

Error Recognition by Medical Students during Simulated Asystole: Teamwork and Assertiveness from Aviation

Margaret Chi, Nakeia Hall, Timothy Hodge, Alexander K Lee, Michael Weigner, MD, Andrew J Behnke, MD Liberty University College of Osteopathic Medicine

Mitchell Morrison, PhD, Liberty University School of Aeronautics

INTRODUCTION

Medical errors result in adverse clinical outcomes and represent increased costs and additional care due to their consequences. The US airline mishap rate decreased 74% from 1987 to 2006, in part, due to various teamwork methods like Crew Resource Management (CRM), checklists, briefings, and reporting-analysis (Morrison, 2013).

During this study, we sought to determine if teamwork training utilized by the aviation industry reduced medical errors in first-year medical students treating simulated asystole. The teamwork training included aspects of CRM that focused on situational awareness, communication, assertiveness, and risk management.

BACKGROUND

Haffner et al. (2017) demonstrated that even a brief ten-minute CRM training in senior medical students can help to identify and correct improper chest compressions during a simulated cardiac arrest scenario.

In this study, we examined error recognition and intervention behavior during a simulated CPR situation with first-year medical students.

METHODS

Our certified instructor provided American Heart Association training in CPR techniques for first-year medical student participants. We then divided students into a control group (n=10) and an intervention group (n=11).

The intervention group participated in a 90-minute discussion on teamwork and error recognition modeled after Crew Resource Management from aviation, with emphasis on assertiveness and error management communication styles.

Participants individually entered a simulated emergency room setting with a nurse and mannequin. Following one cycle of student CPR compressions, a simulated physician entered the room and intentionally performed compressions slowly and therefore incorrectly.

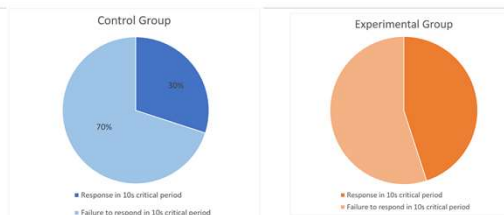
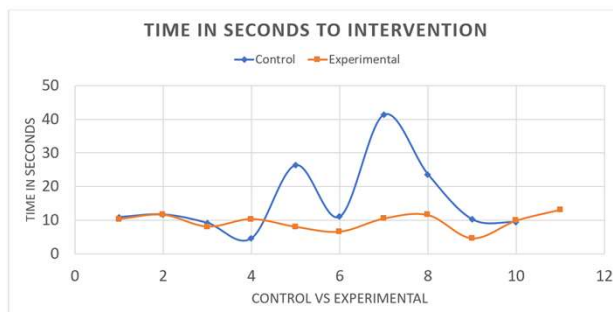
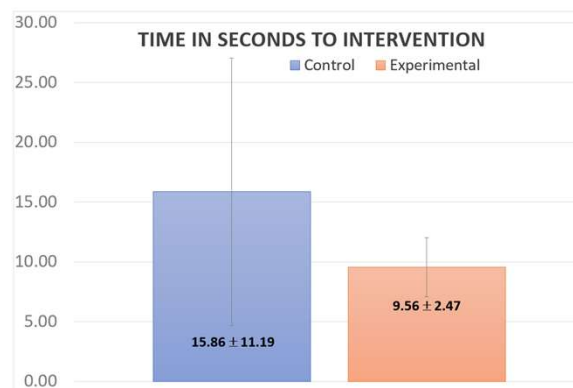
Observers counted the elapsed time (in seconds) for the subject to verbally correct the simulated physician's improper CPR technique.

RESULTS

The time (in seconds) in the intervention group was lower (9.56 ± 2.47) as compared to the control group (15.86 ± 11.19) ($p=0.11$).

Additionally, the percentage of participants who intervened within a critical 10-second period increased from 30% to 42%.

During audiotaped debriefings, respondents from both groups commented on the difficulty of speaking up while working with an unfamiliar senior supervising physician. We employed mind mapping and nVivo analysis to review qualitative data.



CONCLUSIONS

Individuals who received teamwork training prior to the simulation responded more quickly to incorrect CPR technique, thereby decreasing the amount of ineffective chest compressions from 15.86 to 9.56 seconds ($p=0.11$). More participants in the intervention group notified the physician of the error within a critical 10-second time frame (42% vs 30%).

DISCUSSION

This study reinforces the conclusions of previous studies that show the effectiveness of leadership training in high-intensity medical scenarios. CPR is the most important factor in preventing death after cardiopulmonary arrest and is used in this study to stimulate teamwork. The present study therefore illustrates an association between desirable clinical outcomes and enhanced communication between healthcare providers.

Implementing classes or lectures that emphasize leadership, teamwork, and error recognition can equip student doctors to communicate and respond during high-intensity scenarios.

Future research is needed to determine if implementing teamwork and error recognition programs during medical school will be beneficial in clerkships, residency, and clinical practice.

REFERENCES

- Chung, S. P., et al. (2011). Effects of script-based role play in cardiopulmonary resuscitation team training. *Emergency Medicine Journal*, 28, 690-694.
- Haffner, et al. (2017). Improved recognition of ineffective chest compressions after a brief Crew Resource Management (CRM) training: a prospective randomized simulation study. *BMC Emergency Medicine*, 17:7.
- Hunziker, S., Bühlmann, C., Tschan, F., Balestra, G., Legeret, C., Schumacher, C. Marsch, S. (2010). Brief leadership instructions improve cardiopulmonary resuscitation in a high fidelity simulation: A randomized controlled trial. *Critical Care Medicine*, 38(4), 1086-1091.
- Kohn, L., Corrigan, J., Donaldson, M., eds. (1999). *To err is human: Building a safer health system*. Washington, DC: National Academy Press, Institute of Medicine.
- Leape, L. (2015). Symposium: Patient Safety in the Era of Healthcare Reform. *Clinical Orthopaedics and Related Research*, 473, 1568-1573
- Marsch, S.C, et al(2004) Human factors affect the quality of cardiopulmonary resuscitation in simulated cardiac arrests. *Resuscitation*, 60, 51-56.
- Morrison, M. (2013). *Teamworks: Transforming Health Care's Error-Prone Culture*. San Diego, CA: Creative Team Publishing.
- Walsh, L., Anstey, A., & Tracey, A. (2018). Student perceptions of faculty feedback following medication errors: A descriptive study. *Nurse Education in Practice*, 33, 10-16.