EMPOWERING THE NEXT GENERATION -
INVESTMENT IN PREVENTABLE INFANT DEATHS
BY A HEALTHY START ___ March 27, 2024, Taipei

Asia-Pacific Economic Cooperation

HPA Health Promotion Administration, Ministry of Health and Welfare

Advancement and Future Directions in Pediatric Critical Care

Vinay Nadkarni MD, MS, FCCM

2023 President, Society of Critical Care Medicine

Professor, Department of Anesthesiology, Critical Care and Pediatrics

The Children's Hospital of Philadelphia, University of Pennsylvania Perelman School of Medicine

Society of Critical Care Medicine
The Intensive Care Professionals

Right Care Right Now

I will ensure my presentation promotes thoughtful inclusion of underrepresented communities and content relevant to diversity and equity in continuing education activities.

Vinay Nadkarni MD, FCCM

Disclosures: No Relevant Conflicts

Employment: University of Pennsylvania

President 2023-2024: Society of Critical Care Medicine

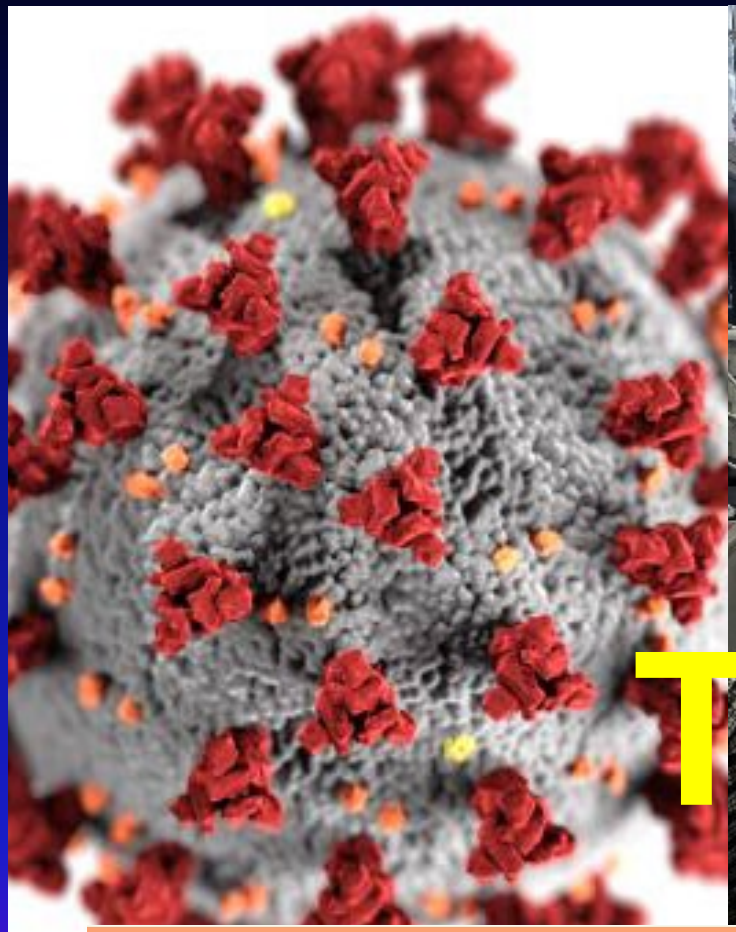
Research Grants:

- National Institutes of Health /Department of Defense
  (Cardiac Arrest , Cardiopulmonary bypass, Airway Registry, Mitochondrial Medicine)
- US Department of Defense (mitochondrial monitoring, pGz)
- American Heart Association-Laerdal Foundation/RQI Partners
  (Academy for Resuscitation of Children)
- Zoll Medical (CPR Learning Laboratory Network: PediRES-Q)
- Nihon-Kohden (Capillary refill, Respiratory Function Monitoring)
- Philips Medical (waveform analysis)
- Hearthero/Defibtech (waveform analysis)
- Agency for Healthcare Research and Quality (Intubation Registry)

Science Advisory Boards (Volunteer)

- International Liaison Committee on Resuscitation (ILCOR)
- AHA ECC and AHA Get with the Guidelines-Resuscitation
- Board Member, Citizen CPR Foundation

Children's Hospital of Philadelphia
Center for Pediatric Resuscitation



“Better Together”

EMPOWERING THE NEXT GENERATION -
INVESTMENT IN PREVENTABLE INFANT DEATHS
BY A HEALTHY START

March 27, 2024, Taipei

APEC Asia-Pacific Economic Cooperation

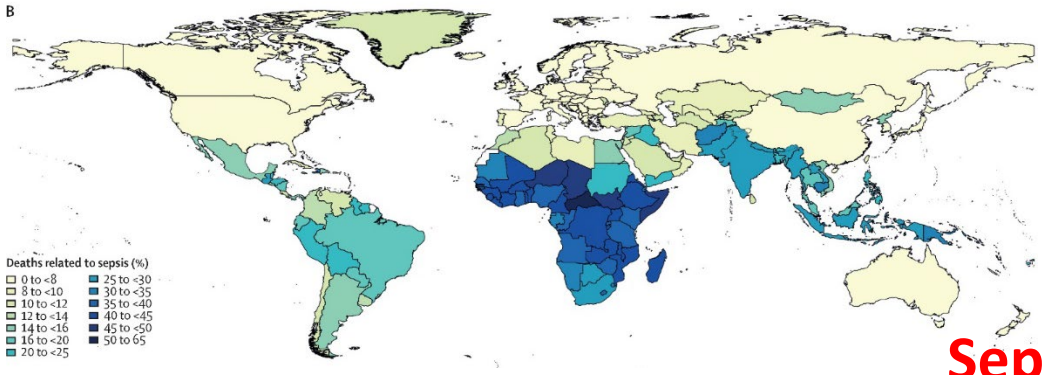
HPA Health Promotion Administration, Ministry of Health and Welfare

Respiratory Failure, Sepsis, Shock and Trauma…

#1 Killers

…in Taiwan,
…in Philadelphia
…in APEC countries,
…Worldwide!

Low- and middle-income countries bear the highest burden of sepsis



- Inverse relationship between income level and sepsis incidence and mortality

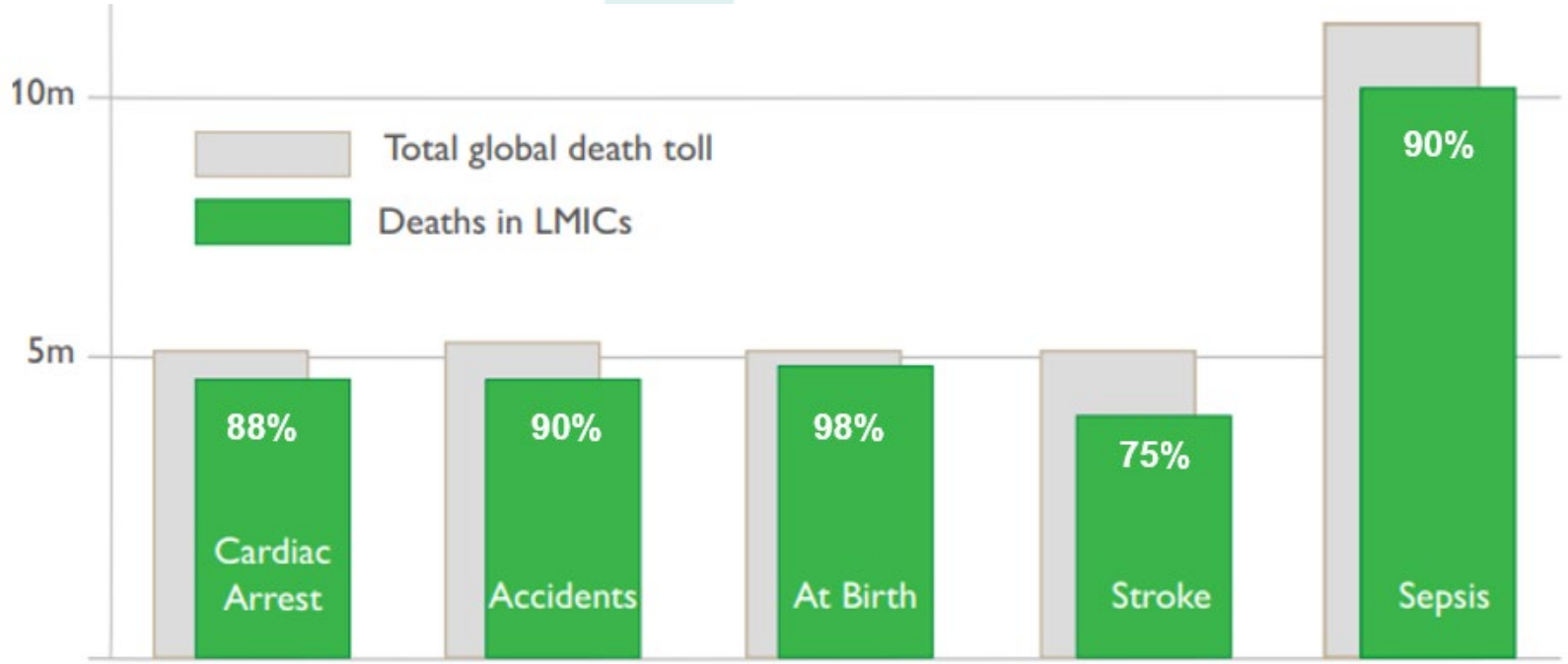
Sepsis Care is the Bellwether for Quality of Care in Health Systems

85.0% of sepsis cases and **84.8% of sepsis related deaths** occurred in countries with low, low-middle, or middle sociodemographic indices (SDI), particularly in sub-Saharan Africa and South-East Asia.

Surviving Sepsis Campaign

88% of the World's Largest Killers occur in LMICs

90% of more than 10 million Sepsis Deaths per year occur in LMIC



Society of Critical Care Medicine
The Intensive Care Professionals

ESICM
The Intensive Connection

Original research

BMJ Global Health

Essential Emergency and Critical Care: a consensus among global clinical experts

Carl Otto Schell ,[1,2,3] Karima Khalid,[4,5] Alexandra Wharton-Smith ,[6] Jacquie Oliwa,[7,8] Hendry R Sawe ,[9] Nobhojit Roy ,[1,10,11] Alex Sanga,[12] John C Marshall ,[13] Jamie Rylance,[14] Claudia Hanson ,[1,15] Raphael K. Kayambankadzanja,[16,17] Lee A Wallis ,[18] Maria Jirwe ,[19] Tim Baker ,[1,5,20] The EECC Collab

To cite: Schell CO, Khalid K, Wharton-Smith A, *et al*. Essential Emergency and Critical Care: a consensus among global clinical experts. *BMJ Global Health* 2021;**6**:e006585. doi:10.1136/bmjgh-2021-006585

ABSTRACT

Background Globally, critical illness results in millior of deaths every year. Although many of these deaths are potentially preventable, the basic, life-saving care critically ill patients are often overlooked in health sys Essential Emergency and Critical Care (EECC) has bee

frontiers in Pediatrics

METHODS
published: 16 March 2022
doi: 10.3389/fped.2022.756643

The Burden of Critical Illness in Hospitalized Children in Low- and Middle-Income Countries: Protocol for a Systematic Review and Meta-Analysis

Teresa B. Kortz[1,2], Katie R. Nielsen[3,4], Rishi P. Mediratta[5], Nicole F. O'Brien[6], Jan Hau Lee[7,8], Jonah E. Attebery[9], Em Carter Biewen[1], Alvaro Coronado Munoz[11], Mary L. deAlm Shubhada Hooli[14], Hunter Johnson[6], Niranjan Kissoon[15,16], Amanda M. McCarthy[11], Carol Pineda[19], Kenneth E. Remy Yemisi Takwoingi[22,23], Matthew O. Wiens[24,25†] and Adnan T. Acute Lung Injury and Sepsis Investigators (PALISI) Netwo Global Health Subgroup*

OPEN ACCESS

Edited by:
Yves Ouellette,
Mayo Clinic, United States

Reviewed by:
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Virginia Commonwealth University, United States
Yee Hui Mok,
KK Women's and Children's

frontiers in Pediatrics

METHODS
published: 28 January 2022
doi: 10.3389/fped.2021.793326

Global PARITY: Study Design for a Multi-Centered, International Point Prevalence Study to Estimate the Burden of Pediatric Acute Critical Illness in Resource-Limited Settings

Qalab Abbas[1†], Adrian Holloway[2†], Paula Caporal[3,4], Eliana López-Barón[5], Asya Agulnik[6], Kenneth E. Remy[7,8], John A. Appiah[9], Jonah Attebery[10], Ericka L. Fink[11], Jan Hau Lee[12,13], Shubhada Hooli[14], Niranjan Kissoon[15], Erika Miller[2], Srinivas Murthy[15], Fiona Muttalib[15], Katie Nielsen[16], Maria Puerto-Torres[6], Karla Rodrigues[17], Firas Sakaan[6], Adriana Teixeira Rodrigues[17], Erica A. Tabor[18], Amelie von Saint Andre-von Arnim[16], Matthew O. Wiens[19,20,21], William Blackwelder[22], David He[23], Teresa B. Kortz[24,25‡] and Adnan T. Bhutta[2,26‡] on Behalf of the PALISI Global Health Subgroup the Global PARITY Investigators*

OPEN ACCESS

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Suresh Kumar,
Postgraduate Institute of Medical Education & Research, India

Saving Children's Lives Mission:

Stop *preventable* deaths of children from pneumonia, diarrhea, and sepsis

World Health Organization

EXECUTIVE BOARD
152nd session
Agenda item 5

EB152(3)
1 February 2023

Integrated emergency, critical and operative care for universal health coverage and protection from health emergencies[1]

The Executive Board, having considered the report of the Director-General,[2]

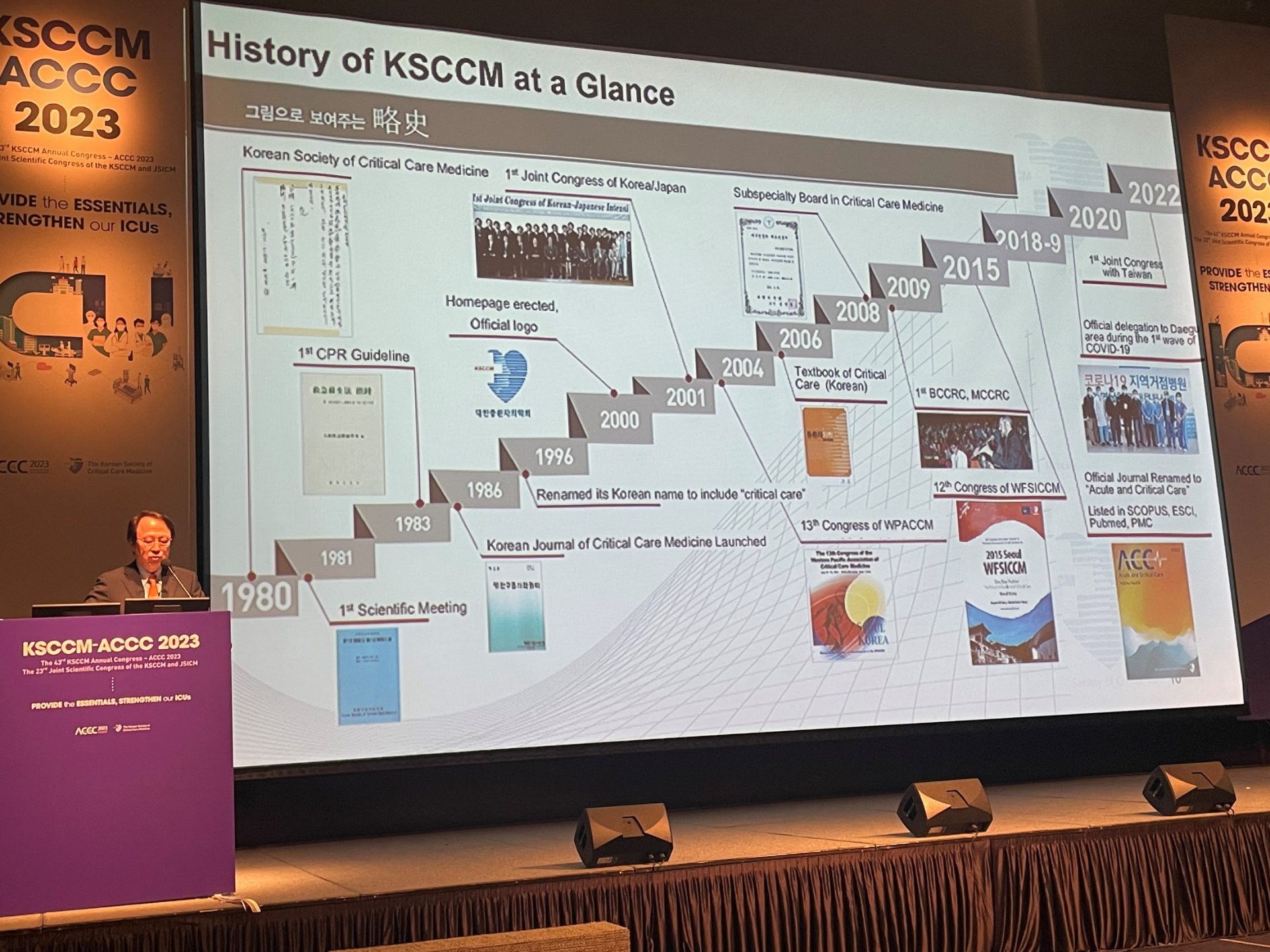
Decided to recommend to the Seventy-sixth World Health Assembly the adoption of the following resolution:

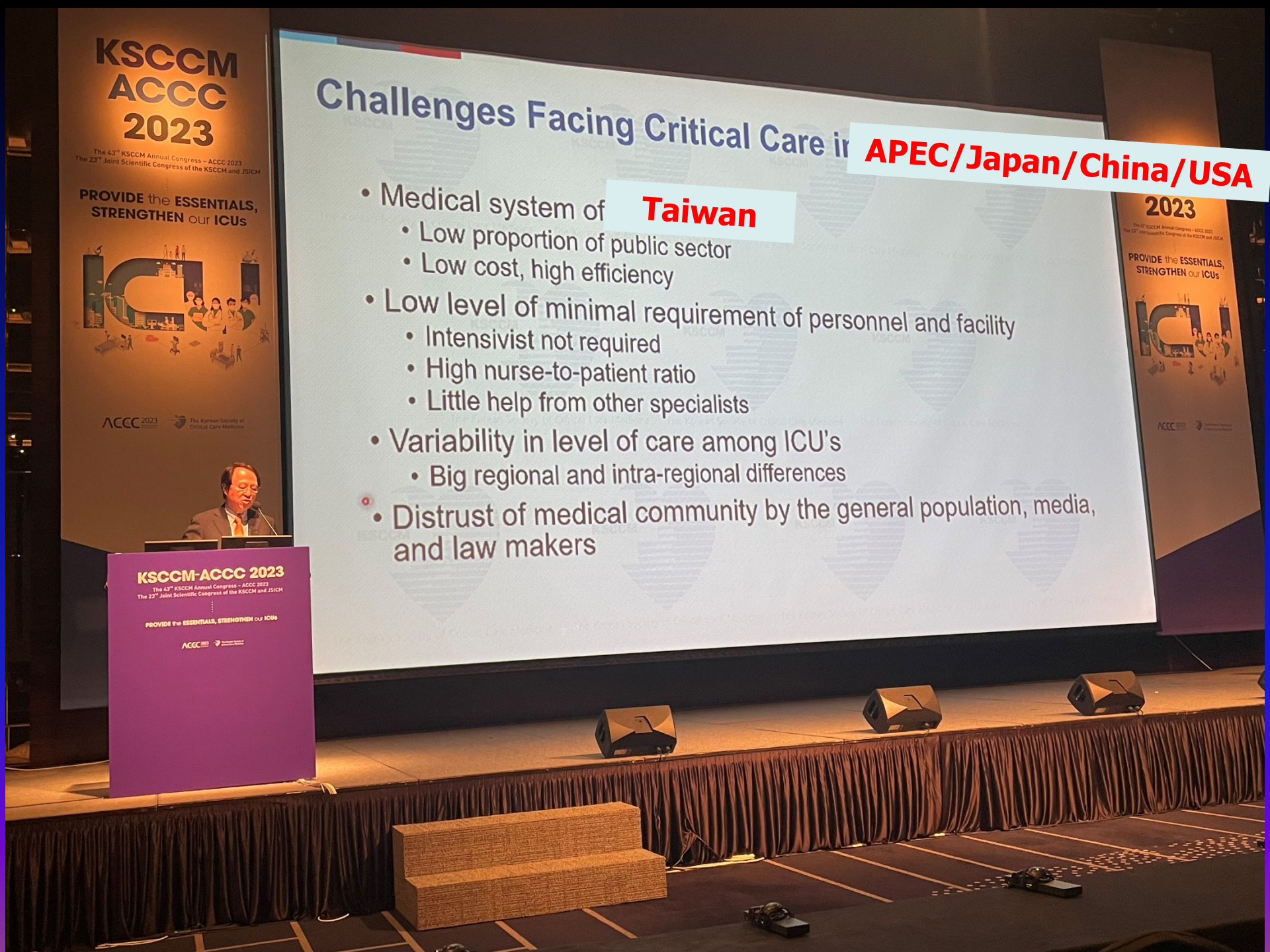
Re-active ⟷ **Pro-active**

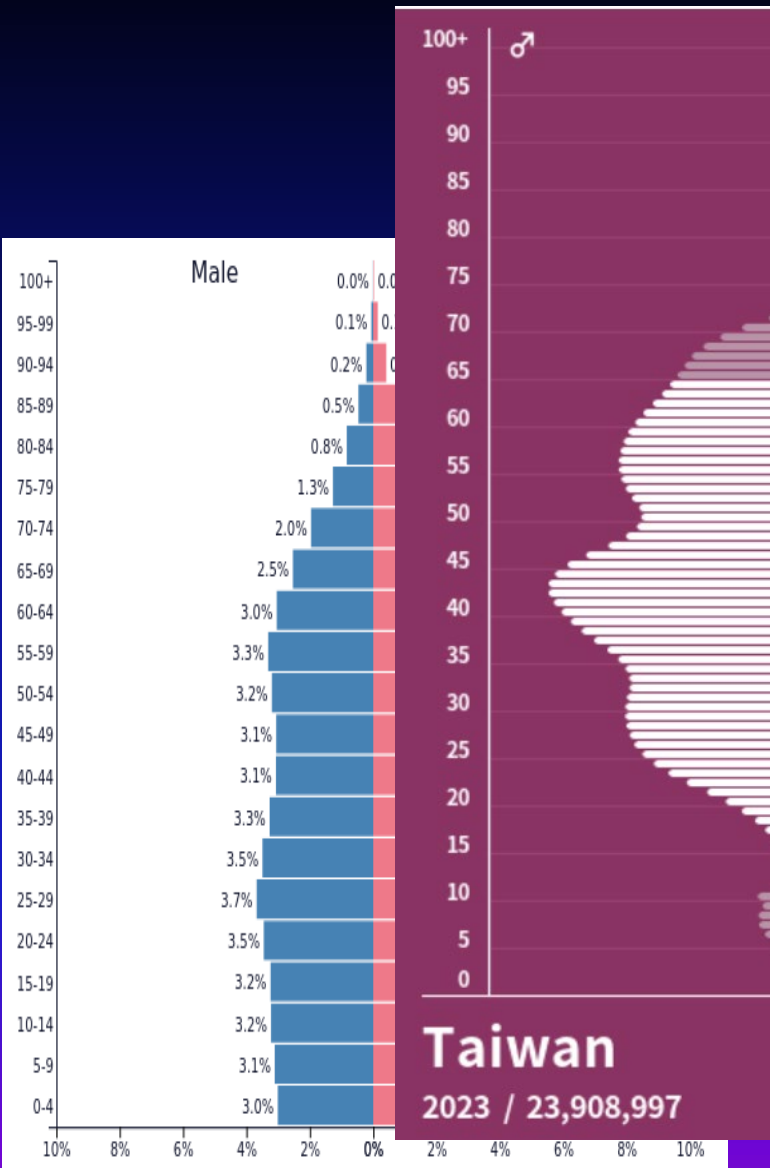
Society of Critical Care Medicine
The Intensive Care Professionals

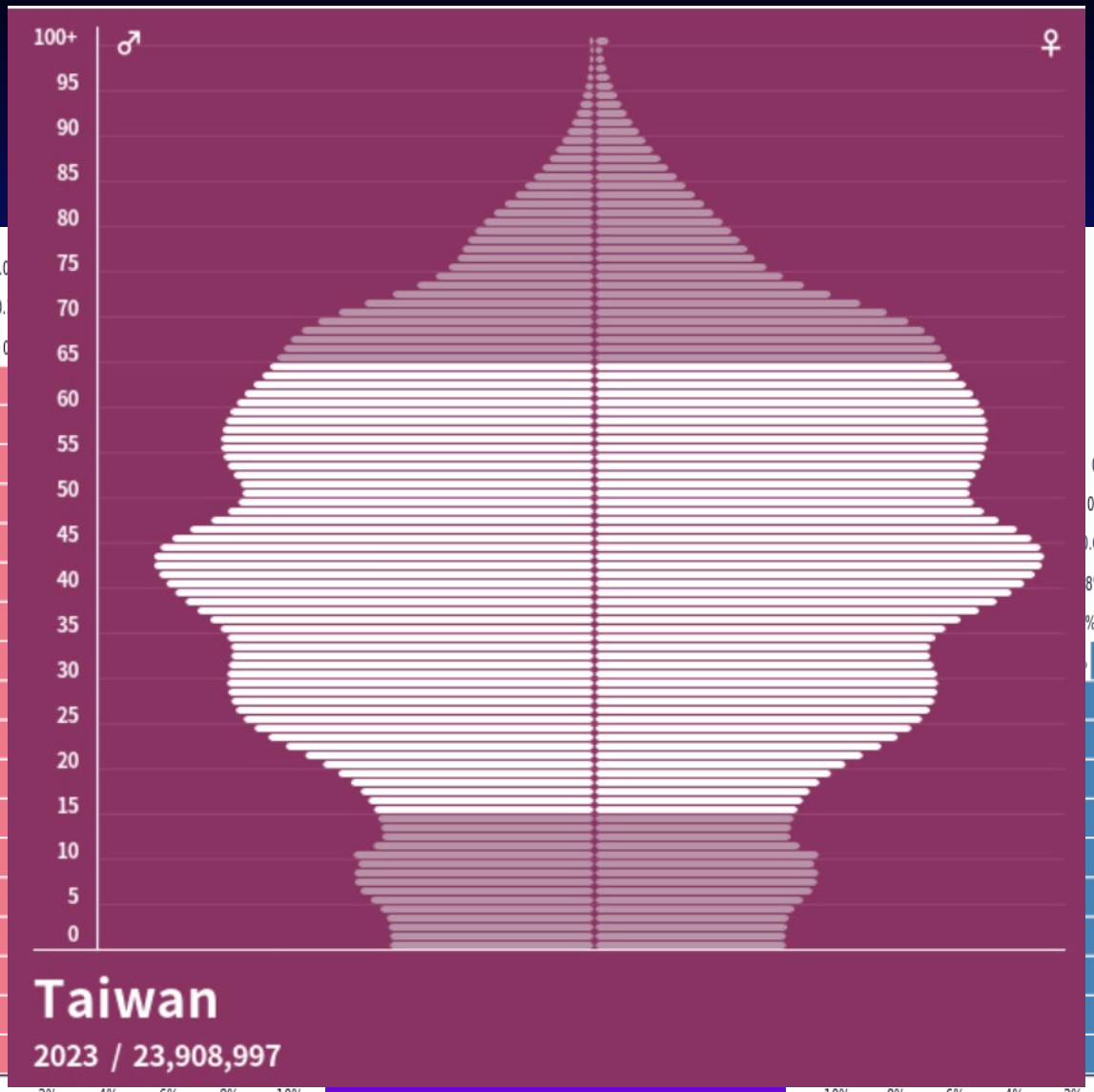
Right Care Right Now

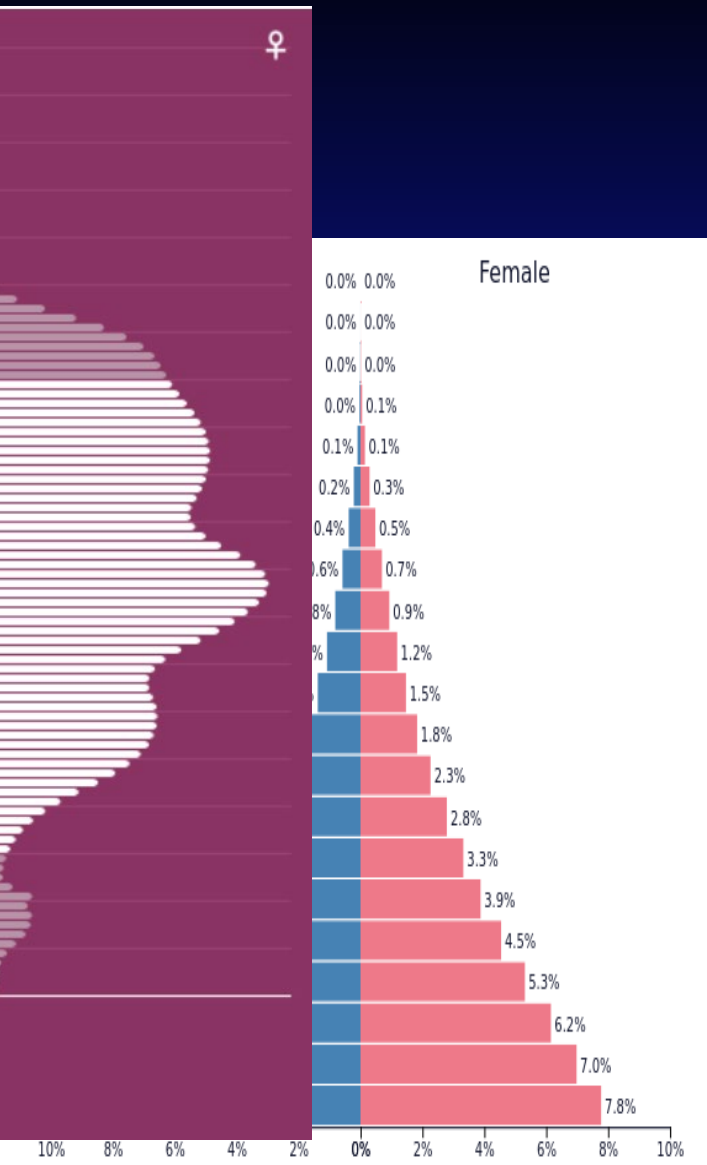
SCCM Founders


History of KSCCM at a Glance
그림으로 보여주는 略史
Korean Society of Critical Care Medicine
1st Joint Congress of Korea/Japan
1st Joint Congress of Korean-Japanese Interni
Subspecialty Board in Critical Care Medicine
Homepage erected,
Official logo
1st CPR Guideline
Textbook of Critical Care (Korean)
1st BCCRC, MCCRC
1st Joint Congress with Taiwan
Official delegation to Daegu area during the 1st wave of COVID-19
Renamed its Korean name to include "critical care"
12th Congress of WFSICCM
13th Congress of WPACCM
Official Journal Renamed to "Acute and Critical Care"
Listed in SCOPUS, ESCI, Pubmed, PMC
Korean Journal of Critical Care Medicine Launched
1st Scientific Meeting
1980
1981
1983
1986
1996
2000
2001
2004
2006
2008
2009
2015
2018-9
2020
2022
2015 Seoul WFSICCM
KSCCM-ACCC 2023
The 43rd KSCCM Annual Congress – ACCC 2023
The 23rd Joint Scientific Congress of the KSCCM and JSICM
PROVIDE the ESSENTIALS, STRENGTHEN our ICUs


KSCCM
ACCC
2023
The 43rd KSCCM Annual Congress – ACCC 2023
The 23rd Joint Scientific Congress of the KSCCM and JSICM
PROVIDE the ESSENTIALS, STRENGTHEN our ICUs
ACCC 2023
The Korean Society of Critical Care Medicine
Challenges Facing Critical Care in
APEC/Japan/China/USA
Taiwan
• Medical system of
• Low proportion of public sector
• Low cost, high efficiency
• Low level of minimal requirement of personnel and facility
• Intensivist not required
• High nurse-to-patient ratio
• Little help from other specialists
• Variability in level of care among ICU's
• Big regional and intra-regional differences
• Distrust of medical community by the general population, media, and law makers
KSCCM-ACCC 2023
The 43rd KSCCM Annual Congress – ACCC 2023
The 23rd Joint Scientific Congress of the KSCCM and JSICM
PROVIDE the ESSENTIALS, STRENGTHEN our ICUs







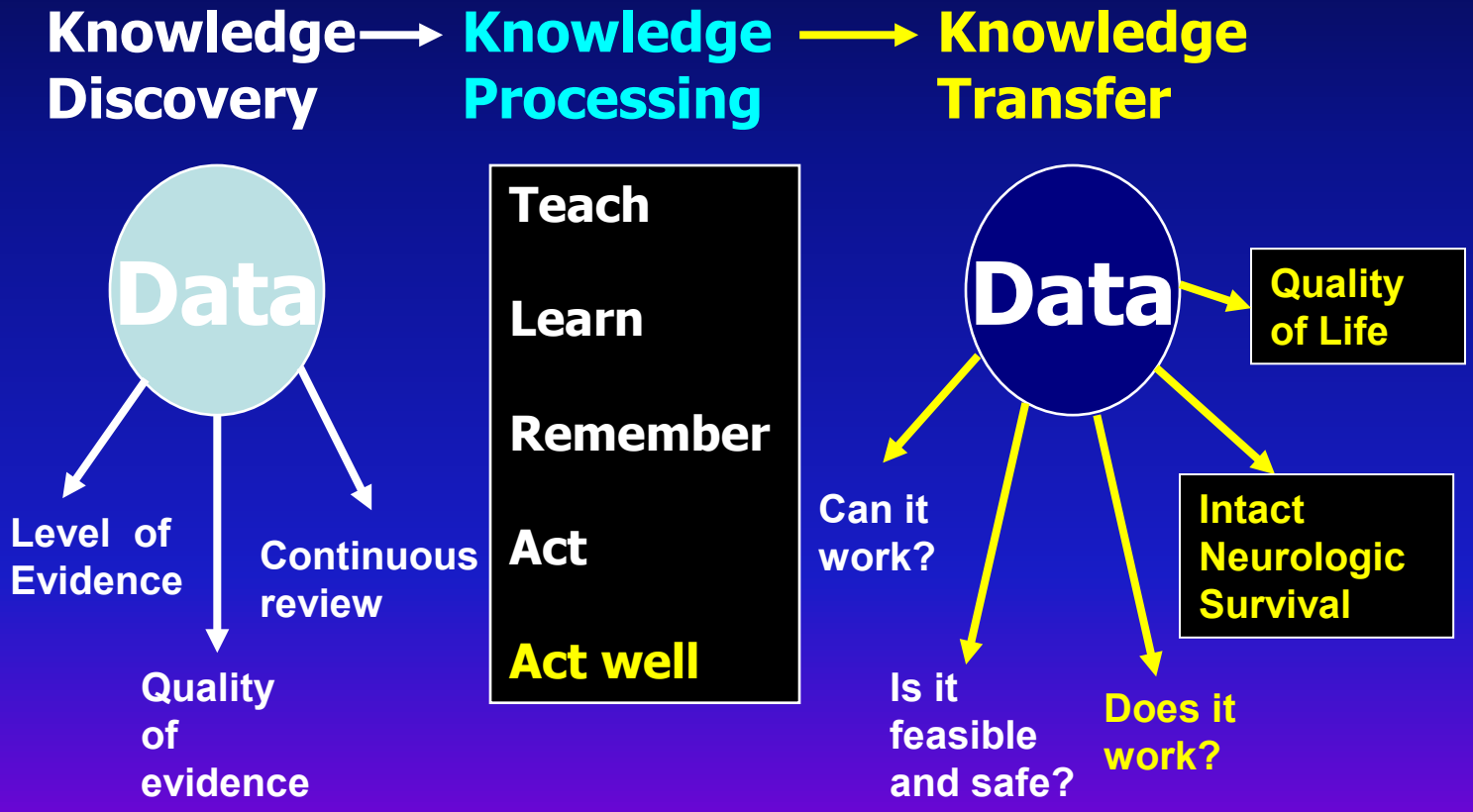
PopulationPyramid.net

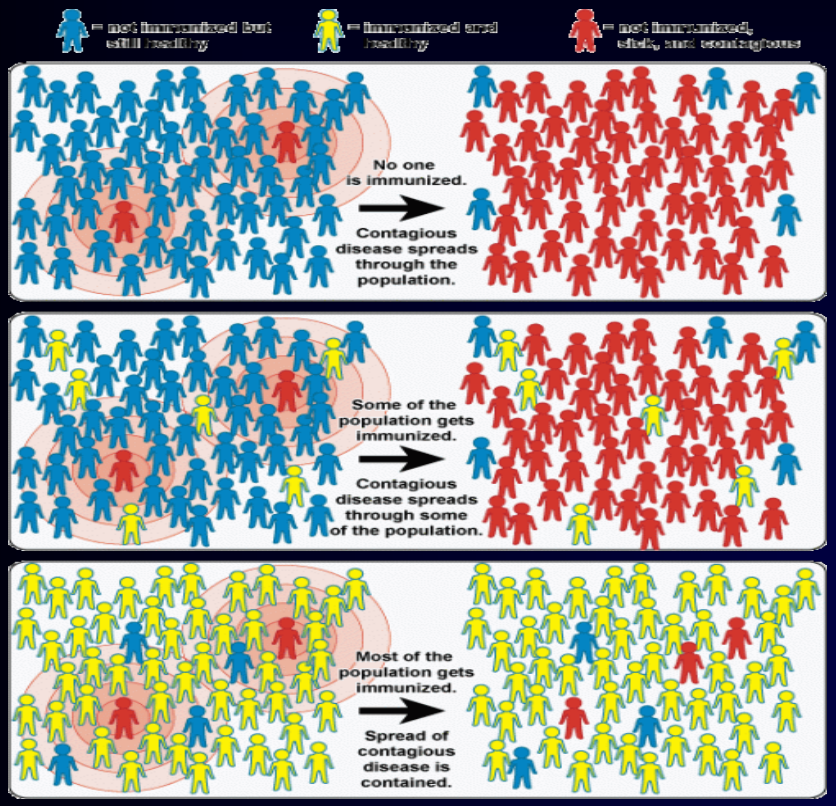
NORTHERN AMERICA - 2019
Population: **366,600,944**

PopulationPyramid.net

Sub-Saharan Africa - 2019
Population: **1,066,283,411**

Challenges toward 2030

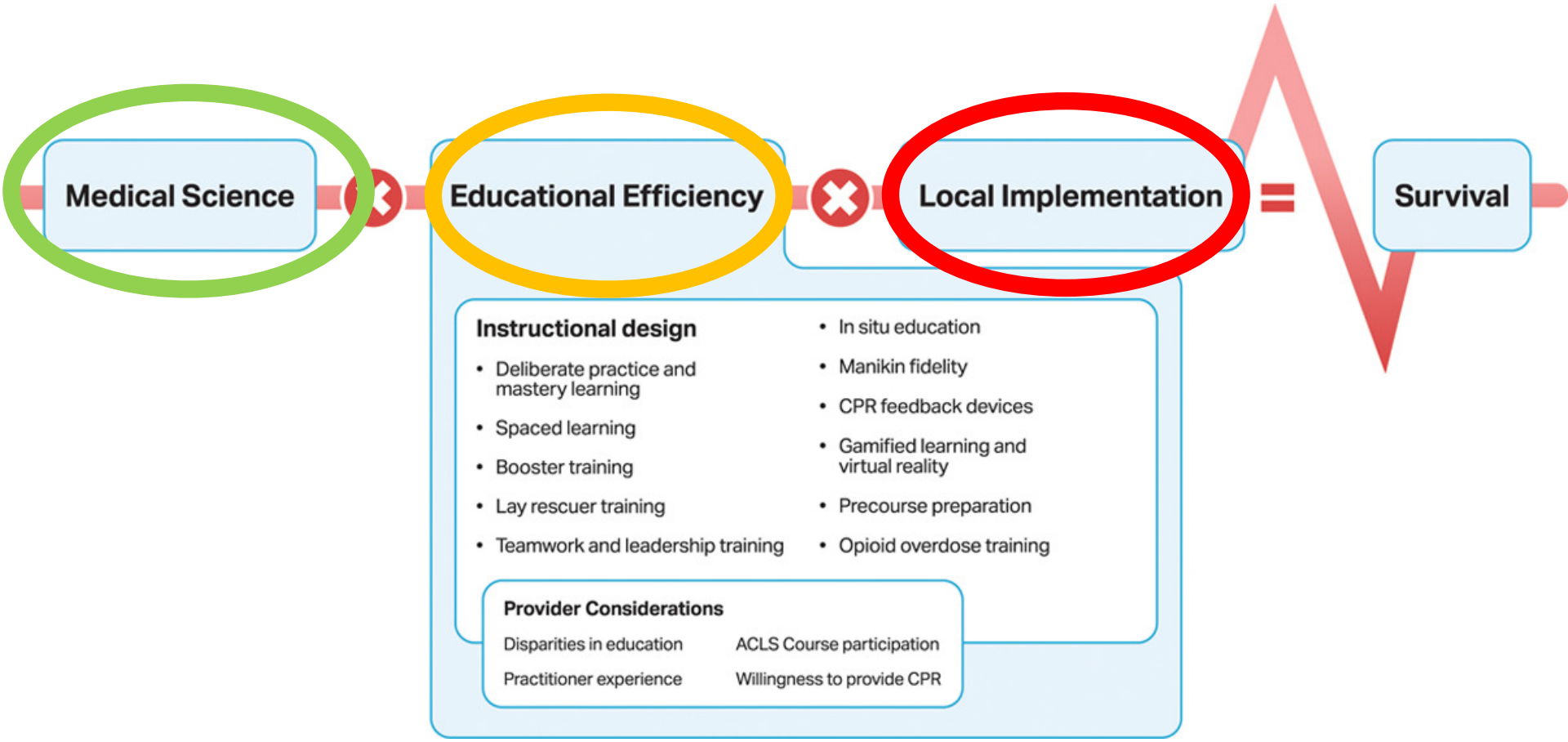




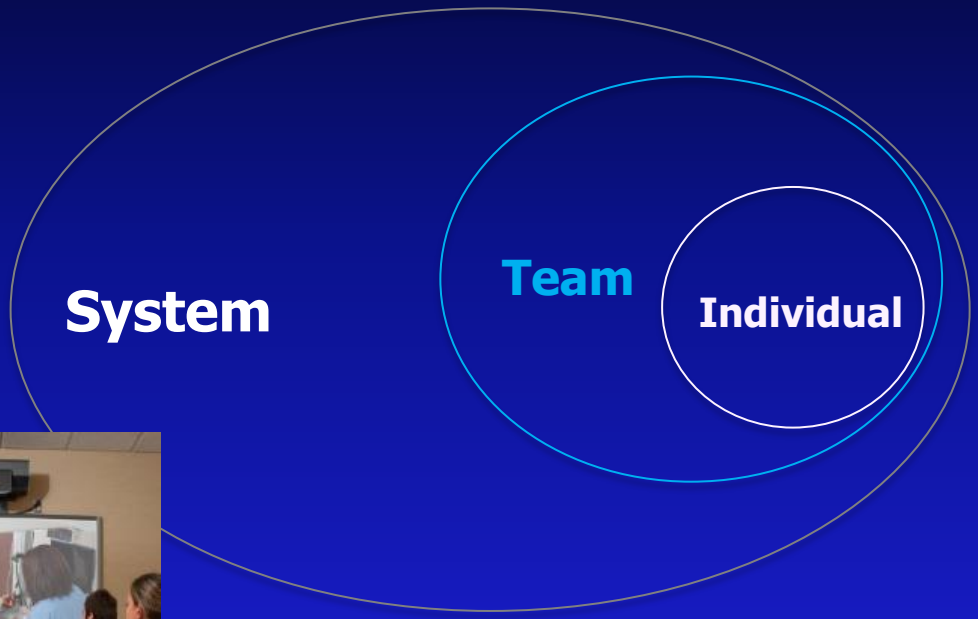
Who, how, and how much, and HOW OFTEN do we have to train??

Concept of "Herd Immunity"

(83 to 94% coverage)


Medical Science
Educational Efficiency
Local Implementation
=
Survival
Instructional design
• Deliberate practice and mastery learning
• Spaced learning
• Booster training
• Lay rescuer training
• Teamwork and leadership training
• In situ education
• Manikin fidelity
• CPR feedback devices
• Gamified learning and virtual reality
• Precourse preparation
• Opioid overdose training
Provider Considerations
Disparities in education
ACLS Course participation
Practitioner experience
Willingness to provide CPR

Linking Training to Patient Outcomes



Screening/Targeting
Low Dose
High Frequency

Simulated or Real Patient
Performance
Debriefing

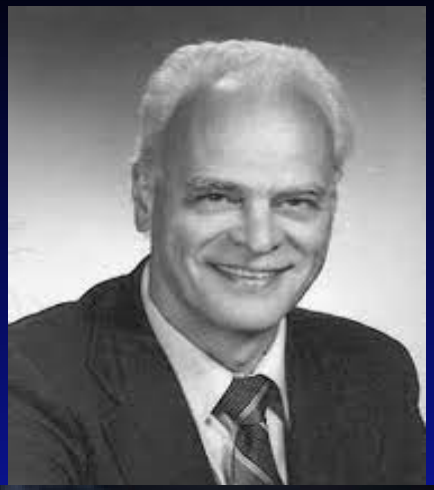
Performance
Feedback

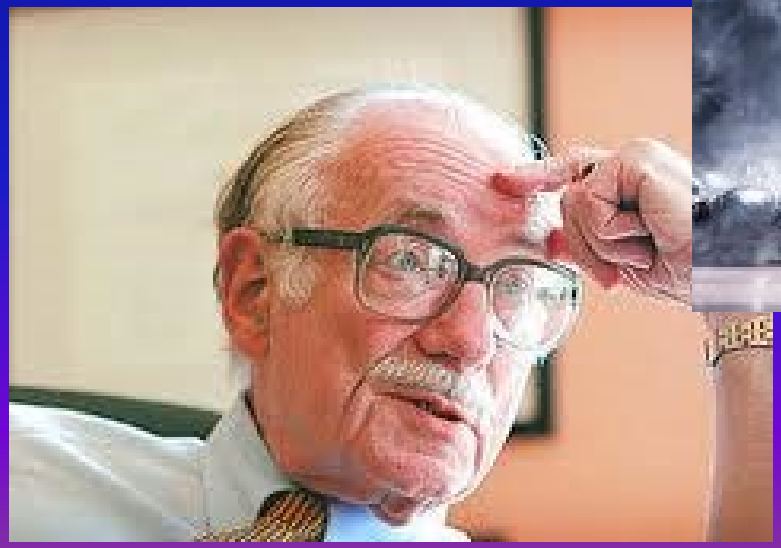
Mentorship

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

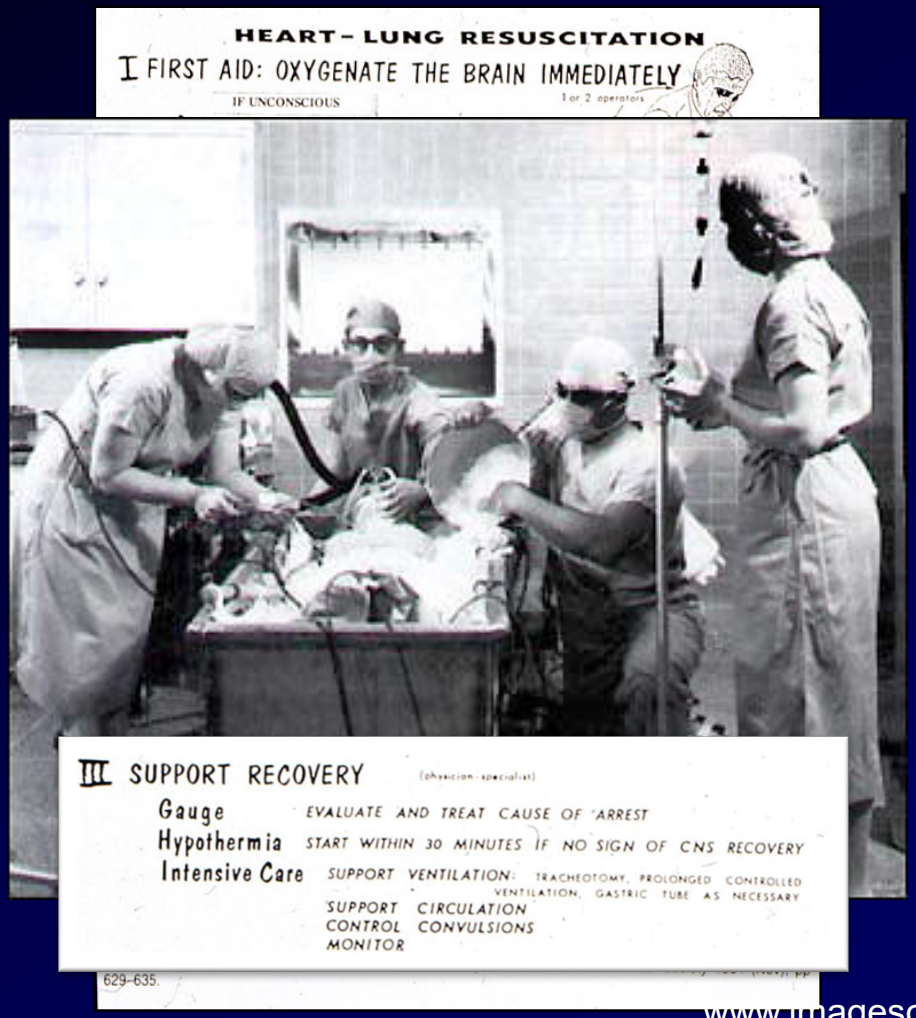
The Future of…**Critical Care Medicine**

Did our founders have a crystal ball?

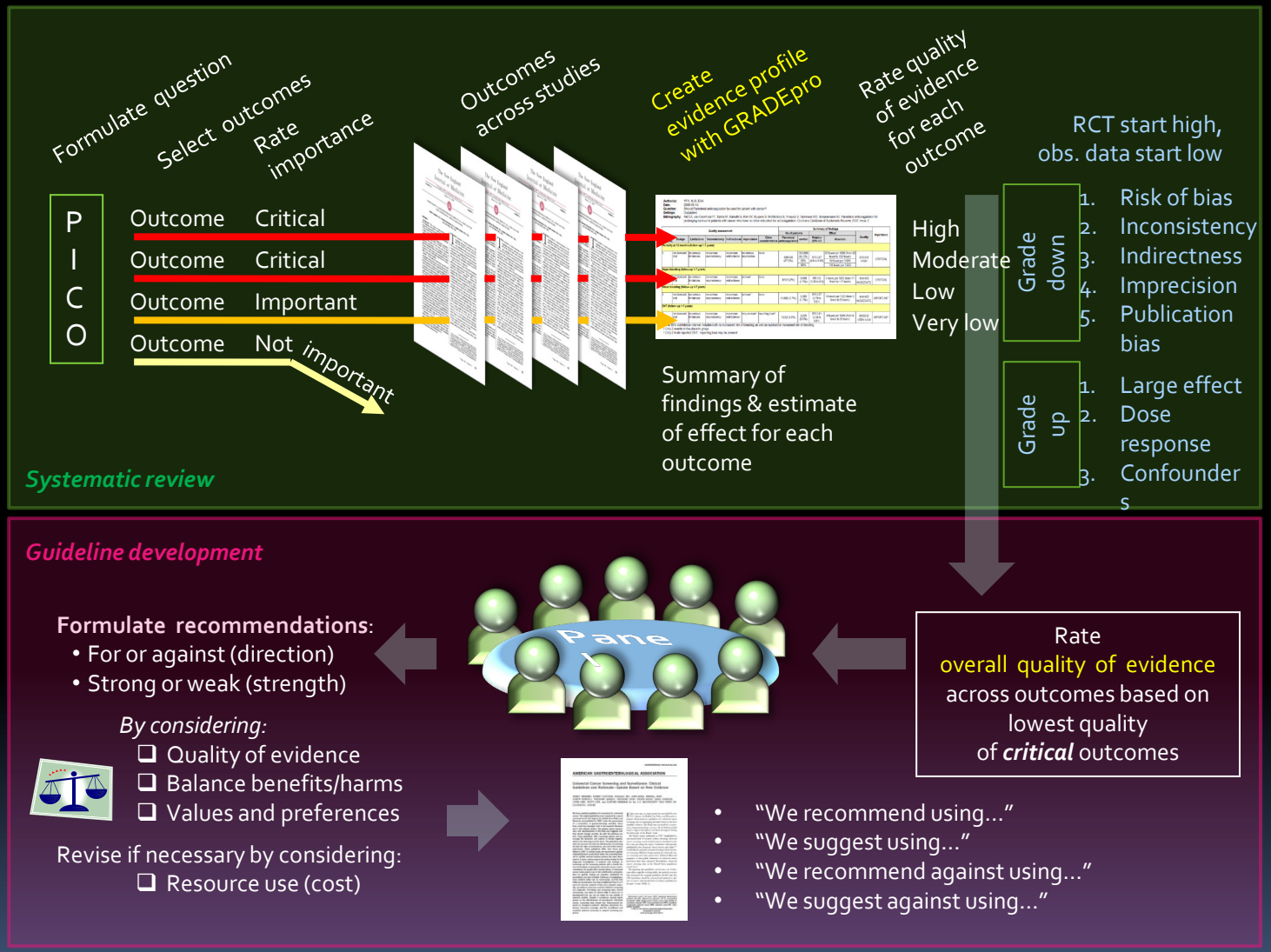




NIH Clinical Center--1955



Formula for Survival
Our Roadmap

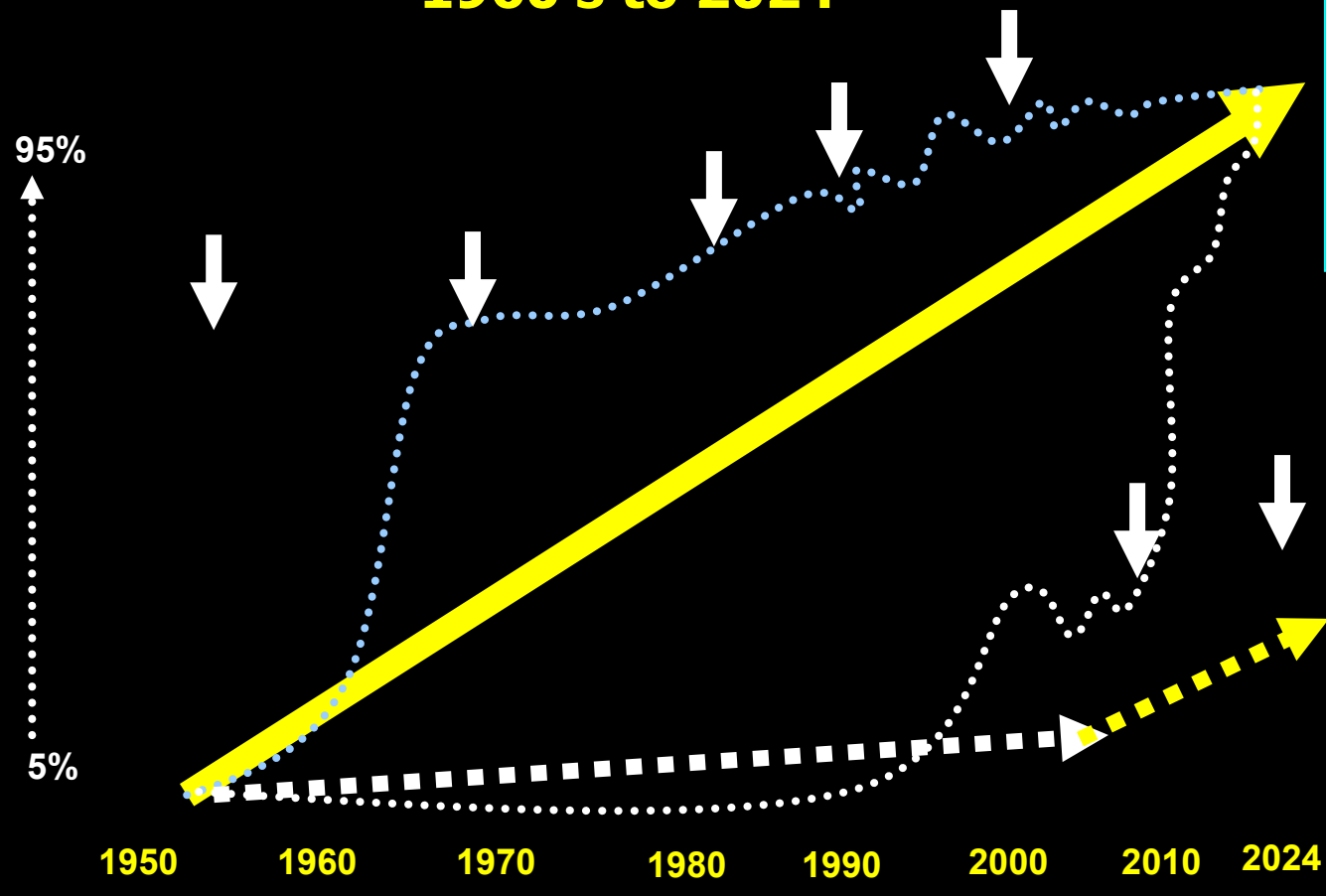

Formulate question
Select outcomes
Rate importance
P
I
C
O
Outcome Critical
Outcome Critical
Outcome Important
Outcome Not important
Outcomes across studies
Create evidence profile with GRADEpro
Summary of findings & estimate of effect for each outcome
Rate quality of evidence for each outcome
High
Moderate
Low
Very low
RCT start high, obs. data start low
Grade down
1. Risk of bias
2. Inconsistency
3. Indirectness
4. Imprecision
5. Publication bias
Grade up
1. Large effect
2. Dose response
3. Confounders
Systematic review
Guideline development
Rate overall quality of evidence across outcomes based on lowest quality of critical outcomes
Panel
Formulate recommendations:
• For or against (direction)
• Strong or weak (strength)
By considering:
❑ Quality of evidence
❑ Balance benefits/harms
❑ Values and preferences
Revise if necessary by considering:
❑ Resource use (cost)
• "We recommend using…"
• "We suggest using…"
• "We recommend against using…"
• "We suggest against using…"

Evidence vs Eminence-based medicine

We will struggle to get from anecdotes, …to studies …to evidence …to guidelines …to practice…to high performance…to saving more lives

…to saving high quality of life?

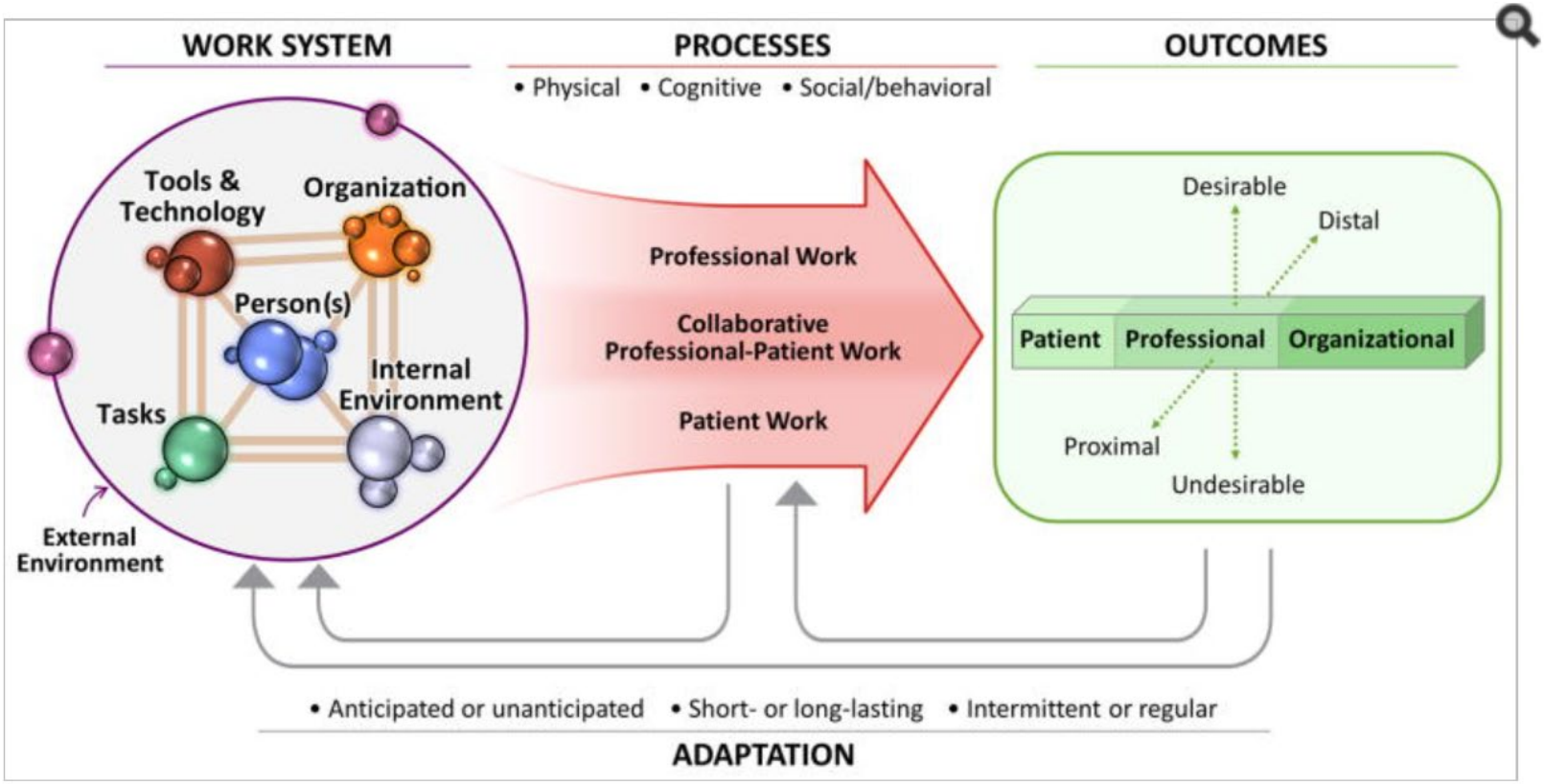
Breakthroughs and Incremental Improvements 1960's to 2024



The Children's Hospital of Philadelphia

40% ICU Beds (240/600+)

> 1,000,000 Possible teams

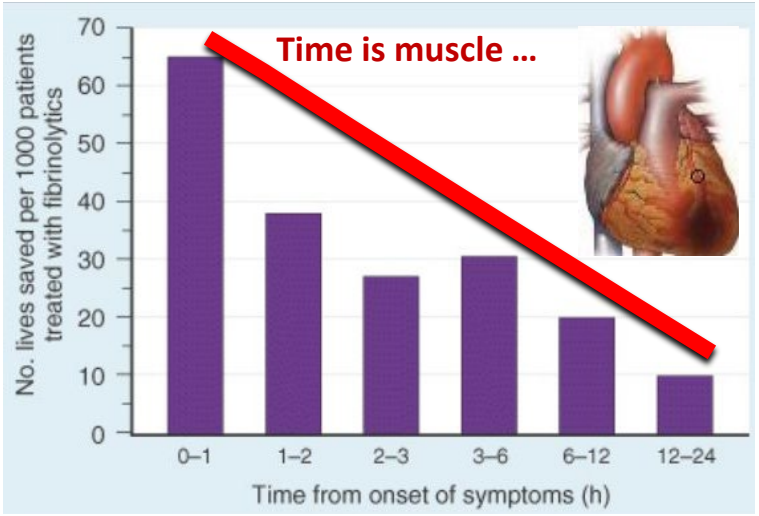


SEIPS 2.0 model.

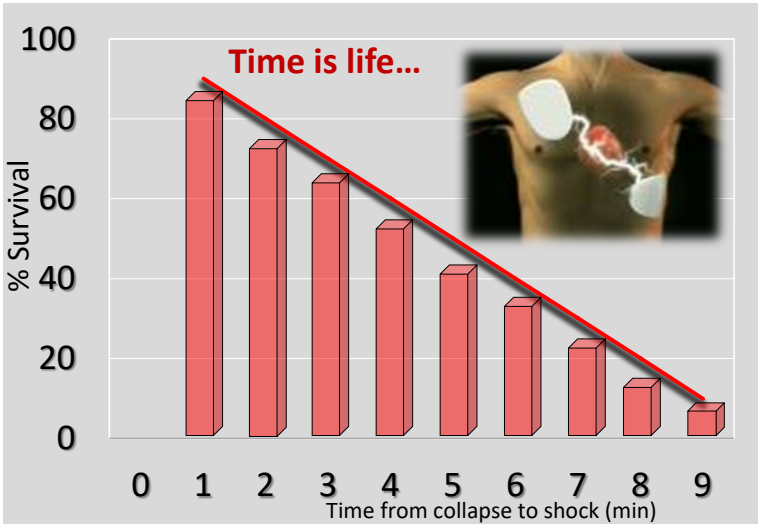
SEIPS 2.0: A human factors framework for studying and improving the work of healthcare professionals and patients
Holden, Carayon, Gurses, Hoonakker, Hundt, Ozok, Rivera-Rodriguez. Ergonomics 2013

Time-Dependence of Acute Cardiovascular Interventions

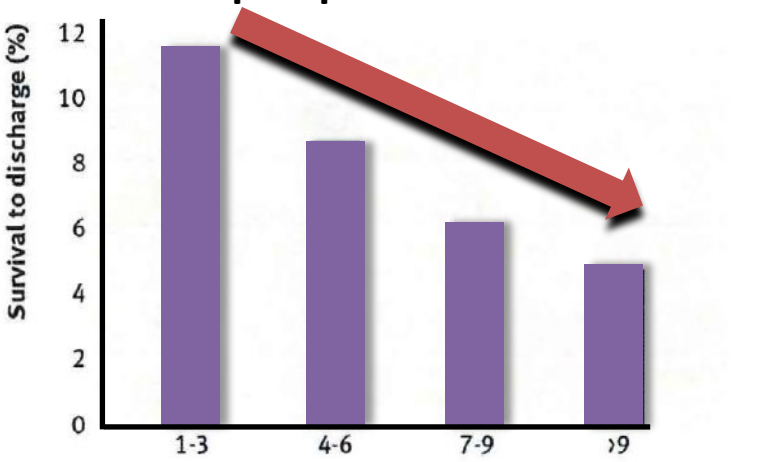
Time-to-thrombolysis in acute MI



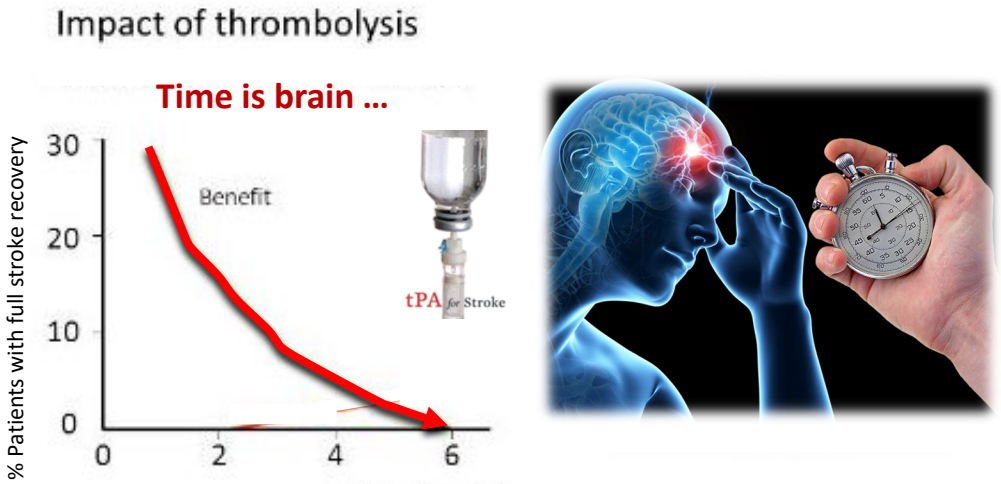
Time-to-shock in witnessed VF



Time-to-epinephrine in Cardiac Arrest

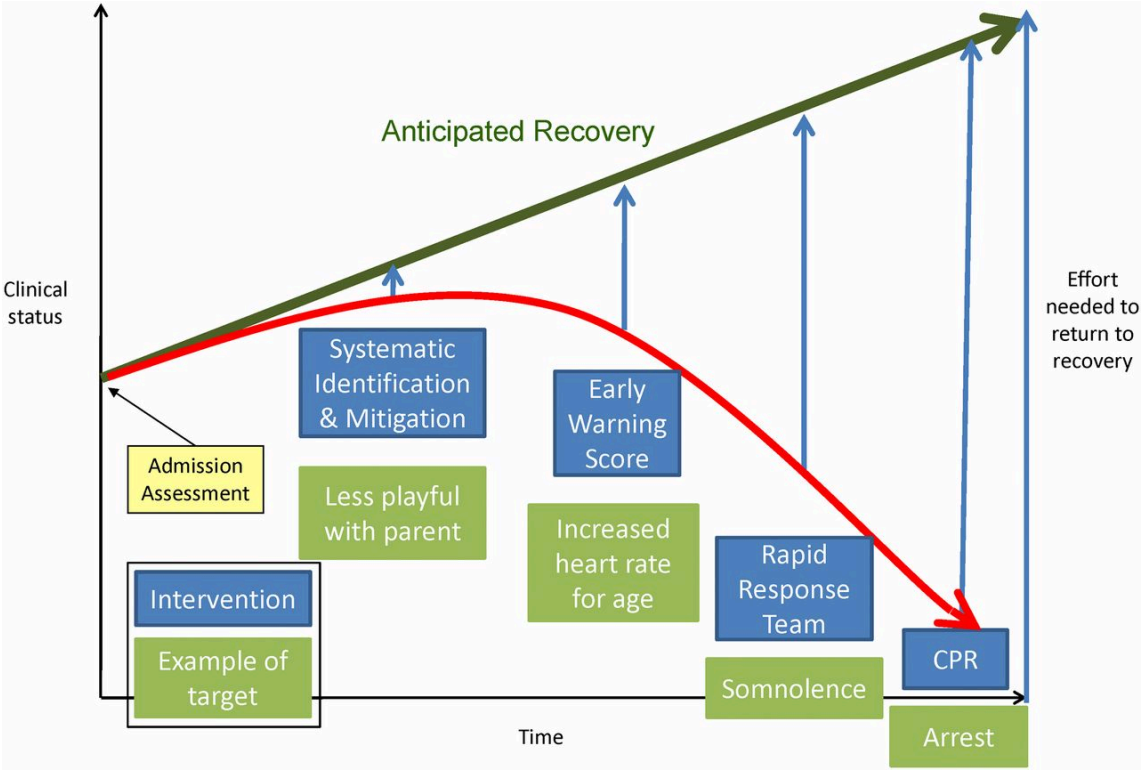


Time-to-thrombolysis in Stroke



Chain of Survival……Survivorship

Current Solutions

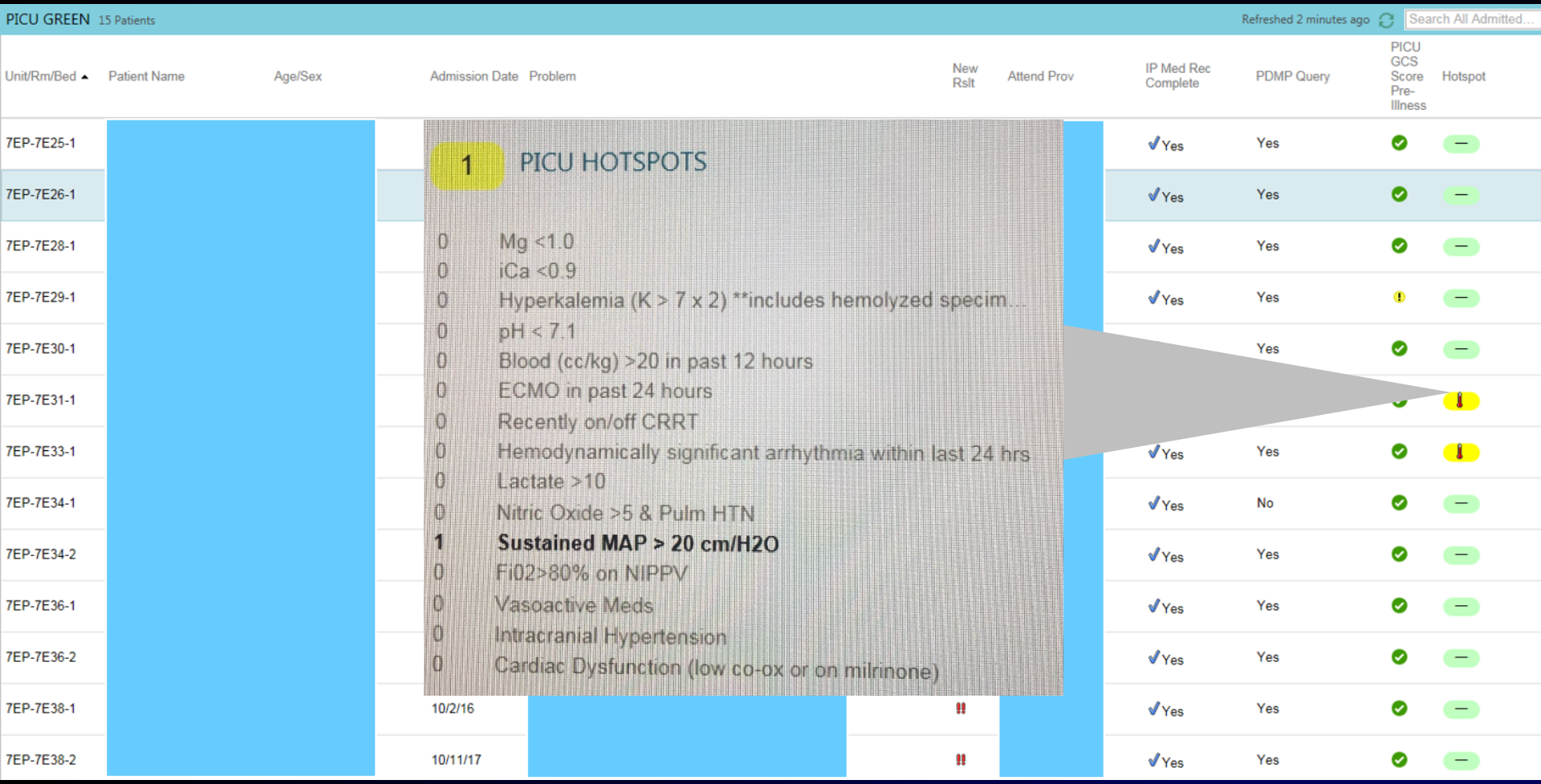


Early identification and mitigation of deterioration is important because deterioration does not occur linearly

Situation Awareness: A New Model for Predicting and Preventing Patient Deterioration
Patrick W. Brady, Derek S. Wheeler, Stephen E. Muething, Uma R. Kotagal
Hospital Pediatrics May 2014, 4 (3) 143-146; **DOI:** 10.1542/hpeds.2013-0119

Cincinnati Children's changing the outcome together | University of Cincinnati

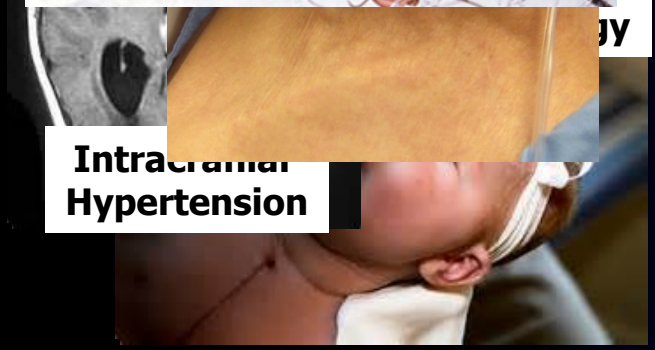
Leverage the Electronic Health Record

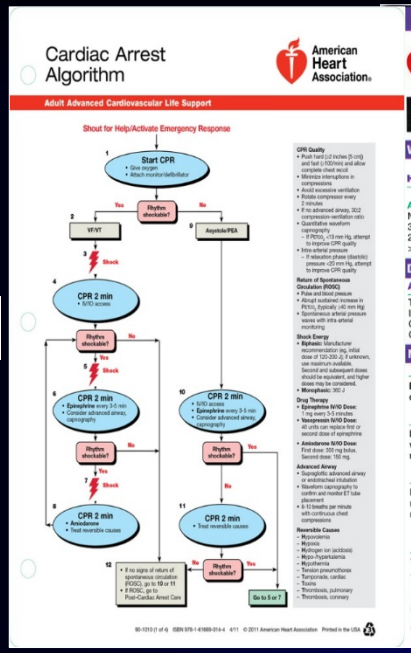


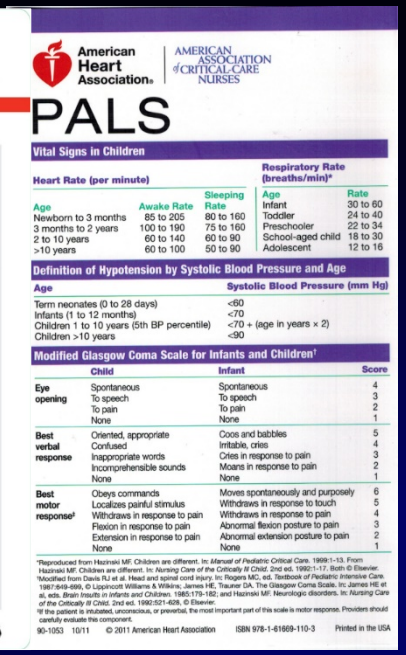
Prepare for intervention!


Steroids, chemotherapy?


Septic Shock


Intracranial
Hypertension


Cardiac Arrest
Algorithm
American Heart Association.
Adult Advanced Cardiovascular Life Support
Shout for Help/Activate Emergency Response
Start CPR
Rhythm shockable?
VF/VT
Asystole/PEA
Shock
CPR 2 min
IV/IO access
Go to 5 or 7


American Heart Association.
AMERICAN ASSOCIATION of CRITICAL-CARE NURSES
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
90-1053 10/11
© 2011 American Heart Association
ISBN 978-1-61669-110-3
Printed in the USA

One Size may not fit all! ....

But, the principles of:

-prediction

-detection

-assessment

-teamwork

-communication

-monitoring

-feedback

-quality

are the same!!

Learning Health System

Outputs

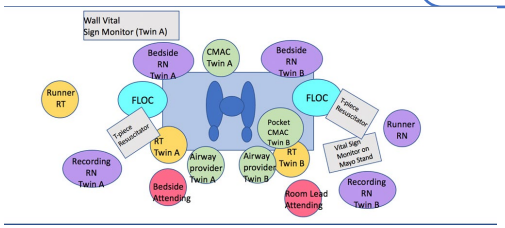
... create Outcomes

... which have Impact

Research and Evidenced Based Practices

Evaluation of Outcome

Information ich- data



Clinical Real Event

Simulation Practice

Simulation-based education: Effectiveness

Effective Care

Improvement in patient outcomes

Operational Performance

Skill improvement in clinical settings

Competence

Skill improvement in simulation settings

Self-Confidence

Improvement in learner's self-confidence

Association of Simulation Training With Rates of Medical Malpractice Claims Among Obstetrician–Gynecologists

Schaffer, Adam C. MD, MPH; Babayan, Astrid PhD; Einbinder, Jonathan S. MD, MPH; Sato, Luke MD; Gardner, Roxane MD, DSc

Author Information

Obstetrics & Gynecology: August 2021 - Volume 138 - Issue 2 - p 246-252
doi: 10.1097/AOG.0000000000004464

DOI: 10.1111/pan.13652

RESEARCH REPORT

Pediatric Anesthesia WILEY

The impact of simulation-based medical education on resident management of emergencies in pediatric anesthesiology

Aditee P. Ambardekar[1] | Stephanie Black[2] | Devika Singh[2] | Justin L. Lockman[2] | Allan F. Simpao[2] | Alan J. Schwartz[2] | Roberta L. Hales[3] | David L. Rodgers[4] | Harshad G. Gurnaney[2]

ORIGINAL ARTICLES | ARTICLES IN PRESS

Purchase Subscribe

Improving Pediatric Readiness and Clinical Care in General Emergency Departments: A Multicenter Retrospective Cohort Study

Kamal Abulebda, MD • Travis Whitfill, MPH MPhil • Manahil Mustafa, MD • ... Mara E. Nitu, MD • Marc A. Auerbach, MD, MSc • on behalf of Improving Pediatric Acute Care Through Simulation (ImPACTS) •

Show all authors

Published: September 05, 2021 • DOI: https://doi.org/10.1016/j.jpeds.2021.08.084

A critical review of simulation-based mastery learning with translational outcomes

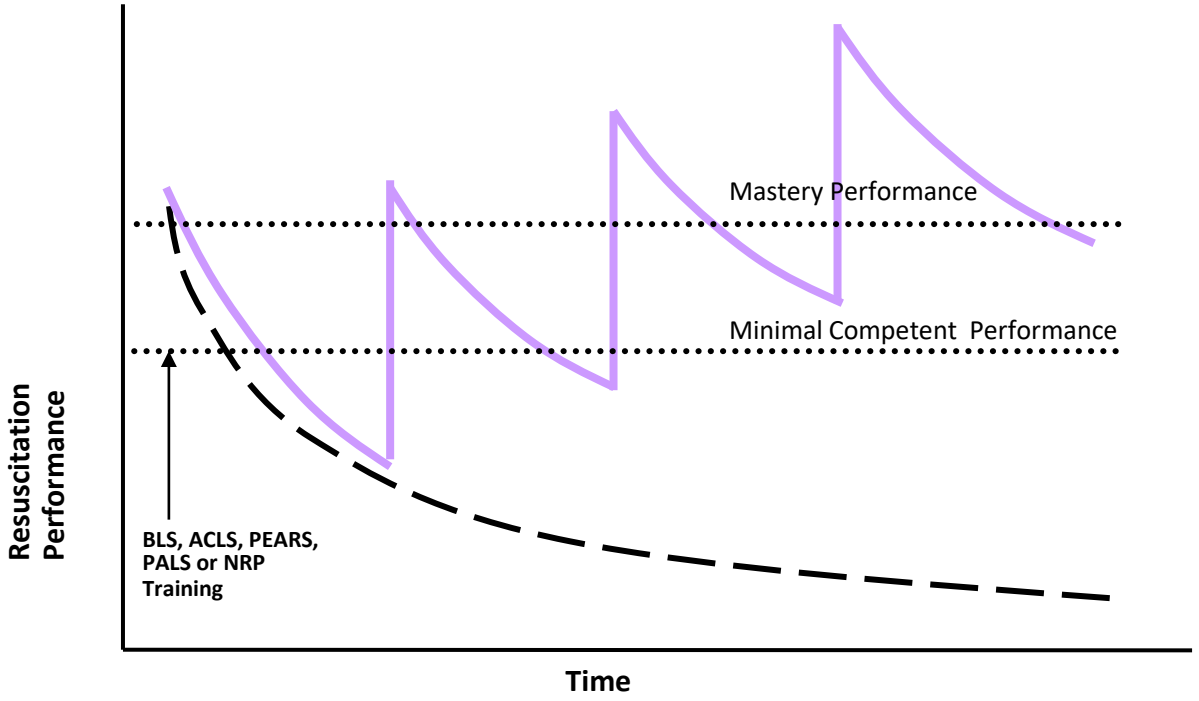
William C McGaghie,[1] Saul B Issenberg,[2] Jeffrey H Barsuk[3] & Diane B Wayne[3]

Medical Education 2014: 48: 375–385
doi:10.1111/medu.12391


ABP No Sensor
Touch when sensor connected
PAP No Sensor
Touch when sensor connected
CO_2 No Sensor
Touch when sensor connected
88/46
(60)

Evolution to “Low Dose – High Frequency” training paradigms

B



Resuscitation: Volume 93, August 2015, Pages 1-7

Frequent brief on-site simulation training and reduction in 24-h neonatal mortality – An educational intervention study

Estomih Mduma, Hege Ersdal, Erling Svensend Hussein Kidanto, Bjørn Auestadb, JeffreyPerlman

Review

OPEN ACCESS

Using clinical simulation to study how to improve quality and safety in healthcare

Guillaume Lamé , Mary Dixon-Woods

THIS Institute (The Healthcare Improvement Studies Institute), University of Cambridge, Cambridge, UK

Correspondence to
Dr Guillaume Lamé, THIS Institute (The Healthcare Improvement Studies Institute), University of Cambridge, Cambridge CB2 0AH, UK; guillaume.lame@thisinstitute.cam.ac.uk

Received 22 June 2018
Revised 3 September 2018
Accepted 6 September 2018
Published Online First 29 September 2018

ABSTRACT

Simulation can offer researchers access to events that can otherwise not be directly observed, and in a safe and controlled environment. How to use simulation for the study of how to improve the quality and safety of healthcare remains underexplored, however. We offer an overview of simulation-based research (SBR) in this context. Building on theory and examples, we show how SBR can be deployed and which study designs it may support. We discuss the challenges of simulation for healthcare improvement research and how they can be tackled. We conclude that using simulation in the study of healthcare improvement is a promising approach that could usefully complement established research methods.

SIMULATION-BASED RESEARCH DESIGNS

Different research designs are made possible using simulation-based techniques.[13 14] We start by offering a broad overview of how simulation might be used in research, and then provide a short description and examples of three types of studies (descriptive, theory-testing and generation, and evaluating interventions) that might deploy simulation. We discuss the particular issues that may apply in multicentre studies. Finally, we discuss the potential for combining SBR with other methods in mixed-methods studies.

Simulation as a way of studying clinical settings

Simulation for research classically seeks to reproduce features of a real-world phenomenon so that

ORIGINAL RESEARCH

In situ simulation: detection of safety threats and teamwork training in a high risk emergency department

Mary D Patterson,[1,2] Gary Lee Geis,[1,3,4] Richard A Falcone,[5] Thomas LeMaster,[1] Robert L Wears[6,7]

[1]The Center for Simulation and Research, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA
[2]Akron Children's Hospital Simulation Center for Safety and Reliability, Akron Children's Hospital, Akron, Ohio, USA
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[4]Division of Emergency Medicine, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA
[5]Division of Pediatric General and Thoracic Surgery, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA
[6]Department of Emergency Medicine, University of Florida, Jacksonville, Florida, USA
[7]Clinical Safety Research Unit, Imperial College, London, UK, UK

Patterson M. BMJ Quality and Safety 2013

Journey

2005
November Opening Center for Simulation

PCCM, EM, Neonatology Simulations

JIT Research Intubation

2006
Inaugural 1st PCCM BC 24 fellows

Start Intern/Resident Simulations weekly

Operation Smile

2007
1st – Technology Process Testing EPIC

Ambulatory-Primary care sites

Japanese Workshop

2009
Simulation Facilitator Workshop

Fetal Surgery Simulation MMC

Ambulatory-Surgical sites

Trauma Sims

2010
CDU Simulations

PCAM Simulations

Neonatology Bootcamp

2020
Vaccine Clinic

ITCU Sims

Covid System Testing

Medication Safety Partial dosing

Voalte Alarm System

11th & 12th floor Orientation & System testing

Career Exposure Program

2019
IR Simulations

Virtual Reality Sims

Outreach-PEPP

EPIC Code Narrator

Impact Research

Buerger Ramp Testing

2017
Buerger Post construction testing

Hand Transplant Sim

FETO Sim

Critical Care Nursing Orientation

2014
Specialty Care Center simulations

Usability Testing

2012
MRI Sim Quench-Magnet

Philly wide Simulation Facilitator Course

System Integration

Safe Keeping Journey

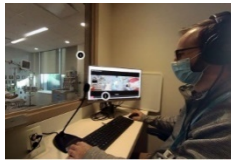
New Patient Tower

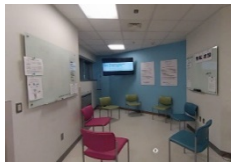
KoPH

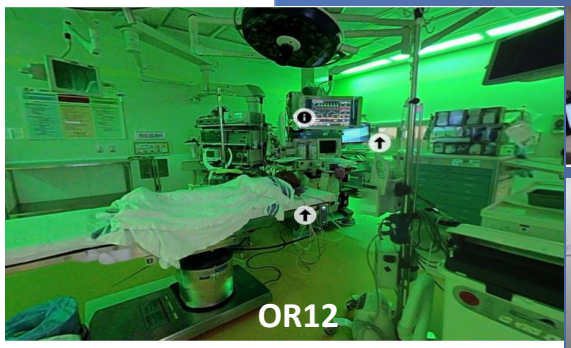
2021 BEYOND

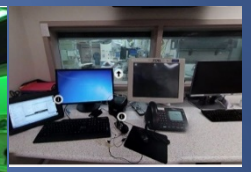
CICU Expansion

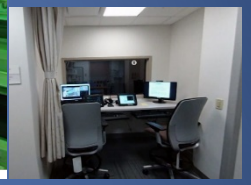
SIMULATION ROOMS

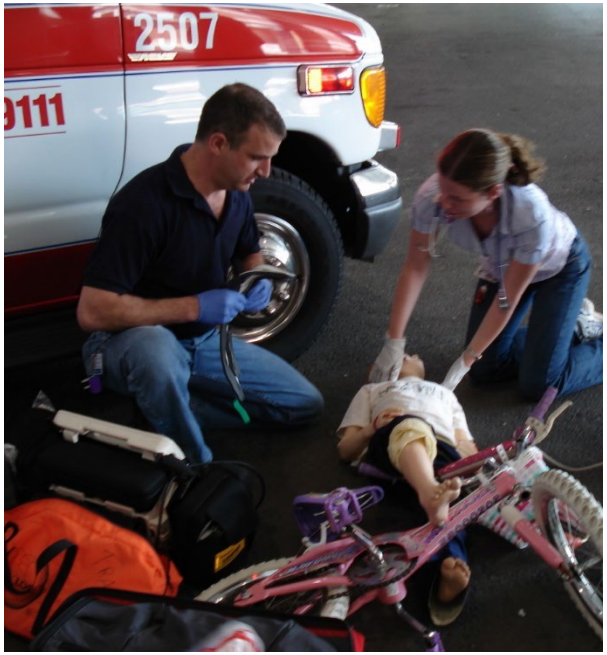








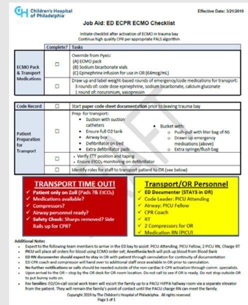




Education

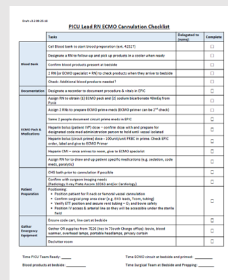
CHOP Care Network

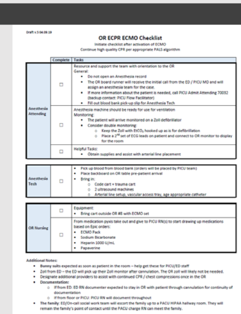
- Broomall
- Cape May
- Central Bucks
- Coatesville
- Drexel Hill
- Flourtown
- Gibbsboro
- Haverford
- Indian Valley
- Kennett Square
- Media
- Mt. Laurel
- Paoli
- West Chester
- Norristown
- Karabots
- Cobbs Creek
- South Philly
- Chadds Ford
- Chestnut Hill
- Newton
- North Hills
- Pottstown
- Roxborough
- Salem Road
- Smithville
- Somers Point
- Springfield
- West Chester
- West Grove


Job Aid: ED ECPR ECMO Checklist

TRANSPORT TIME OUT!

Transport/OR Personnel


PICU Lead RN ECMO Cannulation Checklist


OR ECPR ECMO Checklist

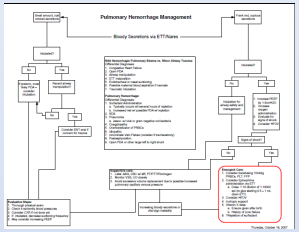
ECMO Time to Cannulation 35 mins

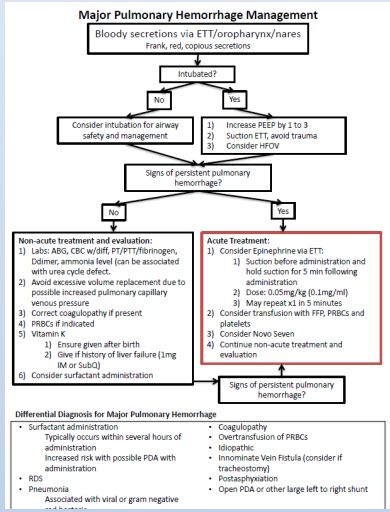
MIBG therapy: Radiation for Neuroblastoma

Process and Procedure Testing

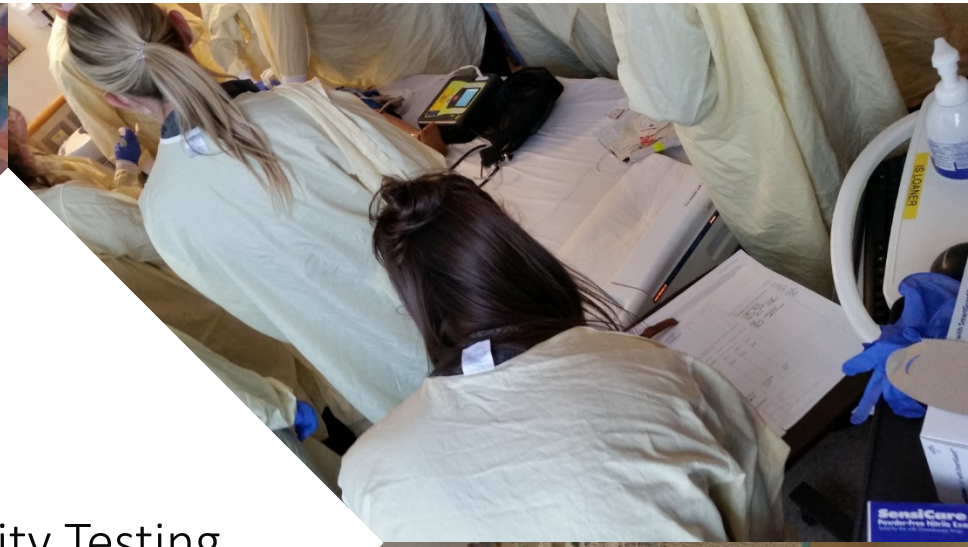
Oncology PICU

NICU-Pathway & Process Refinement

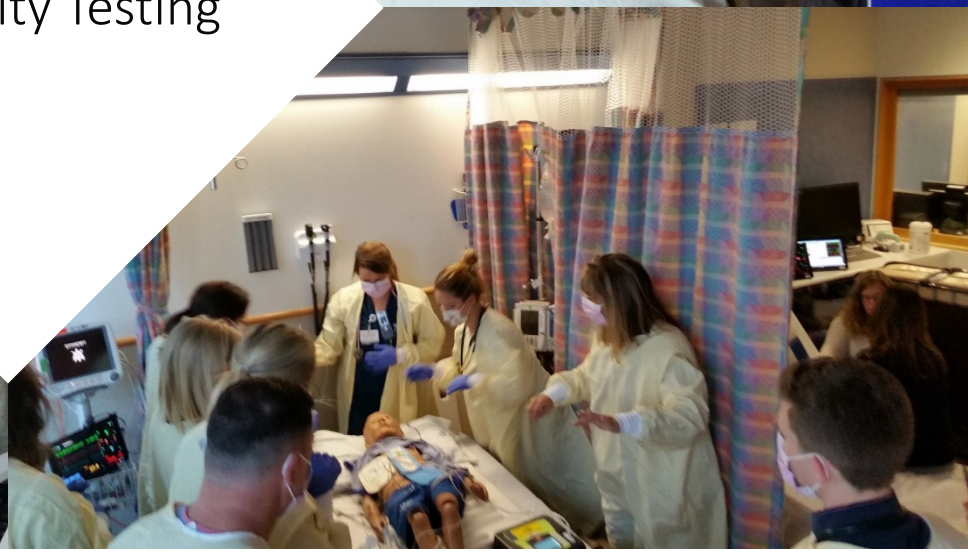


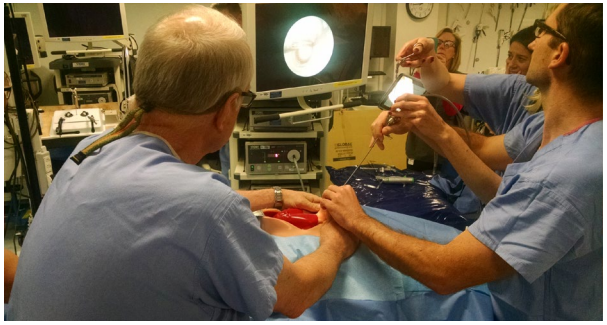


- Request: The NICU Sim champions developed IPE simulations to review, test and/or reconstruct real events, pathways and processes.
    - Pulmonary Hemorrhage Management
    - Acute Treatment of Hyperkalemia
    - Blood Transfusion Exchange



8S Capacity Testing





Simulation-based Clinical System Testing

Highlights- Space Design

Covid Sims

Train the Trainer at CHOP

- Task Training: Training to competence…Excellence

Orientation and Practice Procedure Skills first in the Classroom:

Orientation and Practice Procedures next at the bedside “in situ”

CCM Fellow Skill Training: Central Line Insertion: Realistic with Complication

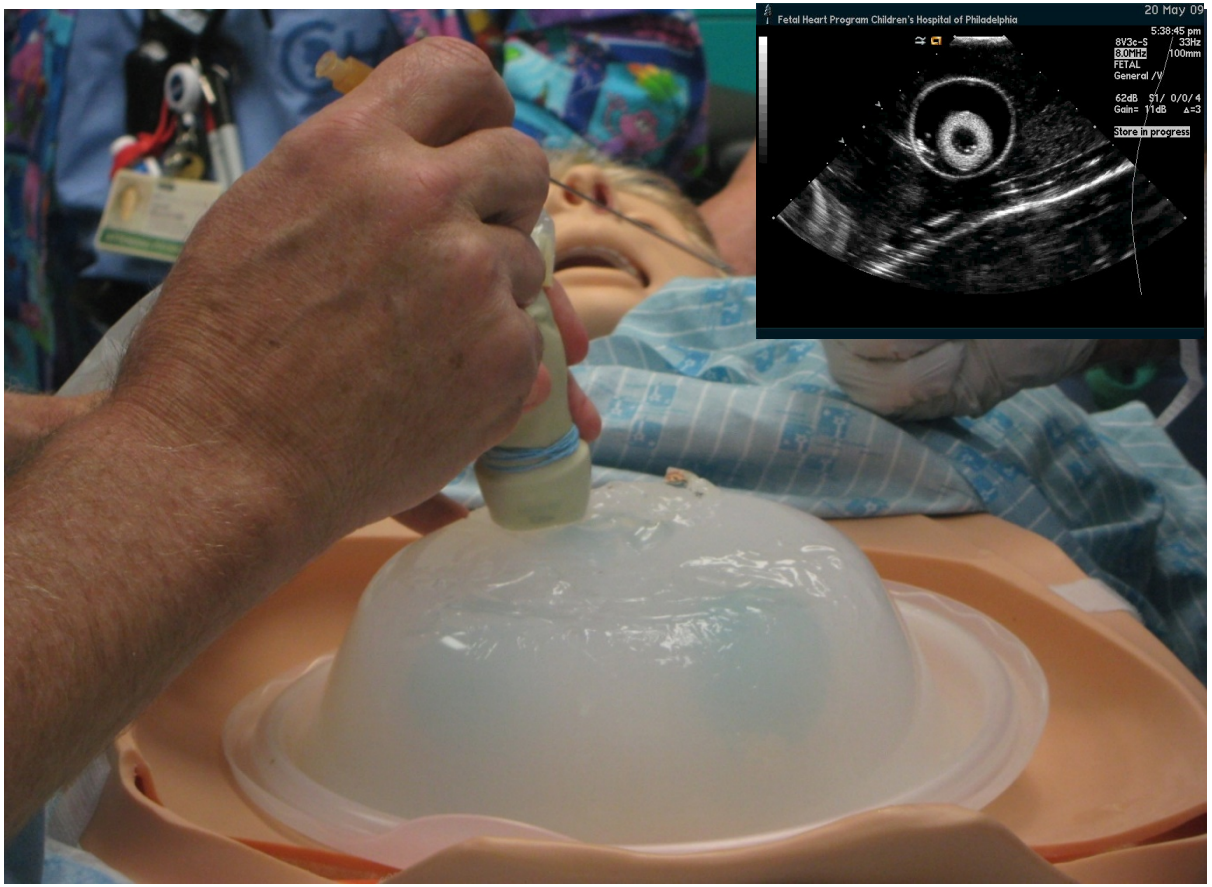
Practice Rare and Stressful Events:

Use Self-Directed Learning:

Walk Through New Procedures:

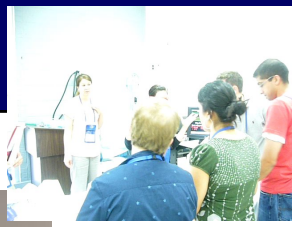
Cou
Ma
E

Moulage and Innovation



Cou
Ma

Blindfold Example



Helping Babies Breathe

pair learning/teaching

Improving Pediatric Acute Care Through Simulation (ImPACTS)

How Failures breed Success !!!

International Network for Simulation-Based Pediatric Innovation, Research and Education (INSPIRE) *Network*

Quality of care with simulation

Research

JAMA Pediatrics | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Differences in the Quality of Pediatric Resuscitative Care Across a Spectrum of Emergency Departments

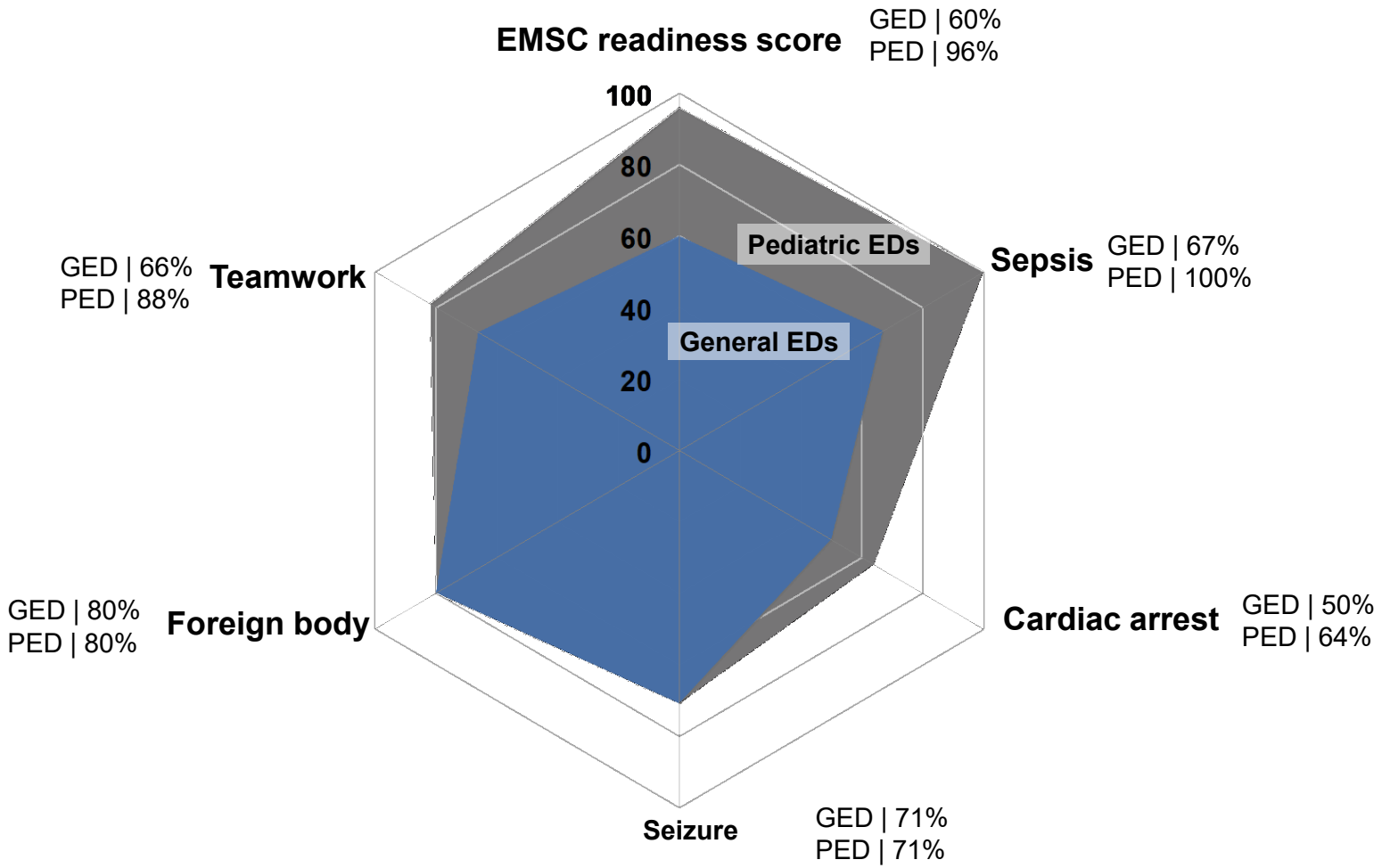
Marc Auerbach, MD, MSci; Travis Whitfill, MPH; Marcie Gawel, MSN; David Kessler, MD, MSc; Barbara Walsh, MD; Sandeep Gangadharan, MD; Melinda Fiedor Hamilton, MD, MSc, FAHA; Brian Schultz, MD; Akira Nishisaki, MD; Khoon-Yen Tay, MD; Megan Lavoie, MD; Jessica Katznelson, MD; Robert Dudas, MD; Janette Baird, PhD; Vinay Nadkarni, MD; Linda Brown, MD, MSCE

IMPORTANCE The quality of pediatric resuscitative care delivered across the spectrum of emergency departments (EDs) in the United States is poorly described. In a recent study, more than 4000 EDs completed the Pediatric Readiness Survey (PRS); however, the correlation of PRS scores with the quality of simulated or real patient care has not been described.

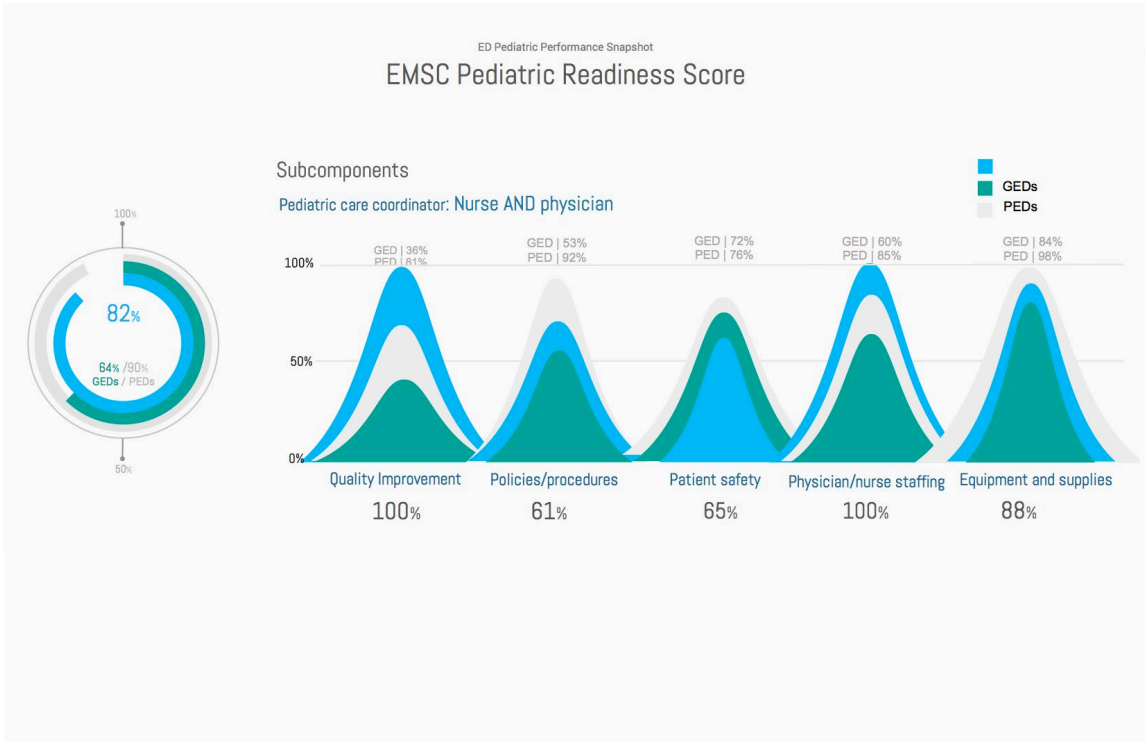
Supplemental content

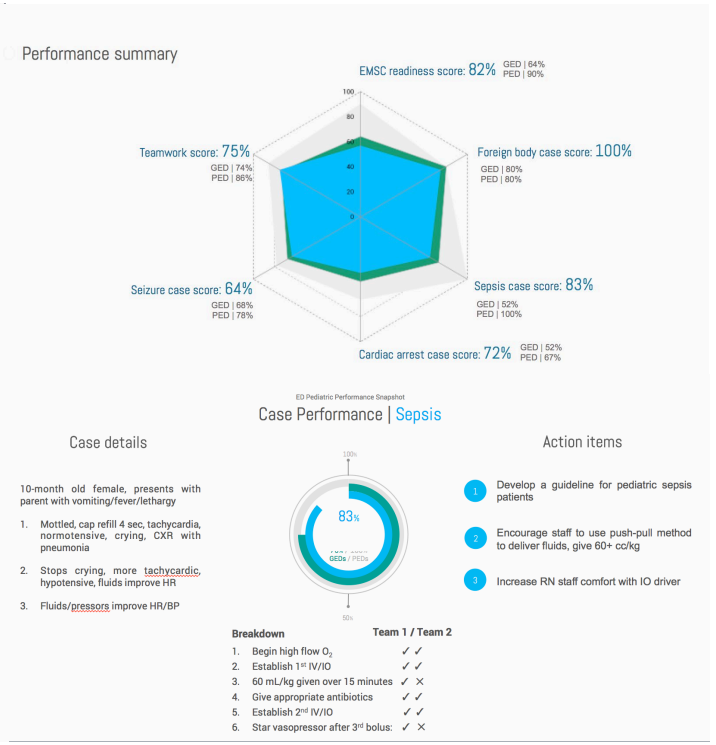
Auerbach M, Whitfill T. *JAMA Pediatr.* 2016.

Primary outcome: quality of care measures



Improving care in hospitals through data reporting



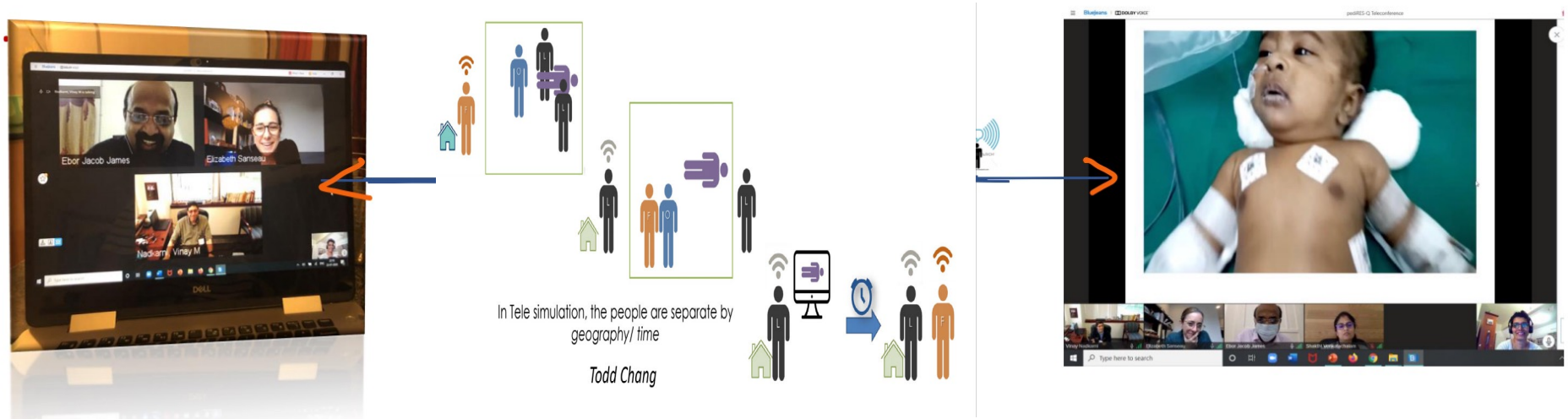


Education : Training citizens


Tokyo
Philadelphia
Image © 2010 TerraMetrics

Tele-simulation

Tele-simulation" is "a process by which telecommunication and simulation resources are utilized to provide education, training, and/or assessment to learners at an off-site location.



Off-site location refers to a distant site that would preclude training, without the use of telecommunication resources

Several Studies suggest Distance Simulation Useful for Global Health Education

Cureus

Open Access Technical Report

DOI: 10.7759/cureus.16317

How to Use TeleSimBox "Off the Shelf" to Connect Remote Content Experts With In-Person Simulation Participants

Elizabeth Sanseau [1], Robert Cameron Sooby [2], Maybelle Kou [3], Marc Auerbach [4], Khoon-Yen Tay [5]

1. General Pediatrics/Emergency Medicine, Children's Hospital of Philadelphia, Philadelphia, USA 2. Emergency Medicine, Jefferson Health Northeast, Philadelphia, USA 3. Emergency Department, Inova Children's Hospital, Falls Church, USA 4. Department of Pediatrics, Section of Pediatric Emergency Medicine, Yale University, New Haven, USA 5. Emergency Medicine, Children's Hospital of Philadelphia, Philidelphia, USA

Corresponding author: Elizabeth Sanseau, elizabeth.sanseau@gmail.com

Review > Simul Healthc. 2023 Apr 1;18(2):100-107. doi: 10.1097/SIH.0000000000000663. Epub 2022 Apr 5.

Setting an Agenda: Results of a Consensus Process on Research Directions in Distance Simulation

Isabel T Gross [1], Timothy C Clapper, Geethanjali Ramachandra, Anita Thomas, Anne Ades, Barbara Walsh, Florian Kreuzer, Rachel Elkin, Michael Wagner, Travis Whitfill, Todd P Chang, Jonathan P Duff, Ellen S Deutsch, Ruth M Loellgen, Janice C Palaganas, Jabeen Fayyaz, David Kessler, Aaron W Calhoun

Affiliations + expand

PMID: 36989108 DOI: 10.1097/SIH.0000000000000663

Abstract

Background: The COVID-19 pandemic forced rapid implementation and refinement of distance simulation methodologies in which participants and/or facilitators are not physically colocated. A

frontiers | Frontiers in Pediatrics

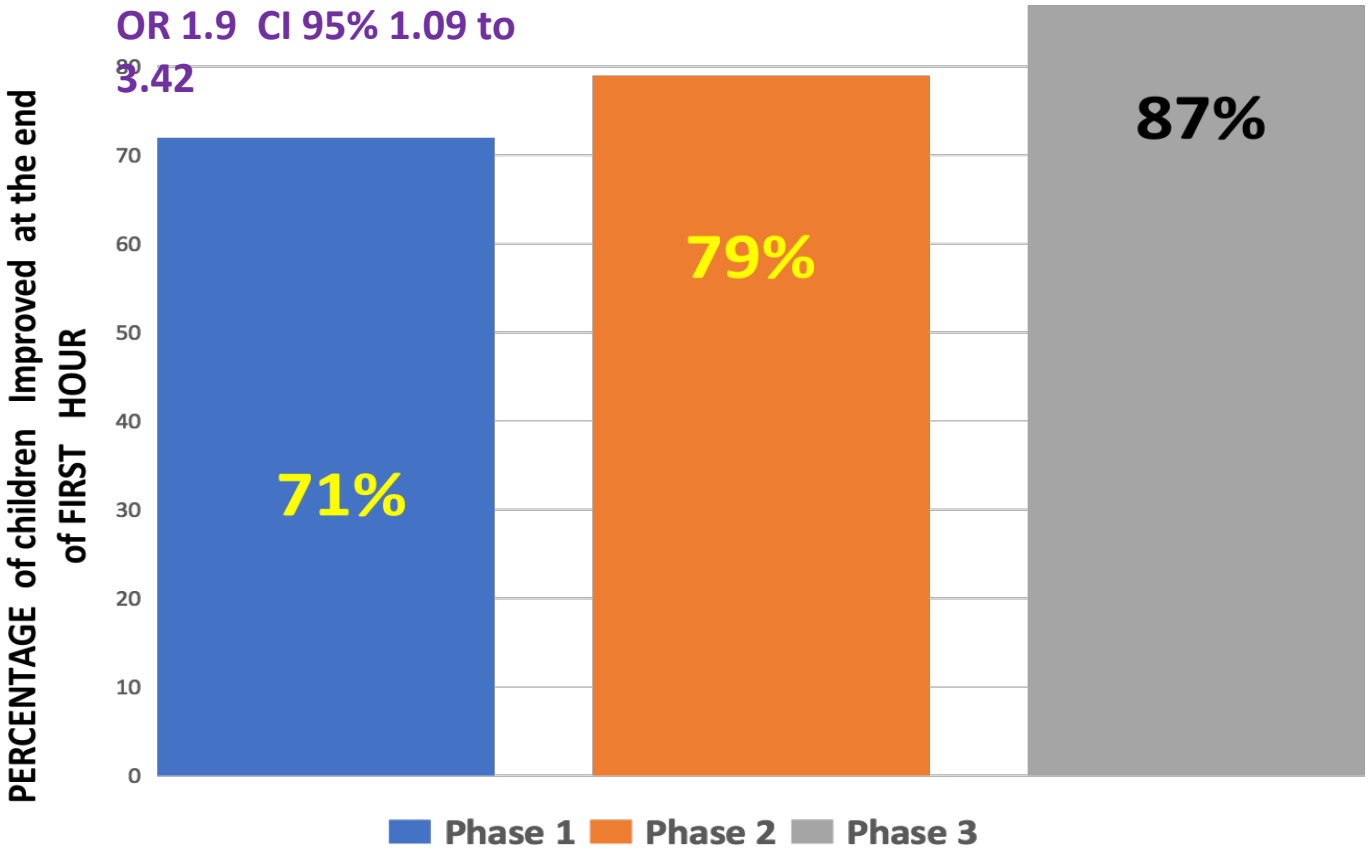
ORIGINAL RESEARCH
published: 26 July 2022
doi: 10.3389/fped.2022.904846

Low-Cost "Telesimulation" Training Improves Real Patient Pediatric Shock Outcomes in India

Ebor Jacob G. James[1,2], Siva Vyasam[1], Shakthi Venkatachalam[3], Elizabeth Sanseau[4], Kyle Cassidy[5], Geethanjali Ramachandra[2,6], Grace Rebekah[7], Debasis D. Adhikari[1], Ellen Deutsch[3,8], Akira Nishisaki[3,8] and Vinay M. Nadkarni[3,8]*

[1] *Pediatric Critical Care, Department of Pediatrics, Christian Medical College, Vellore, India,* [2] *Pediatric Simulation Training and Research Society of India, Hyderabad, India,* [3] *Center for Simulation, Advanced Education and Innovation, The Children's Hospital of Philadelphia, Philadelphia, PA, United States,* [4] *Division of Emergency Medicine, Department of Pediatrics, The Children's Hospital of Philadelphia, Philadelphia, PA, United States,* [5] *Annenberg School for Communication, University of Pennsylvania, Philadelphia, PA, United States,* [6] *Department of Pediatric Intensive Care, Krishna Institute of Medical Sciences, Secunderabad, India,* [7] *Department of Biostatistics, Christian Medical College, Vellore, India,* [8] *Department of Anesthesiology and Critical Care Medicine, The Children's Hospital of Philadelphia, Philadelphia, PA, United States*

Hemodynamics of patients with shock at the end of first hour treatment



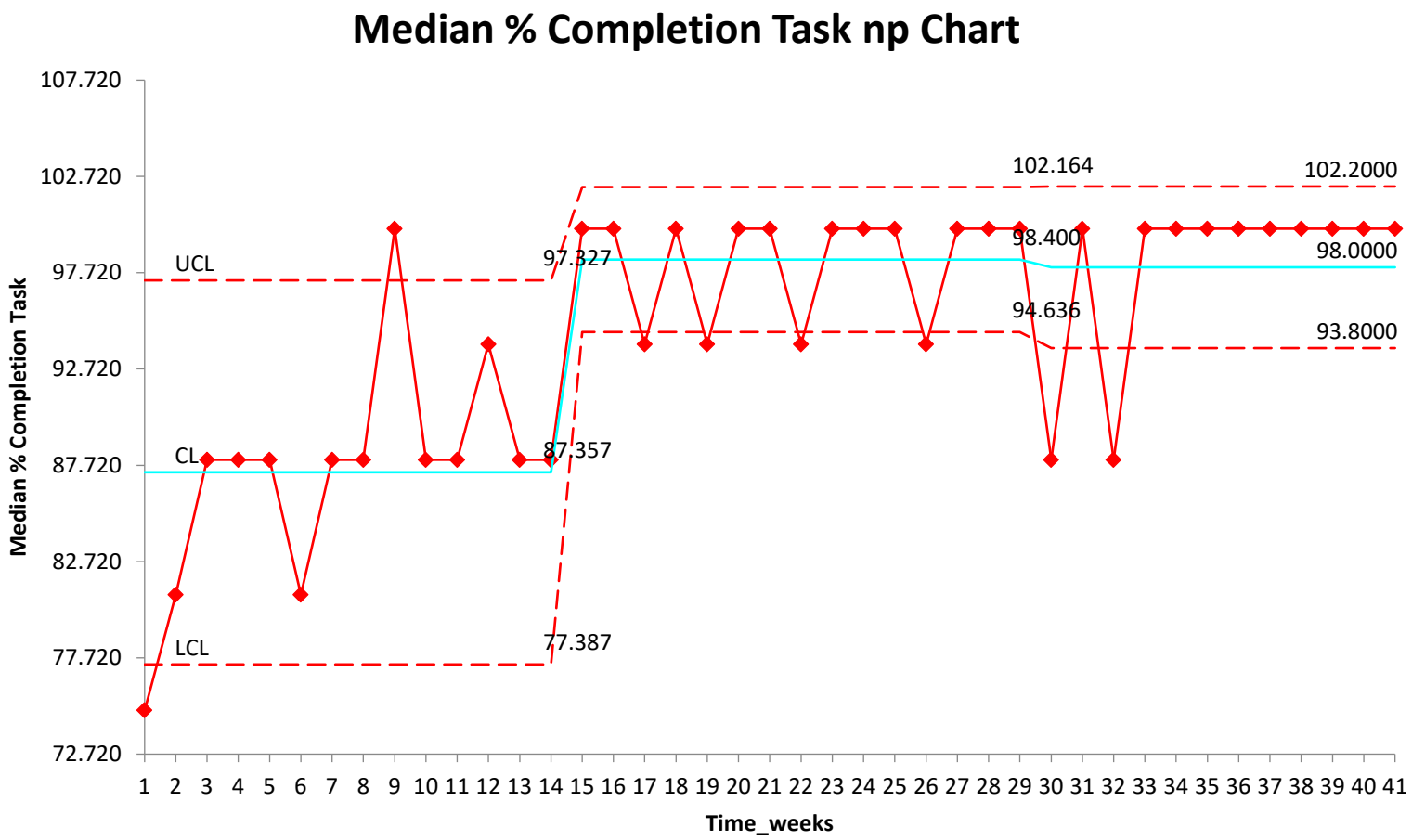
(Overall improvement between phases)

Phase 1 (Pre invention) 71%

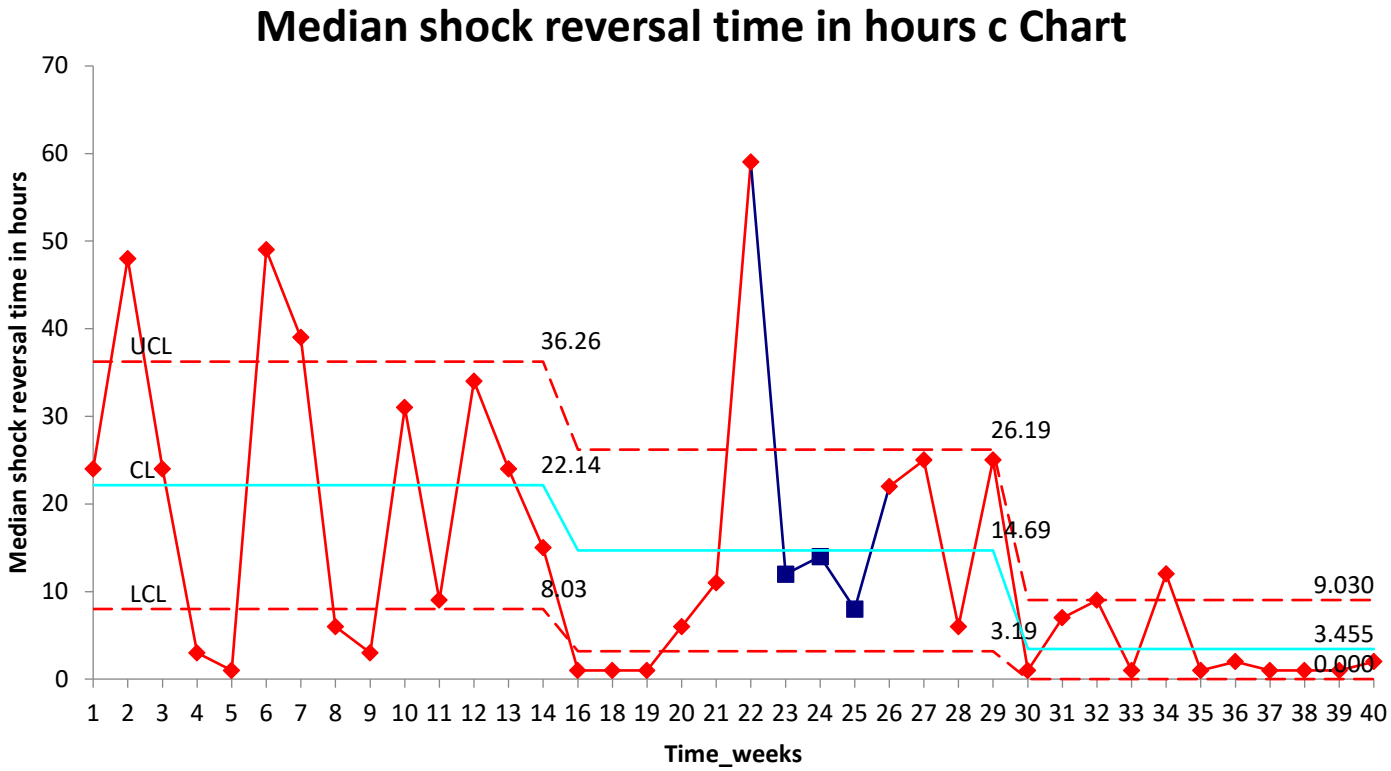
Phase 2 (intervention) 79%

Phase 3 (post intervention) 87%

p Value	
Overall,	0.026
Phase 1 vs 2	0.178
Phase 1 vs 3	0.007


Median % Completion Task np Chart
107.720
102.720
97.720
92.720
87.720
82.720
77.720
72.720
Median % Completion Task
UCL
CL
LCL
97.327
87.357
77.387
102.164
102.2000
98.400
98.0000
94.636
93.8000
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
Time_weeks

i5


Median shock reversal time in hours c Chart
Median shock reversal time in hours
Time_weeks
UCL
CL
LCL
36.26
22.14
8.03
26.19
14.69
3.19
9.030
3.455
0.000

Real Events

Simulated events/ Training

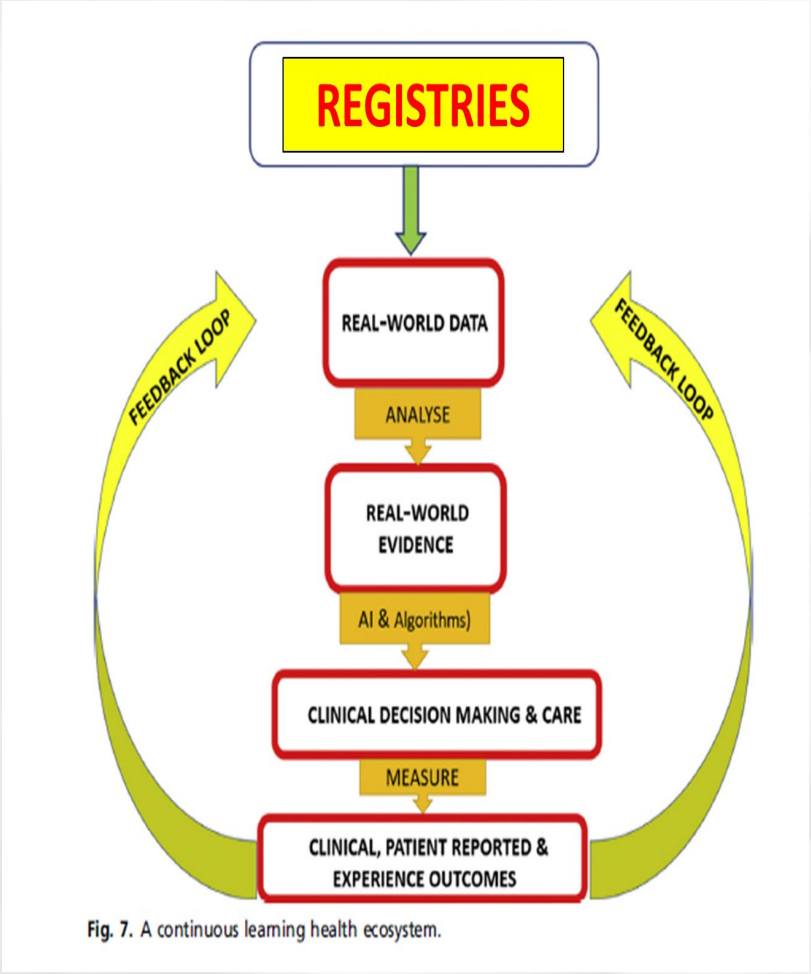


Fig. 7. A continuous learning health ecosystem.

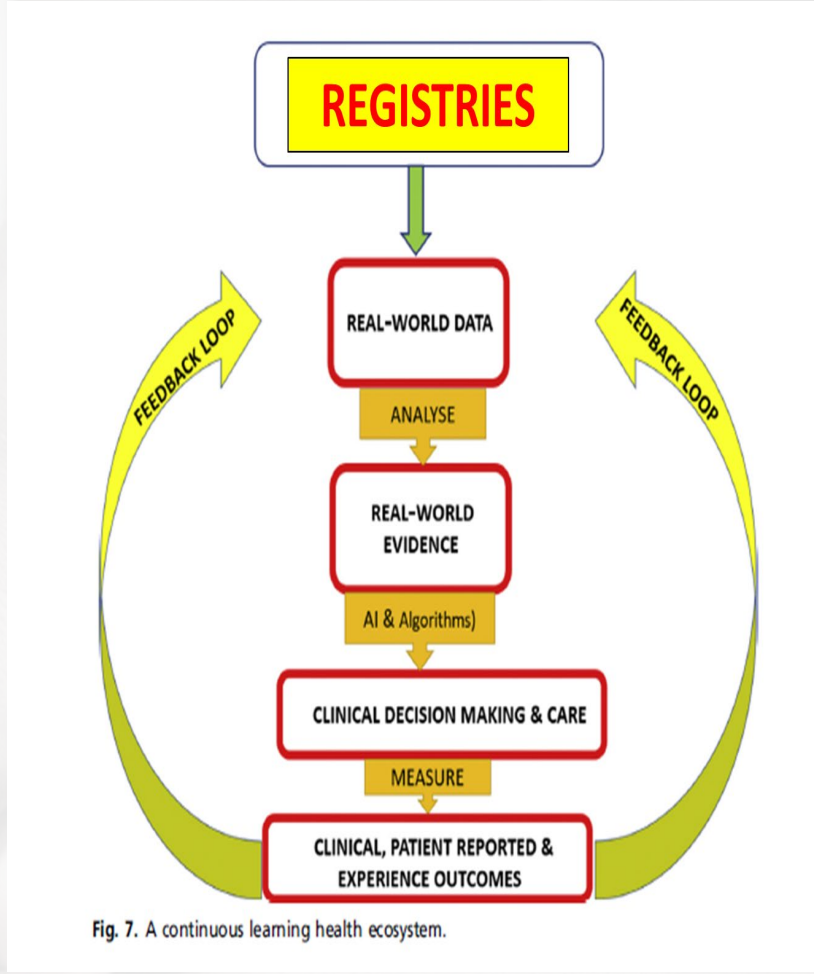
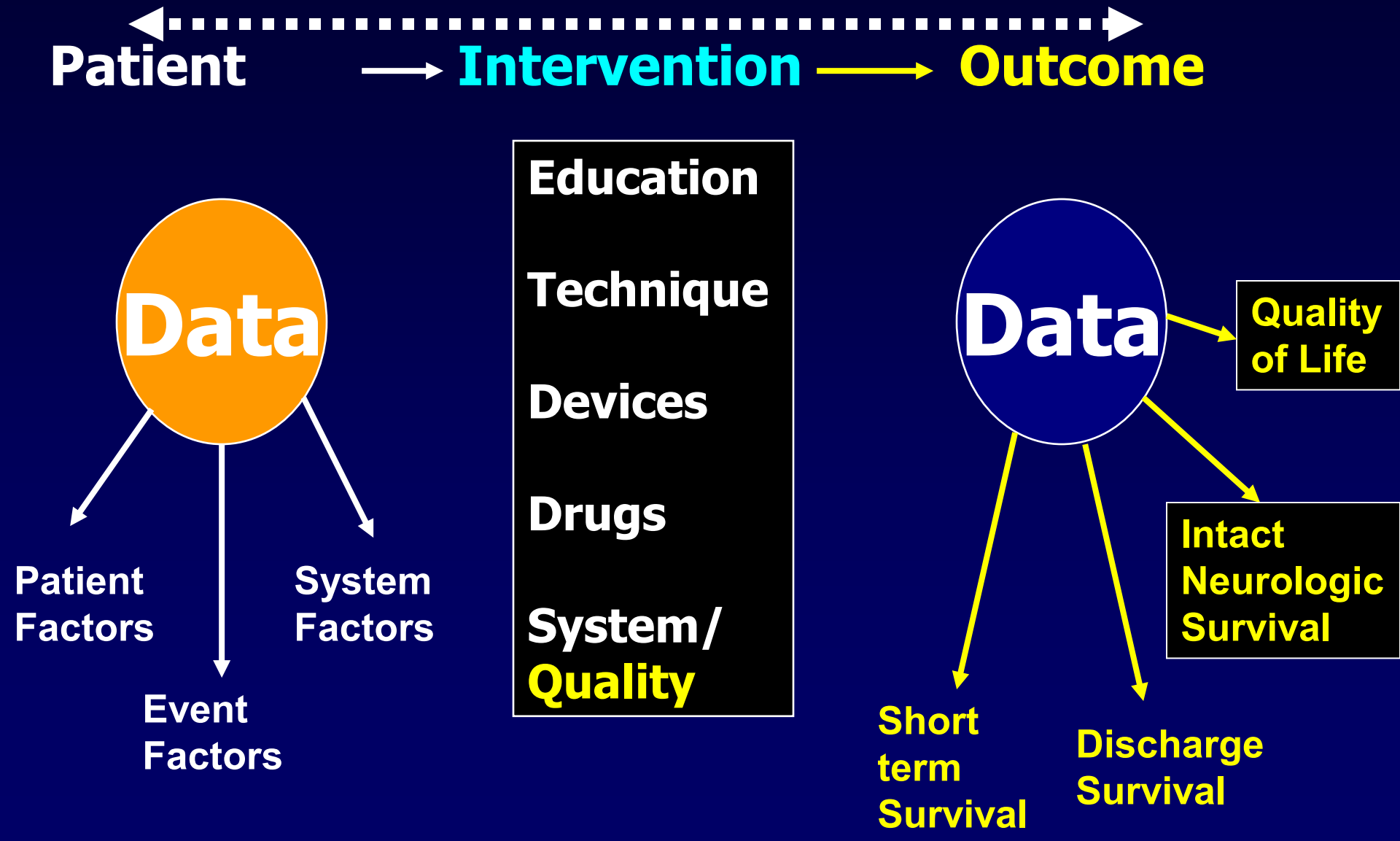


Fig. 7. A continuous learning health ecosystem.

Continuous Re-Certification


BIG
DATA

Patient Selection and Quality of Care

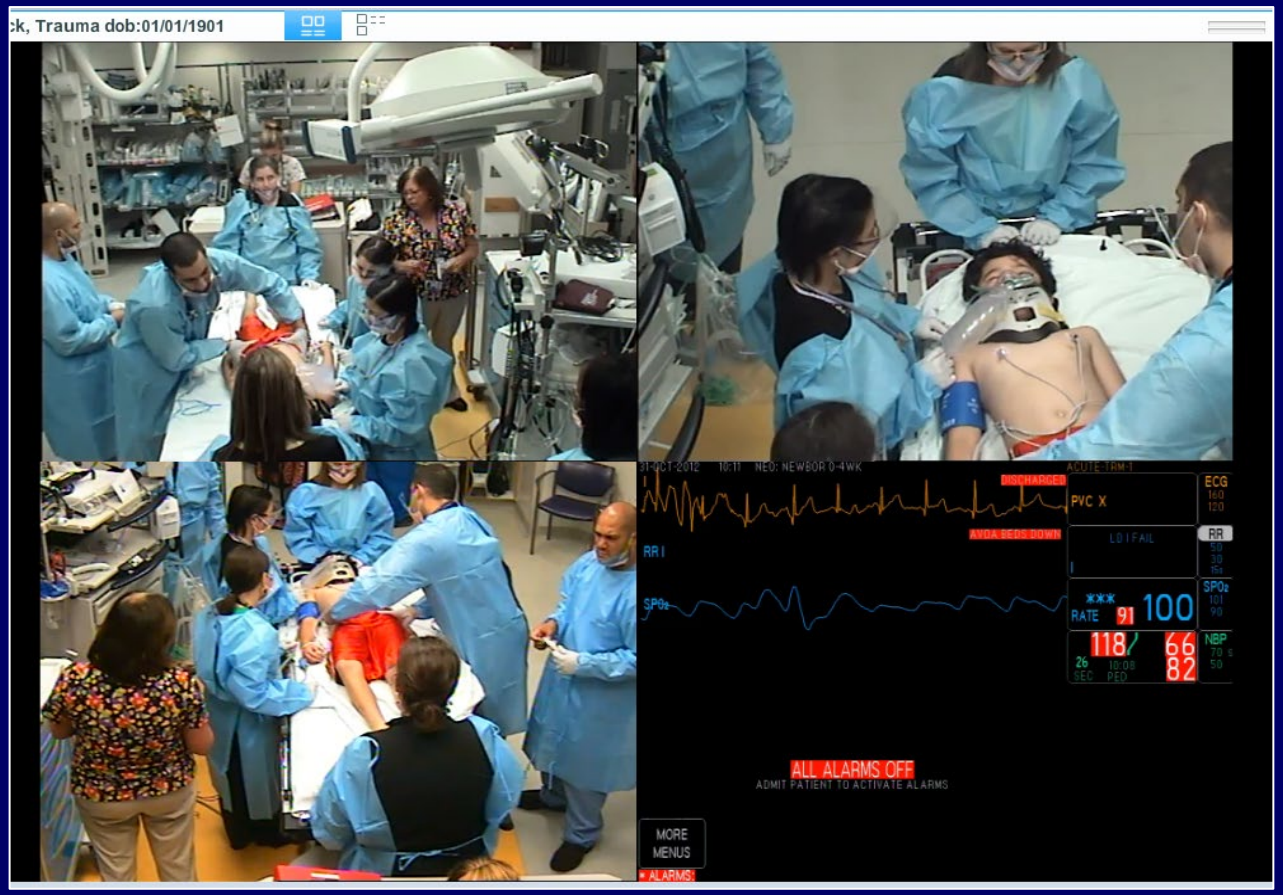


Big Data…Artificial Intelligence…"Virtual Command Centers" and Decision Support…

On-Star On-Line

NASA Command Center

Resuscitation Bays of the Future



"Resuscitation Bay of the Future" Live-Capture Video, Communication, Ultrasound

VIPER Network (Videography In Pediatric Emergency Room)

Eye-Tracking technology

Geolocation and "Resuscitation Room of the Future"

Creating INSTANT REPLAY for in-hospital after Event Review

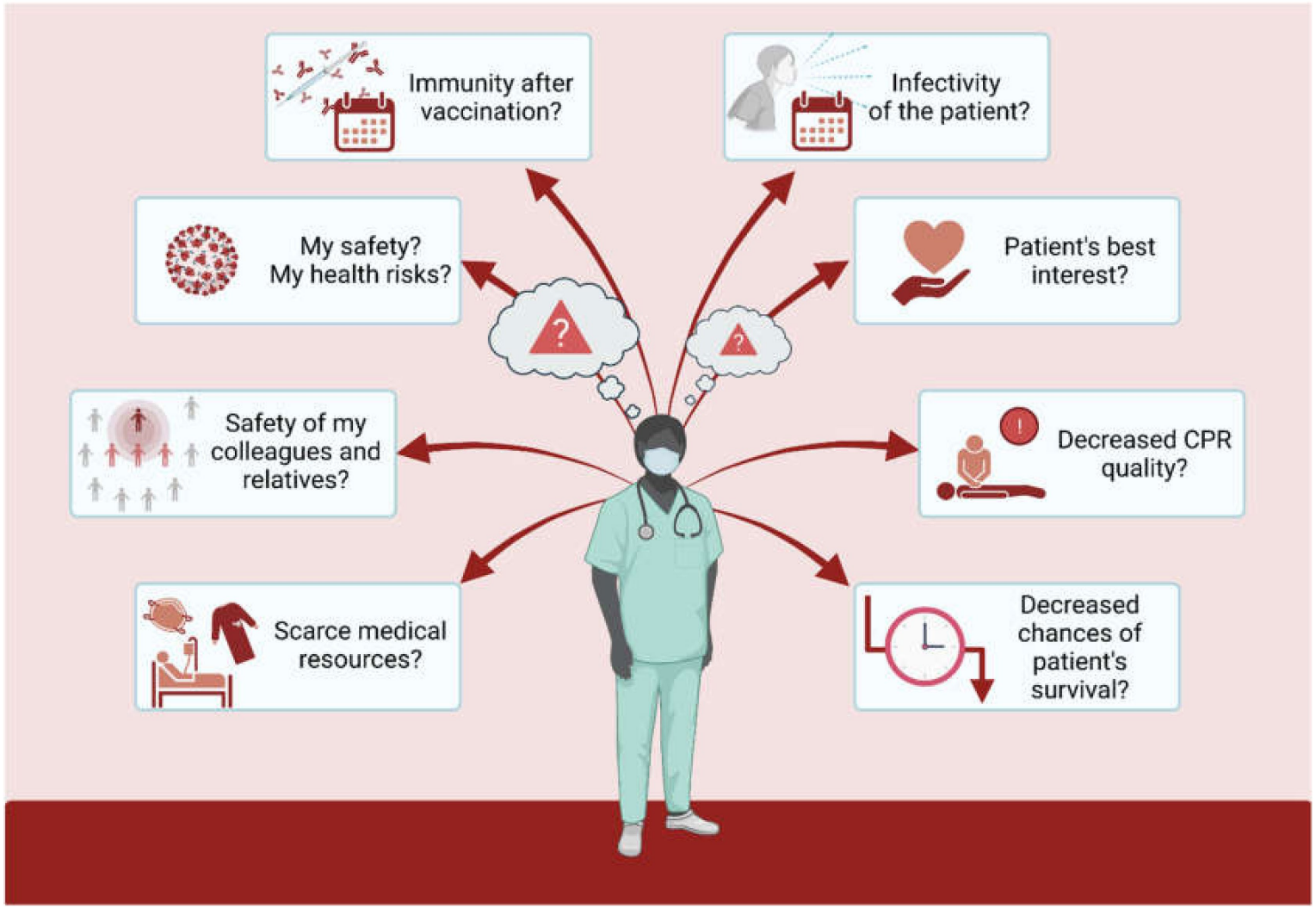
Similar to…

Learning more about provider capabilities

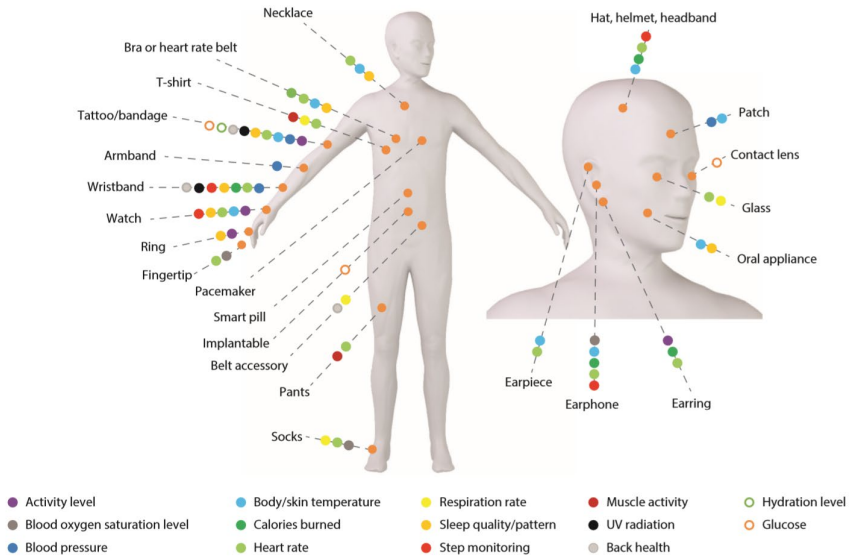
Testing Fatigue and Provider Performance

Stepstool

No stepstool


Immunity after vaccination?
Infectivity of the patient?
My safety? My health risks?
Patient's best interest?
Safety of my colleagues and relatives?
Decreased CPR quality?
Scarce medical resources?
Decreased chances of patient's survival?

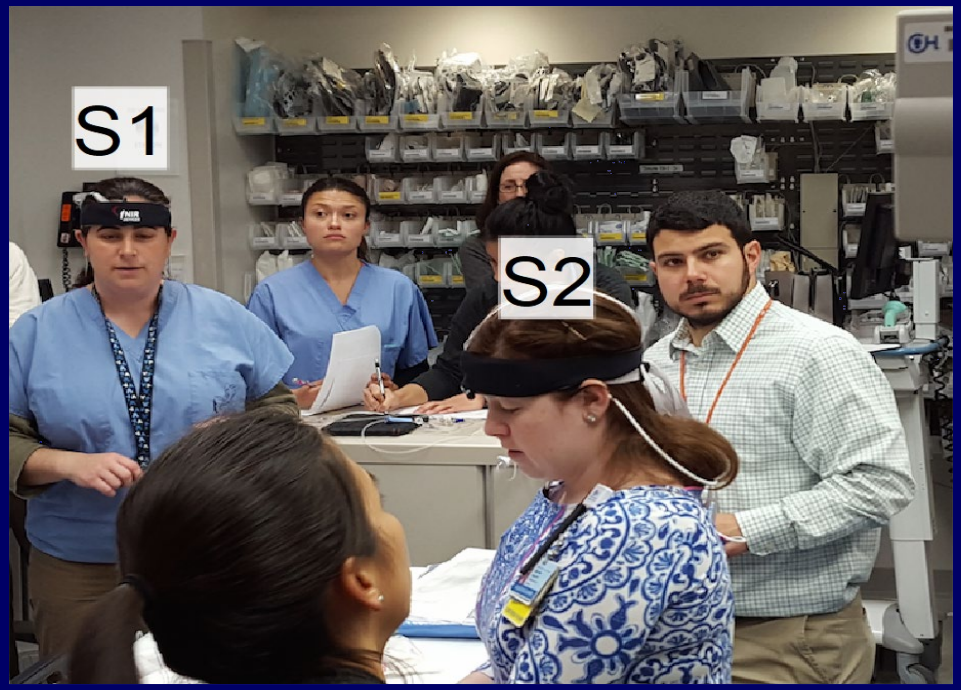
Wearable and Implantable Sensors For Biomedical Applications



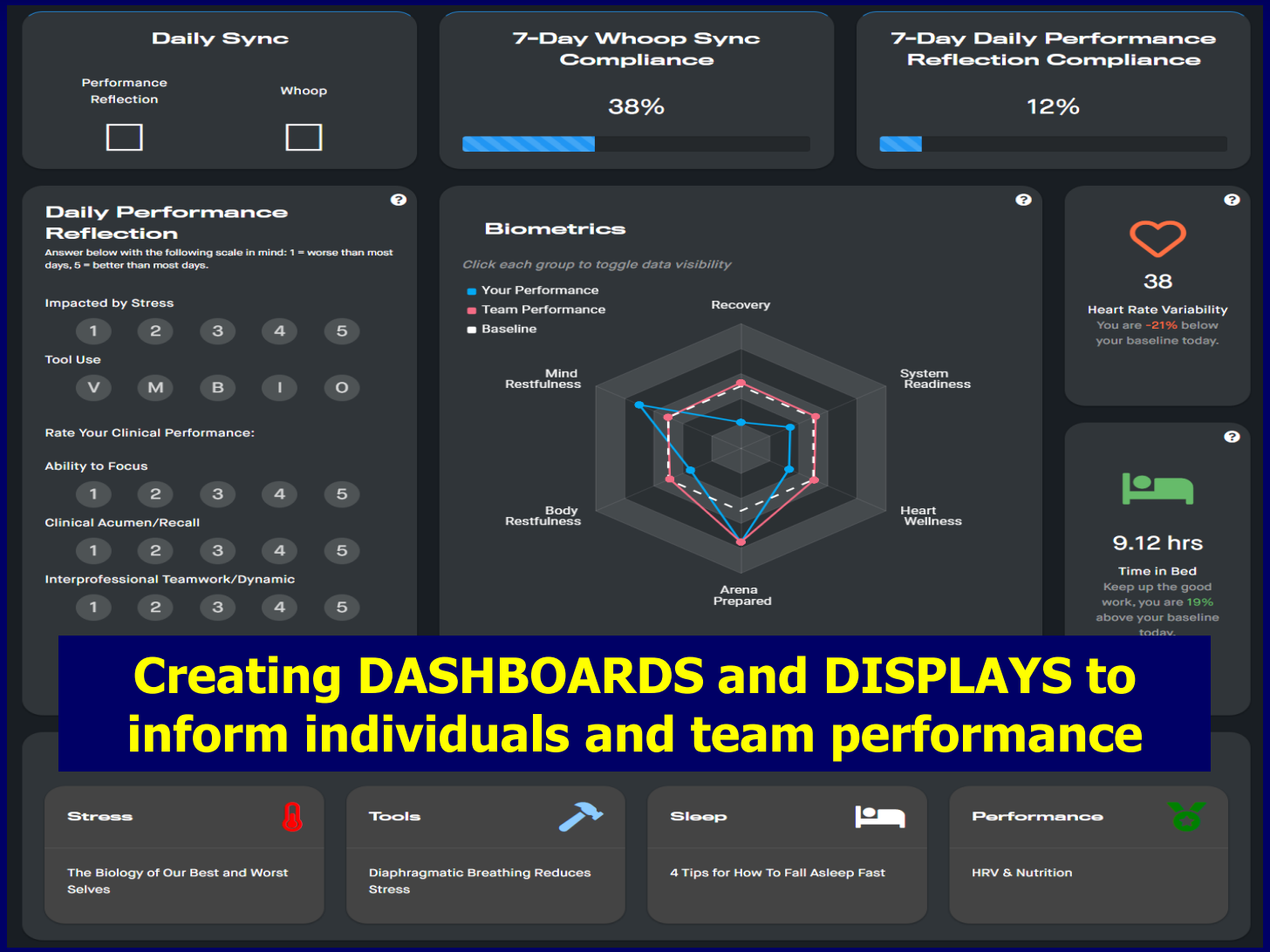
- Vital signs
- Oximetry
- HR variability
- Activity
- Sleep quality
- Glucose
- Hydration
- Location

Koydemir HC, et al. Annu Rev Anal Chem 2018; 11: 6.1–6.20

Understanding Team Task Load, Stress, and Team Performance with Wearables



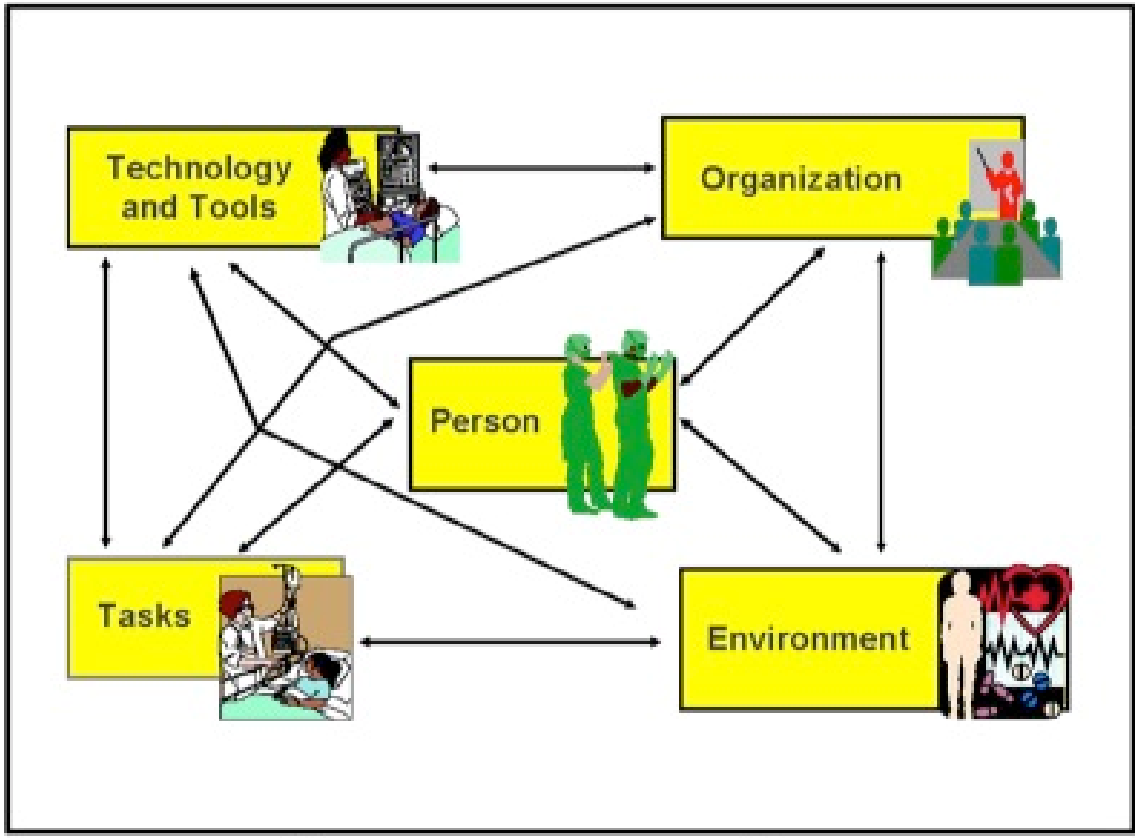
CHOP Trauma team members S1 & S2 wear fNIR headband devices during simulation to correlate Task Load with Brain Blood Flow

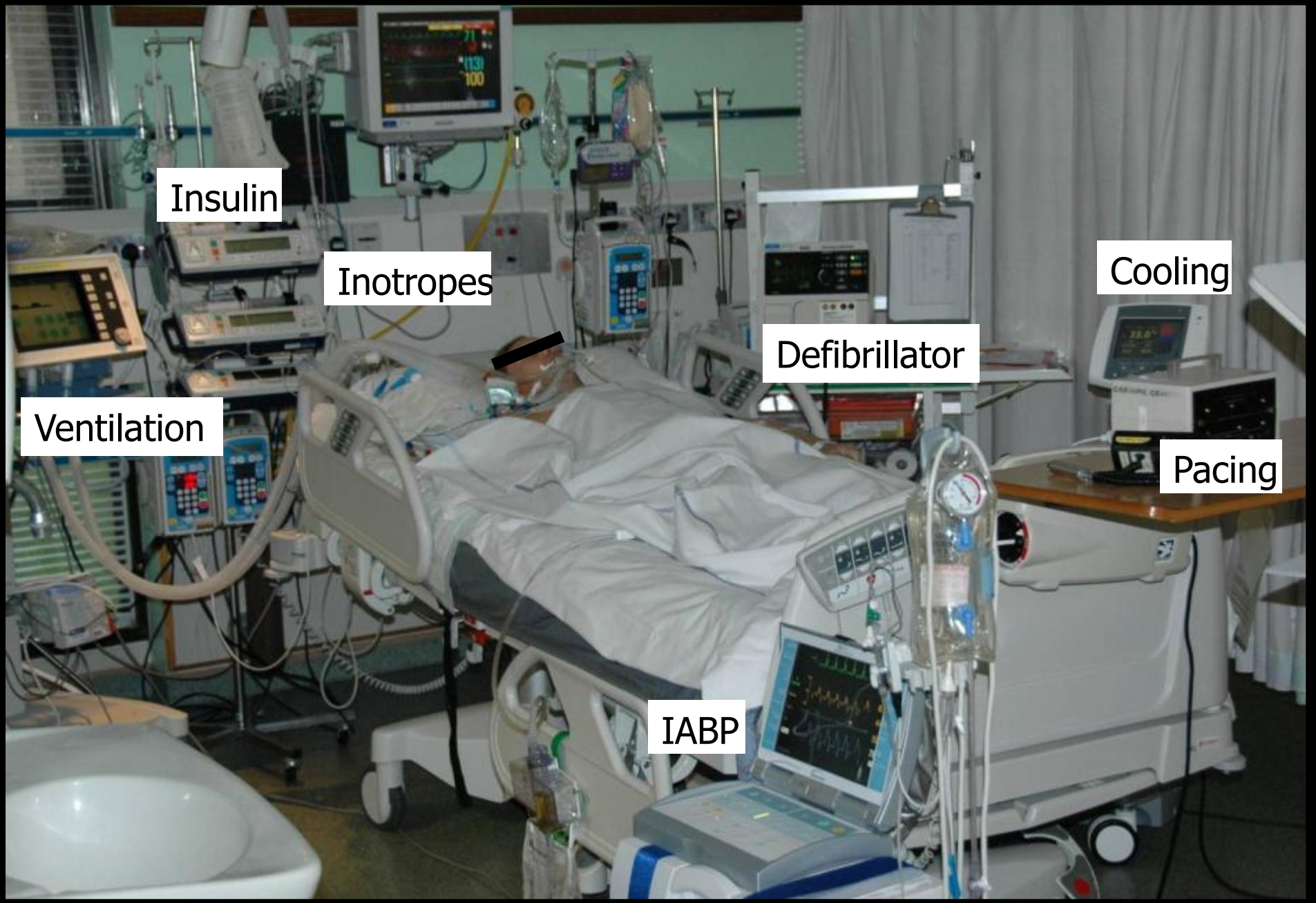

Daily Sync
Performance Reflection
Whoop
7-Day Whoop Sync Compliance
38%
7-Day Daily Performance Reflection Compliance
12%
Daily Performance Reflection
Answer below with the following scale in mind: 1 = worse than most days, 5 = better than most days.
Impacted by Stress
1 2 3 4 5
Tool Use
V M B I O
Rate Your Clinical Performance:
Ability to Focus
1 2 3 4 5
Clinical Acumen/Recall
1 2 3 4 5
Interprofessional Teamwork/Dynamic
1 2 3 4 5
Biometrics
Click each group to toggle data visibility
Your Performance
Team Performance
Baseline
Recovery
System Readiness
Heart Wellness
Arena Prepared
Body Restfulness
Mind Restfulness
38
Heart Rate Variability
You are -21% below your baseline today.
9.12 hrs
Time in Bed
Keep up the good work, you are 19% above your baseline today.
Creating DASHBOARDS and DISPLAYS to inform individuals and team performance
Stress
The Biology of Our Best and Worst Selves
Tools
Diaphragmatic Breathing Reduces Stress
Sleep
4 Tips for How To Fall Asleep Fast
Performance
HRV & Nutrition

Not just in resource-rich, but also contextualized to resource-limited settings

With attention to Diversity, Equity and Inclusion

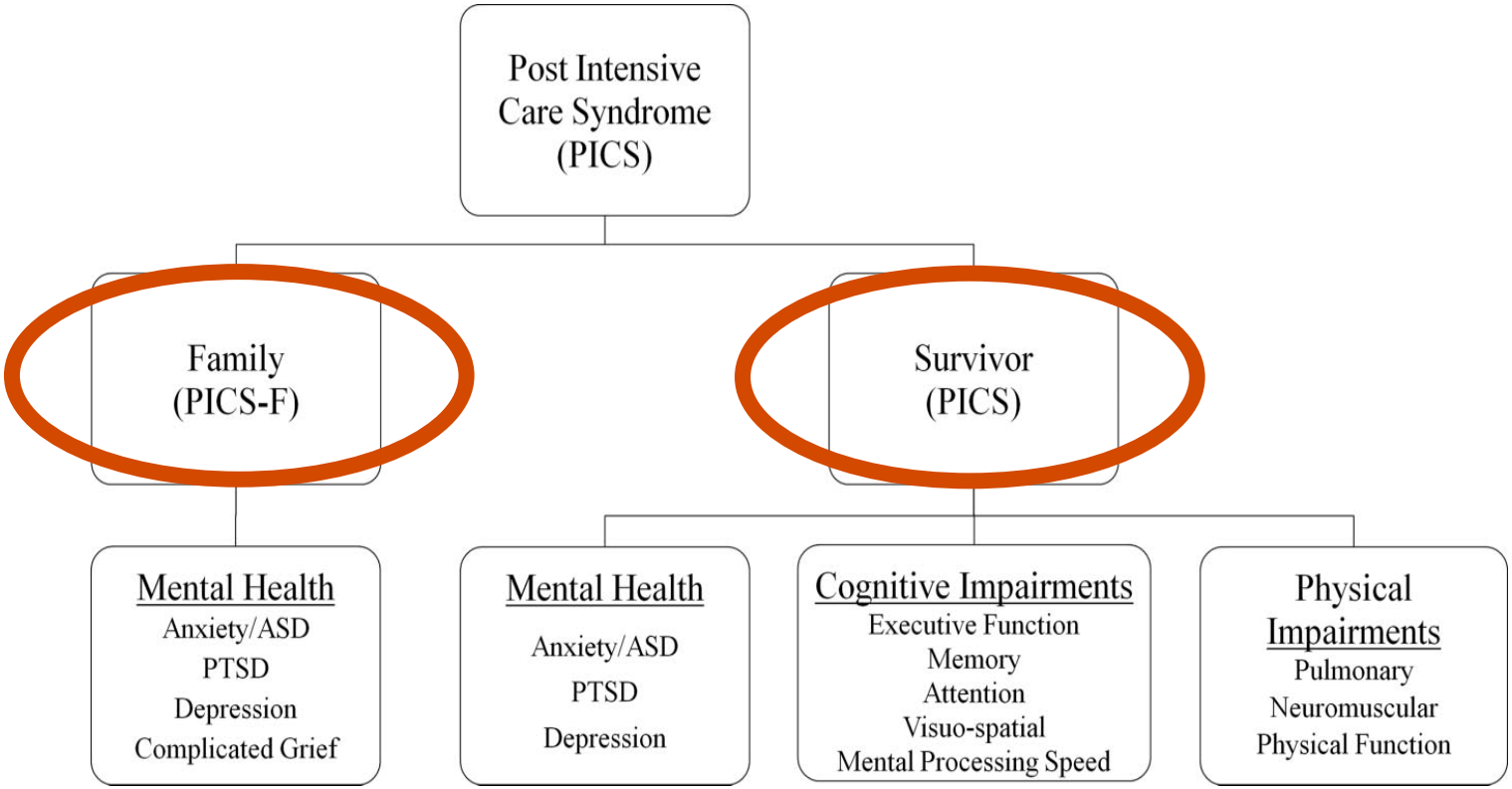
Linking Human Factors and Performance




Insulin
Inotropes
Ventilation
Defibrillator
Cooling
Pacing
IABP

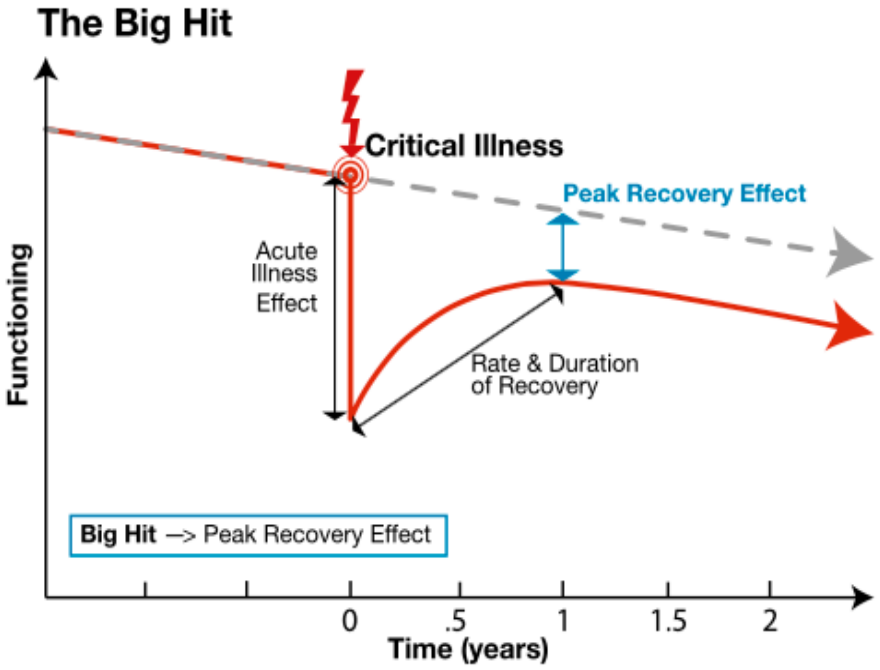

Emotion
Psychological Safety
Mindful Reflection

Post-Intensive Care Syndrome (PICS and PICS-F)



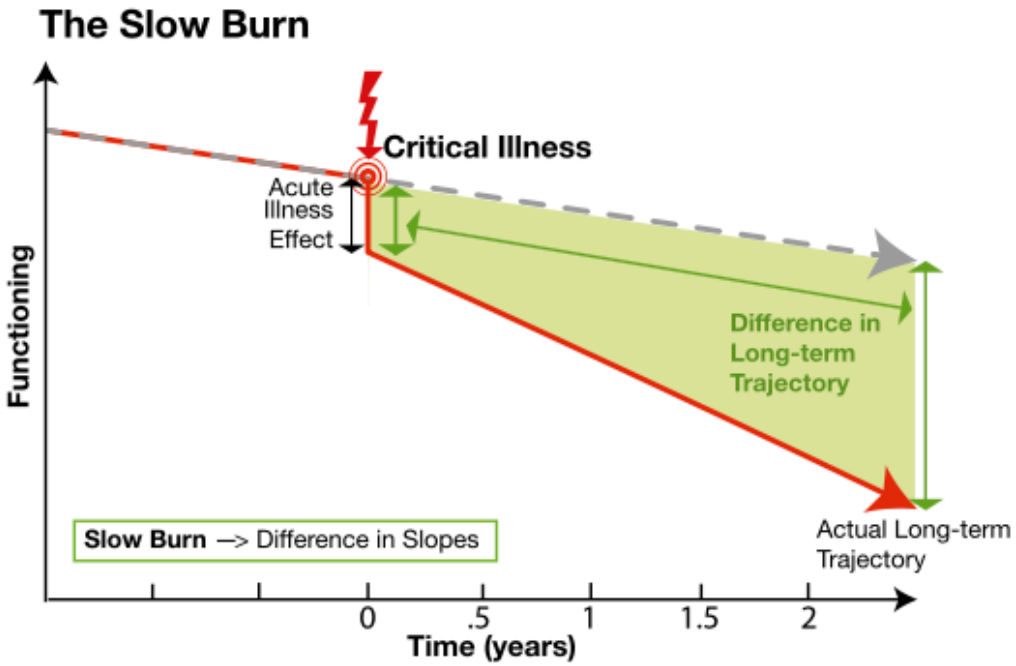
Needham DM et al. *CCM* 2012

Trajectories of Recovery: The Big Hit



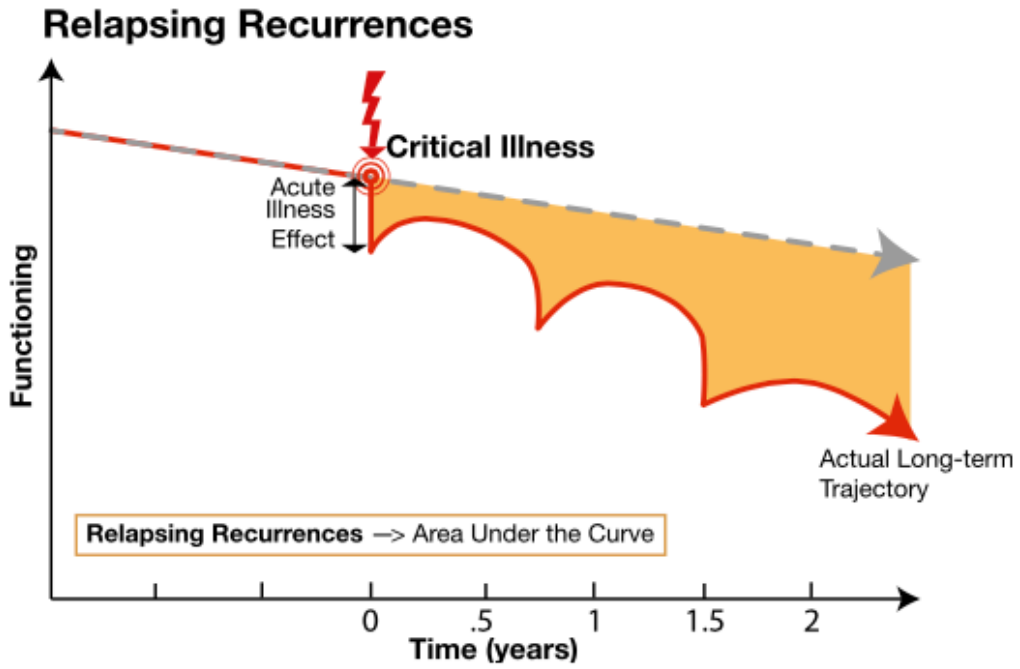
Iwashyna, TJ. *AJRCCM* 2012; 186:302-304

Trajectories of Recovery: The Slow Burn



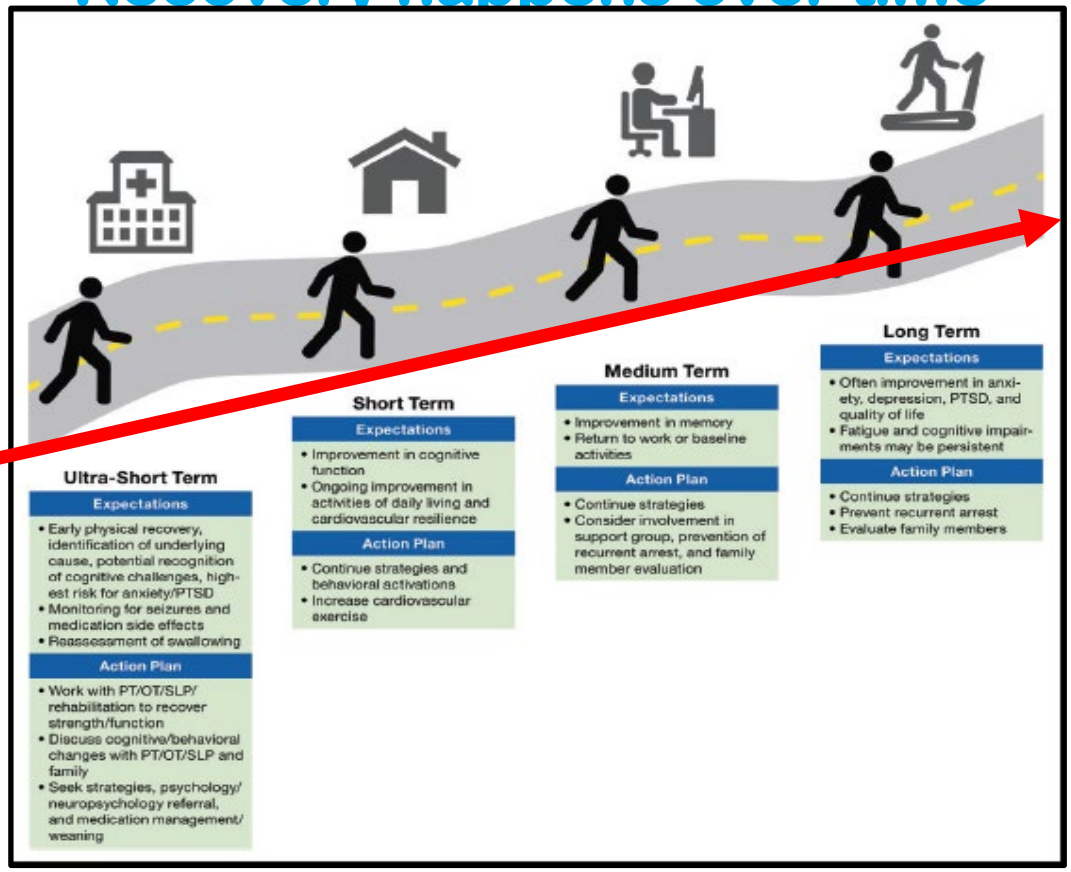
Iwashyna, TJ. *AJRCCM* 2012; 186:302-304

Trajectories of Recovery: Relapsing Recurrences



Iwashyna, TJ. *AJRCCM* 2012; 186:302-304

Recovery happens over time

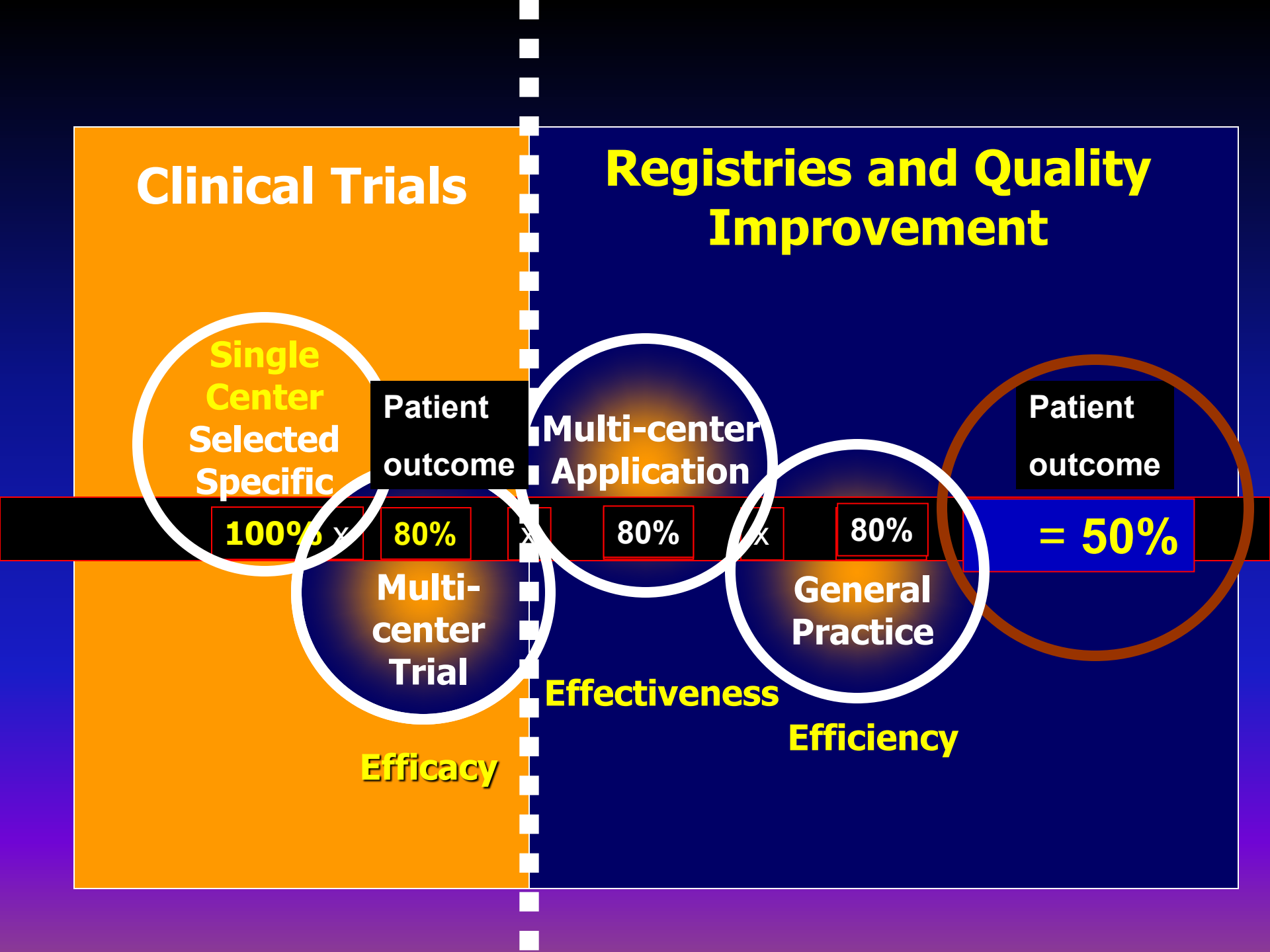


Outcome	Time Point
Survival	30 days or discharge Between 6 and 12 months
Brain Function	PCPC Pre-arrest 30 days or discharge **Between 6 and 12 months**
Cognitive & Physical Function	**PEDSQL** **Between 6 and 12 months**
Basic Daily Life Skills	

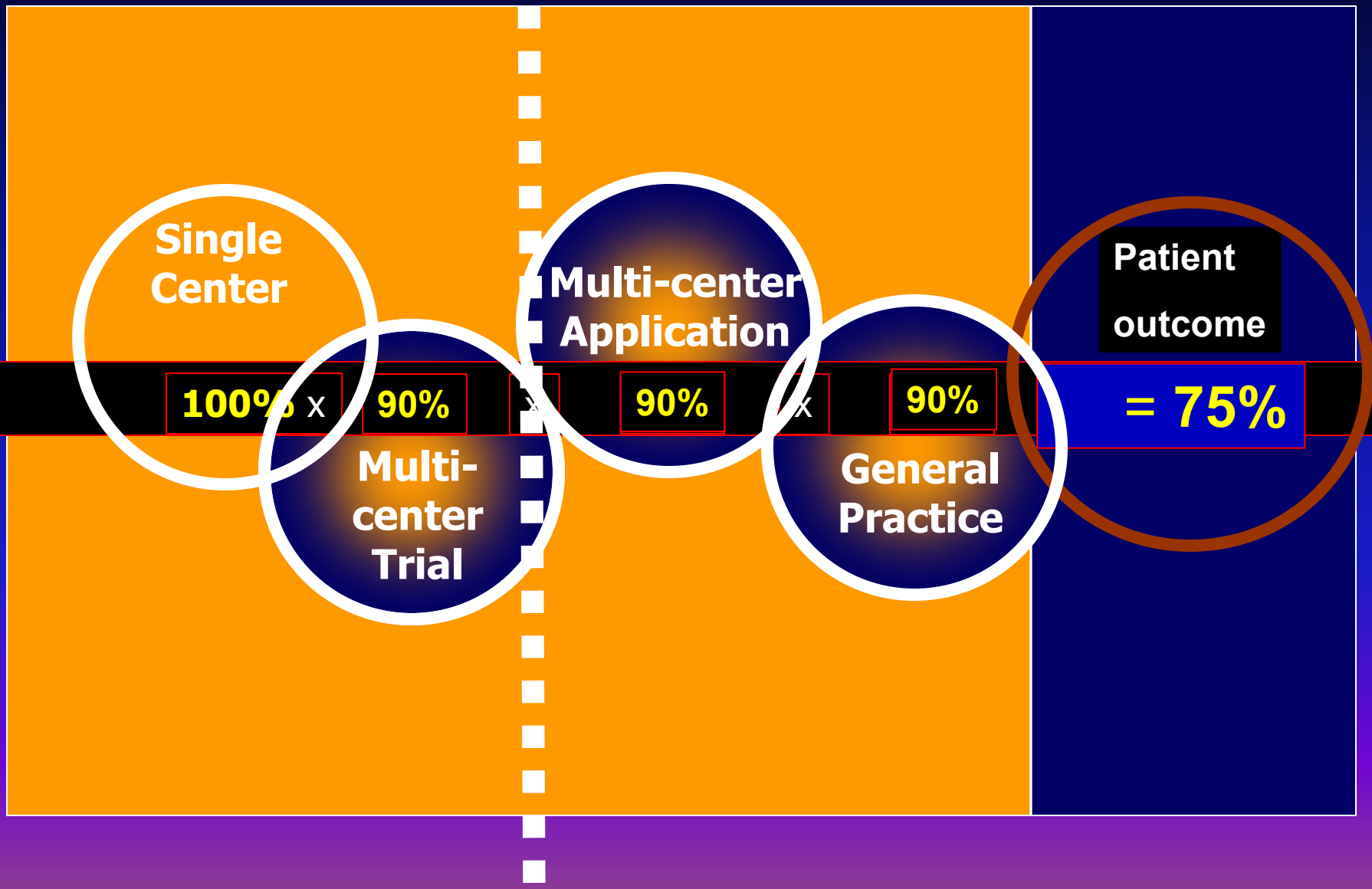
Sawyer, 2020; Topjian, 2020

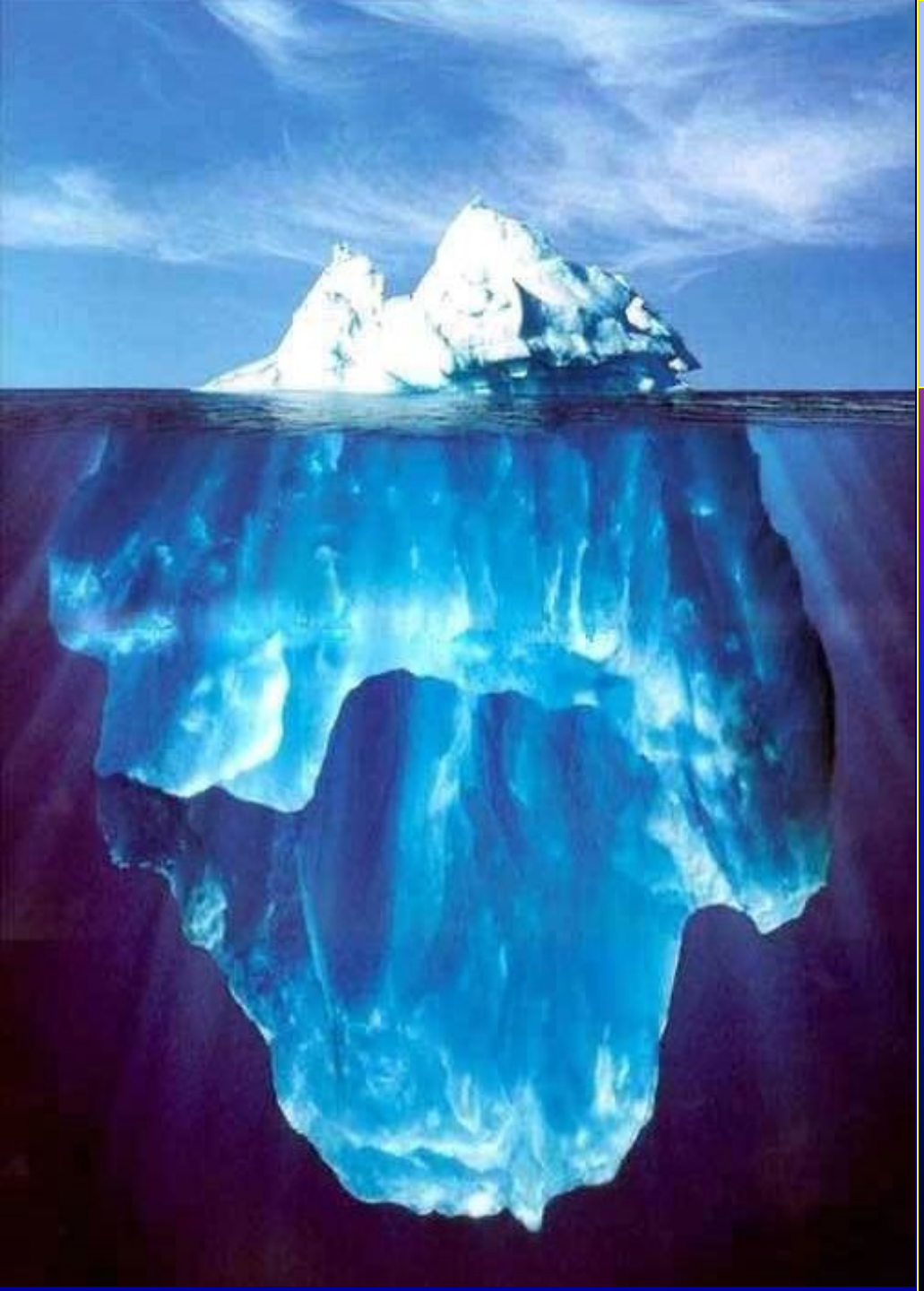
Social Media Landscape

FredCavazza.net


Clinical Trials
Registries and Quality Improvement
Single Center Selected Specific
Patient outcome
Multi-center Application
Patient outcome
100%
80%
80%
80%
= 50%
Multi-center Trial
General Practice
Effectiveness
Efficiency
Efficacy

Clinical Trials, Adaptive Design, Comparative Effectiveness, Registries





The Near Future

The Far Future

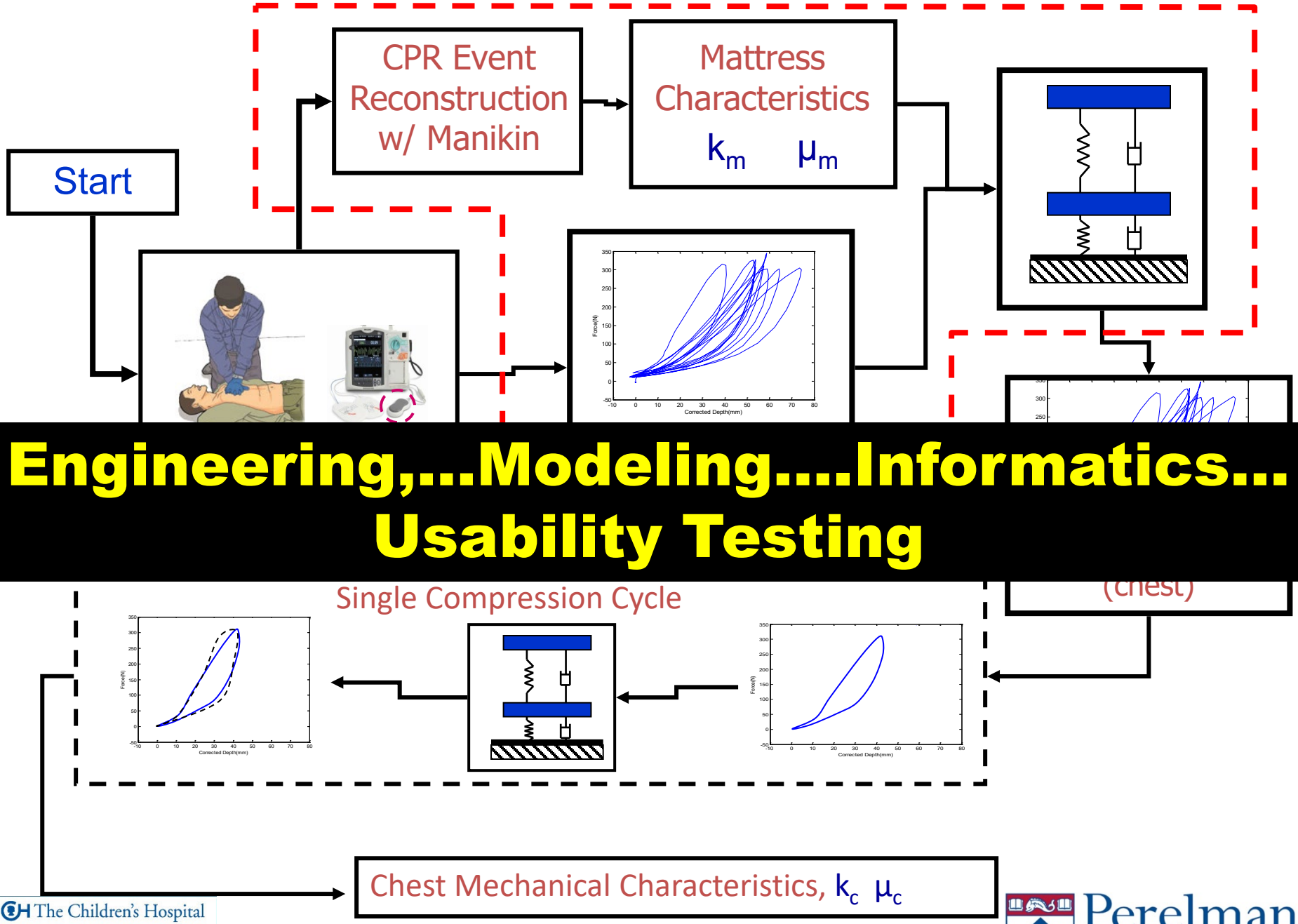
Circumferential chest compressions/Load Distributing Band

Automated Active Compression – Decompression CPR

Impedance Threshold Device Augmentation

Interposed Abdominal Compresssions

Human AND Machine!



Engineering,...Modeling....Informatics... Usability Testing

The Children's Hospital of Philadelphia® RESEARCH INSTITUTE

Perelman School of Medicine University of Pennsylvania

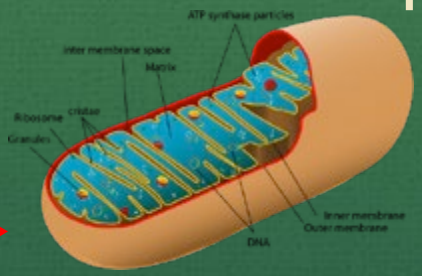
Alternative Perfusion Techniques and Conditions to Improve Recovery

- Controlled Reperfusion
- Ultrasonic Micro bubbles
- Direct Peritoneal Resuscitation
- Rapid and Profound Cooling (Emergency Preservation Resuscitation)
- Carbon Monoxide
- Brain Derived Neurotrophic Factor
- Nannotech guided vascular access Chemical Defibrillation
- Chemical Hibernation

Mitochondrial Resuscitation

Brain injury

Cardiac Arrest
Reperfusion Injury



Hemorrhagic Shock

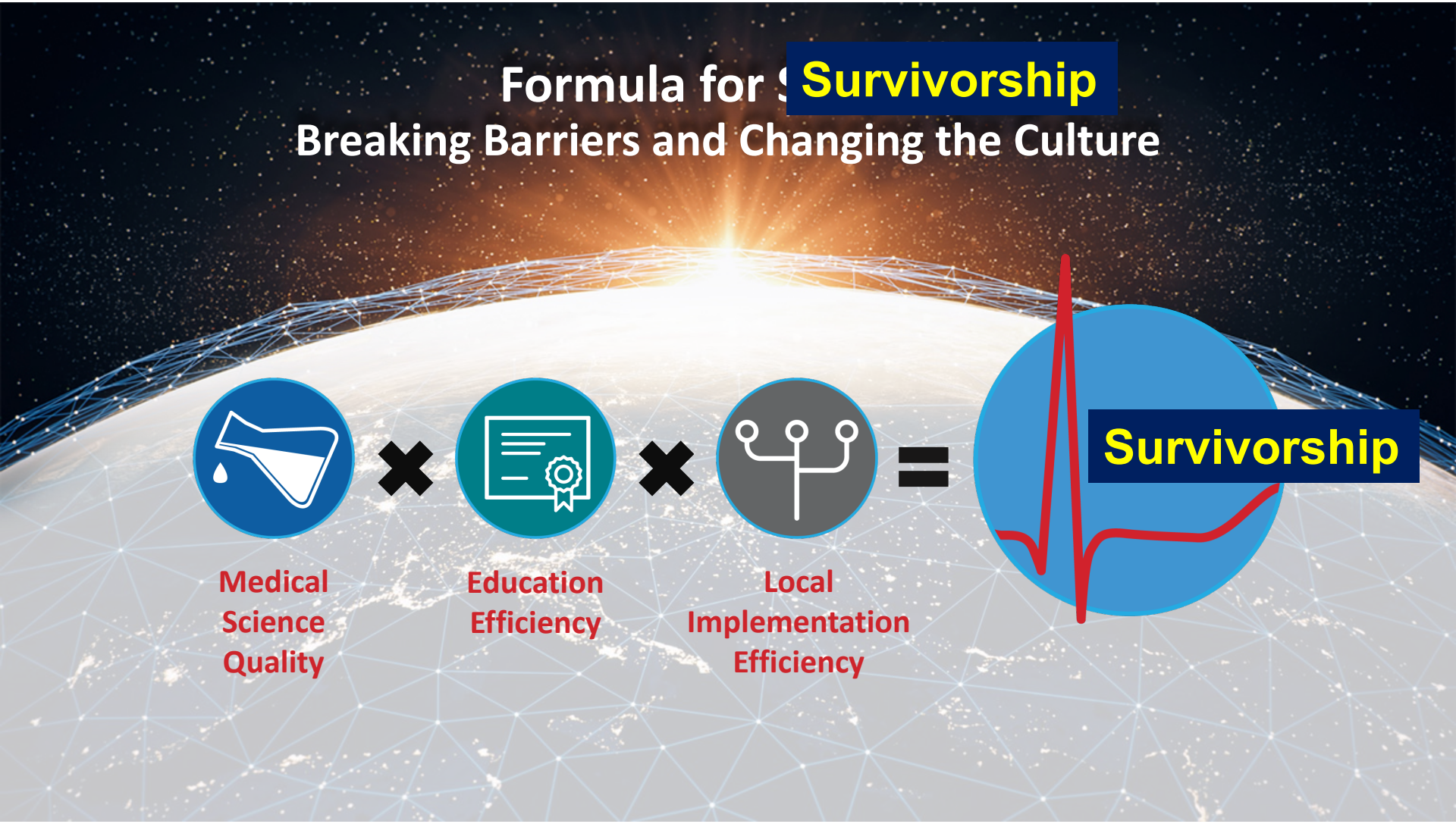
Sepsis
Inflammation

The Future of Critical Care

1. Learning Healthcare Systems
2. Big Data
3. Liberation
4. Mobility…PANDEM-ic
5. THRIVE…PICS
6. Embedded, Just-in-Time training
7. Resilience and Wellness
8. Care (CARING!) everywhere

Formula for Survivorship

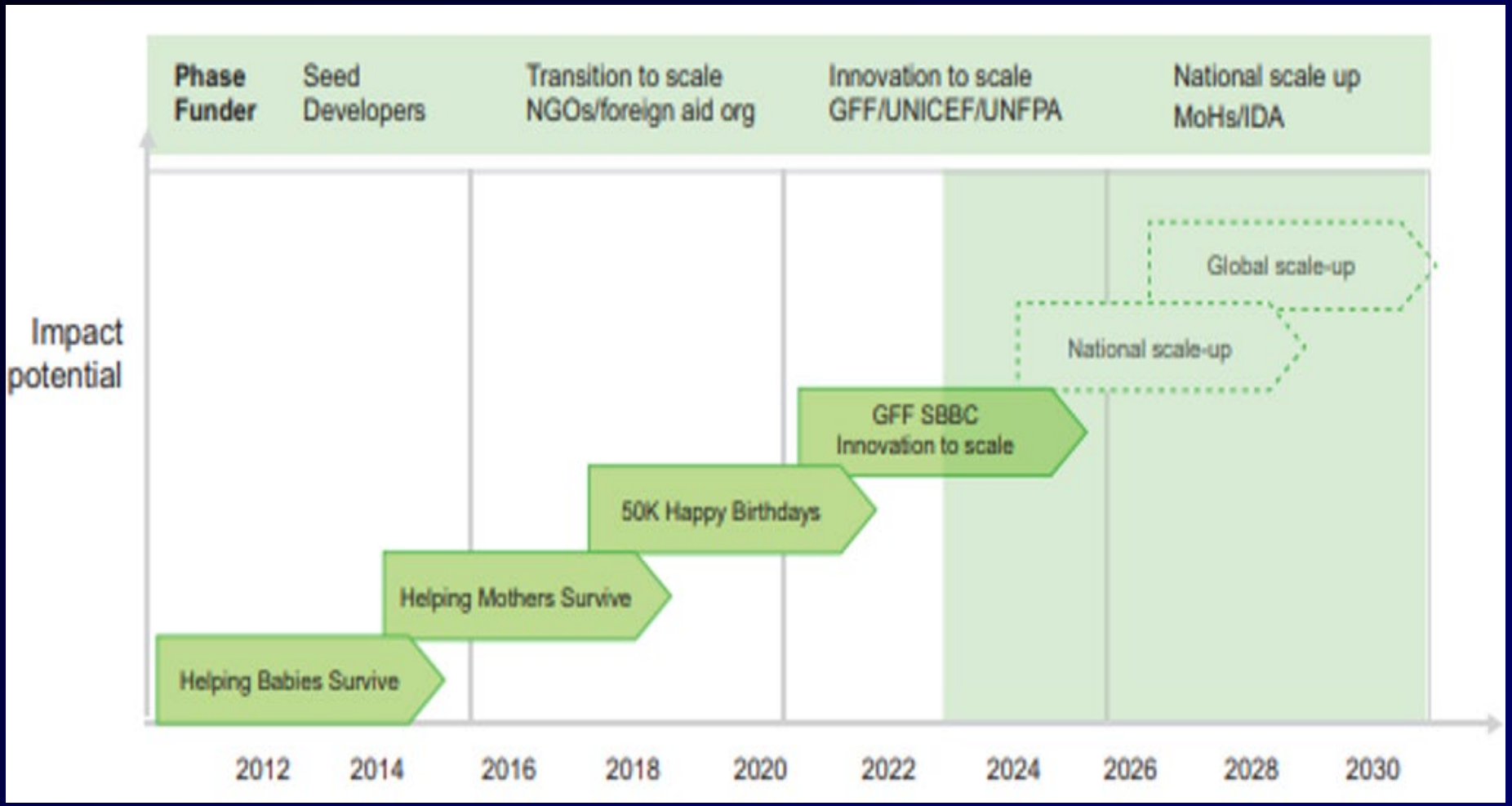
Breaking Barriers and Changing the Culture



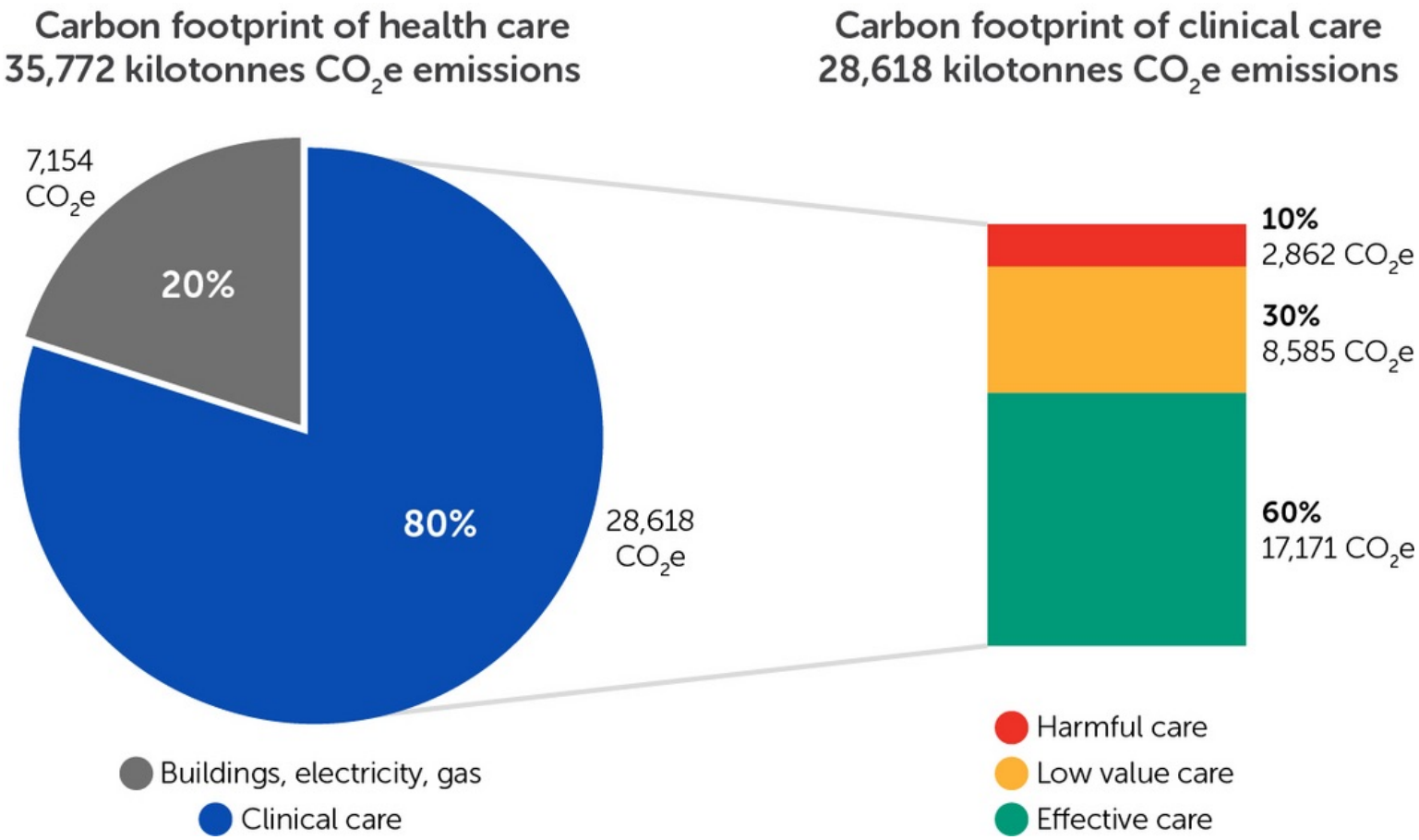
INSPIRE: *Helping babies breathe*

Sustainability

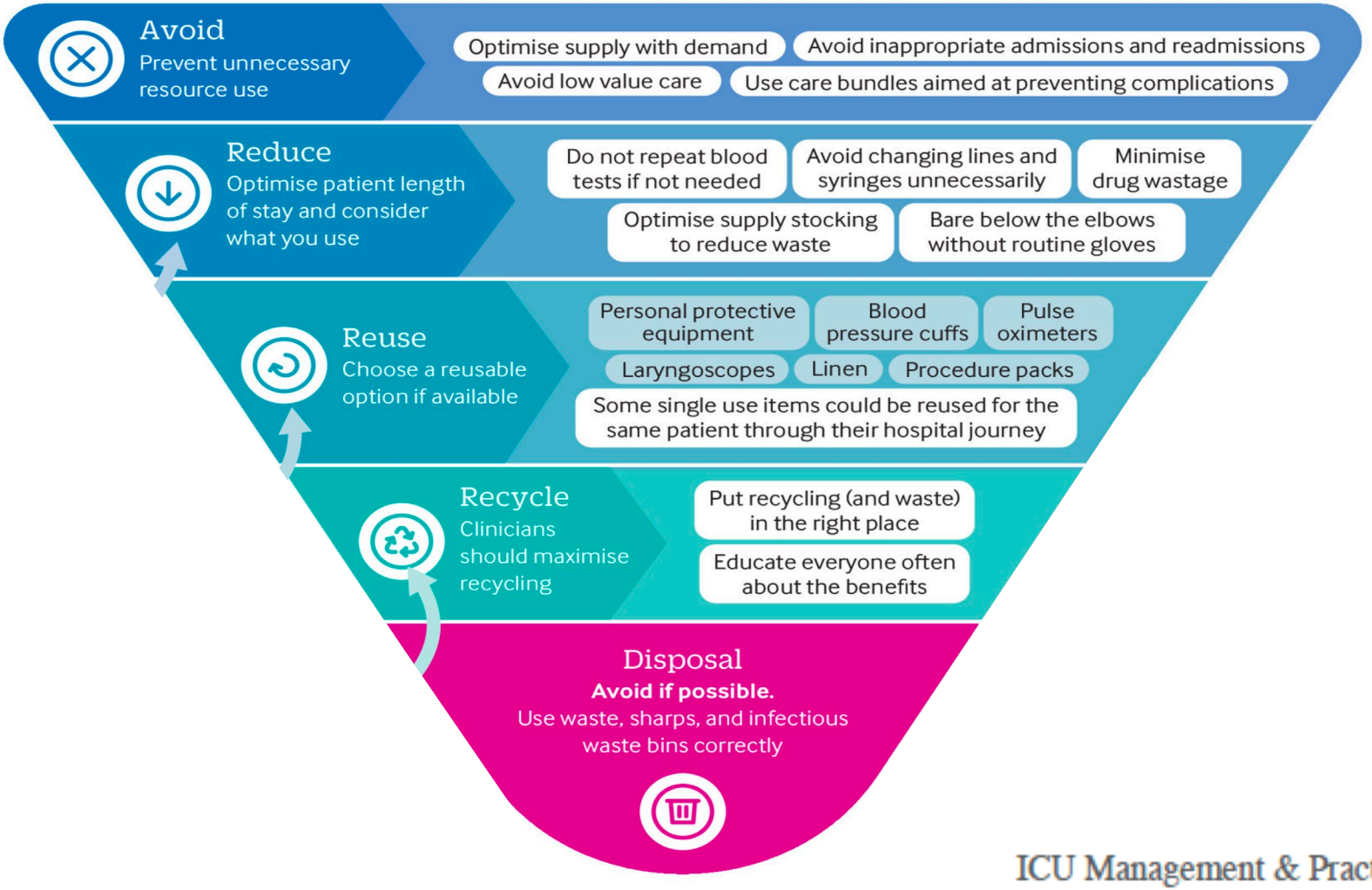
"From Donorship to Ownership"




Green ICU

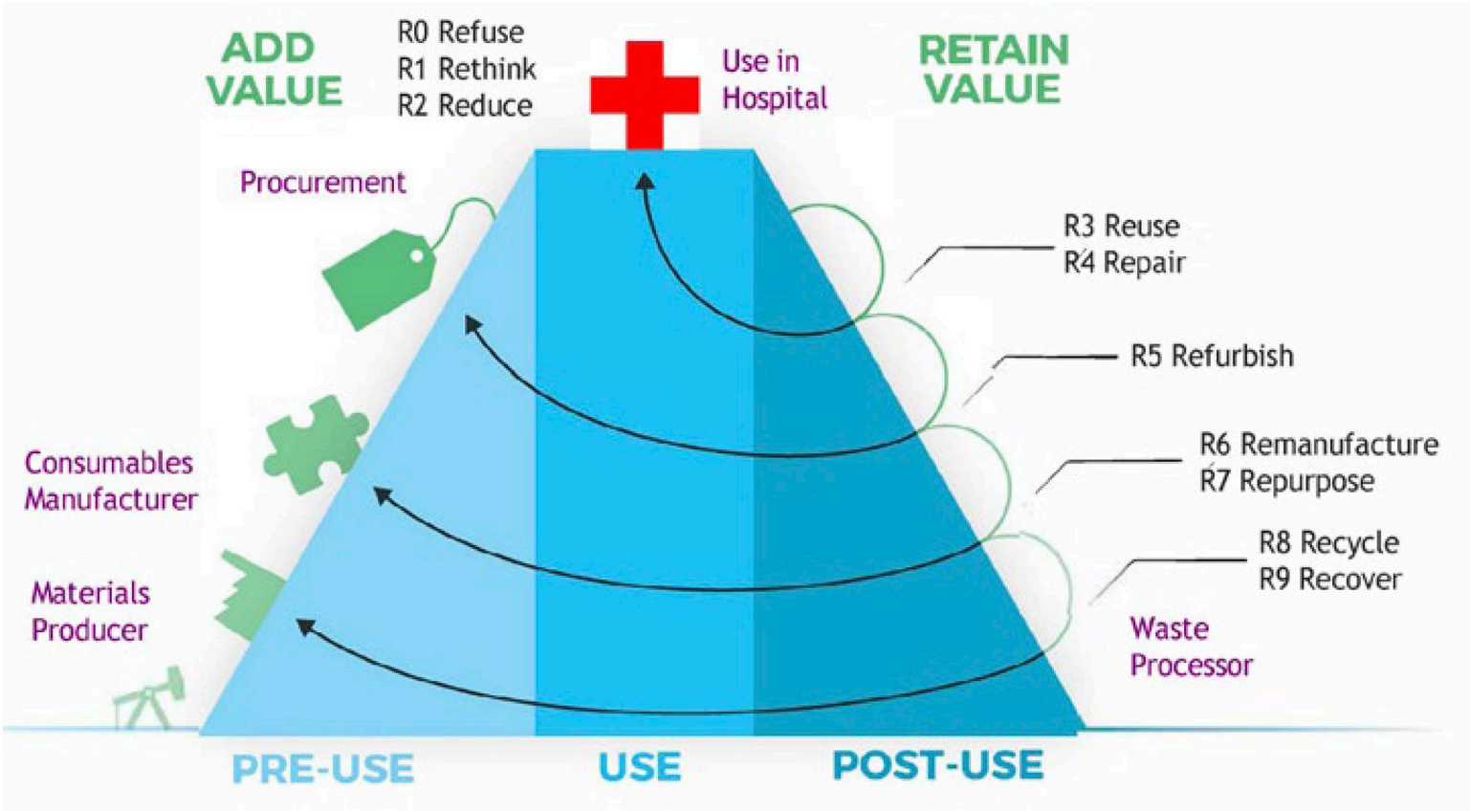

Carbon footprint of health care
35,772 kilotonnes CO_2e emissions
7,154
CO_2e
20%
80%
28,618
CO_2e
Buildings, electricity, gas
Clinical care
Carbon footprint of clinical care
28,618 kilotonnes CO_2e emissions
10%
2,862 CO_2e
30%
8,585 CO_2e
60%
17,171 CO_2e
Harmful care
Low value care
Effective care

Life cycle assessment of phlebotomy

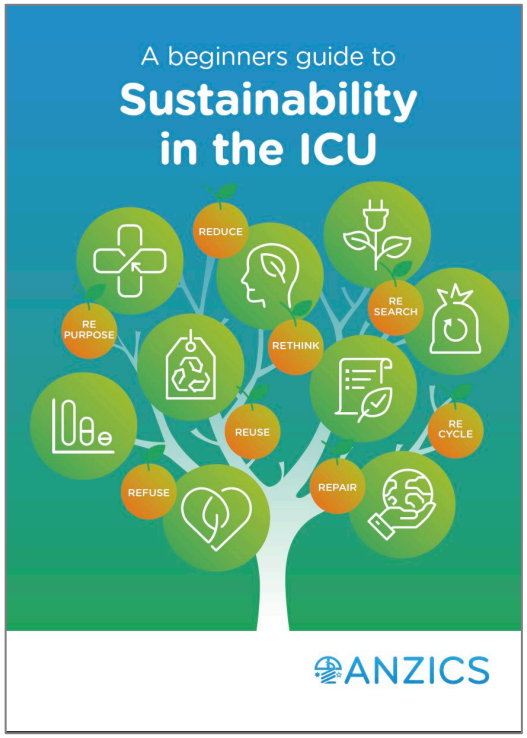


ICU Management & Practice 3 - 2023

Economy strategies along the chain for medical consumables



ICU Management & Practice 3 - 2023


A beginners guide to
Sustainability in the ICU
REDUCE
RE SEARCH
RE PURPOSE
RETHINK
REUSE
RE CYCLE
REFUSE
REPAIR
ANZICS


ESICM
EUROPEAN SOCIETY OF INTENSIVE CARE MEDICINE
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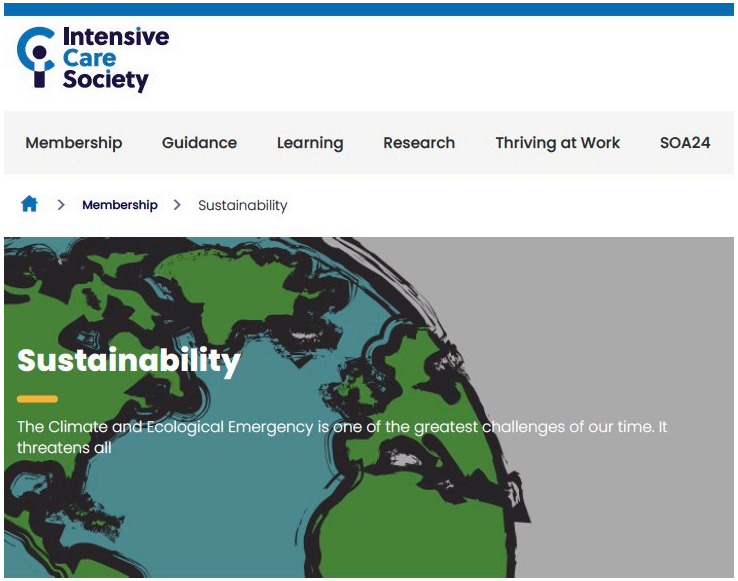
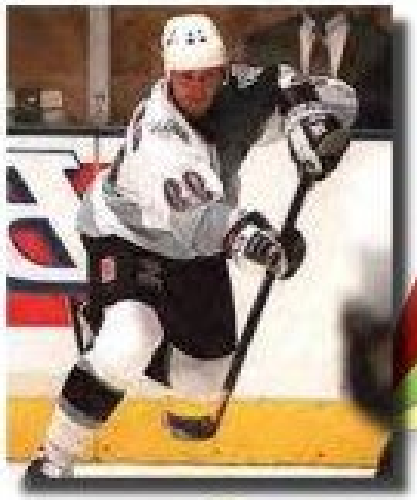
Create account
ESICM
Events
Resources
Journals
Research
Education
Patient and Family
RESOURCES > NEWS > HUMANISING CRITICAL CARE WEBINAR SERIES: ENVIRONMENTAL SUSTAINABILITY IN ICU
Humanising Critical Care webinar series: environmental sustainability in ICU

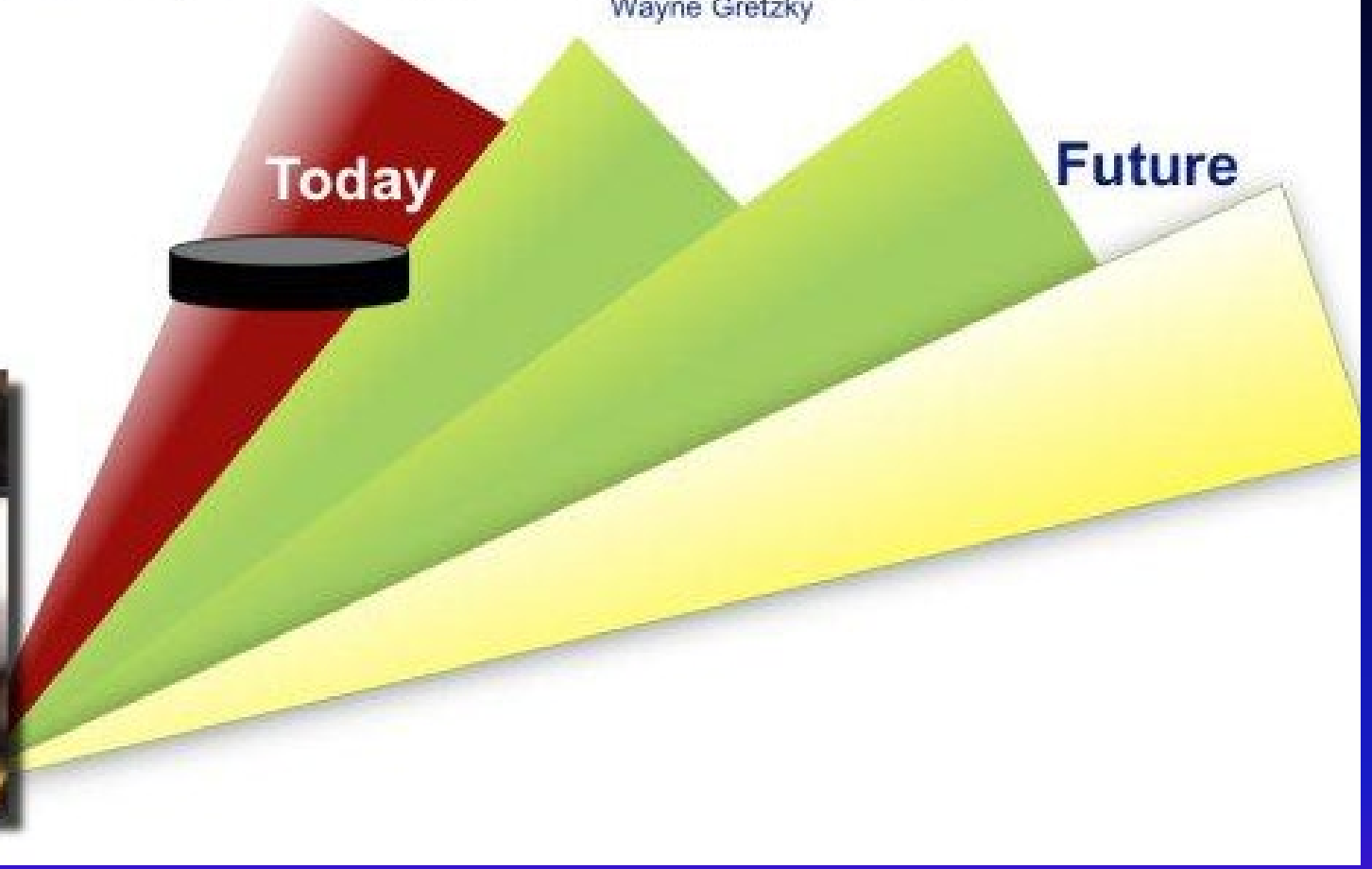

Intensive Care Society
Membership
Guidance
Learning
Research
Thriving at Work
SOA24
Membership
Sustainability
Sustainability
The Climate and Ecological Emergency is one of the greatest challenges of our time. It threatens all


WAYNE GRETZKY
4 STANLEY CUPS
5 LESTER B. PEARSON AWARDS
5 LADY BYNG TROPHIES
9 HART MEMORIAL TROPHIES
10 ART ROSS TROPHIES
2 CONN SMYTHE TROPHIES
#99
OILERS

"I don't skate to where the puck is, I skate to where it is going to be!"

Wayne Gretzky





Saving More Lives Together

The Time is Now

EMPOWERING THE NEXT GENERATION -
INVESTMENT IN PREVENTABLE INFANT DEATHS
BY A HEALTHY START ___ March 27, 2024, Taipei

Asia-Pacific Economic Cooperation

HPA Health Promotion Administration, Ministry of Health and Welfare

Advancement and Future Directions in Pediatric Critical Care

Vinay Nadkarni MD, MS, FCCM

2023 President, Society of Critical Care Medicine

Professor, Department of Anesthesiology, Critical Care and Pediatrics

The Children's Hospital of Philadelphia, University of Pennsylvania Perelman School of Medicine

Society of Critical Care Medicine
The Intensive Care Professionals

Right Care Right Now

I will ensure my presentation promotes thoughtful inclusion of underrepresented communities and content relevant to diversity and equity in continuing education activities.