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

Andrew J. Behnke, MD
Liberty University College of Osteopathic Medicine

Mitchell A. 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 - 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 can reduce medical errors in first-year medical students treating simulated asystole.
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 in a simulated CPR situation with first year medical students
• Study Design: Standard ‘player’ responses during the scenario
Methods

• Our certified instructor provided American Heart Association training in CPR techniques to 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.
Methods (continued)

- 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. When questioned verbally, the physician complied and simulation stopped.

- Observers counted the elapsed time (in seconds) for the subject to verbally correct the simulated physician’s improper CPR technique.
Quantitative 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 of time 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
Time in Seconds to Intervention

Control vs Experimental

Time in Seconds

Control
Experimental

Graph showing the comparison of control and experimental groups over time in seconds to intervention.
Intervention Group - Briefing Highlights

• Effective Communication
  • Passivity: Eight-year old boy elective ear drum surgery; bleeding during perfusion
  • Assertiveness: Not just speaking up, but doing so with impact [CUS, SBAR, Two-Challenge, DESC]
  • Arrogance/Ineptitude: Eastern 401, Tenerife, United 173, Air Florida

• Leape (2015)
  • Patient harm is the result of bad ____________, not bad ______________
  • Barriers to safe care: Dysfunction, Culture of Disrespect, Misguided Autonomy

• CRM, Checklists, Briefings, Reporting-Analysis (Just Culture)

• Role playing to intervene when wrong dose/site being used
  • CUS
  • SBAR
Errors

- Inadvertent action: slip, lapse, mistake

- Manage through changes:
  - Processes
  - Procedures
  - Training
  - Design
  - Environment

At-Risk Behavior

- A choice: risk not recognized; risk believed justified

- Manage through:
  - Removing incentives for at-risk behaviors
  - Creating incentives for healthy behaviors
  - Increasing situational awareness

Support

Reckless Choice

- Deliberate action: Deliberate and willful choice

- Manage through:
  - Remedial action
  - Punitive action

Coach
Do you ‘CUS?’

• I’m CONCERNED
• This is UNSAFE
• This is STUPID! (or I’m SCARED!)

• Use touch
• Raise your voice slightly without being uncivil
SBAR

• Situation
• Background
• Assessment
• Request/Recommendation
Qualitative Results

• Mind mapping and nVivo software to analyze qualitative data
• 21 interview transcripts – Aggregated into thematic clusters
Thematic Clusters - Representative Quotes

• **Stress**
  • “I was more surprised ata how long it took me to respond; it was just hard to focus under a lot of pressure.”
  • ”It took me a lot longer to tell him that we need to do it a little faster.”

• **Real-Life**
  • “I don’t know in a real-life situation what I should do, to be honest. I know what the right thing is, but I don’t know how to do it.”
  • ”I knew what I was doing was not effective, but I still was reluctant to do it.”

• **Speak Up**
  • “We can speak up, even with people in authority. Here’s how to do it. The method for how we speak up is extremely valuable.”
  • “I should have spoken up sooner.”
All but two spoke up - eventually

- I think we need to go a bit faster
- You might try doing compressions a little faster
- If I may, I believe the proper chest compression rate is 100 beats per minute
- Extra assertiveness:
  - And if you could count out loud...
  - Would you mind counting out loud?
Use the video and recording?

- Everybody said yes
- Even a couple who had challenges speaking up
Conclusion

• Individuals who received teamwork training prior to the simulation responded quicker 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%)

• Themes from learning exercise
  • Stress
  • Real-Life
  • Speaking Up

• Move from teaching correct CPR to didactic teamwork methods during simulated high-stress intervention scenarios
Discussion

• CPR is the most important factor in preventing death after cardiopulmonary arrest
• This study reinforces the conclusions of other studies that have shown the effectiveness of leadership training in high intensity medical scenarios
• This study also illustrates the association between desirable clinical outcomes and enhanced communication between healthcare providers
• Mixed analysis methods yielded rich outcomes
Discussion – How does this apply?

• Overall goal – Reduce adverse clinical outcomes
• Current medical school curriculum promotes student independence with little leadership and team-building classes/lectures
• Implementing classes or lectures that emphasize leadership, teamwork, and error recognition can equip student doctors to communicate and respond during high-intensity simulation
  • More aggression or arrogance from simulated physician to elicit response?
  • Study method effectiveness
• Reviewer Comments: Interprofessional context to enhance depth
• 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


