

Joint Trauma System



Interfacility Transport of Patients Between Theater Medical Treatment Facilities

Part of the Joint Trauma System (JTS) Clinical Practice Guideline (CPG) Training Series



Purpose



This CPG recommends the minimum requirements to move critical care casualties after their entry into the evacuation system.

Presentation is based on the JTS Interfacility Transport of Patients Between Theater Medical Treatment Facilities CPG, 24 Apr 2018 (ID: 27). It is a high-level review. Please refer to the complete CPG for detailed instructions. Information contained in this presentation is only a guideline and not a substitute for clinical judgment.

Agenda



1. Background
2. Service Comparison
3. Patient Prior to Transfer
4. Transport Request Criteria
5. Transport of the Patient
6. Supervision of En Route Care (ERC)
7. Performance Improvement (PI) Monitoring
8. Conclusion
9. References
10. Appendices
11. Contributors

Background



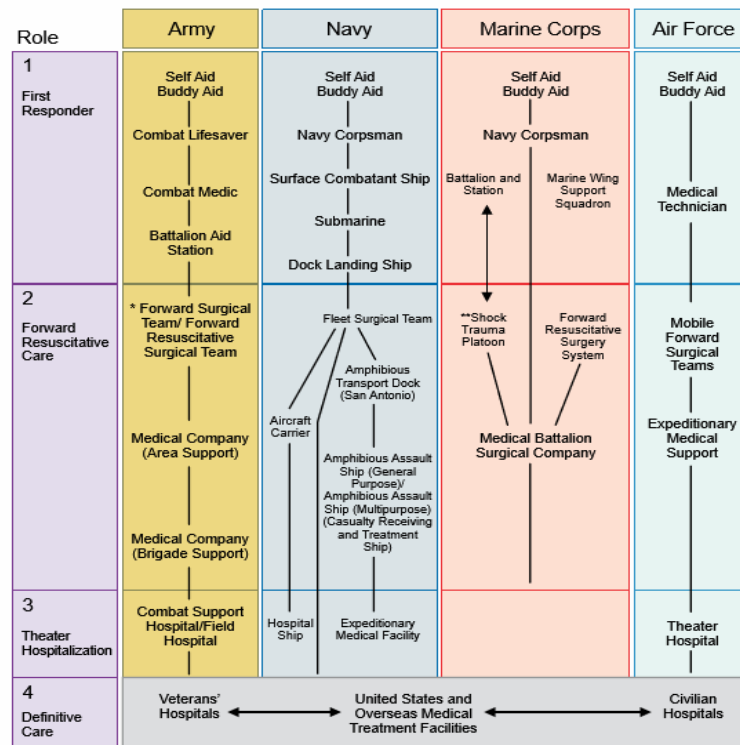
- Reducing time to medical or surgical interventions improves patient outcomes
- It starts on the battlefield and ends at definitive care facilities in the United States
- Some descriptions can be different between branches, but unity of command is critical for ultimate success

Service Comparison



Notional United States Military Roles of Medical Care

Service Comparison



* Note: Army Forward Surgical Team/Forward Surgical Resuscitative Team are a Role 3 capability used to expand care available at Role 2 by providing resuscitative surgical care.

** Marine Corps Shock Trauma Platoon are a Role 2 capability that can be used to expand care available at Role 1 by providing advanced resuscitative care.

Patient Prior to Transfer



- Movement of patients is a medical intervention with associated risks and benefits
- Clinical parameters that suggest normal physiology:
 - Heart rate < 120 beats/minute
 - Systolic blood pressure > 90 mmHg
 - Hematocrit > 24%
 - Platelet count > 50/mm³
 - INR < 2.0
 - pH > 7.3
 - Base deficit < 5 mEq/L
 - Temperature > 35 C

Patient Prior to Transfer



- When any one or more of these criteria are not met, continued care should be rendered at the current facility unless institutional capabilities are exceeded
 - ❑ Best outcomes occur when physiology is closest to normal
 - ❑ Resuscitation may be ongoing in route, but should not require dynamic, complex, or life-preserving adjustments en route
 - ❑ Packing and anticipation of patients needs is important and require careful planning
 - ❑ Documentation of interventions important

Transport Request Criteria



- Dedicated dispatch center allocate resources based on:
 - ❑ Resources based on mission requirements
 - ❑ Requests of transferring provider
 - ❑ Expected en route needs
 - ❑ Capabilities of en route care (ERC) units
- Dispatch centers generally co-located with command and control.
- 9-Line provides a standardized messaging format for communication.

NATO 9 Line MEDEVAC Request



Line	Title	Explanation	Reason
1	Location/Pick up site	Eight or ten digit grid coordinates of pick up site	Required to know where to pick up the patient
2	Radio frequency, call sign	Frequency of radio at the pickup site Call sign of the person to be contacted at the pickup site	Evacuation vehicle can contact requesting unit while en route
3	Number of patients by precedence	A—URGENT D—ROUTINE B—URGENT-SURG E—CONVENIENCE C—PRIORITY	Assist command and control in prioritizing evacuation unit missions
4	Special equipment required	A—None C—Extraction equipment B—Hoist D—Ventilator	Required to have needed equipment loaded prior to mission start
5	Number of patients by type	L+# of patients—Litter A+# of patients— Ambulatory (sitting)	Needed to have appropriate number of vehicles dispatched
6	Security of pick-up site (wartime)	N—No enemy troops in area P—Possibly enemy troops in area (approach with caution) E—Enemy troops in area (approach with caution) X—Enemy troops in area (armed escort required)	For situational awareness and planning
6	Number and type of wound, injury or illness (peacetime)	Specific patient information on wound type (gunshot, blunt force, or explosive device) Serious bleeding and patient blood type if known	Assists evacuation personnel in determining required treatment and special equipment needed
7	Method of marking pickup site	A—Panels D—None B—Pyrotechnic signal E—Other C—Smoke signal	Assists the evacuation crew in identifying the specific location of the pick up
8	Patient nationality and status	A—U.S. military D—Non-U.S. civilian B—U.S. civilian E—Enemy prisoner of war C—Non-U.S. military	Assists in planning for destination facilities and the need for guards.
9	Chemical, biological, radiological, and nuclear contamination (wartime)	Include this line only when applicable R—Radiological C—Chemical N—Nuclear B—Biological	Assists in planning for the mission.
9	Terrain description (peace time)	Identify terrain features in and around proposed landing or pickup site (lake, tower, ridge, mountain).	
+	M I S T	M – Mechanism of injury S – Signs (vital signs) I – Type of Injury T – Treatment given	Recently incorporated into use. May include adult or child notification.

Transport of the Patient



- **Requires proficient personnel and people familiar with theater standards**
- **Two levels of capability recognized:**
 - **Critical Care Transport**

Required when critical illness or injury impairs one or more vital organ system with threat to life during transport
 - **Intermediate Care**
 - Required if dedicated medical attendant with skills equivalent to a paramedic needed
 - Not expected to deteriorate

Transport of the Patient



■ Transport platforms are also required

- ❑ Vehicle selection can directly impact care
- ❑ Weight and space restrictions dependent on vehicle used at time
- ❑ Expendable supplies (e.g. blood, gauze, oxygen) of transferring location should be used until last possible moment given limitations on vehicles

Pre-flight Checklist

(for Critical Care and Post-Surgical Transfers)



Initials	Evaluation Steps
	1. Sending location/physician: _____ Accepting location/physician: _____ Flight nurse called: name / time: _____
	2. Anesthesia called: intubation if indicated. ETT secured/marked
	3. Patient meets criteria for en route critical care transport: risk documented by sending physician (POST-OPERATIVE and CC INTRAFACILITY TRANSFER, Pre-Transfer Patient Status Requirements)
	Preparation Steps
	Position and Proper Monitoring
	1. Patient moved to litter (collapsible handles), positioned, padded, strapped, equipment (with necessary attachments) added and secured.
	2. For head-injured patients, a pre-sedation neurologic examination will be performed. GCS and neurological exam documented on the en route care form, suggest placing patient sitting at 30°-45°. (For eye injured patients, fox shield in place. For burn patients, JTTS burn sheet initiated.)
	3. Ventilator switched to PMI vent at least 20-30 min prior to flight and set with transfer settings ordered by physician.
	4. IV / IO access verified, patent, and secured
	5. Arterial line inserted and secured, if indicated. Transducer accessible.
	6. Ventilator tubing checked to be free from obstruction, with ETCO ₂ and secondary lines attached.
	7. Orogastric or nasogastric tube is inserted (unless contraindicated), placement verified with chest x-ray, and attached to low-intermittent suction.
	8. Chest tubes to water seal/suction (place Heimlich valve for non-atrium chest drainage systems).
	9. Wound vacuum disconnected and stowed.
	10. Foley catheter secured, urine output measured and documented.
	Equipment, Medication, Chart, and Personnel Preparation:
	11. Medications needed for flight prepared and organized.
	12. Flight equipment bag obtained and checked. Backup pulse oximeter readily available.
	13. Complete chart photocopied (including x-ray cd), patient belongings bagged and tagged. Transfer Document, or other theater / unit approved transfer document, has been initiated.
	14. Earplugs and eye protection for patient and flight nurse.
	15. If facility sends medical attendant, attendant must have relevant personal protective equipment. In a combat environment this includes: Uniform, Kevlar, IBA, Weapon, ID Card, and equipment for transport.
	Ventilator Management:
	16. Blood gas (preferably ABG) obtained, 15 min after initial settings and ventilator changes. All efforts will be made to have a documented blood gas within 30 min prior to flight time.
	17. Adjust ventilator settings and check O ₂ tank for length of flight. Resuscitator bag under patient's head with tubing connected to O ₂ source, vent tubing free from obstruction.
	Final Verification:
	18. Transferring Physician, Flight Paramedic, ECCN (or Flight Provider) verbally agrees to flight care plan.
	19. Critical Care Transfer Orders reviewed and signed by transferring physician. (STANDARD ORDER SET for CRITICAL CARE TRANSFERS)
	20. En route CC Transfer Document with completed preflight and en route care data handed over to and confirmed by receiving provider / facility. (CENTCOM Transfer Document)

Transport of the Patient



- **Inter-facility patients transports must be documented on an approved patient record (PCR)**
- **JTS Approved Records Include (not limited to):**
 - ❑ DD Form 1380 Tactical Combat Casualty Care Care: Point of Injury or interfacility transport
 - ❑ DA 4700 Tactical Evacuation Patient Care Record: History of injury, treatment and transportation
 - ❑ AF IMT 3899 Patient Movement Record: Used in Aeromedical Evacuation
 - ❑ Medical Rescue Report SAR Form 3-50.1A: Search and rescue involving Navy
- **At handovers, ERC teams will provide a MIST (Mechanism, Injuries, Vital Signs, and Treatments)**
- **Documentation ensures accuracy of care through multiple hand-offs in the continuity of care**

Supervision of En Route Care



- **Medical direction ensures delivery of an expected capability of care**
- **At the ERC Unit level, commanders must assign a unit medical director**
 - ❑ Must be familiar with en route care
 - ❑ Trained in treatment protocols, CPGs, etc.
 - ❑ Can be offline (chart review, protocol development) and online (on-site supervision, clinical guidance)
- **Regional level ensures quality of care during intra-theater transport**
 - ❑ Advised commanders on medical common operating picture and allocation of resources for transport
 - ❑ Provides technical supervision

PI Monitoring



Intent (Expected Outcomes)

- Casualties will be flown with an ERC team commensurate with the clinical condition of the casualty.
- Casualties and equipment will be thoroughly assessed for flight worthiness to the next level of care.

Data Source

- Patient Record
- Department of Defense Trauma Registry

Performance/Adherence Measures

- Casualties will be flown with an ERC team commensurate with the clinical condition of the casualty.
- Casualties and equipment will be thoroughly assessed for flight worthiness to the next level of care.
- A ventilated patient will be placed on the transport ventilator, all monitors in place and stabilized for 30 minutes prior to departure from the current role of care to the aircraft. Additionally a final check for stability will be performed prior to wheels up and departure from that role of care.
- Hard copy of the medical record accompanied the patient.
- Ventilator settings documented with tidal volume 6-8 mL/kg.

References (1)



1. Walrath, B. Searching for systems-based solutions to enhance readiness. Navy Medicine Live online blog. <http://navymedicine.navylive.dodlive.mil/archives/8760> Accessed Apr 2018.
2. Jones, J., Unity of Command and Unity of Effort in Complex Operations: Implications for Leadership, Institute for Strategic National Studies, <https://inssblog.wordpress.com/2010/07/20/unity-of-commandand-unity-of-effort-in-complex-operations-implications-for-leadership/> Accessed Apr 2018.
3. Eastridge, B. J., Mabry, R. L., Seguin, P., et al. Death on the battlefield (2001–2011): implications for the future of combat casualty care. *Journal of trauma and acute care surgery*, Dec 2012. 73(6), S431-S437.
4. Guide for Interfacility Patient Transfer. National Highway Traffic Safety Administration. Apr 2006. DOT HS 810 599. https://www.ems.gov/pdf/advancing-ems-systems/Provider-Resources/Interfacility_Transfers.pdf Accessed Apr 2018.
5. Warren, J., Fromm, R.E., Orr, R.A., et al. Guidelines for the inter- and intrahospital transport of critically ill patients. *Critical Care Medicine*, 2004. 32, 1, 256-262. doi: 10.1097/01.CCM.0000104917.39204.0A
6. Dunn, M.J., Gwinnutt, C.L., & Gray, A.J. Critical care in the emergency department: patient transfer. *Emergency Medicine Journal*, Jan 24 2007, 40-44. doi: 10.1136/emj.2006.042044
7. Gray, A., Bush, S., & Whiteley, S. Secondary transport of the critically ill and injured adult. *Emergency Medicine Journal*, 2004. 21, 281-285. doi: 10.1136/emj.2003.005975
8. Whiteley, S., Macartney, I., Mark, J., Barratt, H., & Binks, R. (3rd edition, 2011). Guidelines for the transport of the critically ill adult. Intensive Care Society. <https://static1.squarespace.com/static/595276205016e1a5826a3dee/t/59cb93baf09ca4f1e7f8eb2f/1506513856050/Transport+of+Critically+Ill+Adults+2011.pdf> Accessed Apr 2018.
9. Blow, O., Magliore, L., Claridge, et al. The golden hour and the silver day: detection and correction of occult hypoperfusion within 24 hours improves outcome from major trauma. *Journal of Trauma*, Nov 1999. 47, 5, 964-969.

References (2)



10. Meregalli, A., Oliveira, R.P., & Friedman, G. (2004). Occult hypoperfusion is associated with increased mortality in hemodynamically stable, high-risk, surgical patients. *Critical Care*, 8, 2, R60-R65. <http://ccforum.com/content/8/2/R60> Accessed Apr 2018.
11. Ogilvie, T., Taylor, D.M., Wolfe, et al. Pilot study of the prevalence, outcomes and detection of occult hypoperfusion in trauma patients. *Emergency Medicine Journal*, Apr 1 2010. 27, 470-472. doi: 10.1136/emj.2009.073254
12. Raum, M., Rixen, D., Linker, et al. [translated from German] Influence of lactate infusion solutions on the plasma lactate concentration. *Anesthesiology Intensivemed Notfallmed Schmerzther*, 2002. 37, 6, 356-358.
13. Association of Critical Care Transport. The Critical Care Transport Standards Project. Sep 2012 <https://www.nasemso.org/Projects/GovernmentAffairs/documents/AACTMedPACSept2012.pdf>. Accessed Apr 2018.
14. Cone, D., Brice, J. H., Delbridge, T. R., & Myers, J. B. (Eds.). *Emergency Medical Services: Clinical Practice and Systems Oversight*, 2 Volume Set. Feb 2015. John Wiley & Sons. ISBN: 978-1-118-86530-9.
15. Apodaca, A., Olson Jr, C. M., Bailey, J., Butler, F., Eastridge, B. J., & Kuncir, E. (2013). Performance improvement evaluation of forward aeromedical evacuation platforms in Operation Enduring Freedom. *Journal of trauma and acute care surgery*, 75(2), S157-S163.
16. Davies, G. E., & Lockey, D. J. Thirteen survivors of prehospital thoracotomy for penetrating trauma: a prehospital physician-performed resuscitation procedure that can yield good results. *Journal of Trauma and Acute Care Surgery*, May 2011. 70(5), E75-E78. doi: 10.1097/TA.0b013e3181f6f72f.
17. Kehoe, A., Jones, A., Marcus, S., Nordmann, G., Pope, C., Reavley, P., & Smith, C. Current controversies in military pre-hospital critical care. *Journal of the Royal Army Medical Corps*, 2011. 157 (Suppl 3), S305-S309.
18. United States Department of the Air Force. *Aeromedical Evacuation Equipment Standards (AFI10-2909)*. Jul 23 2013. http://static.e-publishing.af.mil/production/1/af_a3_5/publication/afi10-2909/afi10-2909.pdf. Accessed Apr 2018
19. Joint Health Services, Joint Publication 4-02. Dec 11 2017. http://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp4_02.pdf Accessed Apr2018.

References (3)



20. Headquarters Department of the Army. Medical Evacuation (ATP 4-02.2) Army Techniques Publication No. 4-02.2 Aug 12, 2014. http://armypubs.army.mil/doctrine/DR_pubs/dr_a/pdf/atp4_02x2.pdf Accessed Apr 2018.
21. Headquarters Department of the Army. Casualty Evacuation (ATP 4-25.13) Army Techniques Publication No. 4-25.13, Feb 9, 2013. https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/atp4_25x13.pdf Accessed Apr 2018.
22. Headquarters Department of the Army. Army Health System Support to Maneuver Forces (ATP 4-02.3) Army Techniques Publication No. 4-02.3 Jun 2014. https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/atp4_02x3.pdf Accessed Apr 2018.
23. U.S. Department of the Air Force. En Route Care and Aeromedical Evacuation Medical Operations (AFI 41307). Jan 7, 2017. http://static.e-publishing.af.mil/production/1/af_sg/publication/afi48-307v1/afi48307v1.pdf Accessed Apr 2018.
24. Alonso-Serra, H., Blanton, D., & O'Connor, R. E. (1998). Physician medical direction in EMS. *Prehospital Emergency Care*, 2(2), 153-157.
25. Delbridge, T. R., Bailey, B., Chew, J. et al. EMS agenda for the future: where we are... where we want to be. *Annals of emergency medicine*, 1998. 31(2), 251-263.
26. American College of Emergency Physicians. (2006). Interfacility transportation of the critical care patient and its medical direction. *Annals of emergency medicine*, 47(3), 305.
27. Wuerz, R. C., Swope, G. E., Holliman, C. J., & Miguel, G. V. D. On-line medical direction: a prospective study. *Prehospital and disaster medicine*, 1995. 10(03), 174-177.
28. Institute of Medicine Committee on the Future of Emergency Care in the US Health System. *Emergency medical services: at the crossroads*. 2007. Washington: DC. <https://www.nap.edu/catalog/11629/emergency-medical-services-at-the-crossroads> Accessed Apr 2018.

References (4)



29. Lugtenberg, M., Burgers, J. S., & Westert, G. P. Effects of evidence-based clinical practice guidelines on quality of care: a systematic review. *Quality and Safety in Health Care*, 2009. 18(5), 385-392.
30. Afessa, B., Gajic, O., Keegan, M. T., et al. Impact of introducing multiple evidence-based clinical practice protocols in a medical intensive care unit: a retrospective cohort study. *BMC emergency medicine*, 2007. 7(1), 1.
31. Rottman, S. J., Schriger, D. L., Charlop, G., et al. On-line medical control versus protocol-based prehospital care. *Annals of emergency medicine*, 1997. 30(1), 62-68.
32. Jones, A. E., Focht, A., Horton, J. M., & Kline, J. A. Prospective external validation of the clinical effectiveness of an emergency department-based early goal-directed therapy protocol for severe sepsis and septic shock. *CHEST Journal*, 2007. 132(2), 425-432.
33. McFadden, E. R., Elsanadi, N., Dixon, L., et al. Protocol therapy for acute asthma: therapeutic benefits and cost savings. *The American journal of medicine*, 1995. 99(6), 651-661.
34. Pines, J. M., Fee, C., Fermann, G. J., et al. The role of the society for academic emergency medicine in the development of guidelines and performance measures. *Academic Emergency Medicine*, 2010. 17(11), e130-e140.
35. Mabry, R. L., Apodaca, A.; Penrod, J., et al. Impact of critical care-trained flight paramedics on casualty survival during helicopter evacuation in the current war in Afghanistan. *Journal of Trauma and Acute Care Surgery* 2012. 73(2), S32-S37

Appendices



- **Appendix A:** Patient Transport Preparation Checklist
- **Appendix B:** Additional Information Regarding Off-Label Uses in CPGs

Contributors



- CDR Benjamin D. Walrath, MC, USNR
- MAJ Stephen A. Harper, MC, USA
- Maj Joseph L. Reno, USAF, MC
- CDR Joshua M. Tobin, MC, USNR
- LTC Neil Davids, MC, USA
- Col Chetan Kharod, USAF, MC
- MAJ Don Keen, MC, USA
- Col Stacey Shackelford, USAF, MC
- LTC Theodore Redman, MC, USA
- HMC Wayne N. Papalski, USN
- MAJ Benilani Peneda, NC, USA
- CDR Brendon Drew, MC, USN
- Lt Col Antoinette Shinn, NC, USAF
- COL Theresa Duquette-Frame, NC, USA
- Surg Lt Cdr Ed Barnard, MD, Royal Navy
- LCDR Dominique Selby, NC USN
- COL(ret) Samuel W. Sauer, MC, USA
- LTC Cord W. Cunningham, MC, USA
- CAPT Zsolt T. Stockinger, MC, US

Slides: Maj Andrew Hall, USAF, MC