Enhancing Provider Confidence Regarding Early Onset Sepsis Risk and Management in the Newborn Nursery

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BACKGROUND

- Early onset sepsis (EOS) is a rare condition affecting 0.5/1000 live births per the CDC
- Physicians in the newborn nursery (NBN) need to be competent in risk stratification, identification, and management of EOS
- Due to its rarity, pediatric residents may not be exposed to cases of EOS in the NBN
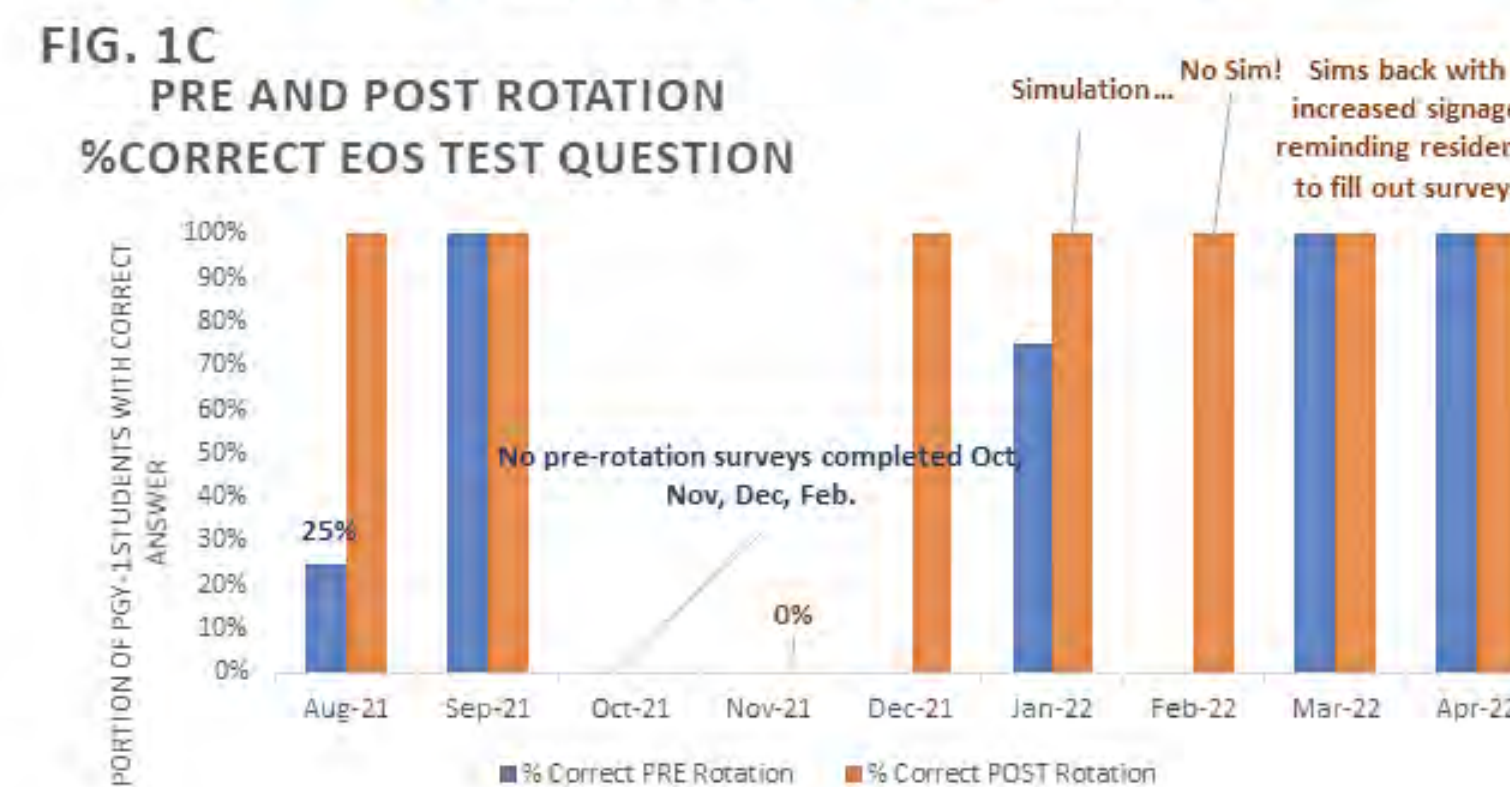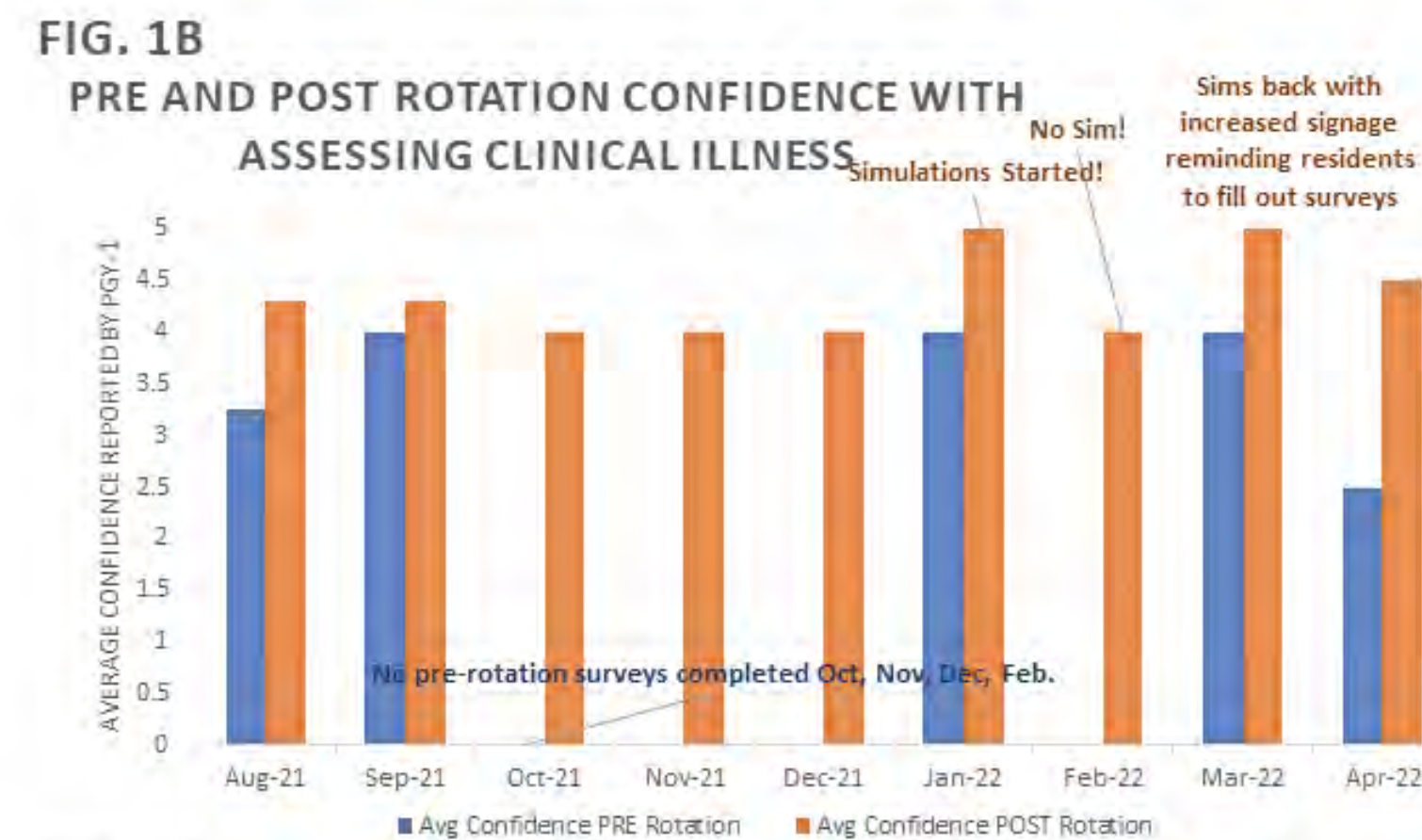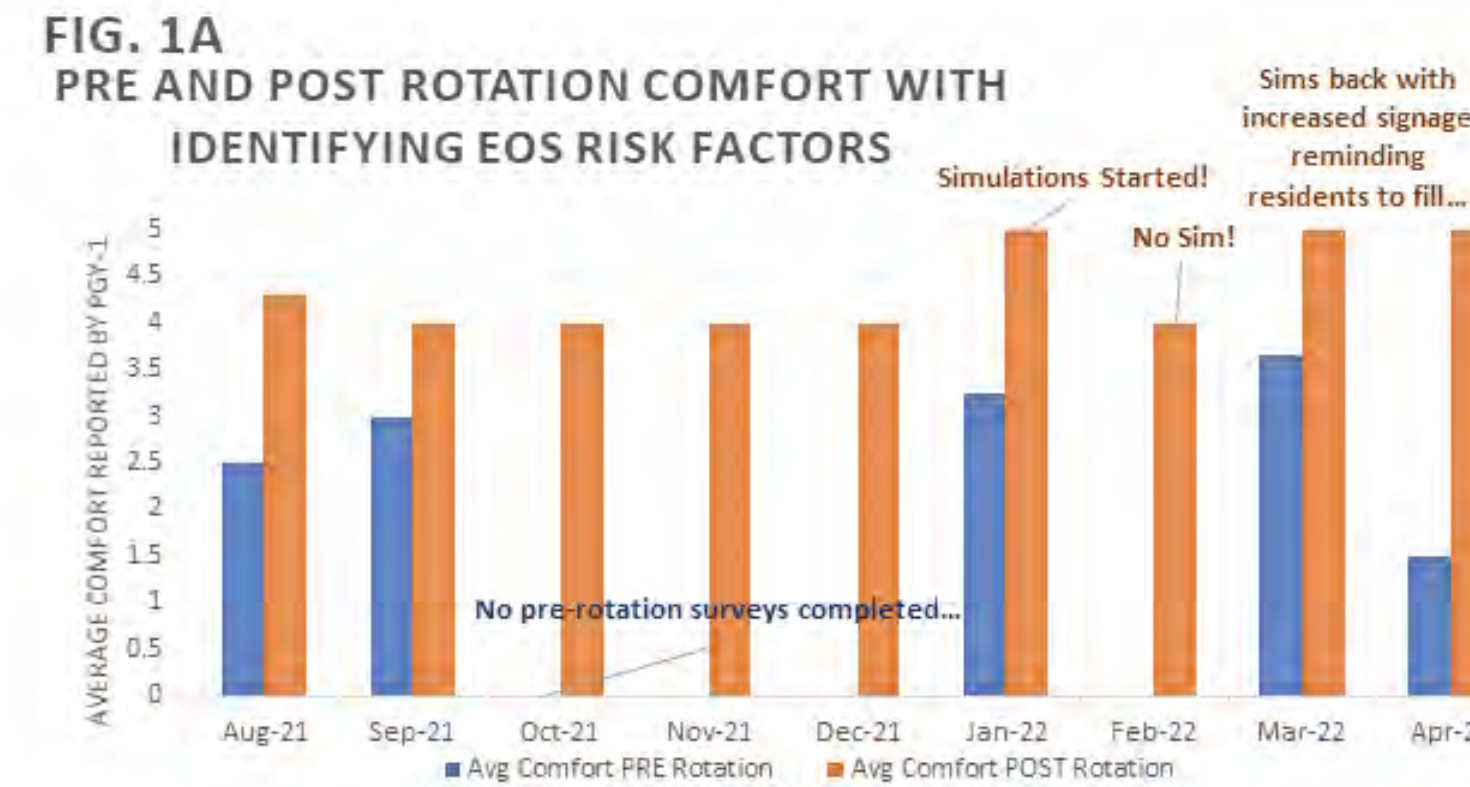- A case discussion curriculum may be useful in this context

AIM STATEMENT

We aimed to increase the proportion of interns who "strongly agree" that they are comfortable and confident in the evaluation and management of EOS to 100% of those surveyed in 1 year.

METHODS

- Pre- and post-rotation survey via Qualtrics
- Self reported comfort identifying risk factors and confidence in determining degree of clinical illness
- Also included a "boards-style" multiple choice question on EOS
- Process measure – % of interns completing survey
- Balancing measures – rates of bcx and abx
- PDSA #1 – 2 standardized case discussions administered by a senior resident in a small group setting
- PDSA #2 – increased signage to encourage survey completion

RESULTS

- At baseline, comfort, confidence, and percent correct improved from pre to post.
- PDSA #1 (the standardized cases) increased post-rotation comfort, confidence, and percent correct
- No special cause variation (SCV) was noted in the balancing measures

FIG. 1A
PRE AND POST ROTATION COMFORT WITH IDENTIFYING EOS RISK FACTORS

FIG. 1B
PRE AND POST ROTATION CONFIDENCE WITH ASSESSING CLINICAL ILLNESS

FIG. 1C
PRE AND POST ROTATION %CORRECT EOS TEST QUESTION

CONCLUSION

- Residents who participated in this EOS case discussion curriculum self-reported greater comfort with identifying risk factors, with our aim of 100% accomplished after PDSA #2
- While confidence assessing clinical illness improved, our aim was not met, and opportunities remain to inform future PDSA cycles
- Upward trend in ordering blood cultures after PDSA#1 did not meet criteria for SCV, but deserves ongoing attention

DISCUSSION

- A QI framework allowed iterative improvement of our educational intervention directly informed by attention to learner and patient outcomes
- QI also allowed acknowledgement of constant learner growth over time.
- This project demonstrated the viability and effectiveness of case discussions in the nursery context
- Other rare infectious diseases like Hep B, HIV, and syphilis may be additional worthwhile QI targets

REFERENCES

Accreditation Council for Graduate Medical Education. *ACGME Program Requirements for Graduate Medical Education in Pediatrics.* 2020.
Kuzniewicz MW, Walsh EM, Li S, Fischer A, Escobar GJ. Development and Implementation of an Early-Onset Sepsis Calculator to Guide Antibiotic Management in Late Preterm and Term Neonates. *Jt Comm J Qual Patient Saf.* 2016;42(5):232-239. doi:10.1016/s1553-7250(16)42030-1
Akangire G, Simpson E, Weiner J, Noel-MacDonnell J, Petrikin J, Sheehan M. Implementation of the Neonatal Sepsis Calculator in Early-Onset Sepsis and Maternal Chorioamnionitis. *Adv Neonatal Care.* 2020;20(1):25-32. doi:10.1097/ANC.0000000000000668
Beavers JB, Bai S, Perry J, Simpson J, Peeples S. Implementation and Evaluation of the Early-Onset Sepsis Risk Calculator in a High-Risk University Nursery. *Clin Pediatr (Phila).* 2018;57(9):1080-1085. doi:10.1177/0009922817751337
Stipelman CH, Smith ER, Diaz-Ochu M, et al. Early-Onset Sepsis Risk Calculator Integration Into an Electronic Health Record in the Nursery. *Pediatrics.* 2019;144(2):e20183464. doi:10.1542/peds.2018-3464

FIG. 1A

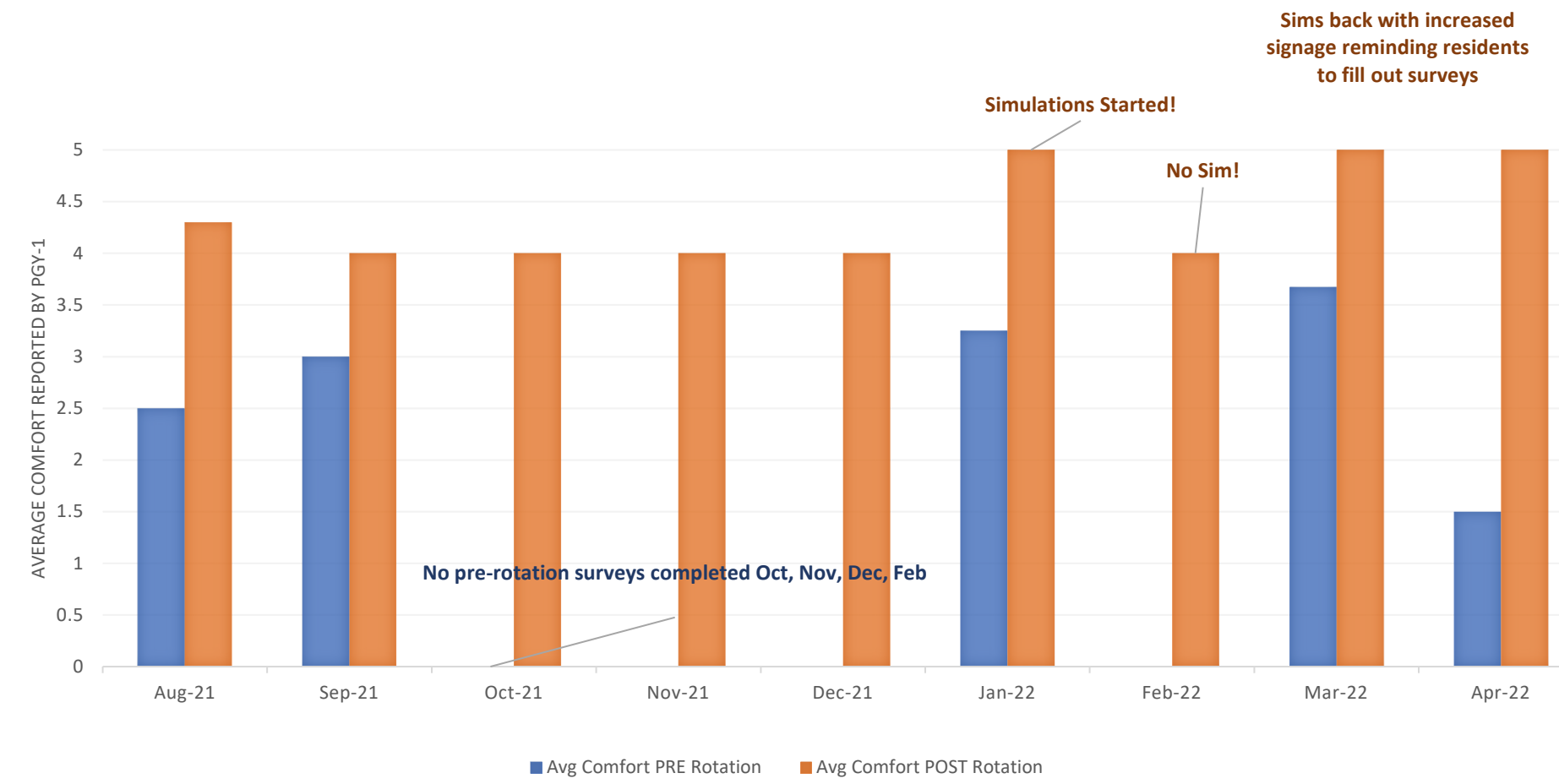PRE AND POST ROTATION COMFORT WITH IDENTIFYING EOS RISK FACTORS

Sims back with increased signage reminding residents to fill out surveys

Simulations Started!

No Sim!

No pre-rotation surveys completed Oct, Nov, Dec, Feb

■ Avg Comfort PRE Rotation   ■ Avg Comfort POST Rotation

AVERAGE COMFORT REPORTED BY PGY-1 (y-axis)
Aug-21, Sep-21, Oct-21, Nov-21, Dec-21, Jan-22, Feb-22, Mar-22, Apr-22 (x-axis)

FIG. 1B

PRE AND POST ROTATION CONFIDENCE WITH ASSESSING CLINICAL ILLNESS

Sims back with increased signage reminding residents to fill out surveys

No Sim!

Simulations Started!

No pre-rotation surveys completed Oct, Nov, Dec, Feb.

■ Avg Confidence PRE Rotation   ■ Avg Confidence POST Rotation

AVERAGE CONFIDENCE REPORTED BY PGY-1 (y-axis)
Aug-21, Sep-21, Oct-21, Nov-21, Dec-21, Jan-22, Feb-22, Mar-22, Apr-22 (x-axis)

FIG. 1C

PRE AND POST ROTATION
%CORRECT EOS TEST QUESTION

Simulations Started!

No Sim!

Sims back with increased signage reminding residents to fill out surveys

25%

No pre-rotation surveys completed Oct, Nov, Dec, Feb.

0%

■ % Correct PRE Rotation   ■ % Correct POST Rotation

PORTION OF PGY-1 STUDENTS WITH CORRECT ANSWER (y-axis)
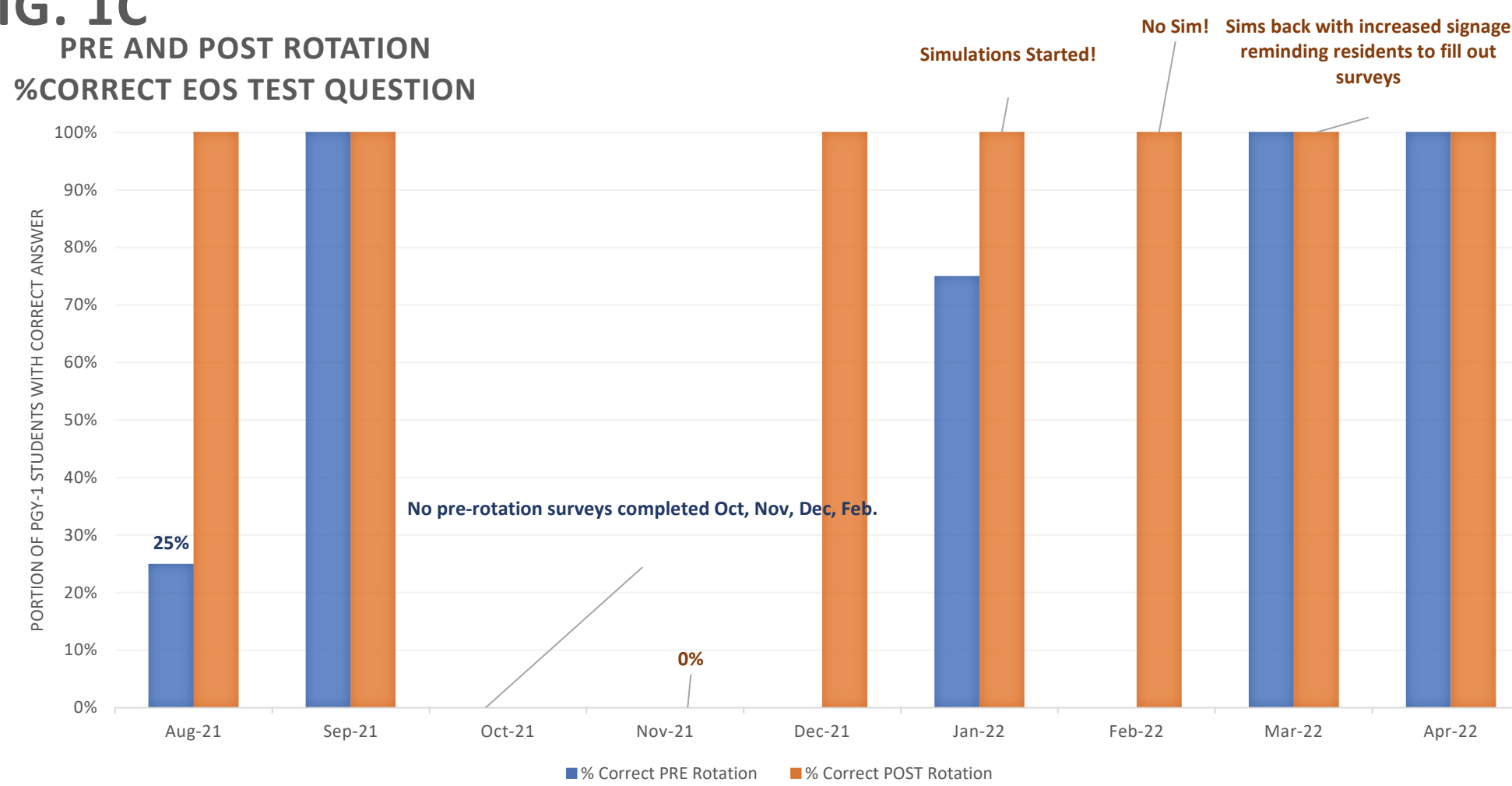Aug-21, Sep-21, Oct-21, Nov-21, Dec-21, Jan-22, Feb-22, Mar-22, Apr-22 (x-axis)

Figure 1. A) Average PGY-1 self-reported comfort in identifying risk factors of Early Onset Sepsis (EOS) before and after their newborn nursery (NBN) rotation. **B)** Average PGY-1 self-reported confidence in assessing symptoms of clinical illness in a neonate before and after their NBN rotation. **C)** Percentage of PGY-1 who answered a test question about EOS correctly, before and after their NBN rotation. PDSA#1 Simulation (SIM) to enhance PGY-1 EOS learning during the NBN rotation started in January 2022. No SIM occurred Feb 2022. SIM restarted March 2022 with PDSA#2 of increased signage in the NBN workroom reminding residents to fill out voluntary pre and post NBN rotation surveys.

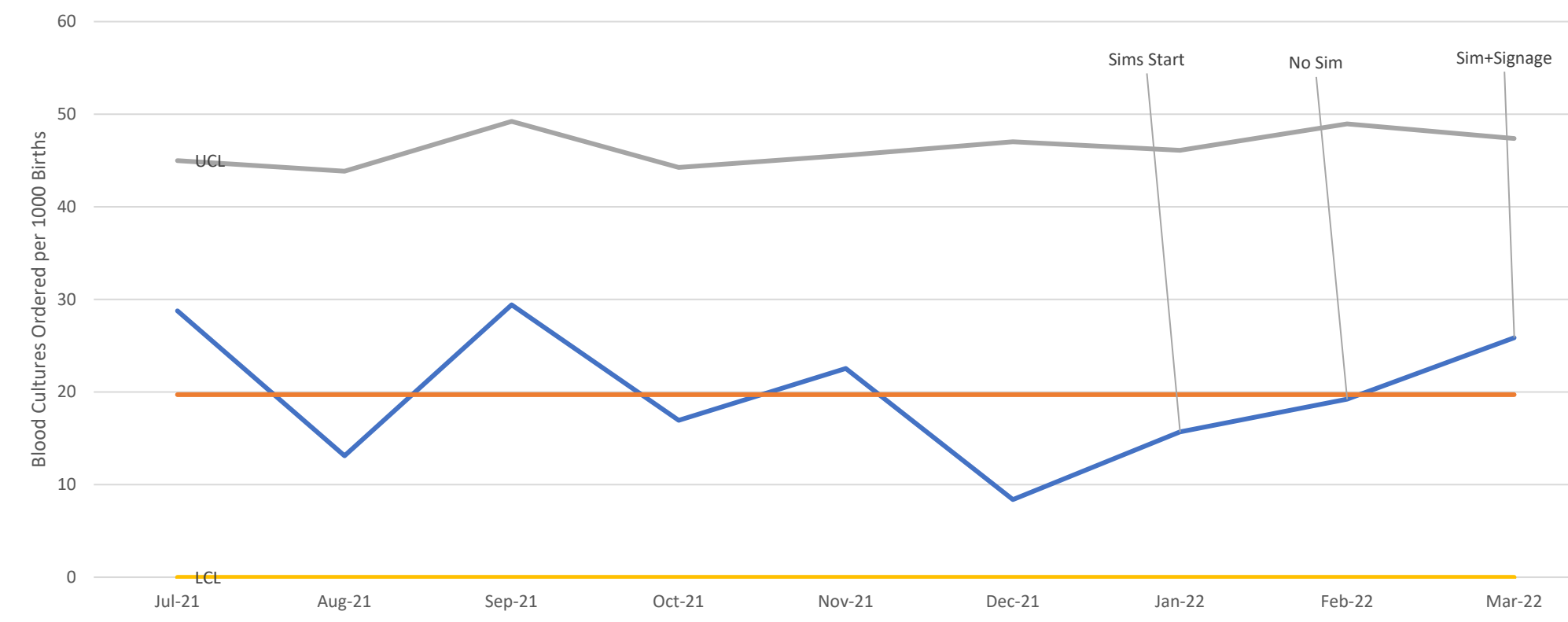**FIG. 2A**   Newborn Nursery Blood Culture Ordering Rate U Chart

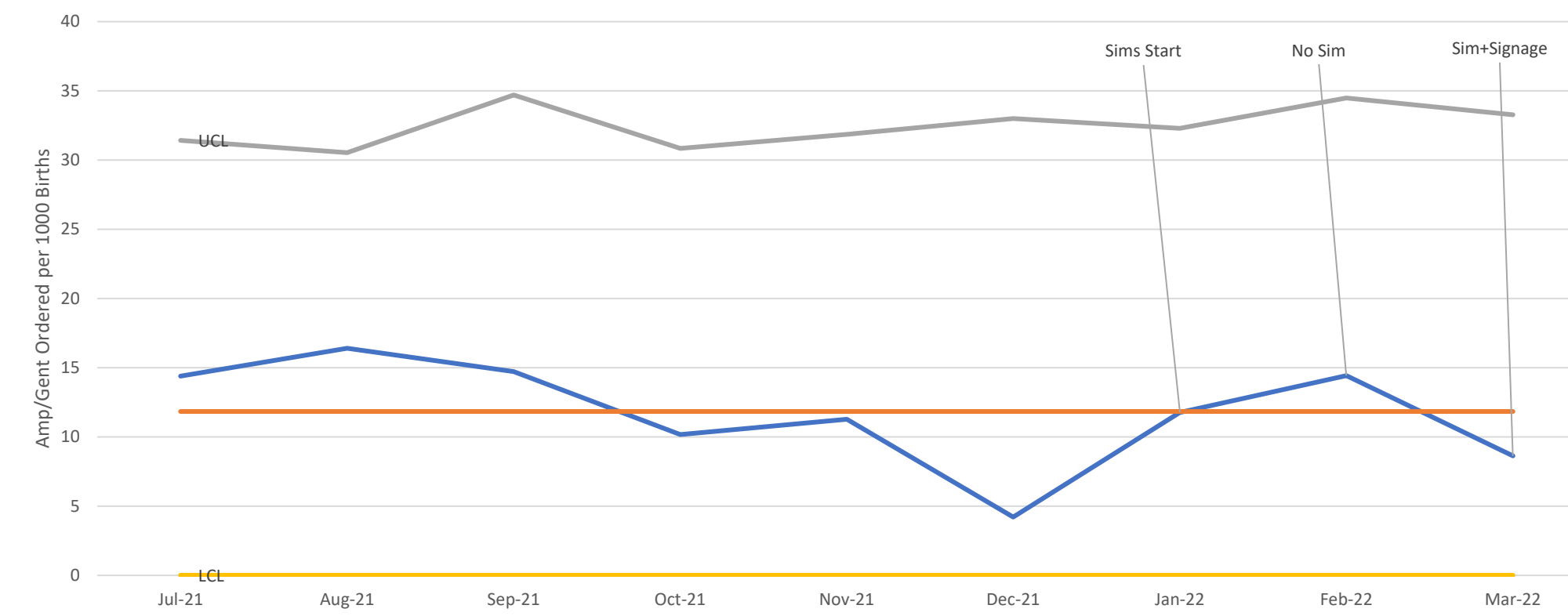**FIG. 2B**   Newborn Nursery Empiric Antibiotics for EOS Ordering Rate U Chart

Figure 2. Clinical metrics to assess impact of educational interventions on EOS-related patient care in the newborn nursery. Of note, the CDC national rate of EOS is 0.5/1000 births. **A)** Blood culture ordering rate did not show special cause variation (SCV) throughout project period although an upward trend warrants continued monitoring. **B)** Ordering rate of empiric antibiotics for EOS did not show SCV throughout project period.

I am comfortable with identifying risk factors for early onset sepsis in a newborn.						
Survey Timing and Simulation Experience	Strongly Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	P value
Beginning	1	4	5	4	0	
End, No Sim	0	0	0	10	2	
End, With Sim	0	0	0	0	5	0.002028231

I am confident in determining a newborn's degree of clinical illness based on vital signs and physical exam findings.						
Survey Timing and Simulation Experience	Strongly Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	P value
Beginning	0	2	2	10	0	
End, No Sim	0	0	0	8	4	
End, With Sim	0	0	0	1	4	0.08837628

Multiple Choice PREP Question		
Survey Timing and Simulation Experience	Correct	Incorrect	P value
Beginning	10	4	
End, No Sim	11	1	
End, With Sim	5	0	0.705882353

Table 1. Raw numbers of survey participants' scores. The first two tables represent the likert scale scores from Question 1 and Question 2, respectively. The third table represents the number of correct and incorrect responses to the multiple choice question. Respondents are grouped by Beginning (pre-survey) and End (post-survey) with and without the simulated cases. Mann-Whitney U testing was done in Excel to compare responses with and without simulation and determine a P value. The P values demonstrate a statistically significant impact of simulation on Question 1 regarding comfort identifying risk factors.