Joint Trauma System

Pain, Anxiety and Delirium

Clinical Practice Guideline (CPG) Training

Joint Trauma System Trauma Care Educational Program

Disclosure/Disclaimer

- No financial disclosures
- The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Brooke Army Medical Center, the U.S. Army or Air Force Medical Department, the U.S. Army or Air Force Office of the Surgeon General, or the Department of Defense or the U.S. Government.

Purpose

- These slides are based on the JTS Pain, Anxiety and Delirium CPG which provides evidence-based guidelines for the management of pain, anxiety, and delirium (PAD) in military trauma patients.
- Date of CPG publication: 26 Apr 2021
- JTS CPGs are evidence-based guidelines developed by subject matter experts in the military and civilian communities. CPGs are compiled from DoD Trauma Registry data, health data abstracted from patient records and after action reports.
- Information contained in this presentation is only a guideline and not a substitute for clinical judgment.

Agenda

- Summary
- Background
- Goals & Staffing
- Evaluation: Scoring Methods
- Pain Medication Treatment
- Preventive Measures
- Pain Evaluation, Control, Pharmacology
- Role 1 Evaluation & Treatment
- Role 2 Evaluation & Treatment
- Role 3 Evaluation & Treatment
- Use of Catheters
- Anxiety & Delirium Treatment
- Analgesics & Anxiolytics
- Special Considerations
- Performance Improvement (PI) Monitoring
- References
- Appendices
- Contributors

Summary

- Aggressive treatment of pain, anxiety, and delirium is an essential part of care throughout the continuum of care.
- Evaluation should use standardized methods.
- Treatment includes both non-pharmacologic and pharmacologic methods.

Background

- Pain is universally present in combat casualties. Treatment should begin at point of injury through all echelons of care.
  - Moral, medical, and operational imperative to treat.
  - Treatment reduces incidence of chronic pain syndromes, post traumatic stress disorder, and long-term narcotic dependency.
  - Pain control should be optimized as a priority over sedation.
  - A multimodal approach is advised to reduce negative side effects.
- All members of the care team should work as a team to provide effective pain management.

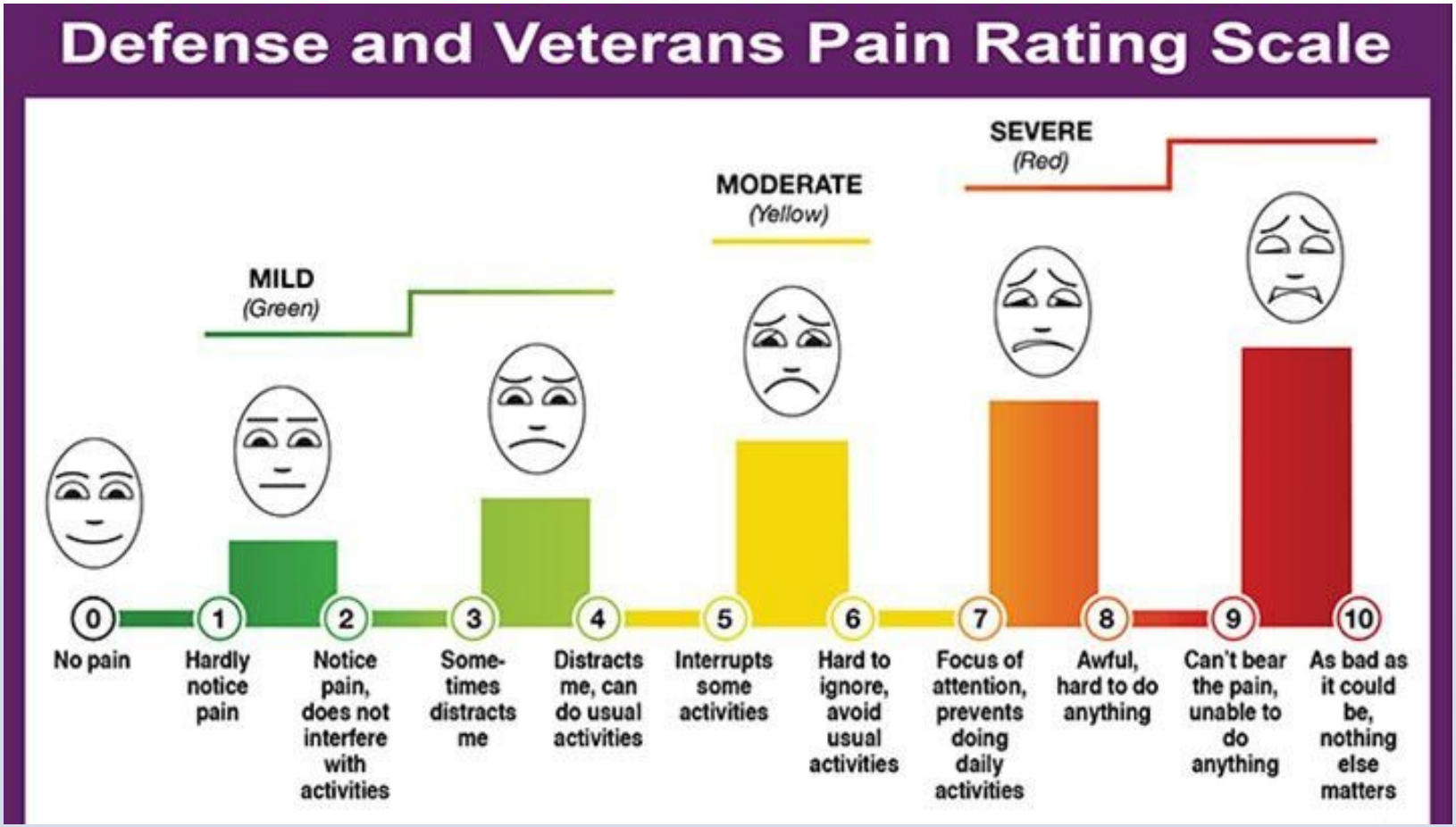
Goals & Staffing

- Pain control starts at point of injury, but limits in staffing make a pain management team most feasible at a Role 3 and above.
  - Establish an Acute Pain Service when able to include at least:
    - Physician most experienced in pain management (often anesthesiologist)
      as Pain Consultant
    - Chief Pain Nurse
    - Ward Pain Nurse Champions
  - Team should interact directly and frequently with primary treating service.
  - Team should be available to all patients admitted to the hospital.
- Primary mission is the provision of effective pain control as well as the treatment and prevention of anxiety and delirium.

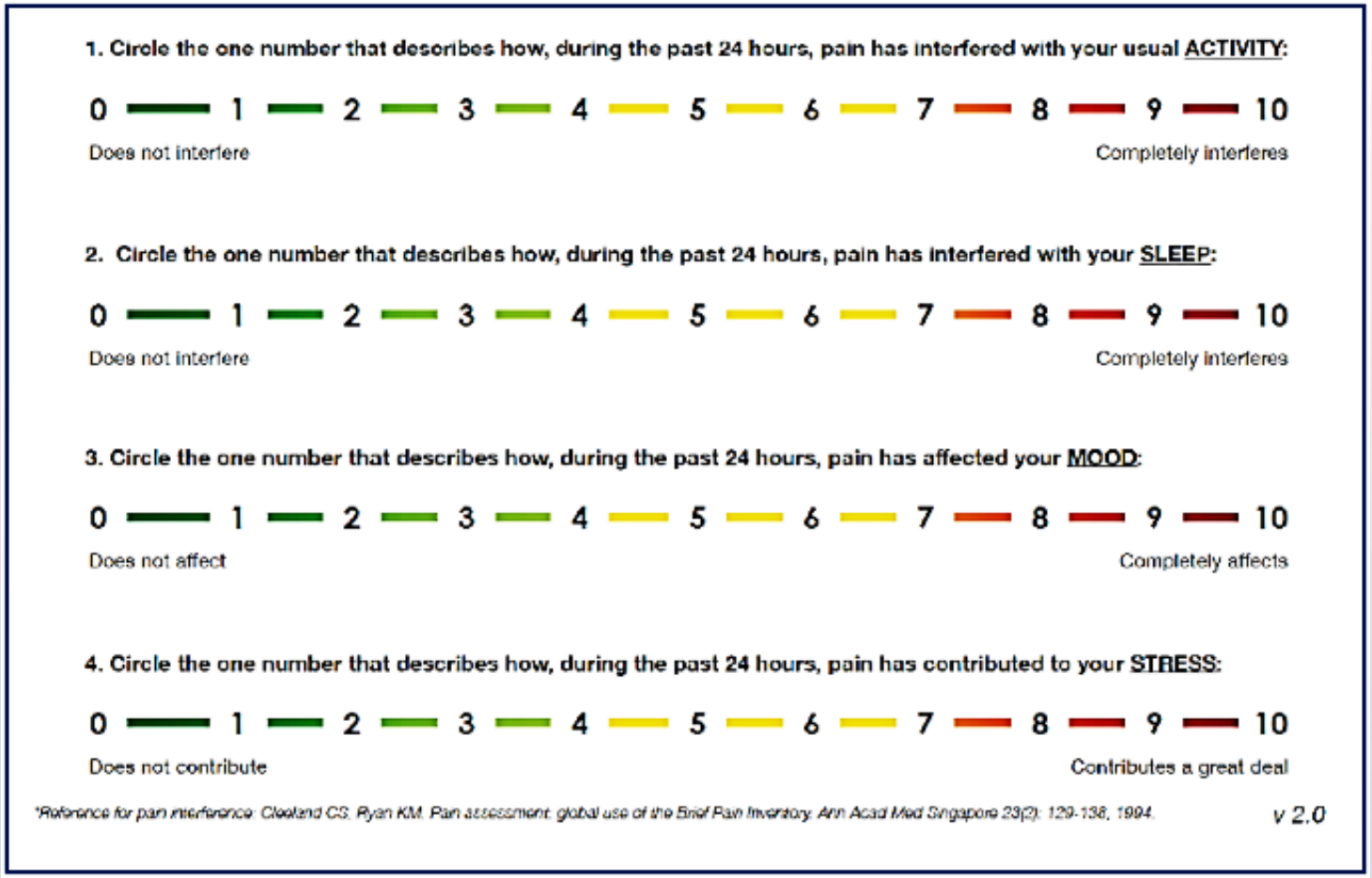
Evaluation: Scoring Pain

- Pain, agitation, and delirium should be measured and treated based on accepted scoring systems.
  - DoD/VA Pain Rating Scale (DVPRS): Used to assess pain.
  - Richmond Agitation Sedation Scale (RASS): Used to assess anxiety.
  - Confusion Assessment Method (CAM): Used to assess presence of delirium.
- Always document treatments.
- Materials to allow for regional anesthesia or systemic medications should be readily available.

DoD/VA Pain Rating Scale



DoD/VA Pain Rating Scale



1. Circle the one number that describes how, during the past 24 hours, pain has interfered with your usual ACTIVITY:

0 — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

Does not interfere — Completely interferes

2. Circle the one number that describes how, during the past 24 hours, pain has interfered with your SLEEP:

0 — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

Does not interfere — Completely interferes

3. Circle the one number that describes how, during the past 24 hours, pain has affected your MOOD:

0 — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

Does not affect — Completely affects

4. Circle the one number that describes how, during the past 24 hours, pain has contributed to your STRESS:

0 — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

Does not contribute — Contributes a great deal

**Reference for pain interference: Cleeland CS, Ryan KM. Pain assessment: global use of the Brief Pain Inventory. Ann Acad Med Singapore 23(2): 129-138, 1994.*

v 2.0

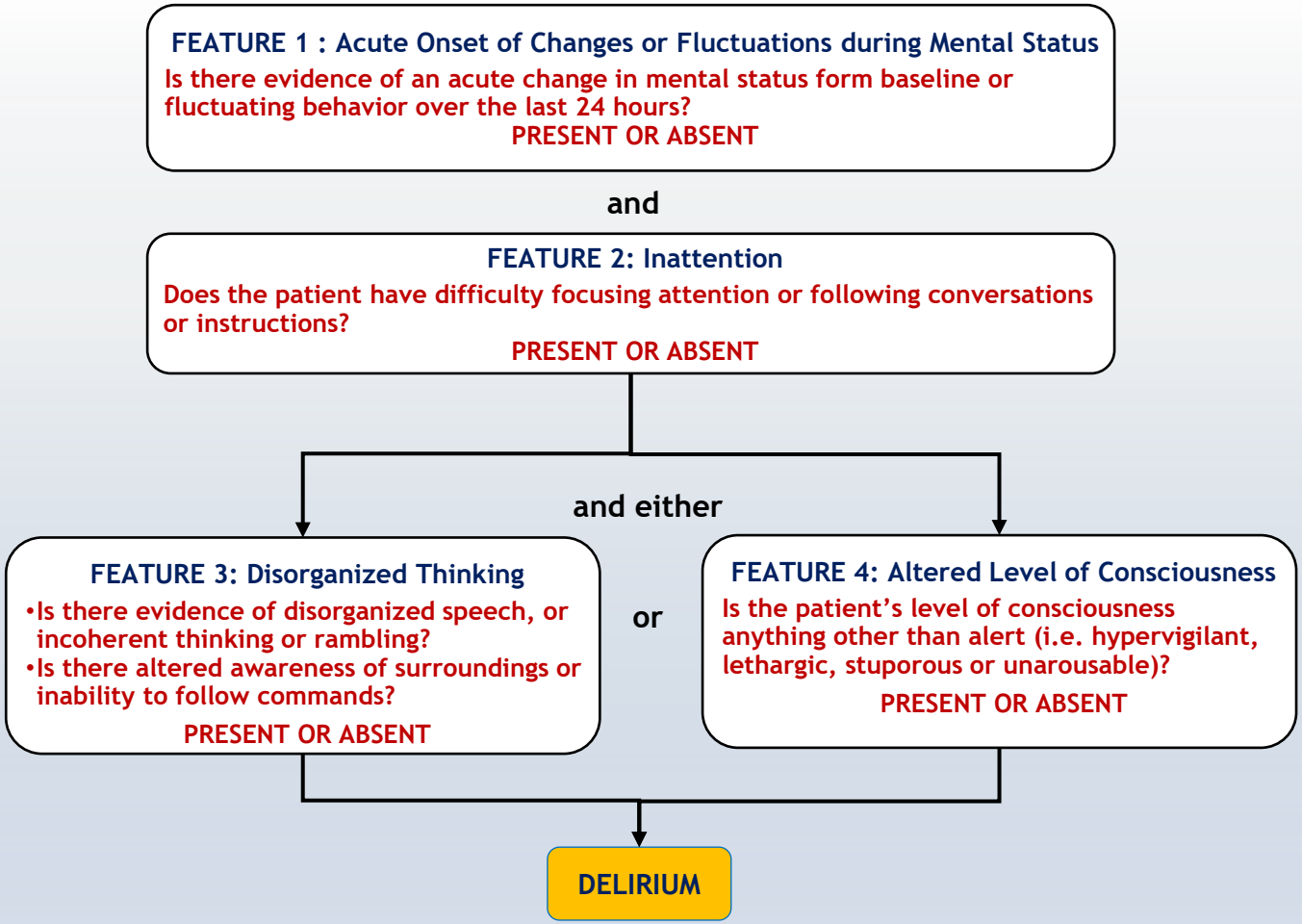
Richmond Agitation Sedation Scale

Score	Term	Description	
+4	Combative	Overtly combative, violent, immediate danger to staff.	
+3	Very Agitated	Pulls or removes tube(s) or catheter(s); aggressive.	
+2	Agitated	Frequent non-purposeful movement, fights ventilator.	
+1	Restless	Anxious but movements not aggressive vigorous.	
0	Alert, Calm		
-1	Drowsy	Not fully alert, but has sustained awakening (eye-opening/eye contact) to voice (≥10 seconds).	Verbal Stimulation
-2	Light Sedation	Briefly awakens with eye contact to voice (< 10 seconds).	
-3	Moderate Sedation	Movement or eye opening to voice (but no eye contact).	
-4	Deep Sedation	No response to voice, but movement or eye opening to physical stimulation.	Physical Stimulation
-5	Unarousable	No response to voice or physical stimulation.	

Procedure for RASS Assessment	
1. Observe patient: Patient is alert, restless, or agitated.	Score 0 to +4
2. If not alert, state patient's name and say to open eyes and look at speaker	
- Patient awakens with sustained eye opening and eye contact.	Score -1
- Patient awakens with eye opening and eye contact, but not sustained.	Score -2
- Patient has any movement in response to voice but no eye contact.	Score -3
3. When no response to verbal stimulation, physically stimulate patient by shaking shoulder and/or rubbing sternum.	
- Patient has any movement to physical stimulation.	Score -4
- Patient has no response to any stimulation.	Score -5

*Sessler CN, Gosnell M. Grap MJ, Brophy GT, O'Neal PV, Keane KA et al. The Richmond Agitation-Sedation Scale: validity and reliability in adult intensive care patients. Am J Respir Crit Care Med 2002; 166:1338-1344.
*Ely EW, Truman B, Shintani A., Thomason JWW, Wheeler AP, Gordon S et al. Monitoring sedation status over time in ICU patients: the reliability and validity of the Richmond Agitation Sedation Scale (RASS). JAMA 2003; 289:2983-2991.

Confusion Assessment Method



Pain Medication Treatment

Medications should be specifically directed and dosed to achieve a desired goal such as:

- Achieve a pain score of 4 or less.
- Maintain sufficient patient consciousness to assess the evolution of injuries by physical exam.
- Decrease the need for mechanical ventilation.
- Ameliorate the symptoms of anxiety, delirium or agitation

Preventive Measures

- Pain, as a product of trauma, cannot be prevented. Early intervention can prevent the psychological and biochemical consequences of pain.
- Prevention of anxiety and delirium begins with recognition that all patients are at risk.
  - Management of underlying etiologies including pain, hypoxia, metabolic abnormalities, etc., is essential.
  - Disorientation from sedation can be mitigated with frequent/systematic reorientation and maintenance of sleep patterns.

Preventive Measures

- Additional preventative measures include:
  - Providing hearing aids or eyeglasses as needed to prevent sensory deprivation.
  - Intubated patients should receive spontaneous breathing trials daily.
  - Physical and occupational therapy should be started as soon as possible.
  - Avoid prophylactic administration of antipsychotics and benzodiazepines. (Consider Propofol for short term sedation.)

Pain Evaluation

Some level of pain is present in all combat casualties.

- Assess as early as possible and repeatedly thereafter.
  - Assess at least 1-4 hours for non-intubated patients using DVPRS.
  - Assess continuously for intubated patients.
- Document pain scores.

Pain Control

Signs of inadequate pain control include tachycardia, hypertension, and agitation.

- Life- and limb-threatening injuries can also have similar systemic effects and include:
  - Compartment syndrome
  - Missed injuries
  - Impending physiologic decline
- Exclude other injuries before attributing physical exam findings to pain.

Pain Pharmacology

Primary pharmacologic treatments include ketamine and opiates.

- Ketamine is a very effective analgesic alone or in association with opiates.
  Parental doses of 0.15 – 0.3 mg/kg are shown to reduce pain, total narcotic use, and need for rescue medications.
- Any opioid medication can be titrated to the equal effectiveness of another opiate to achieve desired pain control.

Role 1 Evaluation & Treatment

Role 1 has limited resources and supplies.
Options include:

- Patient able to fight (mild to moderate pain): Combat pill pack which contains acetaminophen and meloxicam.
- Patient not in or likely to develop shock or respiratory distress (moderate to severe pain): Oral transmucosal fentanyl citrate 800 ug.
- Patient in or likely to develop shock or respiratory distress: Ketamine 50 mg IM/IN or 20 mg IV or IO with repeated doses every 20-30 minutes depending on route.

Role 2 Evaluation & Treatment

At Role 2, an anesthesiologist or nurse anesthetist will be on staff and will be responsible for perioperative pain management.

- May have regional blocks or patient-controlled analgesia (PCA) pumps.
- Opiates and ketamine titrated to effect with benzodiazepines for dysphoric symptoms associated with ketamine.

Role 3 Evaluation & Treatment

At Role 3 or above, more robust options available including:

- Continuous or single-injection epidural and peripheral nerve catheter infusions.
- Low-dose ketamine infusions.
- Fentanyl, hydromorphone, and morphine PCAs.

Use of Catheters

- Epidural and regional catheters should be used with some caution.
  - All catheters should receive a 3 mL test dose of local anesthetic and 1:400,000 epinephrine.
  - Low molecular weight heparin (LMWH) use should be timed to be given at least 12 hours before insertion and 2 hours after removal.
  - LMWH should not be used in aeromedical evacuation (AE) patients with epidural catheters.
  - Be mindful of total anesthetic doses and do not exceed safe limits (i.e., total dose of 0.2% Ropivicaine should not exceed 20 mL/hr).
  - Blocks may mask compartment syndrome, and patients at risk should be closely monitored.

Use of Catheters

- Local anesthetic toxicity can happen in patients with pain control catheters.
  - Symptoms: tinnitus, anxiety, restlessness, dizziness, blurred vision.
  - If toxicity is suspected, stop all local anesthetics.
- If presents with cardiac arrest, stop local anesthetics and:
  1. Start advanced cardia life support.
  2. Patient should immediately receive 1.5 mL/kg of 20% intralipid repeated 1-2 times for persistent asystole, pulseless electrical activity, or reemergence of arrest.
  3. If hemodynamic instability persists or recurs, set intralipid infusion rate to 0.5 mL/kg/min for at least 10 minutes after stability restored.
- If presents with seizure, stop local anesthetics and:
  1. Treat seizure with anti-seizure medication.
  2. Control airway if needed.

Anxiety, Delirium

- Altered mental status can be expected and preemptively managed.
- Evaluation and treatment can be complicated by the presence of traumatic brain injury (TBI).
  - TBI can impede accurate assessment.
  - Moderate to severe TBI is high risk for atypical or paradoxical reactions to sedating and stimulating agents.
  - Reactions to individual agents can change drastically over a short period of time as TBI evolves.

Anxiety Treatment

- Propofol is a good option for short-term sedation in patients with normal hemodynamics.
  - Propofol can cause hypotension.
  - Propofol should only be administered in patients who have a definitive airway and under continuous monitoring.
  - Rapid onset and clearance.
- Dexmedetomidine is an option for patients on non-invasive mechanical ventilation for short-term sedation and anxiolysis.
  - Mild analgesic effects
  - Caution when used in patients with bradycardia or heart block
- Clonidine is useful for mild sedation and analgesia particularly in patients with hypertension with agitation.

Delirium Treatment

Haloperidol (Haldol) and quetiapine (Seroquel) are commonly used for treatment of delirium.

- Both increase QT interval and the cardiac effect should be monitored daily basis EKG.
- Medications should be discontinued if QTc exceeds 500 msec or the interval increases 60 msec from baseline.
- Quetiapine also effective as an anxiolytic and to regulate sleep when used before bed.

Analgesics & Anxiolytics

Use of Analgesics and Anxiolytics with Mechanical Ventilation

- Intermittent dosing of analgesics and anxiolytics has benefits over continuous dosing and should be used first if possible.
  - Reduces duration of mechanical ventilation.
  - Continuous infusion will often result in a prolonged duration of action/effect due to accumulation of metabolites.
  - Patients requiring dosing more frequently than every 1-2 hours, continuous dosing can be titrated to effect.

Analgesics & Anxiolytics

Use of Analgesics and Anxiolytics with Mechanical Ventilation

- Daily interruptions of sedation (sedation vacations) have demonstrated reduction in duration of mechanical ventilation and ventilator-associated pneumonia.
  - To perform, continuous infusions should be stopped daily to assess physical examination and perform spontaneous breathing trial.
  - Sedation goals can be assessed after sedation holidays.
- Contraindications to sedation vacation:
  - Intractable intracranial hypertension.
  - Hemodynamic instability.
  - Inability to adequately oxygenate or ventilate the patient.

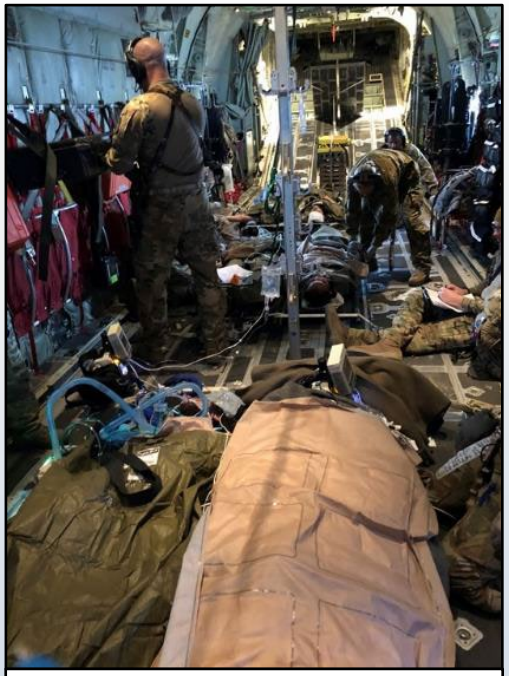
Special Considerations

- Nausea is a common side affect of trauma and of medications used to treat pain, anxiety and delirium.
  - Gastric decompression with a nasogastric tube if any type of obstruction or gastric distension suspected.
  - Ondansetron is pharmacologic therapy of choice.
- Pain control may mask compartment syndrome.
  In patients at risk for compartment syndrome:
  - Any patient at risk for compartment syndrome with increasing pain medication requirements needs aggressive evaluation.
  - Fasciotomies or compartment checks should be done if there are any clinical findings for compartment syndrome or if patient is unable to reliably detect/report pain yet clinical findings raise concern.

AE Special Considerations

AE requires preparation.

- Patient movement requests must state type of regional anesthesia.
- All equipment and therapies used in flight must be approved for flight and personnel trained in their use.
- Ambit pumps currently approved.
- No narcotics should be added to infusions.



Aeromedical transportation of patients

AE Considerations

Patients undergoing prolonged air evacuation are exposed to a multitude of environments in an austere setting.

- Turbulence, weather, temperature, limited patient access, and monitoring make it difficult to maintain sedation and anesthesia.
- May be necessary to empirically increase sedation and pain regimens to maintain safety margin to prevent accidental dislodgement of critical items such as endotracheal tubes.
- Increased medications cloud neurologic examinations, so patients requiring neurologic monitoring in flight should have intracranial pressure monitors.

PI Monitoring

- Population of Interest

  All injured patients

- Intent (Expected Outcomes)
  - Patients in the population of interest have a documented pain assessment at every role of care.
  - Patients in the population of interest in the intensive care unit are screened for delirium daily.
  - Intubated patients will not experience an inadvertent or unplanned extubation.

PI Monitoring

- Performance Adherence Metrics
  - Number and percentage of patients in the population of interest who have a documented pain assessment at each role of care.
  - Number and percentage of patients in the population of interest in the intensive care unit with documented delirium screen daily.
  - Number and percentage of intubated patients who experience an inadvertent or unplanned extubation.
- Data Source
  - Patient Record
  - Department of Defense Trauma Registry (DoDTR)

References

1. Buckenmaier CC, Rupprecht C, McKnight G, et al. Pain following battlefield injury and evacuation: a survey of 110 casualties from the wars in Iraq and Afghanistan. Pain Med. 2009;10(8):1487-96.
2. Buckenmaier CC, Mahoney PF, Anton T, Kwon N, Polomano RC. Impact of an acute pain service on pain outcomes with combat-injured soldiers at Camp Bastion, Afghanistan. Pain Med. 2012;13(7):919-26.
3. Clark ME, Bair MJ, Buckenmaier CC, et al. Pain and combat injuries in soldiers returning from Operations Enduring Freedom and Iraqi Freedom: implications for research and practice. J Rehabil Res Dev. 2007;44(2):179-94.
4. Barr J, Fraser GL, Puntillo K, et al. Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. Crit Care Med. 2013;41(1):263-306.
5. Joshi GP. Multimodal analgesia techniques and postoperative rehabilitation. Anesthesiol Clin North America. 2005;23(1):185-202.
6. Kaye AD, Ali SI, Urman RD. Perioperative analgesia: ever-changing technology and pharmacology. Best Pract Res Clin Anaesthesiol. 2014;28(1):3-14.
7. Moeller-Bertram T, Keltner J, Strigo IA. Pain and post traumatic stress disorder - review of clinical and experimental evidence. Neuropharmacology. 2012;62(2):586-97.
8. Buckenmaier CC. Blood-stained combat boots and acute pain medicine. Pain Med. 2009;10(6):957-8.
9. Polomano RC, Chisholm E, Anton TM, Kwon N, Mahoney PF, Buckenmaier CC. A survey of military health professionals' perceptions of an acute pain service at Camp Bastion, Afghanistan. Pain Med. 2012;13(7):927-36.
10. Nassif TH, Hull A, Holliday SB, Sullivan P, Sandbrink F. Concurrent Validity of the Defense and Veterans Pain Rating Scale in VA Outpatients. Pain Med. 2015.
11. Moeller DR. Evaluation of a Removable Intraoral Soft Stabilization Splint for the Reduction of Headaches and Nightmares in Military PTSD Patients: A Large Case Series. J Spec Oper Med. 2013;13(1):49-54.
12. Meiler SE. Long-term outcome after anesthesia and surgery: remarks on the biology of a newly emerging principle in perioperative care. Anesthesiol Clin. 2006;24(2):255-78.
13. Polomano RC, Buckenmaier CC, Kwon KH, et al. Effects of low-dose IV ketamine on peripheral and central pain from major limb injuries sustained in combat. Pain Med. 2013;14(7):1088-100.
14. Schweickert WD, Pohlman MC, Pohlman AS, et al. Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial. Lancet. 2009;373(9678):1874-82.
15. Schweickert WD, Kress JP. Implementing early mobilization interventions in mechanically ventilated patients in the ICU. Chest. 2011;140(6):1612-7

References

16. Erstad BL, Puntillo K, Gilbert HC, et al. Pain management principles in the critically ill. Chest.2009;135(4):1075-86.
17. Curry P, Viernes D, Sharma D. Perioperative management of traumatic brain injury. Int J Crit Illn Inj Sci. 2011;1(1):27-35.
18. Losiniecki A, Shutter L. Management of traumatic brain injury. Curr Treat Options Neurol. 2010;12(2):142-54.
19. Beaudoin FL, Lin C, Guan W, Merchant RC. Low-dose ketamine improves pain relief in patients receiving intravenous opioids for acute pain in the emergency department: results of a randomized, double-blind, clinical trial. Acad Emerg Med. 2014;21(11):1193-202.
20. Visser E, Schug SA. The role of ketamine in pain management. Biomed Pharmacother. 2006;60(7):341-8.
21. Butler FK, Holcomb JB, Giebner SD, McSwain NE, Bagian J. Tactical combat casualty care 2007: evolving concepts and battlefield experience. Mil Med. 2007;172(11 Suppl):1-19.
22. Butler FK, Kotwal RS, Buckenmaier CC, Edgar EP, O'Connor KC, Montgomery HR, et al. A Triple-Option Analgesia Plan for Tactical Combat Casualty Care: TCCC Guidelines Change 13-04. J Spec Oper Med. 2014;14(1):13-25.
23. Tawfic QA. A review of the use of ketamine in pain management. J Opioid Manag. 2013;9(5):379-88.
24. Loix S, De Kock M, Henin P. The anti-inflammatory effects of ketamine: state of the art. Acta Anaesthesiol Belg. 2011;62(1):47-58.
25. Kress JP, Pohlman AS, O'Connor MF, Hall JB. Daily interruption of sedative infusions in critically ill patients undergoing mechanical ventilation. N Engl J Med. 2000;342(20):1471-7.
26. Schweickert WD, Gehlbach BK, Pohlman AS, Hall JB, Kress JP. Daily interruption of sedative infusions and complications of critical illness in mechanically ventilated patients. Crit Care Med. 2004;32(6):1272-6.
27. Dowben JS, Grant JS, Keltner NL. Clonidine: diverse use in pharmacologic management. Perspect Psychiatr Care. 2011;47(2):105-8.
28. Gorman T, Bernard F, Marquis F, Dagenais P, Skrobik Y. Best evidence in critical care medicine: daily interruption of sedative infusions in critically ill patients undergoing mechanical ventilation. Can J Anaesth. 2004;51(5):492-3.
29. Braude D, Crandall C. Ondansetron versus promethazine to treat acute undifferentiated nausea in the emergency department: a randomized, double-blind, noninferiority trial. Acad Emerg Med. 2008;15(3):209-15.
30. Onifer DJ, Butler FK, Gross KR, et al. Replacement of Promethazine With Ondansetron for Treatment of Opioid- and Trauma-Related Nausea and Vomiting in Tactical Combat Casualty Care. J Spec Oper Med. 2015;15(2):17-24.

Appendices

- **Appendix A:** Pain, Anxiety (Sedation) and Delirium Guidelines
- **Appendix B:** DOD and VA Pain Rating Scale
- **Appendix C:** DOD and Veterans Pain Supplemental Questions
- **Appendix D:** Richmond Agitation Sedation Scale (RASS)
- **Appendix E:** The Confusion Assessment Method (CAM)
- **Appendix F:** Regional Anesthetic Use
- **Appendix G:** Sedation Orders
- **Appendix H**: Additional Information Regarding Off-Label Uses in CPGs

Contributors

- LTC Jennifer Gurney, MC, USA
- LCDR Dana Onifer, MC, USN
- LTC Jeremy Pamplin, MC, USA
- COL Matthew Martin, MC, USA
- LtCol Aaron Fields, USAF, MC
- CAPT Necia William, MC, USN
- CDR Joshua Tobin, MC, USA
- CAPT Zsolt Stockinger, MC, USN
- Col Jennifer J Hatzfeld, USAF, MC
- COL Brian Sonka, MC, USA
- Col Stacy A. Shackelford, USAF, MC

Slides: Lt Col Andrew Hall, USAF, MC
Photos are part of the JTS image library unless otherwise noted.