TACTICAL COMBAT CASUALTY CARE

Military Occupational Specialty training for the U.S. Army Combat Medic is currently based on the principals of a Department of Transportation (DOT) Emergency Medical Technicians Basic course, and Basic and Advanced Trauma Life Support (ATLS).[1] While these guidelines provide a standardized systematic approach to the management of the civilian trauma patient, some of these principals may not be appropriate for the combat setting. Importantly, the pre-hospital phase of caring for combat casualties continues to be critical, since up to 90% of combat deaths occur on the battlefield before a casualty reaches a medical treatment facility (MTF).[2] Factors such as enemy fire, medical equipment limitations, a widely variable evacuation time, tactical considerations, and the unique problems entailed in transporting casualties must all be addressed. The three goals of TCCC are: 1) treat the casualty; 2) prevent additional casualties; and 3) complete the mission.

STAGES OF CARE

In making the transition from the standards of civilian emergency care to the tactical setting, it is useful to consider the management of casualties that occur during combat missions as being divided into three distinct phases: " Care Under Fire," "Tactical Field Care," and "Combat Casualty Evacuation Care." This approach recognizes a particularly important principle – performing the correct intervention at the correct time in the continuum of field care. A medically correct intervention at the wrong time in combat may lead to further casualties.

"Care Under Fire" is the care rendered by the medic at the scene of the injury while he and the casualty are still under effective hostile fire. Available medical equipment is limited to that carried by the individual soldier or the medic in his aid bag.

"Tactical Field Care" is the care rendered by the medic once he and the casualty are no longer under effective hostile fire. It also applies to situations in which an injury has occurred on a mission, but there has been no hostile fire. Available medical equipment is still limited to that carried into the field by medical personnel. Time to evacuation to an MTF may vary considerably.

"Combat Casualty Evacuation Care" is the care rendered once the casualty has been picked up by an aircraft, vehicle, or boat. Additional medical personnel and equipment that has been pre-staged in these assets should be available at this stage of casualty management.

CARE UNDER FIRE

Most medical personnel carry small arms with which to defend themselves in the field. In unit operations the additional firepower provided by the medic may be essential in obtaining tactical fire superiority. The risk of injury to other personnel and additional injury to the previously wounded soldiers will be reduced if immediate attention is directed to the suppression of hostile fire. The medical personnel may therefore initially need to assist in returning fire instead of stopping to care for the casualty. The best medicine on any battlefield is fire superiority. As soon as the medic is directed, or is able to, keeping the casualty from sustaining additional injuries is the first major objective. Wounded soldiers who are unable to participate further in the engagement should lay flat and still if no ground cover is available, or move as quickly as possible if nearby cover is available. If there is no cover and the casualty is unable to move himself to find cover, he should remain motionless on the ground so as not to draw additional fire. There are typically limited medical personnel available. If they sustain injuries, no other medical personnel may be available until the time of evacuation in the CASEVAC phase.

No immediate management of the airway should be anticipated at this time because of the need to move the casualty to cover as quickly as possible. Airway injuries typically play a minimal role in combat casualties. Wound data from previous conflicts indicate airway problems were only 1-5% of combat casualties, usually from maxillofacial injuries. It is very important however, to stop major bleeding as quickly as possible. Injury to an artery or another major vessel may result in the very rapid onset of hypovolemic shock and exsanguination. The importance of this step requires emphasis in light of reports that hemorrhage from extremity wounds was the cause of death in more than 2,500 casualties in Vietnam who had no other injuries.[3] These are preventable deaths. If the casualty needs to be moved, a tourniquet that can be applied by the casualty himself, is the most reasonable initial choice to stop major bleeding. Although ATLS discourages the use of tourniquets, they are appropriate in this instance because direct pressure is hard to maintain during casualty transport under fire. Ischemic damage is rare if left in place for less than 1 hour, and tourniquets are often left in place for several hours during surgical procedures. In any event it is better to accept the small risk of ischemic damage to the limb than to lose a casualty to exsanguination. Both the medic and casualty are in grave danger while a tourniquet is being applied during this phase, and non-life-threatening bleeding should be ignored until the tactical field care phase. The medic rendering care must make the decision regarding the relative risk of further injury, versus that of exsanguination.

Transport of the casualty will often be the most problematic aspect of providing tactical combat casualty care. Although the civilian standard of care is to immobilize the spinal column prior to moving a patient with injuries that might have resulted in damage to the spine, this practice needs to be reevaluated in the combat setting. Arishita et al.[4] examined the value of cervical spine immobilization in penetrating neck injuries in Vietnam and found that in only 1.4% of patients with penetrating neck injuries would

immobilization of the cervical spine have been of possible benefit. The time required to accomplish cervical spine immobilization was found to be 5.5 minutes, even when using experienced emergency medical technicians. The authors therefore concluded the potential hazards to both patients and provider outweighed the potential benefit of immobilization. However, parachuting injuries, fast-roping injuries,[5] falls greater than 15 feet, and other types of trauma resulting in neck pain or unconsciousness should be treated with spinal immobilization unless the danger of hostile fire constitutes a greater risk in the judgment of the medic.

Standard litters for patient evacuation may not be available for movement of casualties in the care under fire phase. Consideration should be given to alternate methods of evacuation, dragging the casualty by the web gear, ponchos, even a length of rope with a snap link can be used to drag a casualty out of the field of fire.

Additionally consider the use of obscurants such as smoke or CS to assist in casualty recovery. Vehicles can also be used as a screen during recovery attempts.

There should be no attempt to save a casualty's rucksack unless it contains items that are critical to the mission. His weapons and ammunition should be taken if at all possible; otherwise the enemy may use them against you.

Combat is a frightening experience, and being wounded, especially seriously, can generate tremendous anxiety and fear. Engaging a casualty with reassurance is therapeutically beneficial, and communication is just as important in patient care on the battlefield as it is in the MTF.

Key Points

1. Return fire as directed or required
2. The casualty(s) should also continue to return fire if able.
3. Try to keep yourself from getting shot
4. Try to keep the casualty from sustaining any additional wounds
5. Airway management is generally best deferred until the Tactical Field Care phase
6. Stop any life-threatening hemorrhage with a tourniquet
7. Reassure the casualty

TACTICAL FIELD CARE

The Tactical Field Care phase is distinguished from the Care Under Fire phase by more time with which to render care, and a reduced level of hazard from hostile fire. The amount of time available to render care may be quite variable. In some cases, tactical field care will consist of rapid treatment of wounds with the expectation of a

re-engagement with hostile forces at any moment. The need to avoid undertaking nonessential diagnostic and therapeutic measures will be critical in such cases. At other times, care may be rendered once the mission has reached an anticipated evacuation point, without pursuit, and is awaiting casualty evacuation. In this circumstance, there may be ample time to render, without haste, whatever care is feasible in the field. The time prior to extraction may range from half an hour or less, to many hours. Care must be taken to partition supplies and equipment in the event of prolonged evacuation times. Although the patient and provider are now in a somewhat less hazardous setting, the tactical field care phase is still not the time or place for some of the procedures taught in ATLS. Procedures such as diagnostic peritoneal lavage and pericardiocentesis obviously have no place in this environment.

If a victim of blast or penetrating injury is found to be without pulse, respiration, or other signs of life, cardiopulmonary resuscitation on the battlefield will not be successful and should not be attempted. Attempts to resuscitate trauma patients in arrest have been found to be futile even in the urban setting where the victim is in close proximity to trauma centers. On the battlefield the cost of attempting to perform cardiopulmonary resuscitation on casualties with what are inevitably fatal injuries will be measured in additional lost lives as care is withheld from patients with less severe injuries, and as medics are exposed to additional hazards from hostile fire because of their attempts.[6] Only in the case of non-traumatic disorders such as hypothermia, near drowning, or electrocution should cardiopulmonary resuscitation be considered prior to the CASEVAC phase. Soldiers with any altered level of consciousness should be disarmed immediately.

Initial evaluation should be directed to evaluation of airway, breathing and circulation. There should be no attempt at airway intervention if the patient is conscious and breathing well on his own. If the patient is unconscious, the cause will likely be hemorrhagic shock or penetrating head trauma. The airway should be opened with a chin-lift or jaw-thrust maneuver without worrying about cervical spine immobilization as previously noted. If spontaneous respirations are present and there is no respiratory distress, an adequate airway may be maintained in an unconscious patient in most cases by the insertion of a nasopharyngeal airway.

This device has the advantage of being better tolerated than an oropharyngeal airway should the patient subsequently regain consciousness,[1] and being less likely to be dislodged during patient transport. The patient should also be placed in the recovery position.

Should an unconscious patient develop an airway obstruction, the nasopharyngeal airway will need to be replaced with a more definitive airway. Endotracheal intubation is the preferred airway technique in civilian emergency departments, and the ability of experienced paramedical personnel to master this skill has been well documented.[7] However, there are no studies that document the ability of inexperienced medical

intubationists to accomplish endotracheal intubation on the battlefield. Another major drawback is the use of white-light from the laryngoscope in a hostile environment. One study that examined first-time intubationists trained with manikin intubations alone noted a success rate of only 42% in the ideal confines of the operating room with paralyzed patients.[8]

Alternatives to endotracheal intubation are the Laryngeal mask airway (LMA) and the Combitube. These airway devices have been found to provide adequate ventilation without the need for illuminated laryngoscopy. Both the LMA and the Combitube have been found to be more quickly and reliably inserted by medical personnel with limited experience with endotracheal intubation. The Combitube has the added advantage of providing better protection of the airway from vomiting and aspiration, and is less easily dislodged with movement of the casualty. Two studies that evaluated the use of the Combitube by paramedics in prehospital cardiac arrest found it to be effective both as a primary airway and as a backup to endotracheal intubation.[9]

Cricothyroidotomy is the other option.[10] This procedure has been reported safe and effective in trauma victims. Although it would typically only be attempted after failed endotracheal intubation, in the hands of a medic who does not intubate on a regular basis it is probably appropriate to consider this the next step when a nasopharyngeal airway, LMA, or Combitube is not effective. This technique is also appropriate in the face of maxoillofacial injuries in which blood or disrupted anatomy would preclude the use of other airway devices. Oxygen is usually not appropriate for this phase of care because cylinders of compressed gas and the associated equipment for supplying the oxygen to the patient are too heavy to make their use in the field feasible on operations where they must be carried by the medic.

Attention should next be directed towards the patient's breathing. Progressive severe respiratory distress on the battlefield resulting from unilateral penetrating chest trauma should be considered to represent a tension pneumothorax, and that hemithorax decompressed with a 14-gauge catheter. The diagnosis in this setting should not rely on such typical signs as breaths sounds, tracheal shift, and hyperresonance on percussion,[11] because these signs may not always be present, and even if they are, they may be difficult to detect on the battlefield. A patient with penetrating chest trauma will generally have some degree of hemo/pneumothorax as a result of his primary wound, and the additional trauma caused by a needle thoracostomy would not be expected to worsen his condition should he not have a tension pneumothorax.

The decompression should be carried out with a needle and catheter so that the catheter with the needle removed can be taped in place to prevent recurrence of the tension pneumothorax. This technique must be monitored to ensure the catheter has not clotted or dislodged or that respiratory symptoms have returned. If this is the case a

second needle thoracostomy may need to be performed adjacent to the first. Chest tubes are not recommended during this phase of care as they are not needed for initial treatment of a tension pneumothorax. They are more technically difficult and time consuming to perform and are more likely to result in additional tissue damage and subsequent infection.

Should the patient be found to have a major traumatic defect of the chest wall, the wound should be covered with petrolatum gauze and a battle dressing. Place the casualty in the sitting position. It is not necessary to vent one side of the dressing since this is difficult to do reliably in a combat setting. An alternative, however, is the "Asherman Chest Seal;" this chest seal has a one-way valve that would be appropriate for use with penetrating chest trauma. If the casualty develops a tension pneumothorax it should be decompressed as described earlier.

The medic should now address any significant bleeding sites not previously controlled.[5] He should remove only the absolute minimum of clothing to expose and treat injuries, both because of time constraints and the need to protect the patient against the environment. Significant bleeding from an extremity artery or major vessel should be stopped as quickly as possible, using a tourniquet without hesitation as previously described. Otherwise, direct pressure with pressure dressings to control bleeding should be used. New Chitosan hemostatic dressings have proved very effective in controlling even arterial hemorrhage. They are applied directly to the bleeding site and held in place for 2 minutes. Another new hemostatic agent, a powder called QuikClot is available and has proven to be effective in controlling severe hemorrhage also. Once the patient has been transported to the site where evacuation is anticipated, consideration should be given to loosening or removing the tourniquet and using direct pressure or hemostatic dressings or powder to control bleeding if this is feasible and the tactical situation allows.

Intravenous (IV) access should be obtained next. Although ATLS recommends starting two large bore (14-16gauge) IVs, the use of a single 18-gauge catheter is preferred in the field setting because of the increased ease of starting.

The algorithm for fluid resuscitation in military pre-hospital situations presented below is guided by the critical differences in civilian and military care environments, the need for improved hemorrhage control, the effectiveness of fluid use and established resuscitation endpoints by the military medic providing care in the forward area.

ASSUMPTIONS BASIC TO THE NEW RESUSCITATION STRATEGY

1. The tactical situation may or may not allow medical care to proceed. Medical care may solely consist of throwing a patient into a ground vehicle or helicopter and evacuating in extremis.
2. Lack of hemorrhage control is the leading cause of preventable death on the battlefield. Hemorrhage control is therefore of paramount importance. This may include the use of temporary tourniquets and in the future may include injectable

methods of hemostasis[12] and new hemostatic dressings or hemostatic powder (QuikClot).[13]

3. Stethoscopes and blood pressure cuffs, mainstays of civilian pre-hospital care, are rarely available or useful to the front line medic in the typically noisy and chaotic battlefield environment.
4. A palpable radial pulse and normal mentation are adequate and tactically relevant resuscitation endpoints to either start or stop fluid resuscitation. Both can be adequately assessed in noisy and chaotic situations without mechanical devices.
5. IV access is important for delivery of fluids and medications and thus, early access should be obtained for any casualty with a significant injury. However, only those casualties meeting criteria for resuscitation are given fluids. Casualties with significant injuries should have a single saline lock started with an 18-gauge catheter. One access portal is sufficient and conserves supplies and time.
6. When IV access is difficult or the tactical situation intrudes, modern intraosseous fluid delivery systems are a reasonable substitute for IV access and a major improvement over "cut downs."[14] Cut-downs are time consuming, technically difficult and require instruments. They are not appropriate for military pre-hospital use. Medics will not be trained, be equipped, or perform a cut-down.
7. Capacity for pre-hospital fluid resuscitation depends on the amount, both weight and volume of fluid that can be carried by each medic and characteristics intrinsic to the fluid itself.[15] Mission constraints will dictate how much fluid is available on the battlefield.
    a. A medic can be expected to carry up to six 1000 ml or twelve 500 ml bags of fluid.
    b. One 1000 ml bag of lactated Ringers (1100 gm or 2.4 lbs), one hour after injection, will expand intravascular fluid volume by approximately 250 ml; one 500 ml bag of 6% Hetastarch (Hextend) (591 gm or 1.3 lb) expands intravascular fluid volume by approximately 800 ml[16] in a similar time period. One 500ml bag of Hextend is functionally equivalent to three 1000 ml bags of lactated Ringers, while there is more than a 51/2 times advantage in the overall weight-to-benefit ratio (1.3 lb to 7.2 lb, respectively) This expansion is sustained for at least 8 hours.

BASED UPON THESE ASSUMPTIONS, WE HAVE INSTITUTED THE FOLLOWING ALGORITHM OF FLUID RESUSCITATIONS:

1. Superficial wounds (>50% of injured): No immediate IV fluid resuscitation required, however, oral fluid intake should be encouraged.
2. Any significant extremity or truncal wound (neck, chest, abdomen or pelvis) with or without obvious blood loss or hypotension irrespective of blood pressure:

    a. If the soldier is coherent and has a palpable radial pulse, blood loss has likely stopped.
    b. Start a saline lock; hold IV fluids; re-evaluate as frequently as situation allows.
3. Significant blood loss from any wound and the soldier has no palpable radial pulse or is not coherent (note: mental status changes due to blood loss only, not head injury):
    a. STOP THE BLEEDING: Direct pressure-hands and gauze rolls, with or without adjuncts like Ace bandages, hemostatic dressings, or hemostatic powder, (QuikClot), is primary when possible. Extremity injuries may require temporary use of a tourniquet. However, > 90% of hypotensive casualties suffer from truncal injuries unavailable to these resuscitative measures.
    b. After hemorrhage is controlled to the extent possible, obtain IV access and start 500ml of Hextend.
        i. -If the casualty's mental status improves and a palpable radial pulse returns, stop IV infusion, maintain saline lock, and observe for changes in vital signs.
    - If no response is seen, give an additional 500 ml of Hextend. If a positive response is obtained, stop IV fluids, maintain saline lock, and monitor vital signs.
    c. Titrating fluids is desirable but may not be possible given the tactical situation. Likewise, the rate of infusion is likely to be difficult to control. Based on the effective volume of Hextend versus lactated Ringers and coagulation concerns with increasing amounts of Hextend, no more than 1000ml of 6% Hetastarch should be given to any one casualty (approximately 10 ml/kg).[17-20] This amount is intravascularly equivalent to six liters of Ringers lactate. If the casualty is still unresponsive and without a radial pulse after 1000ml of Hextend, consideration should be given to triaging supplies and attention to more salvageable casualties.
4. Based on response to fluids, casualties will separate themselves into responders, transient responders, and non-responders.
    a. Responders: casualties with a sustained response to fluids probably have had a significant blood loss, but have stopped bleeding. These casualties should be evacuated at a time that is tactically judicious.
    b. Transient and non-responders are most likely continuing to bleed. They need evacuation and surgical intervention as soon as tactically feasible. If rapid evacuation is not possible the medic may need to triage his attention, equipment and supplies to other casualties as determined by the tactical situation. Remember: no more than 1000ml of Hextend should be given to any one casualty.
5. Head injuries impose special considerations. Hypotension (SBP<90mm Hg) and hypoxia (SpO2<90%) are known to exacerbate secondary brain injury. Both are exceedingly difficult to control in the initial phases of combat casualty care.

2. Given current recommendations on the care of head injury, we cannot at this time recommend hypotensive resuscitation, as outlined above, for the soldier with obvious head injuries.[21-23] Should the combat situation allow for continuous individual patient attention, the medic can attempt to keep SBP > 90 mm Hg via external monitoring of BP and evacuate the casualty to the next higher level of care ASAP.

A careful check for additional wounds should be made, since the high-velocity projectiles from assault rifles may tumble and take erratic courses when traveling through tissue, often leading to exit sites remote from the entry wound.

For the conscious casualty requiring pain control, if the soldier is able to continue to fight, consider the use of oral pain meds that will not alter the level of consciousness. Rofecoxib (Vioxx ®) 50 mg orally daily with 1000 mg of Tylenol® every 6 hours will be sufficient to control moderate pain. If the soldier is unable to fight he should be given IV morphine for pain control. This mode of administration allows for a much more rapid onset of analgesia and more effective dose titration than an intramuscular (IM) approach. An initial dose of 5 mg of morphine is given and repeated at 10 minute intervals until adequate analgesia is achieved. If a saline lock is used it should be flushed with 5ml of normal saline after each dose. Morphine may be administered IM if IV access is not available. The initial dose should be 8mg and the dosing intervals should be 45 to 60 minutes. Dose and time of morphine administration, should be clearly documented and visible so overdose and respiratory compromise is avoided. Medics administering morphine must also be trained in the use of Naloxone (Narcan). Soldiers should also not be given any aspirin, ibuprofen, or other non-steroidal anti-inflammatory drugs while in theatre because of their detrimental effects on hemostasis.

Fractures should be splinted as circumstances allow, ensuring that peripheral pulses are checked both before and after splinting.

Infection is an important cause of morbity and mortality in wounds sustained on the battlefield. Gatifloxacin is an oral antibiotic that can be used by casualties who are awake and alert and who have sustained a battlefield injury. One tablet orally every 24 hours is an acceptable dosage regime. Casualties who are unconscious and unable to use oral antibiotics can be given IV antibiotics. Cefotetan (2gm IV) is an accepted monotheraputic agent for battlefield wounds. Cefotetan is supplied as a dry powder that must be reconstituted with 10cc of sterile water. It may be given slow IV push over 3-5 minutes, which eliminates the need for piggyback solutions. The saline lock should be flushed as described above. Additional doses should be administered at 12-hour intervals until the patient arrives at a treatment facility. For patients with medication allergies that are felt to contraindicate the use of fluoroquinolones or cephalosporins, other broad-spectrum antibiotics should be selected in the planning phase.

Review Tactical Field Care

1. Airway management
    Chin-lift or jaw-thrust
    Unconscious casualty without airway obstruction: nasopharyngeal airway, Combitube, Laryngeal mask airway, place casualty in recovery position.
    Unconscious casualty with airway obstruction: cricothyroidotomy, if other airway techniques are unsuccessful.

Cervical spine immobilization is not necessary for penetrating head or neck trauma.

2. Breathing
    Consider tension pneumothorax and decompress with needle thoracostomy if a casualty has unilateral penetrating chest trauma and progressive respiratory distress.
3. Bleeding
    Control any remaining bleeding with a tourniquet, direct pressure, hemostatic dressings, or hemostatic powder (QuikClot).
4. IV
    Start an 18-guage IV or saline lock, consider sternal I/O if unable to start IV
5. Fluid resuscitation
    Controlled hemorrhage without shock: no IV fluids necessary, encourage oral intake
    Controlled hemorrhage with shock: Hextend up to1000ml
    No more than 1000 ml of Hextend for any casualty.
6. Inspect and dress wounds
7. Check for additional wounds
8. Pain control as necessary:
    If able to fight: Vioxx® 50 mg PO every day, with 1000 mg of Tylenol® every 6 hours
    If unable to fight: Morphine 5 mg IV wait 10 minutes; repeat as necessary
9. Splint fractures and recheck pulse.
10. Antibiotics
    Gatifloxacin one tablet every 24 hours for soldiers who are awake and alert.
    Cefotetan 2 gm slow-IV push (over 3-5 minutes) for soldiers who are unconscious. May repeat every 12 hours
11. Cardiopulmonary resuscitation
    Resuscitation on the battlefield for victims of blast or penetrating trauma, who have no pulse, no respirations, and no signs of life will not be successful and should not be attempted. Casualties with altered level of consciousness should be disarmed immediately.

CASEVAC CARE

At some point in the operation the casualties will be scheduled for evacuation. As mentioned previously the time of extraction may be quite variable, from several minutes to many hours. There are only minor differences when progressing from the Tactical Field Care phase to the CASEVAC phase. The first is that additional medical personnel may accompany the evacuation asset. This may be important for the following reason: (1) the medic may be among the casualties; (2) the medic may be dehydrated, hypothermic, or otherwise debilitated; (3) the EVAC vehicle's medical equipment will need to be prepared prior to the evacuation; and (4) there may be multiple casualties that exceed the capability of the medic to care for simultaneously.

It is possible to have more highly trained and experienced medical personnel accompanying the evacuation asset at this point of the operation, and this opportunity should not go to waste.[26] The best arrangement would be a two-person team composed of an aviation medic who is familiar with that particular airframe and a physician or physician assistant with as much recent trauma or critical care experience as possible. Although there may be times when more than two people would be useful, two is probably the most reasonable number because of space constraints within the evacuation asset and a scarcity of specialized medical personnel in theatre.

The second major difference in this phase of care is that additional medical equipment can be brought in with the EVAC asset and would not have to be carried in the tactical ground portion of the operation. Re-supply may also be accomplished at this time as well.

Helicopter transport impairs or precludes the providers' ability to auscultate the lungs[27,28] or even to palpate the carotid pulse.[29] Electronic monitoring systems capable of providing blood pressure, heart rate, pulse oximetry, and capnography are available and may be beneficial for air medical transport care.

Oxygen should be administered to seriously injured patients during this phase of care.

Tube thoracostomy is a reasonable option in this phase of care since there should be a provider experienced in this technique present and a more favorable environment in which to perform it.

Patients with controlled hemorrhagic shock may be resuscitated with Hextend to a mean arterial pressure of 60-80mm Hg in this phase, since more precise electronic monitoring should now be available. Casualties with penetrating chest wounds or abdominal wounds should still not be aggressively resuscitated, although this decision may be more individualized in the CASEVAC phase by a provider skilled in dealing with

trauma patients. An IV rate of 250ml per hour for patients not in shock will help to reverse mild dehydration and prepare them for possible general anesthesia once they arrive at the medical treatment facility. Lactated ringers solution may be used for fluid resuscitation in these patients because there are no restrictions on weight in this phase and sustained intravascular volume expansion is less critical. Blood products may be a possibility in some cases during this phase.

No attempt should be made during transport to debride or otherwise repair the wounds sustained. The darkness and instability of a rotary wing aircraft combined with the contaminated and crowded conditions that will usually exist make such efforts unadvisable even when individuals with surgical experience are present.[30]

Review Casevac Care

1. Airway management
   - Chin lift or jaw thrust
   - Unconscious casualty without airway obstruction: nasopharyngeal airway, endotracheal intubation, Combitube or Laryngeal mask airway, place the casualty in the recovery position.
   - Unconscious casualty with airway obstruction: cricothyroidotomy if endotracheal intubation and / or other airway devices are unsuccessful
2. Breathing
   - Consider tension pneumothorax and decompress with needle thoracostomy if a casualty has unilateral penetrating chest trauma and progressive respiratory distress
   - Consider chest tube insertion if a suspected tension pneumothorax is not relieved by needle thoracostomy
   - Oxygen
3. Bleeding
   - Consider removing tourniquets and using direct pressure, hemostatic dressings, or hemostatic powder (QuikClot) to control bleeding if possible. Mast trousers for penetrating pelvic injuries with hemorrhage.
4. IV
   - Start an 18-gague IV or saline lock if not already done. Consider sternal I/O if unable to start IV.
5. Fluid resuscitation
   - No hemorrhage or controlled hemorrhage without shock: lactated Ringers at 250ml per hour, encourage oral intake
   - Controlled hemorrhage with shock: Hextend up to1000ml initially
   - Head wound patient: Hextend at minimal flow to maintain infusion unless there is concurrent controlled hemorrhagic shock
6. Monitoring
   - Institute electronic monitoring of heart rate, blood pressure, and hemoglobin oxygen saturation
7. Inspect and dress wounds if not already done
8. Check for additional wounds

9. Analgesia as necessary
    Morphine: 5 mg IV; wait 10 minutes; repeat as necessary
10. Splint fractures and recheck pulse if not already done
11. Antibiotics (if not already given)
    Gatifloxacin one tablet every 24 hours for soldiers who are awake and alert.
    Cefotetan 2 gm slow-IV push (over 3-5 minutes) for soldiers who are unconscious. May repeat every 12 hours

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