Morgan Thomsen, BSN, RN, RNC-NIC

Morgan Thomsen is a Unit Coordinator in the Neonatal ICU at TUKHS. This project was inspired by a desire for improved teamwork and communication during resuscitation events that occur in the Neonatal ICU. It would not have been possible without the staff from the Zamierowski Institute for Experiential Learning.

Michael Blomquist, PhD, RN, CCRN

Michael Blomquist is a registered nurse with over 16 years of experience in intensive care, code blue teams, and rapid response teams. He has been a simulation learning and design strategist for 8 years with simulation trainer course certifications from the Israel Center for Medical Simulation and the Harvard Center for Medical Simulation. He has a strong focus on training that affects patient safety and outcomes and makes the training count twice through research.

Neonatal Resuscitation Training: Design, Implement, and Evaluate

Morgan Thomsen, BSN, RN, RNC-NIC

Michael Blomquist, PhD, RN, CCRN-K, CHSE

The University of Kansas Heath System, Kansas City, KS

Magnet designated organization since 2006

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Disclosure Statement

- The presenters for this presentation have disclosed no conflict of interest related to this topic.
- No relevant financial disclosures.
- Any specific equipment, software, or other vendors mentioned are not endorsed by the presenters.

Objectives

- Learn about the educational approach of high-fidelity simulation training to address interprofessional care delivery during a neonatal resuscitation.

- Understand the benefits of completing a frontline needs assessment, deconstructing care coordination steps, building simulation, and evaluating training using straightforward tools and surveys.

The University of Kansas Health System

- Tertiary/Quaternary Academic Medical Center
- Over 12,500 Employees
- Over 4,000 RNs
- 945 Licensed beds
- 917 Staffed beds
- FY20: 58,420 Emergency Department Visits
- FY20: 44,050 Inpatient Discharges
- Magnet Designations: 2006, 2011, 2016, 2021

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Zamierowski Institute for Experiential Learning (ZIEL)

- Founded in 2015
- Partnership between The University of Kansas Health System and University of Kansas Medical Center
- State of the art medical simulation center
- Hosts ~ 9,000 learners in 1,400 simulation sessions each year
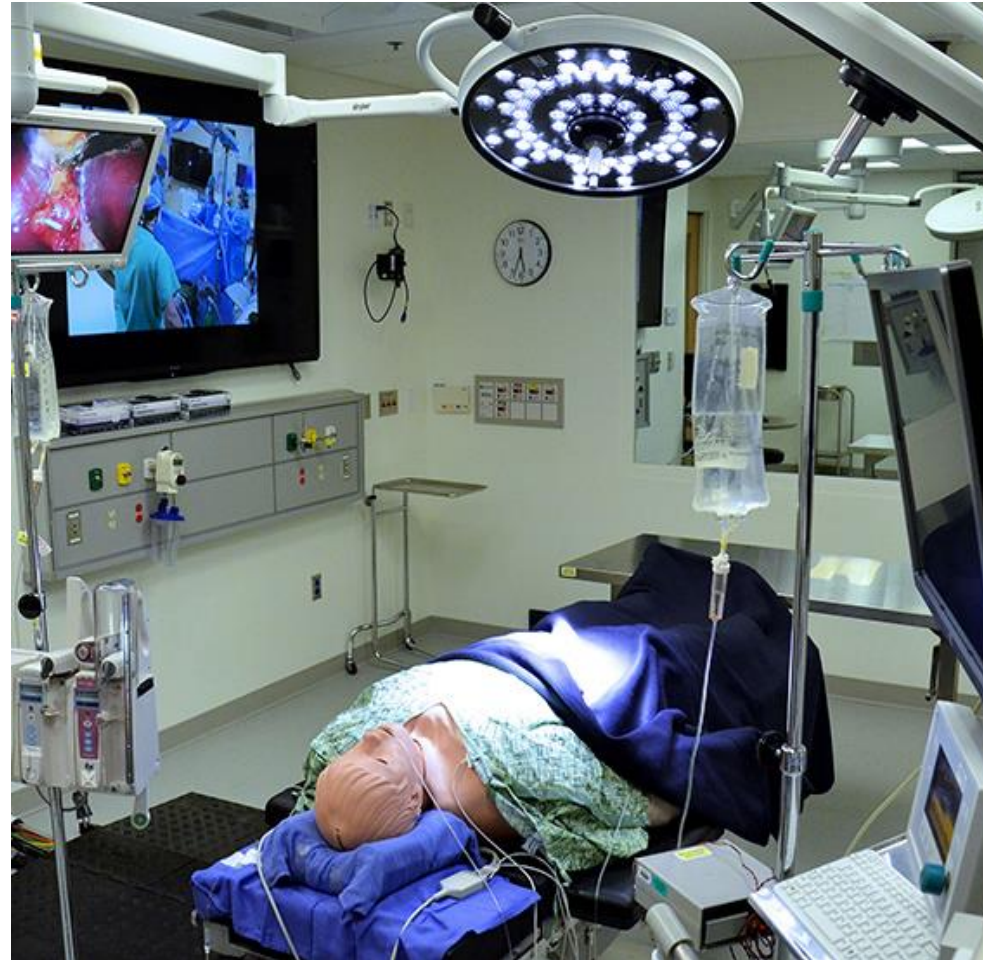
BH55 Neonatal Intensive Care Unit

- 32 bed, Level 3B NICU

- Partner with High-Risk Labor & Delivery

- NICU attends ~1800 deliveries a year

- Admit ~450 babies to the NICU

- Admit ~90 VLBW babies (22-32 weeks; <1,500 grams)

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How would you describe neonatal code blues on your unit?

Well-organized

Chaotic

Sometimes chaotic and sometimes well-organized

I have noted some inconsistent practices during a neonatal code blue on my unit.

True   False

During a neonatal code blue on my unit, we have too little or too many (overcrowded) staff.

True

False

First, a Little Background

- Delivery Room Resuscitations are moderate risk, **high frequency** events
  - Familiar environment, similar situations, and well-known team dynamics
  - Neonatal Resuscitation Program certification required every 2 years

- Code Resuscitation in NICU environment are high risk and **low frequency**.
  - The frontline needs assessment uncovered:
    - Inconsistent practices
    - Poor communication options
    - Chaotic and unorganized environment
    - Overcrowding of staff without role
  - Resuscitation in the NICU environment previously had no training requirement
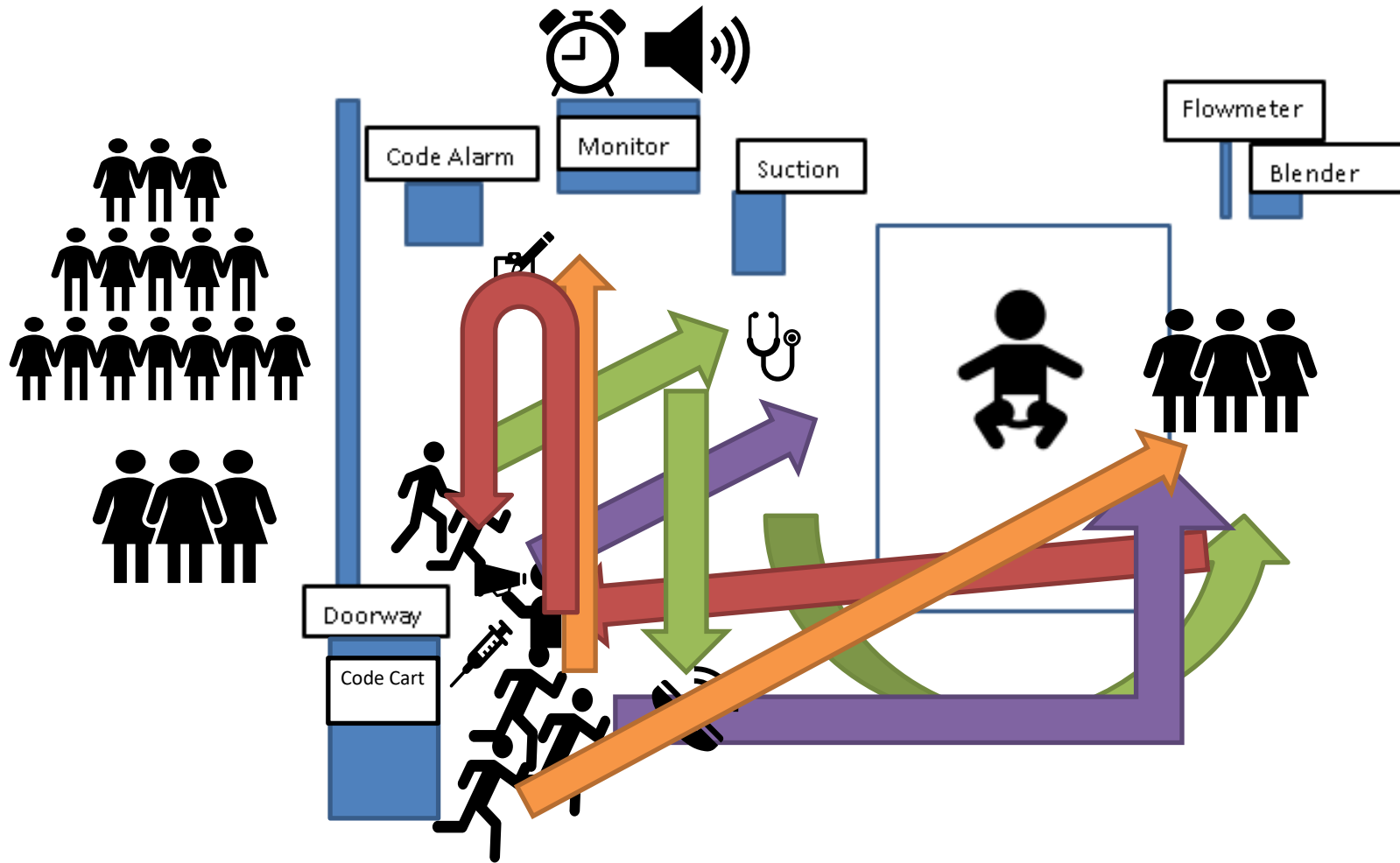
Deconstruction of Resuscitation Steps

Stakeholders:

- Need all disciplines involved
- Aids in buy-in
- Aids in transfer of training to practice.
- Train everyone

What's a Task Decomposition?

- Gather the experts
- Determine "ideal" state (very granular)
- Review ideal state with team (practice council)
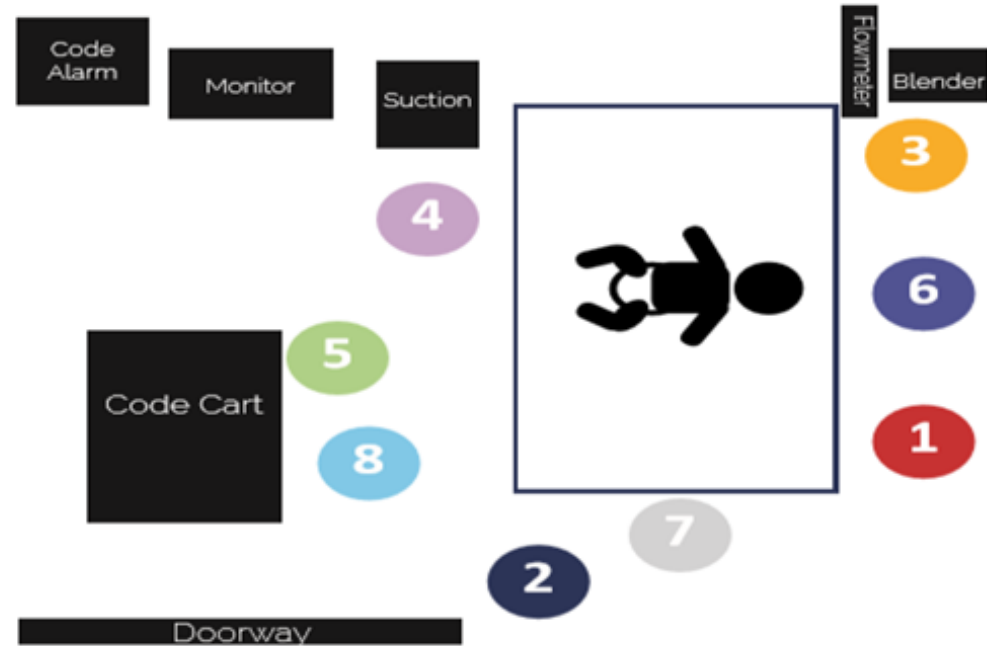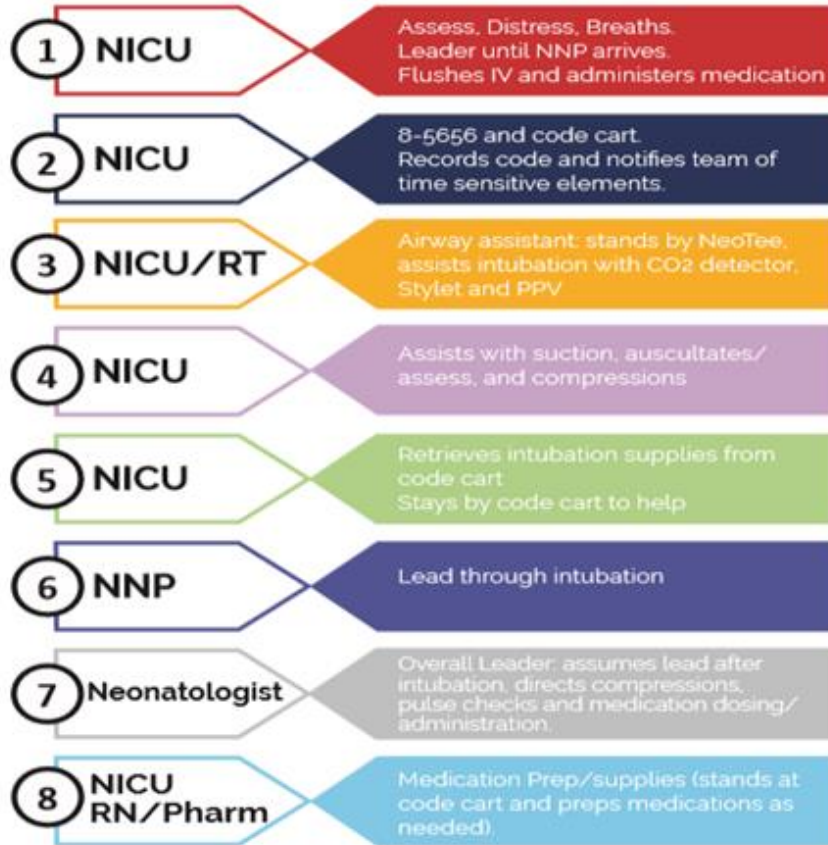- Start the design

The Design

Nurses and Providers from the NICU aligned to develop:

- Clear interdisciplinary resuscitation roles for our environment
- Early team notification using Neonatal Code Blue alarm and pager activation
- Choreographed code response
- A co-leadership model
- Clear scripting for closed-loop communication

Cognitive Aid

PARTICIPANT ORDER AND ROLES

#	Role	Description
1	NICU	Assess, Distress, Breaths. Leader until NNP arrives. Flushes IV and administers medication
2	NICU	8-5656 and code cart. Records code and notifies team of time sensitive elements.
3	NICU/RT	Airway assistant: stands by NeoTee, assists intubation with CO2 detector, Stylet and PPV
4	NICU	Assists with suction, auscultates/ assess, and compressions
5	NICU	Retrieves intubation supplies from code cart. Stays by code cart to help
6	NNP	Lead through intubation
7	Neonatologist	Overall Leader: assumes lead after intubation, directs compressions, pulse checks and medication dosing/ administration.
8	NICU RN/Pharm	Medication Prep/supplies (stands at code cart and preps medications as needed).

Implementation

- Starting in 2019, held twelve 4-hour training sessions

Participants per session include:
- Neonatologist
- Neonatal Nurse Practitioner (NNP)
- Respiratory Therapist
- Pharmacist
- Five NICU Registered Nurses

Session instructors:
- ZIEL Education Specialist
- NICU NNP Coordinator
- NICU Unit Educator
- NICU Unit Coordinators (lead charge RNs)
- Trained NICU RNs

Implementation: The Details

1. Warm-up Code	
Four performance measures timed: 1. Time to positive pressure ventilation (PPV) 2. Time to intubation 3. Time to chest compression 4. Time to epinephrine administration	Debrief post-simulation

2. Break-out into Skills Station			
Choregraphed PPV/First Responder	Coordinating Chest Compressions with Ventilations	Emergency Medications	Code Cart Navigation

Implementation: The Details

3. Choregraphed Resuscitation Skills Stations

Practiced new role assignments	Utilized frontline nurses as at-the-elbow coaches	Modified rapid cycle deliberate practice model of instruction

4. Wrap Up Code

Analyze improvement in four performance measures	Followed with Debrief
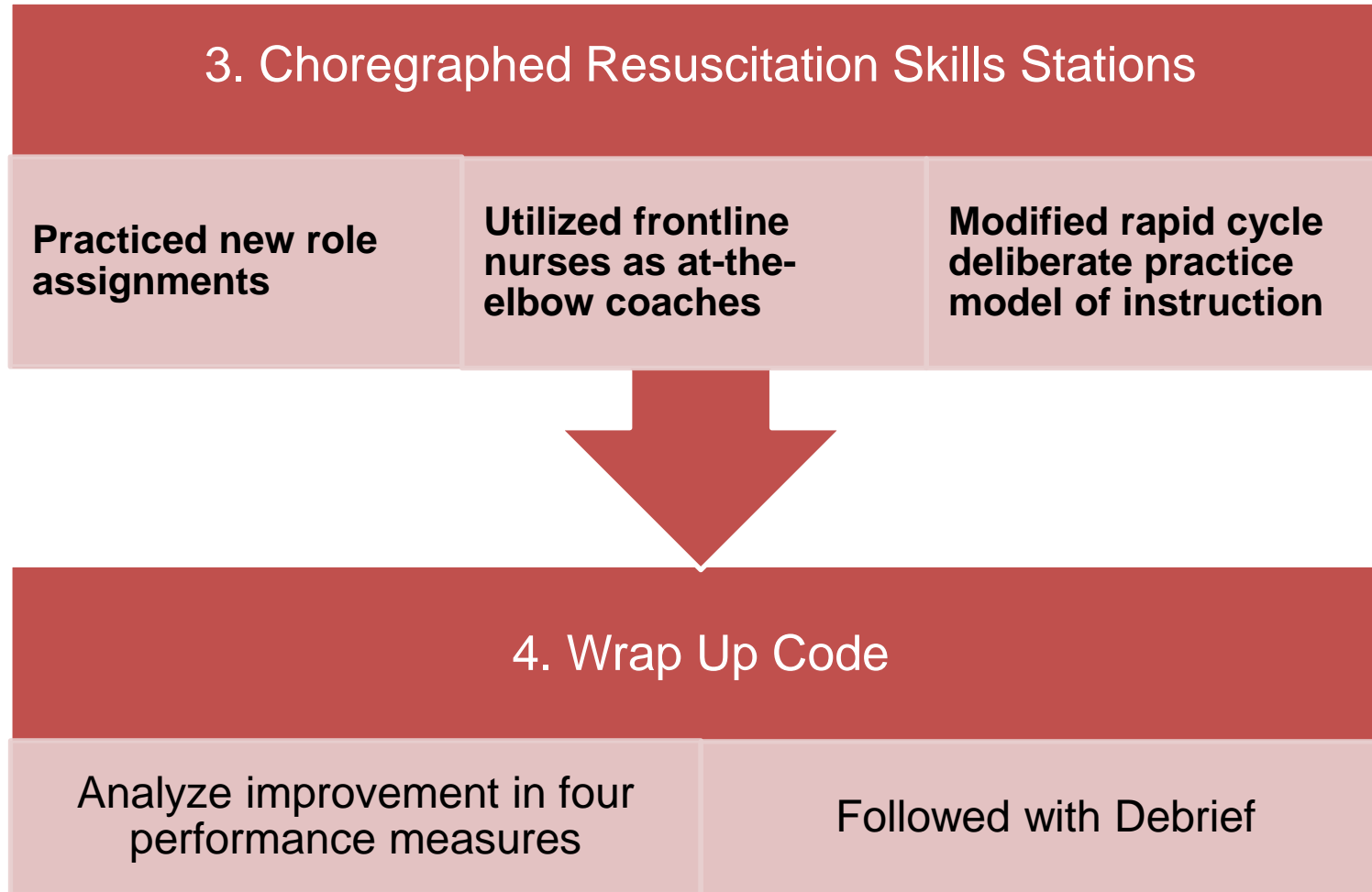
Evaluation

- Just over 100 NICU staff (neonatologists, nurse practitioners, nurses, respiratory therapists, and pharmacists) completed this training in the initial year, 2019.

- Annual training (2020-present)

- A team that works together, should train together.

- Post-Event Survey shows the following results…

I know how to develop straightforward tools to measure the impact of training courses.

True

False

Evaluation: Pre-Data

Before this course, during a code blue response, how competent were you at...
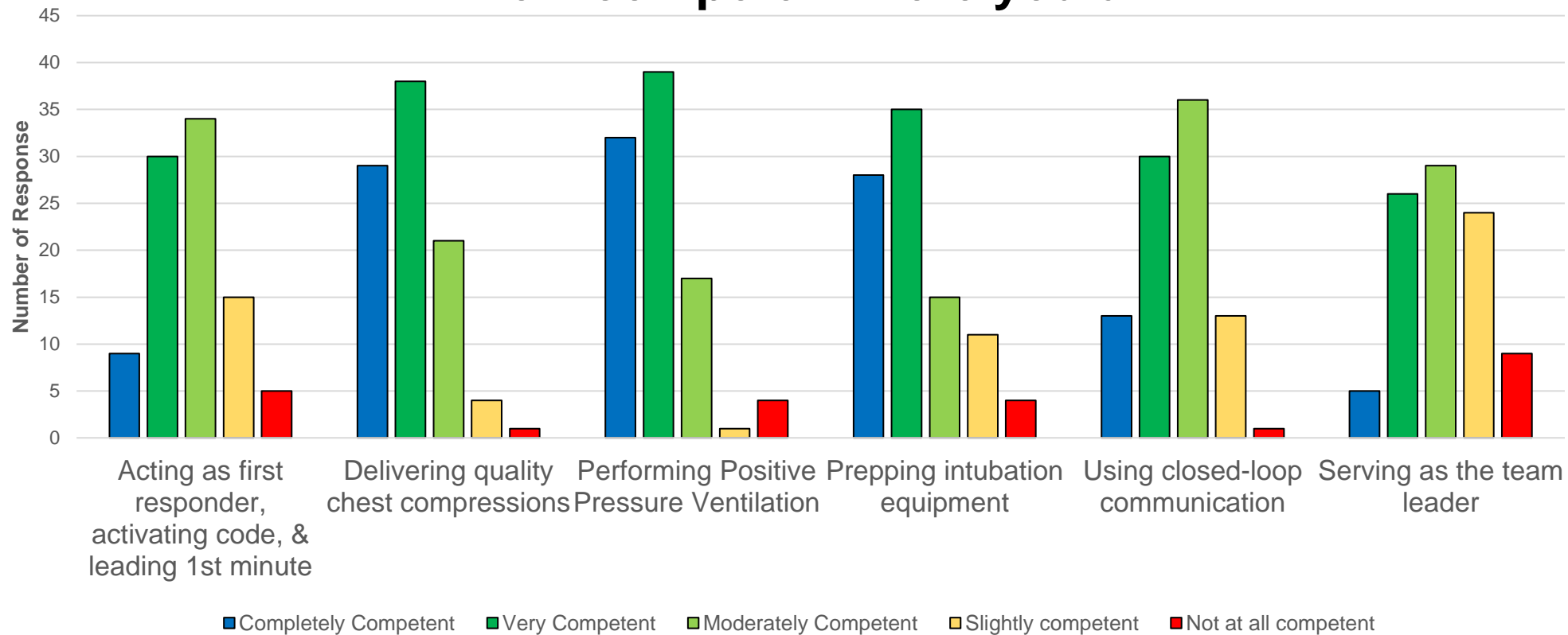
Evaluation: Post-Data

After this course, during a code blue response, how competent were you at...
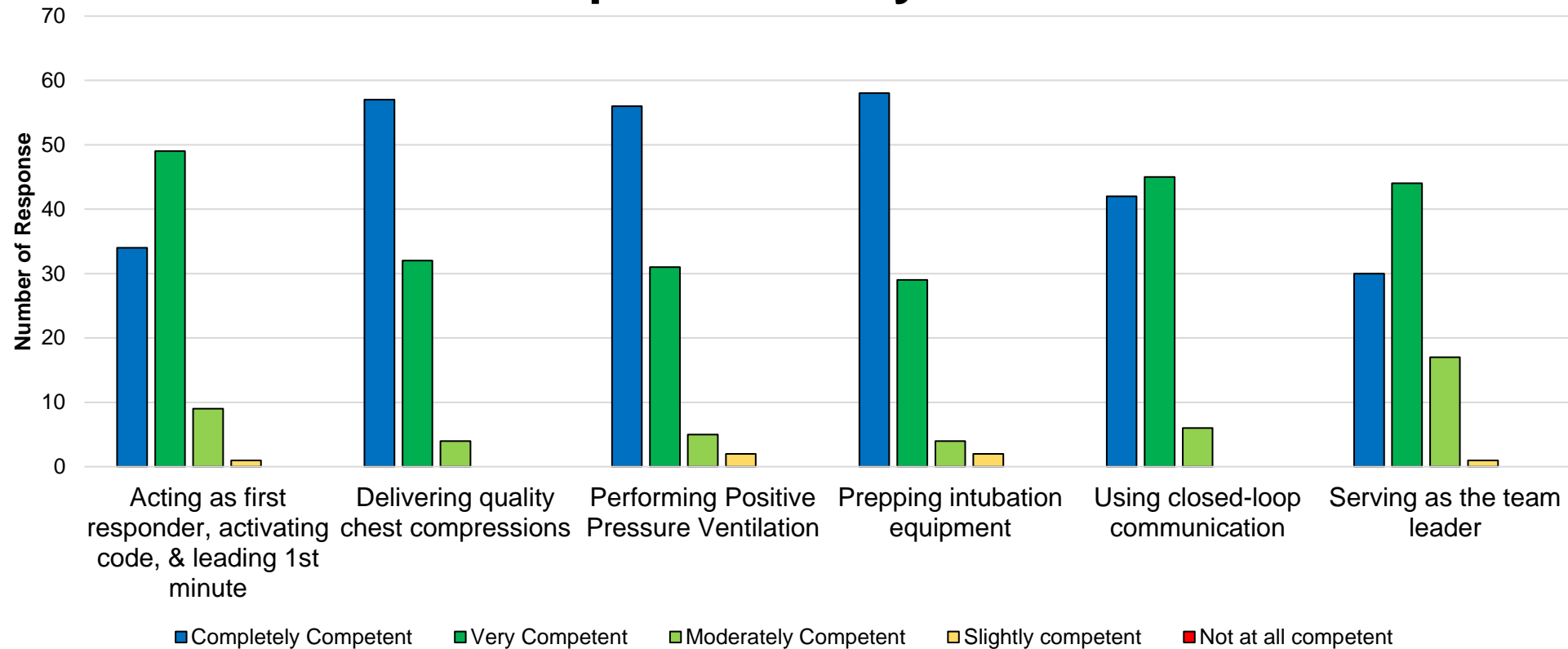
Evaluation: Post-Data

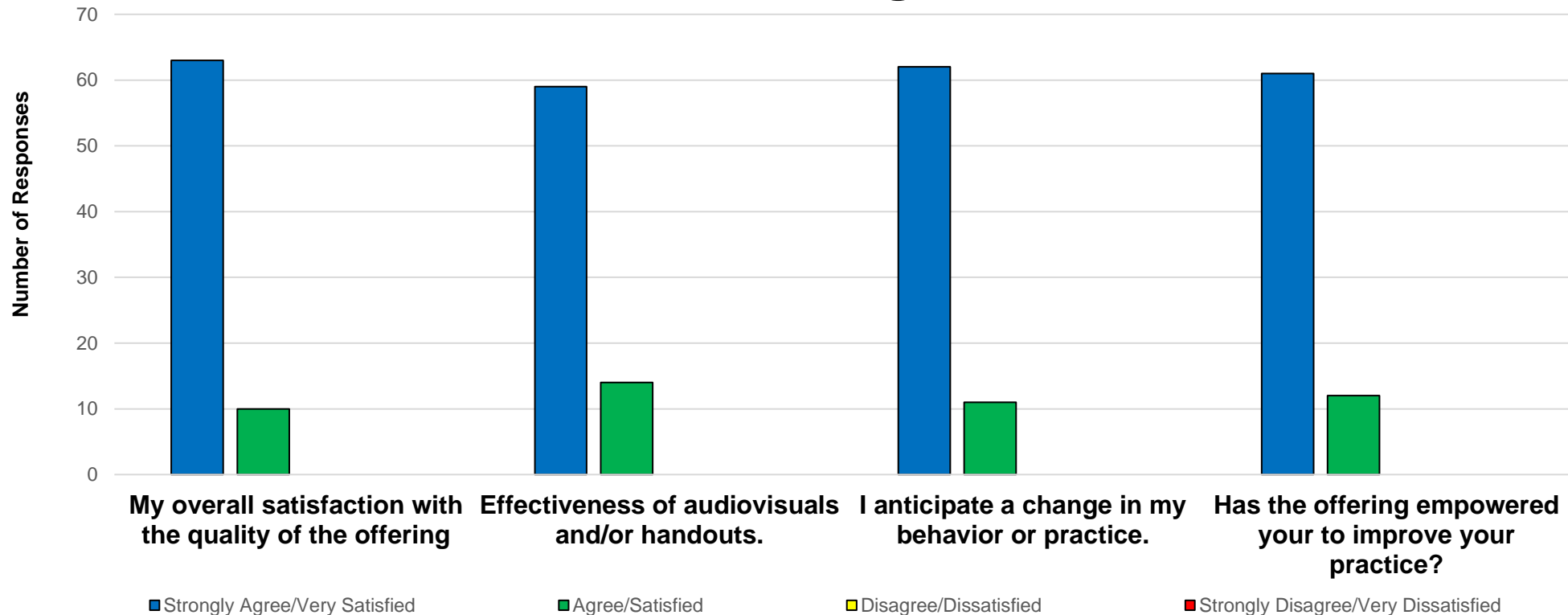## Satisfaction with Code Blue Neonatal ICU Team Training

Bar chart showing Number of Responses (y-axis, 0 to 70) across four categories:
- My overall satisfaction with the quality of the offering: Strongly Agree/Very Satisfied ≈63, Agree/Satisfied ≈10
- Effectiveness of audiovisuals and/or handouts.: Strongly Agree/Very Satisfied ≈59, Agree/Satisfied ≈14
- I anticipate a change in my behavior or practice.: Strongly Agree/Very Satisfied ≈62, Agree/Satisfied ≈11
- Has the offering empowered your to improve your practice?: Strongly Agree/Very Satisfied ≈61, Agree/Satisfied ≈12

Legend: ■ Strongly Agree/Very Satisfied ■ Agree/Satisfied ■ Disagree/Dissatisfied ■ Strongly Disagree/Very Dissatisfied
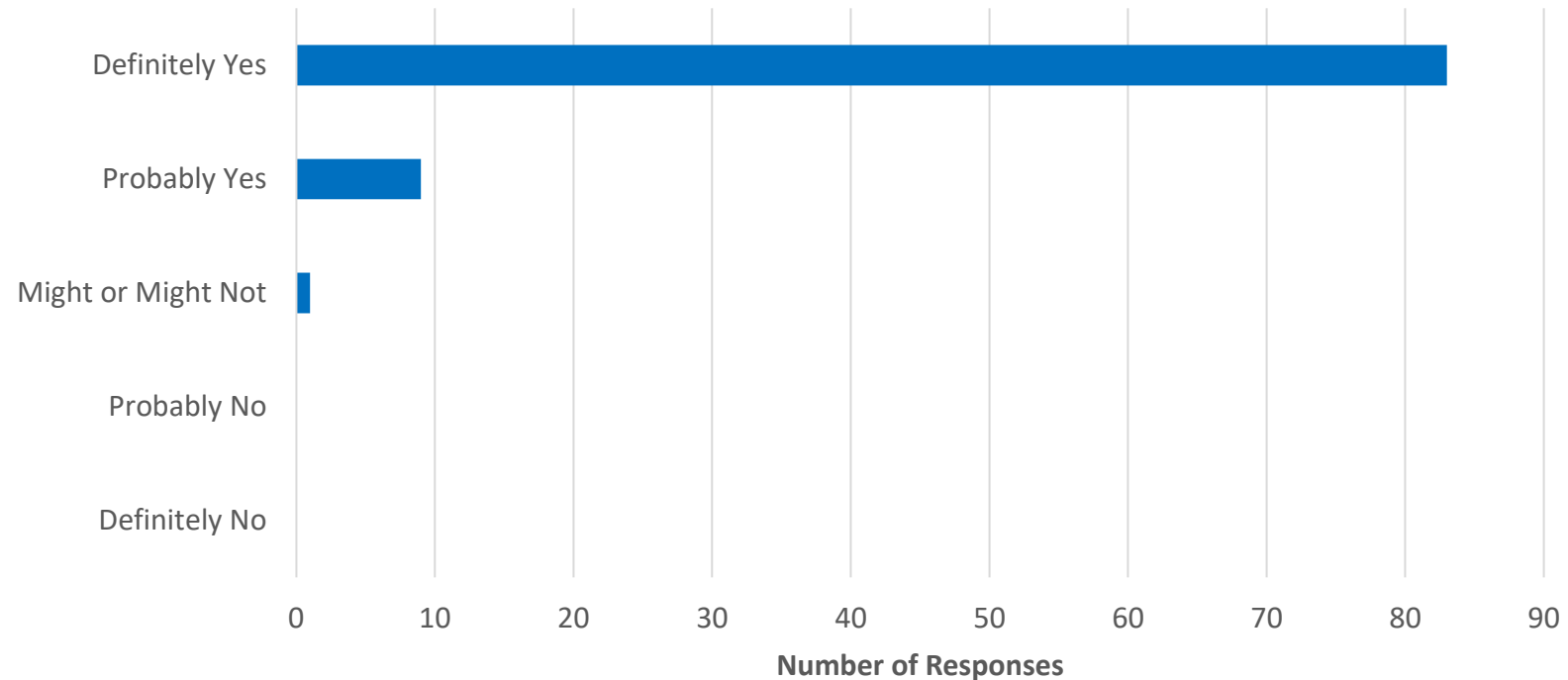
Evaluation: Post-Data

Do you believe this training course will contribute to improved outcomes for patients in respiratory or cardiac arrest?

Evaluation

2019 NICU Code Blue Data: Warm Up vs Wrap Up Simulations

Date	Time to PPV	Time to Intubation	Time to Compressions	Time to 1st Epi	Subjective Leadership Established (1st Responder, NNP, Neonatologist)	Subjective Roles Assigned (4+ roles assigned)	Code Alarm Pulled
8/8/2019	-10 sec	-59 sec	-47 sec	-125 sec	no then yes (NNP and Neo)	No then No	No then Yes
9/6/2019 AM	+3 sec	-84 sec	-100 sec	-103 sec	no then yes (NNP and Neo)	No then Yes	No then Yes
9/6/20							en Yes
9/16/2							tes
10/10/							en Yes
10/11/							en Yes
10/14/							en Yes
10/15/2019	-4 sec	-40 sec	-26 sec	-20 sec	no then yes (NNP)	No then Yes	No then Yes
10/24/2019	+2 sec	-35 sec	-35 sec	-23 sec	no then yes (NNP and Neo)	No then Yes	Yes then Yes
10/25/2019	-36 sec	-55 sec	-48 sec	-60 sec	no then yes (NNP, neo, and 1st responder)	No then Yes	Yes then Yes
11/20/2019	-5 sec	-66 sec	-90 sec	-85 sec	no then yes (NNP and Neo)	No then Yes	Yes then Yes
11/22/2019	-3 sec	-69 sec	-55 sec	-11 sec	no then yes (NNP, neo, and 1st responder)	No then Yes	Yes then Yes
Totals (AVG)	-20.33 sec	-66.6 sec	-70 sec	-77sec		0 to 12	

Overlay:

	Time to PPV	Time to Intubation	Time to Compressions	Time to 1st Epi
Totals (AVG)	-20.33 sec	-66.6 sec	-70 sec	-77sec

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2023 Transfer to Practice Survey

- We wanted to assess trainings transfer to actual NICU events after 3 plus years of simulation training.
- N = 34 - we captured about 1/3 of those that participate in resuscitation events.
- Predominately NICU RNs responded = 85%. The other 15% were NPs and neonatologists.
- Most had been through the training 3 or more times = 79.4%
- 56% of the providers had worked in the NICU for 6 or more years (expert assessments here)

I have used or have seen others use ZIEL simulation training in the clinical setting with a neonatal emergent situation or resuscitation.
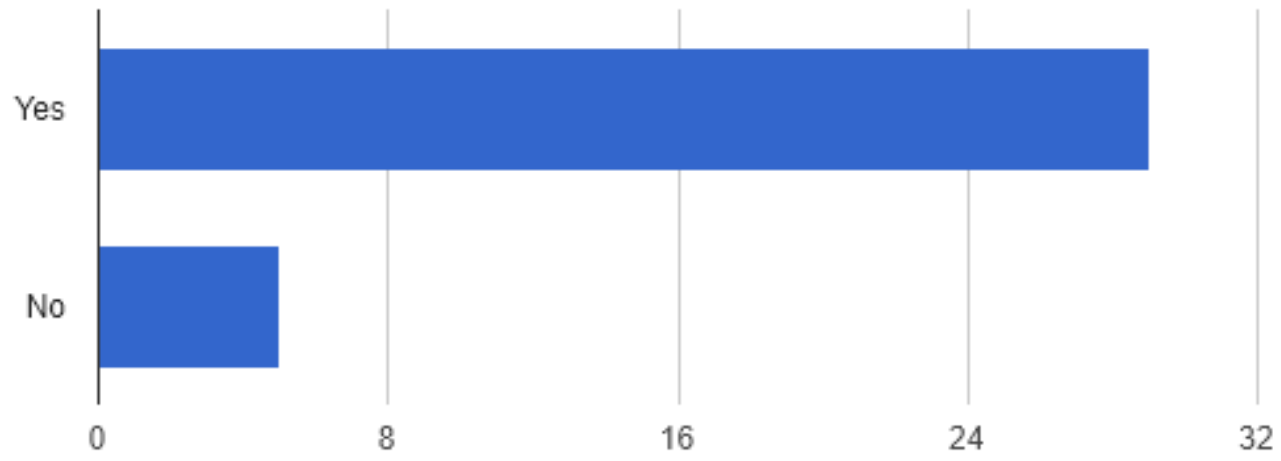
Counts/frequency: Yes (29, 85.3%), No (5, 14.7%)

During a resuscitation or emergent clinical event, I observed these aspects of simulation training transfer to the care of a patient. Please check all the boxes that apply.
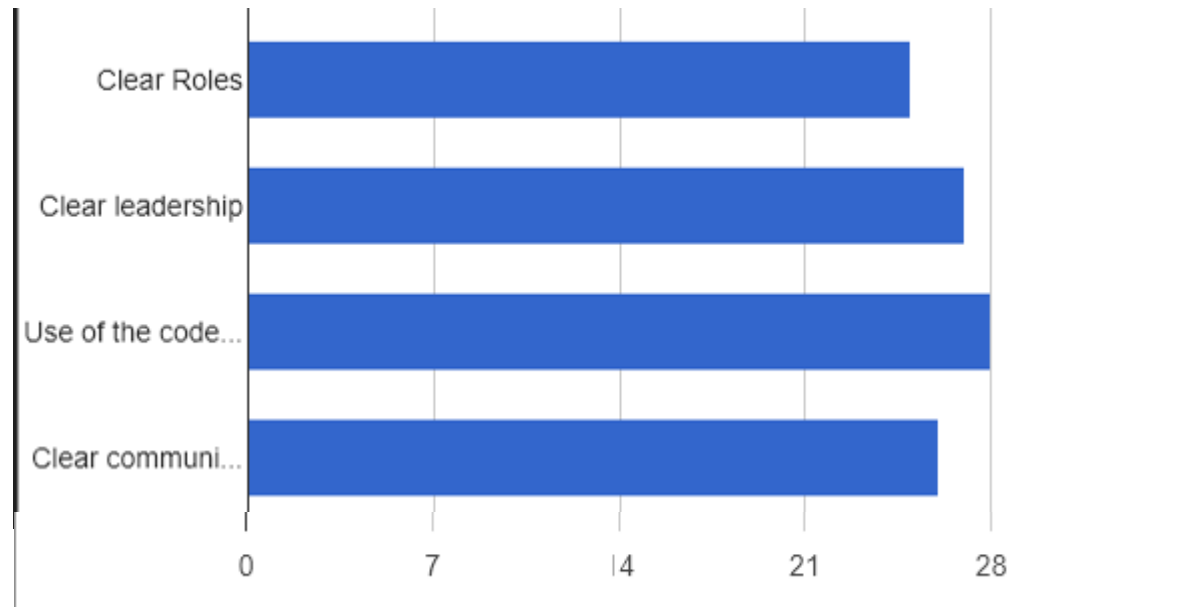
Counts/frequency:
Clear Roles (25, 73.5%),
Clear leadership (27, 79.4%),
Use of the code blue alarm for resuscitation help (28, 82.4%),
Clear communication (26, 76.5%)

Healthcare Provider Quotes

"New nurses responding to code alarms or emergencies and immediately taking a role without having to be instructed. they seem much more comfortable with emergent situations."

"Specifically using the on unit code alarm! It was literally never used before we started ziel."

Healthcare Provider Quotes

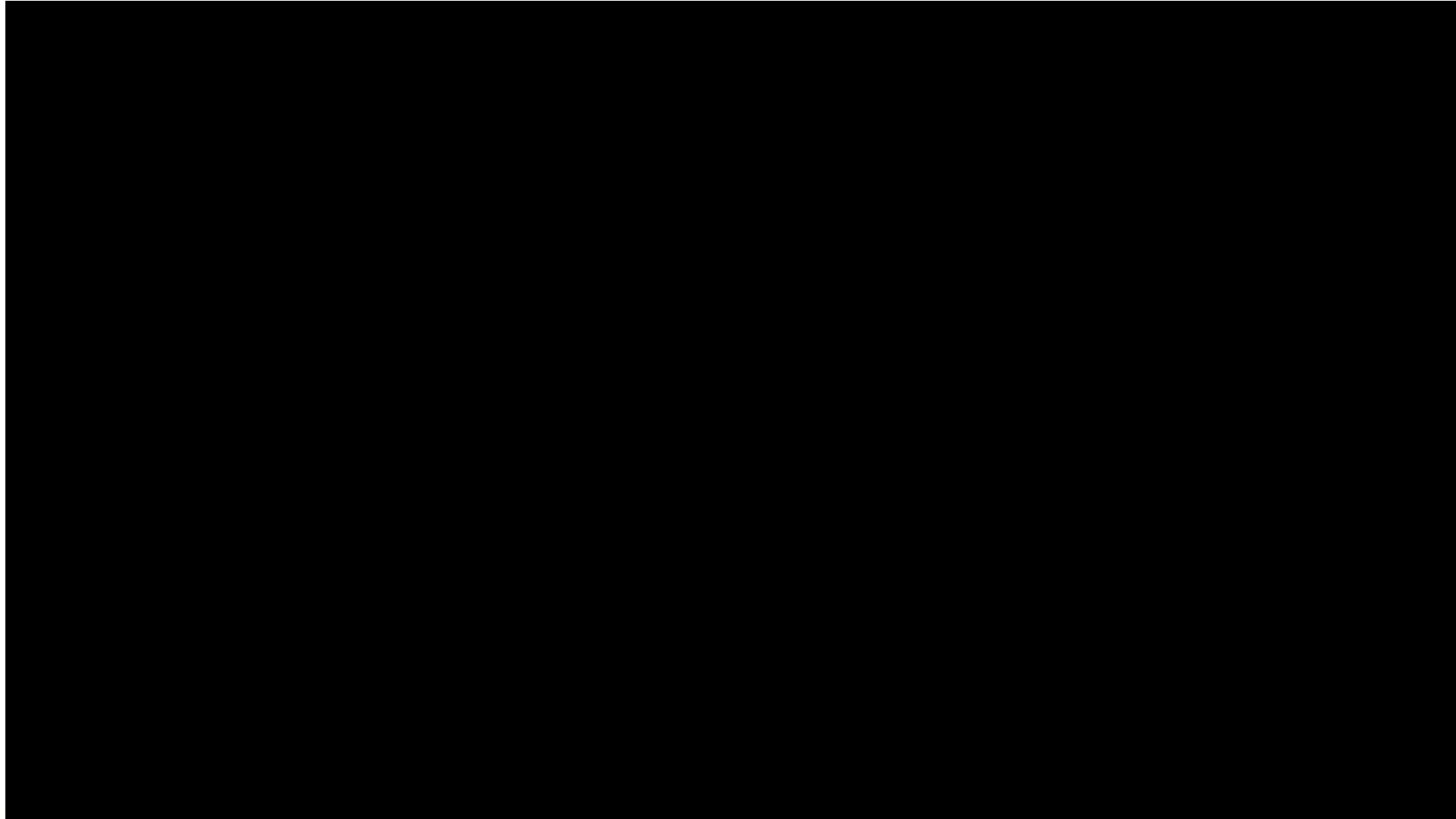"I see it more by the day where nurses come in, and immediately announce themselves and grab a task. I love it!"

"A few weeks after my simulation training, I myself was charge orienting and had to code a baby. Because a few of us have also just completed it, the code went smoothly."

What did the NICU frontline think of the Training?

Getting interdisciplinary buy-in is essential for training program success.

True   False

Impact on Practice

- Solved unknown system issues - led to standardizing NICU code carts

- Initiated utilizing pharmacy personnel during NICU Code Blue

- Immediate practice creep

- Impact of defining roles, clear communication and teamwork wasn't limited to codes in the NICU

- Annual interprofessional training required

Next Steps

- Developed additional programs with similar outline for our high-risk deliveries of infants 22–32-week gestation.

- Golden Hour Training debuted in 2020

- Focused the training on high risk, low frequency delivery room scenarios

Golden Hour Training

- Golden Hour Team Dynamics
  - Pre-Huddle
  - Delivery Room set-up
  - Post-Huddle
- Thermoregulation in the Delivery Room
- Emergent UVC placement
- Surfactant Practices in the Delivery Room
- Emergency medications including emergent blood administration
- Golden Hour Simulations
  - Off-unit micropremie admission
  - Micropremie Abruption
  - Micropremie with prolonged rupture

Recognition
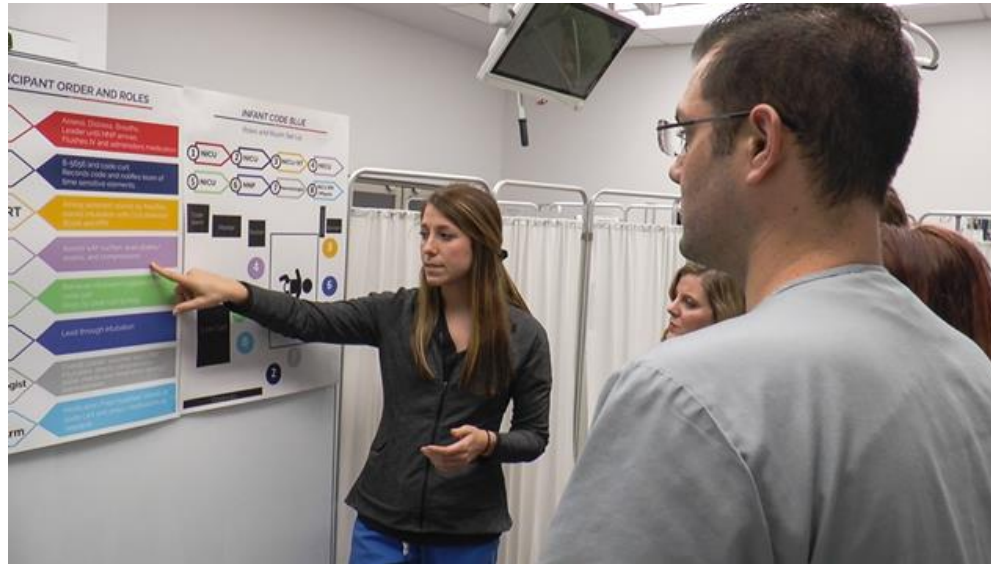
We want to acknowledge ZIEL Simulation and TUKHS leadership for their assistance and support of this project. Moreover, extend a special thank you to Amy Follmer, Alyssa Collier, Akiko Kubo, Kent Garrett, Matt Lineberry, Liz Carlton, and the entire NICU team.

Presentation Resources & Contact Info

Participant Survey: Computer or Phone:
Type in - bit.ly/AY20CodeBlueNICU

Infant Code Blue Infographic:

ZIEL NICU Code Blue Expert
Modeling Video:
 https://youtu.be/CkxezCSBxBk

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