

Preparing for Operations in a Resource-Depleted and/or Extended Evacuation Environment

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ABSTRACT

The wars in Afghanistan and Iraq are the only conflicts to which many medics have ever been exposed. These mature theaters have robust medical systems that ensure rapid access to full-spectrum medical care for all combat-wounded and medically injured personnel. As current conflicts draw to a close, U.S. medics may be deployed to environments that will require the ability to stabilize casualties for longer than 1 hour. Historical mission analysis reveals the need to review skills that have not been emphasized during upgrade and pre-deployment training. This unit's preparation for the extended care environment can be accomplished using a 4-point approach: (1) review of specific long-term skills training, (2) an extended care lab that reviews extended care skills and then lets the medic practice in a real-time scenario, (3) introduction to the HITMAN mnemonic tool, which helps identify and address patient needs, and (4) teleconsultation.

KEYWORDS: *extended care, austere environments, long-term skills training, teleconsultation*

Introduction

After conducting a 2-month training mission in Africa, a small group of U.S. Servicemembers, including a paramedic (PJ), were finalizing the pack out to rotate home. The primary medical staff was already gone. Around mid-day, a flatbed truck arrived with 28 locals who had fallen victim to civic unrest within the past 2 days. The PJ began triaging casualties while other teammates alerted their chain of command that they would soon need support. A few hours later, a motor vehicle accident produced 5 additional casualties, bringing the patient count to 33. The less urgent injuries included broken arms and minor gunshot wounds; the more critical injuries were a tension pneumothorax, bilateral femur fractures, and a closed head injury with intermittent loss of consciousness. As soon as the opportunity was available, the PJ established communications with his medical director.

The physician was briefed on the status of all casualties and then advised and assisted on performing advanced interventions that were required to stabilize the more critical patients. The scenario was handled well, maximizing the few resources available. The most immediate cases were able to evacuate to a U.S. facility in about 6 hours, while the less urgent patients were stabilized and referred to a local facility. A comprehensive After Action Report (AAR) was conducted and the feedback was eye-opening. First Tactical Combat Casualty Care (TCCC) and following interventions were executed without flaw. The situation was handled well but some were concerned that, if this happens again will the outcome be the same? Possibly not; the PJ's predeployment training included little exposure to this type of scenario; he had done TCCC scenarios numerous times, day and night, hot and cold with each one ending after an hour or so with a hand-off to a casevac or surgical facility. He had not trained for when that hand-off does not occur for several hours or even days. It occurred to us that different training and a new way of thinking are needed to help PJs and medics better prepare for these long-term care scenarios.

Also, what will we do in Afghanistan as the medical footprint gets smaller? Medics and rescuers need to be able to think about medical requirements in a different way and, more important, recognize the hazards of these environments before they have to treat a casualty under those circumstances.

Extended Care Course

The exercise can be simple or complicated. Generally, our exercises are 5 to 8 hours in duration. Role players are preferred over live tissue training or dummies to provide better feedback to medics doing hands-on exams. A role player provides real pulse, respirations, oxygen saturation, and electrocardiogram. The role player provides also another opportunity for a medic to be exposed to this type of scenario and will usually provide excellent feedback and AARs, since they have had a front row seat

for the duration of the exercise. Medical personnel are better role players when it comes to presenting illnesses and injuries.

Schedule

- DAY 1 Skills stations review
- DAY 2 Extended care lab
- DAY 3 Skills stations review
- DAY 4 Extended care lab

Skills

It is preferable to practice skills unique to this lab before conducting an extended care exercise. The medics should already be competent at TCCC. Skills that should be taught or reviewed on day 1 are:

- Foley catheterization
- Mechanical ventilator
- Burn treatment and fluid requirements
- Fasciotomy
- Fresh whole blood transfusion procedures
- Nasogastric tube and orogastric tube procedures
- Anesthesia and analgesia
- Cricothyrotomy
- Intubation
- Thoracotomy
- Escarotomy
- Electrocardiogram
- Suprapubic bladder aspiration
- Teleconsultation (simulate what will be used operationally)
- Field laboratory measurement
- Wound debridement
- Suturing

Extended Care Lab

(The players)

Medics: Our experience has been that the optimal team size is 1 or 2 medics per scenario. They should already have a background as an emergency medical technician (EMT) or advanced tactical provider (ATP), but these are personnel that your unit will expect to handle an extended care scenario. One more medic can be a dedicated communicator focused on teleconsultation. The other trainees will be the hands-on medics, actually assessing the patient and performing interventions.

Proctor: The proctor is overall in charge of the scenario; he coordinates the moulage and briefs and then coaches the patient (role player) on how to act and what to say during the scenario. The scenario should be scripted to ensure that all the skills are incorporated and it flows logically. Our experience is that physicians

or physician assistants can readily adapt to the changing scenario.

Role player: Here is another great opportunity to learn—a front row seat on all the action and spend most of the day lying down on the job. People with a medical background tend to do a better job since they will be familiar with procedures and will need less guidance on what symptoms the patient needs to exhibit. They should be included in debriefing.

Online medical control: It is easy to simulate or skip this step; however, performing medical skills properly is critical to achieving good outcomes. This is a great opportunity for a new physician or physician assistant to practice this skill before he has to perform it on an actual patient. It should be someone who is familiar with the scenario already and is competent with the skills that they will be using.

Observers: Other medics should be allowed to observe their peer's performance and provide feedback. This will allow more students to participate. "Expert" observers are an excellent addition to this exercise. Emergency physicians, anesthesiologists, and surgeons can provide subject matter expert debrief.

(The plan)

The scenario should be loosely yet logically scripted out by the proctor. The proctor should also be ready to initiate a "kill plan." Lessons learned in medicine come from patient death. This exercise should allow this to happen. The kill plan allows the training medics to kill the patient and learn from mistakes. The proctor should then quickly end the scenario and give medics feedback to correct mistakes and gather lessons learned and then reset the scenario to just prior to patient death. Not killing the "patient" will reinforce bad medicine, waste time, and give medics a false sense of competency.

- Do the minimal amount of simulation possible.
- Require real vital signs be provided before scenario vital signs will be given.
- Provide simulation equipment for any procedures that cannot be done on the role player.

A couple of separate rooms or buildings are good for training areas. They should not be high-traffic areas, and it is better if the medics are unfamiliar with them. Optimal areas will provide enough climate protection to avoid damaging sensitive equipment but be bare enough to simulate an austere environment. Garage bays work well and a large van or box truck can be used to simulate a casevac platform.

Sample Patient and Script

A 30-year-old man

M: IED/ambush

I: GSW x2 (1x chest, 1x L arm below elbow) approx. 300ml blood loss, 25% burned surface area (airway involvement)

S: Alert, no sensation in most of the burned area, P 110, R 22, BP 100/70, SaO₂ 88% on room air

T: TQT applied to L arm above elbow

Script

Patient is delivered to medics in first treatment room. Treatment begins with TCCC. When all indicated TCCC interventions have been accomplished, transition to extended care skills. Accomplish BLS before ALS.

“MARCH as far as you can, then bring in HITMAN”

- Cricotomy or endotracheal tube
- Fresh whole blood transfusion
- Escarotomy
- Foley or suprapubic bladder aspiration
- Chest tube
- Teleconsultation
- Trend patient’s vitals

Move patient to casevac platform

Transport patient in moving vehicle 20–30 minutes

- Displaced tube

Move patient to second treatment room

- Fasciotomy

Continue trending and reassessing

Endex

Debrief/reset equipment

“Some Problems Require a HITMAN”

HITMAN

For TCCC, I found that the MARCH mnemonic was the most tried and true for me (Massive hemorrhage, Airway, Respirations, Circulation, Hypothermia). No matter what was happening around me, I defaulted back to MARCH and started looking for problems to solve and tried to improve earlier interventions. “Keep marching on” has kept a lot of PJs out of trouble on numerous occasions. So it seems logical that a mnemonic would be the best way to set our medics up for success in the extended care environment. HITMAN is borrowed from our UKSF brethren.

H is for “Hydration”. We like to add “Hypothermia”

- Properly perfusion of a person’s urine output should be at a rate of 30ml/h up to 50ml/h for burns (document and trend).

- Need to know how to perform Foley catheters and understand when to do them as well as how to do them.
- Healthy temp is about 37°C (document and trend)

I is for infection. We like to add “Increased compartment pressures”

- Watch out for fever! Make sure people are using the same location and thermometer for accurate trending.
- Wounds and venipuncture sites for redness, swelling, or discharge
- Soft tissues in extremities for compartment syndrome, especially in unconscious patients (a pulseless limb means you are too late)

T is for Tube management/“Tidy up”

- Tidy up and trace electrocardiograph and intravenous lines so nothing gets inadvertently disconnected or kinked; ensure oxygen and vent lines are connected and functioning properly.
- A Foley catheter bulb to squeegee out endotracheal tubes; document and repeat at least every hour.

M is for Medications

Check your 6 rights: patient, medication, dose, time, route, documentation.

A is for Analgesia

- Patient comfort (not too hot, not too cold)
- Maintain and review a patient pain plan (if the patient wakes up screaming, that is bad).
- Is he supposed to be on a surgical plane?
- How long can we maintain the patient with the medications we have with us right now?
- Roll patient to avoid bed sores.
- Pad any areas where an arm or leg may rest on a litter pole for a long time to avoid nerve damage.
- Patient hygiene

N is for Nutrition

- Feed the patients; food is medicine.
- Prepare to perform nasogastric/orogastric tube procedures.

Teleconsultation

“Teleconsultation Is Teamwork”

It is nearly impossible to train for every contingency or medical emergency that may present. However; the goal is to always to project first world medical care as far forward as possible. While there inevitably will be limitations in the operational environment, when this happens, do what physicians do when they find a problem they cannot solve: consult.

Online medical control is not a new concept, nor is extended field care. The only resource that seems to show up in this situation in abundance is time. It is a good idea to get with your medical director and decide what the plan is going to be if you have to wait with a casualty for a long time. Determine who you will call and via what means. Video conferencing is becoming more prevalent in deployed locations as well as high-speed Internet that may enable the use of Skype or other commercial video chat; smartphones have been used to send narrative video to advanced providers, who then are able to make a more definitive recommendation about what interventions to make and casevac priority.

There are basically 2 major teleconsultation options. One is your unit's organic medical director; the other is the Army's teleconsultation program.¹ Your own unit physician will be more familiar with your mission, med plan and logistical considerations. However, the Army's teleconsultation program has access to more varied medical disciplines than most units (Table 1).

Table 1 *Teleconsultation Specialties*

Medical Specialty	E-mail Address
Burn-trauma	burntrauma.consult@us.army.mil
Cardiology	cards.consult@us.army.mil
Dermatology	derm.consult@us.army.mil
Ophthalmology	eye.consult@us.army.mil
Infectious diseases	id.consult@us.army.mil
Internal medicine	im.consult@us.army.mil
Nephrology	nephrology.consult@us.army.mil
Neurology	neuron.consult@us.army.mil
Orthopedics and podiatry	ortho.consult@us.army.mil
Traumatic brain injury	tbi.consult@us.army.mil
Pediatric intensive care	picu.consult@us.army.mil
Preventive medicine	pmom.consult@us.army.mil
Rheumatology	rheum.consult@us.army.mil
Toxicology	toxicology.consult@us.army.mil
Urology	urology.consult@us.army.mil

Notes: Other specialties "as requested"—send teleconsultation to chuck.lappan@us.army.mil

How to Send a Consult

Gather patient history, images, and other attachments and e-mail them to the specialty e-mail addresses listed in the specialties organized into e-mail groups or to chuck.lappan@us.army.mil for other specialties "as requested" that are not included in the specialties generic e-mails.

Patient History

1. When did it start? Days? Weeks? Months? Years?
2. Patient symptoms now?
3. Chronicity: Getting better? Worse? Staying the same? Spreading?
4. What was used to previously treat the patient?
5. Effectiveness of previous treatments?
6. Laboratory and test results, if any?
7. Your diagnosis and/or differential diagnosis.
8. Limitations you have in treating the patient such as medications, procedures, lab tests.
9. Include patient demographics: branch of service, age, and gender. If not U.S. military, state their nationality. Identify if contractor, detainee, foreign military, etc.

Include Digital Images If Appropriate

1. Use the JPEG format for images.
2. Check images before transmitting to ensure they are in focus and accurately portray the problem as you see it.
3. Usually three to five images is all we need.
4. When in doubt, overload us with images.
5. Other attachments:
 - a. PDFs of ECGs
 - b. JPEGs of radiographs
 - c. Copies of laboratory and pathology reports

What Not to Do

1. Do not include any patient identifying information, especially patient's name or SSN.
2. Do not resend additional request to the consultant who answered your consult; consultants work on a call-roster and look for consults only for the period they are on-call. They usually delete all consults after they have answered them. A new consult file is made by the project manager for each file that is sent to the generic email address and that re-consult will be sent only to the current on-call consultant.
3. Do not include "archive" attachments as certain file types such files are automatically blocked.
4. Do not include any more than one patient per teleconsultation.¹

Extended Care Training is an important part of a pre-deployment train up for medics that may be operating outside a "golden hour" casevac time. The three parts of an extended care plan are to:

1. Train personnel on the skills required in the extended care environment.
2. Conduct an Extended Care Lab (ECL) to simulate the scenario in real time and then conduct a thorough debrief capturing best practices and correcting deficiencies.

3. Take ownership of the HITMAN assessment and interventions that might be indicated.
4. Talk to your medical director and communication shop before deploying, and make a teleconsultation plan using unit physicians and advanced providers or the Army teleconsultation program. The optimal scenario is probably a combination of the two.



This patient presented with complaints of hip pain after conducting open ocean swim training. He had a history of leg surgery on the affected side. Radiographs were taken at the local hospital and then sent via smartphone to a surgeon and headquarters element. The patient was treated for 9.5 hours with an applied traction device and pain medications and then underwent fixed-wing casevac with a surgical team utilized.

The PJ who handled this broken femur had gone through our extended care course and he was able to turn this emergency into a non-event.

Synopsis of Our Missions

Extended Care Mission Analysis

- Africa
- South of Anchorage 1000 nm
- North of Guam 700 nm
- Nesbesna Glacier
- Extended Care training

Africa 2010

- 22 locals injured during civil unrest
- 4 local injured in motor vehicle accident
- U.S. Airman triages and treats patients for 36 hrs.

Nebesna Glacier Alaska

- 18 year-old female complains of vomiting blood >24 hrs
- Patient was as >10,000 ft
- Cloud deck was at 8,500 ft
- Rescuers inhaled to 8,000 ft and conducted overland movement to recover patient then back to helo LZ
- Provided BLS for 6 hours



Movement to patient.



Movement back to LZ in white-out (no fly weather).



HH-60 on approach to recover patient and rescue team.



USAF HH-60 landing on freighter to receive sick crewman.

Pacific Ocean 1000 miles South of Anchorage, AK

- Crewman bedridden on civilian freighter complains of lower right quadrant pain for over 24 hours; no food for 36 hours; hasn't urinated in 24 hours
- PJs parachuted into water via USAF Rescue HC-130 and boarded ship, established IV and Foley catheter administered pain meds and antibiotics via teleconsult
- Cared for patient ~18 hours
- Transloaded to helo and transported to Kodiak, AK. Patient fully recovered after appendectomy



The crewmember was treated on a civilian freighter. Prior to transload to the helo, the patient regained mobility following administration of pain meds and antibiotics.

OPN OLYMPIC TITAN

- Ship with two members injured due to crane accident
- Reported injuries:
 - PT1: Severe head injury critical/non-ambulatory
 - PT2: Multiple injuries, stable/unknown
- 31RQS initiated planning efforts with 353d SOG
- Parachute rescuers via MC-130 and recover via U.S. Navy MH-60 from Anderson AB, Guam

*Native Russian speaker located on KAB short notice – proved invaluable to 353SOG coordination with Ukrainian crew.

Mission Statistics

- Total mission duration: 57 Hours
- MC-130H duration of flight: 11 hours, 37 minutes
- Night personnel airdrops: 2
- Night resupply airdrops: 3
- Hours of continuous medical care: 32 hours, 30 minutes
- Hours of continuous manual ventilation: 32.5 hours
- Longest continuous CPR: 105 minutes (est.)
- MH-60 duration of flight: 75 minutes

Extended Care Training

- 8 hours of total care
- 1 critical patient moved 3 times simulating long-term evacuation
- 3 different field sites
- 1 field expedient ambulance



Improvised ambulance



Sample Extended Care Kit

Stethoscope, BP cuff, ECG monitor, chest tube kit, mechanical vent, AED, Foley cath kit, capno monitor, ENT exam kit, suction, hypothermia blanket, whole blood transfusion kit, drug box, fluid warmer.

Reference

1. Lappan C. *Special Operations Forces Medical Handbook Second Edition, Part 8 Medical Procedures, Teleconsultation.*

Disclosures

The authors have nothing to disclose.

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Mr. Lafayette is a civilian training specialist. In his prior life he was a U.S. Navy Corpsman for 12 years and a USAF pararescuer for 9 years. He also an EMT-Paramedic, advanced tactical paramedic (ATP), law enforcement medic, hyperbaric technician, and dive medical technician.