

Prolonged Casualty Care Principles

- Perform initial lifesaving care using TCCC guidelines and continue resuscitation
 - The foundation of good PFC is mastery of TCCC and a strong foundation in clinical medicine.
- Delineate roles and responsibilities including naming a team leader
 - A leader should be appointed who will be responsible to look at the larger clinical picture while assistants focus on attention intensive tasks.
- Perform comprehensive physical exam and detailed history with problem list and care plan
 - After the initial care and stabilization of a trauma or medical patient, a detailed physical exam and history should be performed for the purpose of completing a comprehensive problem list and corresponding care plan.
- Record and trend vital signs
 - Vital signs trending should be done with the earliest set of vital signs taken and continued at regular intervals so that the baseline values can be compared to current reality on a dedicated trending chart.
- Perform a telemedical consult
 - As soon as is feasible, the medic should prepare a telemedical consultation by either filling out a preformatted script or by writing down his concerns along with the latest patient information.
- Create a nursing care plan
 - Nursing care and environmental considerations should be addressed early so as to limit any provider induced iatrogenic injury.
- Implement team wake, rest, chow plan
 - The medic and each of his helpers should make all efforts to take care of each other by insisting on short breaks for rest, food and mental decompression.
- Anticipate resupply and electrical issues
- Perform periodic mini rounds assessments
 - Stepping back from the immediate care of the patient periodically and reengaging with a mini patient round and review of systems can allow the medic to recognize changes in the condition of the patient and reprioritize interventions.
 - Is the patient stable or unstable?
 - Is the patient sick or not sick?
 - Is the patient getting better or getting worse?
 - How is this assessment different from the last assessment?
- Obtain and interpret lab studies
 - When available, labs may be used to augment these trends and physical exam findings in order to confirm or rule out probable diagnoses.
- Perform necessary surgical procedures
 - The decision to perform invasive and surgical interventions should consider both risks and benefit to the patient's overall outcome and not merely the immediate goal.
- Prepare for evacuation care
 - If the medic is caring for the patient over a long strategic evacuation off continent, they should be prepared with ample drugs, fluids, supplies and be ready for all contingencies in flight
- Prepare documentation for patient handover
 - The preparation for evacuation care should begin immediately upon assuming care for the patient and should include hasty and detailed evacuation requests up both the medical and operational channels with the goal of getting the patient to the proper role of care as soon as possible.

Obtain a GCS BEFORE sedating the patient

Category		Best Response
Eye opening		
Spontaneous		4
To speech		3
To pain		2
None		1
Verbal	(Modified for Infants)	
Oriented	Babbles	5
Confused	Irritable	4
Inappropriate words	Cries to pain	3
Moans	Moans	2
None	None	1
Motor		
Follows commands		6
Localizes to pain		5
Withdraws to pain		4
Abnormal flexion		3
Abnormal extension		2
None		1
Glasgow Coma Scale		
Best possible score		15
Worst possible score		3
If tracheally intubated then verbal designated with "T"		
Best possible score while intubated		10T
Worst possible score while intubated		2T

Once the patient has analgesia and/or sedation medications, use the RASS

Richmond Agitation-Sedation Scale (RASS)

RASS Score	Term	Description
4+	Combative	Combative, violent, immediate danger to staff
3+	Very agitated	Pulls or removes tubes or catheters, aggressive
2+	Agitated	Frequent nonpurposeful movement, fights ventilator
1+	Restless	Anxious but movements not aggressively vigorous
0	Alert and Calm	
-1	Drowsy	Not fully alert but has sustained eye opening/contact 10 sec or more to voice
-2	Light Sedation	Briefly awakens to voice with eye contact less than 10 sec
-3	Moderate Sedation	Movement or eye opening to voice (no eye contact)
-4	Deep Sedation	No response to voice but movement or eye opening to physical stimuli
-5	Unarousable	No response to voice or physical stimuli

Telemedical Consultation Guide
To be used with Prolonged Field Care Card

1. Before calling, E-mail image of the casualty (wounds, environment, etc.), "capabilities" (back of page), & vital signs trends to the remote consultant.
2. If call not answered: a) call next number on PACE or call back in 5 – 10 min.
3. If unable to provide information due to operational security, state so.

P:
A:
C:
E:

This is _____ I am a (job/ position) _____

My best contact info is: _____

YOUR best contact info is (Consultant's number): _____ Alternate e-mail: _____

***** PAUSE POINT to CONFIRM CONTACT INFO *****

I have a _____ year-old _____ (sex) _____ (active duty/foreign national/OGA,etc.), who has the following:

Mechanism of Injury or known diagnosis(es)

The injury/start of care occurred _____ hours ago. Anticipated evacuation time is (hours from now):

Injuries/Problems/Symptoms:

Treatments:

He/she is currently (circle) stable/ unstable, getting better/ getting worse/ getting worse rapidly

Known Medication Allergies/Past medical/Surgical history is:

I need help with (be specific if possible, i.e. "I need help reading this ECG," or "I need help stabilizing this patient," etc.)

Other Consultants have recommended:

***** PAUSE POINT for Remote Consultant to ask clarification questions *****

VITALS (current & trend as of _____): HR BP RR SpO2 EtCO2 Temp

UOP(ml/hr) over _____ (# hours) Mental Status (GCS/ AVPU)

EXAM: Neuro Ext/ MSK

Heart Pulses

Lungs Skin/ Wounds

Abd

LABS: ABG: Lactate: Other:

***** PAUSE POINT for Remote Consultant to ask clarification questions *****

Plans/Recommendations		
PRIORITY	SYSTEM/PROBLEM	RECOMMENDATION
	Neuro or problem #1	
	CV or problem #2	
	Pulm or problem #3	
	GI or problem #4	
	Renal or problem #5	
	Endocrine or problem #6	
	MSK/ Wound or problem #7	
	Tubes, lines, drains or problem #8	
	Prophylaxis/prevention or prob#9	
	Other	

TO-DO/ FOLLOW-UP/TO-STOP	NOTES
1.	
2.	
3.	
4.	
5.	
6.	

***** PAUSE POINT, for Medic/Local Caregiver to ask clarification questions/READBACK*****

Available "kit" (supplies, equipment, medications) !! IF POSSIBLE PHOTOGRAPH AND SEND VIA EMAIL BEFORE CALLING !!

Commo: Tempus i2i ID: _____ SAT#/Local Cell# _____
 Other (FaceTime, VSee, Skype, WhatsApp ,etc.): _____

IV access: IV _____ Central line _____ IO (location) _____ Other: _____
Monitor: Propaq _____ Tempus _____ Foley _____ Graduated urinal _____ PulseOx only _____ Exam Only _____
 Other: _____

IV Fluids: Plasma-Lyte _____ LR _____ Normal Saline _____ 3% saline _____ Other: _____

Colloids: Hetastarch _____ Albumin _____ Other: _____

Blood products: Whole blood _____ PRBC _____ Plasma _____ FDP _____ Platelets _____ Other: _____

Medications: Antibiotics: name/route/dose _____
 Morphine IV/ PO _____ Other opioid (name/ IV/ PO): _____
 Fentanyl IV/ PO (pop) _____ Ketamine _____
 Midazolam _____ Diazepam (IV/ PO) _____
 TXA _____ Other(s): _____

Airway/Breathing: ETT _____ Cric kit _____ LMA _____ BVM _____ O2 _____ Suction (type): _____ Ventilator(model): _____

Miscellaneous: _____

DISCLAIMER! This nursing care guide is designed to be a tool for the medic to consider as many tasks as possible that MAY be necessary for any particular patient. It is not all encompassing! Some patients may only need a few of the tasks to be performed, some may need every task to be performed. This guide is not a substitution for adequate cross training. It should emphasize the REQUIREMENT for medical cross training to properly provide long term care for a patient. There are some tasks that only a medic SHOULD do (ascultate lungs or administer certain medications for example) however, it may not be tactically or practically feasible for the medic to be present to accomplish these tasks, hence the importance of thorough cross training. Reference the individual sections for more detailed information about the listed nursing care tasks.

APPENDIX E: MANAGEMENT OF TRAUMATIC BRAIN INJURY SUMMARY TABLE

Management of Traumatic Brain Injury Summary			
GOAL	MINIMUM	BETTER	BEST
Neurological Assessment			
Goal: Rapidly identify TBI and associated injuries; assess TBI severity.	Consider: If patient is unconscious, measure a baseline optic nerve sheath diameter with ultrasound using a 10(–5)MHz linear probe.	Secondary survey: Evaluate for TBI red flags. Perform detailed neurologic examination.	Primary survey: Perform rapid trauma survey to assess all injuries. Determine and record Glasgow Coma Score. Assess pupils and motor function in all four extremities. Recognize Cushing's triad.
ONSD should not be attempted on any patient with an open globe injury to the eye. Cushing's triad: increased SBP/widened pulse pressure, bradycardia, irregular breathing (typically rapid/shallow)			
Monitoring			
Prevent secondary brain injury, maintain adequate oxygenation and ventilation, avoid hypotension, detect elevated ICP.	Blood pressure cuff, stethoscope, pulse oximeter, method to monitor urine output. If advanced airway is in place, monitor EtCO ₂ with capnometer. Check pupils and GCS hourly or as often as possible.		Portable monitor with continuous vital-signs display, Foley catheter to monitor urine output. If advanced airway in place, monitor end-tidal CO ₂ (EtCO ₂) with capnography. Check pupils and GCS hourly.
Neurologic examination and vital-sign trends are essential to identifying a deteriorating patient with TBI. Monitoring EtCO ₂ is critical for severe TBI patients. Bring the correct equipment whenever possible.			
Management Hemodynamic Control			
Maintain systolic pressure >110mmHg	Stop all external bleeding. Manage internal bleeding to the extent possible with available resources. Administer TXA per TCCC guidelines. Avoid medications that may lower the blood pressure.	If there is evidence of bleeding and no blood products are available, 0.9% sodium chloride 1L. Target SBP: >110mmHg	If evidence of bleeding, transfuse whole blood or, if not available, transfuse blood products per TCCC guidelines. Target SBP: >110mmHg
Brain injury in the presence of hemorrhagic shock requires balancing hemorrhage control with cerebral perfusion. Telemedicine consultation is strongly encouraged. Do not neglect scalp bleeding. Take care to inspect for skull fractures. DO NOT tightly pack an open head wound. Hypotonic fluids (to include lactated Ringer's) should be avoided whenever possible because they can worsen cerebral edema.			
Management: Airway, Oxygenation/Ventilation			
Maintain or secure airway. If GCS score ≤8 or there is facial trauma or other airway compromise, consider definitive airway placement.	Nasopharyngeal airway and bag-valve-mask with PEEP. Supplemental oxygen, if available. Maintain SpO ₂ >90%.	Perform cricothyroidotomy/ETT or place supraglottic airway followed by continuous sedation, supplemental O ₂ , portable ventilator. Target SpO ₂ : >95%, EtCO ₂ : 35–40mmHg.	Perform cricothyroidotomy/ETT followed by continuous sedation, supplemental O ₂ , portable ventilator. Target SpO ₂ >95%, EtCO ₂ 35–40. Check arterial blood gas values. PEEP: 5cmH ₂ O (increase up to 15cmH ₂ O if needed).
Avoid hyperventilation except in extreme cases where imminent cerebral herniation is suspected.			
Management ICP			
Suspect high ICP in any head injury patient with GCS score ≤8 or declining findings on neurologic examination. Minimize factors that could contribute to elevated ICP, such as pain, anxiety, and fever.	<ul style="list-style-type: none"> Elevate HOB 30–45° Neck midline, loosen collar SBP >110mmHg (or at least > 100mmHg) SpO₂ >90% or 95% on ventilator EtCO₂ 35–40mmHg Core temp 96–99.5°F Prevent/treat seizure Last choice if sign of herniation: hyperventilate to EtCO₂ 30mmHg × 20 minutes. 	In addition to minimum steps, ensure adequate sedation and analgesia. If SBP >160mmHg or agitated: <ul style="list-style-type: none"> Ketamine 20mg IV/IO Hydromorphone 0.5–2mg IV/IO Fentanyl 25–50µg IV/IO Midazolam 1–2mg IV/IO 	In addition to minimum and better steps, give osmotic therapy IV/IO: <ul style="list-style-type: none"> HTS 3% 250mL over 20 minutes. Repeat every 3 hours if needed. Mannitol (If no bleeding and SBP >110mmHg) 1g/kg IV/IO over 20 minutes, repeat 0.5g/kg every 3 hours, if needed.
Telemedicine consultation early and often in the patient with elevated ICP.			
Management: Infection Control			
Dress all wounds and administer antibiotic prophylaxis for penetrating brain injuries and open wounds.	Dress all wounds to prevent further introduction of infection. Optimize wound care and patient hygiene to extent possible.	Ertapenem 1g IV/IO every 24 hours and moxifloxacin 400mg PO every 24 hours for 5 days.	Use an antibiotic with strong CNS penetration. <ul style="list-style-type: none"> Ceftriaxone 2 gm IV/IO every 24 hours or cefazolin 2g IV/IO every 8 hours for 5 days Add metronidazole 500mg IV/IO every 8 hours if wounds contaminated with organic debris.
Moxifloxacin may be replaced with levofloxacin 750 mg PO daily to provide better coverage of bacteria found in wet terrain/ jungle environment. Ertapenem and moxifloxacin may increase the risk of seizure and ertapenem may not penetrate an intact blood-brain barrier. If recommended antibiotics are not available or significant drug allergies are present, obtain teleconsultation to discuss alternative medications.			

Management of Traumatic Brain Injury Summary			
GOAL	MINIMUM	BETTER	BEST
Management: Seizures			
Rapidly identify and manage seizures.	For a witnessed or suspected seizure, ensure safety and airway is clear. Treat with rapid-acting benzodiazepine: <ul style="list-style-type: none"> • Midazolam 5mg IV/IO/IM every 5 minutes until seizure stops 		Levetiracetam 2,000mg IV/IO loading dose over 15 minutes + 500mg every 12 hours. Alternate therapy: <ul style="list-style-type: none"> • Phenytoin 1.5g IV/IO load + 100mg IV/IO every 8 hours • Phenobarbital 1.5g IV/IO load + 100mg IV/IO daily.
Consider nonconvulsive seizures in any TBI patient with GCS score ≤ 8 who is not improving with appropriate treatments. If not already placed, consider a definitive airway in any patient who experiences seizure. Perform after seizures are controlled.			
Management: Fever Control			
Maintain core temperature between 96°F and 99.5°F. Treat fever aggressively.	Remove patient from heat or sun. Remove clothing. Use surface cooling measures with misting and fan cooling	Apply cold packs to axillary, posterior cervical, and groin regions.	Acetaminophen 650mg every 4 hours PO or rectally for rectal temperature $>99.5^\circ\text{F}$. Cold saline IV bolus if available.
Avoid NSAIDs, such as ibuprofen, naproxen, and ketorolac, because these agents may increase intracranial hemorrhage, if present.			
Management: Sodium Control			
Avoid hyponatremia. Mild hypernatremia optimal. Target sodium level: 145–160mmol/L.	Avoid administration of free water or hypotonic fluids.		Monitor serum sodium via laboratory blood samples. If patient is stable, check levels every 6 hours. In an unstable patient or one receiving HTS, check sodium level every 3 hours and adjust fluids as needed.
Numerous conditions can rapidly affect sodium levels in TBI patients. Monitor sodium and urine output whenever possible.			
Management: Blood Glucose Control			
Avoid both hypo- and hyperglycemia. Target blood glucose 100–180mg/dL.	Monitor for signs and symptoms of hypoglycemia. Allow patient to eat as long as they are able.		Check blood glucose every 6 hours with handheld glucometer. If $<100\text{mg/dL}$, give 25g (50mL) dextrose 50% (D50) IV/IO or 5tsp sugar/4tsp honey PO/NG.
Transportation			
TBI patients for ground and/or air transport to higher levels of care.	Dose sedative/analgesic medications, osmotic therapies, and/or benzodiazepines before any significant ground or air transport if possible.		Provide a detailed brief to the transport assets specifically highlighting any neurologic deficits and treatments and/or accommodations required during transport.
Neuromuscular blockers should only be used when the benefit outweighs the risks. Most patients should be transported in the supine position with the HOB elevated at least 30°.			
**For fixed-wing aircrafts: load patient with head to the front of the aircraft to minimize G-forces transmitted to the brain.			
**For altitudes >8000 ft, TBI patients are at risk of hypobaric hypoxia and high-altitude cerebral edema (HACE), which can worsen brain injuries.			

APPENDIX F: SUMMARY TABLE

Airway	
Best	<ul style="list-style-type: none"> • Rapid Sequence Intubation • Continuous sedation + airway maintenance and suctioning • O₂ and portable ventilator
Better	<ul style="list-style-type: none"> • Cricothyroidotomy • Continuous sedation + airway suctioning • O₂ concentrator and portable ventilator
Minimum	<ul style="list-style-type: none"> • Cricothyroidotomy • Ketamine • Bag-valve-mask with PEEP valve
Assess Burn Size	
Best	<ul style="list-style-type: none"> • For initial estimate: Rule of 9s • After wounds are cleaned/debrided: re-calculate burn size using Lund-Browder chart
Better	<ul style="list-style-type: none"> • Same as minimum
Minimum	<ul style="list-style-type: none"> • For large burns: Rule of 9s • For small burns: Use patient’s hand = 1% TBSA
Fluid Resuscitation	
Best	<ul style="list-style-type: none"> • Use isotonic crystalloid: Lactated Ringer’s (LR) or Plasma-Lyte • Starting fluid rate is rule of 10s (TBSA x 10; +100 ml/hr for each 10 kg over 80 kg)
Better	<ul style="list-style-type: none"> • Oral resuscitation with electrolyte solution (avoid plain water) • Possible for up to 30% TBSA burns • “Coached” drinking on a schedule to meet target fluid rate
Minimum	<ul style="list-style-type: none"> • Rectal infusion of electrolyte solution • Can infuse up to 500 ml/hr • May use to supplement oral hydration
Teleconsultation	
<ul style="list-style-type: none"> • Establish contact early • Ventilator management • Measuring burn size • Hemorrhagic shock + burns 	<ul style="list-style-type: none"> • Burn > 20% TBSA • Electrical burn • Escharotomy needed • Infection
Monitoring	
Vital Signs	
Best	<ul style="list-style-type: none"> • Portable monitor • Capnography • Document vital signs (VS) and I/O on flow sheet
Better	<ul style="list-style-type: none"> • BP cuff, stethoscope • Pulse oximetry, Capnography • Document VS and I/O on flow sheet
Minimum	<ul style="list-style-type: none"> • Blood Pressure (BP) cuff, stethoscope • Pulse oximetry • Document VS on flow sheet
Urine Output	
Best	<ul style="list-style-type: none"> • Foley catheter, titrate fluids to keep urine output (UO) 30-50 ml/hr • Increase or decrease fluid rate by 25% each hour if UO not at goal
Better	<ul style="list-style-type: none"> • Collect urine in graduated container • >180 ml every 6 hours is adequate
Minimum	<ul style="list-style-type: none"> • If unable to measure UOP, adjust fluids to maintain HR <140, good capillary refill, intact mental status • Treat hypotension if needed, but this is a late sign of hypovolemia

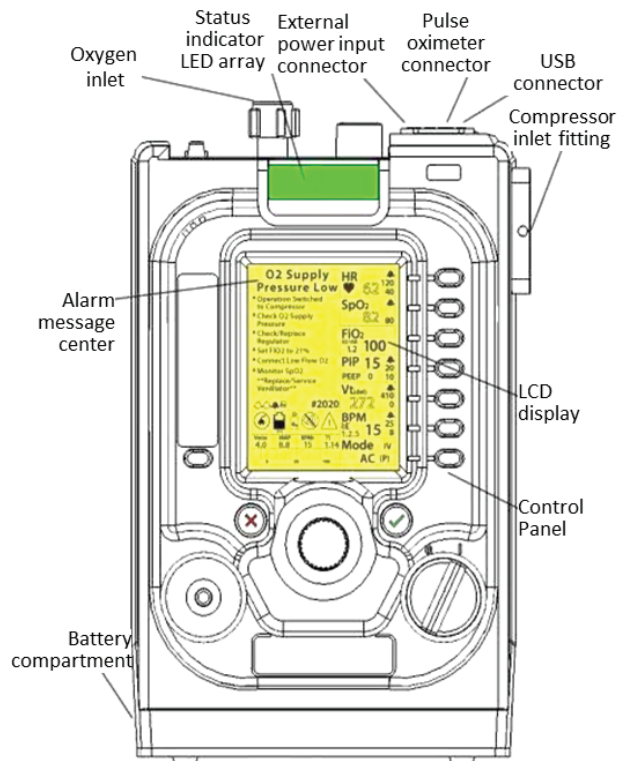
Extremity Burns	
Best	<ul style="list-style-type: none"> Elevate, Exercise Monitor pulses hourly, Doppler flow meter Escharotomy if circumferential 3rd degree burn
Better	<ul style="list-style-type: none"> Elevate, Exercise Monitor pulses hourly Escharotomy only if unable to palpate distal pulses and evacuation delayed
Minimum	<ul style="list-style-type: none"> Elevate, Exercise Monitor pulses hourly
Pain Management	
Best	<ul style="list-style-type: none"> Ketamine infusion Supplement with IV opioids and midazolam (e.g., Versed), frequent small doses
Better	<ul style="list-style-type: none"> Ketamine IV Supplement with IV opioids and midazolam, frequent small doses
Minimum	<ul style="list-style-type: none"> Fentanyl Lozenge Oral acetaminophen/oxycodone (e.g. Percocet, Endo Pharmaceuticals, http://www.endo.com/)
Infection	
Prevent Infection	
Best	<ul style="list-style-type: none"> Clean wound and debride loose dead skin using gauze and Hibiclens in clean water Apply antimicrobial cream (Silvadene or Sulfamylon), cover with gauze. Alternative: Apply Silverlon dressings to clean wounds, cover with gauze
Better	<ul style="list-style-type: none"> Clean wound and debride loose dead skin using any antibacterial soap in clean water Apply any available dressing Optimize wound care and hygiene to extent possible
Minimum	<ul style="list-style-type: none"> Cover with clean sheet or dry gauze Leave blisters intact
Treat Infection	
Best	<ul style="list-style-type: none"> If cellulitis (spreading erythema around edge of burn) treat with IV antibiotics (e.g., cefazolin or clindamycin) If invasive infection with sepsis, foul smell, or burn wound color change, cover gram-positive and gram-negative and Pseudomonas bacteria (e.g. ertapenem + ciprofloxacin)
Better	<ul style="list-style-type: none"> Same as minimum
Minimum	<ul style="list-style-type: none"> If cellulitis (spreading erythema around edge of burn) or invasive infection, treat with antibiotics. Any available antibiotic

APPENDIX B: CRUSH INJURY, MONITORING AND MANAGEMENT CONSIDERATIONS

			Phase 1 Entrapment	Phase 2 Extrication	Phase 3 Immediately Following Extrication	Phase 4 Prolonged Field Care
FLUIDS						
	Best	IV or IO crystalloids	Initial bolus: 2L, continue 1L/h	Continue 1L/h	Titrate to UOP 100– 200mL/h	Titrate to UOP 100– 200mL/h
	Better	Oral electrolyte solution	Continue	Continue	Continue. Goal UOP 100–200mL/h	Continue. Goal UOP 100–200mL/h
	Minimum	Rectal electrolyte solution	Continue	Continue	Continue. Goal UOP 100–200mL/h	Continue. Goal UOP 100–200mL/h
Telemedicine: Consult on management						
Monitoring: 15-minute to hourly vital signs, examination, urine output documented on flowsheet						
VITAL SIGNS						
	Best	Portable monitor with ECG	Record every 15 minutes	Record every 15 minutes	Record every 15 minutes	Record every 1 hour
	Better	Check intermittent vital signs	Every 15 minutes	Every 15 minutes	Every 15 minutes	Record every 1 hour
	Minimum	Monitor pulse and mental status	Every 15 minutes	Every 15 minutes	Every 15 minutes	Record every 1 hour
UOP	Best	Place Foley catheter	N/A	N/A	Record UOP every 1 hour	Record UOP every 2 hours
	Minimum	Capture urine in premade or improvised graduated cylinder				
Urine myoglobinuria	Best	Laboratory monitoring	N/A	N/A	N/A	Every 6 hours
	Better	Assess urine color (red, brown, or even black)				
	Minimum	Dark urine (red, brown, or even black)				
Potassium and cardiac arrhythmia	Best	Laboratory monitoring of potassium levels	N/A	N/A	Check	Every 4-6 hours
		12-lead ECG	N/A	N/A	Check	Every 4-6 hours
	Better	Laboratory monitoring of potassium levels	N/A	N/A	Check	Every 4-6 hours
		3–5 lead ECG	Initiate	Continue	Continue	Continue
	Minimum	Close monitoring of vitals and circulatory examination	Initiate	Continue	Continue	Continue
Treatments for Hyperkalemia (>5.5mEq/L) or Cardiac Arrhythmia						
Calcium gluconate (10%)	Best	10mL IV over 2–3 minutes	N/A	N/A	Monitor; repeat as required	
Insulin (regular) and D50		10 units IV push + 50mL D50	N/A	N/A		
Albuterol (2.5mg/3mL vial)		10mg (4 vials) in nebulizer	N/A	N/A		
Sodium polystyrene sulfonate (Kayexalate)		15–30g suspended in 50– 100mL liquid, oral or rectal	N/A	N/A		

			Phase 1 Entrapment	Phase 2 Extrication	Phase 3 Immediately Following Extrication	Phase 4 Prolonged Field Care
Calcium gluconate 10% Alternate: calcium chloride 10%	Better	10mL IV over 10 minutes				
Insulin (regular) and D50		10 units IV push + 50mL D50	N/A	N/A	Monitor; repeat as required	
Any individual or combination of above, as available	Minimum	See above	N/A	N/A		
Management of Injured Extremity						
Extremity compartment syndrome	Best	Clinical assessment • 6 Ps* • Rigid compartment	---	---	Fasciotomy: only if qualified medical personnel or teleconsultation available	
	Minimum				Cool limb (evaporative or environmental cooling, no ice/snow)	
Tourniquet (for crush management)	Best	If adequate fluids are unavailable, or arrhythmia cannot be managed during entrapment and extrication	If entrapment time >2 hours, consider tourniquet. Place two tourniquets side by side and proximal to the injury	If the patient meets criteria for tourniquet conversion or removal, and fluids are available, initiate crush injury protocol before loosening tourniquet.		
Tourniquet (for irreversible injury)		A limb that is cool, insensate, tensely swollen, and pulseless is likely dead. Patient may develop shock and kidney damage, and may die.				Consider fasciotomy. If no improvement, place two tourniquets side by side and proximal to the injury. Amputation anticipated
Pain						
			Per TCCC	Per TCCC	Per TCCC	Pain/sedation CPG
Infection Control						
Antibiotics	Best	Portable monitor with ECG	Ertapenem, 1g IV/day (1g, 10mL saline or sterile water)			
	Better	Check intermittent vital signs	Cefazolin, 2g IV every 6 to 8 hours; clindamycin (300–450mg by mouth three times daily or 600mg IV every 8 hours); or moxifloxacin (400mg/day; IV or by mouth)			
	Minimum	Monitor pulse and mental status	---	---	Ensure wounds cleaned and dressed, and hygiene of wounds and patient optimized to the extent possible given environment.	
N/A, not applicable; UOP, urine output. *6 Ps: Pain persisting despite adequate analgesia is most important symptom, followed by paresthesia, pallor, paralysis, poikilothermia, pulselessness						

APPENDIX C: ZOLL EMV+ (731 SERIES)

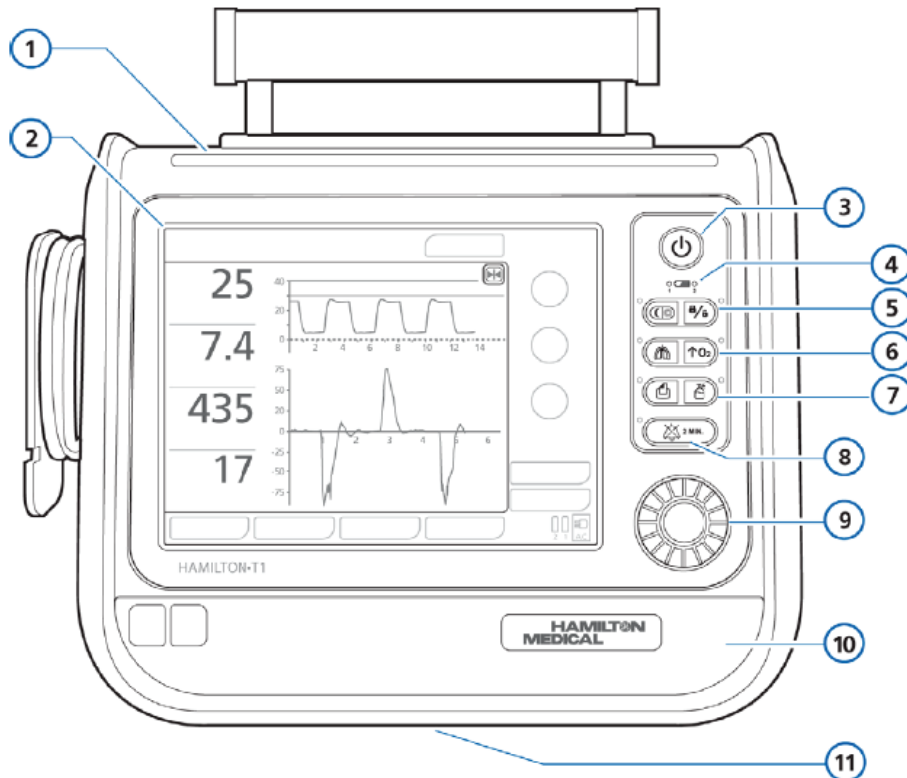


1. Turn on the ventilator and ensure that the machine is functional and the battery is charged.
2. Attach the ventilator tubing and O2 tubing to the machine.
3. If the patient is a transfer on a vent, maintain ventilator settings from the medical treatment facility.
4. If the patient is “newly” on the ventilator, initial settings should include:
 - a. MODE: AC
 - b. BPM/RRate: 14BPM (10-30 range)
 - c. TIDAL VOLUME: 6ml/kg IBW (4-8ml/kg IBW range)

QUICK REFERENCE (Male): (Detailed quick reference in [Appendix A](#))

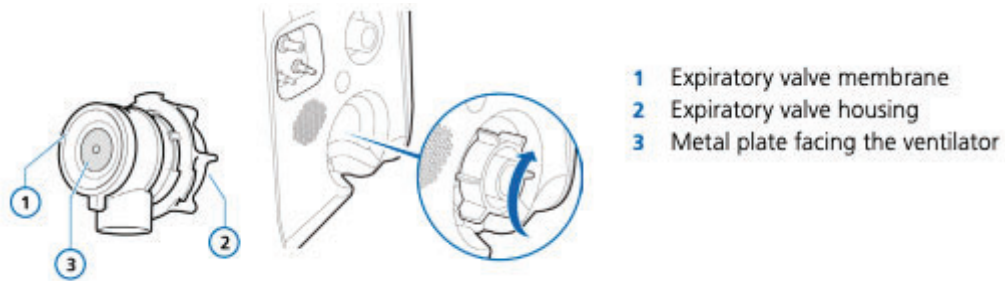
 - 66” = ~380cc [min: 255 / max: 510]
 - 69” = ~420cc [min: 283 / max: 566]
 - 72” = ~465cc [min: 310 / max: 621]
 - 75” = ~505cc [min: 338 / max: 676]
 - d. FiO₂ : 21 - 100% (0.21-1.0) (low flow O₂ @ 3 LPM = ~ 40% FiO₂ [flowrate on Saros oxygen concentrator])
 - e. I:E Ratio: 1:2
 - f. PEEP: 5 [Range 5-20]
5. Monitor waveform on the machine and visually inspect the patient to ensure no “breath stacking.” If this occurs, a high-pressure alarm may sound. However, if breath stacking is suspected even in the absence of alarm – disconnect tubing and allow exhalation and decrease the I:E if possible from 1:2 to 1:4.

APPENDIX D: HAMILTON T1

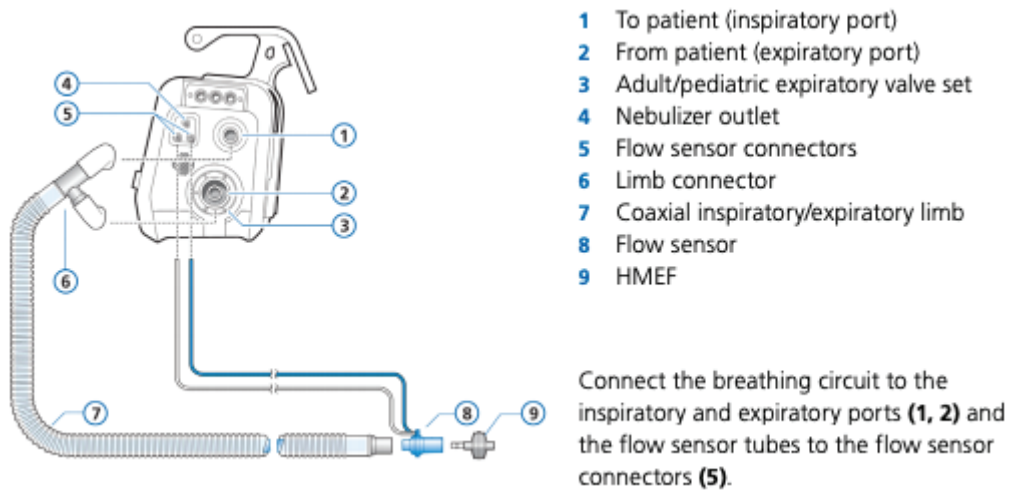


- 1 **Alarm lamp.** Red = high-priority alarm, yellow = medium- or low-priority alarm.
- 2 **Touch screen.** Provides access to measurements and controls.
- 3 **Power/Standby key.** Turns the ventilator on and off and accesses standby.
- 4 **Battery charge indicator.** Lit = battery is fully charged. Flashing = battery is charging.
- 5 **Day/Night key.** Switches between the Day and Night display brightness setting.
- 5 **Screen lock/unlock key.** Prevents inadvertent change of settings.
- 6 **Manual breath/inspiratory hold key.** Triggers a mandatory breath when pressed and released during exhalation. Triggers an inspiratory hold when held down during any breath phase. When active, the green indicator is lit.
- 6 **O2 enrichment key.** Delivers 100% oxygen for 2 min. Press the key a second time to cancel. Press **O2** key and disconnect patient to start a suctioning maneuver.
- 7 **Print screen key.** Save a JPG file of the current ventilator screen to a USB memory drive.
- 7 **Nebulizer on/off key.** Activates pneumatic nebulizer for 30 minutes or until pressed again during the inspiration phase if high-pressure oxygen (HPO) is connected.
- 8 **Alarm silence key.** Silences the main ventilator audible alarm for 2 min. Press the key a second time to cancel the alarm silence.
- 9 **Press-and-turn (P&T) knob.** Use to select and adjust ventilator settings.
- 10 **Front cover and battery.** The backup batteries are located inside the front cover.
- 11 **Underside of ventilator.** Expiratory valve bleed port. *Do not obstruct.*

1. Set up the ventilator.
 - a. Install expiratory valve.



- b. Connect coaxial breathing circuit



- c. Enable Hamilton T1, EtCO₂, or Spo₂ add ons if capable.
2. Perform pre-operational checks.
 - a. Click **PreOp Checks** on main page.
 - b. Conduct Tightness Test.
 - c. Conduct Flow Sensor Test.

****Do not attach a patient to the ventilator without conducting both tests.****
3. Select modes
 - a. Input patient Gender and Height (this calculates all alarm values and “normal” ranges. **Do not bypass this step**)
 - b. Touch **Modes** to change ventilator mode.
 - c. Select **ASV**.
4. Select settings
 - a. Set Tidal Volume (4-8 ml/kg IBW) or Pressure Support (not to exceed 30 mmHg).

NOTE: *This ventilator is “PEEP Compensated” which means when in Pressure Support mode if your Pressure Support is 20 and your PEEP is 10, your settings are actually 30 over 10. If you want 20 over 10, you need to see the Pressure Support at 10 and the PEEP at 10.*

****This can get confusing, seek direction from medical control if necessary.****

- b. Set appropriate rate for age group.
 - c. Set FiO₂ (21 to 100%).
 - d. Set PEEP (5 to 20).
 - e. Adjust I:E Ratio as necessary.
5. Set Flow Trigger (0.5 to 5). Press the start ventilation button prior to connecting patient.
 6. **Once the patient is on the ventilator, you may have to adjust alarm parameters**

SAVE2 Vent Setup, Troubleshooting and Management

Initial Vent Setup

Hook up tubing and circuit to ventilator
 Add any adjuncts such as HME and Emma
 Calculate patient height/ideal body weight
 Calculate patient height/ideal body weight
 Count patient respiratory rate
 Turn on and adjust ventilator
 Remove patient from BVM and place on working vent

Airway Nursing Care

Record baseline settings and vitals below
 Assess patient using the MOVE mnemonic
 Optimize PEEP using (pPlat(PiP) - PEEP = <18)
 Keep PiP below 30 (Reduce volume and increase rate if needed)
 Monitor for signs of pneumothorax
 Suction airway as needed
 Oral hygiene Q8 Hours

DOPERS Troubleshooting

Displacement/Dysynchrony
 Obstruction
 Pneumothorax
 Equipment
 Rigidity(due to fentanyl)
 Stacked Breaths

Admin Data	Name/Number	Height	IBW	Weight(kg)	CC:	Stable or Unstable
	Time					
Mechanics	Posture / Positioning					
	Breath Sounds					
	Chest Rise					
	Mental Status (AVPU, GCS, RASS)					
	Meds/Doses					
Oxygenation	SpO2					
	HR					
	Skin Color					
	FiO2					
	PEEP					
Ventilation	Hemodynamic Status (BP)					
	RR (Respiratory Rate)					
	vT (Tidal Volume)					
	M.V (Minute Volume)					
	vT diff from ARDs vT					
	iTime (Inspiratory Time)					
	etime (Expiratory Time)					
	EtCO2 (End Tidal CO2)					
Eval and Equipment	PIP (Peak Inspiratory Pressure)					
	pPlat (Plateau Pressure (Not on SAVEII))					
	DP (Drive Pressure=pPlat or PIP - PEEP)					
	Tube Cuff pressure or MOV					
	Humidity					

Capnography Waveforms – Quick Reference Guide¹



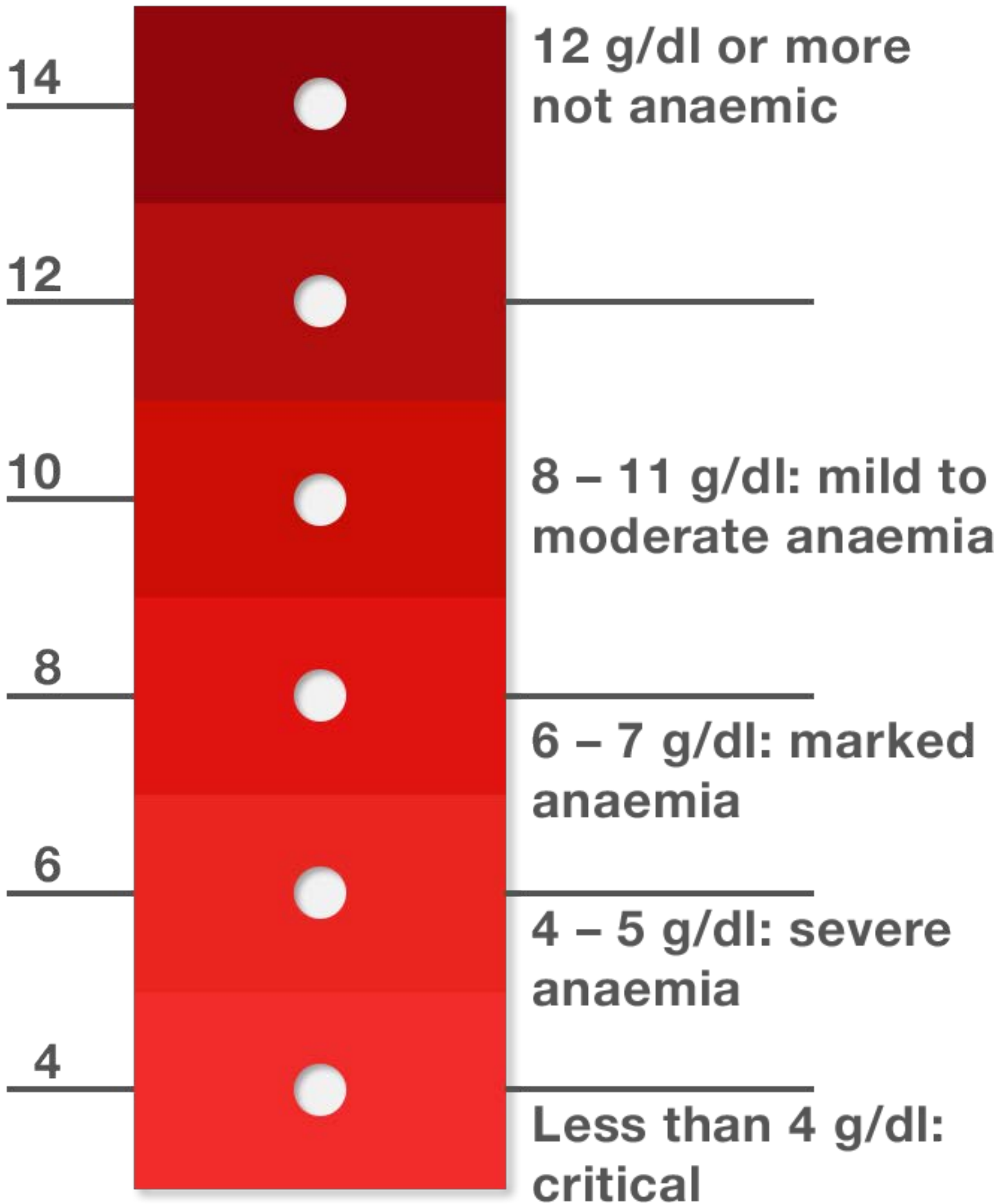
Normal Capnogram Waveform	Normal Waveform Characteristics	
	<p>Phase I: Beginning of exhalation; respiratory baseline containing dead space gas</p> <p>Phase II: Rapid upstroke representing exhalation; contains mixture of dead space and alveolar gases</p> <p>α angle: Normally a 108-degree angle</p> <p>Phase III: Alveolar plateau, containing mostly CO₂-rich alveolar gas.</p> <p>β angle: End of exhalation and beginning of inhalation; normally a 90-degree angle</p> <p>EtCO₂: End of exhaled breath and point of measurement</p> <p>Phase IV: Down-stroke representing inhalation</p>	<p>Normal Range for EtCO₂:</p> <ul style="list-style-type: none"> > 35-45 mmHg > 4.0-5.7 kPa <p>EtCO₂ to PaCO₂ Gradient:</p> <ul style="list-style-type: none"> > EtCO₂ is 1-5 mmHg lower than PaCO₂ in patients with normal lung function > Wider gradient indicates greater ventilation/perfusion deficit
Increasing EtCO ₂	Waveform Characteristics	Nursing Assessment and Considerations
	<ul style="list-style-type: none"> > Increasing amplitude and width, over variable time period, depending on cause > Slowing frequency with decreasing respiratory rate is dependent on cause and patient's physiologic response 	<ul style="list-style-type: none"> > Assess patient for bradypnea/hypercapnia > Assess patient for respiratory failure or over sedation > Consider airway management if needed > Assess for fever or change in temperature from hypothermia to normothermia > Assess for hypermetabolic state > Tourniquet release, sodium bicarbonate, and CO₂ insufflation can cause brief rise in EtCO₂
Decreasing EtCO ₂	Waveform Characteristics	Nursing Assessment and Considerations
	<ul style="list-style-type: none"> > Decreased amplitude and width > Faster frequency, increased respiratory rate 	<ul style="list-style-type: none"> > Assess patient for tachypnea/hypocapnia. > If tachypneic, assess for underlying causes such as pain, anxiety, or respiratory distress > Assess patient for hypoxemia > Assess patient for decreasing metabolic rate, hypovolemia, or shock > Assess patient for temperature change > Assess patient for pulmonary embolism
Loss of Waveform	Waveform Characteristics	Nursing Assessment and Considerations
	<ul style="list-style-type: none"> > Loss of capnographic waveform > No breath detected by capnograph 	<ul style="list-style-type: none"> > Assess patient for apnea, complete airway obstruction, or cardiac arrest > If intubated check for ET tube extubation, kinks or blockage, or ventilator disconnection > Confirm cannula or mask is placed on patient correctly and connected to monitor > Ensure patient's airway is open and patent, and patient is breathing > If patient is mouth breathing use cannula with oral prong to capture breaths from mouth > Follow your institution's procedure for airway and breathing support > Check for equipment failure
Obstructive Airway	Waveform Characteristics	Nursing Assessment and Considerations
	<ul style="list-style-type: none"> > Phase II slopes upward with a blunted α angle instead of a sharp upstroke with strong α angle > Phase III (plateau) is more rounded 	<ul style="list-style-type: none"> > Assess patient for bronchospasm > If intubated, assess ET tube for partial kinking > Assess patient for foreign body in airway > Assess patient for partial airway obstruction > The greater the "shark fin" shape, the greater the severity of the obstructive or reactive airway disease

¹Brast, S., Bland, E., Jones-Hooker, C., Long, M., and Green, K. (2016). Capnography for the Radiology and Imaging Nurse: A Primer. *Journal of Radiology Nursing*, Volume 35, Issue 3, 173 - 190. For professional use. See Directions for Use for full prescribing information including indications, contraindications, warnings and precautions. Caution: Federal (USA) law restricts this device to sale by or on the order of a physician.

Capnography Waveforms – Quick Reference Guide¹

Rebreathing CO ₂	Normal Waveform Characteristics	Nursing Assessment and Considerations
<p>CO₂ (mmHg) Real Time</p>	<ul style="list-style-type: none"> > Waveform shape may be normal but appears to float above baseline > Phase IV (down-stroke representing inhalation) does not go back to baseline or zero 	<ul style="list-style-type: none"> > Assess patient for rebreathing of exhaled CO₂ > If patient is mechanically ventilated, assess for air trapping or breath stacking, check vent settings, circuit set up, and equipment > If patient is spontaneously breathing, ensure drapes are not covering face > If using oxygen mask, ensure oxygen flow is adequate
Leak	Waveform Characteristics	Nursing Assessment and Considerations
<p>CO₂ (mmHg) Real Time</p>	<ul style="list-style-type: none"> > First waveform is normal but second and third waveforms (phase III and phase IV) are degraded or distorted 	<ul style="list-style-type: none"> > Assess for mask leak or loss of seal in patients on CPAP, BiPAP or NIV > For intubated patients check ET tube cuff for leak
Curare Cleft and Secondary (Camel) Hump	Waveform Characteristics	Nursing Assessment and Considerations
	<ul style="list-style-type: none"> > Notching or cleft in first two waveforms during Phase III > Small, secondary waveform during Phase I, between second and third waveform 	<ul style="list-style-type: none"> > Sometimes seen in mechanically ventilated patients due to weak, uncoordinated diaphragmatic movement or ventilator asynchrony under sedation and clearing chemical paralysis > Reassess patient's need for sedation and chemical paralysis > May also be seen with neuromuscular dysfunction
EtCO ₂ Trend Data During Cardiac Arrest		Five-Step Method for Capnography Interpretation
<p>EtCO₂ Trend Data</p> <ul style="list-style-type: none"> > Initially, waveform and EtCO₂ value are low during cardiac arrest but increase with effective chest compressions > The higher the EtCO₂ value the greater the chance of ROSC > EtCO₂ ≥ 20 mmHg during CPR indicates adequate chest compressions > EtCO₂ < 10 mmHg after 20 minutes of high-quality chest compressions indicates poor prognosis for survival 		<ol style="list-style-type: none"> 1. Is there a waveform? No: Is patient pulseless, apneic, or accidentally extubated? Is patient mouth breathing with a nasal cannula? Is the airway obstructed? Repositioning head may alleviate airway obstruction. Yes: What is the height, width, and frequency (respiratory rate)? Is there a pattern? Is patient hypoventilating or hyperventilating? Is patient in shock or hypovolemic? 2. What is the shape of the waveform? Do you see a steep rise in Phase II with a plateau? Is there sloping, notching, or a prolonged Phase III? If the plateau is altered, the expiratory phase and alveolar gas exchange are altered. If sloping is seen, consider bronchospasm, kinked artificial airway, or foreign body. 3. Does the waveform have a steep return to baseline? Phase IV represents the inspiratory phase. If patient is rebreathing CO₂, assess for air trapping or excess dead space in ventilator circuit. 4. What is the EtCO₂ trend? Evaluating the trend provides a graphic representation of patient's ventilatory status over time. Downward trending could indicate shock or hypovolemia. Upward trending could indicate increased metabolic demand, hypoventilation, or hyperthermia. 5. Does your capnographic assessment correlate to your clinical assessment? Are there assessment disparities among EtCO₂ trend, respiratory rate, waveform, and clinical picture? As a standard of practice, multiple subjective and objective assessment criteria are required to confirm ET tube placement.

¹Bratt, S., Bland, E., Jones-Hooker, C., Long, M., and Green, K. (2016). Capnography for the Radiology and Imaging Nurse: A Primer. *Journal of Radiology Nursing*, Volume 35, Issue 3, 173 – 190.
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ProlongedFieldCare.org
Procedural Sedation Checklist

19 Jan 2021

It is far easier to accidentally kill someone during even a short procedure with anesthesia than a scalpel. The most experienced provider should run anesthesia and stay by the patient's head until after the procedure and the patient is fully recovered from all drugs.

Patient Assessment

- _____ Baseline GCS or RASS
- _____ Blood Pressure
- _____ Heart Rate
- _____ Shock Index=(HR+SP) [Normal=.5 - .7]
- _____ Respiratory Rate
- _____ Allergies
- _____ Blood Type
- _____ Actual Weight kg
- _____ Ideal Body Weight based on height kg
- Adequately resuscitated? **YES** **NO**
- SICK** or **NOT SICK?**
- STABLE** or **UNSTABLE?**
- GETTING BETTER** or **GETTING WORSE?**

MSMAID Preparation

- M-Machine
 - BVM and PEEP valve
 - Ventilator and circuit
- S-Suction Device
 - Suction catheter
- M-Monitor
 - Patient Monitor
 - Stethoscope
 - BP Cuff
 - Pulse Ox
 - Capnograph
- A-Airway
 - Cric kit and checklist
 - iGel/SGA
 - RSI Equipment and checklist
 - Oxygen
- I-IV/IO
 - Fluids and lines hooked up
- D-Drugs and doses calculated, drawn and labeled
 - Consider regional anesthesia block for analgesia
 - Antiemetic
 - Ondansetron 4mg
 - Phenergan 25mg
 - Analgesia
 - Fentanyl 25-100mcg as needed for 30-60mins of analgesia for painful stimuli
 - Narcan 0.4-2as needed for fentanyl reversal
 - Ketamine 1-2mg/kg for 10 mins of dissociation or longer duration analgesia
 - Sedation
 - Midazolam 1-4mg for sedation and amnesia as needed

Category		Best Response
Eye opening		
Spontaneous		4
To speech		3
To pain		2
None		1
Verbal	(Modified for Infants)	
Oriented	Babbles	5
Confused	Irritable	4
Inappropriate words	Cries to pain	3
Moans	Moans	2
None	None	1
Motor		
Follows commands		6
Localizes to pain		5
Withdraws to pain		4
Abnormal flexion		3
Abnormal extension		2
None		1
Glasgow Coma Scale		
Best possible score		15
Worst possible score		3
If tracheally intubated then verbal designated with "T"		
Best possible score while intubated		10T
Worst possible score while intubated		2T

Ketamine drip (for sedation): Sedation loading dose first (1mg/kg IV/IO over 60 seconds).
MIX: 750mg (1.5 vials of 500mg/5mL) in 250mL of normal saline (3mg/mL solution).

Initial drip dose:

- **Best:** Using an IV pump, set to µg/kg/min dose desired. Increase or decrease dose by 5-10µg/kg/min increments.
- **Better:** Using a dial flow adaptor, initial drip rate in mL/h equals the casualty's weight in kg divided by 2 (see mL/h table).
- **Minimum:** Count drip rate. Increase or decrease rate by 1-2 drips/min (very slowly) to achieve goal.

Drip adjustments: Increase or decrease drip by 0.25mg/kg/h (1 row).

Ketamine Drip Dosing Tables					
Ketamine drip rate for dial flow or IV pump (starting dose highlighted)					
Dose		Patient's Weight, kg			
mg/kg/h	µg/kg/min	40	60	80	100
		Infusion Rate, mL/h			
0.5	8	7*	10	13	17
0.75	13	10	15	20	25
1.0	17	13	20	27	33
1.25	21	17	25	34	42
1.5	25	20	30	40	50
1.75	29	24	35	47	59
2.0	33	27	40	53	67
Ketamine drip count for 15 drips/mL tubing (starting dose highlighted)					
		Infusion Rate, 1 drip/X seconds			
0.5	8	1:35	1:24	1:18	1:9
0.75	13	1:27	1:18	1:14	1:8
1.0	17	1:18	1:12	1:9	1:7
1.25	21	1:15	1:10	1:8	1:6
1.5	25	1:12	1:8	1:6	1:5
1.75	29	1:11	1:7	1:6	1:5
2.0	33	1:9	1:6	1:5	1:4
Ketamine drip count for 10 drips/mL tubing (starting dose highlighted)					
		Infusion Rate, 1 drip/X seconds			
0.5	8	1:53	1:36	1:27	1:14
0.75	13	1:41	1:27	1:21	1:12
1.0	17	1:27	1:18	1:14	1:11
1.25	21	1:23	1:15	1:12	1:9
1.5	25	1:18	1:12	1:9	1:8
1.75	29	1:17	1:11	1:9	1:8
2.0	33	1:14	1:9	1:8	1:6

Procedural Sedation

Step 1: Bolus (1.0-2.0mg/kg) 80-160mg ketamine IV/IO over 60 seconds (250-400mg IM if necessary).

Step 2: Consider adding (start low, give more):

- 25-100µg fentanyl IV/IO
- 1-4mg midazolam IV/IO

Step 3: May need to repeat doses as below if procedure lasts longer than 10-15 minutes.

- Ketamine every 10-15 minutes
- Fentanyl every 5-30 minutes
- Midazolam every 30-60 minutes

*dial flow adaptor not accurate for rate <10mL/h; use drip count

- Flumazenil 0.2-1mg as needed for Midazolam reversal
 - Etomidate
 - Propofol
 - Epinephrine as needed for vasopressor 20mcg slow push as needed
 - Anaphylaxis
 - Epinephrine .3mg IM/SC
 - Benadryl 25-50mg
 - Solumedrol 125mg vial

Pre-Sedation Brief

Before you sedate a patient in the PFC setting, we highly recommend that you brief your team using the MSMAID format to cover how you will handle contingencies if they arise. For example:

M-Machine: “Guys, if the patient stops breathing, we will need to assist him with the BVM. I will hold the mask to the face like so, and Jim, you will squeeze the bag when I tell you. Use only 3 fingers to squeeze the bag, and ventilate the patient every time you take a breath.”

S-Suction: “If he throws up from the medication, we are going to place him in the recovery position immediately. I will attempt to clear his airway with the Suction Easy, but it is essential that we allow gravity to work in our favor.”

M-Monitor: “Bob, you will be the monitoring guy. I need you to watch the screen and tell me his pulse rate every 5 minutes. If he starts breathing rapidly, let me know. I need you to also watch his oxygen saturation and tell me if the reading starts to drop below 95%.”

A-Airway: “If he stops breathing at any time, we will attempt to ventilate him with the BVM, but if that isn’t working, we may need to put in the iGel to help us out. Let’s review how that works right now. Worst case, my Cric kit is located on the table.”

I-IV/IO: “Jim, please open the IV up and make sure it is still good to go. Let’s go ahead and start another line on his other arm. If we have issues, the FAST 1 is by my Cric kit.”

D-Drugs: “If I need to give the patient more Ketamine, my syringe is sitting right here. It is all drawn up, so if I ask you to give one more CC, it means you will need to connect it to the IV port and push from the 10 mark to the 9 mark, then open the IV up

Doug’s Basic ICU Neuro Exam for a lightly sedated and Intubated or Criced patient:

- Check Motor Cortex: Can the patient wiggle all toes and fingers or give the thumbs up
- Check Frontal , Temporal and Occipital Lobes: check that both pupils are equal, reactive and accommodating with a pen light
- Check Deep Brain Reflexes: Illicit a cough by suctioning the airway down to the carina with a sterile suction catheter like the Ballard inline suction
- Check Brain Stem: Is the patient breathing? If ventilated, are they breathing more than the set rate?

Along with a GCS score, this exam will tell you in simple terms if the geographic areas of the brain are intact.

Circle of Awareness Continuous 5-Minute Checks During the Procedure

1. Airway Patency (Including ventilator if being used)
2. Breathing Rate with stethoscope on chest
3. Circulation Rate and Pressure
4. Check ventilator settings
5. Sedation level (RASS) and drip rate
6. Report Patient Status to the Surgical Team
7. Record
8. Tasks such as untangling lines

Check RASS (Richmond Agitation and Sedation Scale)

Richmond Agitation-Sedation Scale (RASS)		
RASS Score	Term	Description
4+	Combative	Combative, violent, immediate danger to staff
3+	Very agitated	Pulls or removes tubes or catheters, aggressive
2+	Agitated	Frequent nonpurposeful movement, fights ventilator
1+	Restless	Anxious but movements not aggressively vigorous
0	Alert and Calm	
-1	Drowsy	Not fully alert but has sustained eye opening/contact 10 sec or more to voice
-2	Light Sedation	Briefly awakens to voice with eye contact less than 10 sec
-3	Moderate Sedation	Movement or eye opening to voice (no eye contact)
-4	Deep Sedation	No response to voice but movement or eye opening to physical stimuli
-5	Unarousable	No response to voice or physical stimuli

Richmond Agitation-Sedation Scale (RASS) for Traumatic Brain Injury		
RASS Score	Term	Description
4+	Combative	Combative, violent, immediate danger to staff
3+	Very agitated	Pulls or removes tubes or catheters, aggressive
2+	Agitated	Frequent nonpurposeful movement, fights ventilator
1+	Restless	Anxious but movements not aggressively vigorous
0	Alert and Calm	
-1	Drowsy	Not fully alert but has sustained eye opening/contact 10 sec or more to voice
-2	Light Sedation	Briefly awakens to voice with eye contact less than 10 sec
-3	Moderate Sedation	Movement or eye opening to voice (no eye contact)
-4	Deep Sedation	No response to voice but movement or eye opening to physical stimuli
-5	Unarousable	No response to voice or physical stimuli



ProlongedFieldCare.org
Austere Surgical Procedure Checklist
Updated 19 Jan 2021

Is the juice worth the squeeze?

- What happens if you do it and the patient dies?
- What happens if you do nothing and they die?
- Can you transfer to another host-nation, Ally or NGO facility?

Goals of emergency war wound surgical procedures:

1. **Stop Bleeding**
2. **Relieve tension**
3. **Remove or reduce contaminants including dead tissue and reduce bacterial load**
4. **Restore perfusion or function**

Other things that can make a difference and buy time (Things we have learned since the Civil War):

- Early systemic antimicrobials
 - Early Antibiotics
 - Tetanus prophylaxis
- Disruption of superficial biofilm on old wounds by scrubbing with antimicrobial such as
 - Chlorhexidine
 - Iodine surgical scrub
 - Antibacterial soap
 - Dakin's solution (1L water + 0.5ml unscented household bleach) for suspected fungal infection
- Copious irrigation with potable water
- Bacteriostatic dressings such as silverlon, sugar, honey...
- Promoting natural drainage NO occlusive dressings
- Sterility and aseptic technique

Step by Step Surgical Prep

- Telemedical Consult?
- Room Prepped
 - Clean
 - Secure
- Drug Calculations and Syringes
- Procedure and [Anesthesia Cheatsheets](#)
- Patient
 - Resuscitated and Stable?
 - Mental status, BP, HR, RR, SI, Lactate, INR, HCT
 - NPO or decompressed?
 - Additional Blood anticipated?
- Anesthetic strategy
 - Monitors
 - Airway
 - Sedation
 - Analgesia
- Other Meds
 - Antibiotics
 - Antiemetics
 - Antisialagogue
- Instruments Disinfected and Sterile
 - Scalpel w/ 10 blade
 - Forceps/Clamps
 - Tissue forceps nice to have
 - Needle Drivers nice to have

- Gigli Saw wire
 - Gigli handles nice to have
- Scissors
 - Metzenbaums or Mayo nice to have
- Sterile Drapes Recommended

Autoclave - Lobster Pot

Instant Pot - 20 mins on high (15 psi setting)

Stove top Pressure cooker

Dry Heat (Oven, Toaster Oven, grill)

- 180°C (356°F) for 30 mins
- 170°C (338°F) for 1 hour
- 160°C (320°F) for 2 hours

Glutaraldehyde, Cidex 5 mins then rinse

Alcohol:

- 60% to 90% minimum
- 3 hours of contact time
- Consumable alcohol must be a minimum of 120 proof

Bleach: Undiluted (5.25%) sodium hypochlorite **NO MORE THAN 5 mins then rinse off**

Boiling: 20 mins at a low rolling boil

7 mins in the microwave with a small cup of water on the side (NO METAL!)

- Gather Other Surgical Equipment
 - Sterile Gloves
 - Gown
 - mask
 - Suture
 - Chlorhexidine
 - Iodine

Prep and Drape

- Gross decontamination of entire limb with chlorhexidine scrub
- Irrigate and Dry
- Don hat and mask
- Open outer layer of sterile pack, gown and gloves
- Apply tourniquet at this time if needed
- Scrub in and Don gown and gloves
- Open sterile packs and create sterile working space
- Paint everything with Povidone Iodine
- Drape affected area with sterile drapes
 - Air-tight/Waterproof plastic layer
 - Large outer working surface

TIME OUT BEFORE CUTTING

- Procedure, Plan, Roles, Anesthesia, Resuscitation, Antibiotics, Special considerations, Questions
- Incise skin and elongate wound edges with scalpel
- Assess and remove dead tissue with scissors
 - Color
 - Consistency
 - Contractility
 - Capillary bleeding
- Ligate vessels
- Distract and cut nerves (amputation only)
- Cut/remove bone
- Fasciotomies
- Remove tourniquets (**NOTIFY ANESTHETIST FIRST**) and check bleeding
- Irrigate with potable water
- Dry (**Count in and out**)
- Dress the wound/stump
- Bulky sterile non-occlusive dressings and/or drains to allow for exudate drainage

Ensure your interventions worked

- ALL bleeding controlled once tourniquets removed
- No tense compartments
- All contaminants and non-viable tissues removed and irrigated

Patient Preparation for Surgery and Anesthesia

24 hours prior to surgery:
 -review patient chart
 -fill Anesthesia chart
 -calculate fasting deficit requirement
 -calculate drug dosages

12 hours prior to surgery:
 -patient NPO

1 hour prior to surgery:
 -brief patient on procedure
 -obtain patient consent
 -record baseline vitals
 -ensure all equipment is present and functions



obtain IV access

attach patient to all equipment and monitors

perform appropriate anesthesia induction

perform appropriate regional block

place TQ if necessary START 90 MINUTE CLOCK

expose wound observing for signs of infection

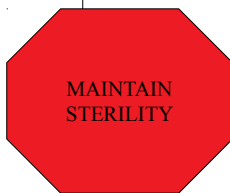
irrigate and clean wound and entire limb

cover wound

setup sterile field with gown and gloves

dawn hat, mask, and booties

scrub hands for 5 minutes from fingers to elbows



Dawn gown and gloves

have non-sterile assistant expose wound and hold limb

prep limb with iodine

remove non sterile assistant by Creating sterile surface for sterile assistant to hold

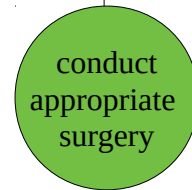
place waterproof barrier

create an air proof layer

lay surgical drapes across patient

copiously irrigate wound

Setup sterile working field for instruments near patient



Fasting Fluid Deficit Calculation

4ml/kg/hr for 1- 10 kg
 2ml/kg/hr for 11-20kg
 1ml/kg/hr for 21kg+

Example: PT weight 60kg, NPO for 8 hours

1st 10 kg x 4ml = 40ml

2nd 10 kg x 2ml = 20ml

Remaining 40kg x 1ml = 40ml

40ml+20ml+40ml = 100ml

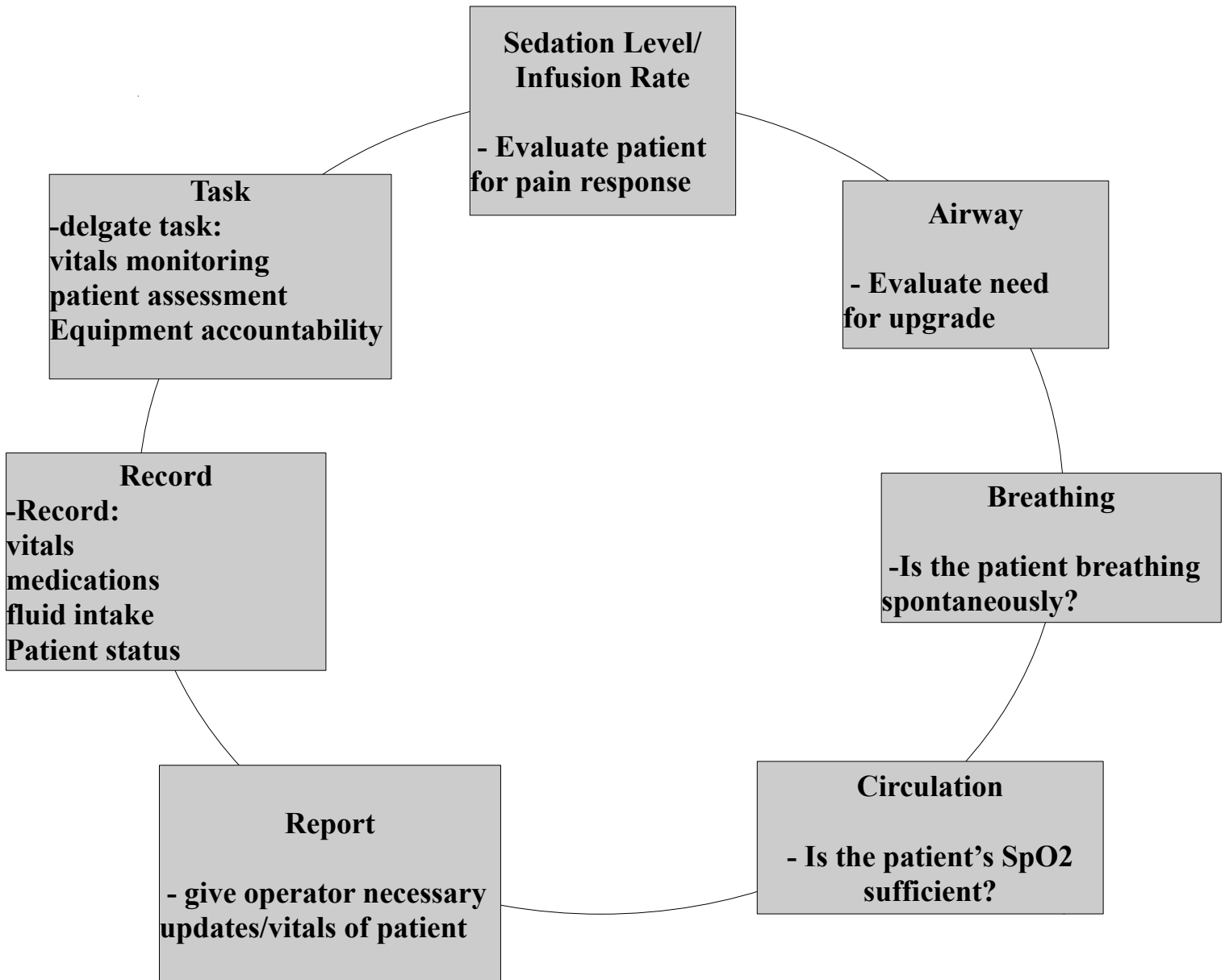
100ml x 8 hours = 800 ml fasting deficit

source: JSOMTC

Regional Block References

- Special Forces Medical Handbook
- SFMS Regional Anesthesia Lecture
- Military Advanced Regional Anesthesia and Analgesia

Circle of Awareness

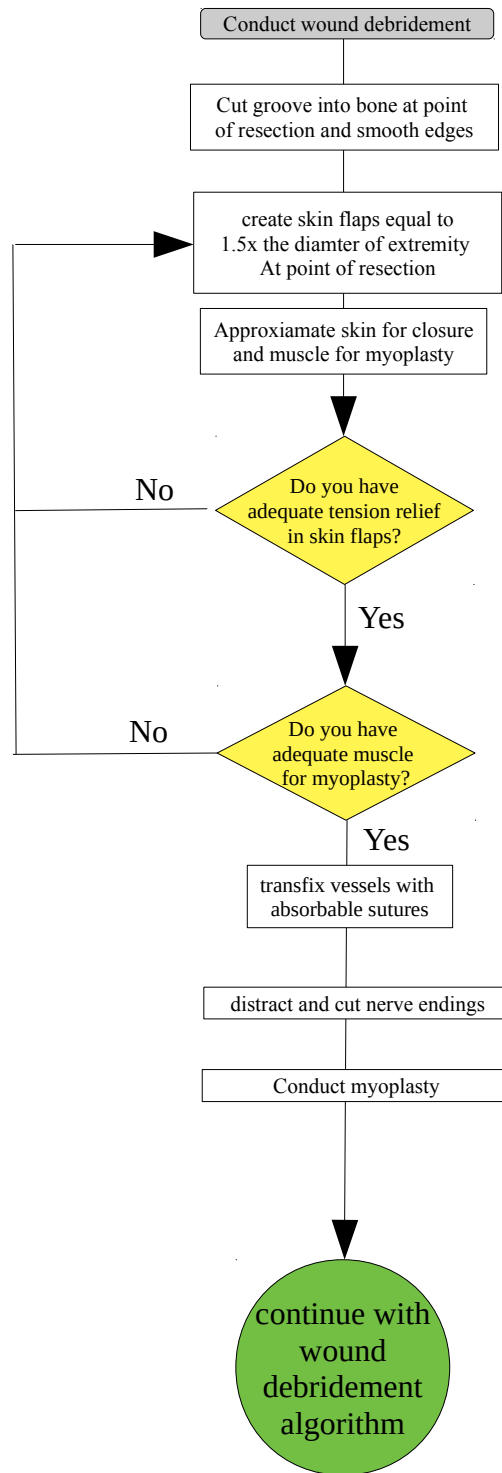


Disclaimer

This is only a quick reference guide and does not take into account all medical considerations.

Always use your best clinical judgement.

Amputation



Wound Debridement

Conduct patient prep

Is wound an exception case?

Yes

Heal by secondary intention

No

Undermine wound edge up to 5cm

Extend wound up to 2cm

Blunt dissect and explore wound with finger

Excise wound border 2mm-5mm

Moving superficial to deep, debride the wound

Debridement Exceptions

- bullet wounds with entry and exit less than 1 cm and no fragments on xray
- bullet wounds with entry of 1 cm, no exit, and intact bullet
- metal fragments with less than 1 cm entry not accompanied by contamination with earth

The 4 C's

- Color
- Consistency
- Contractility
- Capillary bleeding

Fragment Protocol

- remove as encountered
- do not damage healthy tissue to find one
- remove immediately in synovial joints and close to important structures

Relieve tension in muscle compartments

Remove non viable tissues following principles of 4C's

Achieve hemostasis

Remove fragments according to protocol

Reevaluate, Are all principles Meet?

No

Yes

Is this an amputation?

Yes

Perform amputation

No

Irrigate with 3L NS

Cover wound with bulky dressing

Secure in place with bandage, coban, or other means

Splint limb

Is it time for DPC? (4-7 days)

Yes

Perform DPC

No

Has the bandage become soaked?

Yes

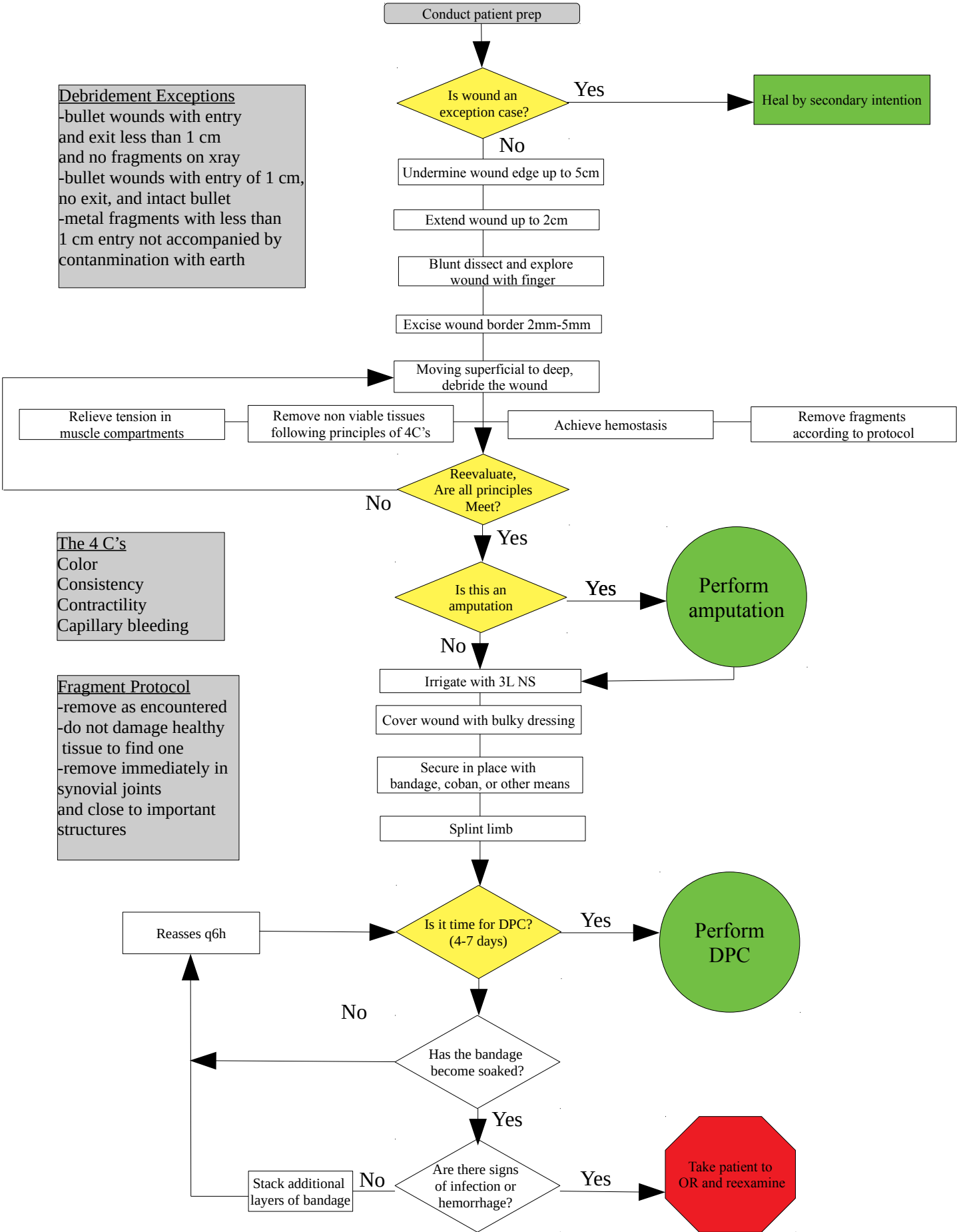
Are there signs of infection or hemorrhage?

Yes

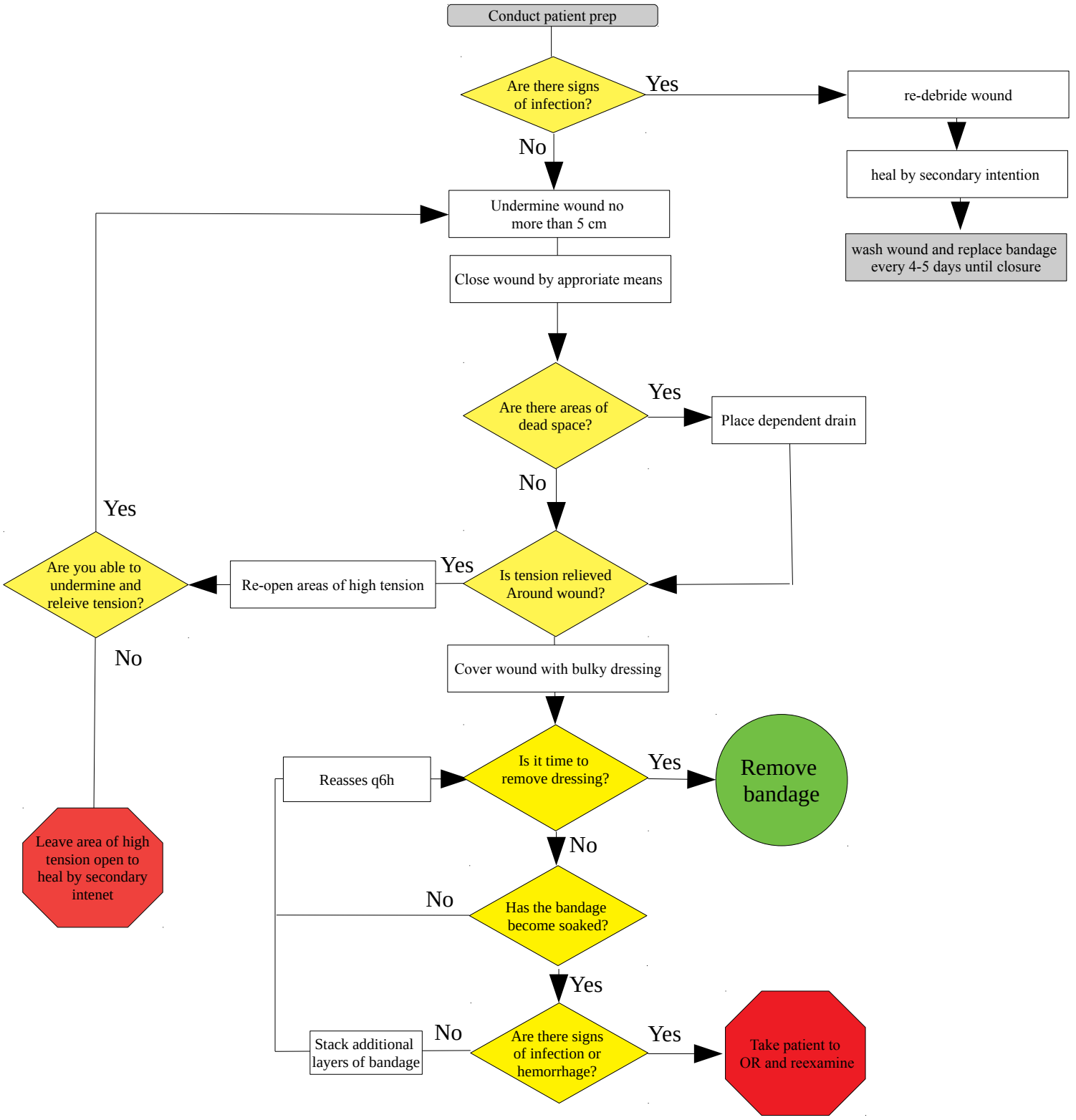
Take patient to OR and reexamine

Reasses q6h

Stack additional layers of bandage



Delayed Primary Closure



Decreased MAP due to Sedation

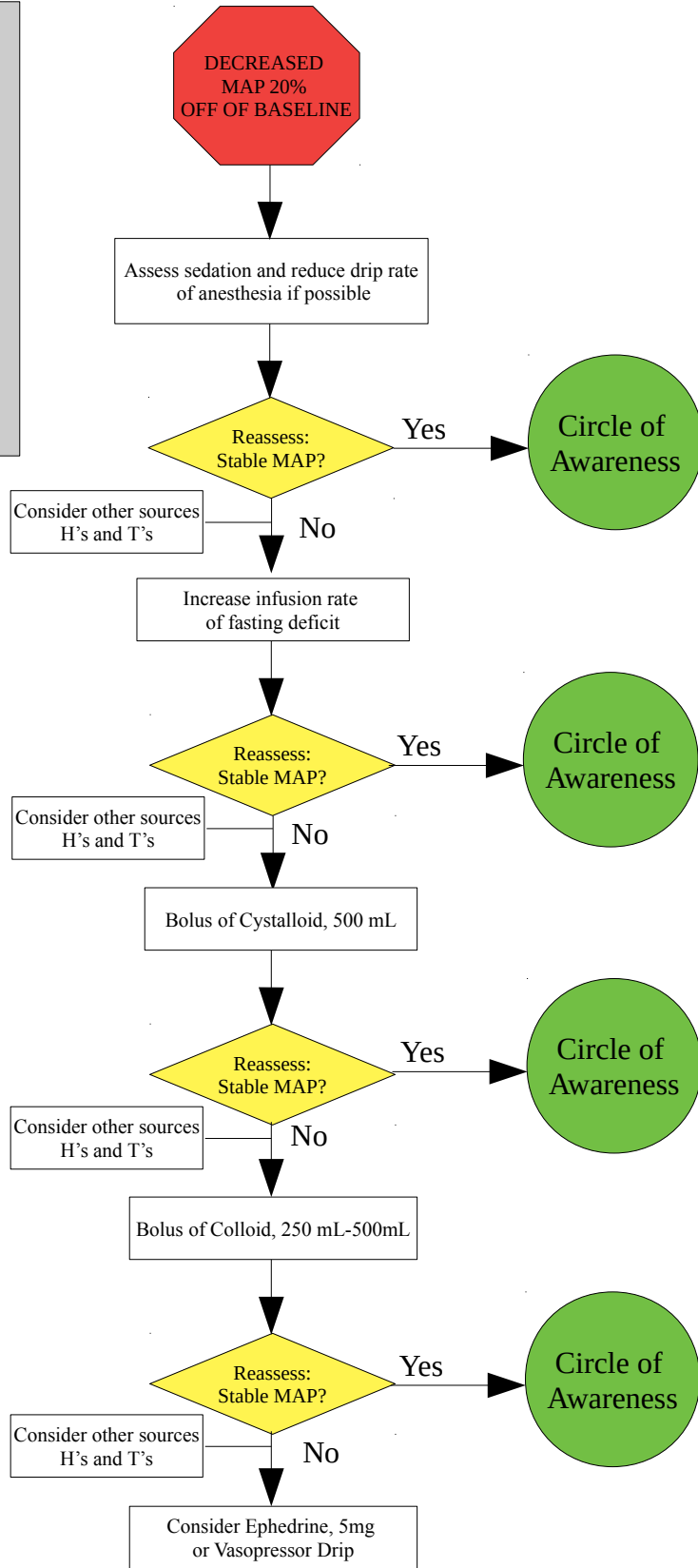
Disclaimer

This is only a quick reference guide and does not take into account all medical considerations.

Always use your best clinical judgement.

H's and T's

- Hypovolemia
- Hypoxia
- Hydrogen ion excess
- Hypoglycemia
- Hypokalemia
- Hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade – Cardiac
- Toxins
- Thrombosis (pulmonary embolus)
- Thrombosis (myocardial infarction)



Required Surgical Equipment

Instrument	Quantity
CVD Mayo Scissors	1
Metzenbaum Scissors	1
One Point Sharp Scissors	1
Tissue Forceps	1
Debaquey Forceps	1
Adson Tissue Forceps	1
#3 Scalpel Handle	1
#6 Needle Holder	1
Allis	2
CVD Mosquito	4
Weitlaner Retractor	1
Dull Volkman Retractor	2
4x8 non-sterile gauze	60
Gigli Saw Handle	2
Gigli Saw Blade	1
Lewis Bone File	1
Lewis Bone Rasp	1
Sterile Indicator (Class V)	2
36x36 Muslin Wrapper	5
Hand Towel	4
Penetrating Towel Clip	4
Kelly (Sponge Stick)	2
Emesis Basin	1

Useful Medications

Medication	Use	Dose	Onset	Duration
atropine	anticholinergic	.4-.8 mg PO/SQ/IV/IM	45s-60s IV	4-6 hours
glycopyrrolate	anticholinergic	.1-.3 mg IV/IM/SC	<60s IV, 15-30 min IM, 50min PO	Up to 7 hours
morphine	analgesic	5-15 mg IM/IV (.05-.1 mg/kg)	5-10 min IV	3-4 hours
fentanyl	analgesic	50-100 mcg IV	<60s IV	30-60 min
Stadol	analgesic	.5-2 mg IV	1-5 min IV	3-4 hours
Narcan	opoid antagonist	.04-.4 mg IV/IM/SQ	~2 min IV	.5-2 hours
Versed	benzodiazepine	.5-5 mg IV	1-5 min IV	<2 hours
diazepam	benzodiazepine	2-10 mg IV	<60s IV	Up to 3 hours
flumazenil	benzodiazepine antagonist	.2-1 mg IV	1-2 min IV	~1 hour
Phenergan	anti-nausea	12.5-50 mg PO/PR/IM/IV	~5 min IV	4-6 hours (up to 12 hours)
Zofran	anti-nausea	4 mg IV	30 min	8 hours
Benadryl	anti-nausea	10-50 mg IV/IM	<60s IV	7 hours
propofol	sedation	loading: 100-150 mcg/kg/min IV sedation: 25-75 mcg/kg min IV	30s IV	3-10 min
ketamine	dissociative	bolus: .2-1 mg/kg IV drip: 5-20mcg/kg/ min	30 s IV	5-10 min
ephedrine	vasopressor	5-25 mg IV	immediate	10-60 min

Last, First MI: _____ DOB/AGE: _____ / _____

DX: _____

Condition: Stable/ Not Stable Sick/ Not Sick Category: Nation/Service _____ / _____

Height: _____ Weight (Kg): _____

Allergies: Unknown NKDA Other: _____

Monitoring - document on the **JTS austere trauma team resuscitation record**

- ___ Continuous cardiac monitoring
- ___ Vitals signs: Q ___ hrs / Q ___ mins (BP, HR, RR, O2 sat, ETCO2, pain, temperature, GCS)
- ___ PaCO2 or EtCO2 monitor for patients with TBI and initial GCS of 3-8 (goal 35-40 mmHg)
- ___ Urine output: Q ___ hrs
- ___ Ultrasound (EFAST) Q ___ hrs
- ___ PMST checks all extremities Q ___ hrs
- ___ Skin exam Q ___ hrs
- ___ Tube check for placement, function, signs of infection Q ___ hrs

Activity

- ___ Able to do activities of daily living (go to bathroom, walk short distances, get food, etc)
- ___ Bedrest
- ___ Roll Q 2 hrs
- ___ Passive ROM to UE and LE Q _____ hrs
- ___ Spine precautions: ___ C-collar / C-spine ___ TLS Spine
- ___ Maintain patient in soft restraints while on ventilator

Wound care (from Initial management of war wounds CPG #N/A)

- ___ NS wet to dry BID to: _____
- ___ Dakin's wet to dry BID to: _____
- ___ Honey/Sugar dressing
- ___ VAC dressing to ___ 75 mmHg ___ 125 mmHg
- ___ Other: _____

Tubes/Drains

- ___ Place NGT / ___ OGT and confirm placement via
- ___ NGT / OGT to LIS
- ___ Foley to gravity
- ___ Chest tube to: ___ 20 cm H2O suction (circle: R L) ___ Water seal: (circle: R L)

Diagnostic Studies

- ___ iSTAT: ___ immediately post-op & q ___ hrs
- ___ EFAST: ___ immediately post-op & q ___ hrs
- ___ Fingerstick glucose Q ___ hrs
- ___ Urine dip stick Q ___ hrs

Diet

- ___ NPO
- ___ PO diet

Nursing (from PFC nursing care CPG #70)

- ___ Strict I&O.
- ___ Clear dressing to IV, change Q7d and PRN
- ___ Passive rewarming until temp > 36° C (97° F)
- ___ Environmental control (protect from bright lights and loud noise)
- ___ Lacrilube both eyes Q 6 hrs while sedated
- ___ Oral care Q 4 hrs; with toothbrush Q 12hrs
- ___ Maintain HOB elevated 30-45° / reverse trendelenburg
- ___ MACE II exam
- ___ Neurologic exam x1
- ___ Vision assessment. document in chart x1 (count fingers, move hand, light/dark, no vision)
- ___ Hearing assessment. document in chart x1 (for blast injuries)
- ___ Tube site care q ___ hrs
- ___ Cric site care Q ___ hrs
- ___ Elevate extremity above level of heart (circle: RUE, LUE, RLE, LLE)
- ___ Apply eye shield to (circle: R L)
- ___ Incentive spirometry Q 1 hrs while awake; cough & deep breath Q 1 hrs while awake

Fluids & pressors

- ___ Titrate resuscitation fluids to maintain goal systolic pressure \geq 100 mmHg
- ___ For head injury patients- maintain goal systolic pressure \geq 110 mmHg with normal saline
- ___ IVF: ___ NS ___ LR ___ Plasmalyte: _____ @ ___ mL/hr
- ___ 3% Na for intracranial hypertension. Bolus 250 mL, then 50-100 mL/ hr (goal Na 150-160)
- ___ EPI infusion ___ mcg/mL @ _____ mL/hr or _____ gtt/min

Ventilator settings

- Mode: ___ SIMV ___ AC ___ CPAP/BPAP
- Rate: _____ BPM I/E ratio: _____
- Tidal volume: _____ ml (standard 6-8 ml/kg) FiO2: _____ %
- PEEP: _____ mm H2O Pressure support: _____ mm H2O
- ___ Wean FiO2 to keep SpO2 > 92% or PaO2 > 70 mmHg

		Intubated Hemodynamically Unstable or severe ARDS	Intubated Hemodynamically Stable, adequate gas exchange	Not Intubated Stable
		Goals: Minimize pain, patient safety RASS -3 to -4, no sedation holiday, consider paralysis	Goals: Minimize pain, patient safety RASS -1 to -2, daily sedation holiday or continuously interactive patient	Goals: Minimize pain, patient safety RASS 0, continuously interactive patient
Background	Pain	<i>Option 1:</i> Ketamine drip <i>Option 2:</i> Intermittent Narcotic (*Option 1 for TBI) <i>Option 3:</i> Fentanyl or drip or equivalent if tolerated	<i>Option 1:</i> fentanyl drip or equivalent <i>Option 2:</i> Ketamine Drip <i>Option 3:</i> Intermittent Narcotic (*Option 1 for TBI)	<i>Option 1:</i> Scheduled Enteral or Parenteral Narcotic <i>Option 2:</i> Intermittent as needed enteral or parenteral narcotic
	Sedation	<i>Option 1:</i> Ketamine drip <i>Option 2:</i> Intermittent Benzodiazepine <i>Option 3:</i> Propofol drip if tolerated (*Option 1 for TBI)	<i>Option 1:</i> Propofol Drip <i>Option 2:</i> Demedetomidine Drip <i>Option 3:</i> Intermittent Benzodiazepines	NA
	Adjuncts	<i>Consider first:</i> Axial or regional anesthetic by catheter or injection <i>Consider also:</i> - scheduled acetaminophen or paracetamol - gabapentin and/or TCA for amputees		

Breakthrough	Pain	<i>Option 1:</i> Intermittent/bolus ketamine <i>Option 2:</i> Intermittent/bolus narcotic	<i>Option 1:</i> Intermittent/bolus narcotic <i>Option 2:</i> Intermittent/bolus ketamine	<i>Option 1:</i> PCA <i>Option 2:</i> Intermittent as needed enteral or parenteral narcotic
	Sedation	<i>Option 1:</i> Intermittent/bolus ketamine <i>Option 2:</i> Intermittent/bolus benzodiazepine	<i>Option 1:</i> Intermittent/bolus benzodiazepine <i>Option 2:</i> Intermittent/bolus ketamine	<i>Option 1:</i> As needed enteral or parenteral benzodiazepine
	Adjuncts	<i>Consider:</i> - Dim, calm environment, reassurance, music, presence of friends/family - Give bolus and/or adjust dose of axial or regional anesthetic		

Analgesia and/or Sedation medications (from pain, anxiety & delirium CPG #29)

Richmond Agitation Sedation Scale (RASS), 0 (alert and calm) to -3 (moderate sedation).

___ Maintain RASS score of ___

___ Ketamine 0.1-0.3 mg/kg/hr or 1.0 – 2.0 mg/kg/hr

___ Fentanyl start at 50 mcg/hr (max 250 mcg/hr); may give 25-100 mcg Q 15m prn pain

___ Morphine start at 1 mg/hr, titrate up to 10 mg/hr; may give 2-10 mg IVP Q 15m prn pain

___ Hydromorphone start at 0.5 mg every 1-6hrs; may give 0.25-2mg q 1hr

___ Versed start at 1 mg/hr, titrate up to 10 mg/hr ; may give 2-5 mg IVP Q 15m prn agitation

___ Propofol start at 10 mcg/kg/min, titrate up to 50 mcg/kg/min (100 kg=start @ 1,000mcg/min)

'As needed' pain & agitation medications

___ Hydromorphone 0.25-2mg IV q 1-6hrs prn

___ Morphine 1-5 mg IV Q 15 minutes prn pain

___ Fentanyl 25-100 mcg IV Q 15 minutes prn pain

___ Percocet 1-2 tablets po Q 4 hrs prn pain

___ Tylenol _____ mg PO / IV / NGT / PR Q _____ hrs PRN pain

___ Zofran 4 mg IV/PO Q 4 hrs PRN for nausea/vomiting

Prophylactic medications

- Calcium after the first unit and after every 4 units of red blood product transfused
 - Keppra/phenytoin/fosphenytoin x7 days for severe head injury
 - Tetanus immunization, if no previously documented administration
 - Protonix 40mg IV Q day
 - Lovenox 30mg SQ BID or Heparin 5000u SQ TID
- NOTE: start within 48 hrs of injury/ 24 hrs for dismantled complex blast injury
- Pneumatic sequential compression devices

Prophylactic Antibiotics (from infection prevention in combat-related injuries CPG #24)

- Ancef 2mg Q 6-8 hrs for soft tissue, CNS, ENT, chest, abd, M/S (alt. clindamycin)
- Invanz 1gm Q 24 hrs alt. For hollow organ perforation
- Flagyl 500mg Q8-12 hrs as additional agent in setting of gross CNS contamination
- Levoquin 500mg PO/IV for penetrating eye injury (alt: cipro, moxiflox)
- Topical erthyro/bacitracin ophth QID for eye burn or abrasion
- Antiseptic body cleaning daily

(STOP sooner than 72 hours post-op for prophylactic use)

NOTE: no documented benefit from empiric use of systemic anti-fungal coverage

Other orders:

Notify Physician if: (fill in or circle)

- SBP < _____ / (normal 90 mmHg)
- MAP < _____ / (normal 65 mmHg)
- HR < _____ / (normal 60 BPM) or > _____ / (normal 110 BPM)
- SaO2 < _____ % / (normal 92%)
- Temp > _____ / (normal 39°)
- UOP < 30 mL / hour for 2 consecutive hours
- Chest tube output greater than 150 cc / hr for greater than 2 hours

Prolonged Field Care MTF handover sheet

PRIOROTY I INFORMATION

I am _____ a _____ from _____

Rank, Name

a

PJ/68W/18D/CRF

from

unit

I'm bringing in a _____ years old _____ patient

critical / non critical

years old

male/female

patient

who is a _____

Coalition(non)military/non coalition security/civilian/opposing force(POW)

The patient got injured by _____ hrs. ago

IED/GSW/RPG/accident/fall/other

hrs. ago

at _____ Evacuation time _____ hrs by _____

location

Evacuation time

hrs by

air / land

Injuries sustained: _____

TBI / penetrating/bunt trauma / amputation / arterial bleeding / bleeding

Eye injury / burns / fracture / intoxication / laceration / other

Problems NOW:

<C> NONE / critical bleeding leg / groin / arm / axilla / neck/ hemodynamic instability

A NONE / Airway obstruction / opened airway / respiratory acidosis

B NONE / low-high respiration rate / thorax injuries / tension pneumothorax / other

C NONE / low-high blood pressure / low-high pulse-rate / bleeding / low O₂-saturation / other

D NONE / A V P U / pupils / pain / spinal injury / fracture / other

E NONE / low-high body temperature / wet clothes / other

Other information: _____

PRIORITY II INFORMATION

Treatment given:

<C> NONE / Tourniquet + TIME ! / hemostatic agent / wound packing / pressure bandage

A NONE / cric / SGA(LT) / ET / NPA / OPA / positioning

B NONE / chest seal / ND / chest tube / other

C NONE / i.v. / i.o. / blood / fluids / recovery position / other

D NONE / splint / spine stabilization / sedation-analgesia / burn dressing / other

E NONE / hypothermia prevention / hyperthermia treatment/ changed clothes / other

Medication: _____

Analgesic / Antibiotics / Oxygen l/min

Fluids: _____

Crystalloid / colloids (ml total)

N K D A

If so, which?

diseases / allergies

No Known Diseases / Allergies

Other information not covered above: _____

Prolonged Field Care MTF handover sheet

PRIOROTY I INFORMATION

I am _____ Rank, Name _____ a PJ/68W/18D/CRF from _____ unit

I'm bringing in a critical / non critical _____ years old male/female patient

who is a Coalition(non)military/non coalition security/civilian/opposing force(POW)

The patient got injured by IED/GSW/RPG/accident/fall/other _____ hrs. ago

at _____ location Evacuation time _____ hrs by _____ air / land

Injuries sustained: TBI / penetrating/bunt trauma / amputation / arterial bleeding / bleeding

Eye injury / burns / fracture / intoxication / laceration / other

Problems NOW:

- <C> NONE / critical bleeding leg / groin / arm / axilla / neck/ hemodynamic instability
- A NONE / Airway obstruction / opened airway / respiratory acidosis
- B NONE / low-high respiration rate / thorax injuries / tension pneumothorax / other
- C NONE / low-high blood pressure / low-high pulse-rate / bleeding / low O₂-saturation / other
- D NONE / A V P U / pupils / pain / spinal injury / fracture / other
- E NONE / low-high body temperature / wet clothes / other

Other information: _____

PRIORITY II INFORMATION

Treatment given:

- <C> NONE / Tourniquet + TIME ! / hemostatic agent / wound packing / pressure bandage
- A NONE / cric / SGA(LT) / ET / NPA / OPA / positioning
- B NONE / chest seal / ND / chest tube / other
- C NONE / i.v. / i.o. / blood / fluids / recovery position / other
- D NONE / splint / spine stabilization / sedation-analgesia / burn dressing / other
- E NONE / hypothermia prevention / hyperthermia treatment/ changed clothes / other

Medication: Analgesic / Antibiotics / Oxygen l/min

Fluids: Crystalloid / colloids (ml total)

N K D A

If so, which?

diseases / allergies

No Known Diseases / Allergies

Other information not covered above: _____

Malaria Treatment Protocol (ver 1.4) Produced OCT 2012, updated OCT 2013

Patient has clinical signs of **Complicated Malaria** *

- Begin Treatment**
- Call Higher Level for Consultation
- Prep for Evacuation
- Administer Rapid Diagnostic Test – Binax
- And if trained:*
- Take Thick and Thin Blood Smears

- Treat for Complicated Malaria***
- Call for Higher Consultation
- Consider treating other causes of Encephalitis/Meningitis

Evacuate to Higher Medical Care

Note: Always treat all fevers in Malarial areas as malaria until proven otherwise. Always treat dehydration and nausea if present.

Patient has clinical signs of **Uncomplicated Malaria** *

- Treat For Uncomplicated Malaria***
- Administer Rapid Diagnostic Test – Binax
- And if trained:*
- Take Thick and Thin Blood Smears

Positive?

Yes

- Continue Treatment (Coartem or Malarone)
- Capture blood drop on filter paper and send to NAMRU in Egypt
- Continue Blood Smears to check for improvement

PT Condition?

Worsening or no change

Switch to Alternate drug regimen: If using Coartem switch to Malarone

Improving

Consider other Diagnoses and Treatments/Call Higher Level Consultation

- Continue Tx
- Repeat Binax and Blood Smears 8-12 hours later

Positive?

Yes

- Complicated Malaria SSX:**
- Unarousable Coma
- Seizures
- Severe Anemia
- Severe Bleeding
- Abnormalities
- Pulmonary Edema/ARDS
- Renal Failure
- Hemoglobinuria
- Hypoglycemia
- Hypotension/shock
- Acid Base Disturbances

- Uncomplicated Malaria SSX:**
- Fever of 101 degrees
- Shaking Chills
- Sweats
- Headache
- Muscle Aches
- Exhaustion
- Nausea/Vomiting
- Diarrhea
- Anemia
- Jaundice

- Continue Tx
- Repeat Binax and Blood Smears 8-12 hours later

Positive?

Yes

Consider other Diagnoses and Treatments/Call Higher Level Consultation

- Treat for Uncomplicated Malaria:**
- 1st Line: **COARTEM**
4 tablets initial dose. Then 4 more tabs after 8 hours and then 4 tablets twice daily for 2 days (total 24 tabs)
- 2nd Line: **MALARONE:** 4 Tabs orally per day x 3 days
- Use Anti-emetics liberally to ensure tolerance of PO meds

- *Treat for Complicated Malaria:**
- 1st Line : **IV ARTESUNATE:**
2.4 mg/kg initial dose, then 2.4 mg/kg dose 12 hours later, then 2.4 mg/kg dose Q 24 hrs once daily for a total of 4 doses or until pt can tolerate oral artemesin-based combination therapy (ie, Coartem)
- 2nd Line : **IV QUININE:**
20 mg/kg loading dose over 4 hours, followed by 10 mg/kg every 8 hours given over 2 to 4 hours. Once parasite density <1%, patient can take oral medication. CAUTION: Do not give loading dose if pt has received quinidine or mefloquine within last 24 hrs

PROLONGED FIELD CARE

Prolonged Field Care Working Group Position Paper *Operational Context for Prolonged Field Care*

Christopher J. Mohr, 18Z; Sean Keenan, MD

We propose a universal approach to operational planning and logistical preparation for prolonged field care (PFC) missions, in the form of four stages. We have been accustomed to view missions in terms of patient treatment stages, such as seen in Tactical Combat Casualty Care (TCCC). This is less useful when planning for PFC because of the more comprehensive list of capabilities needed to consider across a wider spectrum of operational realities. Instead of echelons of patient care, we propose to use a system of mission or evacuation stages to simplify and standardize our language, using the following terminology: RUCK-TRUCK-HOUSE-PLANE (RTHP). We believe that the RUCK-TRUCK-HOUSE-PLANE format is useful, being simple as well as easily transferable and relatable, across all branches of service.

The stages are explained as follows:

RUCK: the gear carried to the furthest point on a mission, generally carried by medical personnel dismounted.

TRUCK: whatever additional equipment will be carried in mission-specific transportation, whether that is trucks, boats, all-terrain vehicle, kayaks, and so forth.

HOUSE: gear available to the medic, but which is only feasible to be maintained at a team house, firebase, or other mission support site. It represents the highest level of care the operational element has organic to it.

PLANE: planning stage included to allow the medical providers to consider how they will move patients on aircraft, whether medical evacuation (MEDEVAC) aircraft (those designated and equipped to move casualties as a primary mission) or casualty evacuation (CASEVAC) (preplanned nonmedical mission support aircraft, opportunity or “slick”) aircraft.

These stages are conceptual and not necessarily linear, but should be used as guidelines only. Two examples follow.

Example 1: A unit conducting foot patrols, supported by gun trucks, with a team house at a local national base and with access to a helipad. In this case, while dismounted, the medic carries what makes sense to him (RUCK). He has access to larger equipment and resupply in the mission support vehicles (TRUCK). The team house stores the balance of medical equipment he could not feasibly carry forward, and this represents his highest organic level of care (HOUSE). The team will have planned for use of the helicopter landing zone to potentially transport patients to higher care or fixed-wing evacuation (PLANE).

However, the RTHP formula can just as easily be used for any other mission.

Example 2: A unit operating out of their vehicles on an extended desert mission may not have any higher level of organic care than that which is contained on their trucks. They may not operate out of a fixed facility or team house. The larger trucks, therefore, would represent the highest level of capability the unit has organic to them (HOUSE). However, when they split up into patrols, the smaller vehicles on each patrol will normally be stocked with resupply bags, and perhaps heavier medical equipment, such as oxygen bottles. These patrol vehicles now represent the TRUCK stage. The most specialized capabilities may only be retained by the command and control element, or mission support site, representing HOUSE. The individual medic and the equipment on his person represent RUCK (Figure 1).

The point of Figure 1 is the flexibility of the language to describe operational context of care. It should be noted these stages are always defined according to assets available, mission, and unit. There is no expectation that a “TRUCK” or “HOUSE” is strictly defined across different mission sets.

A useful operational planning diagram would be the development of a matrix with four horizontal rows labeled with the four operational stages, and the vertical

Figure 1 A Special Forces team may use a large vehicle as their base (or HOUSE) for command and control, as well as logistics re-supply, during long range patrolling operations.



columns labeled with the expected PFC capabilities, tailored to the applicable mission set. This allows for easier visualization and decision-making with respect to capabilities and equipment available throughout stages of the mission, with respect to casualty treatment and transport. A partial example is given in Table 1.

There are several further advantages to considering this model. Most important, after identifying stages in this manner, it is easy to identify which capabilities and which specific equipment a medical provider will have at any point on a mission or during evacuation of a patient. This then helps the medic to visualize gaps and areas that lack important capabilities along the proposed evacuation chain.

Space is a planning constraint on almost all Special Operations Forces (SOF) missions. From the moment a unit loads out from their home station, decisions are made to prioritize the allocation of space in shipping containers, on vehicles, and on the person of the individual combatants. The RTHP framework can be useful by simplifying prioritization here, as well.

Table 1 Example of a PFC Operational Planning Matrix (table is truncated due to space restriction)

Stage	Monitor	Resuscitate	Ventilation/Oxygen	Airway
RUCK	Pulse oximeter, BP cuff, Stethoscope	NS/hetastarch	BVM with PEEP	SGA/cric
TRUCK	Monitor	NS/hetastarch/FWB kit	BVM with PEEP/O ₂ (2 bottles)	SGA/cric with ketamine drip
HOUSE	Monitor	LR, 4 cases hypertonic saline/FWB	O ₂ concentrator	RSI capability
PLANE	Monitor	LR	BVM with PEEP	SGA/cric with ketamine drip

Note: BP, blood pressure; BVM, bag-valve-mask; cric, cricothyrotomy; FWB, fresh whole blood; LR, lactated Ringer's solution; O₂, oxygen; PEEP, positive end-respiratory pressure; RSI, rapid-sequence intubation; SGA, supraglottic airway.

Using this verbiage simplifies communication to unit leadership about constraints and limitations, as well as logistical needs. A medic can use the operational context and stages to better visualize the equipment needs, and communicate this to her team. For example, the medic's explanation would include the operational need to support a HOUSE, four trucks, and possibly the capabilities to outfit an aircraft to some degree. While the medic may carry hetastarch, or freeze-dried plasma, on his person, mission considerations may demand more definitive fluid therapy solutions at the TRUCK level, such as fresh whole blood transfusion equipment. At the HOUSE, she will have all the aforementioned options, as well as a sufficient supply of lactated Ringer's solution and normal saline to cope with other serious medical contingencies. Using this simple planning verbiage, the medic can easily convey to unit leadership his equipment requirements and how it should be distributed.

Finally, one of the strategic advantages of having the community use this lexicon is homogenizing our research, development, and procurement of equipment, and improving our overall capabilities over the long term. Since part of the emphasis on PFC is to effectively evaluate equipment to support capabilities, members of the SOF community can better evaluate equipment in our numerous sets, kits, and outfits, and objectively compare common equipment in the standardized operational phases. It will also quickly identify capability gaps and focus future research and development needs in the community.

To summarize, the application of a standardized, operational-context naming convention system such as RTHP in the context of medical operational planning, and specifically in PFC, provides several immediate benefits:

1. It provides a framework for planning mission support and personal load out.
2. It provides a clear system to communicate limitations of medical patient care and holding capability with leadership.

PROLONGED FIELD CARE WORKING GROUP POSITION PAPER

PROLONGED FIELD CARE CAPABILITIES

JUNE, 2014

A newly formed Prolonged Field Care Working Group (PFC WG), comprised of medical-specialty subject matter experts, has been tasked to evaluate the current training and preparedness of Special Operations Force (SOF) medics. The first formal position paper from the working group suggests that medical providers consider the below list of capabilities when preparing their medics to provide PFC in austere settings. It is presented in a “minimum, better, best” format. The intent is to demonstrate those basic skills, with adjunctive skills and equipment that may be employed when considering what to train for Prolonged Field Care (PFC).

At first glance, the list may seem somewhat simple, but it emphasizes basic medical skills, that, when put together, allow for a more comprehensive approach to critical patient care in an austere setting. Of note, equipment is relatively de-emphasized since medical skills and training should be the focus of preparing the Special Operations provider for providing this care.

PFC requires the following capabilities in at least some capacity. If you can provide these 10 capabilities in at least the minimum requirements, you are on your way to being prepared for PFC. Here are the recommendations:

1. **Monitor** the patient in order to create a useful vital sign trend
 - a. Minimum – blood pressure cuff, stethoscope, pulse oximetry, **Foley catheter** (measure urine output) and an understanding of vital signs interpretation. Use a method to accurately **document** vital signs trends.
 - b. Better - add **capnometry**
 - c. Best - **vital signs monitor** in order to provide hands-free vitals at regular intervals

2. **Resuscitate** the patient beyond crystalloid/colloid infusion
 - a. Minimum - field **Fresh Whole Blood** transfusion kits
 - b. Better - maintenance crystalloids also prepared for a major burn and/or closed head injury resuscitation (2-3 cases of LR or PlasmaLyte A; hypertonic saline); consider adding Lyophilized Plasma as available; Fluid warmer
 - c. Best - maintain a stock of PRBCs, FFP, and have type-specific donors identified for immediate FWB draw.

3. **Ventilate/oxygenate** the patient
 - a. Minimum - provide **PEEP via BVM** valve (you cannot ventilate a patient in the PFC setting (prolonged ventilation) without PEEP or they will be at risk for developing ARDS)
 - b. Better - provide **supplemental O2** via oxygen concentrator
 - c. Best – portable **Ventilator** (i.e. Eagle Impact ventilator or similar) with supplemental O2

4. Gain definitive control of the patient's **airway** with an inflated cuff in the trachea (and be able to keep the patient comfortable)
 - a. Minimum - Medic is prepared for a **Ketamine cricothyrotomy**
 - b. Better - add ability to provide **long-duration sedation**
 - c. Best - add a responsible **RSI capability with subsequent airway maintenance skills**, in addition to providing long term sedation (to include suction and paralysis with adequate sedation)

5. Use **sedation/pain control** in order to accomplish the above tasks
 - a. Minimum - provide opiate analgesics titrated IV
 - b. Better - trained to sedate with ketamine (and adjunctive midazolam)
 - c. Best - experienced with and maintains currency in long term sedation practice using IV morphine, ketamine, midazolam, Fentanyl, etc.

6. Use **physical exam/diagnostic measures** to gain awareness of potential problems
 - a. Minimum - using **physical exam without advanced diagnostics** - maintain awareness of potential unseen injuries (abdominal bleed, head injury, etc)
 - b. Better - trained to use advanced diagnostics - **ultrasound, point-of-care lab testing, etc.**
 - c. Best - experienced in the above

7. Provide **nursing**/hygiene/comfort measures
 - a. Minimum – ensure the patient is clean, warm, dry, padded, catheterized and provides basic wound care
 - b. Better - elevate head of bed, debride wounds, perform washouts, wet-to-dry dressings, decompress stomach
 - c. Best - experienced in all the above

8. Perform advanced **surgical interventions**
 - a. Minimum - chest tube, cricothyrotomy
 - b. Better - fasciotomy, wound debridement, amputation, etc.
 - c. Best - experienced with all the above

9. Perform **telemedicine** consult
 - a. Minimum – make reliable communications; present patient; pass trends of key vital signs
 - b. Better - add labs and ultrasound images
 - c. Best - video teleconference

10. Prepare the patient for **flight**
 - a. Minimum - be familiar with physiologic stressors of flight
 - b. Better - trained in critical care transport
 - c. Best - experienced in critical care transport

Prolonged Casualty Care Principles

The principles and strategies of providing effective prolonged field care are meant to help organize the overwhelming amount of critical information into a clear clinical picture and proactive plan regardless of the nature of injury or illness. The following steps can be implemented in any austere environment from dispersed small team operations in permissive environments or in large scale combat operations in order to make the care of a critically ill patient more efficient for the Medic and his team. These mimic the systems and processes in typical intensive care units without relying on technology while leaving the ability to add technological adjuncts as they become available. The following checklist is meant to emphasize some of the most important principles in efficient care of the critically ill patient.

- Perform initial lifesaving care using TCCC guidelines and continue resuscitation
 - The foundation of good PFC is mastery of TCCC and a strong foundation in clinical medicine.
- Delineate roles and responsibilities including naming a team leader
 - A leader should be appointed who will be responsible to look at the larger clinical picture while assistants focus on attention intensive tasks.
- Perform comprehensive physical exam and detailed history with problem list and care plan
 - After the initial care and stabilization of a trauma or medical patient, a detailed physical exam and history should be performed for the purpose of completing a comprehensive problem list and corresponding care plan.
- Record and trend vital signs
 - Vital signs trending should be done with the earliest set of vital signs taken and continued at regular intervals so that the baseline values can be compared to current reality on a dedicated trending chart.
- Perform a telemedical consult
 - As soon as is feasible, the medic should prepare a telemedical consultation by either filling out a preformatted script or by writing down his concerns along with the latest patient information.
- Create a nursing care plan
 - Nursing care and environmental considerations should be addressed early so as to limit any provider induced iatrogenic injury.
- Implement team wake, rest, chow plan
 - The medic and each of his helpers should make all efforts to take care of each other by insisting on short breaks for rest, food and mental decompression.
- Anticipate resupply and electrical issues
- Perform periodic mini rounds assessments
 - Stepping back from the immediate care of the patient periodically and reengaging with a mini patient round and review of systems can allow the medic to recognize changes in the condition of the patient and reprioritize interventions.
 - Is the patient stable or unstable?
 - Is the patient sick or not sick?
 - Is the patient getting better or getting worse?

- How is this assessment different from the last assessment?
- Obtain and interpret lab studies
 - When available, labs may be used to augment these trends and physical exam findings in order to confirm or rule out probable diagnoses.
- Perform necessary surgical procedures
 - The decision to perform invasive and surgical interventions should consider both risks and benefit to the patient's overall outcome and not merely the immediate goal.
- Prepare for evacuation care
 - If the medic is caring for the patient over a long strategic evacuation off continent, they should be prepared with ample drugs, fluids, supplies and be ready for all contingencies in flight
- Prepare documentation for patient handover
 - The preparation for evacuation care should begin immediately upon assuming care for the patient and should include hasty and detailed evacuation requests up both the medical and operational channels with the goal of getting the patient to the proper role of care as soon as possible.

Improvised Field Medicine List

Prioritize stockpiling these items as they are difficult to improvise:

- Pulse Oxs
- BP cuffs
- Stethoscopes
- Glucometer and strips
- BVM with PEEP valves
- Sterile needles and syringes
- Medications
- IV catheters
- IV fluids
- IV tubing
- Foley catheter(catheter only)
- ET Tubes

The following are recommendations and ideas for medical items you should try and recreate if you do not have commercial, items available. This list is not comprehensive and not mandatory but should be your starting point.

PPE

- Work gloves
- Medical Gloves
- Eye protection
- Ear protection

Convenience items

- Fanny packs
- IFAK pouch
- Dump pouch for trash
- Backpacks
- Trash bags
- Markers
- Paper
- Zip lock bags
- Back up batteries and charging cables for phones
- Batteries for issued devices and any purchased lighting/devices
- Pen Light

Patient Movement and Immobilization

- 2-pole litter (2 poles and a tarp)
- Jungle litter (one pole and a hammock)
- Poleless litter
- Sked
- C-Collar
- Padded restraints

Massive Bleeding

- Extremity tourniquets
- Junctional tourniquets
- Pressure dressings
- Wound packing

Airway

- Cric kit
 - Scalpel
 - Bougie
 - Securing device
- Suction device
- Suction tubing

Respirations

- Chest Seals
- Needle Decompression
- Chest tube and one-way chest tube heimlich valve

Circulation

- Water
 - Container
 - filter
 - iodine/chlorine tabs
- ORS mix

Hypothermia

- Air activated chemical heaters
- Clothing
- Padding
- Blankets/Sleeping bag
- Waterproof layers

Head Injury

Eyes

- Patch
- Irrigation
- Eye drops
- Ointment

Pain control/Meds

- Meds
 - Tylenol (No Aspirin)
 - Benadryl
 - Dramamine
- Other
 - Saran wrap for acute burn covering

Antimicrobials

- Bleach
- Iodine
- Oral rinse

Wounds

- Irrigation (filter?)
- Scrubber to scrub biofilm
- Steri strips (Any small strip of plastic)
- Adhesive glue for steri strips (Super glue)
- Suture material (fishing line)
- Suture needles (Sewing needles)

Splints

- Pelvic binder (Sheet)
- Long bone splint (Any long, rigid item)
- Sling and Swath (Bandana or large square cloth)

Burns

- Dry sterile gauze

Resuscitation

- Foley tubing and connector
- Foley urine capture device and connectors
- Foley urine output measuring device

Analgesia and sedation

- Cheat sheet from analgesia and sedation CPG

Ventilate and oxygenate

-

Initiate communications

- Telemed script
- Comms notification sheet

Nursing

- PFC Charts
- Nursing checklist
- Compact sleep mat(inflatable?)
- Pillows(inflatable?)
- Blood absorbant pads (Puppy training pads)
- Tooth brush and paste/rinse
- Baby wipes
- Hydrogen peroxide
- Incentive spirometry or peak flow (Birthday balloons)
- Adult diapers
- Nutrition
- Medical tape

- Condom catheter

Environmental

- Large Mosquito net tent/Tent/Rain Shelter/Mosquito netting/
- Headlamps
- Hanging work lights/lanterns
- Sunscreen
- Chapstick
- Battery powered fan/Heater
- Lighter/matches

Surgical

- Gigli saw
- Needle drivers
- Forceps
- Scissors
- Tweezers
- 2 twin sheet/pillow case sets
- Foil
- Masking tape
- Unscented bleach
- Iodine
- Medium trash bags
- Small pump sprayer

Prolonged Field Care - Evaluation Rubric

	Green	Yellow	Red	Remarks
<u>Proper Equipment Loadout for Treatment Venue: Ruck, Truck, House, Plane, etc. (According to 10 C.C. Sheet)</u>	Missing 0 Critical Items	Missing 1-2 Critical Items	Missing 3+ Critical Items	
<u>TCCC MARCH Point of Injury Care</u>	Adheres to all CoTCCC guidelines mitigating all risks to life, limb and eyesight	Completes basic MARCH interventions required to save lives	Fails to complete MARCH assessment or interventions leaving patient at risk of death	
<u>Resuscitation</u>	Initiates appropriate resuscitation within 35 mins of injury	Initiates resuscitation within an hour of injury.	Fails to initiate resuscitation in a timely manner that would benefit the patient outcome	
<u>Considered Hypothermia at all Times</u>	Green: Patient Always Covered	Yellow: Patient Left Uncovered	Red: Role-Player is Actually Cold	
<u>Reduction of Tourniquet</u>	Attempts proper tourniquet conversion within an hour of placement. If full conversion is not possible, reduces distally to save tissue	Attempts tourniquet conversion within 2 hours of placement,	Does not attempt to reduce tourniquet within 2 hours. No attempt to save tissue is made.	
<u>Airway Control</u>	Airway is Patent, Secured and Protected Always	Students React Well to Airway Compromise	Airway is Compromised with late or Inadequate Intervention	
<u>Ventilate and Oxygenate</u>	Optimizes ventilation parameters including: RR, Vt, FIO2, PEEP and maintains safety and comfort	Provides ventilation, but is unable to tailor parameters to patient's needs	Provides poor or no ventilation management	
<u>Initiate Telemedical Consult</u>	Clear, Concise, Early Script Prepared/ Has a plan, but needs advise	Not Clear or Concise/ Poorly Prepared Script/ No plan for care of patient and needs to be provided one	Poor Communication Which Affected the Ability of the Doc to Deliver Medical Advice	
<u>Nursing and Hygiene</u>	Nursing Check Sheet Used / Implemented appropriately. Environmental considerations accounted for.	Nursing Check Sheet Used or Well-Developed Student Plan Used / Implemented	Incomplete Plan, Check Sheet not Used / Implemented	
<u>Documentation</u>	Documents all problems, interventions and assessments required to establish trends	Documents major interventions, assessments, drugs and vital signs	Fails to document any assessments, interventions, drugs or vitals	
<u>Monitoring</u>	Appropriate Vitals Taken at Appropriate Times, Vitals Trended and Interpreted	Inconsistent Vitals Taken, at Inconsistent Times, Vitals Interpreted Late	Full Vitals NOT Taken, and Taken Inconsistently, Patient Deterioration Unrecognized	
<u>Physical Exam and Diagnostics</u>	Complete, Serial Physical Exam at Appropriate Increments	Incomplete Physical Exam: Did not inspect a non-vital, but involved Body System. Not performing serial exams.	Incomplete Physical Exam: Missed a Wound or Critical Body System. No Plan for Serial Exams	
<u>Problem List and Care Plan</u>	Includes both Critical and Secondary managements and assessments	Includes only Critical managements and assessments	Fails to record a problem list or care plan or is missing critical management needs	
<u>Maintains analgesia and/or sedation</u>	Early, Consistent assessments and managements	Treated after vitals or patients indicate pain	Late or absent pain management	
<u>Medication administration</u>	Appropriate, by-Weight, Drug Calculation / Administration/ 6 Rights	Generic, not by-Weight Drug Calculation / Administration / 6 Rights	Wrong or Inadequate Drug Calculation / Administration / 6 Rights violation	
<u>Surgical Interventions</u>	Implemented Appropriately Planned out	Implemented Late Not Planned, but Implemented	Not Planned or Implemented	
<u>Patient Reassessed After: Movement, Intervention, Time</u>	Missed <2 times	Missed 2-5 times	Missed >5 times	
<u>Package and Prepare for Flight</u>	Kept Pt. Ready for Evacuation/ Flight Time and Supply Considered	Pt. Not Always Ready for Evac. /Supply Relative to Flight Time Not Considered	Pt. Consistently Not Ready for Evac. Inadequate Supply Allotted for Evac.	
<u>Hand-Over</u>	Accurate SIT-VD or MIST including vital information	Accurate Information, unorganized	Inaccurate, or Incomplete Handover	
<u>Team Dynamics: Sleep/rest cycle, meal plan, Task Organized</u>	Well Organized. Team leader takes charge. Team Rested / Ate	Not Organized. No team leader apparent. Team Rested / Ate	Unorganized chasing the tail. Nobody Rested or Ate	
<u>Did not cause undue harm to patient</u>	Green	Yellow	Red	