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INSPIRE

Advancing Pediatric Patient Safety Through Simulation Science

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Network Co-chairs

Disclosures and Conflict of Interest

- Aaron Calhoun
  - No relevant financial or intellectual disclosures.
  - Presenting as co-chair of INSPIRE, and content of this lecture does not necessarily reflect the official position of the University of Louisville
- INSPIRE Network – Funding/support from the following
  - Society for Simulation in Healthcare (SSH)
  - International Pediatric Simulation Society (IPSS)
  - R Baby Foundation
  - The American Heart Association
  - B-line Medical
  - Laerdal Foundation for Acute Care

INSPIRE – Who We Are…

Mission, vision, core values, Mission, vision, core values,
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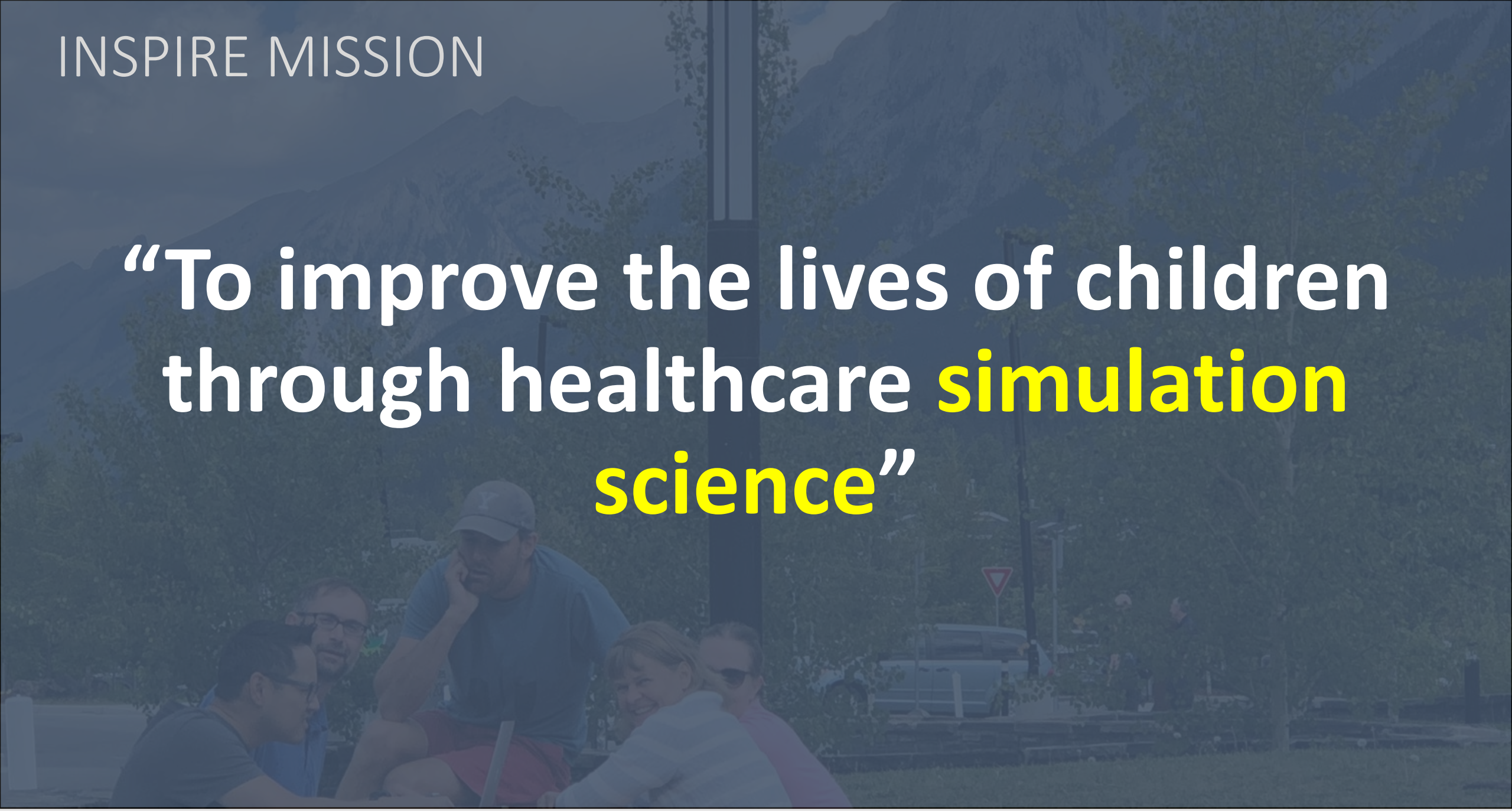
International **N**etwork for **S**imulation-based **P**ediatric **I**nnovation, **R**esearch and **E**ducation

INSPIRE MISSION

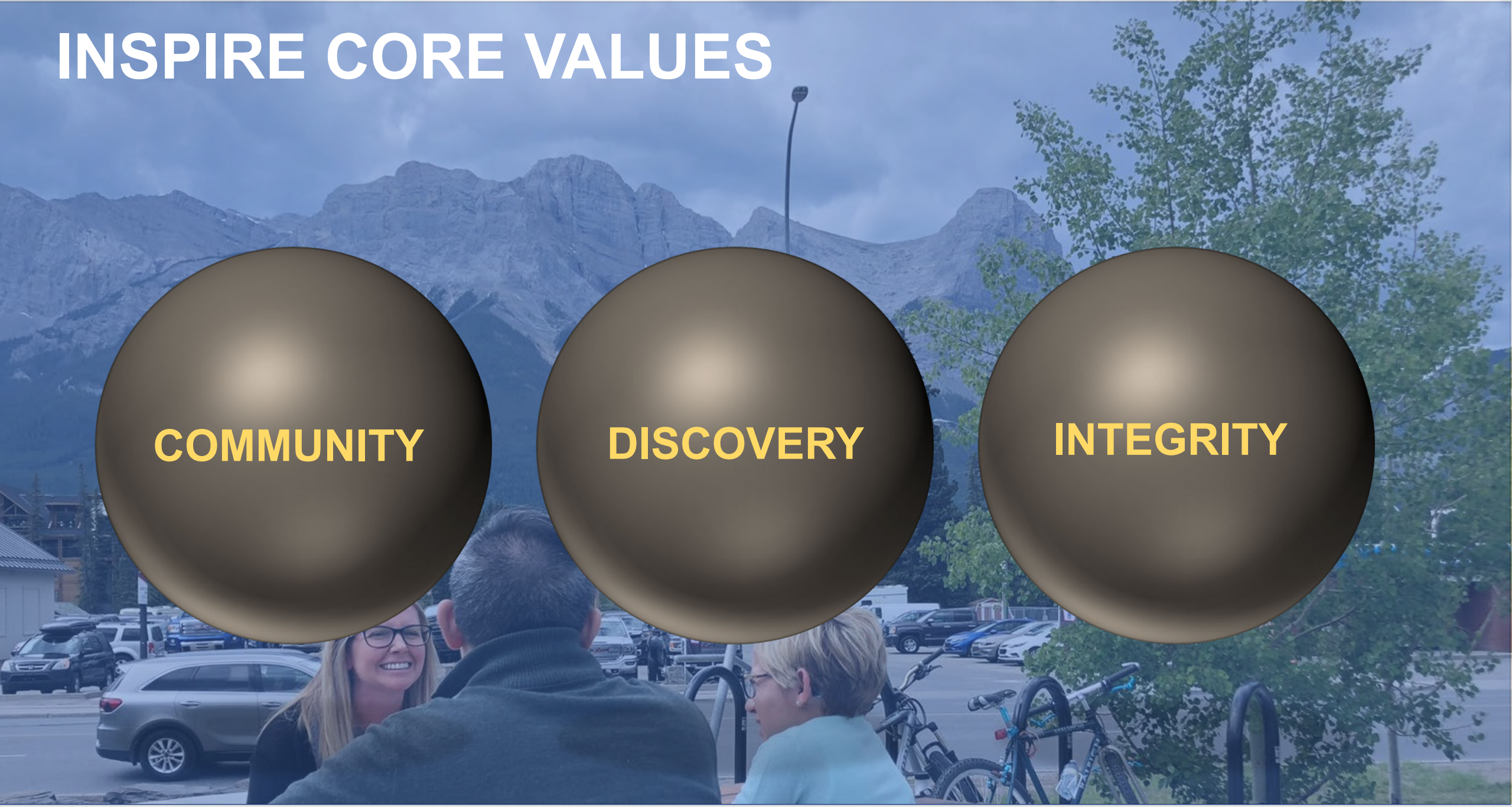


“To improve the lives of children through healthcare simulation science”

INSPIRE VISION

"To serve as a **global community** that catalyzes discoveries and promotes collaboration in simulation-based research, scholarship, and innovation"

INSPIRE CORE VALUES



INSPIRE CORE VALUES

We strive to create a collaborative environment with open-sharing of ideas and accessibility between members while breaking down silos

INSPIRE CORE VALUES

We encourage innovation through taking risks and challenging the status quo

INSPIRE CORE VALUES

We believe in transparency, trust, respect, and high standards for quality in all of our endeavors

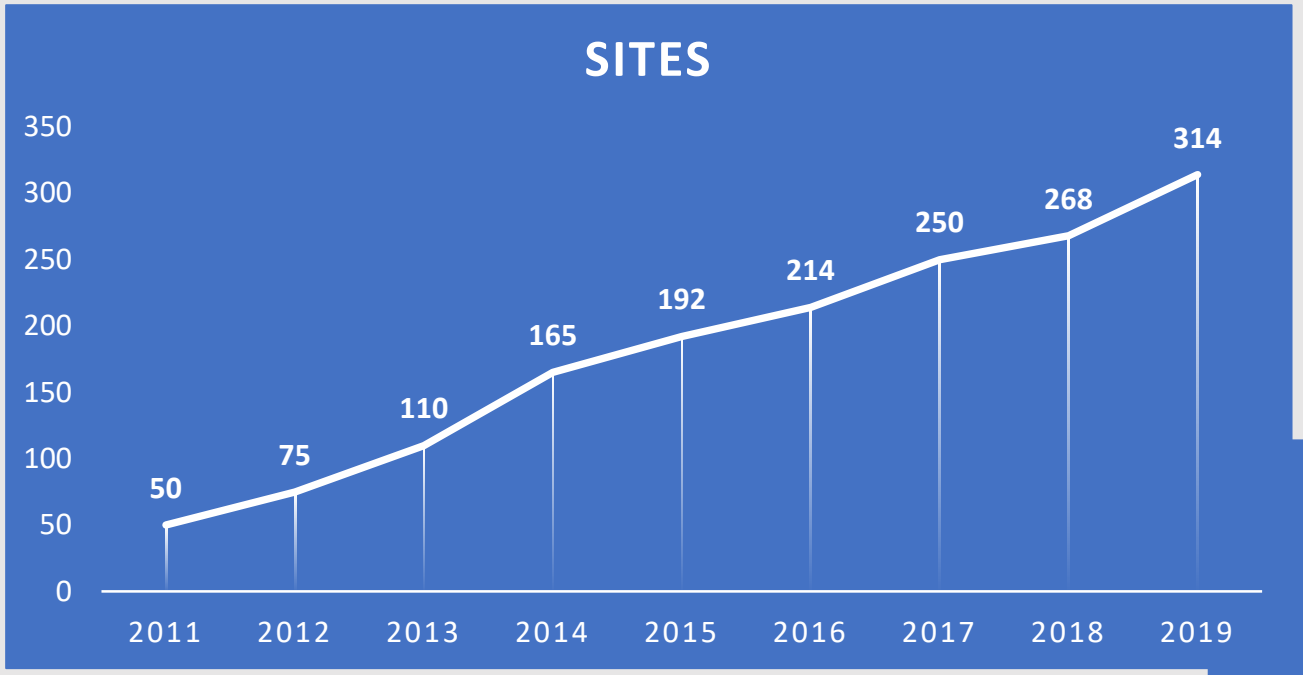
The INSPIRE Community…

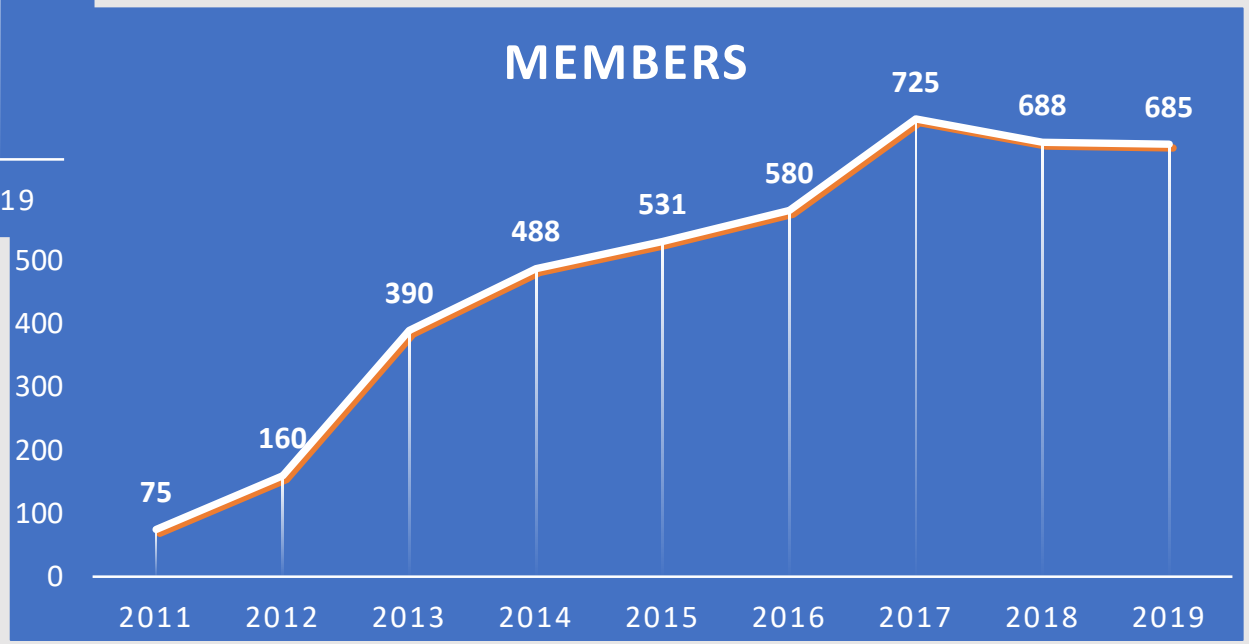
International **N**etwork for **S**imulation-based **P**ediatric **I**nnovation, **R**esearch and **E**ducation

INSPIRE Global Reach- Current Snapshot

685 community members 314 sites 40 countries

INSPIRE Growth Since Its Inception





Productivity

29 new projects in 2019
>163 presentations and abstracts
>159 publications last year
>6 million in funding

http://inspiresim.com/annual-report/annual-report/

The INSPIRE Process

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International **N**etwork for **S**imulation-based **P**ediatric **I**nnovation, **R**esearch and **E**ducation

The INSPIRE Process

Project Submission	Online Scientific Review Committee Consult Development of “ALERT” (Advance Look Exploratory Research Template) Presentation
Shaping the Idea	Presentation of the idea at an INSPIRE national/international meeting “Deep Dive” discussion with worldwide simulation experts to shape the project idea
Acquire Multi-site Support	Develop multiple site protocol based on contacts developed at the meeting Ethical Review and implementation of the project
Project Support	Ongoing project support via engagement with the Project Support Committee Tracking of global programs of research within the network, progress ALERT presentation
Financial Support	Development and adjudication of donor funded awards, with a focus on outcomes, patient safety, and innovation Support of novice researchers and researchers from low/middle income countries

Current INSPIRE Funded Projects

Projects Funded in 2019		
Clinical Outcomes	CPR COACH – CPR Optimization and ACHievement Stepped Wedge Randomized Trial (2-year Award) – Dr. Betsy Hunt	$170,000
Novice Researcher	Deliberate Practice to Improve Interdisciplinary Communication - A Pilot Study – Dr. Veronica Godsey	$10,000
Novice Researcher	Does Implicit Racial Bias Impact Simulated CPR Performance – Dr. Samreen Vora	$10,000

Projects Funded in 2020		
Innovation	3D-Printed Pediatric and Neonatal Models for Simulation– Dr. Michael Wagner	$30,000
Patient Safety	Impact of Visual Distraction on Skills Performance – Dr. Isabel Gross	$30,000
LMIC Research Accelerator	Sequential Simulation in Zambia to Develop Paediatric Perioperative Patient Safety – Dr. Sonia Akrimi	$30,000
Systems-based Care Research Accelerator	Implementation of a Resuscitation Bundle for Neonatal Resuscitation – Dr. Nora Ali	$15,000
LMIC Travel	Implementation of Basic Life Support (BLS) and Pediatric Advanced Life Support (PALS) courses in low resources settings– Dr. Eugene Tuyishime	$4,000
LMIC Travel	Evolution of communication training through Simulation in India – Dr. Geethanjali Ramachandra	$4,000

- Fully funded by donors
- 2019 Total- $190,000
- 2020 Total- $113,000
- $82,000 allocated for 2021

INSPIRE - Key Patient Safety Projects

International **N**etwork for **S**imulation-based **P**ediatric **I**nnovation, **R**esearch and **E**ducation

Key Patient Safety Projects

- **ImPACTS** (Marc Auerbach, MD, MSc) – Longitudinal system-level diagnosis and improvement of care at community hospitals
- **CPR COACHES** (Adam Cheng, MD and Betsy Hunt, MD, MPH, PhD) – Translational simulation research – from simulation lab (bench) to bedside
- **PEAK** (Tensing Maa, MD) – Using simulation registries to detect latent safety threats
- **CONSORT/STROBE Statement Extensions** (Adam Cheng, MD) – Deploying network resources to improve global research quality
- **Virtual Reality Training in Pediatrics** (Todd Chang, MD, MAcM) – Ongoing engagement with new and emerging technologies

ImPACTS

IMPROVING PEDIATRIC ACUTE CARE THROUGH SIMULATION

Baseline Assessment

- Simulation assessments facilitated by children's hospital-based team
  - Infant Foreign Body
  - Infant Sepsis
  - Infant Seizure
  - Child Cardiac Arrest

Report Out

- Benchmarking of local pediatric readiness
- Personalized global reports
- Case specific reports
- Action planning for future improvement

Process Improvement

- Community ED selects action items for next 6 months
- Resources for action plan provided by ImPACTS
- Meetings with Children's Hospital at 2 and 4 months
- Support provided as needed
- ***6 month site visit***

0 months ---------- 2 weeks ---------- 2, 4, 6 months

- 19 children's hospitals
- 37 community emergency departments

Optimizing CPR performance with CPR coaching

multicentre RCT with

40 Teams (200 Part.)

intervention

feedback defibrillator, leader, airway expert,

2 CPR providers + **CPR coach**

control

feedback defibrillator, leader, airway expert,

2 CPR providers + **provider**

paediatric cardiopulmonary arrest simulation

PEAK (Prevalence of Errors in Anaphylaxis in Kids)

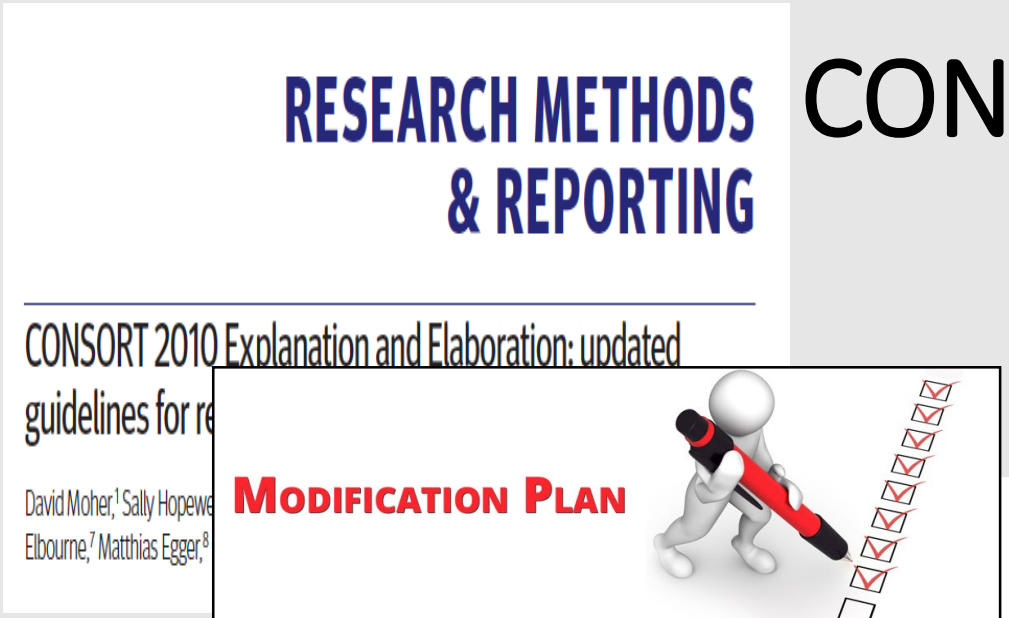
- INSPIRE point-prevalence project assessing global pediatric anaphylaxis care using in-situ simulation
- Usage of International Simulation Data Registry's (ISDR) data entry infrastructure
- 28 institutions from 6 countries
- Poor (46%) access to epinephrine autoinjectors
- 36% of sites uncovered similar latent safety threats (Cognitive aids leading to dosing confusion)
- Provided site-specific actionable patient safety information

ISDR
INTERNATIONAL SIMULATION DATA REGISTRY
CONNECTING DATA TO LIFE

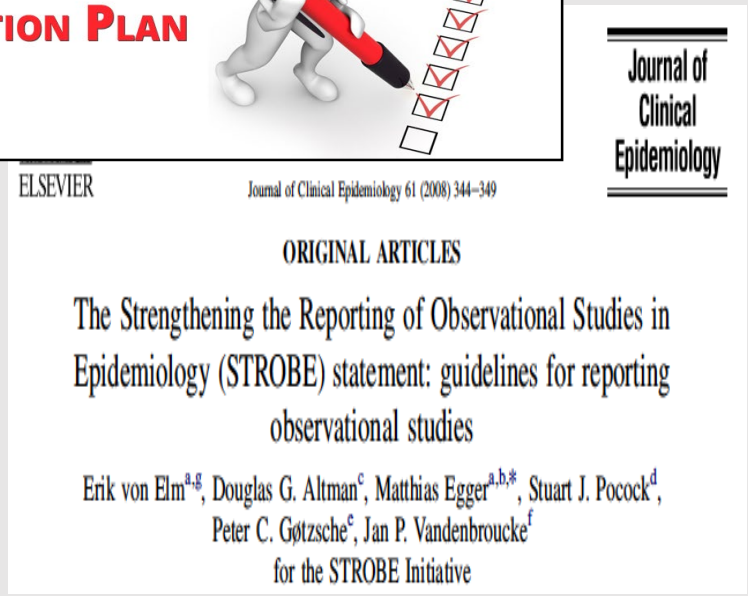
Reporting Guidelines for Healthcare Simulation Research

- Utilized the entire network infrastructure to enhance global simulation science
- Global review of existing guidelines with consensus building process
- Simulation specific extension items
  - CONSORT 11 items
  - STROBE 10 items
- Additional checklist of key elements
- Now a requirement of major simulation journals

CONSORT



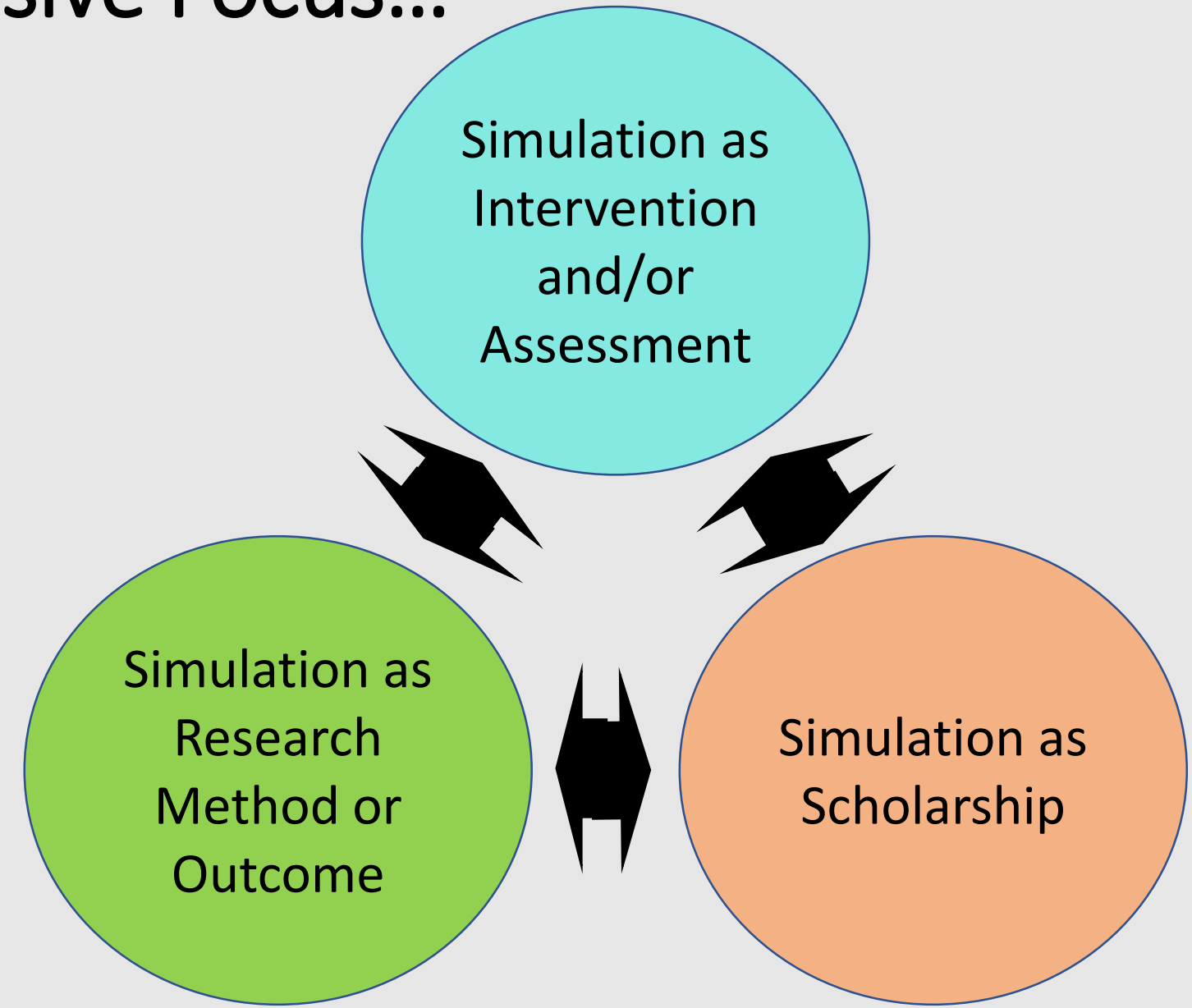
STROBE



Best Practices for Virtual Reality & Resuscitation Leadership Training

- Pediatric simulator fidelity decreases with size
- Virtual Reality (VR) is not yet widely used in pediatric simulation practice, but is a potentially powerful solution
- INSPIRE VR studies demonstrate:
  - Induction of necessary “eustress”
  - Replication of cognitive load
- Ongoing INSPIRE studies assessing ability of VR training to improve critical time metrics in acute care cases

An Expansive Focus…



What INSPIRE Offers to the Healthcare Modeling and Simulation Community…

- Proven project evaluation and development methodology
- Track record of high-impact multi-site patient safety and simulation research
- Capacity to mentor and train large numbers of promising new researchers
- Ability to effect pediatric outcomes using simulation on a worldwide scale

INSPIRE: Ready to Serve…

- Extensive design expertise available
  - Study structure
  - Quantitative and qualitative analysis
  - Technology (VR, etc.)
  - Dissemination
  - Data archival
- Mobilization of multiple pediatric centers
- Letters of support for projects and grants
- Open to communication and questions

https://inspiresim.com/contact-us/

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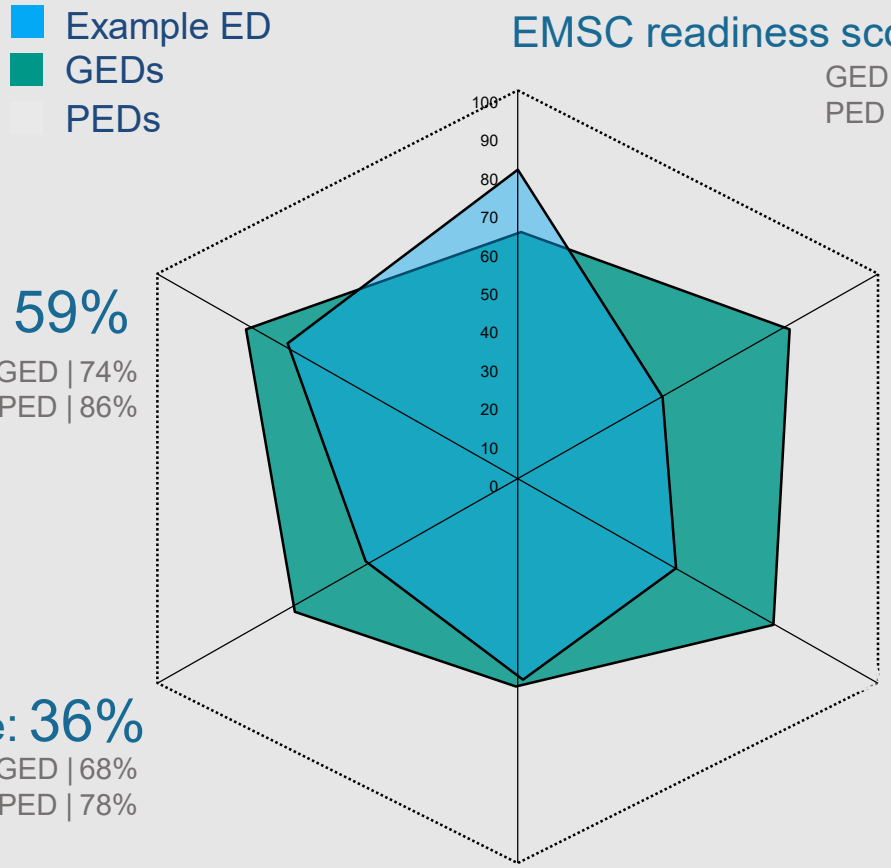
Questions?


International Network for Simulation-based
INSPIRE
Pediatric Innovation, Research and Education

Site Reports



EMSC readiness score: 82%
GED | 64%
PED | 90%

Teamwork score: 59%
GED | 74%
PED | 86%

Foreign body case score: 36%
GED | 80%
PED | 80%

Seizure case score: 36%
GED | 68%
PED | 78%

Sepsis case score: 43%
GED | 73%
PED | 100%

Cardiac arrest case score: 50%
GED | 52%
PED | 67%

Site Reports

ED Pediatric Performance Snapshot: INFANT SEPSIS

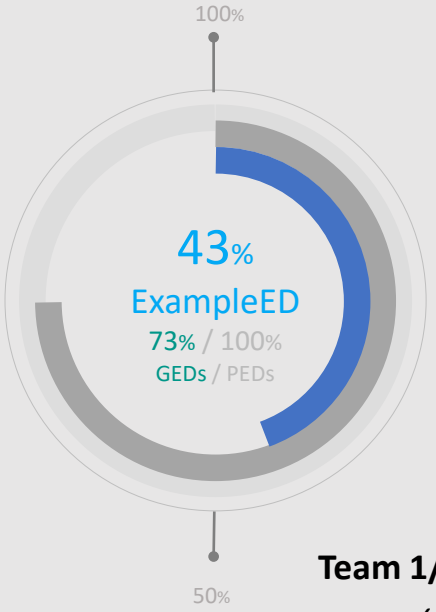
Case details

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	Team 1/Team 2
1.Begin high flow O_2	✓ ✓
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:	✕ ✕

Safety threats

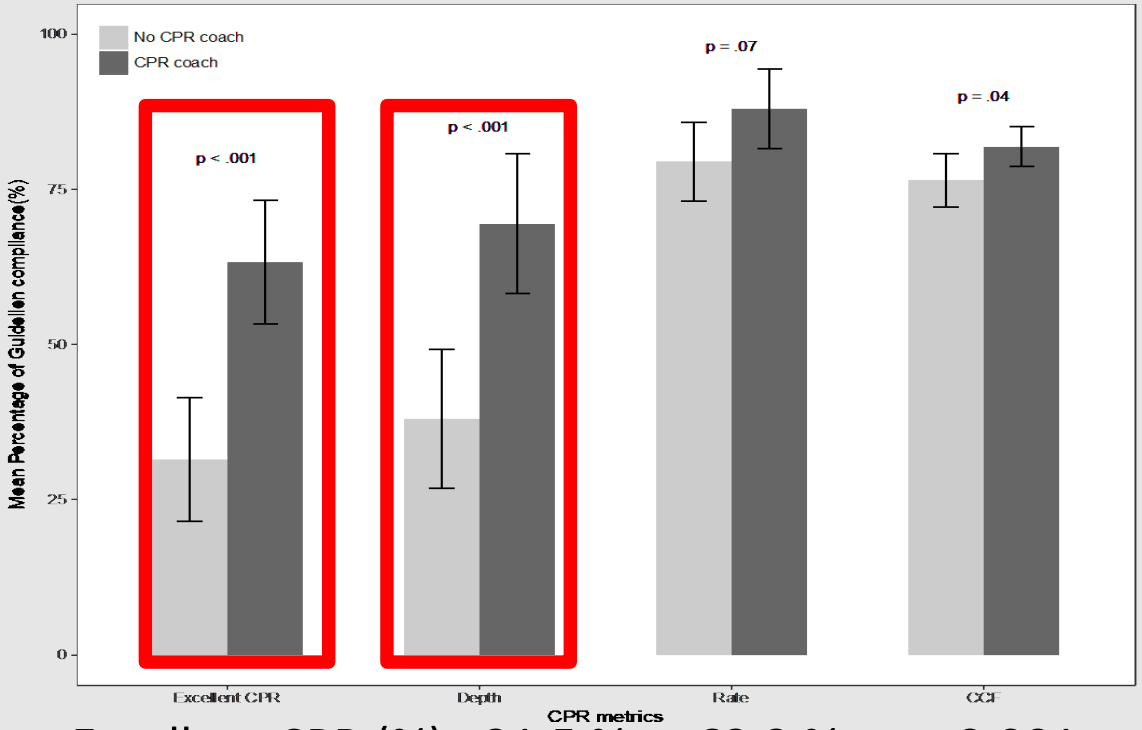
1. Staff members using different applications for medication dosing

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

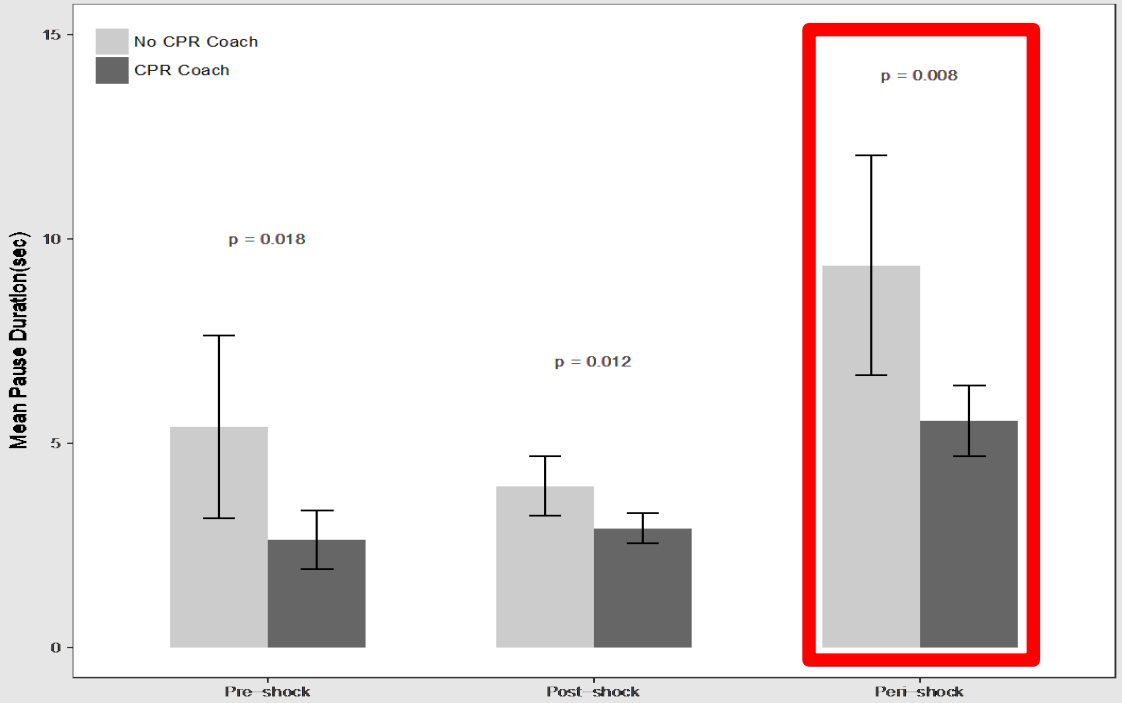
2. To increase the percentage teams that **demonstrate the ability to calculate appropriate weight based dosing of medications in less than two minutes** by 25% within 6 months.

Improved CPR quality

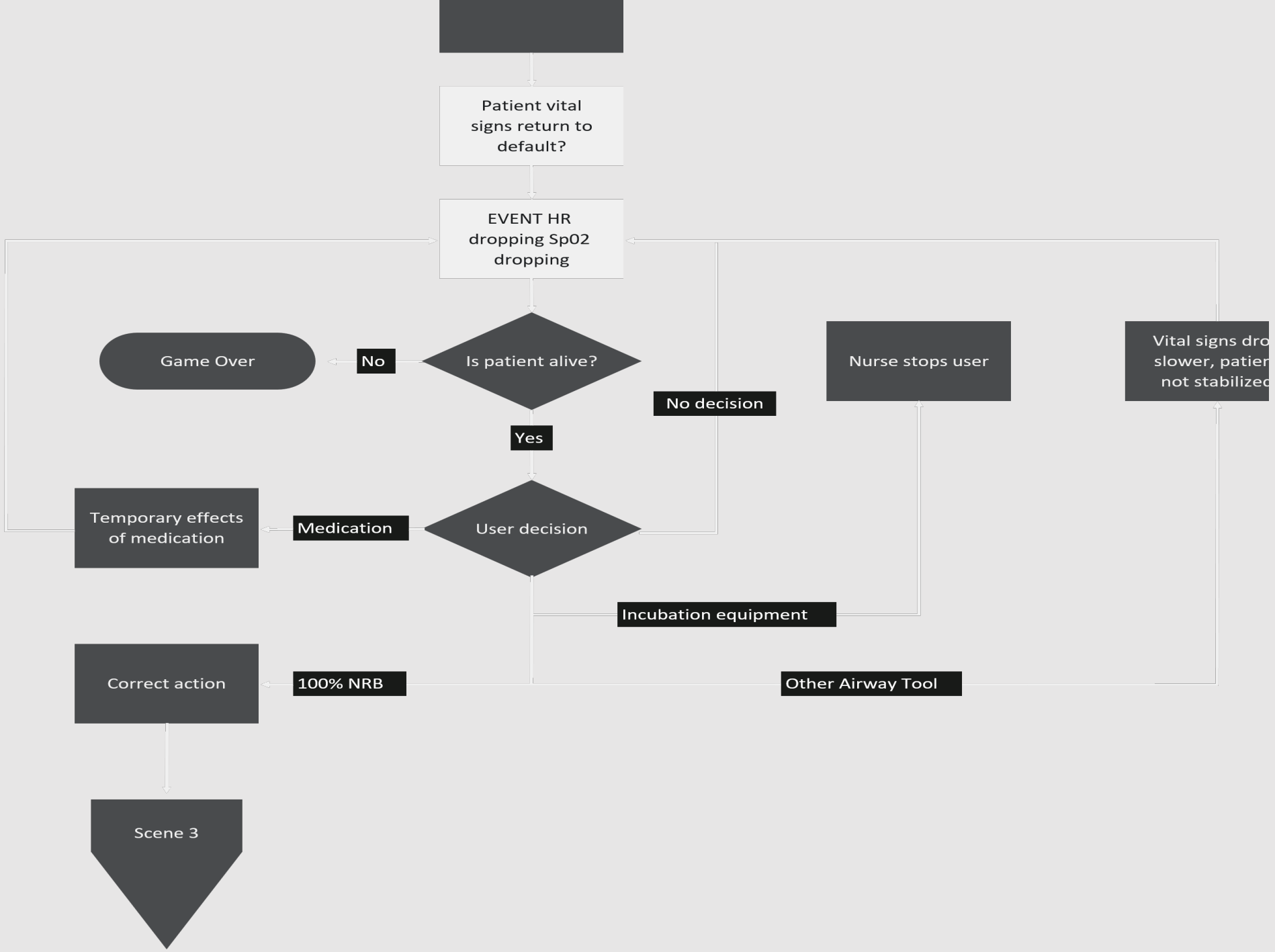


- Excellent CPR (%): 31.5 % vs 63.3 % , p < 0.001
- Depth 50 – 60 mm (%): 38.0 % vs 69.5 %, p < 0.001
- Rate 100 – 120 bpm (%): 79.5% vs 88.0 %, p = 0.07
- Chest Compression Fraction (%): 76.5 % vs. 81.9 %, p = 0.04

Decreased Shock Duration



- Pre-shock duration: 5.4 sec vs. 2.6 sec, p = 0.018
- Post-chock duration: 4.0 sec vs. 2.9 sec, p = 0.012
- Peri-shock duration: 9.4 sec vs. 5.5 sec, p = 0.008


Patient vital signs return to default?
EVENT HR dropping Sp02 dropping
Is patient alive?
No
Game Over
Yes
No decision
Nurse stops user
Vital signs dro slower, patier not stabilized
User decision
Medication
Temporary effects of medication
Incubation equipment
100% NRB
Other Airway Tool
Correct action
Scene 3