Trauma:
Hemorrhage Control and Tourniquet Use

Goal: To minimize morbidity and mortality due to life-threatening external junctional and extremity hemorrhage, through the use of direct pressure, wound packing/hemostatic agents and medical tourniquets
Inclusion Criteria: All adult or pediatric patients with external hemorrhage due to blunt or penetrating trauma
Exclusion Criteria: No specific exclusions
Refer to: Amputation, Shock, Trauma and other relevant CPGs; and to Spinal Motion Restriction and Destination Policies

NOTE: This CPG does not recommend or endorse any specific brand or style of medical tourniquet or hemostatic agent. EMS Providers shall be familiar with the proper and safe application of their agency-approved device(s).

NOTE: Internal bleeding due to blunt or penetrating torso trauma requires emergent surgical consultation in a Level I or Level II Trauma Center – Refer to Destination Policy or consult BioTel for destination advice.

NOTE: Scene safety is #1 priority. This CPG is not intended to provide specific training for "care under fire".

Overview (Observe Body Substance Isolation Precautions and employ appropriate PPE)

1. Assess and support ABCs according to UNIVERSAL CARE – ADULT or UNIVERSAL CARE – PEDIATRIC and according to the Trauma CPG, as clinically indicated, but following the "MARCH" mnemonic, as needed:
   a. M (Massive Hemorrhage): With life-threatening external hemorrhage, hemorrhage control is first priority
   b. A (Airway): Assess and support airway patency, per Airway Management (Adult/Pediatric) CPGs
   a. R (Respirations): Assess and support oxygenation, ventilation and respiratory mechanics
   b. C (Circulation): Assess for other and treat traumatic injuries, signs/symptoms of shock, per Shock CPG
   c. H (Head Injury): Assess for and treat closed and/or open head injuries, per Head Injury/TBI CPG

Basic and Advanced Level

2. **Extremity** hemorrhage control:
   a. Indications for tourniquet application:
      i. Potentially life-threatening hemorrhage **AND**
      ii. Direct pressure fails or cannot be performed (e.g. resource scarcity, unsafe scene)
   b. Contraindications for tourniquet application:
      i. Non-extremity hemorrhage (e.g. head, neck, torso, groin, axilla, buttocks) **OR**
      ii. Hemorrhage controlled by direct pressure
   c. General tourniquet application procedure:
      i. Care under fire/unsafe scene: As "high and tight" as possible, over clothing, may be necessary
      ii. Preferred, "Deliberate" procedure, if scene conditions and resources permit:
         1. Expose wound
         2. Apply tourniquet 2 to 3" above the wound, not over a joint
         3. Tighten until bleeding stops **AND** distal pulse is no longer palpable (important!)
            a. EXCEPTION: In the case of traumatic amputation, tighten until bleeding stops
         4. If bleeding continues, a 2nd tourniquet may be applied proximal to the first (especially on thigh)
   d. **CRITICAL DOCUMENTATION:** Tourniquet application time
      1. Write the application time directly on the tourniquet(s); **AND**
      2. Document the application time in the ePCR
   e. Once placed, the tourniquet should NOT be removed until the patient has been transferred to a higher level of care (see Special Circumstances below), even if patient complains of pain in the extremity
   f. The bleeding site and tourniquet(s) should be left uncovered, or with minimal dressings
   g. Notify BioTel or the receiving hospital en route to a **Level I or Level II Trauma Center** that the patient has had a tourniquet applied, whether or not bleeding is controlled, and the application time
   h. Continue to monitor patient's vital signs and for recurrent bleeding; treat shock per Shock CPG
   i. Treat pain with judicious administration of analgesics, per Pain CPG (advanced level providers only)

3. **Junctional (groin, axilla, neck)** hemorrhage control:
   a. Indications for wound packing with gauze or hemostatic agents:
      i. Potentially life-threatening hemorrhage **AND**
      ii. Direct pressure fails or cannot be performed (e.g. resource scarcity, unsafe scene)
   b. Contraindications for wound packing with gauze or hemostatic agents:
      i. Chest or abdomen wounds (these require surgical intervention), head or eye wounds
      ii. Hemorrhage controlled by direct pressure
   c. General wound packing procedure – **"4 Ps"**:
      i. **Peel:** Peel the (hemostatic) gauze from the roll or folded pile
      ii. **Push:** Pack firmly into the depth of the wound and keep packing, until bleeding stops
         1. If bleeding continues, pack with additional gauze (tie the gauze ends together!)
         2. Keep packing until bleeding stops
         3. If bleeding continues, the most likely explanation is insufficient packing
         4. Caution: bone fragments from associated fracture can injure EMS providers during packing
      i. **Pile:** Pile extra/leftover gauze (if available) on top of the wound
      ii. **Pressure:** Apply pressure for AT LEAST 3 minutes* (hemostatic gauze) or 10 minutes* (plain gauze)
         1. Do NOT remove pressure dressing or packing to assess bleeding
         2. Pressure to groin wounds may be accomplished by the EMS Provider's knee
   d. **CRITICAL DOCUMENTATION:** Wound packing time
      i. Write the wound packing time directly on the dressing, if feasible; **AND**
      ii. Document the would packing time in the ePCR
   e. If a commercial hemostatic gauze or other wound packing product was used, bring package to the E.D.
   f. Continue to monitor patient's vital signs and for recurrent bleeding; treat shock per Shock CPG
   g. Treat pain with judicious administration of analgesics, per Pain CPG (advanced level providers only)
4. Initiate transport as soon as possible
   a. *If the wound pressure period has not yet elapsed, initiate transport and maintain pressure en route
5. For additional patient care considerations not covered under standing orders, contact BioTel

Special Circumstances

6. Improvised tourniquets applied by bystanders or non-medical personnel prior to EMS arrival:
   a. These are NOT a substitute for a medical tourniquet applied by UTSW/Parkland BioTel EMS Providers
   b. Replacement procedure:
      i. Apply, but do not yet secure, the BioTel agency-approved device proximal to the improvised device
      ii. Remove the improvised device and monitor for bleeding
      iii. If bleeding cannot be controlled by direct pressure, apply the EMS tourniquet as described above
7. Patient with tourniquet applied by first-responding law enforcement officer, citizen or other person prior to EMS arrival who declines an EMS offer of hospital transport:
   a. Patient refusal of hospital transport shall be strongly discouraged
   b. If the patient refuses EMS Provider efforts to agree to transport, the following steps shall be taken:
      i. Explain that the tourniquet cannot remain in place if the patient is not being transported by ambulance and that removal may result in uncontrolled bleeding and death
      ii. Contact BioTel requesting that the Medical Command Physician speak directly with the patient
      iii. If the Medical Command Physician fails to convince the patient to accept ambulance transport, and upon acknowledgement of the warnings, slowly release the tourniquet over 3 to 5 minutes
      iv. If bleeding recurs, apply direct pressure/pressure bandaging and observe the patient for **10 minutes**
      v. If bleeding remains uncontrolled, reapply the tourniquet and contact BioTel for further assistance
      vi. If bleeding is controlled with direct pressure/pressure bandaging, document this, as well as the presence of distal pulses and capillary refill
         1. Have the patient sign the refusal and encourage the patient to seek immediate medical care by whatever means he/she chooses
8. Consider prehospital removal of medical tourniquet(s) ***ONLY*** if transport to definitive hospital care is significantly delayed (more than 30 minutes), e.g. during mass casualty incident or other austere conditions:
   a. If the tourniquet is replaced with a pressure dressing, the loose tourniquet should be left in place, in case recurrent hemorrhage necessitates reapplication
   b. EXCEPTIONS: Do not remove tourniquet(s) if: amputation or near-amputation; the patient is unstable or complex poly-trauma; or the clinical or tactical setting is unstable

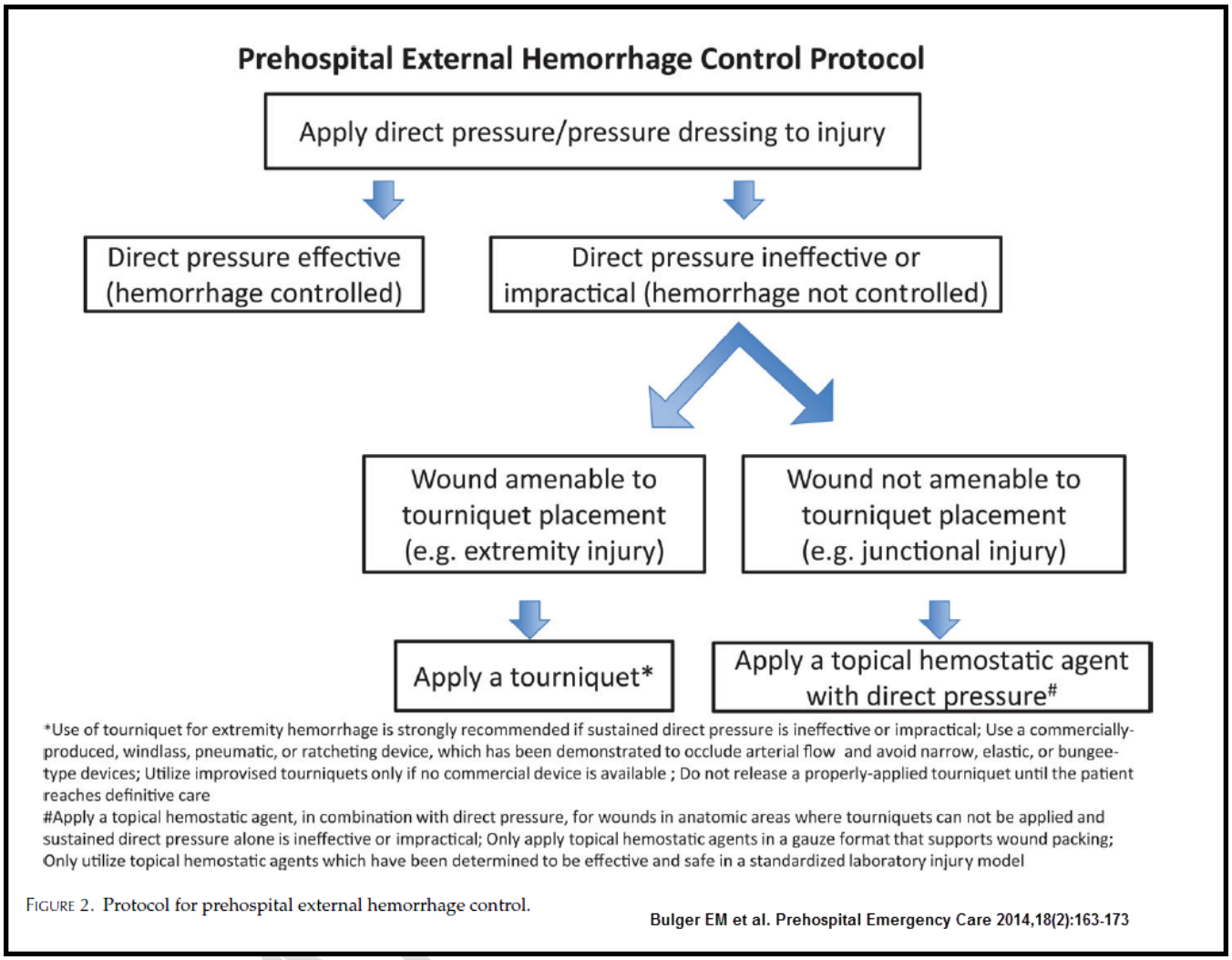

FIGURE 2. Protocol for prehospital external hemorrhage control.

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