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Trauma Patient Care in the Emergency Department : Pitfalls to Avoid

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Lecture Objectives:

Review the 5 Pitfalls that Inhibit a Successful Trauma Resuscitation

- 1. Discuss how institutional and individual commitment to the injured patient is essential.**
- 2. Understand the importance of an ongoing performance improvement program in the care of the trauma patient.**
- 3. Learn how the failure to follow the fundamental principles of trauma resuscitation leads to pitfalls.**

Lecture Objectives (cont.)

4. Understand the importance of early recognition of resource limitation and transfer to definitive care at an accredited trauma center.
5. How the tertiary survey prevents missing injuries.

Pitfalls in Trauma Resuscitation :

Pitfall # 1

**Lack of institutional and individual
commitment to the care of the critically
injured patient**

Question About Pitfall # 1

Can a “non-trauma” General Surgeon and/
or
Non-Trauma Center
render optimal care to the injured patient ?

Does Volume of Trauma Cases Matter Regarding Outcomes ?

- “The more you do, the better you are”
- Development of trauma systems, state designation, and the American College of Surgeons verification process use volume as one qualifying criterion for trauma centers
- There are conflicting reports in the literature on the impact of volume and outcome.

Institutional Outcomes in Rural Level 3 Centers or Non-Trauma Centers

- **Outcomes were good when :**
 - **Appropriate, functional triage protocols comparable to national norms were in place**
 - **Clear stipulations and requirements regarding the process of care were in place**
 - **Ongoing quality assurance or performance improvement was done**

Nathens. Advances in Surgery. 2001.

Key to a Successful Trauma Resuscitation

As long as the institution and the staff is committed to meeting the challenges involved in the care of the trauma patient, and have a rigorous performance improvement process, outcomes will be successful.

Presence of quality Emergency Medicine at the institution has also been shown to be a critical component to achieve good outcomes.

Pitfalls in Trauma Resuscitation :

Pitfall # 2

**Underdeveloped
Performance Improvement Plan**

Performance Improvement Programs or Systems

- Are a mechanism to identify “events”, particularly undesirable ones, prospectively
- Blame and “finger-pointing” are counterproductive
- These need to be :
 - Constructive
 - Transparent (No hidden agendas)

Performance Improvement (PI)

- **How “events” can be identified :**
 - **Physician and nursing members should be on the PI team**
 - **Chart review (ideally 100 % of charts)**
 - **Morbidity and Mortality review conferences**
 - **Should have participation by representatives of all departments involved in trauma care**
 - **Quality Assurance Committees**

Performance Improvement (cont.)

- Events are classified :
 - Determination
 - Grade
 - Preventability

Determination Classification

- **Systems-related example :**
 - Delay in IV access
 - Central lines then needed
- **Disease-related example :**
 - Respiratory failure
 - Due to multiple rib fractures and pulmonary contusion
- **Provider-related example :**
 - Pulmonary embolus in an admitted patient
 - No DVT prophylaxis was prescribed

Grade Classification

- **Grade 0**
 - No complication
- **Grade 1**
 - Expected complication; within the standard of care
- **Grade 2**
 - Unexpected; within the standard of care
- **Grade 3**
 - Unexpected; deviation from standard of care
- **Grade 4**
 - Unexpected; Gross deviation from the standard of care

Preventability Classification

- **Non-preventable**
- **Potentially Preventable**
- **Preventable**

Performance Improvement Operation

- **Develop action plans**
- **Assign accountability**
- **Track and Trend in a measurable way**
- **Re-analyze your progress**
 - Fine tune your action plan,
 - Continue to monitor, or
 - Determine that the action plan has been successful.

Pitfalls in Trauma Resuscitation :

Pitfall # 3

Failure to follow the fundamental principles of resuscitation.

Usually Provider-related

Usually during the Primary Survey

Reminder of the Primary Survey Sequence

- **Airway (with cervical spine immobilization)**
- **Breathing (oxygenation and ventilation)**
- **Circulation with hemorrhage control***
- **Disability**
- **Exposure and Environment**

***Note that in the military or battlefield environment, hemorrhage control is taught to be the top and first priority**

Airway Pitfalls to Avoid

- Delay in recognizing the compromised airway
- **Visual Cues** missed :
 - Comatose (Glasgow Coma Score 8 or less)
 - Combative / Agitated / Altered Mental Status
 - Hypoxia
 - Drugs / Alcohol
 - Traumatic brain injury
 - Emesis and /or blood in the airway

Aggressive Airway Management to Avoid Airway Pitfalls

- **The risks are fairly small**
 - **Rapid sequence intubation**
 - Avoid aspiration
 - Use techniques to keep intracranial pressure low
 - **Maintain in-line cervical spine immobilization**
 - Avoid cervical spine injury
 - **Apply cricoid pressure**
 - Avoid aspiration
- **You will rarely be questioned for this decision**
- **You can always extubate the patient later**

Airway Pitfalls to Avoid (cont.)

- **Delegation of difficult airways to the least experienced :**
 - **Physician Assistant, residents, nurse anesthetists**
- **Delay in mobilization of the most skilled personnel for airway control :**
 - **Varies among institutions (Emergency Medicine, Anesthesia, Trauma)**
- **Dismiss expert or senior help from the resuscitation too early.**

Breathing Related Pitfalls to Avoid

- We know needle thoracentesis before chest tube, and chest tube before chest X-ray, for any case of suspected tension pneumothorax.
- *Failure to recognize hypoxia early*

Breathing Pitfalls to Avoid (cont.)

- Attention is not paid to the **visual cues** :
 - Pallor
 - Cyanosis
 - Altered mental status
 - Pulse oximeter reading falling or not tracking

Breathing Pitfall Reminder

*Remember, the goal is to intubate
before the patient develops profound
respiratory failure*

Breathing Pitfall Reminder

- For Traumatic Brain Injuries, avoid :
 - Hypoxia
 - Profound hyperventilation
 - Keep the pCO₂ in the low to mid 30' s

Circulation Pitfall to Avoid

Problem # 1

Failure to engage or recognize patients that are in profound, decompensatory shock and to initiate timely, appropriate treatment

Failure of Non-Operative Management of Splenic Injury : An Example of a Circulation Pitfall

- **Eastern Association for the Study of Trauma :
multicenter, retrospective study**
- **78 adult patients who failed non-operative
management**
- **17 trauma centers in the U.S. in 1997**
- **8 CT scans were misread initially**
- **42 % (11/26) ultrasounds were false negative**

Failure of Non-Operative Management of Splenic Injury : An Example of a Circulation Pitfall (cont.)

- **37 % failed during the first 12 hours**
- **30 % had hypotension that responded to fluid resuscitation**
- **25 % were persistently tachycardic or hypotensive ($p < 0.05$)**
- **Ten patients died (12.8 %)**
- **2/3 who died from exsanguination never underwent laparotomy.**

Circulation Pitfall (cont.)

40 % of non-operative failures of the spleen were triaged inappropriately with misleading abdominal CT scans or ultrasound interpretation, or hemodynamic instability

Another Circulation Pitfall

Problem # 2

Failure to transfuse blood products early, and to track the amount of crystalloid given.

Remember, the standard initial infusion is :

**2 liters crystalloid in the adult,
20 ml/kg x 2 to 3 boluses in the child.**

Circulation Pitfalls (cont.)

Problem # 3

Use of pressors in hemorrhagic shock.

Should only be used for patients in neurogenic shock, and only then if there is poor response to initial fluid infusion.

Circulation Pitfalls (cont.)

Problem # 4

Spending too much time
doing resuscitation-related procedures
that could be better performed
in the operating room

Examples :

Central and arterial line insertions
Foley catheter placement
Nonessential Radiographic studies

Circulation Pitfalls (cont.)

Problem # 5

Lack of early surgical consultation for patients demonstrating signs and symptoms of shock.

Establish a culture that physician-to-physician communication is not a sign of weakness.

Upgrade care if needed.

“D” in the Primary Survey : Disability Pitfalls to Avoid

**In the last 30 years, early trauma deaths in the
“Golden Hour” are mainly due to :**

**Hemorrhagic Shock
Traumatic Brain Injury**

Disability Pitfalls to Avoid

- **Avoid secondary brain injury :**
 - Treat hypoxia and hypotension aggressively
- **Avoid vigorous hyperventilation**
- **Do not perform CT scans of the head if there is no neurosurgeon available**
 - Rapid transfer preferable
- **Consider steroids early for Spinal Cord Injury:**
 - Clarify with accepting physician if steroids should be started if you are uncertain

“E” in the Primary Survey : Exposure / Environment Pitfalls : Hypothermia

- **Is a preventable complication**
- **Preventive measures :**
 - **Keeping fluids warm in an incubator**
 - **Transfusing blood through a warmer**
 - **Keep the resuscitation area warm**
 - **Limit traffic in and out of room**
 - **Warming blankets and lights**
 - **Keep patient covered when exam is done**
 - **Particularly high heat exchange areas like the scalp**

Hypothermia : Importance of Prevention

- Hypothermia-induced coagulopathy
 - Marked bleeding diathesis
- Death Triad :
 - Hypothermia
 - Coagulopathy
 - Acidosis

Hypothermia has been shown to directly increase trauma mortality several fold

Pitfalls in Resuscitation :

Pitfall # 4

Failure to recognize local resource limitations and make an early decision to transfer to definitive care.

All U.S. trauma centers track transfers which occur > 3 hours from time of arrival.

Audit Filters Used to Track Potential Transfer Pitfalls

- Delay to laparotomy (> 2 hours)
- Delay to craniotomy (> 4 hours)
- Delay to Operating Room for open fractures (> 8 hours)

Transfer to Definitive Care : Special Considerations

- **Extreme age**
 - Age > 55 is considered “geriatric trauma”
- **Significant comorbidities**
- **Anticoagulation therapy**

**Patients with any of these require
higher levels of trauma care**

Transfer to Definitive Care : Special Considerations (cont.)

- **Solid Organ Injury**
 - Large amount of hemoperitoneum
 - Contrast blush
 - Anticoagulation
 - Age > 55 years

**Patients with any of these require
higher level trauma care**

Pitfalls In Trauma Resuscitation

Pitfall # 5

Failure to perform a Tertiary survey to prevent missing injuries.

(meaning a complete, comprehensive, head to toe re-exam for injuries)

Study Showing the Value of the Tertiary Survey

- B.L. Enderson ; Univ. of Tennessee
- 3-month study ; 399 trauma patients
- 89 % blunt etiology
- To find missed injuries :
 - Complete re-examination
 - Head to Toe
 - Within 24 hours of admission

Tertiary Survey Study Results

Injuries Discovered (41)

Musculoskeletal	21
Abdominal injury	6
Thoracic injury	5
Spinal fractures	5
Facial Fractures	2
Vascular Injuries	2

Tertiary Survey

Factors Contributing to Missed Injuries in the Tennessee Study

Closed Head injury	25
ETOH / Drugs	15
Combative / Intubated	7
Unstable	4
No signs / symptoms	4
Non-ambulatory	3
Low index of suspicion	2
Quadriplegic	1
Technical Error	1

Tertiary Survey Discovery of Additional Injuries

Discovered within 24 hours : 35%

Discovered within first week : 68%

Discovered within two weeks : 97%

Discovered > one month : One injury

Trauma Care Pitfalls

Lecture Summary

- **Personnel and institution commitment is key to providing high level trauma care**
 - Performance Improvement
 - Careful, compulsive performance of resuscitations
 - Recognition of early resource limitation requiring early patient transfer
 - Routine performance of a tertiary survey to try to avoid missing injuries

QUESTIONS ?

Thank You for Your Attention