JOINT TRAUMA SYSTEM CLINICAL PRACTICE GUIDELINE

Infection Prevention in Combat-related Injuries (CPG ID: 24)

Provides rationale and guidance for the prevention of infection after combat-related injuries.

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SUMMARY OF CHANGES

1. Infographic added for quick reference.
2. Expanded, aligned (with TCCC guidelines), and updated antimicrobial prophylaxis recommendations.
3. Expanded infection control and PPE protocols.
4. Inserted DOTMLPF-P implementation requirements and added Class VIII supply guidance.
5. Updated performance improvement measures.

Infection Prevention in Combat-Related Injuries

- Battlefield challenges: patient transfers or austere environments
- Requires early/repetitive surgical wound care/ I&D



- MDROs: host nation colonization/ nosocomial transmission
- Remember Tetanus Prophylaxis (Appendix C)

Early Wound Management

- Clean the wounds—debridement and washouts
  - Irrigation/scrubbing
  - Hibiclens/chlorhexidine gluconate (CHG)
  - Dakin's or dilute betadine if possible
- Washout/debride fractures w/in 24 hours of injury
- POI Antibiotics: targeted per TCCC guidelines

▸ Appendix A

Antimicrobial Stewardship

- Improper / overuse of antibiotic use ↑'s MDROs w/o improving outcomes
- All facilities monitor adherence to JTS guidelines
- Role 3 has designated antibiotic stewardship officer

▸ Prophylactic Antibiotics

- Varies by wound location +/- Burn injury
- Select agent/regimen for prophylaxis (Appendix B)
- Limit duration to shortest possible course

Bloodborne Pathogen Exposure

▸ Hep B, Hep C, HIV transmission

- All caregivers of combat wounds
- Security personnel
- Spatters to eyes, mucosa, broken skin
- Infected fragments of suicide bomb blast

▸ Appendix D

- Response varies with:
  - Vaccination status
  - Post exposure testing
- AD.VI.S.OR hotline

Standard Precautions

- Applies to ALL patients regardless of infection
- Handwashing (5 moments of hand hygiene)
  - Before patient contact
  - Before aseptic task
  - After body fluid exposure risk
  - After patient contact
  - After contact w/ patient surroundings
- PPE (between each patient at R2 and R3)
  - Gloves, gowns, masks, goggles
- Accountable to Infection Control Officer

Transmission-Based Precautions

- Droplets/Airborne/ Physical Contact
- Contact precautions (Appendix A)

▸ Prevent Cross-Contamination

- Separate host nation (unable to evacuate) and US/coalition partners (eligible for evac)
- Separate patients with N/V/D (C.diff/Norovirius ↑contagious)
  - Alcohol-based sanitizer NOT effective
  - Use soap and water stations

▸ Skin Care

- Bathe ICU patients DAILY with CHG wipes
- Reduces VRE and MRSA (Appendix E)



METRICS

1. Preferred/alternate antimicrobial agent administered
2. Antimicrobial administered within 3 hrs of injury
3. Duration of antimicrobial use did not exceed recommended timeline.
4. Tdap/TIG administered based on immunization/booster status
5. All ICU patients have daily antiseptic cleaning baths

This information is pulled from the evidence-based Joint Trauma System (JTS) Infection Prevention in Combat-Related Injuries Clinical Practice Guideline (CPG). JTS CPGs can be found at the JTS CPG website or the JTS Deployed Medicine site.

BACKGROUND

Infection has been a complication of war wounds throughout history. While infection prevention and control techniques have advanced since their introduction by Florence Nightingale in the Crimean War, the modern battlefield presents unique challenges. These include multiple patient transfers between hospitals and teams, the austere environment of theater medical care, and the difficulties arising during long distance aeromedical evacuation.[1-3]

Combat casualties are particularly vulnerable to infections, including those caused by multi-drug resistant organisms (MDROs). MDROs are predominantly acquired through nosocomial transmission (colonization/ contamination of patient treatment environments) in higher echelons of care in the chain of tactical combat casualty care (TCCC) to include inpatient management in host nation healthcare facilities.[4,5] Colonization of host nation patients further complicates infection control efforts. Recent experiences from the Russo-Ukrainian War have highlighted additional infection prevention challenges in modern combat environments. These include increased exposure to MDROs, complex wound patterns from high-energy weapons, and prolonged casualty care (PCC) due to disrupted evacuation routes. Reports from the conflict underscore the importance of robust infection control practices, early antimicrobial prophylaxis, and adaptable strategies for wound management in austere and resource-limited settings. Early and repeated surgical wound care cannot be overemphasized to reduce the risk of infection in the wounded. While wound management is foundational for infection prevention, this Clinical Practice Guideline (CPG) will focus on the non-surgical pillars.

NOTE: *Related CPGs published by the Joint Trauma System (JTS): CPG-45, Associated Pneumonia; CPG-09, Blunt Abdominal Trauma Splenectomy Post-Splenectomy Vaccination; CPG-28, Invasive Fungal Infection in War Wounds; CPG-31, War Wounds: Debridement and Irrigation; CPG-62, Acute Traumatic Wound Management in the Prolonged Field Care Setting, and CPG-20, Burn Care. Clinical Practice Guidelines are posted at* https://jts.health.mil/index.cfm/CPGs/cpgs.

STANDARD AND ADDITIONAL PRECAUTIONS FOR COMBAT TRAUMA

STANDARD PRECAUTIONS

Standard precautions are the foundation of infection prevention and apply to all patients, regardless of suspected or confirmed infectious status. These measures are determined by the nature of the interaction between the healthcare worker and the patient, in addition to the extent of anticipated blood, body fluid or pathogen exposure.[6]

Core Elements

- **Hand Hygiene**: The World Health Organization's (WHO) "five moments of hand hygiene" include:
  1. use of soap and water or alcohol-based sanitizer before patient contact;
  2. before aseptic tasks;
  3. after body fluid exposure risk;
  4. after patient contact; and
  5. after contact with patient surroundings, even if gloves were worn.[7]
- **Gloves**: Use to prevent contamination of hands when anticipating direct contact with non-intact skin, mucous membranes and blood or body fluids (e.g., dressing changes, starting IVs).
- **Safe Practices**: Use safe injection techniques and handle contaminated equipment and surfaces appropriately.

Direct observation is the gold standard for monitoring adherence and providing immediate corrective feedback.[8]

ADDITIONAL PRECAUTIONS FOR HIGH-RISK EXPOSURE

In situations where there is a high likelihood of exposure to blood or body fluids – such as a trauma resuscitation, wound care, or surgical procedures – additional personal protective equipment (PPE) is required. This is especially relevant in combat trauma care, where injuries frequently involve significant bleeding and contamination.

ADDITIONAL PRECAUTIONS

- **Gowns**: Isolation gowns are specified by standard and transmission-based precautions to protect the healthcare worker's arms and exposed body areas and prevent contamination of clothing with blood, body fluids, and other potentially infectious material (e.g., changing dressings or open wounds). Gowns are always used in conjunction with gloves.
- **Masks**: Masks protect healthcare workers from contact with infectious material originating from patients. They are also used when performing sterile techniques to protect patients from exposure to infectious agents carried in a healthcare workers' mouth or nose.
- **Goggles or Face Shields**: Use is based on anticipated exposure. Personal eyeglasses and contact lenses are not considered adequate eye protection.

Providers must change gloves (and even gowns, if available) and wash hands (even if PPE was worn) between patient encounters to prevent cross-contamination.

ROLE 2 AND 3 FACILITIES

- Role 2 and 3 medical facilities must ensure that appropriate PPE such as gloves, gowns, masks, eye protection is readily available and used consistently during all trauma resuscitations, surgical procedures, and wound care activities.
- Facility leadership should designate an Infection Prevention and Control Officer (IPCO) to oversee PPE availability, staff training, and compliance monitoring.
- Regular training and drills should be conducted to reinforce correct PPE use and infection prevention practices.[9]

ESTABLISHING ACCOUNTABILITY

- The trauma team leader or designated IPCO is responsible for ensuring adherence to PPE protocols and infection prevention measures at the local level.
- Compliance should be monitored and documented, with feedback provided to staff to support continuous improvement.

Operational Note

Due to the nature of combat injuries,[10] these additional precautions are frequently necessary in deployed and trauma care settings. Consistent application of these measures – including hand hygiene, cohorting, and appropriate isolation – reduces the risk of transmission and limits the emergence of antibiotic-resistant organisms.

TRANSMISSION-BASED PRECAUTIONS

Transmission-based precautions are used in addition to standard precautions for patients known or suspected to be infected or colonized with pathogens that require additional control measures to prevent transmission. For this CPG, the focus is on contact precautions for epidemiologically important organisms, including MDROs and *Clostridioides difficile* (*C. difficile*).

KEY ELEMENTS

- **Contact Precautions**: Gloves and gowns should be worn with all patients suspected or known to have MDRO colonization/infection, or with *C. difficile*- infection (CDI). These patients should immediately be placed into contact precautions.[8] Patients who have received healthcare in a host nation hospital should be considered to be colonized with MDROs until confirmatory laboratory testing can be performed. Refer to Appendix A of the 2007 Isolation Guidelines published by the Centers for Disease Control and Prevention (CDC) for a list of all diseases requiring contact precautions.[6]

- **Cohorting**: Cluster host nation patients (who are not eligible to evacuate from theater) and U.S. and coalition patients (who are eligible for evacuation from theater) and separate when possible to reduce the risk of cross-contamination with MDROs.[11] Care should be taken to ensure hand hygiene is performed between patient care, even if contact precautions or cohorting is implemented.
  - Additional cohorting considerations, as able, should be made for patients with uncontrollable vomiting and diarrhea as norovirus is highly transmissible. Soap and water hand washing stations should be made available for any patients where norovirus or *C. difficile* is suspected or known. Alcohol-based hand sanitizer is not effective for these pathogens.
  - Care should be taken to ensure hand hygiene is performed between patient care while the patient is under contact precautions and when cohorting is implemented.

NOTE: *U.S. personnel with skin and soft tissue infections presenting with abscess or furuncles should be assumed to have community-associated Methicillin-Resistant Staphylococcus Aureus (MRSA).*

- **Skin care**: Intensive care unit (ICU) patients should undergo daily bathing with topical chlorhexidine gluconate (CHG). CHG-impregnated wipes are available commercially. CHG has broad activity against gram-positive and gram-negative bacteria, facultative anaerobes and aerobes. Daily bathing of ICU patients has shown a reduction of infections with vancomycin-resistant Enterococci (VRE) and MRSA. Daily bathing with CHG washcloths significantly reduces the risk of acquisition of MDROs.[12-14] See Appendix E: Antiseptic Body Cleaning. [14]

ENVIRONMENTAL CLEANING AND DISINFECTION

Effective cleaning and disinfection are critical components of infection prevention; and this should start at the earliest level of care in the battlefield trauma system. Routine cleaning should focus on the removal of organic material and visible soil from surfaces, followed by disinfection. See CPG-31, War Wounds: Debridement and Irrigation Terminal cleaning—performed after patient discharge, transfer, or death—should include thorough cleaning and disinfection of all surfaces, equipment, and linens in the patient area. In resource-limited or austere environments, prioritize cleaning of high-risk areas and use available disinfectants with proven efficacy. Staff should be trained in proper cleaning techniques, use of PPE, and safe handling of cleaning materials. Adherence to these practices, as outlined by CDC and WHO, helps prevent healthcare-associated infections and the spread of multidrug-resistant organisms in all roles of care, from field hospitals to higher-level facilities.[15-16]

ANTIMICROBIAL STEWARDSHIP

- Antimicrobial drug usage contributes to the development of multidrug-resistant organisms. Use of overly broad-spectrum antibiotics for combat trauma prophylaxis has resulted in an increased risk of infection from MDROs without improvement in long-term clinical outcomes such as number of surgical procedures, length of hospitalization, or osteomyelitis.[17,18]
- Providers should avoid all unnecessary empiric use of antibiotics.
- Prehospital providers should follow the TCCC Guidelines for antibiotic use. Role 2 and Role 3 providers should follow the JTS CPGs, CPG-31, War Wounds: Wound Debridement and Irrigation, CPG-28, Invasive Fungal Infection in War Wounds, CPG-09, Blunt Abdominal Trauma, Splenectomy, and Post-Splenectomy Vaccination, and CPG-20, Burn Care. If the TCCC or CPG recommendations are not followed, providers should document the reason for the divergence from the guidelines.
- When available, use local antibiogram to guide empiric therapy (typically only available at Role 3 or 4s).
- Limit duration of antibiotic therapy. Several well-controlled studies have shown benefit to shorter courses of antibiotic therapy for common infectious problems (i.e. pneumonia). Prolonged duration of prophylaxis has not been shown to decrease long-term rates of infections in retrospective study of 1,044 patients with combat-related open fractures.[17] The shortest course of post-injury antimicrobial therapy should be used.
- Appendix B: Post-Injury Antimicrobial Agent Selection and Duration describes antimicrobial prophylaxis regimens and proposed durations for combat wounded personnel.[19-22]
- In alignment with the 2024 American Association for the Surgery of Trauma (AAST) clinical consensus document, routine use of extended prophylactic antibiotics should be avoided. Prophylactic antibiotics should be discontinued within 24 hours for open extremity and facial fractures. Washout and debridement of open fractures should take place within 24 hours of injury.
- All facilities responsible for trauma care should monitor adherence to antimicrobial prophylaxis regimens.[23] See below for special situational care of combat injured secondary to suicide bomber/blast injury.

BLOODBORNE PATHOGENS AND POST-EXPOSURE MANAGEMENT

Blast injuries, especially those related to suicide bomber attacks, present a unique bloodborne pathogen risk if an impaled body part is introduced into the trauma patient. There have been reported cases of Hepatitis B virus (HBV)-positive impaled bone fragments recovered from suicide bomber victims in Israel.[24-26] This prompted the Israeli Ministry to provide post-exposure HBV vaccination as a practice. Since the initiation of the vaccine, while HBV impaled fragments have been reported, no disease transmission has been documented. [27]

Prior to deployment, U.S. forces are required to receive a three-dose vaccine series, but 5-14% of vaccinated patients fail to achieve immunity (anti HBs <10mlU/ml) which places them at increased risk of transmission.[28,29] Thus it is recommend to attempt to verify anti-HBV status in those who are combat injured secondary to a suicide bomber and provide HBV immunoglobulin (HBIG) and HBV vaccine for those incompletely vaccinated with unknown titers or anti-HBs<10mlU/ml. Recombinant Hepatitis B vaccine may be considered in those who have failed to respond to conventional Hepatitis B vaccine.

The risk of transmission for human immunodeficiency virus (HIV) is considered very low after blast injury and generally warrants no action.[27] However, in the case of penetrating blast injury in a highly endemic region, expert teleconsultation should be obtained to discuss case specifics. Specific recommendations can be obtained from infectious diseases physicians via the AD.VI.S.OR hotline found at https://prolongedfieldcare.org/telemed-resources-for-us-mil/. Hepatitis C (HCV) prophylaxis is not recommended, but testing can be considered in penetrating blast injury at the time of injury and at two, four, and six months.[30,31]

- **Healthcare Bloodborne Pathogen Exposure**: Staff caring for patients with combat wounds are at risk for blood borne pathogens (HBV, HIV and HCV).[30] At risk activities include security personnel searching patients (for example, patting down patients who are injection drug users, needle sticks, break in surgical technique and blood splatters to non-intact skin, eyes or mucosa).
- **Source testing should be obtained for HBV, HIV and HCV**: Testing for HBV and HIV should be obtained at time of exposure and up to six months post-exposure.[32] There is no post-exposure prophylaxis for HCV, although excellent and well-tolerated regimens to cure HCV do exist for patients who become infected.
    - **For HBV**, treatment is based on the source's HBV surface antigen (HBsAg) status and the exposed patient's vaccine completion and post-vaccine titer (anti-HBs >10mlU/ml. Refer to the *2018 CDC Prevention of Hepatitis B virus infection in the United States: Recommendations of the Advisory Committee on Immunization Practices: A summary of the MMWR report*.[33]

- **For high-risk HIV exposure**, 28 days of post-exposure prophylaxis with antiretroviral therapy should be administered within 1-2 hours but NO LATER than 72 hours post-exposure. Refer to updated *U.S. Public Health Service guidelines for the management of occupational exposures to HIV and recommendations for post-exposure prophylaxis*.[32]

CARE OF COMBAT-INJURED PERSONNEL BASED ON ROLE OF CARE

See Appendix A: Recommendations to Prevent Infections Associated with Combat-related Injuries based on role of care.

- Role 2 and 3 facilities should have a designated IPCO as an additional duty or a full-time position if supported by manning levels. The U.S. Army holds an Infection Control in the Deployed Setting course open to all branches. Army Training Requirements and Resource System catalogs the course as 6A-F22 and U.S. Central Command requires and funds the course for Role 3 IPCOs.
- All facilities responsible for trauma care should monitor adherence to antimicrobial prophylaxis regimens as listed in the JTS guidelines for infection prevention after combat-related injuries and present rates to providers regularly. Rates should include adherence to recommended agents and duration of therapy.
- Role 3 facilities should have a designated antimicrobial stewardship officer as an additional duty if supported by manning levels. Proposed antimicrobial stewardship measures should be discussed with an antimicrobial stewardship expert prior to implementation.

PERFORMANCE IMPROVEMENT MONITORING

POPULATION OF INTEREST

All trauma patients with open wound(s) or penetrating injury, including open fractures, open joints, or open globe injuries.

INTENT (EXPECTED OUTCOMES)

1. Patients will receive the preferred post-injury antimicrobial agent based on injury pattern, or the alternative agent based on allergy or supply constraint. (See Appendix B.)
2. Post-injury antimicrobial agent will be administered within 3 hours of injury.
3. Duration of post-injury antimicrobial prophylaxis will not exceed recommended duration. (See Appendix B.)
4. Tetanus, diphtheria, and pertussis (Tdap) vaccine and/or tetanus immune globulin (TIG) vaccine will be administered post-injury based on immunization and booster status. (See Appendix C.)

5. Intensive Care Unit patients will receive daily antiseptic body cleansing, preferably with CHG. (See Appendix E.)

PERFORMANCE/ADHERENCE MEASURES

1. Either the preferred or alternative post-injury antimicrobial agent was administered.
2. Post-injury antimicrobial prophylaxis was administered within 3 hours from time of injury.
3. Duration of post-injury antimicrobial prophylaxis did not exceed recommended timeline.
4. Tdap/TIG administered appropriately based on immunization and booster status.
5. Intensive Care Unit patients who received daily antiseptic cleaning baths.

DATA SOURCES

- Patient Record
- Department of Defense Trauma Registry (DoDTR)

SYSTEM REPORTING AND FREQUENCY

The pervious sections constitute the minimum criteria for Performance Improvement (PI) monitoring of this CPG. System reporting will be performed annually; additional PI monitoring and system reporting may be performed as needed.

The JTS Chief and the JTS PI Branch will perform the system review and data analysis.

RESPONSIBILITIES

It is the trauma team leader's responsibility to ensure familiarity, appropriate compliance, and PI monitoring at the local level with this CPG.

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DOCTRINE, ORGANIZATION, TRAINING, MATERIEL, LEADERSHIP AND EDUCATION, PERSONNEL, FACILITIES, AND POLICY (DOTMLPF-P)

DOTMLPF-P Implementation Requirements for Infection Prevention CPG

DOTMLPF-P Domain	Implementation Requirements
Doctrine	Update TCCC guidelines, JTS CPGs, and unit standard operating procedures (SOPs) to explicitly mandate early wound washout (3-6L water), use of CHG/Dakin's, and adherence to narrow-spectrum antibiotic protocols (Cefadroxil PO, Ceftriaxone IV). Incorporate 2024 AAST guidelines for shortened prophylactic antibiotic durations.
Organization	Integrate infection control responsibilities at every echelon. Ensure evacuation chains and Role 2/3 triage structures accommodate the requirement for thorough wound washout and debridement within 24 hours of injury.
Training	Institute mandatory training for Role 1 providers (medics/corpsmen) on the basics of early wound irrigation, scrubbing, and basic debridement. Train all echelons on austere hand hygiene, strict PPE protocols (changing gloves/gowns between patients), incorporating infection prevention and control best practices, and the dangers of early broad-spectrum antibiotics.
Materiel	Procure and push critical supplies down to Role 1: potable water generation/storage (for 3-6L per wound), targeted antibiotics, and high volumes of PPE (gloves and disposable/reusable gowns) for Role 2/3 facilities.
Leadership and Education	Educate medical directors and commanders on the strategic impact of antibiotic stewardship, [34] infection prevention standards, and early infection control on force preservation. Leaders must foster a culture that prioritizes hand hygiene and PPE compliance, even in resource-constrained environments.
Personnel	Ensure appropriate medical logistics personnel are assigned to manage the increased supply chain demands for PPE and wound care fluids. Ensure adequate staffing at Role 2 and 3 to allow providers the necessary time to safely doff/don PPE between patient encounters. Appoint infection prevention and control leads.
Facilities	Equip Role 1-3 locations with adequate clean water storage to support the high-volume irrigation requirements. Designate specific clean/dirty zones within Role 2 and Role 3 facilities to support strict infection control, workspace decontamination/disinfection, and PPE protocols. Ensure Role 1 setups can accommodate early wound showering/scrubbing.
Policy	Publish service-level policies mandating the updated TCCC antibiotic guidelines and standardizing infection control practices. Institute policies requiring the tracking of training competencies for wound irrigation and debridement skills for all Role 1 personnel. Update SOPs to include infection prevention and control best practices.

APPENDIX A: RECOMMENDATIONS TO PREVENT INFECTIONS LINKED TO COMBAT-RELATED INJURIES

Recommendations to prevent infections associated with combat-related injuries based on role of care. *Criteria for allowing retained fragments to remain behind: entry/exit wounds < 2cm; no bone, joint, vascular, body cavity involvement; no high-risk etiology (for example, mine); no obvious infection; assessable by x-ray.*

Recommendations to Prevent Infections Linked to Combat-Related Injuries		
Common Surgical Diagnoses	Care Category	Recommendations
Role 1 (Prehospital)	Initial care in the field	▪ Perform early wound cleaning. ▪ Hand hygiene is essential even at this level of care and should not be underestimated. ▪ Bandage wounds with sterile dressings (avoid pressure over eye wounds). ▪ Stabilize fractures. ▪ Transfer to surgical support as soon as feasible.
	Post-injury antimicrobials	▪ Provide single dose point of injury antimicrobials (Appendix B). If evacuation is delayed or expected to be delayed, provide 24 hours of appropriate antimicrobial coverage.
Role 1 and Presurgical Care	Post-injury antimicrobials	▪ Provide PO/oral or intravenous antimicrobials (Appendix B) within 3 hours of injury, as indicated by injury pattern/patient condition for open wounds. ▪ Provide tetanus toxoid and immune globulin as appropriate. (See Appendix C.) ▪ Gram-negative coverage with aminoglycoside or fluoroquinolone are not indicated. ▪ Antibiotics used should be expected to prevent clostridial gangrene or streptococcal infection. ▪ Re-dose antimicrobials if large volume blood product resuscitation (>1500cc blood loss). ▪ Use only topical antimicrobials for burns. ▪ Irrigate wounds with 3-6 liters of water to remove gross contamination. ▪ Hibiclens/CHG, dilute betadine, or Dakin's solution should be used for irrigation and scrubbing of wounds.
	Debridement and irrigation	▪ Irrigate minor wounds to remove gross contamination with normal saline, sterile, or potable water without additives. ▪ Debridement and irrigation of large wounds should be done at a surgical facility (Role 2b or 3). ▪ Do not attempt to remove retained deep soft tissue fragments meeting criteria listed above. ▪ Provide a maximum of 24 hours of appropriate antibiotics prior to the procedure (see below). ▪ Refer to the CPG-31, War Wounds: Debridement and Irrigation.

Recommendations to Prevent Infections Linked to Combat-Related Injuries		
Common Surgical Diagnoses	Care Category	Recommendations
Role 2 (surgical support) and Role 3	Post Injury Antimicrobials	▪ Provide a maximum of 24 hours of appropriate antibiotics within 3 hours of injury (Appendix B). ▪ Provide tetanus toxoid and immune globulin as appropriate (Appendix C). ▪ Re-dose antibiotics with each debridement until bone has soft tissue coverage (Appendix B). ▪ Gram-negative coverage with aminoglycoside or fluoroquinolone is not indicated. ▪ Providers must change gloves and gowns and wash hands between patient encounters. ▪ Antibiotics used should be expected to clostridial gangrene or streptococcal infection. ▪ Re-dose antimicrobials if large volume blood product resuscitation (>1500cc blood loss). ▪ Use only topical antimicrobials for burns. ▪ Refer to the CPG-28, Invasive Fungal Infection in War Wounds for dismounted blast injuries, high amputations, and cases of recurring necrosis on staged debridements. ▪ Provide post splenectomy immunizations if indicated. (See the CPG-09, Blunt Abdominal Trauma, Splenectomy, and Post-Splenectomy Vaccination.)
	Debridement and irrigation	▪ Refer to the CPG-31, War Wounds: Wound Debridement and Irrigation. ▪ Infection prevention starts with early debridement and irrigation. Washout and debridement should take place within 24 hours of injury. ▪ Antimicrobial beads pouches, or topical powder may be used. ▪ Do not attempt to remove retained deep soft tissue fragments if criteria above are met. ▪ Do not obtain cultures unless infection is suspected. ▪ Do not attempt primary wound closure (except for dura and face).
	Other	▪ Perform appropriate cleaning of patient care areas.
Role 4	Post-injury antimicrobials	▪ Re-dose antibiotics for 24 hours with each subsequent washout involving exposed bone. ▪ Providers must change gloves and gowns between patient encounters. ▪ Antimicrobial beads or pouches may be used. ▪ Refer to the CPG-28, Invasive Fungal Infection in War Wounds for dismounted blast injuries, high amputations, and cases of recurring necrosis on staged debridements. ▪ Provide post splenectomy immunizations if not documented. (See the CPG-09, Blunt Abdominal Trauma, Splenectomy, and Post-Splenectomy Vaccination.)
	Debridement and irrigation	▪ Refer to the CPG-31, War Wounds: Wound Debridement and Irrigation. ▪ Do not attempt to remove retained deep soft tissue fragments if criteria above are met.

Recommendations to Prevent Infections Linked to Combat-Related Injuries		
Common Surgical Diagnoses	Care Category	Recommendations
		▪ Do not obtain cultures unless infection is suspected. ▪ Wounds should not be closed until 3-5 days post-injury when wound is clean and all devitalized tissue is removed.
	Other surgical management	▪ Perform appropriate cleaning of patient care areas.

APPENDIX B: POST-INJURY ANTIMICROBIAL AGENT SELECTION AND DURATION

Post-injury antimicrobial agent selection and duration based upon injury pattern.

Post-Injury Antimicrobial Agent Selection and Duration			
Injury	Preferred Agent(s)	Alternate Agent(s)	Duration
Extremity Wounds (Includes Skin, Soft Tissue, and Bone)			
Skin, soft tissue, no open fractures	If able to take PO meds: Cefadroxil 1 gram PO q24h OR Cephalexin 500mg QID x4 If unable to take PO meds: Cefazolin, 2gm IV q6-8h†‡	Clindamycin (450mg PO TID or 900mg IV q8h) (for a history of anaphylaxis or severe allergy to penicillin or cephalosporins)	24 hours
Skin, soft tissue, with open fractures, exposed bone, or open joints	Cefazolin, 2gm IV q6-8h†‡ § Type I or II open fractures: If able to take PO meds: Cefadroxil 1 gram PO q24h OR Cephalexin 500mg QID x4 If unable to take PO Meds: Cefazolin, 2gm IV q6-8h†‡ Type III open fractures: Ceftriaxone 2g q24hr	Clindamycin 900mg IV q8h (for a history of anaphylaxis or severe allergy to penicillin or cephalosporins)	24 hours initially and repeat with each subsequent I&D until soft tissue coverage.
Thoracic Wounds			
Penetrating chest injury without esophageal disruption	If able to take PO meds: Cefadroxil 1 gram PO q24h OR Cephalexin 500mg QID x4 OR Cefazolin, 2gm IV q6-8h†‡	Clindamycin 450mg PO TID or 900 mg IV q8h (for a history of anaphylaxis or severe allergy to penicillin or cephalosporins)	1 day
Penetrating chest injury with esophageal disruption	Cefazolin, 2gm IV q6-8h†‡ PLUS metronidazole 500mg IV q8-12h PLUS Diflucan 400mg q24h	Ertapenem 1gm IV x 1 dose, OR Moxifloxacin 400mg IV x 1 dose	Stop 24 hours after definitive closure
Abdominal Wounds			
Penetrating abdominal injury with suspected/known hollow viscus injury and soilage; may apply to rectal/perineal injuries as well	Ceftriaxone 2gm IV/IO/IM q24h PLUS metronidazole 500mg IV q8-12h OR Cefazolin, 2gm IV q6-8h†‡ PLUS metronidazole 500mg IV q8-12h	Ertapenem 1gm IV x 1 dose, OR Moxifloxacin 400mg IV x 1 dose	Stop 24 hours after control of contamination

Post-Injury Antimicrobial Agent Selection and Duration			
Injury	Preferred Agent(s)	Alternate Agent(s)	Duration
Maxillofacial And Neck Wounds			
Open maxillofacial fractures, or maxillofacial fractures with foreign body or fixation device	If able to take PO meds: Cefadroxil 1 gram PO q24h OR Cephalexin 500mg QID x4 If unable to take PO meds: Ceftriaxone 2g q24h	Ampicillin/sulbactam 1.5g IV q6h OR Clindamycin 900mg IV q8h (for a history of anaphylaxis or severe allergy to penicillin or cephalosporins)	24 hours
Exposed cartilage (nose/ear) *Evidence supporting routine use of antibiotics is limited. In high-risk wounds with heavy contamination, prophylaxis is reasonable.	If able to take PO meds: Ciprofloxacin 500mg PO q12h OR Moxifloxacin 400mg PO q24h If unable to take PO meds: Ciprofloxacin 400mg IV q12h OR Levofloxacin 500mg IV q24	Clindamycin 450mg PO TID or 900mg IV q8h PLUS Trimethoprim/Sulfamethoxazole 160mg/800mg PO q12h (for a history of anaphylaxis or severe allergy to penicillin or cephalosporins)	24 hours or up to 72 hours in heavily contaminated wounds
Central Nervous System Wounds			
Penetrating brain injury	Ceftriaxone 2mg IV q24h. Consider adding metronidazole 500mg IV q8-12h if gross contamination with organic debris.	Cefazolin 2gm IV q6-8h. †‡Consider adding metronidazole 500mg IV q8-12h if gross contamination with organic debris For patients with a history of anaphylaxis or severe allergies to cephalosporins, vancomycin 15-20mg/kg IV q 8-12h PLUS ciprofloxacin 400mg IV q8-12h	Up to 72 hours or until CSF leak is closed, whichever is longer
Penetrating spinal cord injury	Ceftriaxone 2mg IV q24h. Consider adding metronidazole 500mg IV q8-12h if abdominal cavity with hollow viscous injuries are involved.	As above.	Stop 24 to 48 hours after control of contamination
Eye Wounds			
Eye injury, burn or abrasion	Topical: Erythromycin or Bacitracin ophthalmic ointment QID and PRN for symptomatic relief. Systemic: No systemic treatment required	1% Chloramphenicol ointment QID and PRN for symptomatic relief (1st line internationally)	Until epithelium healed (no fluorescein staining)
Eye injury penetrating	Levofloxacin 750mg IV/PO once daily. Prior to primary repair, no topical agents should be used unless directed by ophthalmology	Moxifloxacin 400mg IV/PO once daily	7 days or until evaluated by an ophthalmologist

Post-Injury Antimicrobial Agent Selection and Duration			
Injury	Preferred Agent(s)	Alternate Agent(s)	Duration
Burns			
Superficial burns	Topical antimicrobials with daily dressing changes (include mafenide acetate** or silver sulfadiazine; may alternate between the two), OR silver impregnated dressing changed q3-5d, OR Biobrane	Silver nitrate solution applied to dressings	Until healed
Deep partial thickness burns	Topical antimicrobials with daily dressing changes, OR silver impregnated dressing changed q3-5d, PLUS excision and grafting	Silver nitrate solution applied to dressings PLUS excision and grafting	Until healed or grafted
Full thickness burns	Topical antimicrobials with daily dressing changes PLUS excision and grafting	Silver nitrate solution applied to dressings PLUS excision and grafting	Until healed or grafted
Point of Injury/Delayed Evacuation			
Expected delay to reach surgical care (See JTS Tactical Combat Casualty Care Guidelines for more information)	If able to take PO meds: Cefadroxil 1 gram PO – Recommended Cephalexin 500mg QID x4 – Alternative If unable to take PO meds (shock, unconsciousness):Ceftriaxone 2gm IV/IO/IM once a day		24 hours of therapy

**Post-injury antimicrobial agents are recommended to prevent early post-traumatic infectious complications, including sepsis, secondary to common bacterial flora. Selection is based on narrowest spectrum and duration required to prevent early infections prior to adequate surgical wound management. This narrow spectrum is selected to avoid selection of resistant bacteria. The antimicrobials listed are not intended for use in established infections, where multidrug-resistant (MDR) or other nosocomial pathogens may be causing infection.*

†Cefazolin may be dosed based on body mass: 1 gram if weight < 80kg (176lbs), 2 grams if weight 81-160kg (177-352lbs), 3 grams if weight > 160 kg (>352lbs); doses up to 12 grams daily are supported by FDA-approved package insert.

‡Pediatric dosing: cefazolin, 20-30mg/kg IV q6-8h (maximum, 100mg/kg/day); metronidazole, 7.5mg/kg IV q6h; clindamycin 25-40mg/kg/day IV divided q6- 8h; ertapenem, 15mg/kg IV or IM q12 (children up to 12 years) or 20mg/kg IV or IM once daily (children over 12 years; maximum, 1gm/day); ceftriaxone, 100mg/kg/day IV divided q12-24h (dosing for CNS injury); levofloxacin, 8mg/kg IV or PO q12h (levofloxacin is only FDA-approved in children for prophylaxis of inhalational anthrax in children > 6 months of age, but this dose is commonly used for other indications); vancomycin 60mg/kg/day IV divided q6h (dosing for CNS injury); ciprofloxacin, 10mg/kg IV (or 10-20mg/kg PO) q12h.

§These guidelines do not advocate adding enhanced Gram negative bacteria coverage (i.e., addition of fluoroquinolone or aminoglycoside antimicrobials) in type III fractures.

***Mafenide acetate is contraindicated in infants less than 2 months of age.*

††Post-injury antimicrobial therapy as suggested by CPG-62, Acute Traumatic Wound Management in the Prolonged Field Care Setting.

APPENDIX C: TETANUS PROPHYLAXIS RECOMMENDATIONS

Tetanus Prophylaxis recommendations from the Advisory Committee on Immunization Practices

Tetanus Immunization Chart			
Tetanus Immunization Status	Minor Clean Wound	Major Clean Wound	Contaminated Wound (War Wounds)
Fully immunized recent Td booster	N/A	N/A	N/A
Fully immunized Td booster 5–10 years ago	N/A	Tdap	Tdap
Fully immunized, no booster for >10 years	Tdap	Tdap	Tdap
Unknown, none, or incomplete immunization	Tdap	Tdap and TIG (250U)	Tdap and TIG (500U)

Source: Special Operations Forces Medical Handbook, U.S. DoD. Reprinted from the JTS Acute Traumatic Wound Management – Prolonged Field Care CPG, 24 Jul 2017

N/A, not applicable; Td, tetanus and diphtheria; Tdap, tetanus-diphtheria-acellular pertussis; TIG, tetanus immune globulin.
***NOTE**: Tetanus vaccination of mother gives her protection and protects the newborn in the first few weeks of life.*

**Such as, but not limited to, wounds contaminated with dirt, feces, soil, and saliva; puncture wounds; avulsions; and wounds resulting from missiles, crushing, burns, and frostbite.*

† DTaP is recommended for children aged <7 years. Tdap is preferred to Td for persons aged ≥11 years who have not previously received Tdap. Persons aged ≥7 years who are not fully immunized against pertussis, tetanus or diphtheria should receive one dose of Tdap for wound management and as part of the catch-up series.

§ Persons with HIV infection or severe immunodeficiency who have contaminated wounds should also receive TIG, regardless of their history of tetanus immunization.

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APPENDIX D: POST-EXPOSURE MANAGEMENT OF PERSONNEL

Post exposure management of personnel after occupational percutaneous and mucosal exposure to blood or any body fluids.

Post Exposure Management of Personnel					
Healthcare Personnel Status	Post exposure testing		Post exposure prophylaxis		Post vaccination serologic testing †
	Source patient (HBs Ag)	HCP testing (anti-HBs)	HBIG*	Vaccination	
Documented responder § after complete series (≥3 doses)	**No action needed**				
Documented non-responder ¶ after 6 doses (2 complete series)	Positive/unknown		HBIG x2 separated by 1 month		No
	Negative	**No action needed**			
Response unknown after a complete series	Positive/unknown	‹ 10mIU/mL	HBIG x1	Initiate revaccination	Yes
	Negative	‹ 10mIU/mL	None		
	Any result	≥ 10mIU/mL	**No action needed**		
Unvaccinated/incompletely vaccinated or vaccine refusers	Positive/unknown		HBIG x1	Complete vaccination	Yes
	Negative		None	Complete vaccination	Yes

Source: (Morb Mortal Wkly Rep. 2018; 67(No. RR-1) [:1-31.])

Abbreviations: HCP – Healthcare Personnel; HBsAg – Hepatitis B surface antigen; anti-HBs – antibody to Hepatitis B surface antigen; HBIG – Hepatitis B immune globulin.

** HBIG should be administered intramuscularly as soon as possible after exposure when indicated. The effectiveness of HBIG when administered ›7 days after percutaneous, mucosal, or nonintact skin exposures is unknown. HBIG dosage is 0.06mL/kg.*

† Should be performed 1-2 months after the last dose of the Hep B vaccine series (and 4-6 months after administration of HBIG to avoid detection of passively administered anti-HBs) using a quantitative method that allows detection of the protective concentration of anti-HBs (≥10mIU/mL)

§ A responder is defined as a person with anti-HBs ≥10mIU/mL after ≥3 doses of HepB vaccine.

¶ A nonresponder is defined as a person with anti-HBs ‹10mIU/mL after ≥6 doses of HepB vaccine.

APPENDIX E: CHLORHEXIDINE ANTISEPTIC BODY CLEANING

(Adopted from LRMC Policy)

Policy: The chlorhexidine antiseptic body cleaning wash cloths will be used on all ICU patients unless a patient declines or has any known sensitivities to ingredients.

Purpose: To reduce the risk of hospital associated infection by decreasing bacterial colonization that can cause skin infection.

Applicability: The antiseptic body cleaning wash cloths policy is applicable to all healthcare workers assigned to provide bedside bathing to patients in the medical facility.

Responsibility: It is the responsibility of the nursing managers to ensure that this policy is implemented correctly and consistently.

Exclusion: Avoid facial area, open wounds, and areas of 2nd or 3rd degree burned skin.

PROCEDURE

1. **When the patient arrives to the unit first bathe patient with soap/water. Add 30cc of Hibiclens 4% to the basin and bathe patient to remove all visible dirt.**
    a. Wait 6 hours after initial bath and bathe patient with antiseptic body cleaning washcloths once a day.
    b. Warm the antiseptic body cleaning washcloths (if warmer not available).
    c. Warm package in the dedicated microwave settings: 1000watts for 30 seconds.
    d. Consult package for complete indications, ingredients, and warnings.

2. **Bathing a patient with antiseptic body cleaning washcloths.**
    a. Wash hands prior to the procedure and don a pair of gloves and a gown.
    b. Explain the procedure to the patient.
    c. Ensure the patient has privacy. Have patient remove gown or assist in the removal as needed. Use a towel or sheet to cover the patient appropriately.
    d. Peel back the label on the package and test the temperature by touching the top washcloth. Remember, gloves diminish sensitivity to heat. If temperature is acceptable, proceed to the next step.

e. Remove #1 washcloth.
   i. Test washcloth to back of patient's hand or inside wrist/forearm area.
   ii. Ask patient if the temperature is acceptable.
      - If acceptable, proceed with next step.
      - If NOT acceptable, STOP the procedure until temperature is acceptable to the patient.
      - Continue to monitor patient's comfort level with the temperature as the bath progresses.

f. For incontinence care, clean using terrycloth towels, soap and water. Follow by wiping the involved skin with as many chlorhexidine cloths as necessary.

g. Apply clean gown, reposition and cover the patient.

h. Discard all disposables as general waste.
NOTE: Do not flush antiseptic body cleaning washcloths in the toilet!

i. Document procedure in progress notes.

Wash cloth sequence		
Cloth	Areas*	Action
***Do Not Use on Face**		
1	Both arms and chest	Discard
2	Perineum	Discard
3	Right Leg	Discard
4	Left Leg	Discard
5	Back	Discard
6	Buttocks	Discard

3. What To Do

a. Do use chlorhexidine baths in place of daily bathing with soap and water.

b. Do massage firmly into skin to bind skin proteins and prevent bacteria for 24 hours.

c. Only use CHG-compatible lotions.

d. Use over superficial wounds, including stages 1 and 2 decubitus ulcers.

4. What NOT To Do

a. Do NOT use above jaw line.

b. Do NOT rinse or wipe off CHG. Let air dry.

c. Do NOT flush CHG cloths (discard in trash, not toilet or commode).

d. Do NOT include patients who are allergic to CHG.

APPENDIX F: CLASS VIII MEDICAL MATERIEL

HAND HYGIENE/STANDARD PRECAUTIONS

Consumables

- Alcohol-based hand sanitizer (60–95%)
- Antimicrobial soap
- Surgical scrub solution
- Chlorhexidine gluconate 2% and 4%
- Chlorhexidine gluconate impregnated bathing cloths
- Sterile towels
- Disposable nail cleaners
- Hand lotion/barrier cream

Personal Protective Equipment

- Nitrile gloves (multiple sizes)
- Sterile surgical gloves
- Isolation gowns
- Impermeable gowns
- Surgical masks
- N95 respirators
- Eye protection/goggles
- Face shields
- Bouffant caps
- Shoe covers

Equipment

- Portable handwashing stations
- Foot-operated waste containers
- Sharps containers
- Biohazard disposal bags
- PPE donning/doffing stations

WOUND IRRIGATION/DEBRIDEMENT

Irrigation Supplies

- Sterile normal saline (1L and 3L bags)
- Sterile water
- Pulsatile lavage systems
- Bulb syringes
- Irrigation tubing
- Yankauer suction tips
- Suction canisters
- Portable suction units

Surgical Debridement Instruments

- Major surgical trays
- Minor surgical trays
- Orthopedic debridement sets
- Bone curettes
- Rongeurs
- Periosteal elevators
- Tissue forceps
- Metzenbaum scissors

WOUND IRRIGATION/DEBRIDEMENT (CONT'D)

Surgical Debridement Instruments (cont'd)

- Mayo scissors
- Hemostats
- Scalpels (#10, #11, #15)
- Electrocautery units
- Suction cautery tips

Wound Cleansing

- Betadine solution
- Chlorhexidine gluconate prep sticks
- Sterile gauze
- Sterile sponges
- Cotton-tip applicators

ANTIMICROBIAL THERAPY

IV Antibiotics

First-line Agents

- Cefazolin 1–2g vials
- Metronidazole IV
- Ceftriaxone IV
- Ertapenem IV
- Vancomycin IV
- Piperacillin-tazobactam IV

Alternative Agents

- Clindamycin IV/PO
- Ciprofloxacin IV/PO
- Moxifloxacin IV
- Meropenem IV

Antifungal Therapy

- Liposomal amphotericin B
- Voriconazole
- Posaconazole
- Isavuconazole

Administration Supplies

- IV tubing
- Extension sets
- Saline flushes
- Mini-bags
- Infusion pumps
- Syringe pumps
- Medication labels

TETANUS PROPHYLAXIS

Medications

- Td vaccine
- Tdap vaccine
- Tetanus immune globulin (TIG)

Tetanus Prophylaxis (cont'd)

Supplies

- IM syringes
- Needles
- Alcohol prep pads
- Vaccine storage cooler
- Temperature monitoring devices

Wound Dressings/Bandage Material

Basic Dressings

- Sterile 4x4 gauze
- ABD pads
- Kerlix rolls
- Elastic wraps
- Sterile burn sheets
- Transparent dressings
- Island dressings

Advanced Dressings

- Silver-impregnated dressings
- Hydrofiber dressings
- Alginate dressings
- Hydrogel dressings
- Foam dressings
- Antimicrobial dressings

Packing Materials

- Combat gauze
- Plain packing gauze
- Ribbon gauze
- Hemostatic gauze

Negative Pressure Wound Therapy (NPWT)

The JTS strongly supports NPWT in complex combat wounds when available.

NPWT Systems

- Portable wound VAC units
- VAC sponges
- VAC drapes
- Suction tubing
- Canisters
- Battery chargers

Isolation/Transmission-Based Precautions

Isolation Supplies

- Contact precaution signage
- Isolation carts
- Disposable stethoscopes
- Disposable BP cuffs
- Disposable thermometers

Isolation/Transmission-Based Precautions (cont'd)

Isolation Supplies (cont'd)

- Environmental disinfectants
- Bleach wipes
- UV disinfection devices (Role 3)

Diagnostic/Microbiology Support

Specimen Collection

- Blood culture bottles
- Sterile specimen cups
- Swabs (aerobic/anaerobic)
- Tissue biopsy containers
- Transport media
- Vacutainer tubes

Laboratory Support

- Portable incubators
- Gram stain kits
- Point-of-care CBC analyzers
- Lactate analyzers
- Refrigeration units
- Biohazard transport containers

Line/Device Infection Prevention

Central Line Supplies

- Central line insertion kits
- Maximal sterile barrier kits
- Chlorhexidine gluconate skin prep
- Chlorhexidine gluconate disk dressings
- Sterile ultrasound probe covers

Urinary Catheter Supplies

- Foley kits
- Closed drainage systems
- Securement devices

High-Yield "Core Load" Recommendation

- Cefazolin
- Metronidazole
- CHG products
- PPE sets
- Irrigation saline
- Surgical debridement instruments
- NPWT systems
- Sterile dressing supplies
- Tetanus prophylaxis
- Biohazard/isolation supplies
- Portable suction
- Sterilization capability

For additional information including National Stock Number (NSN), please contact dha.ncr.med-log.list.lpr-cps@health.mil
***DISCLAIMER**: This is not an exhaustive list. These are items identified to be important for the care of combat casualties.*

APPENDIX G: TELEMEDICINE / TELECONSULTATION

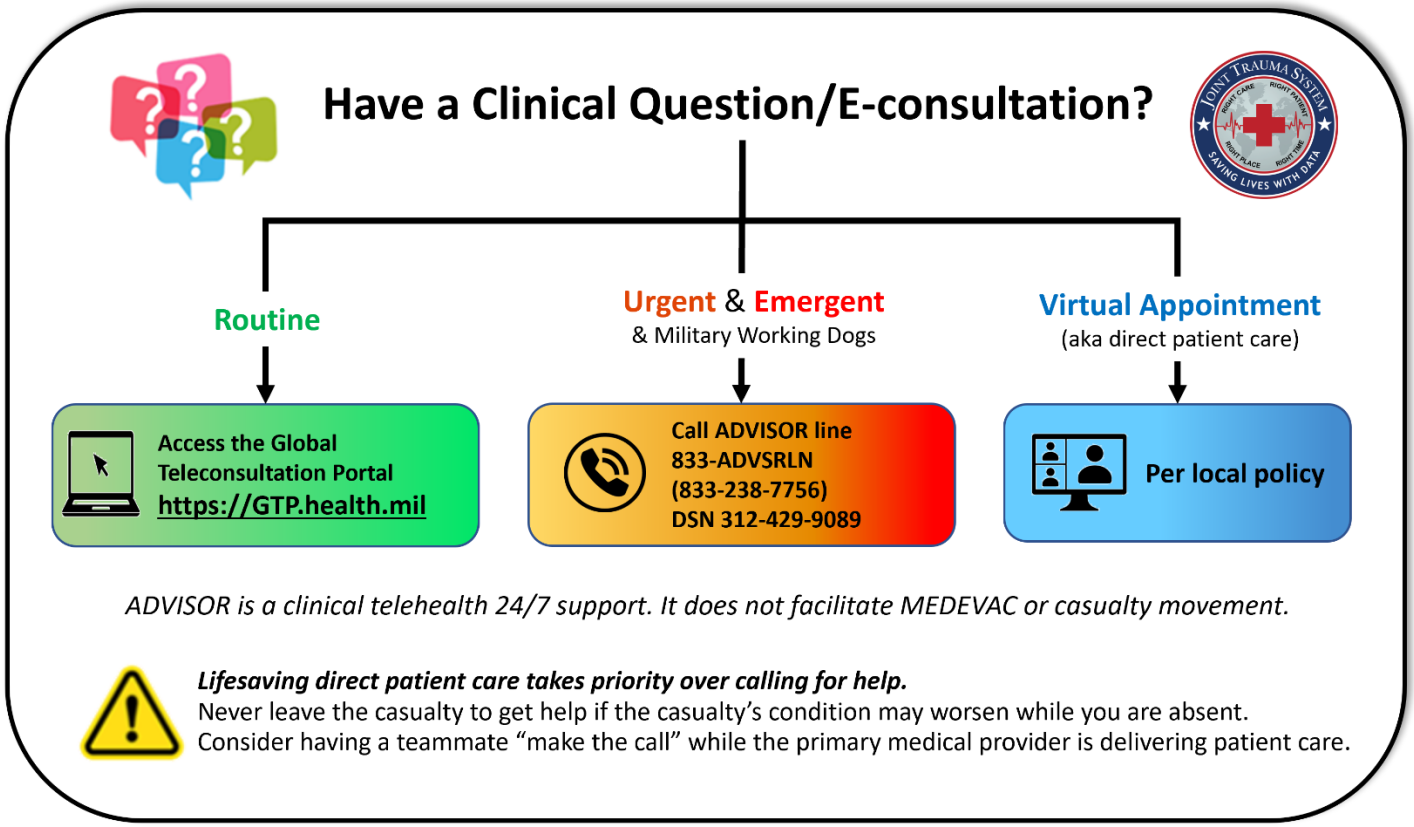


Illustration by Raymond Samonte

GTP: https://GTP.health.mil

Theater Patient Movement Requirements Center (TPMRC) to coordinate evacuation:

- *TPMRC-Americas (NORTHCOM & SOUTHCOM), 618-817-4200*
- *TPMRC- East (EUCOM, AFRICOM, CENTCOM), DSN 314-480-8040*
- *TPMRC- West (INDOPACOM), DSN 315-448-1062*

APPENDIX H: INFORMATION REGARDING OFF-LABEL USES IN CPGS

PURPOSE

The purpose of this Appendix is to ensure an understanding of DoD policy and practice regarding inclusion in CPGs of "off-label" uses of U.S. Food and Drug Administration (FDA)–approved products. This applies to off-label uses with patients who are armed forces members.

BACKGROUND

Unapproved (i.e. "off-label") uses of FDA-approved products are extremely common in American medicine and are usually not subject to any special regulations. However, under Federal law, in some circumstances, unapproved uses of approved drugs are subject to FDA regulations governing "investigational new drugs." These circumstances include such uses as part of clinical trials, and in the military context, command required, unapproved uses. Some command requested unapproved uses may also be subject to special regulations.

ADDITIONAL INFORMATION REGARDING OFF-LABEL USES IN CPGS

The inclusion in CPGs of off-label uses is not a clinical trial, nor is it a command request or requirement. Further, it does not imply that the Military Health System requires that use by DoD health care practitioners or considers it to be the "standard of care." Rather, the inclusion in CPGs of off-label uses is to inform the clinical judgment of the responsible health care practitioner by providing information regarding potential risks and benefits of treatment alternatives. The decision is for the clinical judgment of the responsible health care practitioner within the practitioner-patient relationship.

ADDITIONAL PROCEDURES

Balanced Discussion

Consistent with this purpose, CPG discussions of off-label uses specifically state that they are uses not approved by the FDA. Further, such discussions are balanced in the presentation of appropriate clinical study data, including any such data that suggest caution in the use of the product and specifically including any FDA-issued warnings.

Quality Assurance Monitoring

With respect to such off-label uses, DoD procedure is to maintain a regular system of quality assurance monitoring of outcomes and known potential adverse events. For this reason, the importance of accurate clinical records is underscored.

Information to Patients

Good clinical practice includes the provision of appropriate information to patients. Each CPG discussing an unusual off-label use will address the issue of information to patients. When practicable, consideration will be given to including in an appendix an appropriate information sheet for distribution to patients, whether before or after use of the product. Information to patients should address in plain language: a) that the use is not approved by the FDA; b) the reasons why a DoD health care practitioner would decide to use the product for this purpose; and c) the potential risks associated with such use.