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

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**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

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**Reckless Choice**

Deliberate action:
- Deliberate and willful choice

Manage through:
- Remedial action
- Punitive action

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**Support**

- Coach

**Sanction**
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


