Presented at 2015 TQIP conference

Developed by a panel of experts

Evidence based with expert opinion as needed
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American College of Surgeons
Inspiring Quality: Highest Standards, Better Outcomes

ACS tqip TRAUMA QUALITY IMPROVEMENT PROGRAM
Orthopaedic Trauma Best Practice Guidelines (BPG) Goals

• Offer guidance on what is practical to do at most institutions
• Provide a tool to increase the delivery of “good care” to orthopaedic trauma patients
  • Move care in the right direction
  • Try to eliminate variability
  • Use metrics that have a rationale/evidence behind them
• TQIP data base may eventually show a center how they are doing on an ongoing basis
Orthopaedic Trauma BPG

- Performance Improvement (PI) indicators included
- Guidelines drive outcomes using TQIP data
  - BPG will be modified in the future based on data
  - Use TQIP data to support best practices
  - Integrate with Performance Improvement and Patient Safety (PIPS) process
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Orthopaedic Trauma Background

• > 60% of injuries involve the musculoskeletal system

• > 50% of hospitalized trauma patients have at least one musculoskeletal injury that could be life threatening, limb threatening, or result in significant functional impairment

• Orthopaedic injuries are often associated with significant health care costs, decreased productivity in the workplace, and, in some cases, long-term disability
Orthopaedic Trauma Background

• The optimal management of trauma patients with orthopaedic injuries requires significant physician and institutional commitment

• The American College of Surgeons (ACS) Resources for the Optimal Care of the Injured Patient, 2014 includes several key hospital and provider-level orthopaedic trauma criteria that must be met in order to attain ACS trauma center verification
Background

• These criteria are important - do not cover the entire breadth of orthopaedic trauma care

• Furthermore, trauma centers may identify unique areas in need of improvement
Background

• These best practice guidelines represent:
  • A compilation of the best evidence available for each topic
  • When the literature is inconclusive, incomplete, or controversial, expert opinion is provided
Centers should have:

• Appropriate pain management guidelines for traumatic orthopaedic injuries

• Patients with orthopaedic injuries should be preferentially placed in hospital units staffed by nurses who receive ongoing orthopaedic-specific in-service training
Centers should have:

- Facilities should have guidelines regarding ongoing neurovascular assessments prior to fixation for high-risk injuries

- When appropriate, prosthetics counseling, evaluation, and implementation should be made available in a timely manner

- Guidelines may be used to evaluate the delivery of orthopaedic trauma care at your center
Performance Improvement

• A list of suggested PI indicators for hospitals with interest in improving the quality of orthopaedic trauma care is provided

• Using these indicators is not a requirement for verification, but could serve as useful tools for process improvement
PI Background

• Longitudinally tracking each of these metrics within a hospital may:
  • Provide valuable insight into institutional practice patterns
  • Find potential opportunities for improvement
Focused Section Discussion *

- Triage and Transfer Orthopaedic Injuries
- Open Fractures
- Damage control: Orthopaedic Surgery
- Mangled Extremity
- Compartment Syndrome
- Pelvis Fracture with Associated Hemorrhage
- Geriatric Hip Fractures
- Pediatric Supracondylar Hip Fractures

*More information is present in the actual guidelines
Triage and Transfer of Orthopaedic Injuries: Key Messages

• Optimal care of orthopaedic injuries occurs when both the health care providers and hospitals are capable of providing high-quality care

• Hospitals should develop protocols and procedures for identifying patients with orthopaedic injuries who are likely to benefit from transfer
Triage and Transfer of Orthopaedic Injuries

• Certain orthopaedic injuries always warrant strong consideration for transfer to a designated trauma center

• In the setting of concurrent injuries, co-morbidities, or extremes of age, strong consideration should be given to transferring patients with minor orthopaedic injuries
Triage and Transfer of Orthopaedic Injuries

• Transfer agreements between hospitals can facilitate the timely transfer of injured patients

• Direct communication between transferring and receiving institutions is important prior to patient transfer and when breakdowns in the transfer process occur
PI: Triage and Transfer of Orthopaedic Injuries

- Patients with orthopaedic injuries should be transferred to a higher level of care when the resources to optimally manage the orthopaedic injury or concomitant injuries exceed those available at the evaluating hospital.

- That transfer should occur in a timely (as defined by institutional protocol) manner.
PI: Triage and Transfer of Orthopaedic Injuries

- Deviations from predetermined transfer agreements:
  - Should be reviewed and discussed by involved trauma PIPS committees at both centers
PI: Triage and Transfer of Orthopaedic Injuries

• Direct communication between orthopaedic providers at each facility should occur prior to all patient transfers

• When transfer does not occur, the reasons should be documented by providers on both ends of the transfer

• Images and reports should be sent to the receiving hospital with the patient
  • When possible, images should be made available prior to patient arrival
Open Fractures: Key Messages

• A fractured bone exposed to contamination from the external environment through a disruption of the skin and subcutaneous tissues

• Patients with open fractures should receive intravenous antimicrobials within one hour of presentation to your ED

• This is currently being collected during verification/re-verification visits
Open Fractures

• Gustilo type 1 or 2 open fractures: first-generation cephalosporin (for example, cefazolin)

• Gram negative coverage should be considered in patients with Gustilo type 3 fractures (for example, gentamicin)

• The addition of a penicillin for anaerobic coverage should be considered in the presence of severe contamination or impaired vascularity
Antibiotic Duration

- Antibiotics should be administered for no longer than 24 hours after a surgical procedure

- In cases of severe contamination, antibiotics may be continued for as long as 72 hours after a surgical procedure
Tetanus: Open Fractures

• Tetanus toxoid if:
  • patient had an incomplete primary immunization,
  • it has been >10 years since his or her last booster dose,
  • or if the immunization history is unknown or unclear

• Tetanus immunoglobulin if:
  • it has been >10 years since the patient’s last booster dose
  • or there’s a history of incomplete primary immunization
Operating Room: Open Fractures

- To the operating room for irrigation and debridement within 24 hours of initial presentation whenever possible
  - Open tibia time to OR from your ED door is currently being collected

- “Severe” fractures associated with “gross wound contamination” should be brought to the operating room more quickly, and as soon as clinically feasible, based on the patient’s condition and resources available
Wound Management: Open Fractures

• Skin defects overlying open fractures should be closed at the time of initial debridement when possible

• Soft tissue coverage should be completed **within seven days** of injury
PI: Open Fractures

- Patients with open fractures receive intravenous antibiotics within 60 minutes of presentation to your ED

- All patients with open fractures are evaluated for the potential need for tetanus vaccination
Pl: Open Fractures

• Patients with open fractures are taken to the operating room for surgical irrigation and debridement within 24 hours of presentation to your ED

• Patients with open fractures requiring wound coverage with skin grafting or soft tissue transfers have coverage completed within seven days of injury
Damage Control Orthopaedic Surgery: Key Messages

• Damage control surgery is an integral tool in the armamentarium of the orthopaedic trauma surgeon and should be considered when early definitive surgical management is not possible.

• Used for patients who are critically injured or those with significant soft tissue injuries pending resuscitation and/or soft tissue injury resolution.
Damage Control Orthopaedic Surgery

• **Sick patient examples:**
  • Severe traumatic brain injury
  • Not adequately resuscitated as demonstrated by:
    • ongoing fluid and blood requirements
    • high base deficit or lactate, which are not improving
    • pulmonary dysfunction requiring significant ventilatory support
Damage Control Orthopaedic Surgery

- **Sick limb examples:**
  - Open or closed compromised soft tissues
    - soft tissue loss
  - significant contamination
  - severe closed soft tissue injury
Damage Control Orthopaedic Surgery

- Consider in environments with limited experience and/or resources

- Patients in extremis:
  - Reasonable to place fractures in skeletal traction

- Patients with femur or pelvis fractures who are not “stable enough” to be anesthetized may benefit from a period of skeletal traction
Damage Control Orthopaedic Surgery

- Once patients are in an operating room for management of concurrent injuries and/or are able to physiologically tolerate operative intervention, they should have formal stabilization with external or definitive fixation.
PI: Damage Control Orthopaedic Surgery

• Patients with femoral shaft fractures undergo fracture stabilization within the first 24 hours of presentation
  • Metric: % of femoral shafts stabilized within 24 hours of presentation to your ED is currently being collected by the VRC

• Patients appropriate for damage control management who received early definitive management are reviewed by the trauma PIPS
The Mangled Extremity: Key Messages

- A mangled extremity has an injury to three of the four major components of a limb: soft tissues, nerves, vascular supply, and skeletal structures.

- If the patient has inadequate physiologic reserve due to associated other injuries, or the mangled extremity is contributing to significant physiologic derangement, attempts at limb salvage should not be considered: life takes precedence over limb.
The Mangled Extremity

• Limb salvage should be attempted only when there is a reasonable expectation that the limb is salvageable

• Surgical decision making should take patient and injury-specific factors into consideration
The Mangled Extremity

- Age, comorbidity, functional status, occupation, patient preference, and self-efficacy/social support systems are important patient factors

- The extent of soft tissue injury, fracture pattern, level of the vascular injury, warm ischemia time, the *anatomic* status of nerves (in other words, transection versus continuity injury), and the status of the ipsilateral foot (for lower extremity injuries) are important injury specific factors
The Mangled Extremity

- Limb salvage and amputation are associated with significant morbidity, but overall functional outcomes and quality of life are similar

- The decision is a multidisciplinary process and should be considered in conjunction with other providers (orthopaedics, vascular, plastics, and trauma) along with strong patient engagement
PI: The Mangled Extremity

• All patients who present to the emergency department with a mangled extremity undergo prompt orthopaedic evaluation (as defined by institutional protocol)

• All patients with a mangled extremity have timely (as defined by institutional protocol) operative management

• All patients with a mangled extremity undergo re-debridement and/or definitive soft tissue coverage within seven days of injury
Compartment Syndrome: Key Messages

• A high index of suspicion for compartment syndrome should be maintained for all patients with extremity injuries

• Compartment syndrome can result in irreversible tissue damage within six hours of impaired perfusion
  • Be cautious regarding the estimation of elapsed time since the time of onset is often uncertain
Compartment Syndrome

• Compartment syndrome is a dynamic process and patients with high-risk injuries should be re-evaluated every one to two hours for a 24 to 48 hour period.

• Sequential physical examinations should be performed for individuals at risk for compartment syndrome, since a single exam at one point in time is unreliable.
Compartment Syndrome

• The most reliable early clinical findings of compartment syndrome are:
  • Pain out of proportion to the injury- pain that is initially well controlled and then becomes refractory to and/or requires escalating doses of analgesics
  • Pain with passive stretch of the musculature within the involved compartment
  • Paraesthesias of the nerve(s) running through the compartment(s)
Compartment Syndrome

- Clinical findings are very reliable in ruling out acute compartment syndrome.

- Patients with an unreliable or unobtainable clinical exam may benefit from measurement of intra-compartmental pressures.

- A gradient of <30 mmHg between the diastolic blood pressure and intra-compartmental pressure is predictive of patients who would benefit from a fasciotomy.
Compartment Syndrome

• When a compartment syndrome is suspected, early fasciotomies should be performed:
  • Using long, generous skin and fascial incisions to release all the compartments of the involved limb
  • The incisions should be left open at the conclusion of the procedure
Pl: Compartment Syndrome

- All patients diagnosed with compartment syndrome who require an amputation of the involved extremity are identified and reviewed by the trauma PIPS or equivalent committee within the hospital.
Pelvis Fracture with Associated Hemorrhage: Key Messages

- Hemodynamically stable patients with pelvic fractures should undergo cross-sectional imaging to evaluate the extent of the injury and the presence of pelvic hemorrhage.

- A patient’s contrast extravasation on imaging and either significant hemorrhage or hemodynamic instability should undergo angiography and potential embolization.
Pelvis Fracture with Associated Hemorrhage

- Hemodynamically unstable patients with pelvic fractures should have a pelvic binder or circumferential sheet used to temporarily stabilize their pelvis

- Early activation of a massive transfusion protocol should be strongly considered
Pelvis Fracture with Associated Hemorrhage

- When angiography is unavailable, pre-peritoneal packing and/or external fixation of the pelvis should be performed.

- If this is not possible, early transfer to a designated trauma center is recommended.
Pelvis Fracture with Associated Hemorrhage

- Patients with pelvic fractures are at high risk for deep vein thrombosis (DVT) and pulmonary embolism (PE)

- Early initiation of pharmacologic DVT prophylaxis is recommended
PI: Pelvic Trauma/ Associated Hemorrhage

- Patients with hemorrhage from pelvic fractures are evaluated promptly by orthopaedics (as defined by institutional protocols)
- A team with angiographic capabilities is consulted and promptly (as defined by institutional protocols) evaluates all patients with pelvic fractures, evidence of contrast extravasation on cross-sectional imaging, and either hemorrhage or hemodynamic stability
PI: Pelvic Trauma/ Associated Hemorrhage

• For all hemodynamically unstable patients with pelvic fractures, the time from arrival to initial hemorrhage control via pelvic REBOA, angioembolization, or preperitoneal packing is monitored and reviewed by the trauma PIPS or equivalent committee within the hospital
Geriatric Hip Fractures: Key Messages

• Hip fractures are common among the elderly, are associated with substantial morbidity and mortality, and result in a significant cost to the health care system.

• Early consultation with medical or geriatric specialists is recommended for geriatric hip fracture patients with significant medical co-morbidities (all of them).
Geriatric Hip Fractures

- Peri-operative regional anesthesia reduces pain and might reduce delirium and cardiac events in the postoperative period

- Timely surgical intervention within 48 hours for hip fractures is recommended

- If appropriate resources are available at the admitting hospital, it is not necessary to transfer isolated hip fractures to a designated trauma center
Geriatric Hip Fractures

• Surgical reduction and fixation or reconstruction are the primary treatment options for geriatric hip fractures

• Multimodal analgesia, venous thromboembolism (VTE) prophylaxis, delirium prevention/management, nutritional supplementation, osteoporosis screening, and early physiotherapy and rehabilitation are important components of postoperative care following hip fracture surgery in geriatric patients
PI: Geriatric Hip Fractures

- All geriatric (≥65 years of age) patients with hip fractures and multiple co-morbidities are evaluated by a multidisciplinary team, including, at minimum, personnel with expertise in the care of the geriatric patients.

- All geriatric patients with hip fractures who do not undergo surgical repair within 48 hours are identified and reviewed by the trauma PIPS, or equivalent committee, within the hospital.
• The rehabilitation process is initiated within 24 hours of admission and is continued through discharge for all geriatric hip fracture patients.
Pediatric Supracondylar Humerus Fractures: Key Messages

• A supracondylar distal humerus fracture, or a suspected supracondylar fracture in a skeletally immature patient, warrants evaluation by an orthopaedic surgeon.

• There should be a low index of suspicion for concomitant nerve injuries, vascular injuries, and ipsilateral distal radius fractures in a child with a supracondylar fracture of the humerus.
Pediatric Supracondylar Humerus Fractures

• Non-operative and operative management may be used for the appropriate fractures

• When there is vascular compromise to the distal upper extremity, immediate closed reduction is indicated
  • Failure to re-perfuse the hand after a closed reduction in the operating room suggests a need for open exploration of the vessel in the antecubital fossa
All patients with radiographic evidence of a supracondylar humerus fracture are promptly (as defined by institutional protocol) evaluated by an orthopaedic surgeon.

All patients with supracondylar fractures who do not receive timely management (for example, surgical repair within 18 hours for Gartland Type III fractures) are identified and reviewed by the trauma PIPS or equivalent committee within the hospital.
PI: Pediatric Supracondylar Humerus Fractures

- Any patient with evidence of global forearm dysfunction or ischemia following supracondylar humerus fracture is identified and reviewed in the trauma PIPS or equivalent committee within the hospital.
PI: Rehabilitation of the multisystem trauma patient

• All delays in discharge of multisystem trauma patients due to inadequate or unavailable rehabilitation services are identified and reviewed by the trauma PIPS or equivalent committee within the hospital
Current Orthopaedic Trauma Metrics Being Collected by the VRC

- Time to IV antibiotics for open fractures should be less than 1 hour from presentation to your ED (and # of pts)

- Time to operative I+D (not ER or ICU) for open tibia fractures should be less than 24 hours from presentation to your ED

- The percent of femoral shaft fractures (shaft only) treated with an IMN, plate and screws, or external fixation within 24 hours of presentation to your ED
Questions *

• Please direct any follow-up questions to:

TQIP@facs.org

*Questions will be consolidated, answered, and placed on TQIP website