Prolonged Field Care (PFC)

Mass Casualty Training Program

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Introductions
48 hours until MEDEVAC/CASEVAC?!?!

Now what!?!
Assumptions

• You will have limited medical resources.

• You may be providing the highest level of medical care this person receives for hours or days.

• It may take hours or days to get to definitive care.

• The local hospital may be unable to provide the needed level of care.

• Definitive care may be in another country.
“What’s in it for you?”

• There will be people who will die regardless of care given.

• There will be people who will live regardless of care given.

• For everyone else… The availability of transport to a surgeon is essential for surviving their injuries. You need to have a plan of action for long term care to help ensure that the patient survives to reach the hospital.
Objective

• Develop a plan for the care of trauma patients who are awaiting transportation to definitive care.

• Demonstrate the ability to anticipate expected complications of traumatic injuries in the field.

• Develop a plan for the nursing care of a trauma patient
Focused on Three Areas of Prolonged Field Care

• Patient Care

• Teleconsultation

• Evacuation
Patient Care

• Monitoring
• Resuscitate
• Ventilation/Oxygenation
• Pharmacology
• Nursing
• Surgical Interventions
Monitoring

• What:
  – Vital signs, Mental Status
  – Physical Exams (serial)
  – Intake/Output
  – Labs

• How:
  – Manual, low tech but time intensive
  – Monitors, PO2, Capnography, POC testing, Foley Catheters, Pleurovacs, Mini-Mental Status vs Orientation
Resuscitate

Fluid Strategies

• Resuscitation Fluids
  – Therapeutic to correct end organ dysfunction or hemodynamic compromise from volume depletion

• Replacements Fluids
  – Correct water and electrolyte deficits

• Maintenance Fluids
  – Used to mitigate ongoing fluid loss and nutritional needs of a casualty
Resuscitate

Fluid Strategies
• Fresh Whole Blood
  – Ideal for trauma but requires preplanning
• Freeze Dried Plasma
  – Second best choice for trauma
• Clear Fluids
  – Crystalloids vs Colloids?
• How much fluid and what are your end points
  – Systolic blood pressure?
  – Urine output?
    • Urine output: 30ml/hr/50ml/h for burns
  – Labs(?)
Ventilation/Oxygenation

• Airway Management
  – Patient maintains airway and needs oxygenation
  – Patient cannot maintain airway
    • Nasal vs Supraglottic vs Endotracheal vs Surgical

• Supplemental Oxygen
  – Can you supply supplemental oxygen?
  – Nasal Cannula - Non-rebreather
  – Pulse oximetry - capnography

• Ventilatory Support
  – Is it a ventilation or oxygenation problem?
  – Sedation?
  – BVM
  – SAVe Ventilator
Pharmacology

Focus pharmacology on the following strategies

• Sedation/Analgesia
• Preventing/Treating coagulopathies
• Maintenance on current medications
• Infection Prevention/Prophylaxis
Sedation/Analgesia

THE AMAZING NITROUS OXIDE

Also Known As The Exhilarating Laughing Gas

Observe Phlogistic Nitrous Air

0 1 2 3 4 5 6

7 8 9 10 11 TOO SERIOUS FOR NUMBERS
Sedation/Analgesia

• Opiates, Sedatives, Dissociative Agents, Anesthetics
  – What is in your formulary?
  – Will you run out of pain medications for patients?

• IV vs IM vs Oral
  – IM dosing larger than IV dosing “More medication needed.”

• Goal is to make discomfort tolerable not “snow” the patient
  – Do you have the resources to provide adequate monitoring of sedated patients?
Sedation/Analgesia

• Considerations
  – Pain severity level?
  – Is the patient ambulatory?
  – Is the patient in shock?
  – Does the patient have respiratory distress?
  – Can you monitor the patient?

Patient’s clinical status must be included in a decision to use vaso-active medications

• What is your formulary?
  – APAP
  – NSAID’s
  – Oral narcotics
  – Oral Transmucosal Fentanyl Citrate
  – Ketamine
  – Parenteral Narcotics
  – Anxiolytics (Benzo’s)
Sedation/Analgesia

- Regional anesthesia
  - Reduces use of narcotics
  - May reduce monitoring
  - Anatomic nerve blocks
- Hematoma blocks
- Topical anesthesia
- Which anesthetic?
  - Lidocaine
    - Duration 120 m w/o epi
    - Duration 240 m w epi
  - Bupivacaine
    - Duration 4 h w/o epi
    - Duration 8 h w epi
TXA

No it is not a college Fraternity

- Should be given within 3 hours of injury
- Use for severe trauma & noncompressible bleeding
- 15% relative reduction in mortality from bleeding
- Not thrombogenic

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Tranexamic acid dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading</td>
<td>1 gram over 10 minutes (by slow intravenous injection or an isotonic intravenous infusion)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>1 gram over 8 hours (in an isotonic intravenous infusion)</td>
</tr>
</tbody>
</table>
Jehovahs Witnesses – approved

- Desmopressin (DDAVP)
- e-aminocaproic acid (Amicar)
- **Tranexamic acid (Cyklokapron)**
- Vasopressin (Pitressin)
- Aprotinin (Trasylol)
- Vincristine (Oncovin)
- Conjugated estrogens
- Vitamin K (Phylonadione)
- Recombinant Factor VIIa (NiaStase)
- Recombinant Factor IX (BeneFIX)
Medications

• Medications
  – Maintenance on current meds
  – Do you have medications in your formulary to keep people maintained on their medications?
  – HTN, Diabetes, Psych, etc…

• DVT prophylaxis (Lovenox)
  • BMI<35 30mg Q12 (post injury if hemostasis is achieved)
  • BMI>35 40mg Q12 (post injury if hemostasis is achieved)
Infections

*Infections are an expected complication of traumatic wounds*

− Do not close contaminated/infected wounds
− Restore circulation to wounds as soon as it is safe to do so
− Utilize “surgical toilet” (irrigation and wound debridement)
− Anticipate increased rate of infections in patients with comorbid conditions
Infections

Predisposing factors for wound infection

• Contamination with potential pathogens
• Foreign materials in the wound
• Delay in primary treatment
• Devitalized tissue
• Impaired blood supply
• Host factor lowering resistance
  – extremes of age, debility, DM, cigarette smoking, alcoholism, steroids, severe obesity, malnutrition, remote infection
Infections

• Primary host defenses: localized inflammatory/immune response
  – Good tissue perfusion and oxygenation are required for optimal host defense
  – All injured tissue is less aerobic than normal tissue
  – Hypothermia can also lead to impaired tissue perfusion and oxygenation (Lethal Triad)
Antimicrobial Prophylaxis

• **Antibiotics**
  – Early administration to inhibit growth and delay tissue invasion
  – Prophylaxis for *Gram Negative* and *Gram Positive* flora
  – What are the local antimicrobial resistance patterns?
  – Clarify what antibiotic regimen you should use
Antimicrobial Prophylaxis
Highlights from 2011 update in *The Journal of Trauma*, endorsed by IDSA

Antibiotic prophylaxis

- *Systemic ABX should be given within 3/h of injury*
  - Extremity; primarily gram-positive coverage
  - CNS; Cefazolin 2gm IV Q 6-8H consider adding Metronidazole 500mg IV Q 8-12H
  - Eye; Levofloxacin 500 mg IV Q 24H
  - Face & Neck; Cefazolin 2gm IV Q 6-8H
  - Thoracic; Cefazolin 2 gm IV Q 6-8H
  - Abd; Cefazolin 2 gm IV Q 6-8H and Metronidazole 500mg IV Q 8-12H
Other Antimicrobial Options

• Non-GI/GU (skin flora)
  – TMP/SMX (mild) or Doxycycline (mild)
  – Vancomycin (severe)

• GI/GU
  – Amox/Clav (mild) may need to add TMP/SMX (MSSA)
  – 3rd gen cephalosporin + flagyl (severe)

Alternate Tx’s

• Non-GI/GU (skin flora)
  – Clindamycin (mild)
  – Daptomycin + Ciprofloxacin or Levofloxacin and Metronidazole (severe)
Tetanus Prophylaxis

- 0.5 ml IM *tetanus vaccine*, *(Tdap or Td)*
  - If status is in question: give the immunization

- 250-500 units IM *tetanus immune globulin*
  - Give if available and if:
    - Immunization status is uncertain
    - Patient has never received a tetanus immunization
    - Heavily contaminated wounds
Nursing

- Nutrition
- Hygiene
- Comfort
- Documentation
  - VS
  - Trends
  - Mental Status
- Tubes and lines

Remain CALM and call a NURSE
Nursing

• Nutrition
  – Feed the patient
    • Nutrition strategies...
    • Ensure, Liquids, Broths
  – Nasogastric/orogastric tube placement
    • Decompress stomach/feeding (+/-)
  – Elevate HOB
Nursing

• *Pressure Sores (Decubitus ulcers)*
  – Causes
    • Shear
    • Pressure
    • Friction
    • Moisture
  – Signs/Symptoms
    • May be
      – Painful
      – Cool or hot
      – Firm or soft
Nursing

• **Pressure Sores (cont.)**
  
  – Prevention
    
    • Position changes q2h
    • Keep patient clean, dry
    • Proper nutrition and cessation of tobacco
  
  – Management
    
    • Bedside debridement
    • Appropriate antibiotics when indicated
    • Strict pressure care
      
      – Foam padding
      – Frequent patient turning and weight shifting
Nursing

• Patient hygiene
  • Oral care (Pneumonia Prevention)
• Skin care
  – Prevent skin breakdown
  – Position changes q2h
  – Keep patient clean, dry
  – Strict pressure care
  – Foam padding
  – Frequent patient turning and weight shifting
Surgical Interventions

• Chest tubes
• Surgical Airways
• Fasciotomy (?)
  – Burns
  – Compartment Syndrome
• Wound Debridement

❖ Do you have adequate analgesia/sedation?
Teleconsultation

• How?
  – Telephone: voice landline or mobile, video, SMS
  – Internet: live video, document scanning/email
  – DVC
  – Tempus Pro
• What?
  – Pertinent patient information
• Who?
  – RMO, RMM, Specialists etc…
• When?
  – Early and often
Teleconsultation

• Be concise: just like presenting a patient to an attending physician

• There is no specific format but this template may help

• Teleconsultation reduces isolation that clinicians can experience in small medical facilities in remote locations.

Medical Evacuation/Treatment Reference Card (modify as needed)

Communications PACE Plan: (examples)
P: (THEATER SURGEON)________________________________________________________________________
A: (THEATER JOC)_____________________________________________________________________________
C: (REGIONAL MEDICAL CENTER ON-CALL NUMBER)__________________________________________________
E: (UNIT OPERATIONS / UNIT SURGEON)__________________________________________________________________

Call script:
“THIS IS ___________, (JOB/POSITION):___________________, In(LOCATION)__________________________.
I HAVE A PATIENT WITH _________________________ WHO I THINK HAS ___________________________,
AND I NEED ___________________________________________.”

CHIEF COMPLAINT: __________________________________________________________________________

BRIEF HISTORY:____________________________________________________________________________

PE: VITALS: HR:____________ BLOOD PRESSURE: _______________ RESPIRATION RATE: __________
OXYGEN SATURATION: __________ TEMPERATURE: _________ MENTAL STATUS (AVPU):

EXAM:____________________________________________________________________________________

“I NEED ___________________________________________.” (CONSULTATION, HELP, ADVICE, TRANSPO…)

Recommendations From Call:
1.Fluids/Meds:__________________________________________________________________________________
2.Interventions:__________________________________________________________________________________
3.Procedures:____________________________________________________________________________________
4.RedFlags:_____________________________________________________________________________________
5.Other:________________________________________________________________________________________
Evacuation

• Remember that patient needs to be under the care of someone else at a hospital and not the Health Unit

• The best care you can provide is EARLY coordination of an appropriate medical evacuation

• You will need help with all of the phone calls and logistics arrangements
Mnemonics for PFC

• **HITMAN**

  • **H** – Hydration
  • **I** – Infection
  • **T** – Tubes
  • **M** – Medications
  • **A** – Analgesia
  • **N** – Nursing
Mnemonics for PFC

- **RAVINE**
- **R** – Resuscitate/Reduce Tourniquets
- **A** – Airway
- **V** - Ventilate or oxgenate
- **I** – Initiate telemedicine and evac early
- **N** – Nursing
- **E** – Environmental: hypothermia or hyperthermia
Head Injuries

- Head of Bed 30 degrees
- Sedation
- Limit stimuli
- Prevent hypotension
  - BP > 90mmHg
  - MAP > 80mmHg
- Temp > 37.5 (antipyretics)
- H2 blocker
- Seizure prophylaxis (?)

![Glasgow Coma Scale](https://example.com/glasgow_coma_scale.png)
Head Injury cont…

– Mannitol
– Hypertonic Saline
– Anti-seizure prophylaxis
– Hyperventilation to PaCo2 30-35mmHg
– TXA? (Yutthakasemsunt; et al 2013)
If you find yourself happy and warm in a pile of snow you probably have hypothermia, but don't worry it won't last long.
Hypothermia

- Hypothermia (prevent)
  - Healthy temp is about 37°C/98.6°F (document and trend)
  - Prevent lethal triad

Trauma Triad of Death

- Decreased coagulation
- Increased lactic acid in blood
- Low body temperature (hypothermia)
- Decreased heart performance
- Acidic blood (acidosis)
EBOLA.

OH YEAH?
MALARIA.

WELL, I HAVE CHOLERA.
WHAT ABOUT YOU, CHUCK?
...CHUCK??.. DANG.
CHUCK WINS.

THE FIRST 'DEADLIEST CATCH' T.V.
SHOW WAS FAR LESS POPULAR.
Tourniquets

- Can you reduce tourniquets in the field?
- If transport is going to be delayed more than 6 hrs consider removing tourniquets.

TCC Update 2014

- Casualty is not in shock and is adequately resuscitated.
- It is possible to monitor the wound closely.
- Tourniquet is not being used to control bleeding from an amputation.
- All 3 criteria must be met prior to reducing tourniquets.
Tourniquets: Points to Remember

• Every effort should be made to convert tourniquets in less than 2 hours if bleeding can be controlled with other means.

• If bleeding remains controlled with Combat Gauze, leave the loosened tourniquet in place.

• If the bleeding is not controlled with Combat Gauze, re-tighten the tourniquet until bleeding stops.

• Restoring blood flow to the limb by transitioning to Combat Gauze at the 2-hour mark will minimize the chance of ischemic damage due to the tourniquet.
Tourniquet Reduction

1. Expose the wound(s).
2. Apply Combat Gauze and a pressure dressing.
3. Loosen “high-and-tight” tourniquet and move it down to just above the pressure dressing. (Leave it loose here just in case it’s needed later.)

4. Monitor for re-bleeding.
Tourniquet Reduction

• If the transition to Combat Gauze at 2 hours failed, try again at 6 hours using the steps outlined in the previous slides.

• *Do not release* the tourniquet after 6 hours of application unless close cardiac monitoring and lab support are available to evaluate for metabolic complications of prolonged tourniquet use.
LEFT & Right

What's with the dorky headband?

It's not a headband actually. It's a tourniquet.

Well you better take it off because you look ridiculous.

Ehh... alright.

There you go! Now you're stylin'!

by J.L. Westover

www.mrlovenstein.com
Compartment Syndrome

A condition in which increasing pressure in a limited space compromises the circulation and function of the tissues within that compartment.

- Elevated tissue pressure within a closed fascial or intra-abdominal space
- Reduced tissue perfusion = ischemia
- Results in cell death and necrosis
Compartiment Syndrome

• Anatomical risks
  – Lower leg (53-62%)
    • Anterior compartment affected 62-96% of the time
  – Forearm (24-26%)
  – Thigh (4-15%)
  – Foot (4-5%)
  – Hand
Compartment Syndrome

- Cellular Hypoxia Leads to Cellular Death
  - Muscle
    - 3-4 hours – reversible
    - 6 hours – variable
    - 8 hours – irreversible
  - Nerve
    - 2 hours – loses nerve conduction
    - 4 hours – neurapraxia
    - 8 hours – irreversible
Compartment Syndrome

- Compartment Syndrome is Assessed Clinically
  - Pain out of proportion
  - Pain with passive stretch
  - Palpably tense compartment
  - * Paresthesia
  - * Paralysis
  - * Pulselessness/pallor
Compartment Syndrome
Emergent Treatment

• Remove cast or dressing
• Place at level of heart
  (DO NOT ELEVATE to optimize perfusion)
• Medical treatment
• Immediate evacuation for surgical evaluation and treatment
• (+/-) Field fasciotomy
Operational Behavioral Health: Prehospital Factors

• Intensification of psychological effects of:
  – Pain
  – Uncertain endpoint
  – Fear
  – Helplessness
  – Stress
  – Separation from family, friends, colleagues
Psychological Protective Strategies

- ID & Treat pain: early and aggressive analgesia
- Facilitate connectedness: talk to the patient
- Promote calm: put minimally injured to work helping wherever needed
- Promote hope: Focus on adequate rather optimal care
Take Care of Yourself and Team Members

• Fatigue
  – Physical ➔ plan time for rest
  – Mental ➔ double check each other’s work
  – Emotional ➔ talk early

• Get Help
  – Don’t let your ego get the best of your patient
  – Evac
  – Teleconsultation
  – Train assistants

• Set Realistic Expectations
  – Good enough…
  – You cannot control everything
  – The casualty’s injury’s get a vote…
Questions?
Evaluations

Today’s Date

Class Name
Prolonged Field Care

Location