North Memorial
Trauma Update
North Memorial Medical Center is a *Level I Trauma Center*

North Memorial

Volume 8 | February 2010

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As we provide care for injured patients, there are some things we can be certain of. Trauma resuscitation always starts with the ABCs but caring for the injured Pediatric patient can pose unique challenges. In this edition of *North Memorial Trauma Update*, we will be discussing trauma resuscitation as it applies to the Pediatric trauma patient.

New issues of *Trauma Update* will be announced on North Memorial's Facebook and Twitter sites. Go to northmemorial.com and follow the links to become a fan.

To receive one AMA PRA Category 1 Credit(s) ™ email the answers to the questions to traumaupdate@northmemorial.com. Be sure and include which edition you are answering and your credentials. If you receive Trauma Update by mail you can answer the questions on the Word document attached and either mail it to traumaupdate@northmemorial.com or mail it to:

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Pediatric Injuries

This addition of the Trauma Update focuses on pediatric injuries. There are certain components of pediatric trauma that are similar to adult trauma and other components that are distinct. The approach to both groups of patients is identical, but the specific injuries that clinicians encounter and the treatments clinicians utilize are different.

QUESTION #1:
Which of the following is true about pediatric trauma resuscitation compared with adult resuscitations?

A. The sequence is breathing then circulation then airway, because airway loss is so unlikely

B. The sequence is airway then circulation then breathing, because pneumothorax is improbable

C. Information on birthing history should precede the trauma evaluation

D. The priorities are the same

The priorities established for adult resuscitation apply equally to pediatric resuscitation. There are certainly differences in children compared with adults, but the priorities are always the same. The first priority is always to evaluate and establish an airway. The second priority is to evaluate breathing, such as evaluating oxygen saturation, chest rise, and breath sounds. The third priority is to evaluate the circulation, such as treating external points of hemorrhage and any hemodynamic alterations. While these priorities are listed separately, they are often completed simultaneously. The evaluations of the ABCDE (airway, breathing, circulation, neurologic disability, exposure) comprise the primary survey in any trauma evaluation regardless of the age of the patient.

QUESTION #2:
Which of the following is true regarding pediatric volume resuscitation?

A. It should be guided by hemodynamic parameters, urine output, and other components of the physical exam

B. The initial crystalloid bolus should be 20 mL/kg

C. If blood is necessary, the amount should be 10 mL/kg

D. Pediatric patients will show signs of shock later than adults

E. All of the above

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As in adults, shock in an injured child is presumed to be hemorrhagic until proven otherwise. Initial volume resuscitation should be with crystalloid. While adults are given 1-2 liters of crystalloid, pediatric patients are bolused with 20 mL/kg of fluid. If they are either a non-responder or a transient responder to crystalloid, they should be given blood. They can be given either O negative or crossmatched blood, depending upon the urgency. While adults are given "units" of packed red blood cells, children are resuscitated with increments of 10 mL/kg of blood. Shock has a different presentation in children compared with adults. Hypotension occurs much earlier in an adult suffering from hemorrhagic shock. A child may not manifest hypotension until the timeframe immediately before cardiac arrest. As such, the clinician must be aware of other signs of shock, such as tachycardia, pallor, listlessness, and reduced capillary refill. These signs should prompt immediate treatment rather than waiting for hypotension to occur. Additionally, hemoglobin levels are of dubious value in the initial resuscitation. A child can have a normal hemoglobin despite being in class 4 hemorrhagic shock if the hemoglobin has not yet equilibrated.

QUESTION #3:
What is the most expedient method to determine height, weight, and drug reference information for a child?

A. Estimation based upon the Helsinki formula

B. The parents must be located and queried about height and weight prior to any intervention

C. Use of the Broselow tape

The Broselow tape is a commercial product that lists a variety of pediatric specific information. The tape should be available in all emergency rooms that treat children. The tape can be laid next to a child. The height as well as an estimation of the weight can be read from the tape. The tape also lists information regarding correct drug doses for age/weight correct equipment sizes. The purpose of the tape is to give rapid estimates during a time of emergency resuscitation. It does not take the place of more accurate information, such as a real weight if it is available. The tape may also underestimate the weight of children. This should be taken into account if the child appears overweight.

QUESTION #4:
How does vascular access differ between adults and children?

A. Central lines are contraindicated in children

B. Both adults and children should have 14 gauge IV lines placed

C. IV access is unnecessary in children

D. Intraosseous lines are more commonly needed in children

As noted above, the priorities in trauma resuscitation are the same, regardless of age. All patients with serious trauma require vascular access to enable administration of fluids and medications. While central lines can be placed in both children and adults, these catheters are considered second or third line agents. Two large bore IV's are the preferred form of vascular access for injured patients. The term "large bore" has a different meaning in adults when compared with children. While a 16 gauge or 18 gauge IV may be obtained in healthy adults, a much smaller IV will be needed for children. A peripheral IV can be obtained in many children. Nonetheless, their veins are small enough that this form of access can be challenging. Intraosseous lines can be placed in adults, but they are far more commonly placed in children. An intraosseous line can be placed in a child of any age, including babies. These lines can be placed in 1-2 minutes. The standard location for placement is the proximal tibia, just distal to the tibial tuberosity. Placement of intraosseous lines has been simplified with the advent of automated systems, such as the EZ-IO (Vidacare Corp, San Antonio, Tex).

QUESTION #5:
Which of the following is true regarding pediatric abdominal trauma?

A. Bowel injuries are common with abdominal trauma
B. All splenic injuries require an operation due to the risk of delayed splenic rupture
C. A seatbelt sign is an unimportant finding
D. The clinical findings are the most important factor determining the need for operative intervention

Children have the same intra-abdominal organs as adults but the likelihood of requiring an operation is much different. The initial studies that demonstrated the safety of non-operative management of splenic lacerations were conducted in children. In 2010, it is uncommon to perform a splenectomy for trauma in a child. Children who are diagnosed with a splenic injury should undergo close monitoring of their vital signs as well as serial hemoglobin monitoring. The decision to operate on a child with abdominal trauma is made based upon clinical findings, such as signs of shock or peritonitis. A hemodynamically stable child with a splenic laceration noted on CT scan will generally be observed. Bowel injuries are uncommon in children but require a prompt operation when present. Signs of bowel injury include peritonitis, free air on abdominal imaging, and free fluid in the abdomen on CT scan without a solid organ injury (though this is the least solid indication).

QUESTION #6:
Which of the following is not true regarding imaging procedures in children?

A. A chest and pelvis X-ray should be obtained for multisystem trauma
B. Deformed extremities should be imaged with plain X-rays
C. CT scans should be liberally obtained regardless of clinical findings

There is mounting evidence that there are real cancer risks associated with CT scans. The risk is greater among younger patients and with higher doses of radiation. CT scans are still a valuable adjunct to the evaluation of injured children. They allow prompt diagnosis of internal injuries that are not readily apparent by physical exam. Nonetheless, clinicians must weigh the risks of CT scans with the benefits, and they should believe that the information obtained with a CT scan is important to the treatment of the child.

Answers: 1. d, 2. e, 3. c, 4. d, 5. d, 6. c

Minneapolis Youth – Violence Intervention Project

We are pleased to announce the launching of a new program in the Emergency Department at North Memorial and Hennepin County Medical Center effective January 6, 2010.

The Minneapolis Youth – Violence Intervention Project is a community-based collaborative effort between North Memorial, the City of Minneapolis, Hennepin County Medical Center and a number of community agencies that provide prevention and early intervention for youth who have been badly hurt in a traumatic event. The objective is to work closely with youth age 8 – 24 who have been the victim of a traumatic injury, to minimize the psychological damage caused by the physical trauma. Research tells us that children who have been badly hurt without receiving emotional/psychological support are very likely to get hurt again themselves or to retaliate and hurt others.

Social workers or psychologists who are part of the Emergency Behavioral Medicine staff will spend time with the injured person and/or family to help identify ways we might be able to help them in the days and weeks after the injury. They will also help identify experts in the community who can help them after they leave the hospital.

For questions contact:

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2010 CME Opportunity

ATLS (Advanced Trauma Life Support)

June 3 & 4, October 14 & 15, December 2 & 3

This program was developed by the American College of Surgeons Committee on Trauma and is designed to assist physicians in providing the first hour of emergency care to trauma patients. Training combines didactic lectures and practical skills stations, allowing time to perfect skills in the initial assessment; and management and stabilization phases of trauma patients.

For more information and to register online for classes, visit us at www.northmemorial.com/emsED

For questions please call (763) 520-5451

Long Hot Summer 2010

March 5-6, 2010

Check the web site frequently for updates.
www.northmemorial.com/emsed/

2010 Trauma Nursing Education

Trauma 101

April 19

This program was designed to cover the basics of the multi-system care of the trauma patient through discussion and case presentations.

Trauma 201

October 25

This program builds on the basics presented in Trauma 101. Discussions and case presentations cover the critical care needs of the injured patient. Trauma 101 is strongly recommended as a prerequisite to this class.

For registration and/or questions, please call (763) 520-5940 or email, ce@northmemorial.com

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