Pediatric Transfer Criteria
- Describe transfer criteria for pediatric patients
- Understand factors influencing optimal modes of transport
- Detail proper pre-transfer stabilization of seriously injured or ill children
- Be aware of resources available at children's hospitals to support your care of pediatric patients
This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education through the joint providership of the Minnesota Medical Association and MMIC. The Minnesota Medical Association (MMA) is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

The Minnesota Medical Association designates this internet activity for a maximum of 1 AMA PRA Category 1 Credit(s)™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Physicians and other licensed health care professionals requesting CME credit must complete the CME Evaluation form provided to them and follow the instructions on the form.

The speaker has no personal financial relationships to disclose.
Transfer Criteria for Pediatric Patients

Abraham Jacob, MD, MHA
CMO, University of MN
Masonic Children’s Hospital
Local Needs and Resources

- Decisions on when to seek or to transfer pediatric patients should be individualized based on local needs and resources.
- Children with critical illness and injury are at high risk of death and disability.
- Early consultation with pediatric critical care or trauma specialists and rapid transport to referral centers can improve the outcomes for these children.
- It is recommended that hospitals and their medical staffs develop appropriate policies, procedures and staff education programs to determine pediatric transfer criteria and procedures.
Inter-facility Consultation and/or Transfer of Pediatric Medical Patients (non-trauma)

- Physiologic Criteria
  - Depressed or deteriorating neurologic status
  - Severe respiratory distress with
    - Cyanosis
    - Moderate to severe retractions
    - Apnea
    - Moderate to severe stridor
    - Grunting or gasping respirations
    - Status asthmaticus
    - Respiratory failure
Inter-facility Consultation and/or Transfer of Pediatric Medical Patients (non-trauma)

- Physiologic criteria
  - Children requiring endotracheal intubation
  - Cardiac rhythm disturbances
  - Hx of cardiac arrest
  - Heart failure
  - Compensated or Uncompensated shock not responding to treatment
  - Severe hypothermia or hyperthermia
  - Hepatic failure
  - Renal failure- acute or chronic
Other Criteria

- Near drowning
- Status epilepticus
- Potentially dangerous life threatening ingestion or exposure to toxic substance
- Severe electrolyte disturbances
- Severe dehydration
- Potentially life-threatening infections/ sepsis
- Children requiring intensive care
Inter-facility Pediatric Consultation/Transfer Criteria - Trauma

- Depressed or deteriorating Neuro status
- Respiratory distress or failure
- Children requiring ventilatory support
- Compensated or uncompensated shock
- Injuries requiring blood transfusion
- Fractures or wounds to an extremity complicated by neurovascular or compartment injury
Inter-facility Pediatric Consultation/Transfer Criteria - Trauma

- Fractures of two or more major long bones
- Fracture of axial skeleton
- Spinal cord or column injuries
- Traumatic amputation of an extremity
- Head injury with CSF leaks, open head injuries, depressed skull fractures
- Penetrating wounds to head, neck, thorax, abdomen, neck, thorax, abdomen or pelvis
- Major pelvis fractures
- Blunt injury to chest or abdomen
Second and third degree burns greater than 10% of BSA for children < 10 years of age
- Second and third degree burns greater than 20% of BSA for children > 10 years of age
- Third degree burns > 5%
- Burns involving inhalation injury, respiratory distress, face, ears, mouth and throat, deep burns to hands, feet, genitalia, major joints or perineum
Electrical injury or burns (including lightening)
Burns associated with trauma or complicating medical conditions
Frostbite
Consult a child abuse physician prior to transfer as some children may be managed locally, while others may need transfer for specialized studies or consultation.

**Physical Abuse**
- Children under 3 years of age with head injuries, abdominal injuries, fractures, and/or extensive cutaneous trauma

**Sexual Abuse**
- Children 12 years of age and younger
- History of suspected sexual abuse/assault occurring within prior 72 hours
- Acute genital injury/bleeding

NOTE: Obtaining a Skeletal Survey may require transfer to a Children’s Hospital
CENTER FOR SAFE AND HEALTHY CHILDREN
Assessment for Physical Abuse

0 - 6 months
- Head CT (recommended in all)
- Skeletal Survey
- Labs (CBC, Metabolic Panel with Liver Enzymes, Lipase)
- Urine Drug Screen
- Social Work Consult
- SANE Consult
- Ophthalmology Consult
- Trauma Service Consult

6 - 12 months
- Skeletal Survey
- Labs (CBC, Metabolic Panel with Liver Enzymes, Lipase)
- Urine Drug Screen
- Neuro-Imaging
- Social Work Consult
- SANE Consult
- Ophthalmology Consult
- Trauma Service Consult

2 - 5 years
- Labs (CBC, Metabolic Panel with Liver Enzymes, Lipase)
- Urine Drug Screen
- Skeletal Survey (Extensive Trauma, Developmental Delays, Burns)
- Neuro-imaging
- Social Work Consult
- SANE Consult
- Trauma Service Consult

1 - 2 years
- Skeletal Survey
- Labs (CBC, Metabolic Panel with Liver Enzymes, Lipase)
- Urine Drug Screen
- Neuro-Imaging
- Social Work Consult
- SANE Consult
- Trauma Service Consult

5 years and older
- Labs (CBC, Metabolic Panel with Liver Enzymes, Lipase, Urine Drug Screen)
- Neuro-Imaging
- Social Work Consult
- SANE Consult

* Clinical Indicators
- Labs – Non-Patterned Bruising or ICH: add PT/PTT; Extensive Trauma: add CPK
- Abdominal Imaging – AST or ALT > 80 and/or abdominal bruising/tenderness
- Neuro-Imaging - Altered Mental Status, Skull Fracture(s), Bruising Face/Head
- Ophthalmology – Positive Neuro-Imaging and/or Altered Mental Status
- SANE Consult – Evidence Collection, Suspected Sexual Abuse/Assault
- Social Work Consult – Suspected Abuse/Neglect, Ingestions, CPS involvement
- Trauma Service Consult – Head, Abdomen and Multi-system Trauma

Updated: 07/01/2015
Patterned Skin Injuries & Unusual Locations of Injury

**TEN-4 FACES**

**TEN**
- Torso
- Ear
- Neck

**FACES**
- Frenulum
- Auricular area (ear)
- Cheek
- Eyelids (bruising)
- Scleral hemorrhage

4: less than 4-6 months of age

**ALWAYS SCREEN:**
- Rib Fx
- Metaphyseal Fx
- Longbone Fx (non-ambulatory)
- Oropharyngeal injury (non-ambulatory)
- Abdominal injury (non-MVC)
- Head injury (unwitnessed, unexplained)

---

**Chief Complaint:**
- i. Vomiting
- ii. Fussiness
- iii. ALTE or unresponsiveness
- iv. Fell off bed*

* Most common history in accidental and abusive injuries

**History:**
- i. Injury not consistent w/ child's age, development abilities, or injury morphology
- ii. History is vague or changes w/ time, repetition, or caregiver
- iii. Delay in seeking medical care

---

**Psychosocial Assessment:**
- i. Negative attributions ascribed to the child by the caregiver (e.g. "my baby is mean")
- ii. Social service involvement
- iii. Law enforcement involvement
- iv. Domestic/intimate partner violence
- v. Substance abuse
- vi. Mental health issues

**Examination:**
- i. Full or bulging fontanelle in an infant
- ii. Rapidly increasing head circumference
- iii. Any bruising in an infant
- iv. Bruising in a child in the TEN or FACES distribution
- v. Patterned injury
- vi. Failure to thrive or weight loss
Regional Child Abuse Consultants

- Midwest Children’s Resource Center at Children’s Hospitals and Clinics of Minnesota
  - (651) 220-6750
  - Physician Access Line 1-866-755-2121 ask for child abuse physician
- Center for Safe and Healthy Children at University of Minnesota Masonic Children’s Hospital
  - (612) 273-SAFE (7233)
  - Operator (612) 365-1000 – ask for child abuse physician
- Center for Safe and Healthy Children at Hennepin County Medical Center
  - Operator (612) 873-3000 ask for the child abuse physician
- Mayo Child and Family Advocacy Program at Mayo Clinic
  - (507) 266-0443 from 8 AM to 5 PM
  - Operator (507) 284-2511 – ask for child abuse physician
Pre-Transport Stabilization

Andrew W. Kiragu, MD, FAAP
Interim Chief of Pediatrics
Medical Director, PICU
Hennepin County Medical Center
Assistant Professor of Pediatrics
University of Minnesota
Case 1

- SN is a 2 year-old female toddler who was pulled from a burning house.
- Apparently, her parents were “cooking methamphetamine” and there had been an explosion that had started the fire.
- When the paramedics arrive they find a child who is unconscious and has obvious extensive 2nd and 3rd degree burns over most of her body.
Case 2
Case 2

- BL is a 16 year-old adolescent female coming from a party with friends where there had been alcohol served.

- She was an unrestrained backseat passenger of a motor vehicle which was involved in a collision with a train.

- She was thrown out of the vehicle and was found unconscious with obvious head and extremity injuries. The teenage driver and front-seat passenger were dead at the scene.
Introduction

- Adequate resuscitation and stabilization of critically ill children plays a crucial role on their survival and their ability to tolerate transport.

- Stabilization involves the identification and management of those factors that, if not properly corrected, may lead to deterioration of the child’s condition during transfer.

- Adequate stabilization before transport lowers morbidity and improves the chances of survival.
Introduction

- The patients clinical status/underlying condition at the time of presentation will guide management.

- Single or multi-organ trauma/burns, severe respiratory distress, intractable seizure, cardiac disease, sepsis/septic shock require a targeted approach.

- Adequate preparation/marshaling available resources in advance if possible is key.

- Communication with referral facility.
Management Overview

- Rapidly identify and immediately treat all physiologic derangements. Priorities:
  - Airway, with cervical spine control
  - Breathing (oxygen, MV, tube thoracostomy)
  - Circulation (hemorrhage control, arrhythmia tx, inotropic support, PGE1 as needed)
  - Disability (neurologic deficit evaluation, analgesia, sedation, seizure control)
  - Exposure (wounds, fractures, burns)
Airway

- Failure to manage the airway appropriately is the most common cause of preventable morbidity and mortality.

- Critical findings include airway obstruction due to direct injury, edema, blood or foreign bodies or inability to protect the airway due to a decreased level of consciousness.

- Patient may require placement of an endotracheal tube or replacement of malpositioned ETT.

- Airway management expertise (ED, anesthesia, ICU).

- Cervical spine precautions.
Breathing

- Evaluate patients ability to ventilate and oxygenate

- Critical findings include absence of spontaneous ventilation, absent or asymmetric breath sounds consistent with either PTX, HTX or ETT malposition

- Provision of 100% oxygen, initiation of mechanical ventilation

- Placement of thoracostomy tube(s) as needed

- Concern for inhalation injury- carbon monoxide, cyanide(Cyano-Kit)
Circulation

- Clinical presentation guides treatment course.
- Hemorrhage that may be inconsequential in an adult may devastate a child
- Important to assess for clinical evidence of shock in patients with “normal” blood pressure
- Initial evaluation for and management of arrhythmia
- Index of suspicion for congenital heart disease
The replacement of intravascular volume is the initial focus of trauma/burn resuscitation and is key in a patient with hemodynamic instability from sepsis, severe dehydration etc.

- Access with PIV’s or IO

- Caution with fluid if CHF a concern

- Type of fluid used less important than adequate restoration of intravascular volume. Crystalloid typically initial choice. Massive hemorrhage mandates replacement of blood and other blood products

- Hemodynamic instability may necessitate use of vasoactive agents including epinephrine, norepinephrine and dopamine

- PGE1 for ductal dependent lesions
Neurologic Status

- A gross mental status and motor exam is performed
- It is important to determine whether a serious head and/or spinal cord injury exists
- Examine pupils for size and symmetry. Abnormal findings may indicate the need for institution of urgent measures to treat intracranial hypertension
- Seizure control-benzodiazepines, anti-epileptic drugs
- Provision of adequate analgesia, sedation, chemical paralysis
- Mannitol/HTS if concern for intracranial HTN
Exposure

- Examination of skin to aid in determination of perfusion
- Temperature management
- Identify injuries (unintentional/intentional)
- Hemorrhage management
- Dress burns, wounds, packing as needed
- Stabilization of fractures
Imaging can aid in diagnosis and guide treatment

- EFAST exams in the ED
- Chest x-ray-fractures, PTX/HTX, parenchymal disease, ETT position, CHD
- C-spine and pelvic radiographs
- CT scans (head, CAP as indicated) if time permits
- Transmission of images
Minnesota’s...
Level I Pediatric Trauma Center
Little Lives. Big Futures.

Little Lives. Big Futures.

Level I Adult Trauma Center
Level I Pediatric Trauma Center
How should pediatric interhospital transfer patients be transported?

Ronald A. Furnival, MD
UMMCH ED Medical Director
Disclosures

• I serve as the (unpaid) Pediatric Emergency Medicine representative for the LifeLink III Clinical Council.

• I serve as the (unpaid) Chairman of the MN Department of Health State Trauma Advisory Council (STAC).

• I was the Medical Director of InterMountain Healthcare LifeFlight Pediatric Air-Transport at the University of Utah and Primary Childrens’s Hospital for for 9 years.
Does mode of transport matter?

- How sick is the patient?
- What care may (or will) the patient need?
- Mode of transport = clinical care capability
- Who is responsible for the patient during transport?
A past case

- 3 year-old girl, with an 80-minute GTC febrile seizure, requiring multiple doses of anti-epileptic medications at local community hospital ED. Appropriate transport could include:
  - A. Helicopter
  - B. Ambulance
  - C. Private vehicle (telling family to stop at phone booth and dial 911 for problems)
A past case

- 3 year old girl, with an 80-minute GTC febrile seizure, requiring multiple doses of anti-epileptic medications at local community hospital ED. Appropriate transport could include:
  - A. Helicopter
  - B. Ambulance
  - C. Private vehicle (telling family to stop at phone booth and dial 911 for problems)

- Answer: Not C.
Mode of transport

• Private automobile:
  – Inexpensive, but no medical care capability

• Ambulance:
  – Safe, reliable in bad weather, & relatively low cost, but limited range, comparatively slow

• Fixed-wing aircraft:
  – Safe, reliable, long range, fast, well-trained teams, but expensive, slow to initiate, & less flexible (need an airstrip)

• Helicopter:
  – Fast, fairly flexible, well-trained teams, but more expensive, weather-limited, range-limited, & some risk
Mode of transport = care capability

• Stable, with no risk of deterioration
  – EMT-B ambulance
    • Oxygen, VS monitoring, BLS services

• Stable, with moderate risk of deterioration
  – EMT-P ambulance
    • IV medications, ECG monitoring, ALS services

• Stable, with high risk of deterioration, or Unstable
  – Specialty transport, air or ground
    • Advanced airway-ventilation, CV medications & support
Transfer of responsibility

• Who is responsible for the patient during interhospital transport?
  – The referring MD & facility is medically & legally responsible until the patient arrives at receiving hospital
  – This responsibility is shared with the advanced transport program, when utilized for higher risk patients
  – The referring hospital must ensure that no drop-off in clinical care capabilities occurs during transport
  – ‘Fastest’ is not always best for the patient or your responsibility to provide appropriate care
Be prepared

• Transfer agreements with your referral centers
  – Required by State Trauma hospital criteria
• Know the clinical capabilities of your local & regional transport agencies
  – EMT-B, EMT-P, or specialty programs
• Have contact information & phone numbers readily available for each transport program
• Match the transport program to your individual patient’s care needs
  – Discuss with your transport program for the most appropriate mode of transportation for each patient
Questions?
Resource to Support Care of Pediatric Patients

MHA Webinar
Emily Chapman, MD, FAAP
Emergency

- Children’s Hospitals and Clinics of Minnesota, Mpls and St Paul
- Hennepin County Medical Center, Mpls
- Mayo Clinic’s Hospital, Rochester
- St Cloud Hospital Children’s Center
- St Mary’s Medical Center, Duluth
- U of MN Masonic Children’s Hospital, Mpls
Trauma

- Level I Pediatric:
  - Children’s of Minnesota Mpls
  - Hennepin County Medical Center Mpls
  - Mayo Clinics Hospital Rochester
  - Region’s Hospital St Paul

- Level 2 Pediatric:
  - North Memorial Medical Center Robbinsdale
  - St Mary’s Medical Center Duluth
Children’s Hospitals and Clinics of Minnesota, Mpls and St Paul
Gillette Children’s Specialty Center, St Paul*
Hennepin County Medical Center, Mpls
Mayo Clinic’s Hospital, Rochester
St Cloud Hospital Children’s Center
St Mary’s Medical Center, Duluth
U of MN Masonic Children’s Hospital, Mpls
CVICU

- Children’s Hospitals and Clinics of Minnesota, Mpls and St Paul
- Mayo Clinic’s Hospital, Rochester
- U of MN Masonic Children’s Hospital, Mpls
ECMO

- Children’s Hospitals and Clinics of Minnesota, Mpls and St Paul
- Hennepin County Medical Center, Mpls
- Mayo Clinic’s Hospital, Rochester
- U of MN Masonic Children’s Hospital, Mpls
Level III NICU

- Children’s Hospitals and Clinics of Minnesota, Mpls and St Paul
- Hennepin County Medical Center, Mpls
- Mayo Clinic’s Hospital, Rochester
- St Cloud Hospital Children’s Center
- St Mary’s Medical Center, Duluth
- U of MN Masonic Children’s Hospital, Mpls
Burn

- Hennepin County Medical Center, Mpls
- Mayo Clinic’s Hospital, Rochester
Hyperbaric Chamber

- Hennepin County Medical Center, Mpls
Hemodialysis

- Hennepin County Medical Center, Mpls
- Mayo Clinic’s Hospital, Rochester
- U of MN Masonic Children’s Hospital, Mpls
Hematology/Oncology

- Children’s Hospitals and Clinics of Minnesota, Mpls and St Paul
- Mayo Clinic’s Hospital, Rochester
- U of MN Masonic Children’s Hospital, Mpls
Transplant

- Mayo Clinic’s Hospital, Rochester
- U of MN Masonic Children’s Hospital, Mpls
Fetal Surgery

- Children’s Hospitals and Clinics of Minnesota, Mpls and St Paul
- Mayo Clinic’s Hospital, Rochester
- U of MN Masonic Children’s Hospital, Mpls
Metabolism

- Children’s Hospitals and Clinics of Minnesota, Mpls and St Paul
- Mayo Clinic’s Hospital, Rochester
- U of MN Masonic Children’s Hospital, Mpls
Cystic Fibrosis

- Children’s Hospitals and Clinics of Minnesota, Mpls and St Paul
- Mayo Clinic’s Hospital, Rochester
- U of MN Masonic Children’s Hospital, Mpls
Neuroscience

- Children’s Hospitals and Clinics of Minnesota, St Paul
- Gillette Children’s Specialty Center, St Paul
- Hennepin County Medical Center, Mpls
- Mayo Clinic’s Hospital, Rochester
- U of MN Masonic Children’s Hospital, Mpls
Inpatient Behavioral Health
Child and Adolescent Services

- Abbott Northwestern Hospital, Mpls
- Prairie Care, Maple Grove
- Mayo Psychiatric Treatment Center, Rochester
- Miller-Dwan Hospital, Duluth
- Willmar Regional Treatment Center, Willmar
- St Cloud Hospital, St Cloud* 10 y.o. and over
- U of MN Masonic Children’s Hospital, Mpls
“Inpatient” Chemical Dependency

- Mayo Clinic’s Hospital, Rochester
- U of MN Masonic Children’s Hospital, Mpls
- Hazelden, Plymouth
Inpatient Eating Disorder

- Children’s Hospitals and Clinics of Minnesota, Mpls
- Mayo Clinic’s Hospital, Rochester
Telehealth

- Video or multimodality
  - Camera at a minimum
  - Auscultation technology
  - Otoscopic technology
- Organizational agreement and local credentialing
- Equipment in place
- Governmental support grants available for rural or underserved
Telehealth

- **Children’s Hospitals and Clinics of Minnesota**
  - on-line with handful ED’s
  - inpatient consultation up and coming

- **Mayo Clinic’s Hospital, Rochester**
  - primarily adult population
  - focus on follow-up

- **U of MN Masonic Children’s Hospital, Mpls**
  *in development*
SAVE THE DATE

• Pediatric Safety Conference
• December 18, 2015
• More Information to come