

Right care, right place, every time: Optimizing pediatric emergency care

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Disclosures

- I have no relevant financial relationships with any commercial interests nor conflicts of interest to declare
- I will discuss projects with grant funding from:



TOYOTA
way forward
FUND

HRSA
Health Resources & Services Administration

American Academy
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™



MICHIGAN
EMSC State Partnership Program

RBaby™
foundation
saving babies lives

American College of
Emergency Physicians®

ADVANCING EMERGENCY CARE 

Objectives

By end of this presentation the attendee will be able to

1. Define Pediatric Readiness
2. Describe disparities in pediatric emergency care in the US
3. Locate three resources to improve Pediatric Readiness
4. Plan to engage in Pediatric Readiness improvement in the next three months

Monday at 10 pm- text from your cousin



Friday, March 22 10:00pm

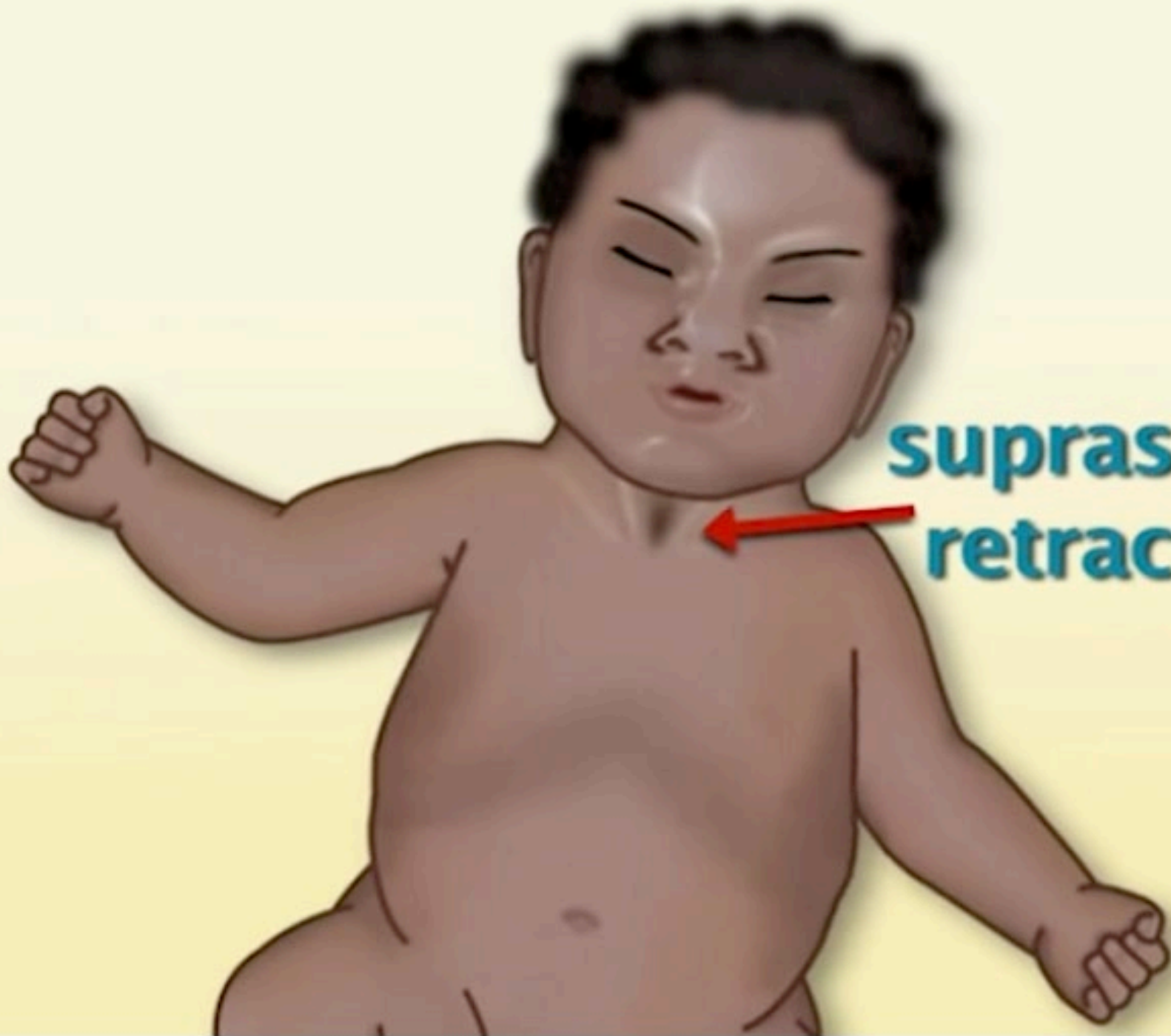
Emily our 6 month old
is coughing, is
breathing fast and
has a fever.

What should we do?



Tuesday 4 am- another text...



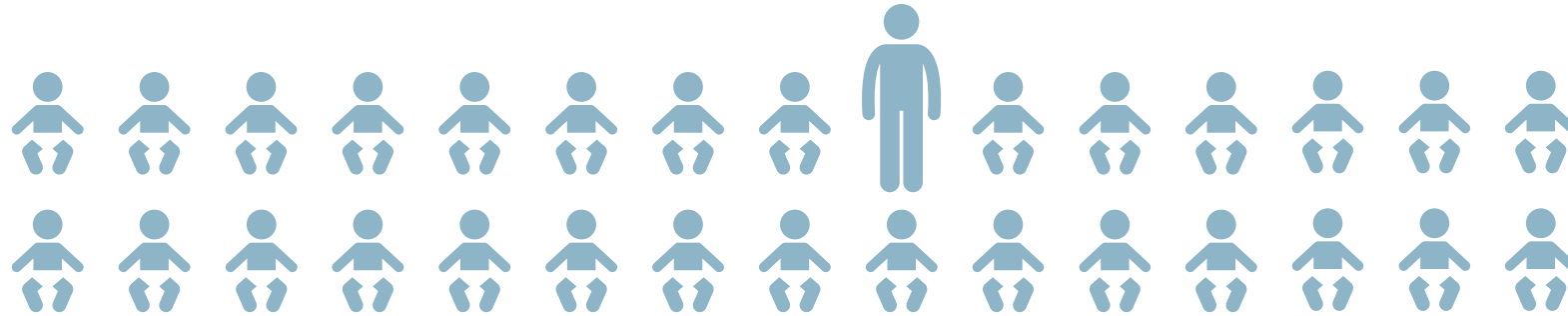


**suprasternal
retractions**

Emily Lives in Portland



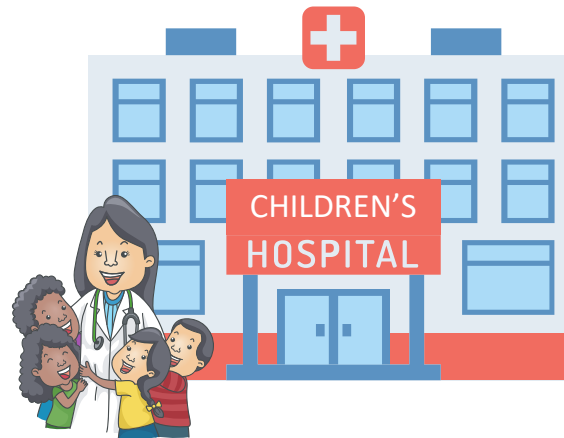
Emily Lives in Portland



Community



EMS



Pediatric ED/
Children's Hospital

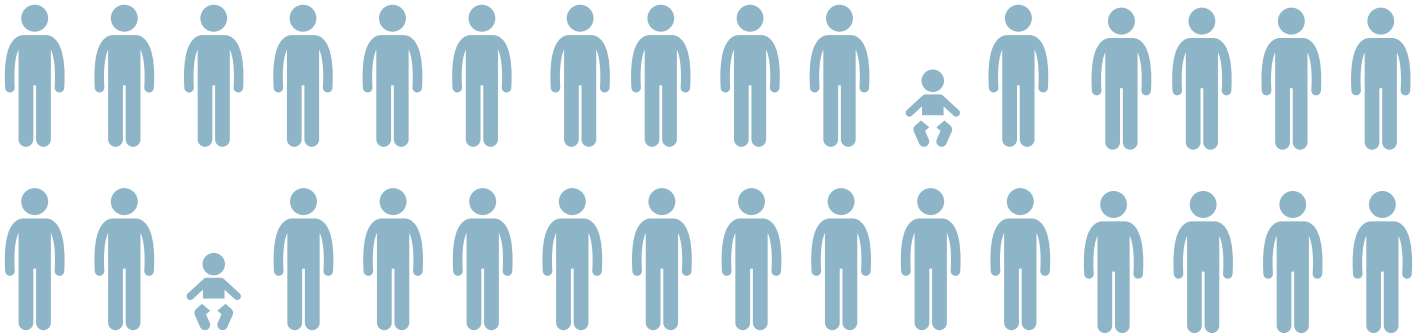


Home

Emily Lives in Rockland



Emily Lives in Rockland



Community



EMS



Community ED



Inter-facility
transport



Pediatric ED/
Children's Hospital



Home

Continuum of Emergency Care in Maine

1. Community: 1.4 million
 - 252,000 pediatric (**18%**)
2. Emergency Medical Services: 300,000 calls/year
 - 15,000 Pediatric (**5%**)
 - 272 agencies + 5,500 EMS providers
 - 167 Transporting ground services
 - 101 Non-transporting services
 - 4 Air services (3 are restricted response services)

Continuum of Emergency Care in MN

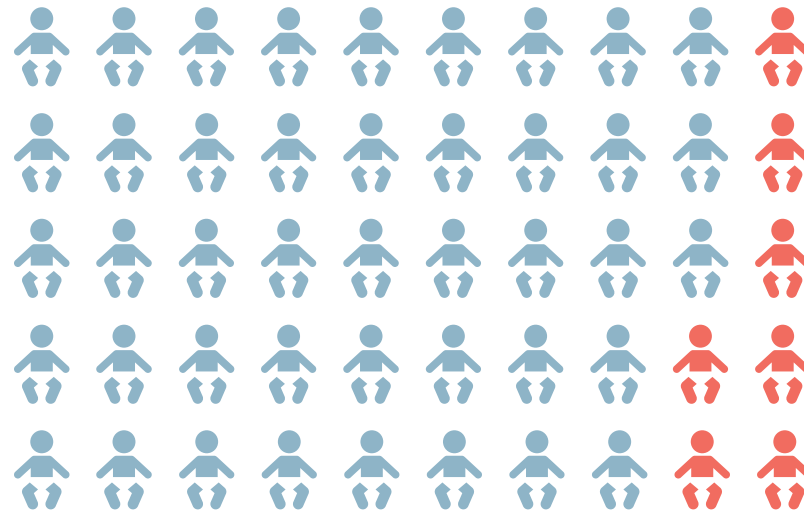
3. Emergency Departments: 8.5 million ED visits
 - 1.5 million pediatrics (**18%**)

4. Hospitals: 35 hospitals (16 CAH)
 - 1 Children's
 - 124 Pediatric Beds, 8 PICU

Where do children receive emergency care?



82.7% in
community EDs
(<15 pediatric
patients/ day)



17.3% in Children's
Hospital EDs (100-250
pediatric patients/
day)

History of Emergency Medicine

- 1965: Vietnam War- NHTSA
- 1966: 1st 24/7 ED Alexandria, VA
- 1973: EMS Systems Act
- 1979: EM- 23rd specialty



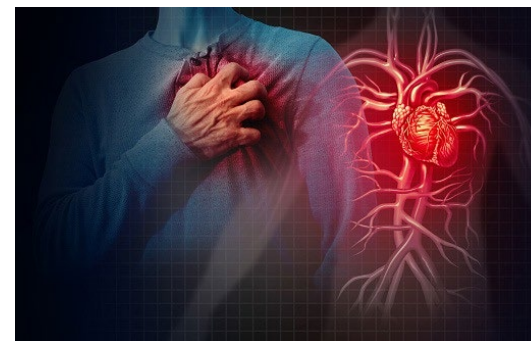
<https://www.sciencealert.com/cancer>

<https://www.pngkit.com/bigpic/u2t4r5i1u2u2t4e6/>

<https://www.docwirenews.com/docwire-pick/cardiology-picks/heart-disease-cancer-risk-linked/>

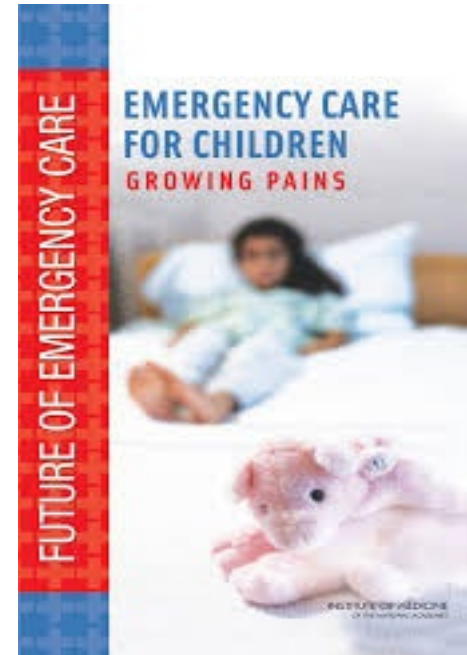
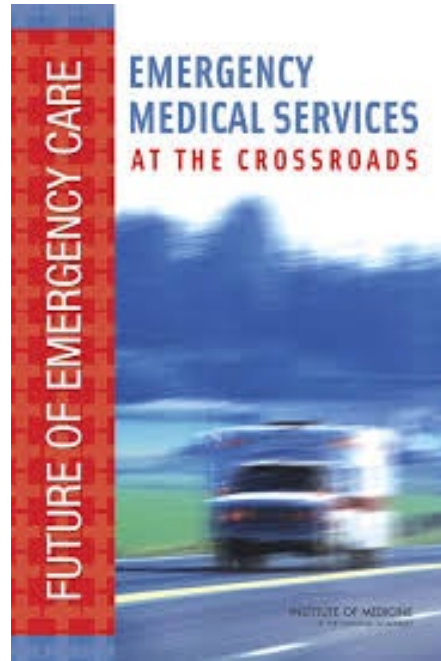


1992 PEM



<https://www.sciencealert.com/cancer>
<https://www.pngkit.com/bigpic/u2t4r5i1u2u2t4e6/>
<https://www.docwirenews.com/docwire-pick/cardiology-picks/heart-disease-cancer-risk-linked/>

Institute of Medicine Reports 2003

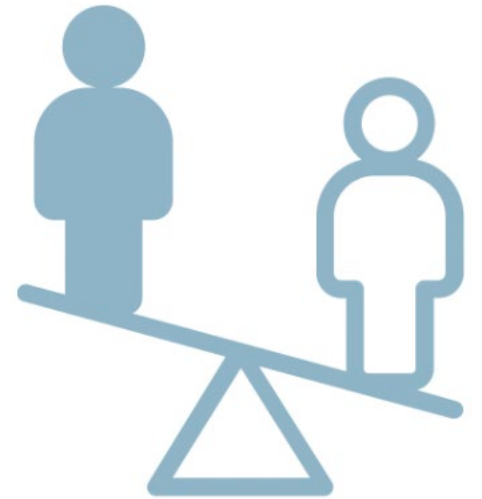


Pediatric emergency care is UNEVEN

- Variation in pediatric equipment
- Variation in pediatric standards/protocols
- Variation in pediatric training/subspecialists

Health Disparities

- Preventable differences in the **burden of illness/injury** based on:
 - **Age**
 - **Geographic factor**
 - Gender/Sexual identity
 - Disability
 - Socioeconomic status
 - Race/ethnicity



Disparities in process

- Pediatric ED: ↑ **adherence to guidelines**
 - Bronchiolitis, AOM, imaging, asthma
- General ED: ↑ **over treatment**
 - Admission, medications, testing (labs/imaging)



Disparities in outcomes

- General vs Pediatric ED
 - Pediatric Cardiac Arrest: OR mortality 2.2 (1.7-2.8)
 - Pediatric Trauma: OR mortality 1.57 (1.15-2.14)





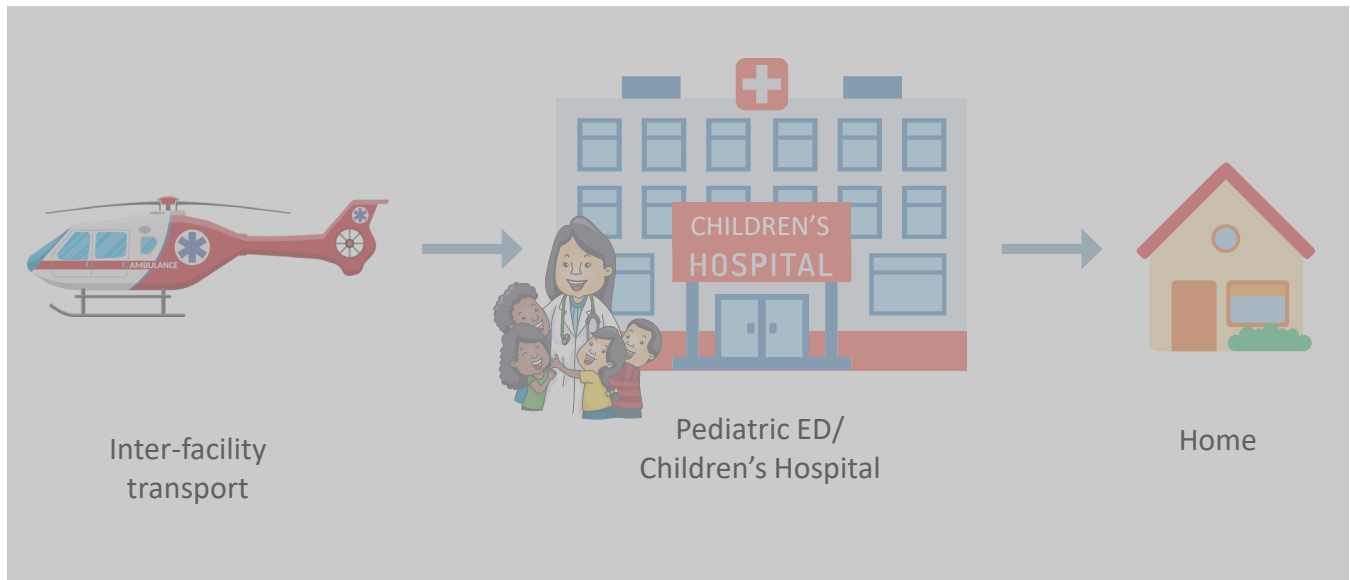
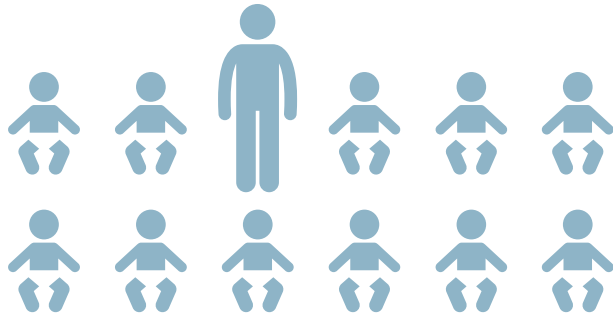
Community



EMS



Community ED



Reducing Disparities



Aim: to ensure all US EDs + EMS have essential guidelines and resources to provide effective and appropriate pediatric care

Pediatric Readiness Score= compliance with Joint Policy Statement



FROM THE AMERICAN ACADEMY OF PEDIATRICS

Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

Joint Policy Statement—Guidelines for Care of Children in the Emergency Department

AMERICAN ACADEMY OF PEDIATRICS
COMMITTEE ON PEDIATRIC EMERGENCY MEDICINE
AMERICAN COLLEGE OF EMERGENCY PHYSICIANS
PEDIATRIC COMMITTEE
EMERGENCY NURSES ASSOCIATION
PEDIATRIC COMMITTEE

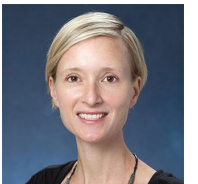
KEY WORD

pediatric emergency preparedness

ABBREVIATIONS

abstract

Children who require emergency care have unique needs, especially when emergencies are serious or life-threatening. The majority of ill and injured children are brought to community hospital emergency departments (EDs) by virtue of their geography within communities. Similarly, emergency medical services (EMS) agencies provide the bulk of out-of-hospital emergency care to children. It is imperative, therefore, that all hospital EDs



2003, 2009, 2013, 2018

Pediatric Readiness Score

- 55 question online survey provides a weighted score from 0-100%

1. Administration +
coordination
19/100

2. Physician + RN
staffing/training
10/100

3. Pediatric quality
improvement
7/100

4. Pediatric patient
safety
14/100

5. Policies, procedures
and protocols
17/100

6. Equipment,
supplies, medications
33/100

Pediatric Readiness Survey

Pediatric Patient Safety in the ED

27. Are all* children seen in the ED weighed in kilograms (without conversion from pounds)?

**Note: This includes critical situations when a child might bypass triage and have his/her weight estimated in kilograms.*

Yes
 No → **Go to 29**

28. Is the weight recorded in the ED medical record in kilograms only?

Yes → **Go to 30**
 No

29. If no, how are children in the ED weighed, and how is the weight recorded in the medical record?

(Choose one)

- a. Weighed in pounds and converted to kilograms for recording in the medical record
- b. Weighed in either pounds or kilograms with an option to record in either pounds or kilograms in the medical record

30. Are temperature, heart rate, and respiratory rate recorded on all children? Yes No

49. Is each of the following monitoring equipment items available for immediate use in the ED?
(Check Yes or No for each)

- a. Neonatal blood pressure cuff Yes No
- b. Infant blood pressure cuff Yes No
- c. Child blood pressure cuff Yes No
- d. Defibrillator with pediatric and adult capabilities including pads/paddles Yes No
- e. Pulse oximeter with pediatric and adult probes Yes No
- f. Continuous end-tidal CO2 monitoring device Yes No

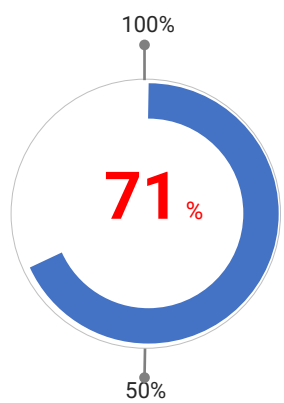
50. Is each of the following fluid resuscitation equipment items available for immediate use in the ED?

(Check Yes or No for each)

- a. 22 gauge catheter-over-the-needle Yes No
- b. 24 gauge catheter-over-the-needle Yes No
- c. Pediatric intra-osseus needles Yes No
- d. IV administration sets with calibrated chambers and extension tubing and/or infusion devices with ability to regulate rate and volume of infusate Yes No
- e. Umbilical vein catheters (3.5F or 5.0F) Yes No
- f. Central venous catheters (any two sizes in range, 4F-7F) Yes No

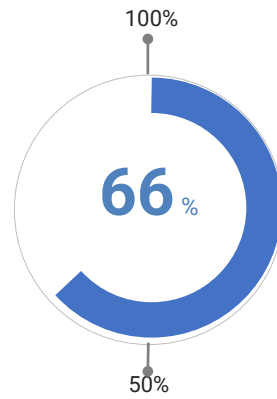
Pediatric Readiness Score (2021)

Improved from 55% in 2003, stable from 2013



All

3557/5150
hospitals

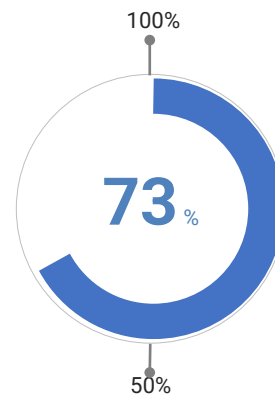


Low

<1,800 children/yr

1793 (50%)

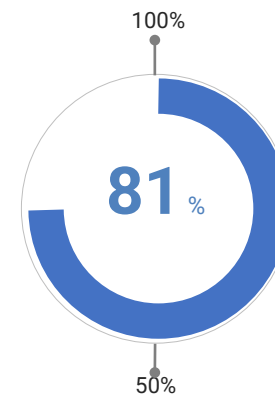
30% rural/remote



Medium

1,800 – 4,999

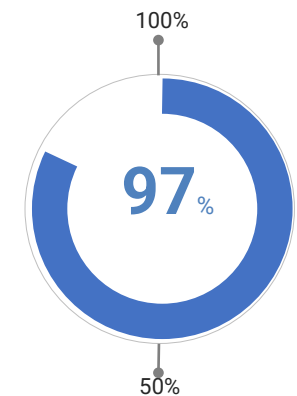
1102 (31%)



Medium to high

5,000-9,999

376 (11%)

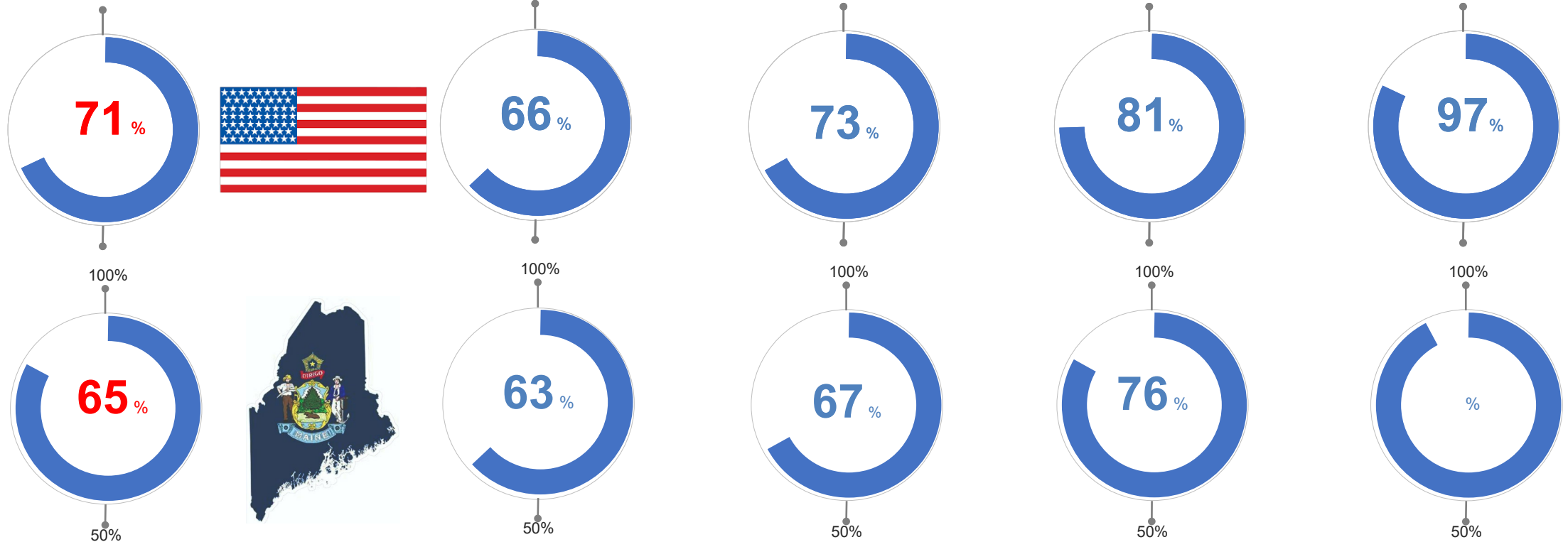


High

≥10,000

286 (8%)

Maine Pediatric Readiness Score



All

15/35
hospitals

Low

<1,800 patients
9 hospitals

Medium

1,800 – 4,999
5 hospitals

Medium to high

5,000-9,999
1 hospitals

High

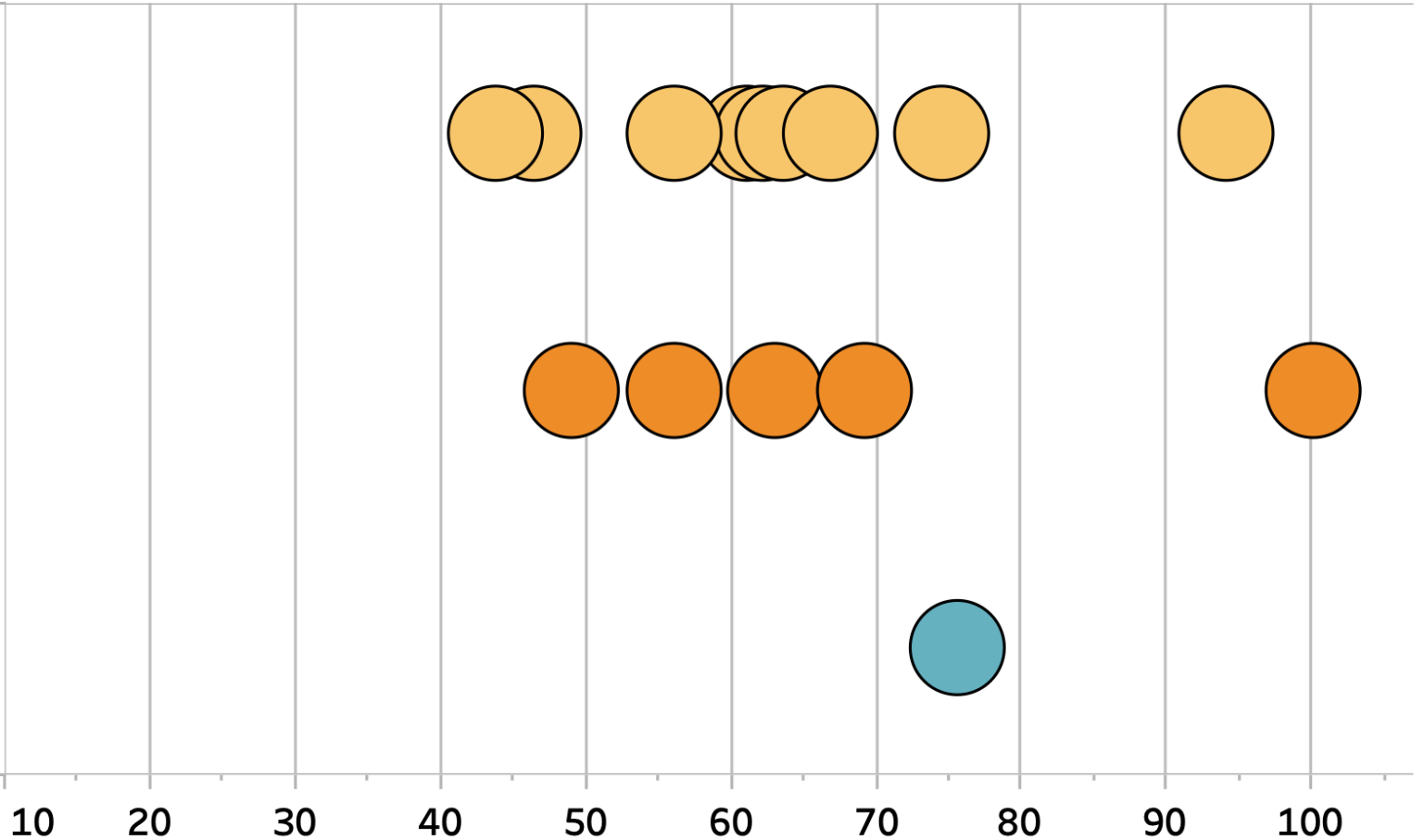
≥10,000
hospitals

2021 Distribution of Scores by Volume

Low: <1,800 pediatric patients (average of 5 or fewer a day)

Medium: 1,800 – 4,999 pediatric patients (average of 6-13 a day)

Medium to High: 5,000 – 9,999 pediatric patients (average of 14-26 a day)



Pediatric Readiness Scores by Volume

Disparities in access

- Families seek care in ED closest to home
 - 94% live < 30 minutes from any ED
 - 90% live closest to NOT PEDIATRIC READY



Rural child = Low Pediatric Readiness ED

4X higher mortality

Disparities in Outcomes- Medical

	Pediatric Readiness Scores by Quartile			
	30-59	60-74	75-87	88-100
Adjusted Relationship PRS and in-hospital mortality	Ref	0.52 (0.3-0.90) p = 0.018	0.36 (0.22-0.58) p<0.001	0.25 (0.18-0.37) p<0.001
Unadjusted Mortality	11.1%	5.4%	4.9%	3.4%

Racial/Ethnic Disparities

A Patients with acute medical emergencies (n = 557 537)

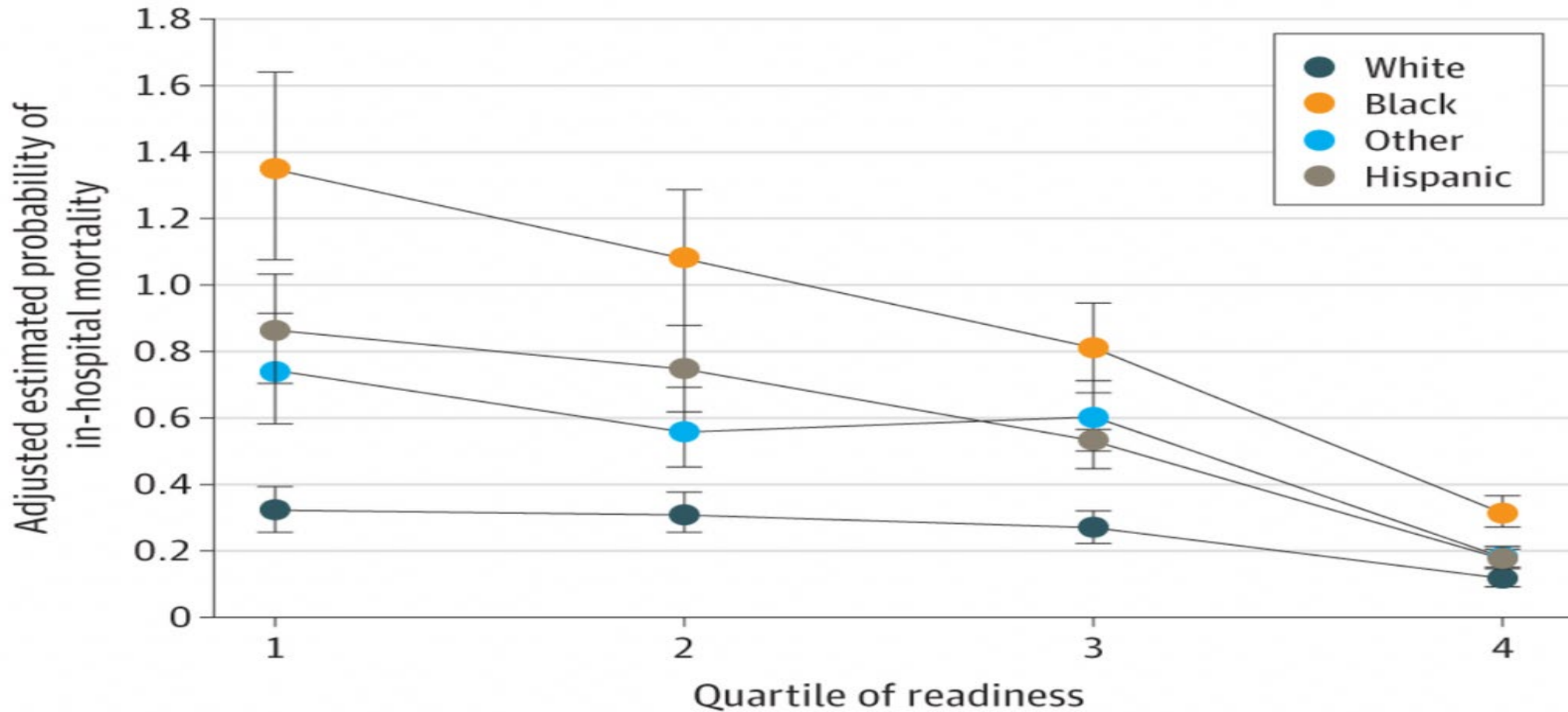


Figure 1. Adjusted Odds Ratios (aORs) for In-Hospital Mortality Among Children With Injuries and Medical Conditions Across Quartiles of Emergency Department (ED) Pediatric Readiness, Including Subgroups

Readiness factors associated with survival

- 1. Presence of Pediatric Emergency Care Coordinators**
2. Pediatric resuscitation equipment/supplies
3. Pediatrics specific QI, triage tools, and disaster plans

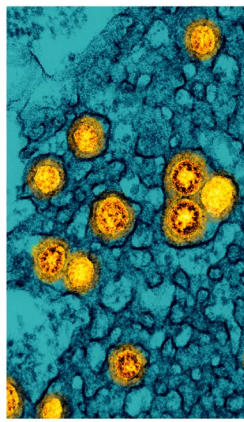
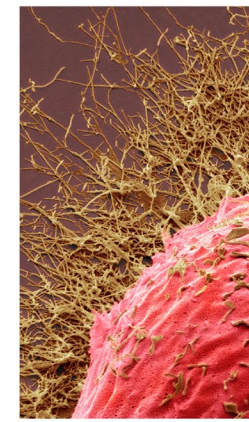
PECC: Pediatric Emergency Care Coordinator

- Nurse +/- Physician
- Responsible for overseeing pediatric specific activities
 1. Provides pediatric perspective to ALL work
 2. Pediatric specific quality improvement
 3. Ensures pediatric skills of staff
 4. Ensures availability of pediatric equipment, supplies, meds
 5. Develops/periodically reviews pediatric policies/procedures

***** ROLE FOR PEDIATRICIANS/PEDIATRIC DEPARTMENTS*****

PECCs Post-pandemic

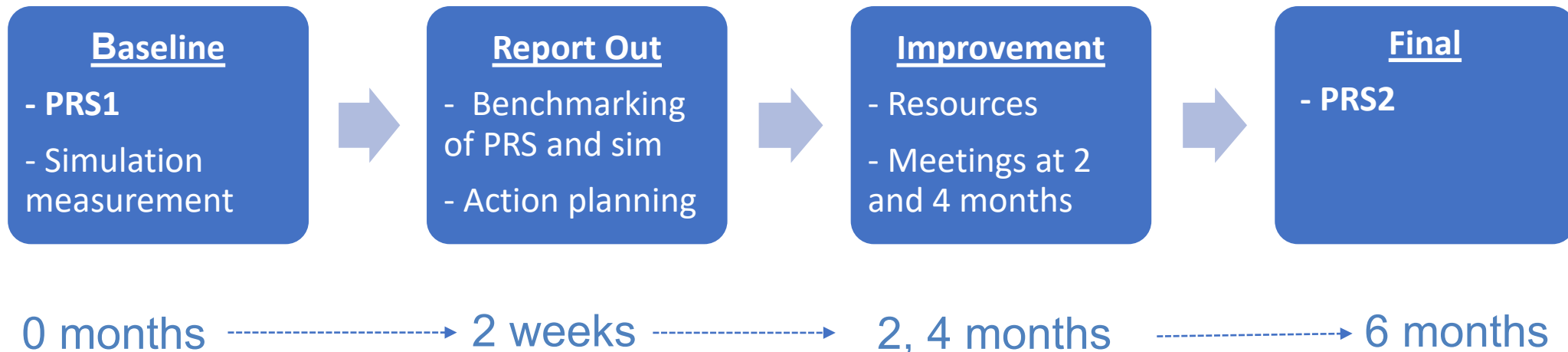
- PECCs in MN
 - Physician 25% (52% in 2014)
 - Nurse 33% (64%)
- Barriers to PECC
 - Lack of support/time
 - Pediatrics relatively lower priority
 - Less access to pediatric resources + expertise



ImPACTS

IMPROVING PEDIATRIC ACUTE CARE THROUGH SIMULATION

Aim: improve pediatric readiness over 6 months



Why pediatric simulation?

	Clinical	Simulation
Experiences	Few Unstructured Uncontrolled	Many Structured Controlled
Feedback	Rare	Frequent
Errors	Patient harm, unethical	Valuable to learning

SENIOR
LEADER



Adhere to
protocols in care



Work as
imagined

Work as
simulated

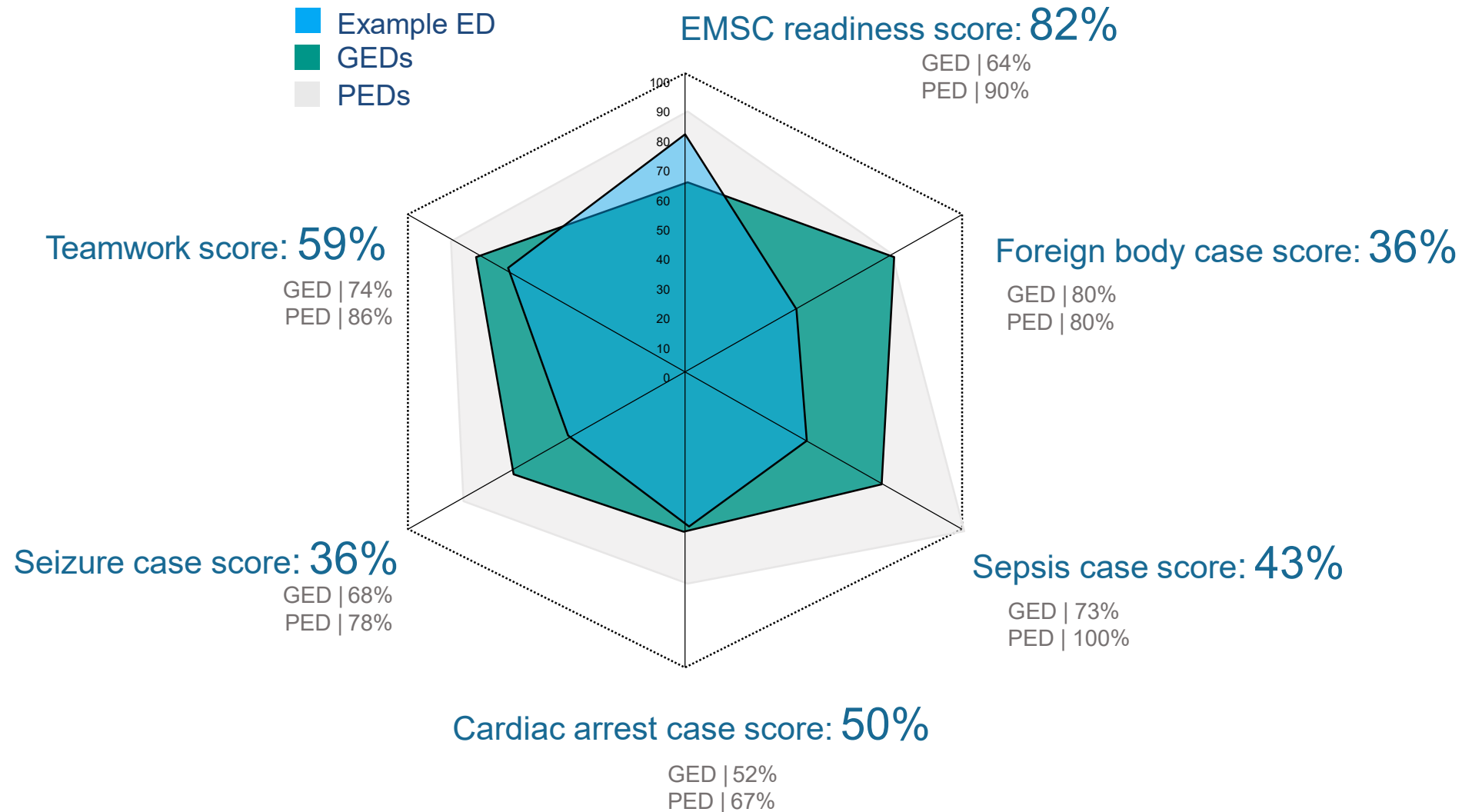
Work as
done

Step 1: Simulation-based Measurement

- Simulated pediatric patients with parent present to community EDs
 1. Infants Foreign Body
 2. Infant sepsis
 3. Infant seizure
 4. Child cardiac arrest
- Participating providers
 - Two real world teams of 1-2 physicians, 3-5 nurses, 1-2 technicians
 - In-situ in ED resuscitation bay using real equipment/resources and simulated medication
- Facilitated by Children's Hospital physician/nurse/sim team
 - Identical patient physiology and response to treatment
 - Scripted parent actor
 - Train-the-trainer for all Children's Hospitals
- **Customized needs assessment for each ED**



Step 2: Report Out to ED Leadership



Step 2: Report Out to ED Leadership

ED Pediatric Performance Snapshot: INFANT SEPSIS

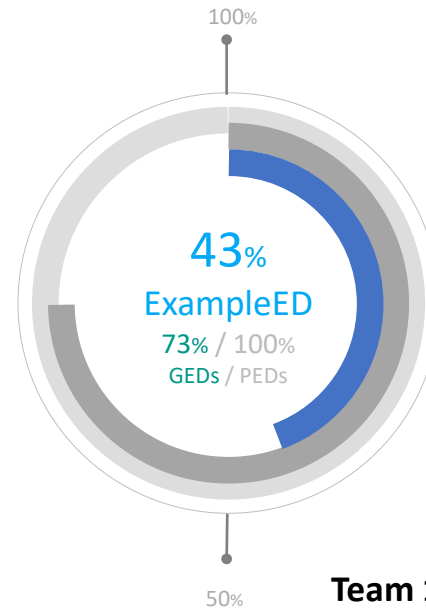
Case details

10-month old female, presents with parent with vomiting/fever/lethargy

1. Mottled, cap refill 4 sec, tachycardia, normotensive, crying, CXR with pneumonia

2. Stops crying, more tachycardic, hypotensive, fluids improve HR

3. Fluids/pressors improve HR/BP



Breakdown

1. Begin high flow O₂
2. Establish 1st IV/IO
3. 60 mL/kg given over 15 minutes
4. Give appropriate antibiotics
5. Establish 2nd IV/IO
6. Push-Pull technique used
7. Start vasopressor after 3rd bolus:

Team 1/Team 2

- ✓ ✓
✓ ✓
× ×
× ×
✓ ✓
× ×
× ×

Safety threats

1. Staff members using different applications for medication dosing

Action items

1. To increase percentage of teams that **demonstrate delivery of 60 cc/kg in less than 10 minutes** by 25% within 6 months

Understanding gaps in sepsis care



Step 3: Collaborative Improvement Phase

Supported by Super PECC in collaboration with

- Interprofessional pediatric content experts/specialists
- State EMSC program
- Other PECCs in region

1. Conducting staff training/education
2. Implementing quality improvement and safety
3. Updating policies, procedures and protocol templates
4. Guidance on equipment, supplies, medications



Akron Children’s Hospital, Alaska Native Medical Center, Alberta Children's Hospital, Boston Medical Center, Boston Children’s Hospital, Brown University, C.S. Mott Children’s Hospital, Children’s Hospital Colorado, Children’s Hospital of Montefiore, Children’s Hospital of Alabama, Children’s Hospital of Philadelphia, Children’s Hospital of Pittsburgh, Children’s Hospital of Los Angeles, Children’s Medical Center Dallas, Children’s Minnesota Minneapolis Hospital, Children's National Medical Center, Cohen Children’s Medical Center, Connecticut Children's Medical Center, Dartmouth-Hitchcock Medical Center, Harbor UCLA Medical Center, Johns Hopkins All Children’s Hospital, Lucille Packard Children’s Hospital, Mayo Clinic, UCSF Benioff Children’s Hospital , McMaster Children’s Hospital, Nationwide Children's Hospital, Morgan Stanley Children’s Hospital, Seattle Children’s Hospital, The Johns Hopkins, Hospital, UC Davis Children’s Hospital, NYU Langone Children’s, Mount Sinai Children’s Hospital

Step 4: Repeat PRS Measurement

	Pre-PRS	Post-PRS	
Connecticut (n= 12 EDs)	64+/-4	77+/-4	p=0.022
Indiana (n=10 EDs)	58 +/-5	75+/-3	p=.009
National (n=34 EDs)	62+/-2	79+/-2	p < 0.001



**Effective Program
BUT only 250 of 5500 EDs
Costly to sustain**

Abulebda, J Peds 2020

Auerbach. Pediatric Emergency Care 2017

Abulebda, Auerbach. Academic Emergency Medicine 2017

Auerbach. Pediatrics 2022



Mentor PECCs

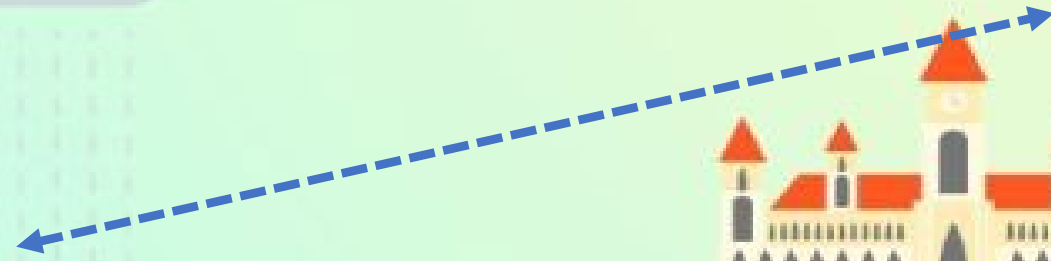
- Often affiliated with Children's Hospital (any specialty)
- Goal: make it easy for community ED PECCs to do job well!

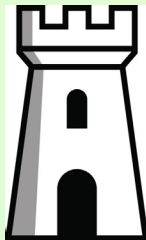
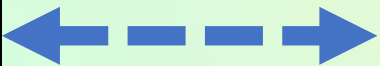
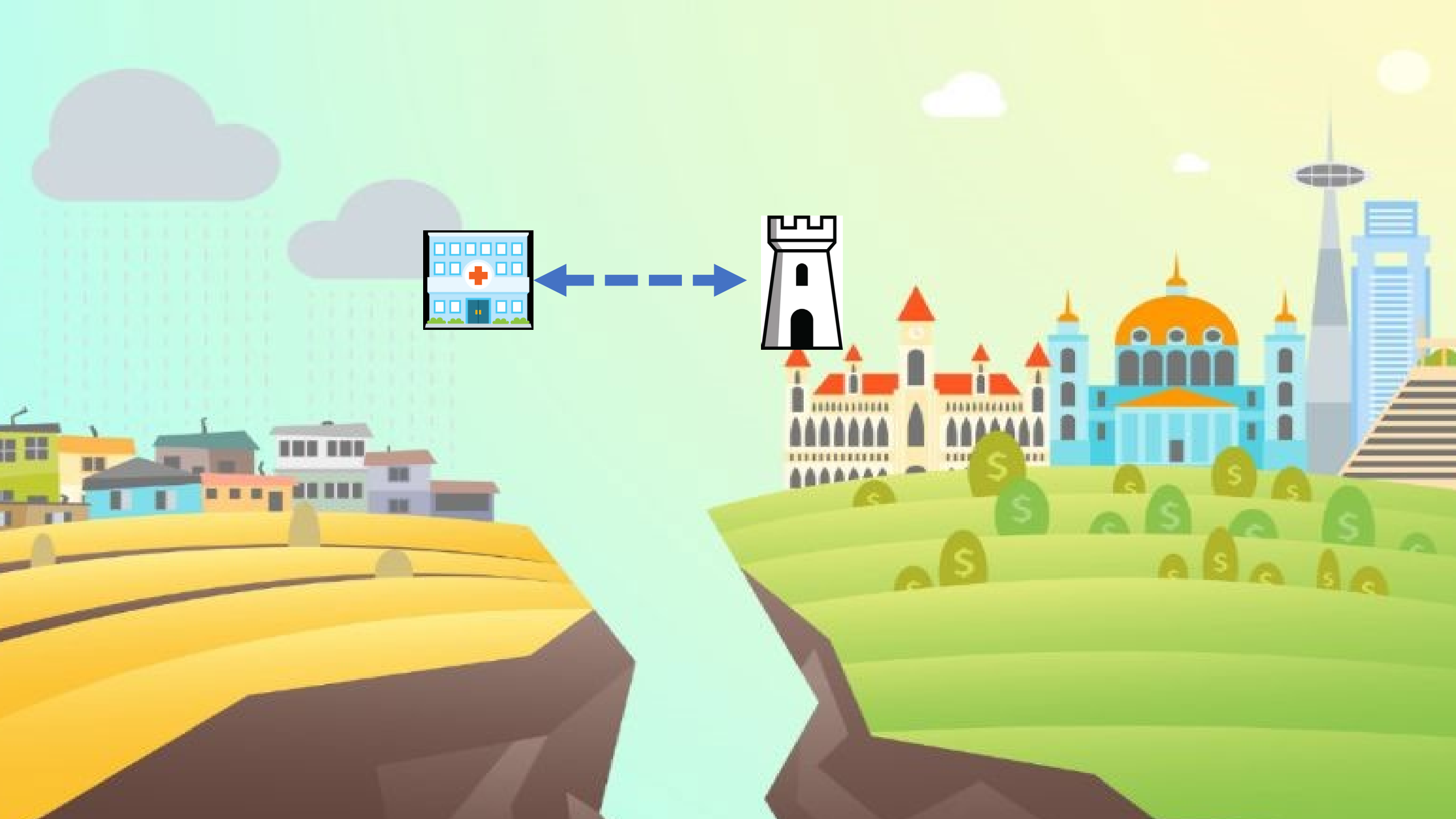


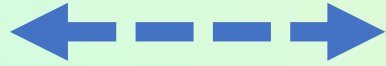
THEM



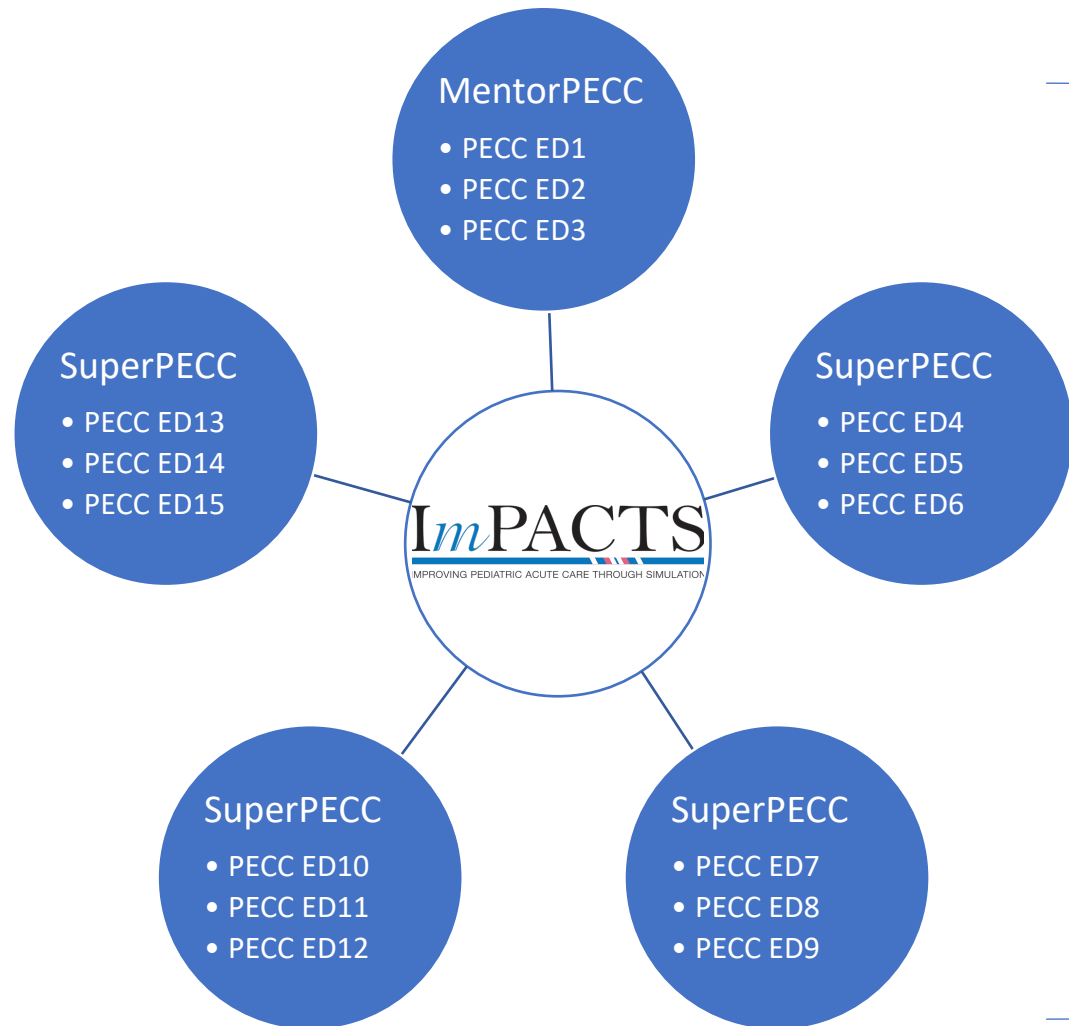
US







Collaborative Pediatric Education



Lectures

Case reviews

Simulation



Simulation definitions

- **Simulation**
 - Technique: *NOT the simulator technology/equipment*
 - Replaces/amplifies real experiences with guided experiences, interactive
- **Simulator**
 - Object, imitates reality for the purpose of experiment or training
- **Fidelity**
 - Degree to which sim replicates real events and/or work
 - High technology ≠ High fidelity

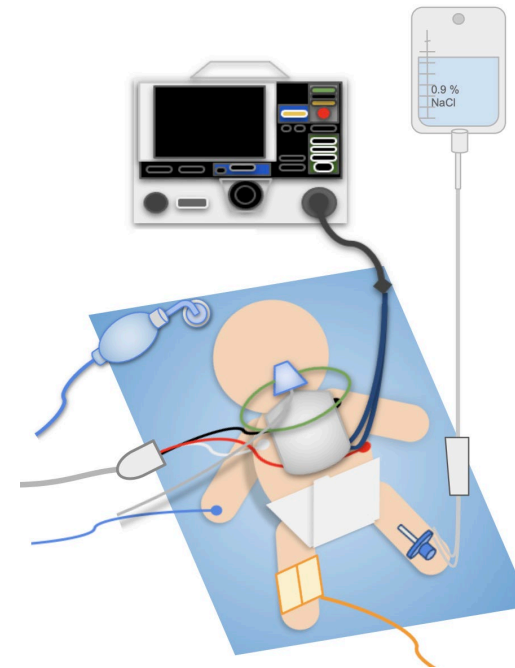
Barriers to High-Fidelity Pediatric Simulations

Lack of access to:

1. Simulators \$\$\$\$\$
2. Equipment/consumables \$
3. Actors/SPs \$\$
4. Maintenance of simulators \$

5. Trained sim staff/technicians \$\$
6. Trained sim faculty \$\$
7. Subject matter experts (pediatrics) \$

8. Time for participants
9. Space/sim-center/travel \$\$
10. Cases/curriculum \$\$



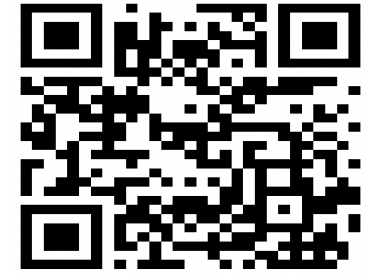
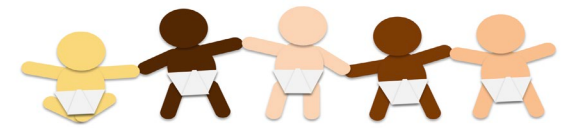
SimBox+ + Tele SimBox

Free online simulation for everyone.

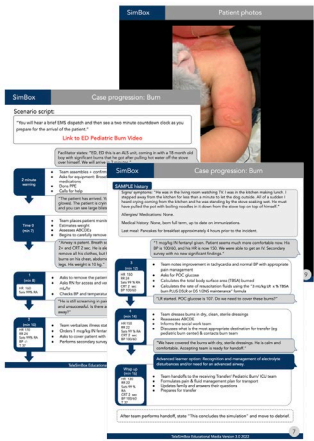
Step by step guide on how to facilitate a simulation.

Use to augment in-person, hybrid or distance simulation.

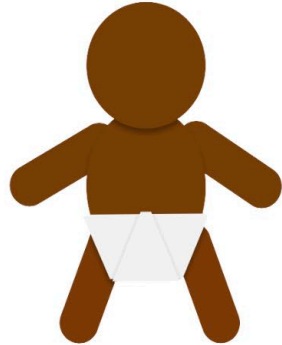
Low to no technology required.



What is SimBox?



Booklet



Low or high
technology
mannequin



Monitor or
computer



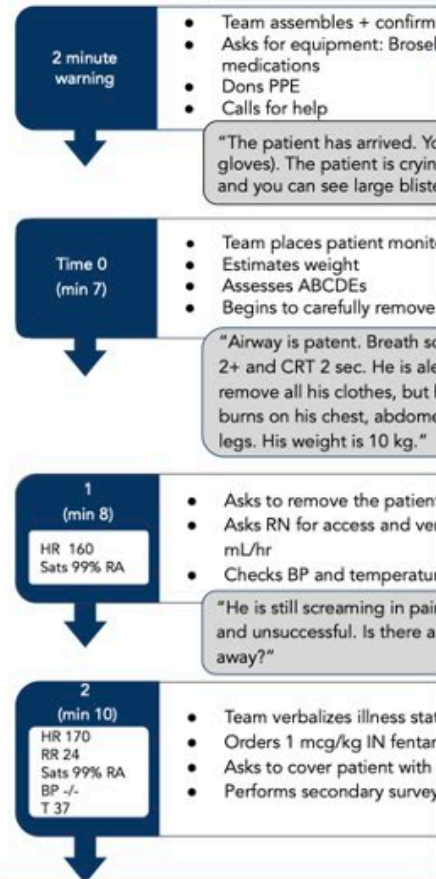
Your own
equipment

Scenario script:

"You will hear a brief EMS dispatch and then see a two minute countdown clock as you prepare for the arrival of the patient."

[Link to ED Pediatric Burn Video](#)

Facilitator states: "ED, ED this is an ALS unit, coming in with a 18 month old boy with significant burns that he got after pulling hot water off the stove over himself. We will arrive in 2 minutes."



TeleSimBox Educational

SAMPLE history

Signs/ symptoms: "He was in the living room watching TV. I was in the kitchen making lunch. I stepped away from the kitchen for less than a minute to let the dog outside. All of a sudden I heard crying coming from the kitchen and he was standing by the stove soaking wet. He must have pulled the pot with boiling noodles in it down from the stove top on top of himself."

Allergies/ Medications: None.

Medical history: None, born full term, up to date on immunizations.

Last meal: Pancakes for breakfast approximately 4 hours prior to the incident.

"1 mcg/kg IN fentanyl given. Patient seems much more comfortable now. His BP is 100/60, and his HR is now 150. We were able to get an IV. Secondary survey with no new significant findings."

3 (min 12)

HR 150
RR 24
Sats 99% RA
CRT 2 sec
BP 100/60

- Team notes improvement in tachycardia and normal BP with appropriate pain management
- Asks for POC glucose
- Calculates the total body surface area (TBSA) burned
- Calculates the rate of resuscitation fluids using the "3 mL/kg LR x % TBSA burn PLUS D5LR or D5 1/2NS maintenance" formula

"LR started. POC glucose is 107. Do we need to cover these burns?"

4 (min 14)

HR 150
RR 22
Sats 99% RA
CRT 2 sec
BP 100/60

- Team dresses burns in dry, clean, sterile dressings
- Reassesses ABCDE
- Informs the social work team
- Discusses what is the most appropriate destination for transfer (eg pediatric burn center) & contacts burn team

"We have covered the burns with dry, sterile dressings. He is calm and comfortable. Accepting team is ready for handoff."

Advanced learner option: Recognition and management of electrolyte disturbances and/or need for an advanced airway.

Wrap up (min 16)

HR 130
RR 22
Sats 99% RA
CRT 2 sec

- Team handoffs to the receiving Transfer/ Pediatric Burn/ ICU team
- Formulates pain & fluid management plan for transport
- Updates family and answers their questions
- Prepares for transfer

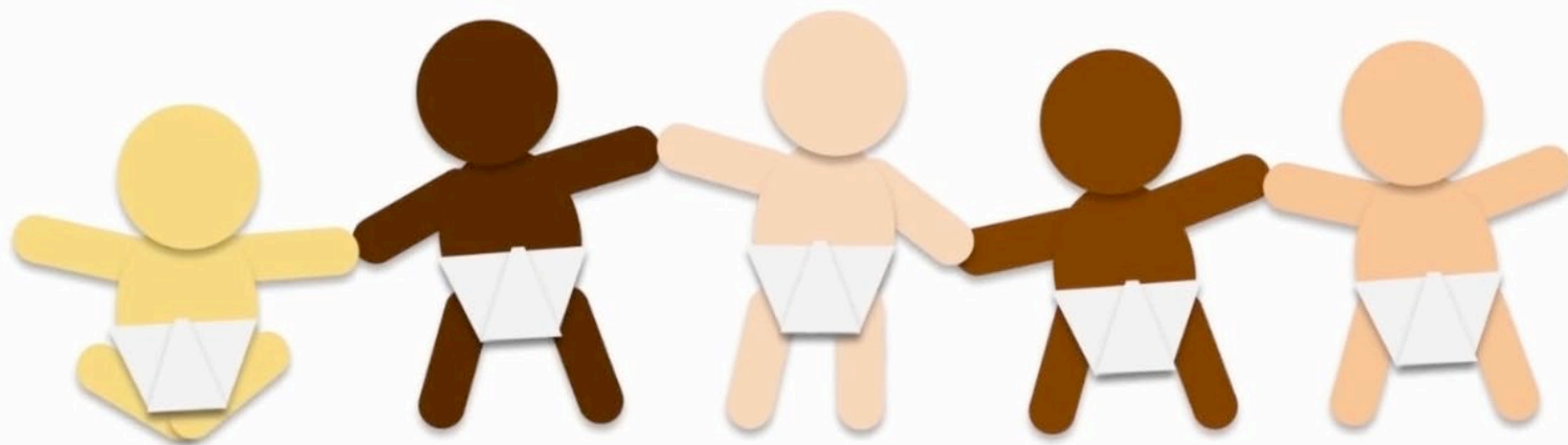
Emergencysimbox.com

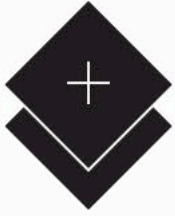




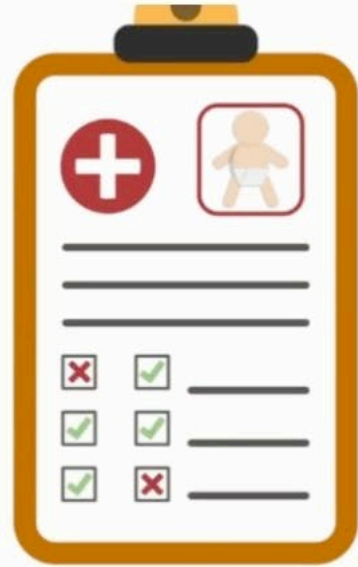
marc auerbach

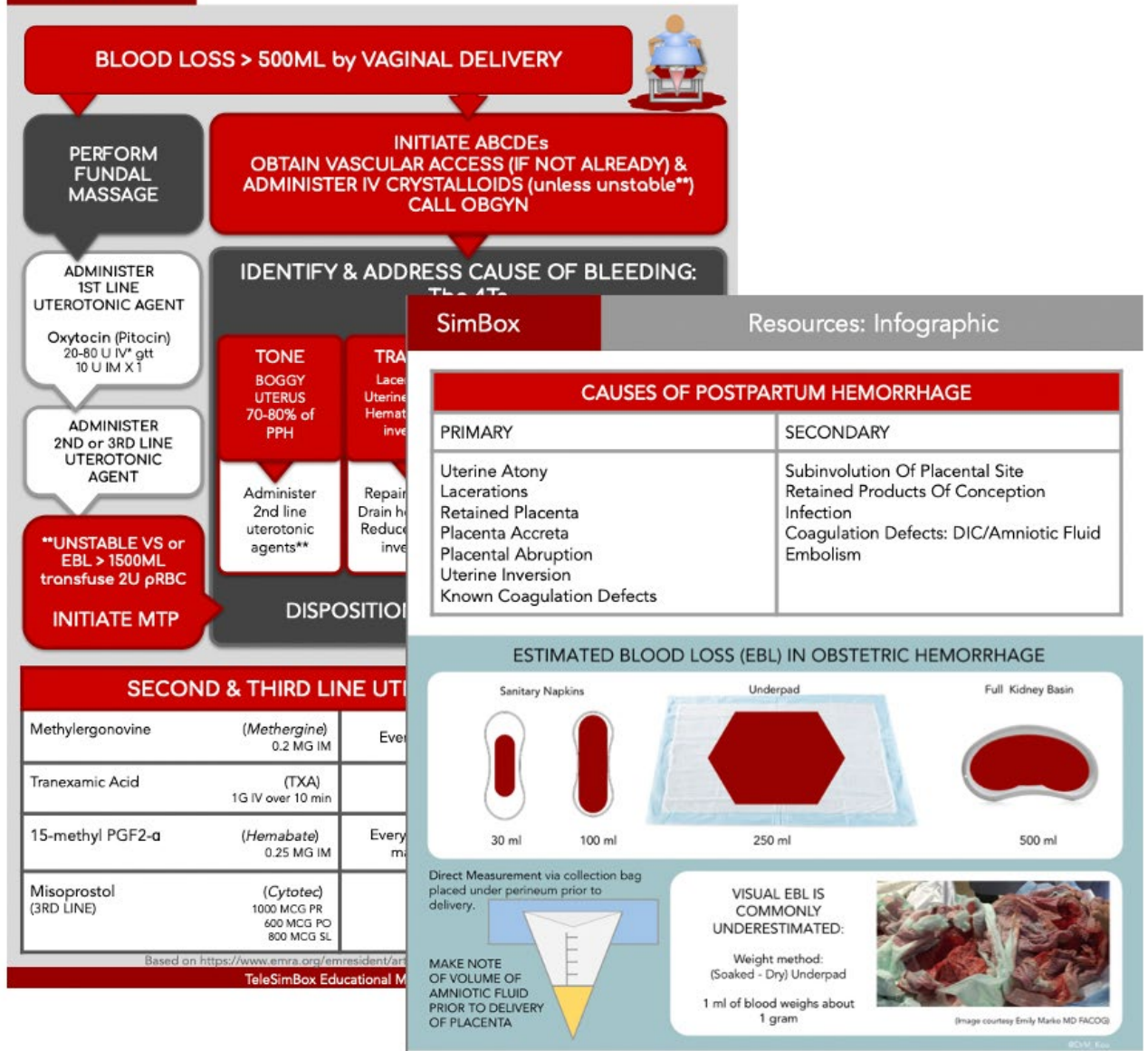
SimBox+ +TeleSimBox





Brief patient update
and 2-minute countdown clock.



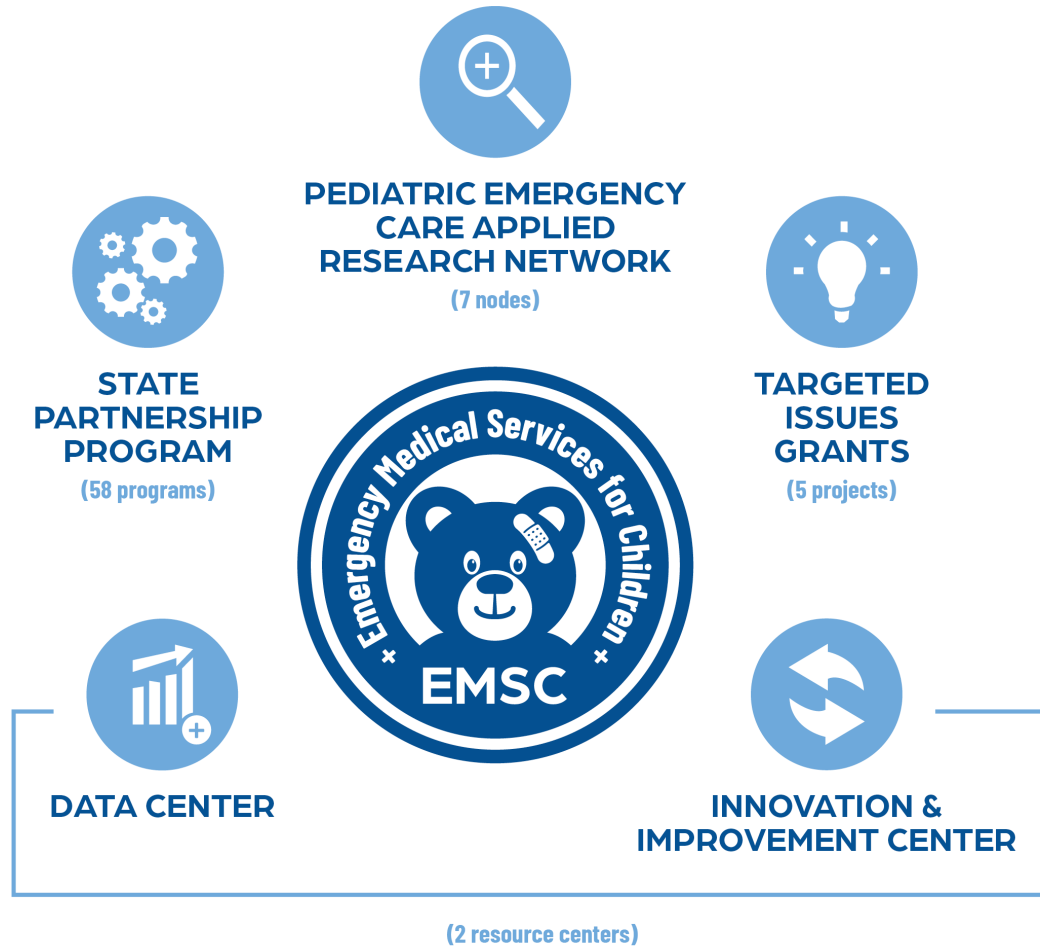


Emergencysimbox.com



Based on <https://www.emra.org/emresident/articles>
TeleSimBox Educational Material





EMSC Mission: to reduce child and youth mortality and morbidity resulting from severe illness or trauma

EMSC Vision: *no matter where a child lives—the health systems in their area will provide quality emergency care services*

Maine EMSC State Partnership Program



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EMS for Children

Visit the [Maine EMS-C Advisory Committee & Minutes](#) page for meeting information

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What is Always Ready for Children?



A collaborative Northeastern program for state and regional recognition of emergency departments that are “pediatric ready”



Always Ready for Children

CT • MA • ME • NH • NJ • NY • RI • VT

Hospital Pediatric Readiness Recognition Program

The Maine Always Ready for Children Recognition Program

The care and management of a pediatric patient in the Emergency Department can be one of the most stressful events clinicians can face. One way to help prepare to provide excellent care is to participate and evaluate your Emergency Department with the [National Pediatric Readiness Assessment](#). The Assessment is a key component of the National Pediatric Readiness Project, a nationwide collaborative effort to help provide resources and guidelines for hospital EDs to utilize with their unique needs, challenges, and resources for pediatric care.

The National Pediatric Readiness Project is a multi-phase quality improvement initiative to ensure that all U.S. emergency departments have the essential guidelines and resources in place to provide effective emergency care to children.

The NPRP assessment helps ED personnel to be better prepared to provide quality care for all patients of all ages.

MAINE ALWAYS READY FOR CHILDREN program for Hospital Emergency Departments & Trauma Centers

[About Pediatric Readiness](#) ▼

What is assessed? ▼

The assessment includes questions for hospital EDs around:

- Infrastructure
- Administration and coordination of care for children
- Personnel
- Pediatric-specific policies



Always Ready for Children

★ ENGAGED ★

1. Complete National Pediatric Readiness Assessment (NPRA) or National Pediatric Readiness Project (NPRP)
2. Readiness Score from NPRA or NPRP (any score)
3. Identify an ED PECC



Always Ready for Children



READY



1. Complete National Pediatric Readiness Assessment (NPRA) or National Pediatric Readiness Project (NPRP)
2. Readiness Score from NPRA or NPRP (70 or above)
3. Identify an ED PECC



Always Ready for Children



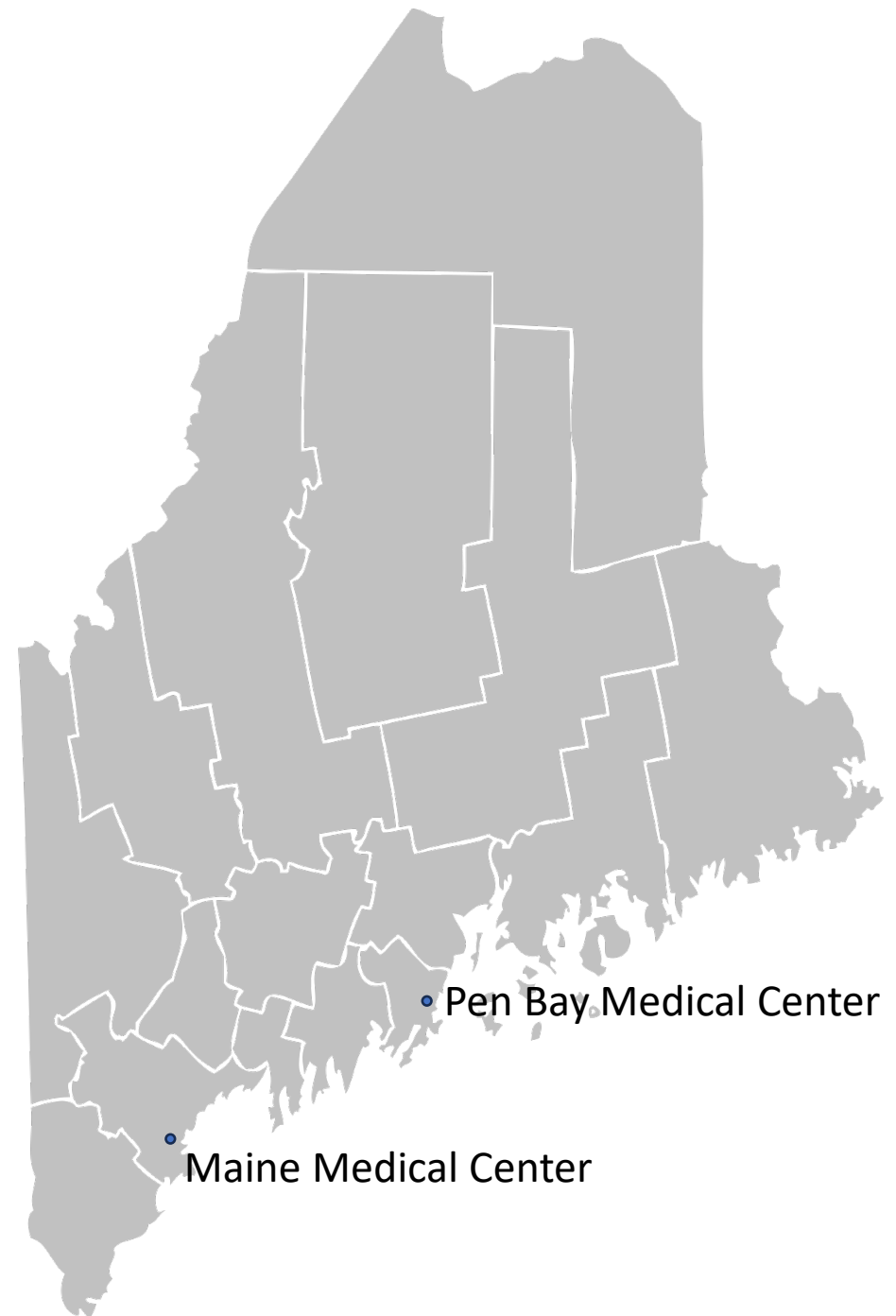
INNOVATOR



1. Complete National Pediatric Readiness Assessment (NPRA) or National Pediatric Readiness Project (NPRP)
2. Readiness Score from NPRA or NPRP (80 or above)
3. Identify an ED PECC
4. Willing to share ARC best practices & resources

Maine Always Ready for Children Recognized Hospitals

- Recognition Level:
- Pediatric Innovator



Maine Medical Center

ARC Pediatric Innovator Recognized

Physician PECC:

Dr. Rachel Williams

Nurse PECC:

Heidi Cote



Maine Medical Center
MaineHealth



Pen Bay Medical Center
MaineHealth

Pen Bay Medical Center

ARC Pediatric Innovator Recognized

Physician PECC:

Dr. Tyler Giberson

Nurse PECC:

Diane Hynes

How to participate:

- Ensure your facility has an ED PECC
- Have completed the National Pediatric Readiness Assessment (NPRA) or self assess with the National Pediatric Readiness Project (NPRP) Tool
- Submit application with commitment letter to NYS EMSC Program <https://www.maine.gov/ems/hospitalpecc>
- Start improving patient care!
- Maine EMSC Program Manager Marc.A.Minkler@maine.gov

Objectives

By end of this presentation the attendee will be able to

1. Define pediatric readiness
2. Describe disparities in pediatric emergency care in the US
3. Locate three resources to improve ED pediatric readiness
4. Plan to engage in pediatric readiness improvement in the next three months

Three options to engage NOW

1. Conduct a pediatric simulation (office, ED, EMS)
2. Become/Recruit/Mentor a PECC
3. Engage with EMSC at state level (ARC program)

Questions?

National work: marc.auerbach@yale.edu

NY specific- amy.eisenhauer@health.ny.gov



Erin Montgomery
RN, BSN, CCRN

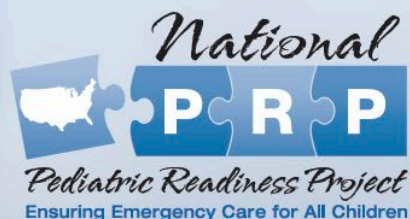
Kamal Abulebda
MD-PICU Indiana

Marc Auerbach
MD-ED Yale

Elizabeth Sanseau
MD-Global-ED CHOP



Pediatric Readiness Saves Lives



You can help save children's lives.
www.pediatricreadiness.org