To Resuscitate Or Not to Resuscitate?
Pediatric Edition

You pull up on scene of a rollover to transport a trauma victim or you are standing in the ER waiting for the ambulance to bring in the trauma victim. One of the first things you might be thinking is, "I need two large bore IVs with warmed fluids running wide open!" If this sounds familiar.....it should! This is what we talked about last month! Let's take a different spin on this scenario though. Now your trauma victim is a child. Does this change your approach to fluid management?

Some basic thoughts

- According to PALS, "*There is insufficient evidence to make a recommendation about the best timing or the extent of volume resuscitation for children with hemorrhagic shock following trauma.*"
- Many pediatric patients further deteriorate due to delays in obtaining vascular access (think IO in difficult vascular access scenarios).
- However, we do know that blood pressure is very important with pediatric patients
    - Hypotension is a LATE sign in pediatric shock.
    - Kids can lose up to 1/3 of their blood volume before there is a significant decrease in blood pressure.
    - Children maintain blood pressure by increasing heart rate and vasoconstriction even with a significant volume loss.

PEDIATRIC HYPOTENSION = PRE-ARREST STATE

Pediatric shock criteria—any three of the following criteria **OR** hypotension + one additional criteria

- Capillary refill greater than three seconds
- Decreased mental status, irritable, confused
- Decreased pulses
- Cool, mottled, or flushed skin
- Heart rate above normal limit for age
- Respiratory rate above normal limit for age
- Systolic blood pressure below normal limit for age

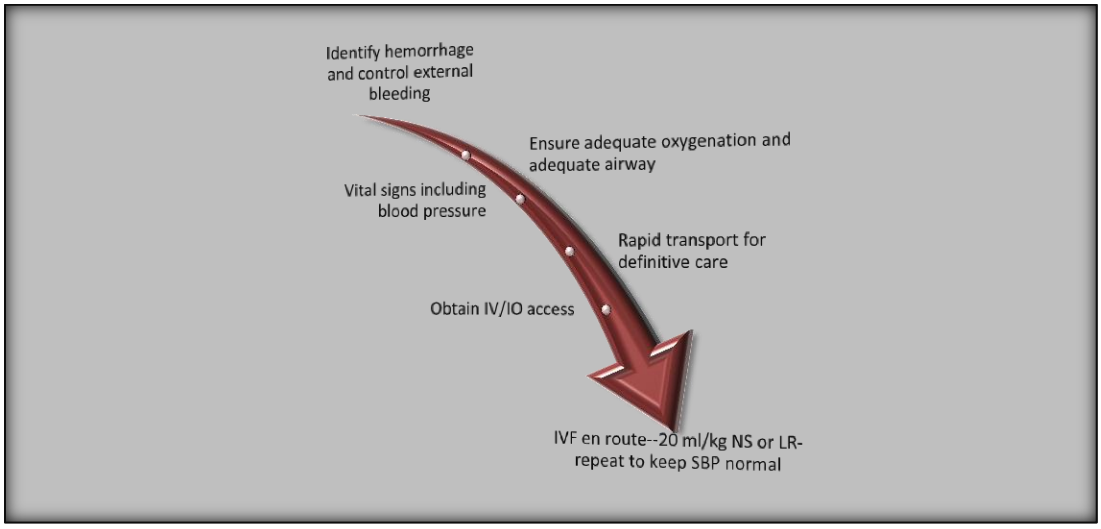
Treatment

- Pre-hospital—20 ml/kg bolus of crystalloid fluids (normal saline or lactated ringers)
- ER treatment—after the initial crystalloid bolus
    - Blood products if available—1:1:1 ratio—repeat if needed
        - PRBCs—10 ml/kg
        - Platelets—10 ml/kg
        - FFP—10 ml/kg
    - If blood is not available—repeat the 20 ml/kg crystalloid boluses

(continued)

For more information: https://health.utah.gov/ems/trauma/fluid_resuscitation.pdf

Pediatric fluid management



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PALS

Vital Signs in Children

Heart Rate (per minute)

Age	Awake Rate	Sleeping Rate
Newborn to 3 months	85 to 205	80 to 160
3 months to 2 years	100 to 190	75 to 160
2 to 10 years	60 to 140	60 to 90
>10 years	60 to 100	50 to 90

Respiratory Rate (breaths/min)*

Age	Rate
Infant	30 to 60
Toddler	24 to 40
Preschooler	22 to 34
School-aged child	18 to 30
Adolescent	12 to 16

Definition of Hypotension by Systolic Blood Pressure and Age

Age	Systolic Blood Pressure (mm Hg)
Term neonates (0 to 28 days)	<60
Infants (1 to 12 months)	<70
Children 1 to 10 years (5th BP percentile)	<70 + (age in years × 2)
Children >10 years	<90

Modified Glasgow Coma Scale for Infants and Children†

	Child	Infant	Score
Eye opening	Spontaneous	Spontaneous	4
	To speech	To speech	3
	To pain	To pain	2
	None	None	1
Best verbal response	Oriented, appropriate	Coos and babbles	5
	Confused	Irritable, cries	4
	Inappropriate words	Cries in response to pain	3
	Incomprehensible sounds	Moans in response to pain	2
	None	None	1
Best motor response‡	Obeys commands	Moves spontaneously and purposely	6
	Localizes painful stimulus	Withdraws in response to touch	5
	Withdraws in response to pain	Withdraws in response to pain	4
	Flexion in response to pain	Abnormal flexion posture to pain	3
	Extension in response to pain	Abnormal extension posture to pain	2
	None	None	1

*Reproduced from Hazinski MF. Children are different. In: *Manual of Pediatric Critical Care*. 1999:1-13. From Hazinski MF. Children are different. In: *Nursing Care of the Critically Ill Child*. 2nd ed. 1992:1-17. Both © Elsevier.
†Modified from Davis RJ et al. Head and spinal cord injury. In: Rogers MC, ed. *Textbook of Pediatric Intensive Care*. 1987:649-699, © Lippincott Williams & Wilkins; James HE, Trauner DA. The Glasgow Coma Scale. In: James HE et al, eds. *Brain Insults in Infants and Children*. 1985:179-182; and Hazinski MF. Neurologic disorders. In: *Nursing Care of the Critically Ill Child*. 2nd ed. 1992:521-628, © Elsevier.
‡If the patient is intubated, unconscious, or preverbal, the most important part of this scale is motor response. Providers should carefully evaluate this component.

90-1053 10/11 ISBN 978-1-61669-110-3 Printed in the USA