Fireside Chat about Abnormal Vital Signs

Session 1: 11- February 2019

Hosted by Dr. Madeline Joseph & Sally Snow

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Pediatric Readiness Quality Collaborative
Ensuring Emergency Care for All Children

HRSA
Maternal & Child Health

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Why Is it Important to Detect Abnormal Vital Signs?

- **At Triage:**
  - ✓ To ensure timely recognition of patients with potential or established critical illness: “Early recognition of sick children”
  - ✓ To ensure a timely and appropriate response from skilled staff.
- **Repeated Vital Signs:**
  - ✓ Early and timely detection and response to clinical deterioration in children.

Tricks on Obtaining Vital Signs in Children

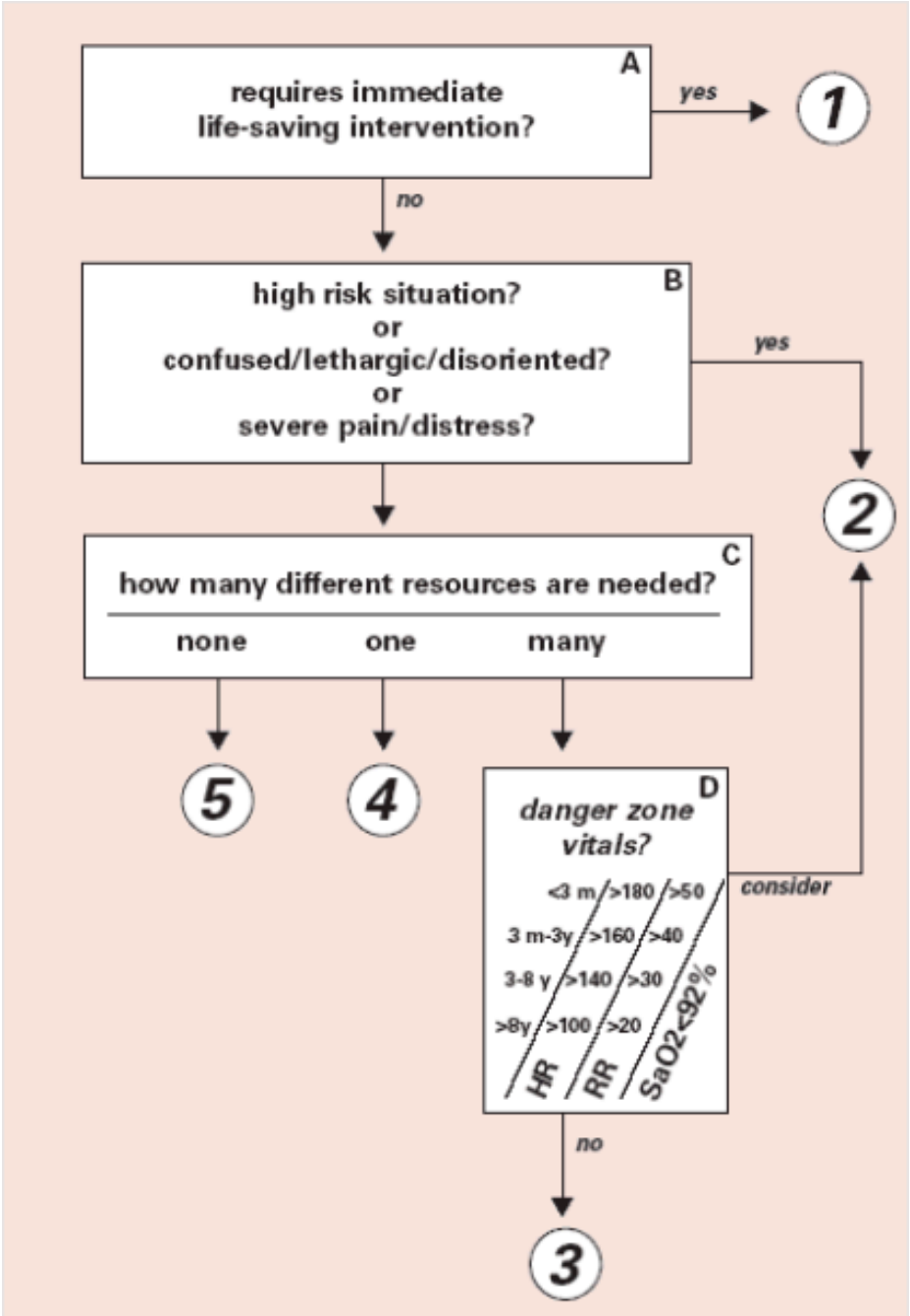
- Take a deep breath yourself: children can feel your agitation
- Involve the caregivers in the process to calm the child
- Use pulse oximetry to measure heart rate (children could forget the probe)
- Use distraction tools/technology: parent cell phone, bubbles, your badge (children love pictures). Child Life Specialist can help!!
- Triage in the exam room if possible: less noisy

Example:

The Emergency Severity Index (ESI) ED Triage Algorithm

ESI is a 5 –level triage algorithm that provides clinically relevant stratification of patients into 5 groups from 1 (most urgent) to 5 (least urgent) on the basis of acuity and resource needs.

The algorithm/DVD set and implementation handbook may be incorporated into additional training materials developed by a user, on the condition that no fee is charged.



Consideration for *Pediatric* Fever

- **1-28 days of age**: Assign at least ESI-2 if temperature >38C (100.4 F)
- **1-3 months of age**: Consider assigning ESI-2 for temperature > 38C (100.4 F)
- **3 months- 3 years of age**: Consider assigning ESI-3 for temperature > 39 C (102.2), or incorporate immunizations, or no obvious source of fever
- Rectal temperature is more accurate in infants

Consideration for *Pediatric* Respiratory Rate

- Count for 60 seconds in young children to account for “periodic breathing” to avoid inaccurate RR.
- What cause high RR commonly in children?
  - Fever: RR increase can on an average of 7-11 breaths/min per min per Celsius elevation in temperature.
  - Dehydration
  - URI/Bronchiolitis: Suction, suction, suction
  - Acidosis: DKA, overdose, etc.
  - Hyperventilation

Consideration for *Pediatric* Heart Rate

- Age
- Activity level (150 HR could be normal in a 2 year old running in the room but abnormal for a 10 year old who is laying down)
- Fever
- Crying
- Pain/agitation
- Dehydration
- Shock (septic, cardiogenic, or hemorrhagic): compensated and decompensated
- Others: common meds such as cold preparation, nebs, etc.)
-

Heart Rate and Fever

Abnormal pulse beyond temperature correction: Five beats/1°F above 100°F

Hanna CM, Greenes DS. How much tachycardia in infants can be attributed to fever? Ann Emerg Med. 2004;43(6):699 –705

Blood Pressure - Why Should we Measure it in Children?

- **Normal versus high blood pressure**: In children, the normal range for blood pressure is determined by the child's gender, age, and height. It is expressed as a percentile, similar to charts used to track children's growth.

- **Normal blood pressure** — Both systolic and diastolic blood pressure <90th percentile.

- **Elevated blood pressure** — Systolic and/or diastolic blood pressure ≥90th percentile but <95th percentile or if blood pressure exceeds 120/80 mmHg (even if <90th percentile for age, gender, and height).

- **Hypertension** — Hypertension is defined as either systolic and/or diastolic blood pressure ≥95th percentile measured on three or more separate occasions, or if blood pressure exceeds 130/80 mmHg

Blood Pressure - Why Should we Measure it in Children?

- High blood pressure in children is almost always asymptomatic—that is, without any symptoms or noticeable discomfort.
- Could be a red flag from heart or kidney disease.
- By age 7, more than 50% of hypertension is due to obesity; this rises to 85-95% by the teenage years.
- Of course to distinguish compensated from uncompensated shock.

Abnormal Vital Signs - Speak the Adult ED language - Addressing Septic Shock in *Children*

- Our first priority is to improve shock recognition, specifically by identifying patients with abnormal vital signs.

- We needed to create a system that would minimize variation in ED provider experience and the fluctuations in ED patient arrivals that contributed to delayed recognition of abnormal vital signs.

Example- Septic Shock Recognition *in Children*

CRUZ et al.- PEDIATRICS 2011

TABLE 1 Triage Algorithm

Characteristic	Criteria	
Temperature abnormality	≥100.4°F/38°C[a]	≤96°F/35.5°C[a]
High-risk patient (any of the conditions listed)	Malignancy	Solid-organ transplant
	Bone marrow transplant	Central venous catheter
	Asplenia	Immunodeficiency
and		
Abnormal pulse beyond temperature correction[b]	—	—
and/or		
Abnormal mental status or capillary refill time of >3 s	—	—
or[c]		
Patient in shock without meeting criteria listed above	—	—

[a] Fever or hypothermia may have been documented at home or in the ED.

[b] Five beats/1°F above 100°F.

[c] This category requires no vital-sign or risk-factor criterion.

Septic Shock Recognition *in Children- Does Matter!*

CRUZ et al.- PEDIATRICS 2011

- When compared with children seen before the protocol, time from triage to first bolus decreased from a median of 56 to 22 minutes ($P < .001$) and triage to first antibiotics decreased from a median of 130 to 38 minutes ($P < .001$).

- It all starts with Early Recognition (Abnormal vital signs/sick or not sick)!

Key to Success in Developing *Protocols*

- Recognition of a need for improvement by all stakeholders.
- Engagement and recognition of the importance of care of septic pediatric patients by hospital administration and staff as an improvement opportunity.
- Collaboration, flexibility in responding to feedback, and a culture receptive to change: frontline workers should be given the opportunity to make the necessary changes to facilitate flow and dismantle barriers.

Reminder – PRQC Quality Measures

- Presence of a written procedure/guideline that defines a standard set of vital signs for pediatric patients
- Percentage of pediatric patients presenting to the emergency department that have a standard set of vital signs collected
- Percentage of pediatric patients with abnormal vital signs that are included in the notification process
- Percentage of pediatric patients presenting to the emergency department that have a pain assessment at triage
- Median time from recognition of abnormal vital signs/pain to first intervention (Optional Measure)

Policy/Guidelines for Abnormal Vital Signs in *Children*

- Identified a standard for normal vital signs ranges (i.e., age or weight-based): 1 - PALS / 2 - PEWS / 3-APLS / 4 - Harriet Lane / 5 - Site Specific / 6 – Other

- Indicate standard for normal vital signs ranges

- Notification of abnormal vital signs

Recommended Strategies

- Written procedures/guidelines for pediatric vital signs: A standard set of vital signs consists of temp, HR, RR, pulse oximetry, BP, pain, and mental status (when indicated). Pediatric patients' weight should be documented in kg in the medical record. LOCK THE SCALE!

- Recommendations for the communication of clinical concerns based of abnormal vital signs (i.e., notification process). The process for documenting the escalation of care should be noted in the guideline.

- Consider adopting standing orders that can be used by nurses (comfort measures and medications).

Recommended Strategies - Education

- Develop a training/educational program for care team to emphasize:
  - ✓ Importance of collecting standard set of vital signs for pediatric patients
  - ✓ Importance of early recognition of abnormal vital signs;
  - ✓ Components of the site-specific vital signs guidelines/procedures
  - ✓ Identify training delivery modality (e.g., hospital's learning management system (Health Stream), PowerPoint slides presented during staff meetings, just-in time education; peer-to-peer)
- Host a PALS training session for the ED care team and/or ENPC for nurses
- Host brown-bag sessions or case reviews of pediatric patients periodically to highlight opportunities for improvement in the early recognition and escalation of care

Knowledge Reinforcement for Care Team

- Table top exercise to recognize patients with abnormal vital signs

- Posters in triage area with normal vital ranges
  Posters with scoring tool of abnormal vital signs
  Pocket cards/badge cards for care team with normal vital ranges

- Direct feedback to care team following chart audits

Thank You for What you Do!

Any Questions?

Upcoming Fireside Chats

February 12 at 11am

Disaster Planning

February 19 at 12pm

Weight in Kilograms