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ORIGINAL PAPER

Comparing the Effectiveness of a Guide Booklet to Simulation-Based Training for Management of Acute Agitation

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Abstract
Simulation-based training may be an effective teaching modality for psychiatry residents; however, simulation-based training is an unstudied and underutilized aspect of psychiatry resident training. The objective of this study was to compare the teaching effectiveness of a simulation-based training to reading a resident *on-call psychiatry guide* booklet in improving the self-confidence and knowledge of residents that is necessary for managing acutely agitated patients. Pre-intervention self-confidence and knowledge were measured for all residents using a Likert scale questionnaire and a clinical vignette questionnaire, respectively. Residents ($n = 23$) were randomly assigned to either the simulation group ($n = 12$) or the guide booklet group ($n = 11$). Residents in the simulation group completed the simulation-based training, and residents in the guide booklet group were instructed to read the corresponding pages of the booklet regarding management of acute agitation. The comparative teaching effectiveness of the guide booklet and simulation-based training was measured with a post-intervention self-confidence questionnaire and a clinical vignette questionnaire. The study spanned approximately one academic year (July 2016– Sept 2017). Residents who participated in the simulation-based training showed significantly greater improvement in self-confidence (simulation median improvement = 1.458 vs. guide median improvement = 0.033, $p = 0.002$) and knowledge (simulation median improvement = 0.135 vs. guide median improvement = 0.021, $p = 0.0124$). Simulation-based training was more effective at improving residents' self-confidence and knowledge compared to the *on-call psychiatry booklet* for the management of acutely agitated patients. Though simulation is being used in other specialties, it is a very underutilized tool in the field of psychiatry. This finding underscores the potential for simulation-based training in residency programs to improve resident learning.

Keywords Medical education · Simulation · Residency · Behavioral emergency

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Introduction

Acute agitation is one of the common behavioral emergencies across psychiatric conditions that occur in many treatment settings including: psychiatric emergency rooms, consultation-liaison services, inpatient psychiatric units, and outpatient clinics. Although there is no consensus definition, agitation is referred to as a behavioral syndrome with non-purposeful motor behavior, an increase in excitability, and deterioration of normal patient functions [1]. Prior reports have estimated prevalence rates ranging from 4.3% to 10% in psychiatric emergency services and a frequency of violent incidents between 0.4 and 33.2 annually per psychiatric patient with agitation [2–4].

The complex and high-risk nature of behavioral emergencies dictates that residents should have early and specific training around best practices. One survey of psychiatry residents revealed that 73% reported being threatened, 36% had been physically assaulted in residency, and 66% of them had received either no or inadequate training in managing combative patients [5]. Many new residents only receive a didactic session or written concise guidelines such as those found in a "Resident Survival Guide" (i.e., On-call guide booklet) at the start of their residency programs.

Simulation-based training has been shown to be an effective teaching tool across a range of learners [6, 7]. Simulations are commonly used for emergency situations (e.g., cardiac arrests) as they provide opportunities for learners to hone their skills with some representation of real world clinical complexity. However, simulation-based training is an unstudied and underutilized aspect of psychiatry resident training.

Given the need to teach psychiatry residents to manage acute agitation, it is essential to explore whether or not simulation-based training is a viable teaching option. To our knowledge, there has been a small number of pilot studies, which used mostly self-reported measures of confidence and skill [8, 9] and one study that used performance-based measures for the management of acute agitation [10]. Simulation-based training has not been adequately compared to other well-established, status quo methods of teaching such as: reading, lectures, online modules, etc.

The purpose of this study was to implement a simulation-based training for first post-graduate year (PGY-1) psychiatry residents and compare this method to the pre-existing method of teaching, a concise booklet (*On-call Psychiatry Guide*) that remains the primary source of guidelines for acute agitation management for beginning residents at this particular training program. We sought to compare the guide booklet to a simulation-based training, which are both designed to teach residents the clinical approaches and management of acute agitation on an inpatient psychiatric unit. A randomized trial was conducted to compare the teaching effectiveness (based on confident and knowledge measures) of the simulation training to that of reading the *On-call Psychiatry Guide*. This study was designated as exempt status by the Institutional Review Board.

Methods

Participants

The participants in this study were PGY-1 residents ($n = 23$). The study spanned approximately one academic year (July 2016– Sept 2017). All 23 (18 residents were recruited from the 2016–

17 cohort and 5 were recruited from the 2017–18 cohort) eligible residents were invited to participate in the study over the course of their 5 months long inpatient psychiatry rotation. Residents had varying amounts of psychiatry experience depending on their rotation order throughout the year. Simulation-based trainings took place in the local medical school's Simulation Center. A PGY4 chief resident and a hospital staff member both served as standardized patients depending on scheduling. Both standardized patients adhered to the same clinical scenario.

Simulation Training Description

The simulation scenario was constructed to meet certain learning objectives outlined in Appendix 1. During the scenario, the resident is approached by the nurse who provides a brief history of the patient and current situation. When the resident addresses the patient, the patient demands to leave AMA for reasons based on obvious psychotic symptoms suggesting a primary psychotic etiology to the agitation. The resident attempts multiple verbal de-escalation strategies, and the standardized patient repeatedly insists on being discharged from the hospital, becomes progressively more agitated. The standardized patient eventually requires physical restraint and/or emergency administration of intramuscular medications for patient safety.

On-Call Guide

The on-call guide included two full pages of guidelines for the management of acute agitation, which has been annually reviewed and updated. The relevant pages include: intramuscular medication options, psychopharmacology guidelines, side effect warnings, and clinic pearls. The residents in the on-call booklet group were instructed to read the relevant pages immediately prior to take the post-assessment. Residents were supervised during the readings and assessments to ensure completion.

Measures

All participants completed a pre- and post- confidence self-assessments as well as pre- and post- knowledge-based assessments. Self-confidence assessments were designed to assess the confidence level of the resident corresponding with each learning objective (Appendix 1). Subjective self-assessments were scored on a Likert scale graded 1–5 (1 = not at all confident, 5 = completely confident). Identity codes were given to all residents to conceal any identifying information during the completion of all assessments.

For instance, one assessment question was, "How comfortable do you feel responding to acutely agitated patients in the hospital?"

Knowledge-based assessments were designed using a clinical case vignette to evaluate the knowledge corresponding to each learning objective (Appendix 1). Clinical case vignettes have been validated in a variety of medical settings and has been shown to correlate with both standardized patient assessment and clinical observation [11, 12]. Specifically, clinical case vignettes with open text responses have been validated to measure competence in managing acute agitation) [13]. A combination of both multiple choice and open text responses were included to assess learning objective achievement. A sample open text response question was phrased, "What is your differential diagnosis for the acute agitation in this patient?"

Pre- and post- knowledge-based assessments utilized identical question sets with slightly varied clinical vignettes to elicit the same knowledge as applied to a different scenario. The assessment was scored based on 1 point for each multiple-choice question and 1 point for each correct answer given in the open text field. A maximum score of 100% (34/34 points) and minimum score of 0% was possible.

Study Overview

Figure 1 provides a diagrammatic study overview. Residents were randomly assigned to either the simulation group or on-call guide group. All participants received a pre-intervention self-confidence assessment and a knowledge-based assessment regarding the management of acute agitation. The guide group was instructed to read the chapter on acute agitation in the *On-call Psychiatry Guide*. After reading this guide, the guide group was instructed to complete the post-assessments (i.e. self-confidence and knowledge) without participation in simulations. The simulation intervention group underwent the one-hour simulation session for acute agitation and then completed a post-session de-brief of major teaching points. Following the simulation, the simulation group completed all post-assessments.

Data Analysis

Non-parametric rank-based statistics were used for all statistical analyses because the data did not appear to be normally distributed [14]. Mann-Whitney tests were used to test for between-group differences in prior clinical experience of residents, as well as baseline (pre-intervention) self-confidence scores and knowledge-based scores, to ensure that there were no significant baseline group differences after randomization. Wilcoxon tests were used to evaluate for a difference in pre- and post-intervention for all residents, regardless

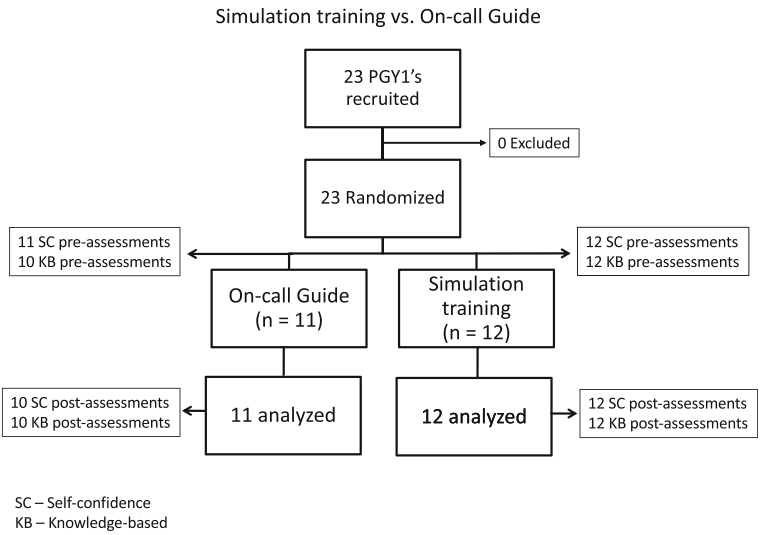

Fig. 1 Flow diagram of resident progress through guide and simulation interventions. SC – Self-confidence. KB – Knowledge-based

of intervention type. Wilcoxon test was also used to test for an effect of each intervention type (simulation or guidebook) individually on longitudinal change (difference between pre- and post-intervention) in confidence assessments and knowledge-based assessments. Mann-Whitney tests were then used to test the between-group differences in improvement (difference between pre- and post-intervention) on both assessments. Some residents (n = 3) mistakenly completed their pre-assessments twice; therefore, the mean was calculated between the two assessments and was used as the final score. One resident in the guide group did not complete a pre-intervention knowledge assessment or post-assessment, so that resident's score was counted as a zero value. Even when using alternative statistical analysis methods that excluded residents with missing data, similar robust results were obtained. The results were also robust to an alternative procedure where residents with missing data were excluded from the analyses. All p values were reported from two-tailed tests, with the threshold for statistical significance set at $p = 0.05$. Statistical analyses were conducted using Prisma GraphPad™ software.

Results

Subjective Self-Confidence Assessments

There were no statistically significant between-group differences in the mean number of months that residents had on psychiatric rotations. There were also no statistically significant between-group differences found in baseline self-confidence, referenced in Table 1 (Guide median score = 3.83, Simulation median score = 2.83, W = 50.5, Mann-Whitney test, $p = 0.35$). All resident pooled data showed that all residents improved in self-confidence pre-and post- assessments (All median difference = 0.786, W = 161, Wilcoxon test $p = 0.0072$). The simulation intervention group improved to a greater extent between pre- and post- self-confidence assessments (Simulation median difference = 1.458, W = 78, Wilcoxon test, $p = 0.0005$) than that of the guide booklet group (Guide median difference = 0.333, W = 19, $p = 0.375$), which was not statistically significant improvement. When comparing the between-group differences in improvement (i.e. median difference between pre- and post-intervention), there was a statistically significant difference between the improvement observed in the simulation group than that of the guide group (Simulation median difference = 1.458, Guide median difference = 0.333, U = 18, Mann-Whitney test, $p = 0.002$) (Fig. 2).

Objective Knowledge-Based Assessments

There were no statistically significant between-group differences in baseline knowledge-based scores (Table 1). The guide group did not significantly improve in knowledge-

Table 1 Mann-Whitney test comparison of baseline assessment scores and prior psychiatry experience of post-graduate year 1 residents in both simulation and guide groups

Groups	N	Prior experience	P value	Self-confidence	P value	Knowledge	P value
Simulation	12	2.5		2.83		0.60	
Guide	11	2.0	0.72	3.83	0.35	0.61	0.72

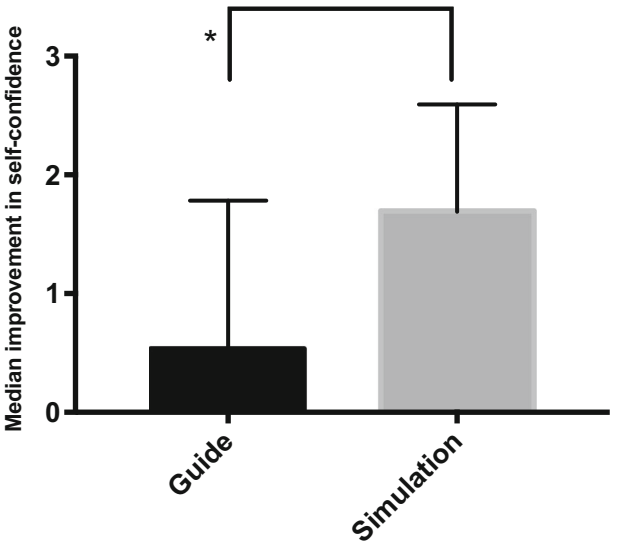

Fig. 2 Effectiveness of guide booklet compard to simulation on self-confidence measures between pre- and post-measures. Error bar represent the 95% confidence interval. Asterisks indicate signifcant differences between pre- and post-, *$p < .01$

based scores pre- to post-intervention (Guide median difference = .0333, W = 12, Wilcoxon test, $p = 0.638$). Residents in the simulation group had a statistically significant increase in their knowledge-based scores pre- to post-intervention (Simulation median difference = 0.135, W = 74, Wilcoxon test, $p = 0.0015$). When comparing the improvement (i.e. median difference between pre- and post- knowledge-based scores), there was a statistically significant difference between the improvement observed in the simulation group than that of the guide group (Simulation median improvement = 0.135, Guide median improvement = 0.021, U = 26, Mann-Whitney test $p = 0.0124$) (Fig. 3).

Discussion

Our results suggest that simulation-based training for resident physicians produced improvements in subjectively reported confidence as well as objectively measured knowledge as compared to residents who read an o*n-call psychiatry booklet.* The findings of this study suggest that utilizing simulation-based training is more effective teaching tool than a reading of a resident guide booklet as evidenced by greater improvements in confidence and knowledge.

The literature on simulation-based training in psychiatric education is very much in its infancy. Despite the limitations in the breadth of evidence, the extant literature does make a strong case for simulation training over other existing teaching methods. Additionally, this study was not time-consuming as all training sessions were approximately one hour and a half. The use of simulation may also encourage collaboration and collegiately among residents, nurses, and staff.

The feedback from residents who engaged in the simulated scenario was overwhelmingly positive. In particular, the real-time, one-on-one feedback was highly valued. Additionally, residents appreciated the simulated use of auxiliary staff and nursing as this mirrored their

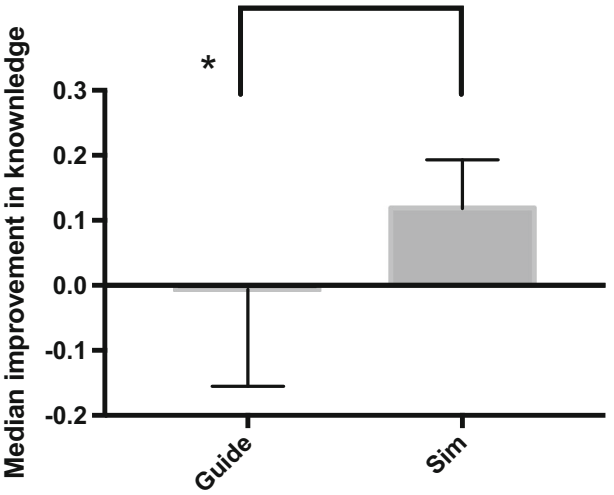

Fig. 3 Effectiveness of guide booklet compard to simulation on self-confidence measures between preand post-measures. Error bar represent the 95% confidence interval. Asterisks indicate signifcant differences between pre- and post-, $*p < .05$

daily experiences. Many residents suggested that more complex scenarios be offered. Residents also suggested that scenarios be completed alone, rather than with other residents, to assist in simulating real-life situations more closely.

There were several limitations to this study. This study did not do a thorough review of residents' prior experiences of managing acute agitation besides the number of months on psychiatric rotations. Other experiences may have affected residents' confidence level including reading articles or observing a senior physician. Staff that played the role of the standardized patient changed, so some characteristics of the patient presentation changed in accordance with the actor's individual style, which may have caused slightly compromised intervention fidelity.

Conclusion

Our study suggested that simulation training warrants implementation and evaluation in other scenarios and training programs. Future studies should compare simulation-based training to other teaching methods such as didactics, computer modules, or watching videos. Additionally, future research should be targeted at evaluating the longevity of knowledge and confidence gained throughout training.

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Compliance with Ethical Standards

Disclosure Statement On behalf of all authors, the corresponding author confirms that there are no conflicts of interest, including financial or personal, that impacted this study.

Ethical Considerations (e.g., IRB information, consent process, if applicable) The study was designated IRB exempt status by Yale University School of Medicine Institutional Review Board

Appendix 1

Table 2 Curriculum learning objectives for participating residents in the simulation-based trainin

Simulation learning objective	Associated ACGME competency
Residents will be able to assess the safety of the immediate situation of the patient, staff, and environment to call for security or back-up in a timely manner	IV.A.5.a) Patient Care and Procedural Skill IV.A.5.f) Systems-based Practice
Residents will be able to perform verbal de- escalation techniques	IV.A.5.a) Patient Care and Procedural Skill IV.A.5.d) Interpersonal and Communication Skills
Residents will be able to offer PO medication before administering IM medications	IV.A.5.a) Patient Care and Procedural Skill IV.A.5.c) Practice-based Learning and Improvement
Residents will be able to develop a differential diagnosis for the agitation and select appropriate pharmacologic sedation based on their differential diagnosis of the acute agitation (e.g. mania psychosis vs. personality substance use)	IV.A.5.b) Medical Knowledge
Residents will be able to know appropriate times to re-assess the effect of the pharmacologic intervention	IV.A.5.b) Medical Knowledge
Residents will be able to communicate with staff in a courteous and professional manner	IV.A.5.e) Professionalism IV.A.5.d) Interpersonal and Communication Skills

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