Simulation Use in Outreach Setting: A Novel Approach to Building Sustainability

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Introduction

Simulation is a well-studied teaching tool for multi-disciplinary teamwork, crisis resource management, and communication skills. These elements are essential for successful international medical missions that include health care providers with different areas of expertise, levels of training, or familiarity with the outreach environment and each other's roles. The effect of immersive simulation on team dynamics remains poorly studied in similar settings. With that in mind, we hypothesize that incorporating simulation into the workflow of international medical missions will result in enhanced team preparedness for addressing the innate challenges of working in the outreach setting.

Methods

Nine teams, each comprising 3 to 10 participants, were formed. On day 1 of a 7-day-long mission, participants received a brief Pediatric Advanced Life Support (PALS) crash course. This was followed by a immersive simulated resuscitation exercise using a pediatric low-fidelity simulator. A debriefing session focused on crisis resource management, with special emphasis on role assignments and successful team dynamics, was then performed. The simulation exercise was repeated on day 3. Team performance was measured on days 1 (baseline) and 3 (post-intervention) using the Clinical Teamwork Scale (CTS) by Guise et al. (2008). The difference between baseline and post-intervention performances was compared using Wilcoxon Signed Rank Test.

Figure 1. In situ (PACU) set-up of mannequin. The simulated vitals monitor is behind the participant.

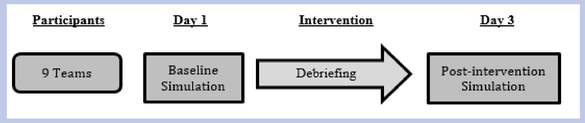

Figure 2. Structure of the research design used in the study.

Criteria	Baseline		Postintervention		Significance	Effect Size
	Median (from 1–10; min–max)	Mean (SD)	Median (from 1–10; min–max)	Mean (SD)		
1. Overall score	4.0 (2.0–6.0)	4.3 (1.3)	8.0 (5.0–10.0)	7.7 (1.6)	0.008*	0.63†
2. Overall communication	4.0 (2.0–4.0)	3.4 (0.73)	7.0 (5.0-10.0)	7.2 (1.7)	0.007*	0.63†
3. Orient new members‡	3.0 (0.0–4.0)	2.8 (1.6)	8.0 (7.0–9.0)	8.0 (1.0)	0.109	0.38
4. Transparent thinking	4.0 (2.0–8.0)	4.2 (1.9)	8.0 (6.0–10.0)	7.8 (1.2)	0.011*	0.60†
5. Directed communication	3.0 (2.0–5.0)	3.3 (1.0)	7.0 (4.0–9.0)	6.6 (2.1)	0.011*	0.60†
6. Closed loop	3.0 (0.0–5.0)	2.9 (1.5)	7.0 (4.0–10.0)	7.3 (1.7)	0.011*	0.60†
7. Overall situational awareness	4.0 (3.0–6.0)	4.3 (1.0)	8.0 (7.0–10.0)	8.0 (1.0)	0.007*	0.63†
8. Resource allocation	4.0 (2.0–5.0)	4.1 (1.1)	8.0 (7.0–10.0)	8.0 (1.0)	0.007*	0.63†
9. Target fixation					0.157	0.33
10. Overall decision making	5.0 (3.0–7.0)	5.1 (1.5)	8.0 (5.0–10.0)	8.2 (1.4)	0.007*	0.63†
11. Prioritization	4.0 (2.0–7.0)	4.4 (1.7)	8.0 (5.0–10.0)	8.1 (1.5)	0.007*	0.63†
12. Overall role responsibility	4.0 (2.0–6.0)	4.2 (1.4)	8.0 (6.0–10.0)	7.9 (1.4)	0.011*	0.60†
13. Role clarity	3.0 (2.0–6.0)	3.6 (1.5)	8.0 (6.0–10.0)	7.9 (1.5)	0.011*	0.60†
14 (a) Performance as a leader	3.0 (1.0–6.0)	3.7 (1.5)	8.0 (5.0–10.0)	7.8 (1.7)	0.012*	0.59†
14 (b) Performance as a helper	5.0 (3.0–8.0)	5.4 (1.5)	8.0 (6.0–10.0)	8.1 (1.3)	0.018*	0.56†
15. Patient friendly§	7.0 (7.0–7.0)	7.0 (0.0)	8.0 (7.0–8.0)	7.8 (0.5)	0.083	0.41

*$P < 0.05$
†Large effect size according to Cohen (1988).
‡Four responses were "not relevant" for baseline (n = 5) and six responses were "not relevant" for postintervention (n = 3).
§Five responses were "not relevant" for baseline (n = 4) and five responses were "not relevant" for postintervention (n = 4).
Abbreviations: SD, standard deviation.

Table 1. CTS Median and Mean Scores of Baseline and Post-Intervention (n=9)

Results

Post-intervention performance scores significantly increased from baseline in 13 of 16 criteria defined in CTS with large effects sizes: overall communication, transparent thinking, directed communication, closed loop communication, overall situational awareness, resource allocation, overall decision making, prioritization, overall role responsibility, role clarity, performance as a leader, performance as a helper, and overall evaluation. The score improvement for the remaining two criteria, orientation of new members and patient friendliness, was not statistically significant. In fact, both items were marked as "not relevant" by the raters on multiple occasions. Although non-statistically significant, the rate of target fixation decreased post-intervention.

Discussion

Considering the importance of solid team dynamics in crisis resource management, our results provide a strong incentive for incorporating a rigorous and standardized simulation curriculum into high-risk medical missions. The simplicity of the proposed platform overcomes the limitations of time and resources inherent to outreach mission work. Further research with larger sample sizes may be needed to fully assess the benefits of simulation in global health.

Acknowledgments

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