

Scope of the Problem

Pediatric Sepsis...

Is Common: Affects 75,000 children per year in the US

Is Expensive: Costs Americans \$7.3 billion a year

Is Fast-Developing: Can progress to death within 48-72 hours of onset; even one hour of antibiotic delay increases mortality

Is Fatal: Takes the lives of 7,000 children per year (more than pediatric cancer); 1 in 3 survivors experiences long-term cognitive changes

Is Sneaky: Presents differently than in adults and is missed 8% of the time in the emergency department (ED)

What can be done? Implementation of the **Surviving Sepsis Campaign's** (SSC) 2020 pediatric clinical practice guideline & bundle of interventions: *IV access, labs, fluid resuscitation, empiric antibiotic therapy, and vasopressors*



In a large, Midwest, academic medical center's ED, which serves patients across the lifespan:

- Intervention bundle completion times exceed 1-hour goal
- Nurses report a knowledge deficit related to the bundle
- The ED has relatively low volume of pediatric patients, impacting nurses' pediatric-specific knowledge and skills

Purpose

Use a brief, targeted educational intervention to increase busy ED nurses' confidence in recognizing pediatric sepsis and in implementing the bundle of sepsis interventions

Theoretical Framework

Ericsson's Deliberate Practice Theory (DPT)

- Use of simulation and feedback to improve performance and achieve mastery, especially in situations where real-time practice is unsafe or impractical
- DPT capitalizes on participants' desire to improve mastery (win-motivated)

Our Take: Incorporate game-like elements into our web-based educational module in the form of a case study simulation which lets providers:

- Rehearse a clinical scenario
- Increase confidence in use of sepsis bundle interventions

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Project Implementation

Justification for the Educational Module

Support for use of a sepsis bundle of interventions

- Use of tailored institutional protocols improves response time, decreases organ dysfunction, and reduces death by 5x in pediatric cases of severe sepsis/septic shock
- Adherence to Pediatric Advanced Life Support (PALS) sepsis guidelines led to 57% shorter hospital stay

Evidence for targeted, multimodal education

- eLearning allows for greater participation and knowledge acquisition among pediatric ED healthcare providers
- Face-to-face, self-directed learning increases knowledge among ED nurses and benefits patient outcomes

Creation of the Educational Module

Multimodal module components:

- 10-minute, interactive, web-based, practice module via Pear Deck (a Google Slides add-on): based on a pediatric sepsis 'escape room' (UC Health-North, 2020) and revamped to fit a digital game-like format
- Visual reinforcement
 - Flyer: posted around the unit ongoing reinforcement
 - Badge buddy: distributed for just-in-time reference
- Advantages
 - Completed at participants' pace on their own device
 - Able to pause and completed later

Included topics: SSC best practice recommendations, sepsis signs and symptoms, normal pediatric vital signs, institution-specific sepsis bundle, and policy on difficult IV access



Implementation of the Educational Module

The module deployment involved 2 options:

- On-unit face-to-face sessions with module accessible via QR code (predominant method)
- authors on hand for discussion, troubleshooting, and further explanation
- Virtual independent module, accessible via emailed link

On-unit time spanned 40 teaching hours over 7 days

- One-on-one or small group independently-paced learning
- Reinforcement with handouts, badge buddies, and treat bags



Implementation Challenges

- Variable technology literacy levels (e.g., unfamiliarity with QR codes or smart phones)
- Limited on-unit time and short project implementation window
- Busy ED workflow which limited time and, therefore, depth of education

Evaluation & Outcomes

General Evaluation Measures

- Module completion (independent and in-person options)
- Participants' satisfaction with delivery of educational module
- Assessment of participants' learning

Analysis of Dependent Variables

Quantitative: 100-point Likert scale questions administered before and after the module, described via paired T-test

- Confidence in ability to recognize instances of sepsis in pediatric patients
- Confidence in knowledge of bundle of sepsis interventions

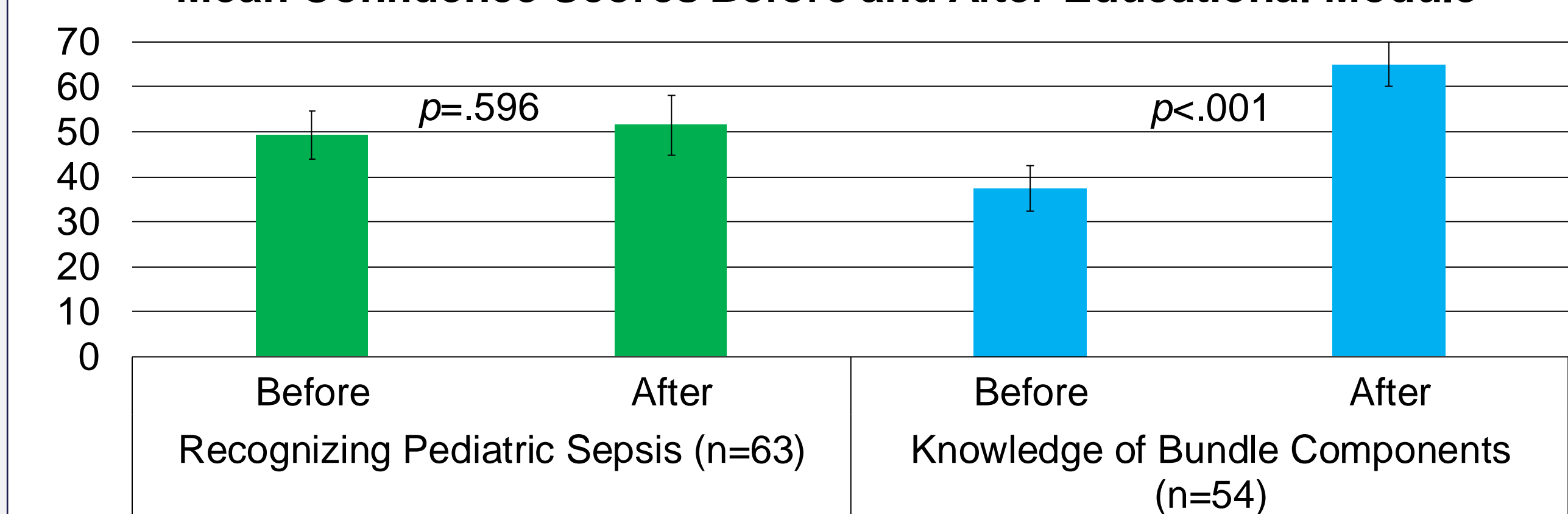
Qualitative: Free response questions, coded via thematic analysis with 2 independent coders (discrepancies rectified by consensus)

- Perceived barriers to bundle completion
- Feedback and takeaways from the module

Project Outcomes

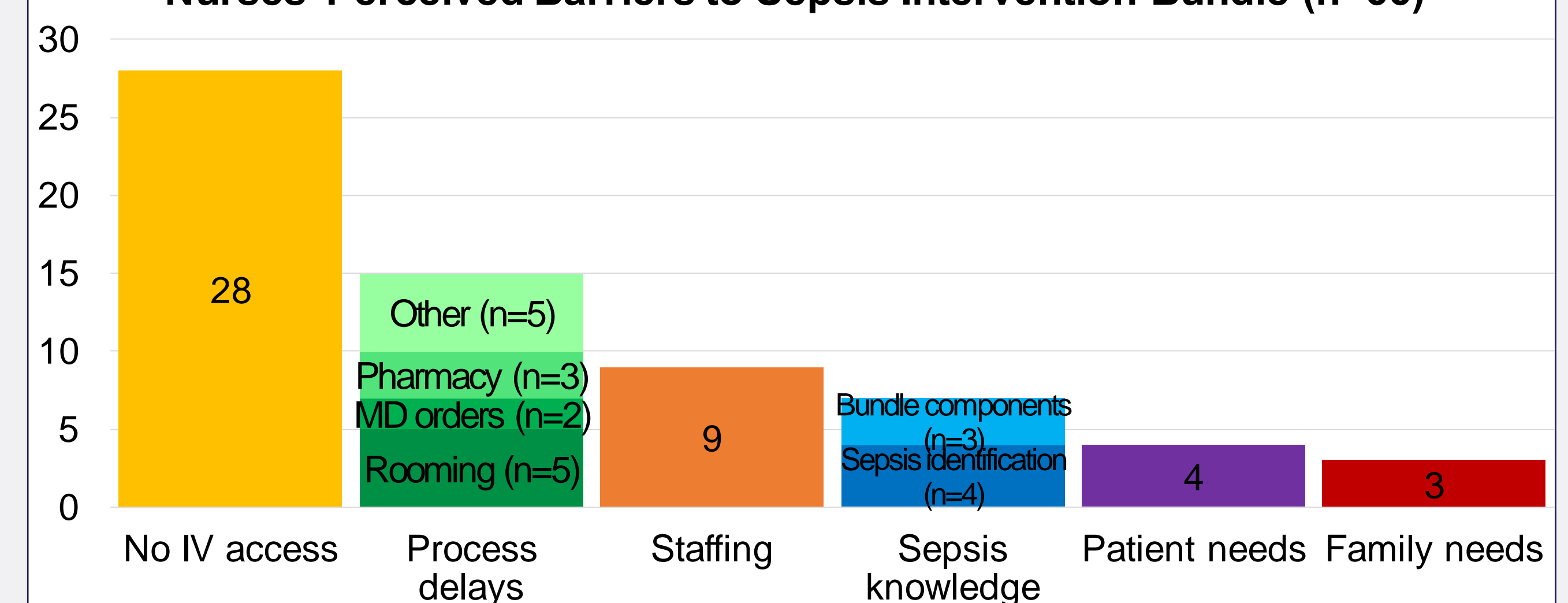
Total reach = 61% (70/114) of ED nurses (63 in-person, 7 independent)

Mean Confidence Scores Before and After Educational Module



- Confidence in sepsis recognition (n=63): no meaningful change
- Confidence in knowledge of bundle ↑ 73% (n=54): statistically significant increase

Nurses' Perceived Barriers to Sepsis Intervention Bundle (n=66)



- Nurses' top barriers to bundle completion: lack of IV access and process delays

Nurses were particularly receptive to:

- Web module: antibiotic facts
- Badge buddy: just-in-time pediatric vital sign ranges by age group

Recommendations

We Recommend That:

- This module be implemented with interdisciplinary teams within the ED setting to streamline treatment and eliminate process delays
- Nursing leadership re-evaluate existing nurse-driven protocols that impact bundle implementation, such as timely intravenous or intraosseous access
- The hospital continue to support its providers and pursue best practices in the treatment of pediatric sepsis via implementation of emerging technologies, literature, and education