

Effects of Brief Mental Skills Training on Emergency Medicine Residents' Stress Response During a Simulated Resuscitation: A Prospective Randomized Trial

Matthew Aronson MD¹, Timothy Henderson MD¹, Kenneth W. Dodd MD^{1,2,3}, Michael Cirone MD^{1,2}, Margaret Putman MD^{1,2}, David Salzman MD, MEd⁴, Elise O. Lovell MD^{1,2}, and M. Kelly Williamson MD^{1,4}
¹AAH Christ Medical Center Dept. of EM; ²University of Illinois Chicago Dept. of EM; ³Hennepin County Medical Center Dept. of EM; ⁴Northwestern Medical Center Dept. of EM

Introduction

Background

Acute stress impairs physician decision-making and clinical performance in resuscitations. Mental skills training, a component of the multi-step cognitive-behavioral technique of stress inoculation, modulates stress response in high-performance fields.

Objectives

We assessed the effects of mental skills training on emergency medicine (EM) resident stress response in simulated resuscitations as well as resident perceptions of this intervention.

We hypothesized that the intervention group would have less subjective stress as measured by pre- and post-simulation State Trait Anxiety Index-6 (STAI-6) scores. Secondary outcomes included biometric correlates of stress (i.e., heart rate [HR] and heart rate variability [HRV]) and residents' perception of the stress inoculation skills training program.

Methods

In this prospective, educational intervention trial, PGY-2 EM residents in seven Chicago-area programs were randomly assigned to either receive stress inoculation training or not. One month prior to assessment, the intervention group received didactic training on the "Breath, Talk, See, Focus" (BTSF, **see Figure 1**) mental performance tool. A standardized, case-based simulation was used for assessment. Subjective stress response was measured using the state trait anxiety inventory (STAI-6, **see Figure 2**). Objective stress response was measured through heart rate (HR) and heart rate variability (HRV) monitoring. Subjects' perceptions of the training were measured via survey.

Subjects

Eligible subjects for this study were PGY-2 EM residents at the participating programs during the study period of January 2020 to February 2020. Recruitment took place in January 2020 during each EM program's weekly resident educational conference. Subjects were randomized into intervention or control groups at that time in an alternating fashion based on last name. Each spring, all PGY2 residents in the Chicagoland EM programs participate in an annual city wide simulation assessment, *Simtastic*. This study was designed to coincide with this event. A critically-ill patient simulation cases served as the assessment.

Protocol

At the time of enrollment, each subject completed a pre-intervention survey that assessed perceptions about the incorporation of mental skills training and stress inoculation principles into residency training as well as prior exposure to these techniques.

During the recruitment session, study investigators provided a 20 minute interactive, didactic session to the intervention group about the effects of acute stress on performance, specific mental skills to mitigate the effects of stress, and the application of these skills to high-stress clinical scenarios. The mental skills training was based on the BTSF approach to performance under pressure. Subjects in the intervention group were strongly encouraged to review the BTSF tool and to use these mental skills in their own clinical practice.

Upon arrival to *Simtastic*, all subjects completed a STAI-6 survey and were fitted with heart rate monitors (Polar © H10).

Subsequently, subjects in the intervention group received a 5-minute refresher on stress inoculation concepts and BTSF. Biometric data were recorded both at baseline and throughout the simulation case.

Once the case concluded, residents immediately completed a second STAI-6 survey and a post-intervention survey.

Results

Subject Characteristics

92 were screened for eligibility during resident conferences and 61 underwent randomization after informed consent

61 residents participated: 25 in control group, 36 in intervention group
 There were no significant differences in age, sex, or ethnicity, between subjects in the control and intervention groups.

Primary Results

There was no significant difference in STAI-6 survey responses between groups

Secondary Results

There was no significant difference in biometric data between groups. There were no significant group differences in responses to the pre-intervention survey. However, there were significant differences in the post-intervention survey (**see Figure 4**). Specifically, in response to the question "How relevant is the topic of stress inoculation to the resident physician?," 91% of the intervention group responded "very relevant" compared to 26% of the control group (p <0.01). In response to the question "How important is it to include education about stress inoculation topics in residency training?" 75% of the intervention group responded "very important" compared to 28% of the control group (p <0.01).

Conclusions

A brief, didactic mental skills training intervention did not demonstrate significant differences in subjective or objective measures of stress responses in EM residents during a simulated resuscitation.

Participating residents did rate the training highly.

Future investigations involving comprehensive, longitudinal stress inoculation curricula are warranted.

Limitations

The lack of requisite deliberate practice and delay from the initial exposure could have attenuated the benefits obtained from the introductory lecture, and decreased STAI-6, biometric, and performance data differences between the groups.

There were also a number of subject-specific non-controlled confounders that may have impacted the biometric data, including stimulant ingestion (e.g. coffee, energy drinks), prescribed medications, sleep quality/duration in the preceding evening, and nutritional intake.

Figure 1. BTSF Tool
 (Lauria, M. Annals of EM. 2017)

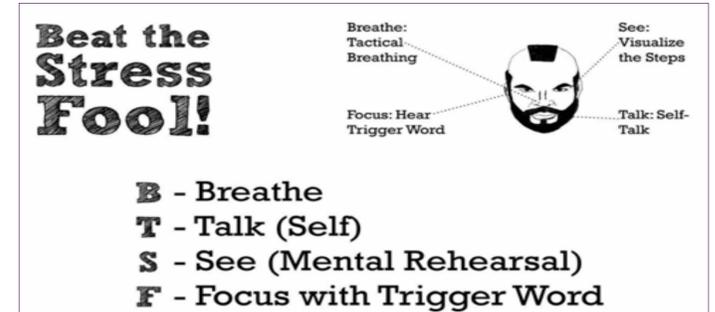


Figure 2. State Trait Anxiety 6 (STAI-6) Survey
 (Marteau et al., 1992)

	Not at all	Somewhat	Moderately	Very much
1. I feel calm	1	2	3	4
2. I am tense	1	2	3	4
3. I feel upset	1	2	3	4
4. I am relaxed	1	2	3	4
5. I feel content	1	2	3	4
6. I am worried	1	2	3	4

Figure 3. Comparison of STAI-6 scores

	Intervention	Control	p value
Pre-case STAI-6 score, mean ± SD	41±11	40.2 ±6.6	0.13
Post-case STAI-6 ± SD	40 ±9.7	41 ±5.9	0.83
Change in STAI-6 ± SD	-1.7 ±3.3	0.4 ±6.6	0.38

Figure 4. Comparison of Post-Intervention survey responses

Post-Intervention Survey Responses	Control group	Intervention group
How important is it to include education about stress inoculation topics into residency training?		
Very Important	10 (27.8%)	18 (75.0%)
Somewhat Important	14 (38.9%)	4 (16.7%)
Neutral	11 (30.6%)	1 (4.2%)
Unimportant	1 (2.8%)	1 (4.2%)
How relevant is the topic of stress inoculation training to the resident physician?		
Very Relevant	9 (25.7%)	19 (90.5%)
Somewhat Relevant	14 (40.0%)	2 (12.5%)
Neutral	12 (34.3%)	0 (0.0%)
Irrelevant	0 (0.0%)	0 (0.0%)