MET by Chance? Adapting Existing METs for Pediatric Patients

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Learning Objectives

Recognize

Recognize the early signs and symptoms of children at high risk for clinical deterioration and when to seek assistance

Improve

Improve knowledge surrounding the management of common pediatric-specific conditions that require MET support

Adapt

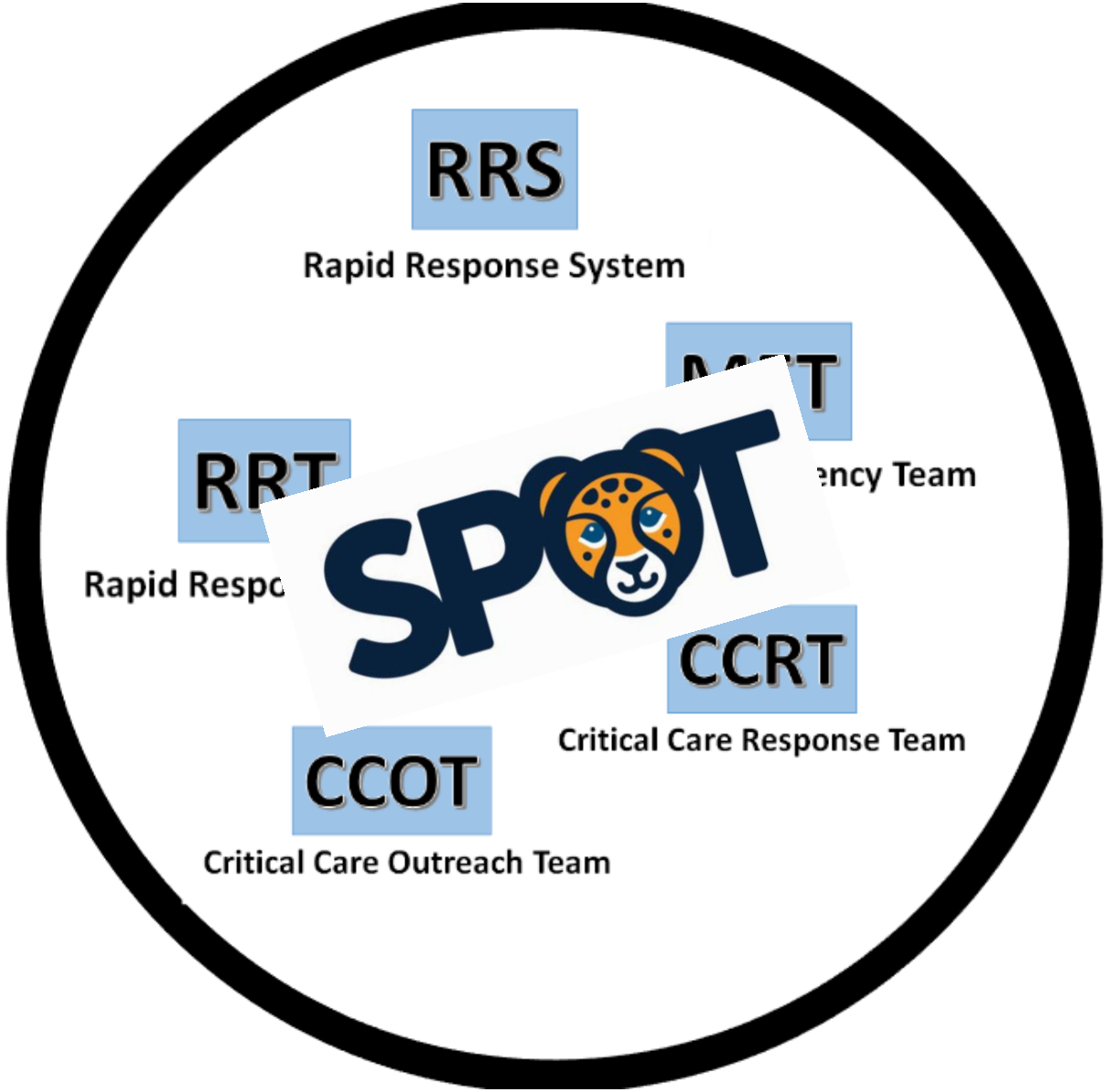
Identify ways to adapt existing MET infrastructure to deliver effective care to high-risk and clinically deteriorating pediatric patients

Ask the Audience

TERTIARY CARE CENTRE VS REGIONAL/COMMUNITY HOSPITAL?

PEDIATRIC CENTRE? PEDIATRIC PATIENTS?

MEDICAL EMERGENCY TEAM / RAPID RESPONSE TEAM?


RRS
Rapid Response System
RRT
Rapid Respo
ency Team
SPOT
CCRT
Critical Care Response Team
CCOT
Critical Care Outreach Team

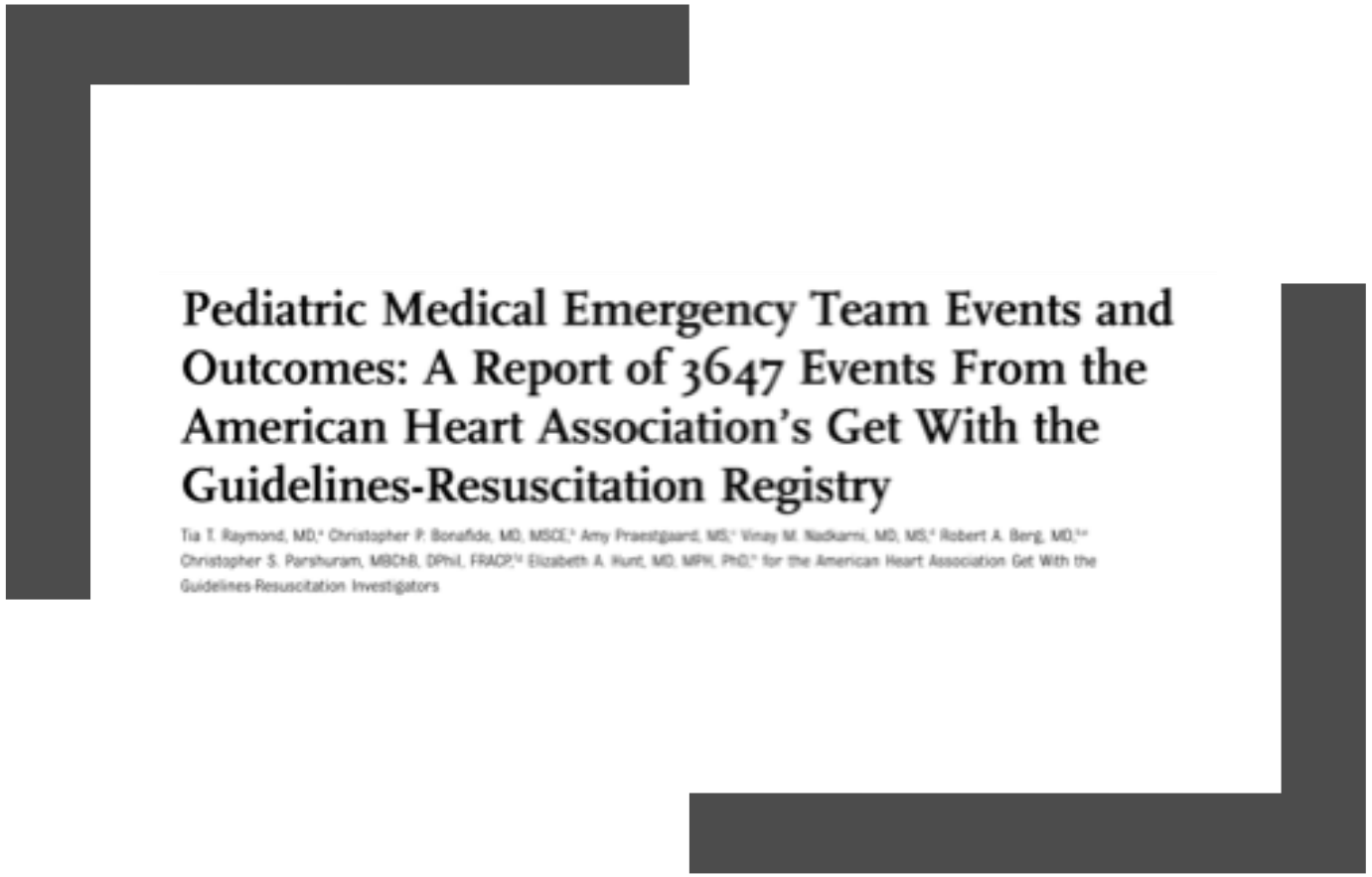
Medical Emergency Teams

1. Hospitalized patients can physiologically deteriorate to the point where there is an imminent risk of serious harm

2. These events require urgent access to critical care resources (e.g., knowledge, skills, equipment, personnel)

3. Early recognition and "critical care" interventions can improve outcomes

Who deteriorates?



Pediatric Medical Emergency Team Events and Outcomes: A Report of 3647 Events From the American Heart Association's Get With the Guidelines-Resuscitation Registry

Tia T. Raymond, MD;* Christopher P. Bonafide, MD, MSCE;* Amy Praestgaard, MS;* Vinay M. Nadkarni, MD, MS;* Robert A. Berg, MD;*† Christopher S. Parshuram, MBChB, DPhil, FRACP;*‡ Elizabeth A. Hunt, MD, MPH, PhD;* for the American Heart Association Get With the Guidelines-Resuscitation Investigators

- described the clinical characteristics and outcomes of 3647 MET activations from 151 US hospitals between January 2006 to February 2012
- 84% ward; 16% telemetry / step-down units
- median age 3.0 years (IQR 0.0-11.0); 54% male
- median call duration 29 minutes (IQR 18-49)
- 53% transferred to PICU

TABLE 1 MET Activation Triggers From Hospitals Contributing to the GWTG-R

Trigger	Frequency[a] (*n*)	Frequency (%)
Respiratory		
Decreased oxygen saturation	1151	31.9
New onset of difficulty breathing	938	26.0
Tachypnea	839	23.2
Respiratory depression	437	12.2
Bleeding into airway	18	0.5
Cardiovascular		
Tachycardia	643	17.8
Hypotension	286	7.9
Bradycardia	138	3.8
Symptomatic hypertension with end organ signs/symptoms	13	0.4
Neurologic		
Mental status change	585	16.2
Seizure	504	14.0
Acute loss of consciousness	132	3.7
Suspected acute stroke	8	0.2
Unexplained agitation or delirium	33	0.9
Staff member acutely worried about patient	859	23.8
Uncontrolled bleeding	36	1.0
Chest pain unresponsive to nitroglycerine	20	0.6
>1 stat page required to summon regular team for acute problem	19	0.5
Acute decrease in urine output	14	0.4
Other	645	17.9
Unknown/not documented	33	0.9

[a] Data obtained from 3614 events.

TABLE 2 Categories of MET Interventions and Relative Proportions of Overall Use

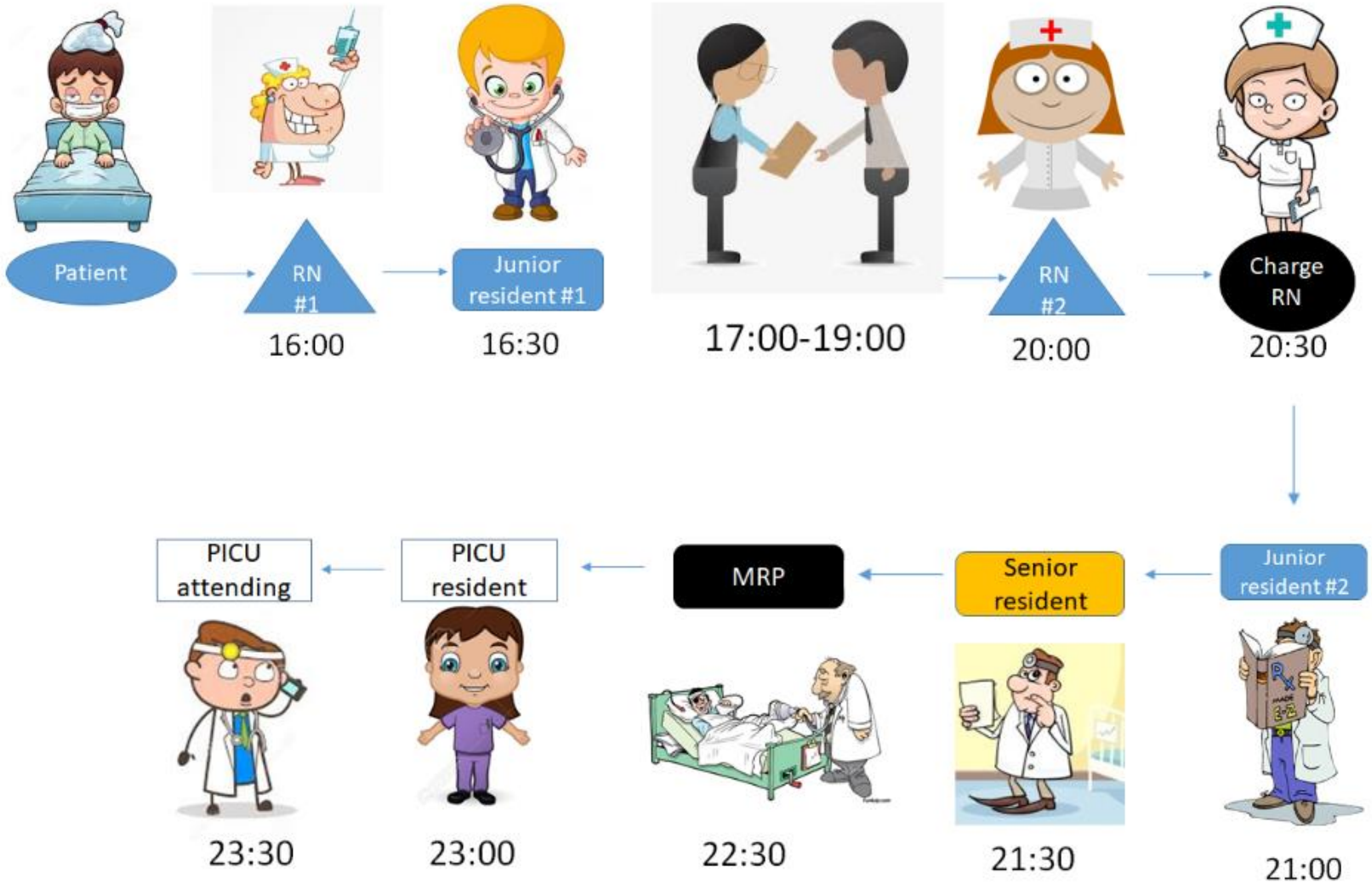
Assessment/Examination	*n*	%	Ward-Level Intervention	*n*	%	Critical Care–Level Intervention	*n*	%
Apnea/bradycardia monitor, ECG, NIBP, pulse oximeter, ECHO, chest x-ray, EEG, head CT, lactate, ultrasound	2625	72.1	Airway: suctioning	581	16.0	Airway: oral/nasal airway, laryngeal mask, endotracheal tube, tracheostomy care/replacement, bronchoscopy	184	5.0
			Breathing: oxygen via mask/nasal prongs	2206	60.6	Breathing: noninvasive positive pressure ventilation, bag-and-mask hand ventilation, invasive positive pressure ventilation	407	11.2
			Circulation: peripherally inserted IV cannula, IV fluid bolus	1608	44.2	Circulation: CPR, defibrillation, cardioversion, CVL insertion, arterial line insertion, intraosseous insertion, pacemaker, administration of blood products	271	7.4
			Drugs: IV diuretic, IV glucose, bronchodilators via nebulizer, IV anticonvulsants, aspirin, low molecular weight heparin, IV insulin/glucose	939	25.8	IV drugs: sedatives, anesthetic agents, antiarrythmics, inotropes/vasopressors, atropine, calcium, mannitol, nitroglycerin, sodium bicarbonate, thrombolytic	208	5.7

CPR, cardiopulmonary resuscitation; CT, computed tomography; ECG, electrocardiogram; ECHO, echocardiogram; NIBP, noninvasive blood pressure.

TABLE 3 MET Nonpharmacologic Interventions From Hospitals Contributing to the GWTG-R Registry

Nonpharmacologic Interventions	Frequency	
	n	%
Respiratory management		
Supplemental oxygen	2206	60.6
Suctioning	581	16.0
Noninvasive ventilation	407	11.2
Bag-valve mask	206	5.7
Elective intubation for airway protection	52	1.4
Mechanical ventilation (includes BIPAP/CPAP)	92	2.5
Mask CPAP/BIPAP	89	2.5
Endotracheal tube	71	2.0
Nasal airway	46	1.3
Tracheostomy care/replacement	42	1.2
Oral airway	10	0.3
Hyperventilation	3	0.1
Monitoring		
Pulse oximetry	2145	58.9
ECG	1533	42.1
Noninvasive blood pressure	1434	39.4
Apnea/bradycardia	238	6.5
12-lead ECG	222	6.1
Venous access		
Peripheral vein	1161	31.9
Central vein	190	5.2
Intraosseous	9	0.3

Before we MET



Now that we MET

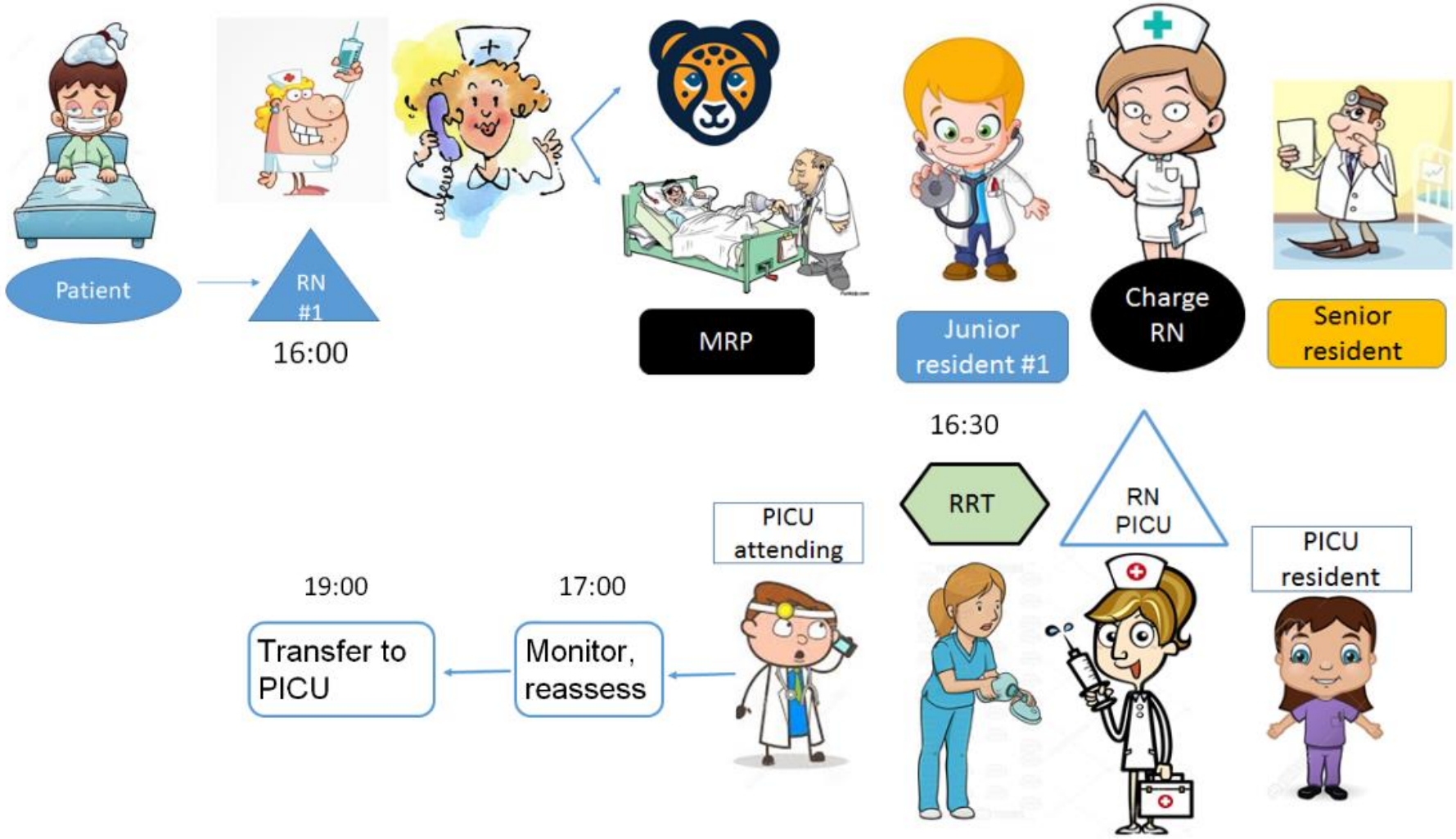


Table 1. Comparison between a Traditional Code Team and a Rapid-Response Team.*

Feature	Traditional Code Team	Rapid-Response Team
Typical criteria for calling the team	No recordable pulse, no recordable blood pressure, absence of respiratory effort, unresponsive	Low blood pressure, rapid heart rate, respiratory distress, altered consciousness
Typical conditions that the team assesses and treats	Cardiac arrest, respiratory arrest, airway obstruction	Sepsis, pulmonary edema, arrhythmias, respiratory failure
Typical team composition	Anesthesia fellow, ICU fellow, internal-medicine house staff, ICU nurse	ICU fellow, ICU nurse, respiratory therapist, internal-medicine house staff
Typical call rate (no./1000 admissions)	0.5–5	20–40
Typical in-hospital mortality (%)	70–90	0–20

Reactive

Proactive

- goal: assess a greater number of patients at an earlier stage of clinical deterioration, with the aim of preventing serious adverse events

POSITION STATEMENT

Rapid response systems for paediatrics: Suggestions for optimal organization and training

RECOMMENDATIONS

For rapid response systems (RRSs):

Hospitals caring for paediatric in-patients should develop and implement a RRS. Implementation should include:

- Standards for vital signs monitoring
- Calling criteria or early warning scores
- A planned response arm
- A quality monitoring process and administrative arm
- Education on the early detection and management of deteriorating patients for front-line health care providers.

For rapid response teams (RRTs):

- Hospitals caring for paediatric in-patients should implement and train RRTs with expertise in paediatrics. The composition, structure and functions of the team should be adapted based on resource availability and tailored to facility needs.
- Special attention should be paid to the following details of implementation:
  - Composition (skills and disciplines) and member availability
  - Calling criteria
  - Awareness of and interface with hospital staff
  - Methods of activation
- Education should include simulation-based team training where resources are available. Partnering with other institutions on educational programs can help secure institutional commitment and support.

Table 1.

Benefits of RRS and RRT implementation in paediatrics

ɔe	Results
	RRT implementation associated with reducing hospital-wide mortality rate and code rate outside the paediatric ICU setting Also, the mean monthly mortality rate decreased by 18% and the mean monthly code rate per 1000 admissions decreased by 71.7%
	RRT implementation associated with reducing risk of respiratory and cardiopulmonary arrests outside critical care areas in a large, tertiary care children's hospital
	36% decreased incidence of both cardiac and respiratory arrests after RRT implementation
	73% decreased incidence of respiratory arrests after RRT implementation
	RRT implementation associated with reducing total hospital deaths and increasing survival after cardiac arrests on the wards
	RRS implementation associated with decreasing rate of PICU mortality after readmission
	RRS implementation associated with a significant downward change in the pre-intervention trajectory of critical deterioration and a 62% net decrease relative to the pre-intervention trend

Paediatric RRTs belong in tertiary care, paediatric hospitals

Kristina Krmpotic, MD MSc ✉, Jennifer Foster, MD

Paediatrics & Child Health, pxz041, https://doi.org/10.1093/pch/pxz041
Published: 02 April 2019

The evidence for RRS / RRTs come from studies conducted in academic, tertiary care, paediatric hospitals with:

1. Large volumes of paediatric patients

2. The ability to urgently transfer the patient to a paediatric intensive care unit within the same facility

3. RRTs comprised of paediatric critical care-trained professionals

IWK Health Centre

nova scotia health authority

When you've MET a child

Case

2 month old presents in ED with 3 day history of tachypnea, increased secretions. Admitted to medical ward.

Interview/History

- Previously well
- Ex-33 weeker, spent several weeks in NICU
- No cough, mother reports "breathing funny, chest looks off"
- Decreased appetite, decreased voiding
- Siblings of daycare age, snotty

Case

You're called because the bedside nurse feels that "the child looks worse", more tired, not crying

- Vitals:
  - HR: 170's
  - RR: 80-110's
  - BP: 74/55
  - Temp: 38.7C
  - SpO2: 94 on RA

- Respiratory Assessment
  - Moderate inter/sub costal retractions
  - Forced expiratory phase
  - Nasal Flaring
  - Grunting/Moaning
  - O/A: B/S quiet + CBS T/O

- Labs
  - Cap: 722/72/-1.3
  - WBC: 16
  - Lactate: 0.3

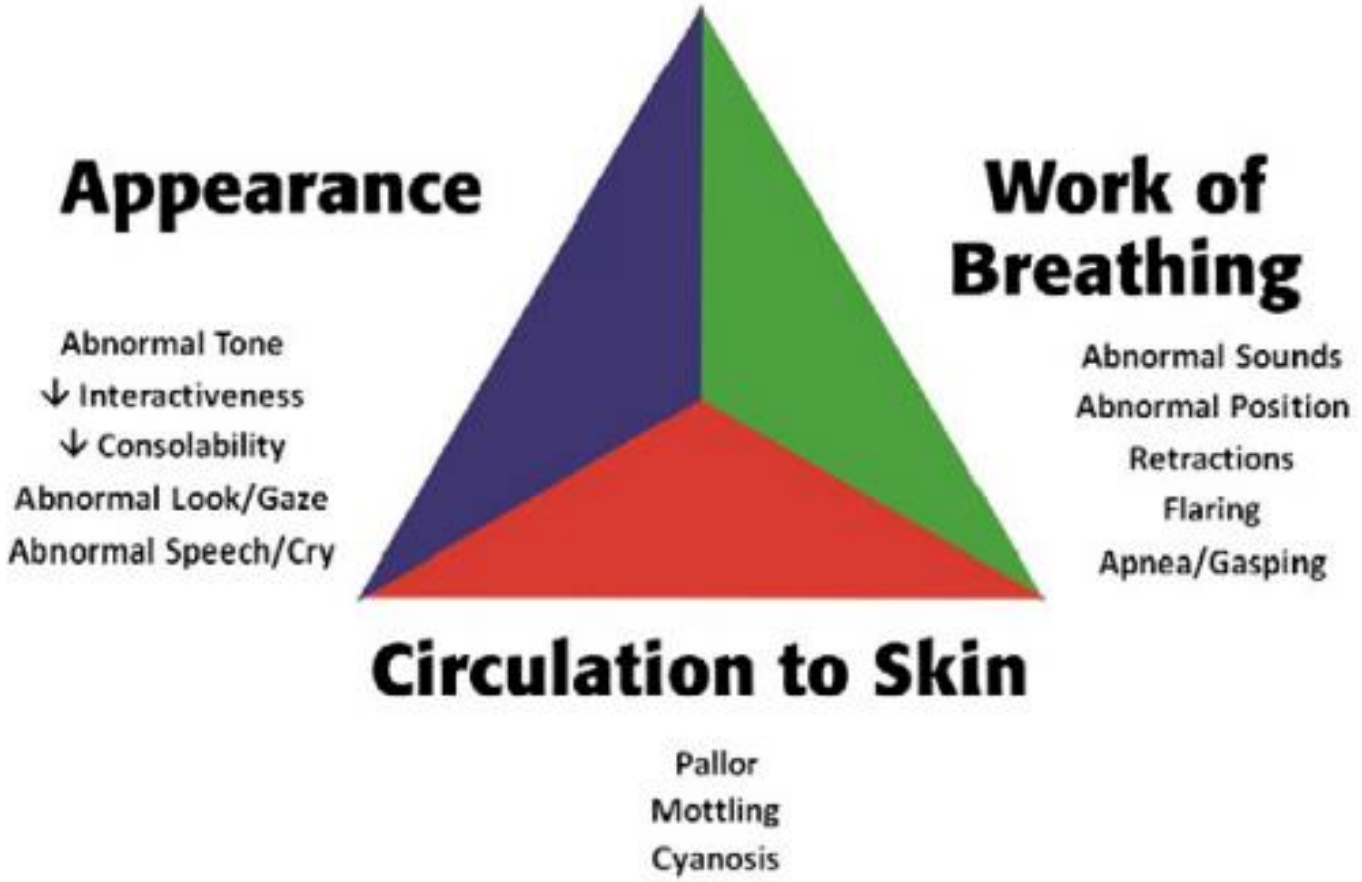
Is this child deteriorating?

Does this child need escalation of care, or should we stay the course?

Recognizing Risk

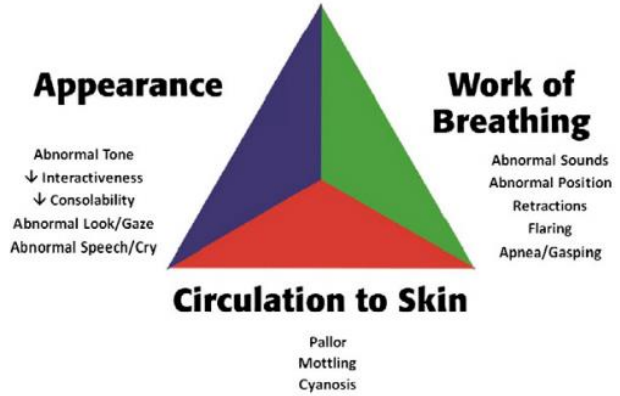
- A rapid response team is only effective when people know what warning signs to look for
- Risk mitigation
  - Is it responsible to escalate care in this situation; is it irresponsible to wait it out
- Early Identification of Deterioration Risk
  - Pediatric Assessment Triangle
  - Early Warning Systems

Pediatric Assessment Triangle



Pediatric Assessment Triangle

Category	Appearance	WOB	Circulation
Stable	☺	☺	☺
Respiratory Distress	☺	☹	☺
Respiratory Failure	☹	☹	☺
Shock	☺/☹	☺	☹
CNS/Metabolic	☹	☺	☺
Cardiopulmonary Failure	☹	☹	☹



The Pediatric Assessment Triangle: Accuracy of Its Application by Nurses in the Triage of Children

Authors: Timothy Horeczko, MD, MSCR, Brianna Enriquez, MD, Nancy E. McGrath, MN, RN, CPNP-AC/PC, CEN, Marianne Gausche-Hill, MD, and Roger J. Lewis, MD, PhD, Torrance and Los Angeles, CA, Seattle, WA
Section Editors: Joyce Foresman-Capuzzi, RN, BSN, CEN, CTRN, CPN, CCRN, SANE-A, EMT-P, Michelle Tracy, RN, MA, CEN, CPN, and Sue M. Cadwell, RN, MSN

TABLE 5
Inter-rater reliability of chart review for components of Pediatric Assessment Triangle and category of pathophysiology (N = 38; 3 raters)

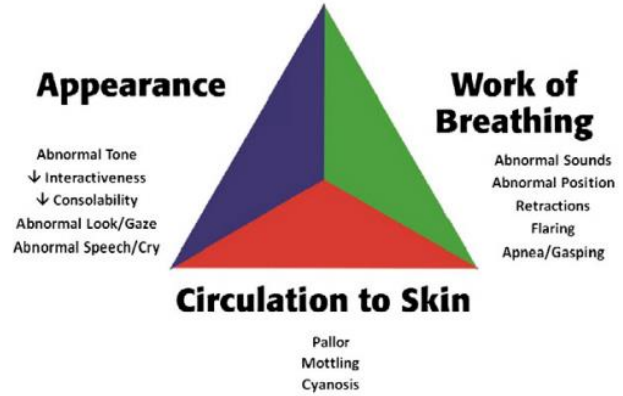
	κ[a]	95% CI	*P* value
Component			
Appearance	0.70	0.51 to 0.88	<.001
Work of breathing	0.24	0 to 0.48	0.01
Circulation to skin	0.32	0 to 0.49	<.001
Category of pathophysiology			
Stable	0.70	0.51 to 0.88	<.001
Respiratory distress	0.16	0 to 0.49	0.08
Respiratory failure	0.74	0 to 1.00	<.001
Shock	0.32	0 to 0.49	<.001
Central nervous system/metabolic disturbance	0.68	0.51 to 0.88	<.001
Cardiopulmonary failure	N/A[b]	N/A	N/A

[a]Fleiss' κ coefficient: <0.00 poor; 0.00-0.20 slight; 0.21-0.40 fair; 0.41-0.60 moderate; 0.61-0.80 substantial; 0.81-1.00 almost perfect.[4]
[b]N/A because of the rarity of the condition and limits of statistical calculation.

TABLE 4
Likelihood ratio performance for Pediatric Assessment Triangle–defined category of illness

	N	Positive LR (LR+)	95% CI	Negative LR (LR–)	95% CI
Instability	58	1.2	1.2-1.3	0.12[b]	0.06-0.25
Respiratory distress	290	4.0[a]	3.1-4.8	0.11[b]	0.078-0.17
Respiratory failure	14	12.0[a]	3.7-36.7	0.80[c]	0.55-1.06
Shock	109	4.2[a]	3.1-5.6	0.32[b]	0.17-0.60
CNS/metabolic disturbance	49	7.0[a]	4.3-11.4	0.58	0.43-0.78
Cardiopulmonary failure	11	49.1[c]	20.2-120.0	0.25[c]	0.046-1.39

CI, Confidence interval; *CNS*, central nervous system; *LR*, likelihood ratio.
[a]Meets LR+ 95% confidence threshold criterion (LR+ min ≥ 2.8).
[b]Meets LR– 95% confidence threshold criterion (LR– max ≤ 0.4).
[c]Does not meet sample size requirement.



- Children deemed stable by initial PAT were nearly 10 times more likely to be stable on further assessment
- Readily and reliably identifies high acuity pediatric patients, and highly predictive of clinical status on further investigation

Early Warning Scores

Predictive tools which detect risk for clinical deterioration in patients

Prompt the necessary steps to intervene

Symptoms of clinical deterioration often **present 6-12 hours prior to arrest**

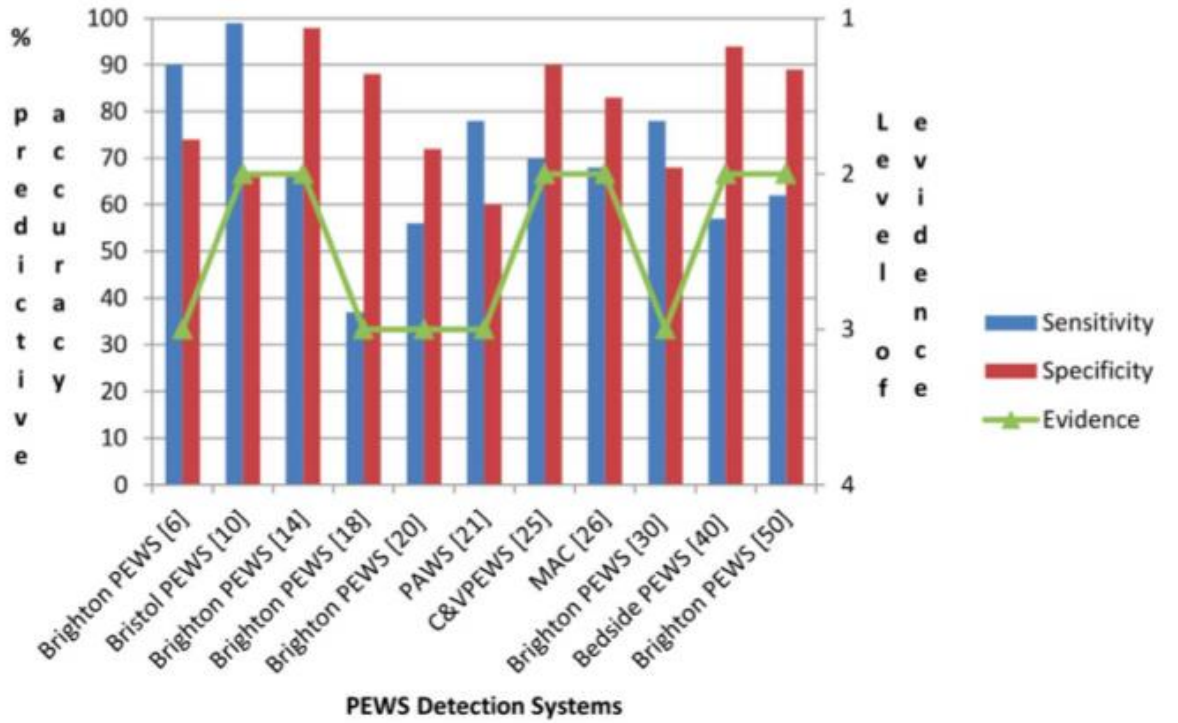
Nearly 2/3 arrests considered **preventable**

Recognizing Deterioration

BMJ Open Paediatric early warning systems for detecting and responding to clinical deterioration in children: a systematic review

Veronica Lambert,[1] Anne Matthews,[1] Rachel MacDonell,[2] John Fitzsimons[3]

Figure 2 Diagnostic predictive accuracy of paediatric early warning detection systems.



CHEWS

Early Warning Score

Newly Implemented at IWK Health Center

CHEWS Scoring Assessment

	0	1	2	3
Behaviour/Neuro	• Playing/Sleeping Appropriately • Alert, at patient's baseline	• Sleepy, Somnolent when not disturbed	• Irritable, difficult to console • Increase in patient's baseline seizure activity	• Lethargic, confused, floppy • Reduced response to pain • Prolonged or frequent seizures • Pupils asymmetric or sluggish
Cardiovascular	• Skin tone appropriate for patient • Capillary refill ≤ 2 seconds	• Pale • Capillary refill 3-4 seconds • Mild*Tachycardia • Intermittent ectopy or irregular HR(not new)	• Grey • Capillary refill 4-5 seconds • Moderate* Tachycardia	• Grey and mottled • Capillary refill >5 seconds • Severe*Tachycardia • New onset bradycardia • New onset/increase in ectopy, irregular HR or heart block
Respiratory	• Within normal parameters • No retractions	• Mild*Tachypnea/increased WOB (flaring, retracting) • Up to 40% supplemental oxygen • Up to 1L NC > patient's baseline need • Mild* desaturations < patient's baseline • Intermittent apnea self-resolving	• Moderate* Tachypnea/ increased WOB (Flaring, retracting, grunting, use of accessory muscles) • 40-60% oxygen via mask • 1-2L NC > patient's baseline need • Nebs q1-2hr • Moderate* desaturations < patient's baseline • Apnea requiring repositioning or stimulation	• Severe*Tachypnea • RR < Normal for age • Severe increased WOB (i.e. head bobbing, paradoxical breathing) • >60% oxygen via mask • >2L NC >patient's baseline need • Nebs q30 minutes-1hr • Severe* desaturations < patient's baseline • Apnea requiring interventions other than repositioning or stimulation
Staff Concern		Concerned		
Family Concern		Concerned or Absent		

		MILD*	MODERATE*	SEVERE*
Respiratory Rate and Heart Rate	**Infant**	≥10%↑ for age	≥15%↑ for age	≥25%↑ for age
	Toddler and Older	≥10%↑ for age	≥25%↑ for age	≥50%↑ for age
Desaturation from patient's baseline O2 saturation	**All Ages**	5 points	10 points	15 points

Action to Take

CHEWS
Children's Hospital Early Warning Score

0 - 2 Green **Stable**	**3-4** Yellow **Decompensating**	**≥ 5** Red **Critical**
• Continue Routine Assessment	• Notify Team Lead* • Notify Resident • Increase frequency of vital signs/ CHEWS assessment (Minimum Hourly) • Resident or designate to assess at bedside • Discuss treatment plan with team • Consider higher level of care • Document interventions **Consider activating SPOT**	• **Activate SPOT** • **If score =3 on any domain Consider Code Blue** • Notify Team Lead* • Notify Attending Physician • Resident or Attending to assess at bedside • Discuss treatment plan with team • Increase frequency of vital signs/ CHEWS assessment • Place patient on cardiac monitor • Consider higher level of care • Document interventions

SPOT / CODE BLUE CAN BE ACTIVATED AT ANYTIME

*** If patient being cared for by LPN, should immediately collaborate with RN for assessment and monitoring**

So you've identified risk...

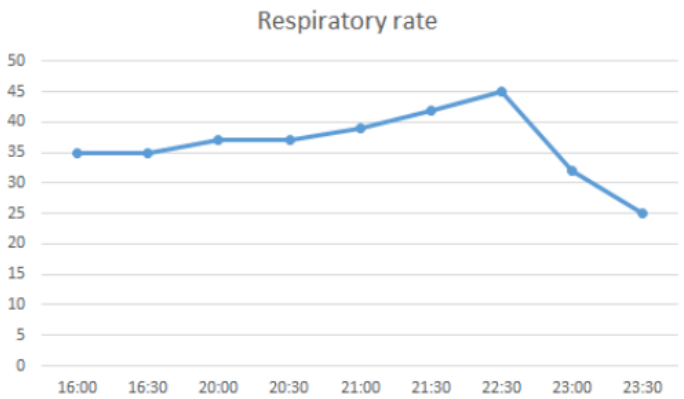
What next?

Risk Mitigation

How do we Assess and Optimize our A B C D's

- **Airway**
- **Breathing**
- Circulation
- Disability

Will discuss some of our common offenders


Respiratory rate
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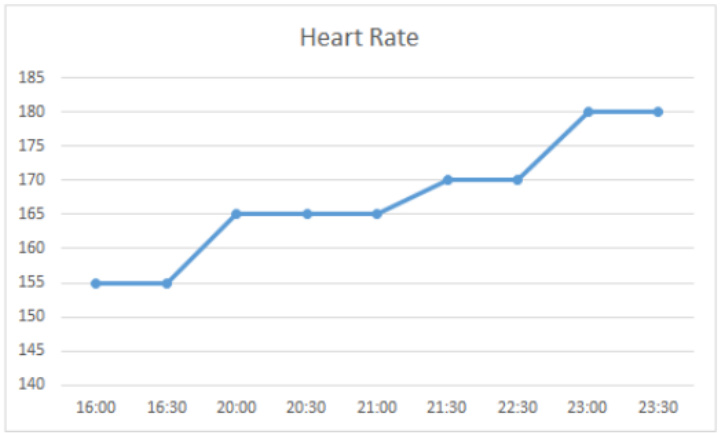
Heart Rate
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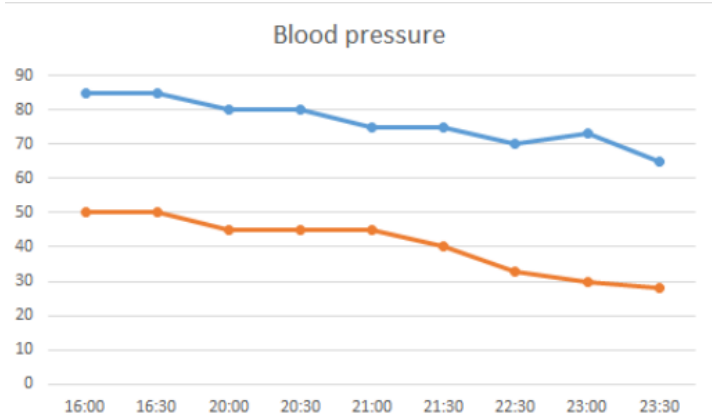
Blood pressure
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Airway/Breathing

Airway

- Stridor
- Obstruction – Partial vs. Full

Breathing

- Rate
- WOB
  - Flaring,
  - Subcostal/intercostal retraction,Indrawing
  - Moaning, Grunting

Breath Sounds

- Wheezes, crackles
- Expiratory, inspiratory, both

Airway/Breathing Support

- Optimizing Management
  - Repositioning
  - Suctioning (nasal, mouth)
  - Oxygen therapy
  - Chest Physio
  - Aerosols
  - HFNC
  - CPAP at bedside
  - Intubation and Ventilation

Lower respiratory tract infection during the first year of life

Leading reason for hospitalization for infants beyond neonatal period

Main Features:

Nasal Mucous

Persistent Cough

Tachypnea and/or Work of breathing

Wheeze and/or Crackles

Poor feeding

Typically reaches peak at day 5-7

Bronchiolitis

Management Keys

- **Supportive Therapy**
  - Minimal handling; avoiding exhaustion
  - Nasopharyngeal suctioning
  - Fluid management; NG or IV (re: poor feeding)
  - Oxygen
  - Permissive Hypercapnia, hypoxemia
- **High-Flow Nasal Cannula ****
- Aerosolized Epinephrine, salbutamol, hypertonic saline: mixed results regarding LOS, clinical scores, oxygenation

To Avoid

- CPAP: some improvement in gases, no reduction in intubation rates
- Heliox: may reduce clinical scores within the first hour, no evidence reduces need for intubation or LOS
- Chest Physiotherapy: no benefit to LOS, oxygenation or clinical scoring, can increase agitation and distress

A Randomized Trial of High-Flow Oxygen Therapy in Infants with Bronchiolitis

Donna Franklin, B.N., M.B.A., Franz E. Babl, M.D., M.P.H., Luregn J. Schlapbach, M.D., Ed Oakley, M.B., B.S., et al.

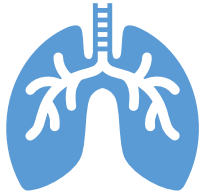
- Multicenter RCT
- Infants <12 mo. of age, bronchiolitis requiring oxygen therapy randomized to either HFNC or standard O2 therapy
- Findings with HFCN group:
  - Decrease in escalation of care/treatment failure (P<0.001)
  - No differences in LOS
  - Of the standard-group that reached treatment failure, 61% responded to HFNC as a rescue therapy

High-flow warm humidified oxygen versus standard low-flow nasal cannula oxygen for moderate bronchiolitis (HFWHO RCT): an open, phase 4, randomised controlled trial

Elizabeth Kepreotes, Bruce Whitehead, John Attia, Christopher Oldmeadow, Adam Collison, Andrew Searles, Bernadette Goddard, Jodi Hilton, Mark Lee, Joerg Mattes

- Open, phase 4, RCT
- Infants <24 mo. of age, moderate bronchiolitis randomized to either HFNC or standard O2 therapy
- Findings with HFCN group:
  - Fewer treatment failure (p=0.0016), increased time to treatment failure
  - No difference in time on oxygen
  - 63% of standard with treatment failure were rescued by HFNC, **avoided ICU**

Asthma



Chronic inflammatory disorder of airways, airway hyperresponsiveness

Leading reason for hospitalization for children

<u>Hallmarks</u>:

Bronchospasm

Increased Mucous Production

Airway inflamation/edema

Asthma Exacerbation Classification

from CPS Position Statement (2012, reaffirmed 2017)

Clinical Feature	Mild	Moderate	Severe	Impending Resp Failure
Mental Status	Normal	? Agitated	Agitated	Drowsy/Confused
Activity	Normal	Decreased, poor feeding	Decreased, stops feeding	Unable to eat
Speech	Normal	Phrases	Words	Unable to speak
WOB	Min. Intercostal retractions	Intercostal and substernal retractions	Accessory muscles, nasal flaring, paradoxical added	Marked respiratory distress at rest
Auscultation	Moderate wheeze	Loud expiratory and inspiratory wheeze	Audible wheezes	Silent chest
SpO2 on RA	>94%	91-94%		<90%

Asthma Exacerbation Management

from CPS Position Statement (2012, reaffirmed 2017)

Severity	Drug and Route	Risks
Mild	Inhaled corticosteroids Salbutamol MDI	
Moderate	Salbutamol intermittent nebs Oral Corticosteroids (prednisone, dexamethasone) Ipratropium Bromide MDI	Prolonged/frequent use can lead to adrenal suppression
Severe	Continuous Salbutamol nebs Ipratropium bromide nebs IV corticosteroid (methylpred, hydrocortisone) IV Magnesium Sulfate	Tachycardia, hypokalemia, hyperglycemia Hypotension
Impending Respiratory Failure	IV Magnesium Sulfate IV Salbutamol	Hypotension Tachycardia, hypokalemia, hyperglycemia

Early identification and aggressive treatment of symptoms

Intubation and mechanical ventilation in asthma is linked with significant adverse effects; require significant ventilation pressures

- Pneumothorax
- Decreased venous return
- CV collapse
- Death

Attempt other means of respiratory support first

- HFNC
- NIV

Asthma Exacerbation and Intubation

Circulation

Heart Rate

- Children are HR dependent
- BP is last thing to go
- Act on tachycardia; do not wait for hypotension

Colour

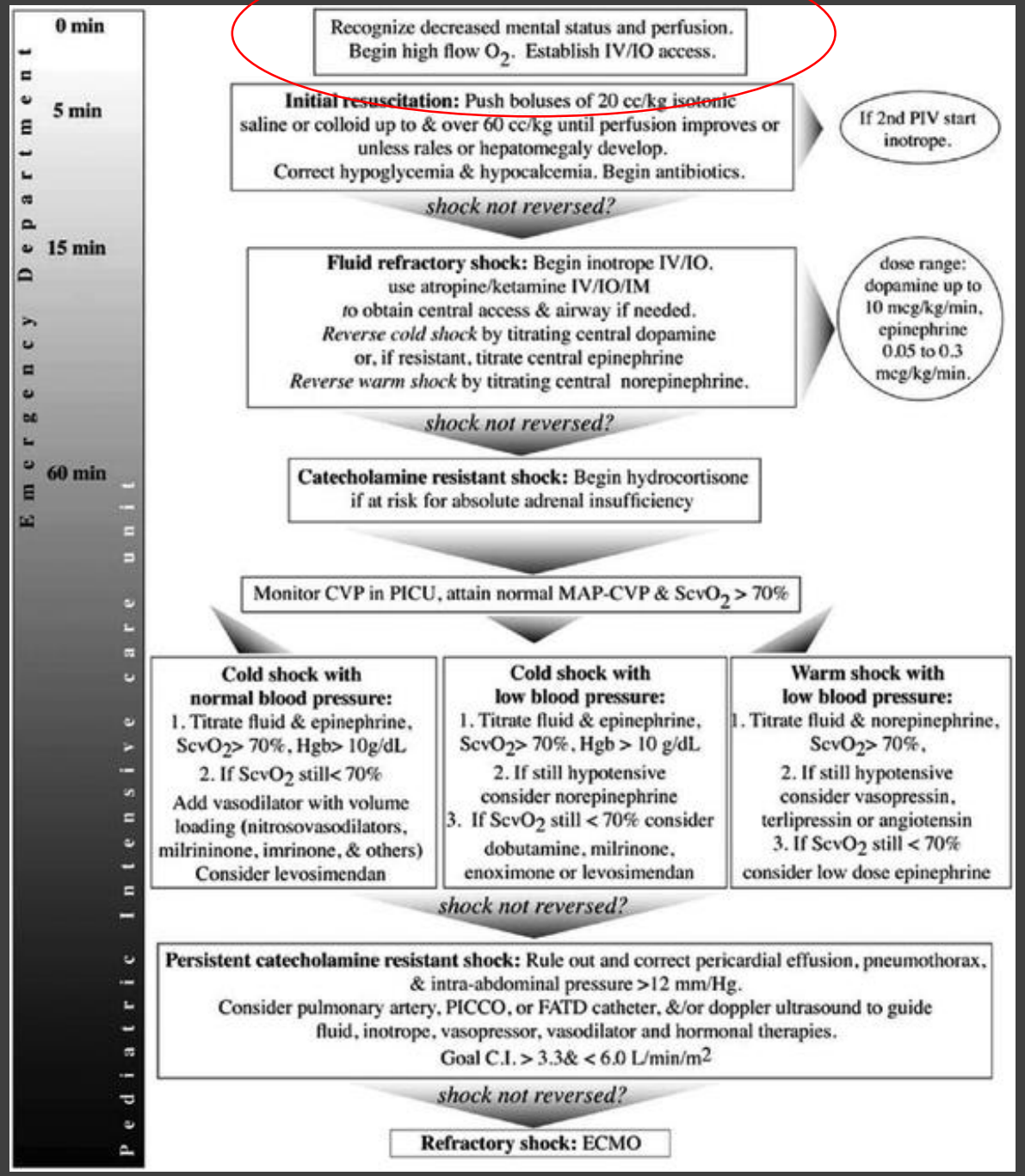
- Pale, mottled, grey?

Capillary Refill

- 2s, 3-5s, >5s

Hemodynamic Support

- Balance oxygen supply and demand
- Hemodynamic instability is an indication for intubation


Emergency Department
Pediatric Intensive care unit
0 min
5 min
15 min
60 min
Recognize decreased mental status and perfusion.
Begin high flow O_2. Establish IV/IO access.
Initial resuscitation: Push boluses of 20 cc/kg isotonic saline or colloid up to & over 60 cc/kg until perfusion improves or unless rales or hepatomegaly develop.
Correct hypoglycemia & hypocalcemia. Begin antibiotics.
If 2nd PIV start inotrope.
shock not reversed?
Fluid refractory shock: Begin inotrope IV/IO.
use atropine/ketamine IV/IO/IM
to obtain central access & airway if needed.
Reverse cold shock by titrating central dopamine
or, if resistant, titrate central epinephrine
Reverse warm shock by titrating central norepinephrine.
dose range:
dopamine up to 10 mcg/kg/min,
epinephrine 0.05 to 0.3 mcg/kg/min.
shock not reversed?
Catecholamine resistant shock: Begin hydrocortisone if at risk for absolute adrenal insufficiency
Monitor CVP in PICU, attain normal MAP-CVP & $ScvO_2$ > 70%
Cold shock with normal blood pressure:
1. Titrate fluid & epinephrine, $ScvO_2$> 70%, Hgb> 10g/dL
2. If $ScvO_2$ still< 70%
Add vasodilator with volume loading (nitrosovasodilators, milrininone, imrinone, & others)
Consider levosimendan
Cold shock with low blood pressure:
1. Titrate fluid & epinephrine, $ScvO_2$> 70%, Hgb > 10 g/dL
2. If still hypotensive consider norepinephrine
3. If $ScvO_2$ still < 70% consider dobutamine, milrinone, enoximone or levosimendan
Warm shock with low blood pressure:
1. Titrate fluid & norepinephrine, $ScvO_2$> 70%,
2. If still hypotensive consider vasopressin, terlipressin or angiotensin
3. If $ScvO_2$ still < 70%
consider low dose epinephrine
shock not reversed?
Persistent catecholamine resistant shock: Rule out and correct pericardial effusion, pneumothorax, & intra-abdominal pressure >12 mm/Hg.
Consider pulmonary artery, PICCO, or FATD catheter, &/or doppler ultrasound to guide fluid, inotrope, vasopressor, vasodilator and hormonal therapies.
Goal C.I. > 3.3& < 6.0 L/min/m^2
shock not reversed?
Refractory shock: ECMO

Sepsis

Disability

Baseline

Neuro

Agitation
Irritability

LOC

Sleepiness
Rousability
Feeding
Speech/Cry

Disability Support

- Repositioning/Optimal Position
- Secretion Clearance
  - Suctioning
  - Chest Physio
  - Cough Assist
- Possible chronic ventilation or oxygenation issues

Seizures

Episodic high frequency discharge of impulses by synchronized group of neurons

Causes

Congenital abnormality, epilepsy, infection, electrolyte imbalance, hypoglycemia, fever, drug toxicity

Convulsive vs. Non-convulsive

Status Epilepticus?

>5 mins, unlikely to spontenously resolve

Management

- Support Airway/Breathing as needed
  - Attempt to bag through, intubation not always necessary
  - Avoid Succinylcholine for intubation
- Meds
  1. Lorazopam Q5mins until stops
  2. Load with Phenytoin/Phenobarbital (10 mins)
  3. Phenobarb (15-20 mins)
     - Decrease phenytoin levels, reload phenytoin (20-30 mins)
  4. Consider valproic acid, IV keppra (45 mins)
- Respiratory suppression with barbituates, get ready to bag!

Barriers & Learning Together…

When Nursing Assertion Stops

A Qualitative Study to Examine the Cultural Barriers Involved in Escalation of Care in a Pediatric Hospital

Jodi Thrasher, MSN, RN, CFNP[a,*], Heidi McNeely, MSN, RN, PCNS-BC[a], Bonnie Adrian, PhD, RN[b]

Fear of "False" Alarms

"Trying things" first

Convincing physicians to call

Hospital Pediatrics
March 2014, VOLUME 4 / ISSUE 2
Research Articles

Patient Characteristics and Disposition After Pediatric Medical Emergency Team (MET) Activation: Disposition Depends on Who Activates the Team

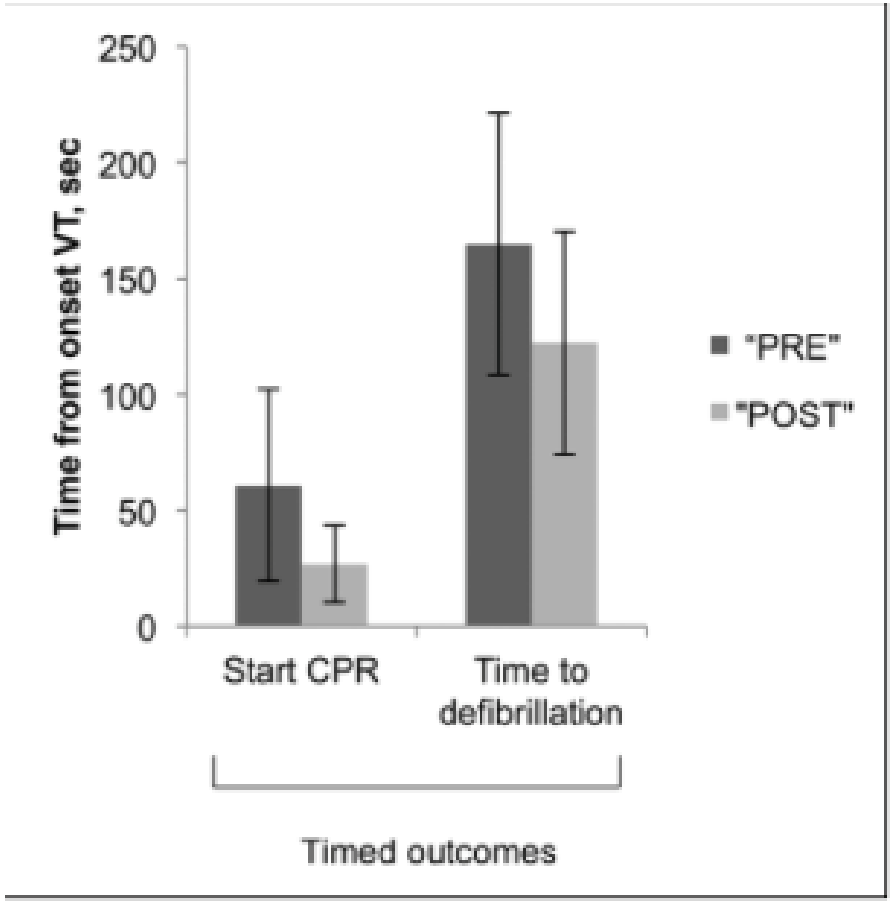
Anna-Theresa Lobos, Rachel Fernandes, Tim Ramsay, James Dayre McNally

	Physician	Non Physician	*P* Value
Respiratory			
Intubation	0.3 (1)	0.6 (2)	.60
Artificial airway	1.1 (4)	2.5 (8)	.24
Invasive ventilation	0.5 (2)	0.6 (2)	1.00
Noninvasive ventilation	6.5 (24)	7.5 (24)	.65
Nebulized medication	16.8 (62)	13.1 (42)	.20
Physiotherapy	9.5 (35)	7.8 (25)	.50
Suctioning	18.7 (69)	23.8 (76)	.11
Pleural drain	0.3 (1)	0.3 (1)	1.00
Magnesium sulfate	3.8 (14)	2.2 (7)	.27
Oxygen administration	15.7 (58)	20.0 (64)	.16
Chest radiograph	26.3 (97)	25.9 (83)	.93
Circulation			
Vasopressors	1.1 (4)	0.9 (3)	1.00
Vascular access	23.6 (87)	21.9 (70)	.59
Antiarrhythmics	0.8 (3)	0.9 (3)	.86
Fluid bolus	17.9 (66)	19.4 (62)	.62
Blood product	3.8 (14)	3.4 (11)	.80
IVF change	3.5 (13)	5.6 (18)	.18
Diuretics	3.8 (14)	3.1 (10)	.84
Antihypertensives	0.3 (1)	0 (0)	1.0
Neurologic			
Mannitol	0.8 (3)	1.2 (4)	.71
Antiseizure	4.1 (15)	2.5 (8)	.25
Head imaging	1.6 (6)	2.8 (9)	.29
Sedation/Analgesia	2.7 (10)	5.9 (19)	.04
Other			
Laboratory testing	31.2 (115)	32.2 (103)	.77
Other imaging[a]	7.1 (26)	8.4 (27)	.49
Consultation	5.2 (19)	8.1 (26)	.11
Antibiotics	5.7 (21)	5.0 (16)	.69

Improved Clinical Performance and Teamwork of Pediatric Interprofessional Resuscitation Teams With a Simulation-Based Educational Intervention*

Elaine Gilfoyle, MD, MMEd, FRCPC[1]; Deanna A. Koot, RN, BScN, MN[1]; John C. Annear, BSc, RRT[2];

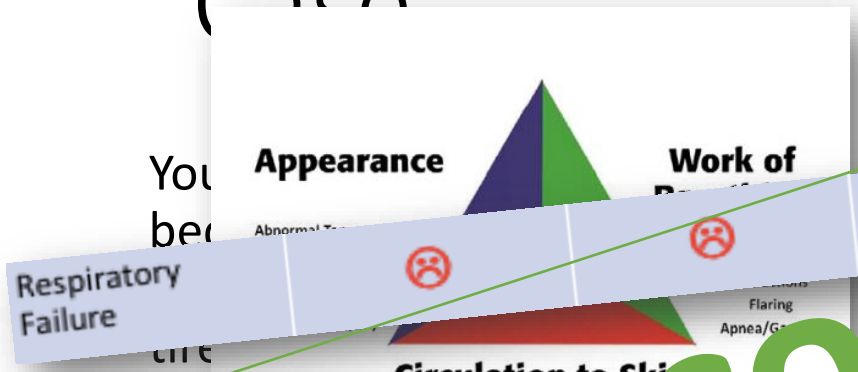
Conclusions: Participation in a simulation-based team training educational intervention significantly improved surrogate measures of clinical performance, time to initiation of key clinical tasks, and teamwork during simulated pediatric resuscitation. A positive correlation between clinical and teamwork performance suggests that effective teamwork improves clinical performance of resuscitation teams. (*Pediatr Crit Care Med* 2017; 18:e62–e69)



Case

You
bec
life

- Vitals:
  - HR: 170's
  - RR: 80-110's
  - BP: 74/55
  - Temp: 38.7C
  - SpO2: 94 on RA



Recovery on Wards

iratory Asses ner
te inte /sub costal
etrac ons
Forced expiratory phase
- Nasal Flaring
/M aning
qui + CBS T/O

- Cap:
- WBC
- Lacta

HFNC

[hold for applause]

…

Questions