

EMSC Connects

Volume 6, Issue 6

June 2017

Emergency Medical Services for Children
Utah Bureau of EMS and Preparedness

Special points of interest:

- Pediatric shock
- Traumatic shock
- Medications for shock
- Shock and fluid therapy protocol
- Join our team

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A Word From Our Program Manager

I am writing this article on the eve of Memorial Day weekend which used to be known as Decoration Day in honor of the men and women who died serving in the military. However, school is out and the weekend has become the gateway to summer activities when people venture out on road trips and camping with boats, RVs, SUVs, and ATVs. So, my thought is to weave some summer safety driving tips into the fabric of this newsletter, so that we may be reminded to safely enjoy the summer as we explore this great country in all its beauty.



According to the National Highway Safety Administration Summer Driving Tips 2017, the focus on safety begins with:

- Getting the car or truck serviced
- Check for recalls
- Check the tires
- Check the lights
- Check the cooling system
- Check fluid levels
- Check the belts and hoses
- Check wiper blades
- Check the air conditioning
- Check the floor mats

While on the road, stay alert, share the road, avoid risky behavior, do not drive impaired, and drive within the speed limits.

Remember to protect the children.

- All children under 13 should ride in the back seat
- Make sure car seats and booster seats are the appropriate size
 - Visit www.nhtsa.gov/cps/cpsfitting/index.cfm for child passenger safety recommendations
- Never leave the child unattended in the vehicle
- Lock the vehicle when exiting so children do not get trapped inside
- Walk around your vehicle before backing up and use backup camera

As we embark on the fun family road trips, remember these safety tips. It may take extra time to be prepared but the time is well spent to avoid crashes, harm to others or disabled vehicles.

I hope you enjoy this Memorial Day weekend. For those who have died serving our country, we owe a debt of gratitude. Thank you.

And to the emergency healthcare heroes, thank you for your continued efforts, dedication and commitment in caring for the children.

Jolene Whitney
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To submit or subscribe to this newsletter

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The Doc Spot

David Chau1k MD, MPH PCH Emergency Attending Physician
Adapted from *Pediatric Shock* presented 2017

Pediatric Shock –the Basics

Children respond differently to shock. They raise their heart rates and unlike adults their blood pressures don't change until the end stages of shock. In children the earliest signs are a change in heart rate and in mental status.

Assess for:

- Tachycardia: fast heart beat, especially when not crying
- Tachypnea: increased breathing rate, assess this before touching the child, it can change your exam.
- Altered mental status: this comes down to consolability.
- Decreased perfusion: mottling, weak peripheral pulses, pallor, and delayed capillary refill. If the child is hypotensive, that is BAD.

Recognition of shock is a significant challenge. Once you recognize it, know what to do!

What is shock? -Inadequate perfusion**What are the types of shock?**

- Hypovolemic
- Distributive
- Cardiogenic
- Obstructive

What are the stages of shock?

- Early/compensated
- Late/decompensated
- Irreversible

Early intervention is important, as first on scene what you do matters! The basics of shock management include providing supplemental oxygen, obtaining vascular access and beginning fluid resuscitation early. Early and aggressive fluid resuscitation (Up to 60cc/kg of NS) within the first hour can lead to early reversal and improvement in mortality. Early recognition and action (early fluids) save lives.

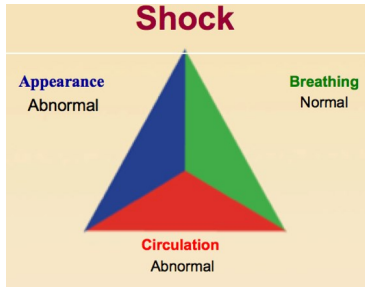
Pedi Points

Tia Dickson RN, BSN

Patients can progress from normal to irreversible shock within 20 minutes depending on the mechanism and the fastest mechanism is trauma, bleeding out. The average child has a circulating blood volume of 80ml/kg. So an average toddler (12kg) has around 960ml of circulating blood in his body, that's about 4 cans of soda. Because they compensate so well, a child can lose up to 1/3 of their blood volume (1.5 soda cans) before you start to see changes in their blood pressure. Children are also built to hide internal bleeding. They have "baby fat" that can obscure swelling and bruising, big bellies are often normal, and some cannot localize or verbalize pain. Recognizing traumatic shock in children is truly a time-sensitive emergency.

In traumatic shock the ultimate goal is to replace what has been lost. Blood for blood, plasma for plasma, and FFP as needed.

1. STOP the bleeding
2. Restore and maintain blood pressure in a normal range FOR THAT AGE (know your norms)
3. Avoid over-hydration, reassess after every 20ml/kg bolus and consult OLMC after 60ml/kg
4. Resuscitate with balanced blood component replacement when possible



What does the PAT look like for shock?

“Early recognition and action (early fluids) save lives”



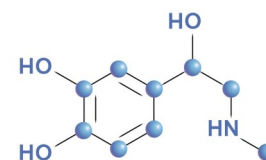
An average toddler (12kg) has around 960ml of circulating blood in his body, that's about 4 cans of soda

Pharmacy Facts

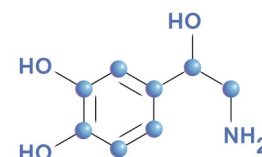
Greg Nelsen PharmD, Bureau of EMS Pediatric Disaster Strike Team

Traumatic shock in any patient is, in the majority of cases, due to hypovolemic shock secondary to blood loss. In these cases the gold standard for volume resuscitation is blood, but in the field this is not widely available. Hopefully in the future it will be. NS or LR is currently the fluid of choice. Give a fluid bolus of NS or LR 20 mL/kg at a time, reassess and repeat up to a maximum of 60 mL/kg total. Look for reversal of the signs of shock after each bolus. If further boluses are required, call OLMC (AEMT and above, per EMS Protocol).

If medications are required to help maintain blood pressure, you have a choice of epinephrine or norepinephrine. Follow your medical control for which to use first but my first choice is usually epinephrine. Knowing how they are different can help to know the situations/circumstances when one would be better. Epinephrine works by constricting the peripheral blood vessels, which helps get blood back to the heart and increases the heart rate. In contrast norepinephrine works by just constricting the peripheral blood vessels. It has no relative effect on heart rate, it effects peripheral circulation. Dosing for epinephrine is 0.1–1 mcg/kg/min IV/IO OR Norepinephrine 0.05 - 0.1 mcg/kg/min IV/IO, (maximum rate of 2 mcg/kg/min). Titrate either to maintain SBP >70 + (age in years x 2) mmHg.



Epinephrine



Norepinephrine

Protocols in Practice; Utah EMS Protocol Guidelines 2017

Shock and Fluid Therapy

SHOCK and FLUID THERAPY

ALL PROVIDERS / EMT

- ❑ Focused history and physical exam
 - Blood glucose, oxygen saturation and temperature assessment
 - Consider shock in patients with one or more the following:
 - Vital signs: HR >100, SBP of <90mmHg for adults, SBP <70 + (age in years x 2) mmHg for children, or RR >20 BPM
 - Skin signs: cold clammy skin, febrile, or delayed capillary refill
 - Mental status: altered, lethargic, or irritable (esp. in infants).
- ❑ Evaluate for the source including distributive (e.g. infection, anaphylaxis), hypovolemic (e.g. hemorrhagic, vomiting/diarrhea, heat exposure), neurologic (i.e. spinal injury), or cardiogenic
- ❑ **Sepsis Alert** – Contact the hospital and institute a Sepsis Alert if:
 1. Suspected or documented Infection
 2. Two or more of the following criteria are met:
 - a. Temp >100.4 °F (38°C) or <96.8°F (36°C)
 - b. RR >20 BPM
 - c. Heart Rate >90 bpm
 3. Signs of hypoperfusion – SBP <90mmHg or MAP <65mmHg
 4. ETCO2 <25mmHg
- ❑ Continuous cardiac, ETCO2, and pulse oximetry monitoring, when available
- ❑ Obtain a 12 Lead EKG when available
- ❑ **Treatment Plan**
 - Address the underlying cause of the shock, if possible
 - Administer 10-15 lpm of oxygen to keep oxygen saturations between 90-94%.
 - Ensure patient warmth, resuscitate with warm IV fluids, when available
 - Pregnancy >20 weeks gestation - Transport in partial left lateral decubitus position. Place wedge-shaped cushion or multiple pillows under patient's right hip and shoulders to elevate R side 45 degrees
 - Pediatric lowest acceptable systolic blood pressures are birth to 1 month = 60mmHg, 1 month to 1 year = 70mmHg, 1 year to 10 years is = 70mmHg + (age x 2) and over 10 years = 90mmHg.

ADULT

PEDIATRIC (<15 years of Age)
NOTE: Pediatric weight based dosing should not exceed Adult dosing.

AEMT

AEMT

Protocols in Practice –continued

- ❑ Vascular access per *IV/IO Access Guideline*
 - Insert 2 large bore IVs
- ❑ **Traumatic Shock – Permissive Hypotension**
 - If SBP >80-90:
 - No IV fluid bolus
 - Place saline locks on IVs or run at TKO rate
 - If SBP <80-90:
 - Give fluid bolus 500mL at a time, reassess and repeat as needed to:
 - Maintain SBP to 80-90 mmHg **WITHOUT** a CLOSED HEAD INJURY.
 - Maintain SBP to 110-120 mmHg **WITH** a CLOSED HEAD INJURY.
 - Once minimum blood pressures have been achieved the patient should have a saline lock and no further fluid boluses should be administered until the BP falls below the limits.
- ❑ **Non-Traumatic Shock** – Give IV fluid bolus 500 ml at a time, reassess and repeat up to a maximum of 2 liters as required for reversal of signs of shock
 - ① Call OLMC if the patient remains hypotensive after 2 liters has been administered
- ❑ **Cardiogenic Shock** - In patients with CHF, pulmonary edema, and cardiogenic shock, IV fluids should be withheld, to avoid worsening shock
 - Apply high flow oxygen
 - Rapidly transport to hospital
- ❑ **Kidney Failure (i.e. dialysis patients)** - Give 500mL fluid boluses up to a maximum of 1 liter and reassess for reversal of the signs of shock
- ❑ Vascular access and fluid per *IV/IO Access Guideline*
 - Insert 2 large bore IVs
- ❑ **Traumatic Shock** – Give fluid bolus of NS 20 mL/kg at a time, reassess and repeat up to a maximum of 60 mL/kg total. Reassess for reversal of the signs of shock
 - ① If the patient remains hypotensive after 60mL/kg of NS call OLMC
- ❑ **Non- Traumatic Shock** - Provide 20mL/kg boluses up to a maximum of 60mL/kg and reassess for reversal of the signs of shock
 - ① If the patient remains hypotensive after 60mL/kg of NS call OLMC
- ❑ **Cardiogenic Shock** - In patients with CHF, pulmonary edema and cardiogenic shock, IV fluids should be withheld, to avoid worsening shock
 - Apply high-flow oxygen
 - Rapidly transport to the hospital
- ❑ **Kidney Failure (i.e. dialysis patients)** - Give 10 mL/kg fluid boluses up to a maximum of 20mL/kg and reassess for reversal of the signs of shock
 - ❑ Call OLMC if the patient remains hypotensive after 20 mL/kg has been administered

PARAMEDIC

- ① **Epinephrine (1 mg/mL/1:1000) 2–10 mcg/min IV/IO infusion for hypoperfusion.**
Titrate to maintain a SBP >100 mmHg
- OR
- ① **Norepinephrine initial dose: 0.5 – 1 mcg/minute titrated to maintain a SBP > 100 mmHg. For patients in refractory shock: 8-30 mcg/minute**

PARAMEDIC

- ① **Epinephrine (1 mg/mL/1:1000) 0.1–1 mcg/kg/min IV/IO infusion for hypoperfusion.**
Titrate to maintain a SBP >70 + (age in years x 2) mmHg
- OR
- ① **Norepinephrine initial dose: 0.05 - 0.1 mcg/kg/min, titrate to max of 2 mcg/kg/min to maintain SBP >70 + (age in years x 2) mmHg**



UTAH DEPARTMENT OF
HEALTH



News from National

Vehicle Heatstroke Prevention

Heatstroke is the leading cause of vehicular non-crash-related deaths for children under 14. In fact, each year, an average of 37 children have died from vehicle heatstroke between 1998-2015.

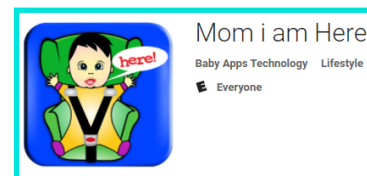
While it seems like an impossible mistake to make, every parent or caregiver can potentially become distracted, and distractions often fuel this devastating situation.

No one is immune. **Yet, this tragedy is 100% preventable.**

We each have a role to play to help keep our kids safe. Help us share live-saving tips and resources with as many people as we can.

Click [here](#) to get your **Heatstroke Prevention Toolkit** (English/Spanish)

- Heatstroke begins when the core body temperature reaches about 104 degrees and the thermoregulatory system is overwhelmed.
- A core temperature of about 107 degrees is lethal.
- In 10 minutes a car can heat up 20 degrees. Rolling down a window does little to keep it cool.
- Heatstroke fatalities have occurred even in vehicles parked in shaded areas and when the air temperatures were 80 degrees Fahrenheit or less.
- Heatstroke can occur in temperatures as low as 57 degrees.



Parents consider the app *Mom I am Here*

Save the Date

Annual EMSC Coordinators Workshop September 8-10, 2017

EMSC Coordinators, please mark your calendars for our annual workshop in Moab this year.

We have open spots for new coordinators in the counties listed below. Before the workshop is the perfect time to join our EMSC team. We are looking for EMTs, Paramedics, RNs, or MDs living or working in those counties. The job is mostly voluntary but we do compensate for teaching and we cover expenses for the workshop. Our Coordinators are EMSC's biggest asset, you will represent your county and help guide EMSC to meeting your individual pediatric needs. Check out the full position commitment and application at https://site.utah.gov/bemsp/wp-content/uploads/sites/34/2016/09/ut_emsc_coord_application.pdf

- | | | | |
|---------------|---------------|--------------|----------------|
| • Wasatch (1) | • Daggett (2) | • Beaver (1) | • Morgan (1) |
| • Summit (1) | • Millard (1) | • Piute (1) | • Garfield (1) |

Before the workshop is the perfect time to join our EMSC team

Happenings

June 8 & 9th, 2017 8a-5p

Davis Hospital and Medical Center is hosting a Pediatric Disaster Response and Emergency Preparedness class.

Utrain #1069306 www.utah.train.org

Contact:

Michelle Villegas

801-807-7635

mhvillegas@iasishealth.com



June 2017

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1 Project ECHO	2	3
4	5	6	7	8 Pediatric Disaster and Preparedness Class	9 PEPP Dixie →	10
11	12	13	14	15 TGR/PLE	16	17
18 Happy Father's Day!	19	20	21	22	23	24
25	26	27	28	29	30	

Pediatric Education Around the State

Pediatric Grand Rounds (PGR) are educational/CME offerings webcast weekly (Sept-May) you can watch live or archived presentations. It is geared towards hospital personnel. But watching live will qualify for BEMSP CME Access at <https://intermountainhealthcare.org/locations/primary-childrens-hospital/for-referring-physicians/pediatric-grand-rounds/>

Peds EMS Lecture Series (PEL) Free monthly pediatric CME/CEU presentations from Primary Children's Emergency Department Attending Physicians to Utah's EMS. Offered every 3rd Thursday 3:30pm. Contact Lynsey.Cooper@imail.org for more info

June 15th Fever West Valley Fire Department, Station 73 (2834 S 2700 W)

Trauma Grand Rounds (TGR) This free offering alternates with EMS Grand Rounds every other month, it is geared towards hospital personnel.

June 15th Reversal of Anticoagulants in Trauma Dr. Jason Young

There are 3 ways to participate

- Attend in person 0700-0800 Classroom A SOM University Hospital.

- Attend live via the internet at : <http://utn.org/live/trauma/> To receive CME for viewing via live stream, please send an email with your name and the presentation you viewed to zachery.robinson@hsc.utah.edu. A CME certificate will be emailed to you within two weeks.

- View the archived presentation two weeks after the live date. at www.healthcare.utah.edu/trauma

Project ECHO Burn and Soft Tissue Injury (ECHO) has a pediatric and adult component. CME/CEU and MD CME available <https://crisisstandardsofcare.utah.edu> click request access and follow instructions.

June 1st 1600 MST Traumatic Arrest Toby Ennis MD

Upcoming Peds Classes, 2017

For PEPP and PALS classes throughout the state contact Andy Ostler Aostler@utah.gov

For PALS and ENPC classes in Filmore, Delta and MVH contact Kris Shields at shields57@gmail.com

Save the Date

June 8 & 9 Pediatric Disaster Response and Emergency Preparedness class hosted by Davis Hospital contact mhvillegas@iasishealth.com

Emergency Medical Services for Children

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Follow us on the web
<http://health.utah.gov/ems/emsc/>
and on Twitter: EMSCUtah

The Emergency Medical Services for Children (EMSC) Program aims to ensure that emergency medical care for the ill and injured child or adolescent is well integrated into an emergency medical service system. We work to ensure that the system is backed by optimal resources and that the entire spectrum of emergency services (prevention, acute care, and rehabilitation) is provided to children and adolescents, no matter where they live, attend school or travel.

Bring on the Summer!

