

## **Introduction**

“Just-In Time” (JIT) training and simulations are a relatively new educational modality tailored around specifically timed educational interventions to optimize retention of knowledge and procedural skills such as CPR, lumbar punctures, defibrillator use and intubation skills (1-11). However, there is limited data showing objective improvement in performance measures during simulated mock code situations with the use of Just-in Time simulations.

Mock code simulations have been established as vital educational tools for preparing medical trainees for how to respond to critically ill patients (12-13). Our project focused on the effect of JIT training with mock code situations for medical trainees participating in their Pediatric ICU rotation on both objective measures of performance, as well as subjective comfort with code situations.

## **Methods**

Participants were residents and medical students participating in Pediatric ICU rotation at St. Christopher’s Hospital for Children. These participants ideally completed two sets of mock code simulations during their PICU rotation, primarily focused on a case of cardiac arrest secondary to respiratory failure. Simulations were observed by members of the research team and specific time points were recorded such as timing of initiation of bag mask ventilation, recognition of abnormal heart rhythm, initiation of chest compressions, and administration of epinephrine. Pre and Post-intervention surveys included an evaluation of knowledge retention with multiple-choice questions, as well as survey questions evaluating comfort managing code situations.

Primary outcomes were delays in objective patient care measures recorded during simulated mock codes, specifically how these measures changed for simulation groups at the end of their rotation compared to the beginning. Additional outcomes measured were retention in participant’s knowledge as measured by survey questions, as well as comfort with managing critically ill patients. Continuous variables were analyzed using t-test mean comparison, whereas Chi Square testing was used for categorical variables.

## **Results**

Since April 2021, we were able to administer 17 different simulations with a total of 69 participants. While consistency of participation was limited by the COVID-19 pandemic, there were four groups that were able to complete both simulations at the beginning and end of their rotation. However, changes in objective patient care time points were not consistently different, and although participants indicated an increased level of comfort managing critically ill patients, these results were not statistically significant (See Table 1).

Overall, even participants who completed a single simulation experienced an improved sense of comfort with code situations, especially seen in code-based procedures (see table 2). Additionally, we observed an increase in code-based clinical knowledge, with a mean increase in correct answers by 24% as measured by paired t-test.

## **Conclusion**

Participants of mock-code JIT simulations displayed increased knowledge and levels of comfort with managing critically ill patients. However, more consistent data is needed to further evaluate the full effect of JIT training within the context of pediatric mock codes, including its effect on objective patient measures. Next steps include improving the consistency of simulation sessions and data collection, possibly by implementing bi-monthly simulated cases as part of an already established PICU educational curriculum.

	Avg Delay in bag mask ventilation (seconds)	Avg Delay in chest compressions (seconds)	Avg Delay in rhythm recognition (seconds)	Avg Time to Epinephrine Administration (seconds)	"I feel comfortable managing critically ill patients"*	"I feel comfortable performing code-related procedures"*
1st session (n=4 groups)	0	31	52	138	40%	33%
2nd Session (n=4 groups)	20	39	29.5	131	69%	56%
Change	(+20)	(+ 8)	(-22.5)	(-7)	(+29%)	(+23%)
	p=0.374	p = 0.761	p = 0.485	p= 0.891	p= 0.108	p= 0.2

Table 1. This table illustrates the difference in both objective patient measures and participant comfort based on post-session survey results in groups that were able to complete 2 sim sessions during their PICU rotation. \*Participants determined to be comfortable when answering "agree/strongly agree" to the quoted questions on post-session survey.

	Clinical knowledge score (out of 5 points)	"I feel comfortable managing critically ill patients"*	"I feel comfortable performing code-related procedures"*
Pre-survey	2.57	16%	3%
Post-survey	3.76	26%	37%
Average change	(+1.2)	(+10%)	(+34%)
	p = 0.00026	p= 0.36	p = 0.0016

Table 2: This table shows the average change in clinical knowledge scores and overall comfort with code-based situations/procedures over the course of a single simulation session. Answers were collated from pre and post-session surveys. \*Participants determined to be comfortable when answering "agree/strongly agree" to the quoted questions on post-session survey.

## References

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