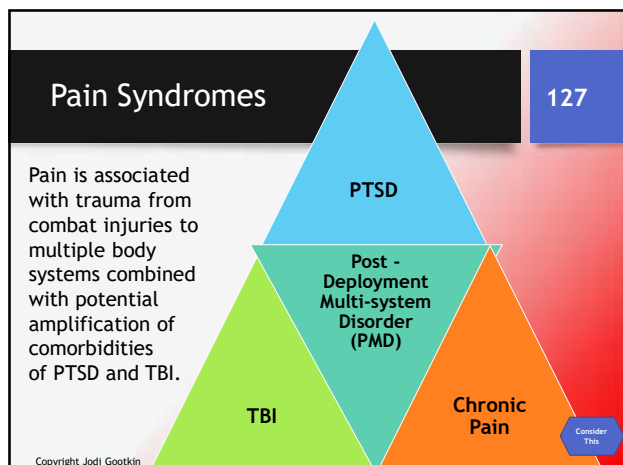
Copyright Jodi Gootkin https://www.ptsd.va.gov/professional/manuals/manual.pdf/hrs/hrs_clinician_guide_ch_7.pdf

126

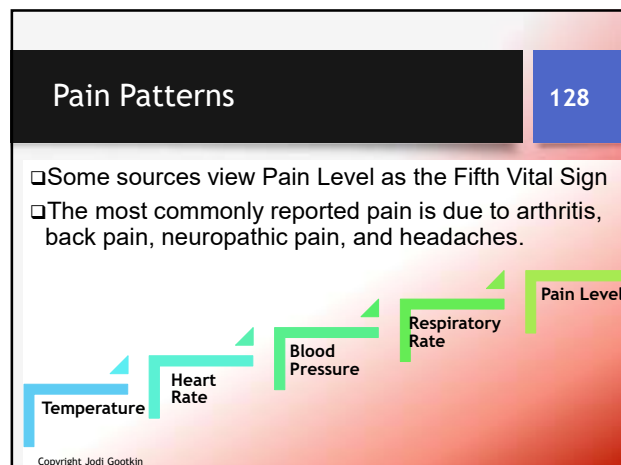
Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.



127



128

Chronic Pain

129

- Following combat-related injuries, increased incidence of chronic pain greater than three months is associated with:
 - Ongoing sleep disturbance
 - Emotional distress
 - Residual traumatic brain injury symptoms
- Low pain self-efficacy, maladaptive coping strategies, reluctance to access mental health care may contribute to the cycle of pain.

Enhancing Veteran-centered care: a guide for nurses in non-VA settings Johnson BS, Boudiab LD, Freundt M, Anthony M, Gmerek GB, Carter J Am J Nurs. 2013 Jul; 113(7):24-39; quiz 54, 40.

Copyright Jodi Gootkin

Consider This

129

Pain Screening Tools

130

- Standard musculoskeletal assessments should determine if a physiologic etiology for the pain exists.
- When diffuse somatic, cognitive, and emotional complaints are associated with pain multiple system polytrauma assessments should be utilized.

Copyright Jodi Gootkin

130

Pain Screening Tool Defense and Veterans Pain Rating Scale (DVPRS)

131

□ Visual analog scale (VAS) with functional clarifiers and supplemental pain questions to evaluate biopsychosocial impact of pain.

https://www.va.gov/PAINMANAGEMENT/docs/DVPRS_slides_and_references.pdf

Copyright Jodi Gootkin

131

Pain Screening Tool DVPRS Clarifying Questions

132

□ Circle one number that describes how, during the past 24 hours pain has:

- interfered with you usual ACTIVITY
- interfered with you SLEEP
- affected your MOOD
- contributed to your STRESS

Does not

Completely

Copyright Jodi Gootkin

132

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.
Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Pain
Pharmaceutical Management
133

- Condition specific non-opioid agents should be optimized before opiates are considered for short durations.
 - Risk of dependence, addiction, and death.
- Narcotics and muscle relaxants can slow cognition and executive functions.
- Complexity in symptom relief from narcotics needs to be recognized as reduction of psychological anxiety may be confused with diminished pain intensity.

Howell, P., Capehart, B. P., & Hoenig, H. (2015). Rehabilitation of combat-related injuries in the Veterans Administration A web of support. *North Carolina Medical Journal*, 76(5), 323-327. <https://www.healthquality.va.gov/guidelines/Pain/cot/VADoDOTCPGProviderSummary022817.pdf>

Copyright Jodi Gootkin

133

Adverse Effects of Opioids
134

Respiratory Depression	• Drowsiness, slow shallow breathing, loud or unusual snoring
Mental Status Changes	• Confusion, hallucinations, restlessness, dysphoria, seizures, agitation
Opioid Induced Endocrinopathy	• Loss of libido, fatigue, mood alterations, loss of muscle mass/strength, abnormal menses
Sleep Apnea	• Loud snoring, morning headaches, irregular pauses in breathing depression/emotional instability

Copyright Jodi Gootkin <https://www.healthquality.va.gov/guidelines/Pain/cot/ManagingSideEffectsFactSheetFINAL2017.pdf>

134

Pain
Non-Pharmaceutical Management
135

- Comprehensive management must address biological, psychological, and psychosocial aspects of pain.
- Distinguish pain from musculoskeletal dysfunction or neurologic alterations in tone.
- Biofeedback, exercise, thermal modalities
- Relaxation exercises and meditation
- Good sleep hygiene
- Patient education

Copyright Jodi Gootkin

135

Pain
Cognitive Behavioral Therapy
136

- Encouraging increasing activity by setting goals
- Correcting false and unrealistic beliefs/concerns about pain
- Teaching cognitive and behavioral coping skills (e.g., activity pacing)
- Practicing and consolidation of coping skills and reinforcement of use.

Copyright Jodi Gootkin

136

Non-Somatic Disorders
137

- Post deployment individuals experience a variety of physical conditions (somatic) in addition to presenting with less tangible non-somatic mental health conditions that contribute to the complex management of polytrauma.
 - Anxiety
 - Drug Use
 - Sleep Disturbance

Copyright Jodi Gootkin

137

Anxiety Assessment
Beck Anxiety Inventory (BAI)
138

- The 21-item self-report measures emotional, physiological, and cognitive symptoms of anxiety.
- Respondents rank how bothered they are by each of the symptoms.

Copyright Jodi Gootkin

138

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.
Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Anxiety Assessment in Polytrauma BAI Continued

139

- Symptoms can be aligned to specific factors associated with anxiety measured with the BAI.
- Safety threat component provides information regarding the mental health of combat Veterans.

Palmer, G. A., Happe, M. C., Paxson, J. M., Jurek, B. K., & Olson, S. A. (2016). Dimensionality of the Beck Anxiety Inventory in a polytrauma sample of OEF/OIF/OND Veterans: Findings from exploratory and confirmatory factor analysis. *Military Psychology, 28*(5), 226.

Copyright Jodi Gootkin

139

Stress, Trauma, Alcohol, and Drug Use Assessment

140

- Drug and alcohol use is common to self-medicate.
- Common statements attempting to self-assure there is not a problem with dependency or overuse of drugs or alcohol.
 - "I just drink beer (wine)"
 - "I don't use hard drugs"
 - "I'm not an alcoholic"
 - "I gave it up for 3 weeks last year"
 - "I don't drink every day"
 - "I've never missed a day of work"
 - "I don't need help, I can handle it myself"

https://www.ptsd.va.gov/professional/manuals/manual-pdf/twecg/traq_clinician_guide_app_j4.pdf

Copyright Jodi Gootkin

140

Traumatic Stress in Female Veterans

141

- As of 2015, women are being integrated into military combat positions and receiving the specialized training that they did not receive in prior years.
- Changing theaters of operation may contribute to feeling along compounded by worrying about family at home during long deployments.
- High social and emotional support after war has been shown to contribute to lower stress levels.

<https://www.defense.gov/News/Article/Article/648766/officials-describe-plans-to-integrate-women-into-combat-roles/>
https://www.ptsd.va.gov/professional/trauma/war/traumatic_stress_in_female_Veterans.asp

Copyright Jodi Gootkin

141

Sleep Disturbance

142

- Difficulty initiating or maintaining sleep and non-restful sleep may be related to experiences during deployment for combat or peacekeeping missions.
 - Nightmares result in waking up feeling terrified.
 - Saying awake to "stand guard" rather than sleep.
 - Irregular sleep-wake cycles from shifts and loud noise exposure.

Copyright Jodi Gootkin

142

Sleep Disturbance and Comorbidities

143

Theories:

- Altered hypothalamus neuropeptide
- Altered melatonin production by pineal gland
- Intrusive chronic headaches

Ouellet, M. C., Beaulieu-Bonneau, S., & Morin, C. M. (2015). Sleep-wake disturbances after traumatic brain injury. *The Lancet Neurology, 14*(7), 746-757.

Copyright Jodi Gootkin

143

Sleep Disturbance Assessment

144

- Defense Centers of Excellence recommends including an interview question regarding sleep:
 - Are you experiencing frequent difficulty falling or staying asleep, excessive daytime sleepiness or unusual events during sleep?
- Pittsburgh Sleep Quality Index (PSQI) is a self-report with higher global score on the 0-21 scale indicating worse sleep quality.
 - Validated on TBI patients with >5 indicating sleep disturbance

Department of Defense. (2014). Management of sleep disturbance following concussion/mild TBI: guidance for primary care management in deployed and non-deployed settings. *Clinical Recommendation June 2014*.
<http://www.psychiatry.pitt.edu/research/tools-research/assessment-instruments/pittsburgh-sleep-quality>

Copyright Jodi Gootkin

144

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

Sleep Hygiene and Stimulus Control

- Keep bed only for sleep
- Decrease stimulants and alcohol
- Have a regular bedtime and rising time
- Get exposure to sunlight every morning
- Increase regular exercise
- If you don't fall asleep within 30 minutes, get up
- Wind down before bedtime
- Remove electronics your bedroom
- Go to bed only when sleepy

Copyright Jodi Gootkin

145

Compassion Fatigue

- Providing care and support to service members and Veterans can lead to burnout and secondary traumatic stress for the healthcare provider.
- The Provider Resilience app created by National Center for Telehealth & Technology includes tools for monitoring to avoid compassion fatigue.
 - Self assessments
 - Inspirational videos
 - Tools for restful breaks

Copyright Jodi Gootkin <http://t2health.dcoe.mil/apps/provider-resilience>

146

Conclusion

- Remember all that our men and women in uniform have selflessly sacrificed.
- Analyze their conditions from every perspective and be an advocate to help them access the extensive VA resources available to foster the independence and recovery they deserve.

Copyright Jodi Gootkin <https://www.polytrauma.va.gov/>

147

148

1. What is the Veteran's Administration term for two or more injuries resulting in physical, cognitive, psychological, or psychosocial impairments and functional disability?

- A. Polytrauma
- B. Symptom exacerbation
- C. Multisystem involvement
- D. Terrible Triad

Copyright Jodi Gootkin

148

149

2. Which of the following is NOT a diagnosis typically associated with the polytrauma?

- A. Psoriasis
- B. Traumatic Brain Injury
- C. Hearing Impairment
- D. Post-Traumatic Stress Disorder

Copyright Jodi Gootkin

149

150

3. What is the term for the exposure when chemicals released from IED shrapnel travel to other body regions inducing pathology?

- A. Infectious disease
- B. Toxic embedded fragments
- C. Chemical agent resistance coating
- D. Occupational injury

Copyright Jodi Gootkin

150

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.
Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

151

4. The clinician can include _____ in their evaluation to provide additional context to current injuries and promote the therapeutic relationship.

- A. Functional Capacity Evaluation
- B. Occupational Exposure Assessment
- C. Military Service History Survey
- D. Ergonomic Evaluation

Copyright Jodi Gootkin

151

152

5. Placing a _____ proximal to a traumatic amputation while in the battle field manages hemorrhaging to preserve life and avoid the need for massive transfusion.

- A. Negative Pressure Dressing
- B. Drainage Tube
- C. Cast
- D. Tourniquet

Copyright Jodi Gootkin

152

153

6. According to the DoD Standard Surveillance Case Definition, what TBI severity would be assigned to an individual presenting with memory loss lasting greater than 24 hours but less than seven days?

- A. Concussion/Mild TBI
- B. Moderate TBI
- C. Severe TBI
- D. Penetrating TBI

Copyright Jodi Gootkin

153

154

7. If a female veteran presents with excessive fatigue, low muscle mass, low blood pressure, and reports amenorrhea, the clinician might suspect what condition?

- A. Hyperthyroidism
- B. Neuroendocrine Dysfunction
- C. Goiter
- D. Cushing Syndrome

Copyright Jodi Gootkin

154

155

8. When a patient is experiencing PTSD symptoms during therapy, the clinician should _____.

- A. Ask the patient to describe the flashback
- B. Allow re-enactment of the traumatic event
- C. Remind the patient they are in a safe place
- D. Restrain the patient for safety

Copyright Jodi Gootkin

155

156

9. Which of the following is NOT associated with increased incidence of chronic pain following combat related injuries?

- A. Ongoing sleep disturbance
- B. Early acute pain management
- C. Emotional distress
- D. Residual traumatic brain injury symptoms

Copyright Jodi Gootkin

156

Combat Related Polytrauma

Copyright Innovative Educational Services and Jodi Gootkin. All rights reserved.

Reproduction, reuse, or republication of all or any part of this presentation is strictly prohibited without prior written consent of both Innovative Educational Services and Jodi Gootkin.

10. Which factor assessed on the Beck Anxiety Inventory may provide the most beneficial information regarding the mental health of combat veterans?

- A. Subjective fear
- B. Panic
- C. Safety threat
- D. Autonomic symptoms

Copyright Jodi Gootkin

Combat-Related Polytrauma

References

- Angelakis, I., Molina, J., Winter, C., Ford, K., Kitchiner, N., & Hughes, K. (2025). Trauma exposure in adulthood and suicidal experiences in serving and ex-serving military personnel: A systematic review and meta-analysis. *Psychological Trauma: Theory, Research, Practice, and Policy*.
- Angehele, M., Marina, V., Moscu, C. A., Dragomir, L., Angehele, A. D., & Lescai, A. M. (2023). Emotional distress in a patients following polytrauma. *Journal of Multidisciplinary Healthcare*, 1161-1170.
- Crosier, A. K., Tracy, E., Bell, A. G., Eliassen, K. M., Peterson, T. J., Allard, R. J., & Rupp, T. L. (2025). A Scoping Review on the Efficacy/Effectiveness and Utilization of Complementary and Integrative Health for Pain in the Military Health System. *Journal of Integrative and Complementary Medicine*.
- Devendra, A., Raja, S. D. C., Dheenadhayalan, J., & Rajasekaran, S. (2021). Current updates in management of extremity injuries in polytrauma. *Journal of Clinical Orthopaedics and Trauma*, 12(1), 113-122.
- dos Santos Bunn, P., de Oliveira Meireles, F., de Souza Sodr , R., Rodrigues, A. I., & da Silva, E. B. (2021). Risk factors for musculoskeletal injuries in military personnel: a systematic review with meta-analysis. *International archives of occupational and environmental health*, 94(6), 1173-1189.
- Faraji, E., Allami, M., & Dabiri, A. (2022). Assessment of musculoskeletal Pain Associated with Combat-Related lower limb injuries leading to foot and ankle disorders. *Journal of Military and Veterans Health*, 30(1), 16-22.
- Fecher, A., Stimpson, A., Ferrigno, L., & Pohlman, T. H. (2021). The pathophysiology and management of hemorrhagic shock in the polytrauma patient. *Journal of clinical medicine*, 10(20), 4793.
- Hardy, B. M., Varghese, A., Adams, M. J., Enninghorst, N., & Balogh, Z. J. (2024). The outcomes of the most severe polytrauma patients: a systematic review of the use of high ISS cutoffs for performance measurement. *European journal of trauma and emergency surgery*, 50(4), 1305-1312.
- Iyengar, K. P., Venkatesan, A. S., Jain, V. K., Shashidhara, M. K., Elbana, H., & Botchu, R. (2023). Risks in the management of polytrauma patients: clinical insights. *Orthopedic research and reviews*, 27-38.
- Klingebiel, F. K. L., Landre, V., Hasegawa, M., Kalbas, Y., Hanschen, M., Sawauchi, K., ... & Pfeifer, R. (2024). The three stages of polytrauma rehabilitation—a recommendation and a systematic literature review on behalf of SICOT. *International Orthopaedics*, 1-10.
- Kumar, A., Soliman, N., Gan, Z., Cullinan, P., Vollert, J., Rice, A. S., & Kemp, H. (2024). A systematic review of the prevalence of postamputation and chronic neuropathic pain associated with combat injury in military personnel. *Pain*, 165(4), 727-740.
- Lakshman, R., Tomlinson, E., & Bucknall, T. (2024). A systematic review of chronic pain management interventions among veterans of recent wars and armed conflicts. *Pain management nursing*.
- Laughter, S., Khan, M., Banaag, A., Madsen, C., & Koehlmoos, T. P. (2022). Prevalence of polytrauma clinical triad among active duty service members. *Military Medicine*, 187(7-8), e856-e861.
- Lee, C., Rasmussen, T. E., Pape, H. C., Gary, J. L., Stannard, J. P., & Haller, J. M. (2021). The polytrauma patient: Current concepts and evolving care. *OTA International*, 4(2S), e108.
- Mathieu, L., Choufani, C., Andro, C., & de l'Escalopier, N. (2024). Management of combat-related extremity injuries in modern armed conflicts. *Orthopaedics & Traumatology: Surgery & Research*, 104055.
- McDonald, J. R., Wagoner, M., Shaikh, F., Sercy, E., Stewart, L., Knapp, E. R., ... & Tribble, D. R. (2024). Mental and Physical Health-Related Quality of Life Following Military Polytrauma. *Military medicine*, 189(11-12), 2550-2561.
- Meakes, S., Enninghorst, N., Weaver, N., Hardy, B. M., & Balogh, Z. J. (2024). Long-term functional outcomes in polytrauma: a fundamentally new approach is needed in prediction. *European Journal of Trauma and Emergency Surgery*, 50(4), 1439-1452.
- Nauth, A., Hildebrand, F., Vallier, H., Moore, T., Leenen, L., McKinley, T., & Pape, H. C. (2021). Polytrauma: update on basic science and clinical evidence. *OTA International*, 4(1), e116.
- Neilson, L. E., Balba, N. M., Elliott, J. E., Scott, G. D., Mist, S. D., Butler, M. P., ... & Lim, M. M. (2024). The potential role of chronic pain and the polytrauma clinical triad in predicting prodromal PD: A cross-sectional study of US Veterans. *Clinical Parkinsonism & Related Disorders*, 10, 100253.

- Pape, H. C., Moore, E. E., McKinley, T., & Sauaia, A. (2022). Pathophysiology in patients with polytrauma. *Injury*, 53(7), 2400-2412.
- Perrin, P. B., Haun, J. N., Klyce, D. W., Melillo, C., Nakase-Richardson, R., Seel, R. T., ... & Zuber, J. (2024). Efficacy and Implementation Planning Across the Veterans Affairs Polytrauma System of Care: Protocol for the REACH Intervention for Caregivers of Veterans and Service Members With Traumatic Brain Injury. *JMIR Research Protocols*, 13(1), e57692.
- Petfield, J. L., Lewandowski, L. R., Stewart, L., Murray, C. K., & Tribble, D. R. (2022). IDCRP combat-related extremity wound infection research. *Military medicine*, 187(Supplement_2), 25-33.
- Pfeifer, R., Klingebiel, F. K. L., Balogh, Z. J., Beeres, F. J., Coimbra, R., Fang, C., ... & Pape, H. C. (2023). Early major fracture care in polytrauma—priorities in the context of concomitant injuries: A Delphi consensus process and systematic review. *Journal of Trauma and Acute Care Surgery*, 10-1097.
- Pursel, A., Nichols, R., & Lindquist, K. (2024). Combat amputee care for Global War on Terror Veterans: A systematic review. *Journal of Military, Veteran and Family Health*, 10(5), 7-29.
- Raut, S., Mellor, R., Meurk, C., Lam, M., Lane, J., Khoo, A., ... & Johnson, L. (2024). Prevalence and factors associated with polypharmacy in military and veteran populations: A systematic review and meta-analysis. *Journal of Affective Disorders*.
- Ribeiro, D. (2023). *Polytrauma Clinical Triad Uniquely Impacts Veterans* (Doctoral dissertation, Alliant International University).
- Ritschel, M., Kuske, S., Gnass, I., Andrich, S., Moschinski, K., Borgmann, S. O., ... & Icks, A. (2021). Assessment of patient-reported outcomes after polytrauma—instruments and methods: a systematic review. *BMJ open*, 11(12), e050168.
- Sammito, S., Hadzic, V., Karakolis, T., Kelly, K. R., Proctor, S. P., Stephens, A., ... & Zimmermann, W. O. (2021). Risk factors for musculoskeletal injuries in the military: a qualitative systematic review of the literature from the past two decades and a new prioritizing injury model. *Military Medical Research*, 8, 1-40.
- Schram, B., Canetti, E., Orr, R., & Pope, R. (2022). Injury rates in female and male military personnel: a systematic review and meta-analysis. *BMC women's health*, 22(1), 310.
- Shogren, K., Muir, J., Skiles, Z., Willock, S., & Kixmiller, J. (2022). Post Deployment Assessment & Treatment (PDAT) Inpatient Rehabilitation Program Improves Both Psychological Distress and Physical Pain Experience in Veterans w/History of mTBI/Polytrauma Comorbidities. *Archives of Physical Medicine and Rehabilitation*, 103(3), e25-e26.
- Silverstein, L. A., Higgins, J. T., & Henderson, S. (2021). Health-related quality of life after polytrauma: A systematic review. *Journal of Trauma Nursing| JTN*, 28(2), 107-118.
- Stannard, J., & Fortington, L. (2021). Musculoskeletal injury in military special operations forces: a systematic review. *BMJ Mil Health*, 167(4), 255-265.
- Stewart, I. J., Poltavskiy, E., Howard, J. T., Janak, J. C., Pettey, W., Zarzabal, L. A., ... & Gundlapalli, A. (2021). The enduring health consequences of combat trauma: a legacy of chronic disease. *Journal of General Internal Medicine*, 36, 713-721.
- Upadhyaya, G. K., Iyengar, K. P., Jain, V. K., & Garg, R. (2021). Evolving concepts and strategies in the management of polytrauma patients. *Journal of clinical orthopaedics and trauma*, 12(1), 58-65.
- Uzdavines, A., Gonzalez, R. D., Price, A., Broadway, D., Smith, T. L., Rodrigues, M., ... & Dindo, L. (2021). Acceptance and Commitment Training for veterans with polytrauma: a randomized controlled trial protocol. *Contemporary clinical trials*, 111, 106601.
- Valcarcel, C. R., Bieler, D., Bass, G. A., Gaarder, C., & Hildebrand, F. (2025). ESTES recommendations for the treatment of polytrauma—a European consensus based on the German S3 guidelines for the treatment of patients with severe/multiple injuries. *European Journal of Trauma and Emergency Surgery*, 51(1), 171.