

## **Feasibility and Acceptability of a Resilience Training Program for Intensive Care Unit Nurses**

Meredith Mealer, David Conrad, John Evans, Karen Jooste, Janet Solyntjes, Barbara Rothbaum and Marc Moss

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# FEASIBILITY AND ACCEPTABILITY OF A RESILIENCE TRAINING PROGRAM FOR INTENSIVE CARE UNIT NURSES

By Meredith Mealer, PhD, David Conrad, LCSW, John Evans, MAT, MA, EdD, Karen Jooste, MD, Janet Solyntjes, MA, Barbara Rothbaum, PhD, and Marc Moss, MD

**Background** The critical nursing shortage is particularly apparent in specialty areas such as intensive care units (ICUs). Some nurses develop resilient coping strategies and adapt to stressful work experiences, mitigating the development of common maladaptive psychological symptoms.

**Objectives** To determine if a multimodal resilience training program for ICU nurses was feasible to perform and acceptable to the study participants.

**Methods** In a randomized and controlled 12-week intervention study, treatment and control groups completed demographic questions and measures of resilience, anxiety, depression, posttraumatic stress disorder (PTSD), and burnout syndrome before and after the intervention. The intervention included a 2-day educational workshop, written exposure sessions, event-triggered counseling sessions, mindfulness-based stress reduction exercises, and a protocolized aerobic exercise regimen. Nurses in the intervention arm also completed satisfaction surveys for each component of the intervention.

**Results** This multimodal resilience training program was feasible to conduct and acceptable to ICU nurses. Both nurses randomized to the treatment group and nurses randomized to the control group showed a significant decrease in PTSD symptom score after the intervention.

**Conclusions** A multifaceted resilience training program for ICU nurses was both feasible and acceptable. A sufficiently powered, randomized clinical trial is needed to assess the effect of the intervention on improving individuals' level of resilience and improving psychological outcomes such as symptoms of anxiety, depression, burnout syndrome, and PTSD. (*American Journal of Critical Care*. 2014;23:e97-e105)

**A** critical nursing shortage exists in the US health care system, particularly in specialty areas such as the intensive care unit (ICU).<sup>1,2</sup> The reasons for this national crisis are multifactorial, but 1 important component is the accelerated departure of nurses from their profession. Turnover, or lack of retention of qualified personnel in the job environment, occurs frequently in critical care nursing, with reported annual rates exceeding 25% to 60%.<sup>3</sup> Accordingly, reducing the ICU nurse turnover rate is a high priority for nursing and health care leaders.<sup>4</sup>

ICU nurses sometimes leave their profession because the ICU is a stressful place to work, with high patient mortality and morbidity, daily confrontations with ethical dilemmas, and a tension-charged atmosphere.<sup>5</sup> As a consequence, ICU nurses have an increased prevalence of psychological disorders such as anxiety, depression, burnout syndrome, and posttraumatic stress disorder (PTSD).<sup>6-8</sup>

Some nurses are able to develop resilient coping strategies and adapt to stressful work experiences in a positive manner. Resilience is a psychological characteristic that has been defined as a trait or capacity depending on the underlying theory adopted. Resilience can be learned and has also been recognized as one of the most important factors in successful adaptation following exposure to a traumatic event.<sup>9</sup> Specific factors that can promote resiliency include positive support systems, attention to physical well-being, and development of active coping skills.<sup>10</sup> Cognitive behavioral therapy bolsters modifiable resilient characteristics such as the ability to engage the support of others, optimism, faith, cognitive flexibility, and self-care. Self-care behaviors that promote coping with the physical and emotional consequences of stress include mindfulness-based stress reduction (MBSR),<sup>11,12</sup> expressive writing,<sup>13,14</sup>

and exercise.<sup>15</sup> For the present study, we incorporated these coping mechanisms into a multimodal resilience intervention. Although resilience training is widely recognized as an important intervention to promote satisfaction in work environments,<sup>16</sup> few evidence-based data are available that support the effectiveness of this training in the ICU work environment. The purpose of this pilot investigation was to determine if a multimodal resilience training program for ICU nurses was feasible to perform and acceptable to the study participants and to identify an effect size of the intervention and the prevalence of psychological disorders in persons who would volunteer to enroll in a clinical trial.

Some nurses are able to develop resilient coping strategies.

## Methods

### Study Population and Enrollment

This single-center, randomized, controlled study involved a 12-week intervention. ICU nurses were selected from an academic institution and were recruited from October 2012 to December 2012. Nurses were eligible to participate if they (1) were currently working 20 hours per week at the ICU bedside, (2) had no underlying medical condition that would be a contraindication to exercise, and (3) scored 82 or less on the Connor-Davidson Resilience Scale (CD-RISC). Nurses were excluded from participating if they (1) were unable to participate in a 2-day educational workshop or (2) had a medical condition that would limit exercise.

Written informed consent was obtained from all participants. This study was approved by the Colorado Multiple Institutional Review Board.

**Measures.** Basic demographic information was collected from each study participant: sex, age, marital status, race, and ethnicity. Work-specific demographics were collected, and the following questionnaires were completed.

1. The Connor-Davidson Resilience Scale (CD-RISC) was developed as a short self-report assessment

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to quantify resilience and as a clinical measure to assess treatment response. It is a 25-item self-report scale with a total score from 0 to 100. Higher scores reflect greater resilience. A score of 82 or greater is defined as a positive score for being resilient.<sup>17</sup> The CD-RISC has been extensively used in community samples, primary care outpatients, general psychiatric outpatients, a clinical trial of generalized anxiety disorder, and 2 clinical trials of PTSD.<sup>8,17</sup> The CD-RISC maintains excellent reliability (Cronbach  $\alpha$ , 0.89) and a test-retest reliability correlation of 0.87.<sup>17</sup>

2. The Posttraumatic Diagnostic Scale (PDS) is a self-report tool that yields both a PTSD diagnosis according to criteria from the *Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition)* and a measure of the severity of PTSD symptoms. Although the gold standard for diagnosing PTSD is the clinician-administered PTSD scale, the PDS is highly correlated with the clinician-rated measures for diagnosing PTSD.<sup>18-20</sup> The PDS is a well-accepted and validated survey instrument for diagnosing PTSD<sup>7,18</sup> that has a high internal consistency reliability (Cronbach  $\alpha$  range, 0.78-0.92). In addition, test-retest reliability coefficients of the total PDS score demonstrated satisfactory reliability: 0.83 for total symptom severity, 0.77 for re-experiencing, 0.81 for avoidance, and 0.85 for arousal.<sup>7,18</sup>

3. The Hospital Anxiety and Depression Scale (HADS) is a 14-item self-report screening scale originally developed to indicate the possible presence of anxiety and depression states in the setting of a medical, nonpsychiatric outpatient clinic. HADS consists of a 7-item anxiety subscale and a 7-item depression subscale. A score of 8 or greater indicates a person with a history of anxiety and/or depression.<sup>7,21,22</sup> The HADS has been extensively studied with respect to its validity for identifying anxiety and depression disorders in a variety of populations including the general population, general practice, and psychiatric patients.<sup>7,21,22</sup> The HADS is a reliable tool with a Cronbach  $\alpha$  by subscale of 0.83 for anxiety and 0.82 for depression.<sup>22</sup>

4. The Maslach Burnout Inventory (MBI) is a 22-item self-report questionnaire consisting of 3 independently scored dimensions (emotional exhaustion, depersonalization, and a reduced sense of personal accomplishment).<sup>8,23,24</sup> For this investigation, we scored participants as having moderate to high levels of burnout syndrome with the following values: emotional exhaustion score greater than 17, depersonalization score greater than 7, and reduced

sense of personal accomplishment score less than 3<sup>18,25</sup> (MBI-Human Services Survey, ©1986 by CPP, Inc). The MBI is an instrument that measures burnout in the health professional environment. This instrument has been extensively tested for reliability, validity, and internal consistency. Previous reported values for Cronbach coefficient  $\alpha$  have been from 0.71 to 0.90.<sup>23,26,27</sup>

5. The Client/Patient Satisfaction Questionnaire-8 (CSQ-8) is an 8-item measure of satisfaction that is rated on a 4-point Likert scale, with higher scores indicating greater satisfaction.<sup>28</sup> The CSQ-8 has good test-retest reliability, internal consistency, and sensitivity to treatment.<sup>29</sup>

Participants in the control arm and the intervention arm were asked to complete questionnaires before and after the intervention. The CD-RISC, PDS, HADS, and MBI were completed by both groups before the intervention started and within 1 week after the intervention ended. Additionally, the intervention group completed the CSQ-8 for each of the 5 components of the intervention (described later).

## Description of Intervention

An honest broker was used to ensure that participants' responses remained anonymous. The honest broker was not part of the study team, assigned unique identification numbers to participants, and then linked individual participants' information with those identification numbers.

All data were entered into the REDCap data management system<sup>30</sup> by using unique study identification numbers so that study personnel remained blinded to the identity of the participants.

## Intervention Arm

**Two-Day Educational Workshop.** The 2-day educational workshop included an introduction to resilience training<sup>31</sup> and the types of psychological distress experienced in the ICU. Self-care topics and cognitive behavioral therapy were introduced. A MBSR expert conducted two 2-hour guided mindfulness exercise sessions and provided guided compact discs for use during the 12-week intervention. Finally, expressive writing experts conducted a 4-hour introduction to written exposure that served as a guide for the written exposure sessions that would occur during the 12-week program.

**Written Exposure Therapy.** The writing sessions were led by expressive writing experts who were trained in motivational interviewing and resilience. Participants were given weekly writing prompts based on Pennebaker's expressive writing framework<sup>32</sup> and the written exposure therapy protocol developed by

The 12-week intervention included a 2-day educational workshop.

Sloan and colleagues.<sup>14</sup> Participants were asked to write twelve 30-minute sessions based on the e-mailed prompts that were delivered by our writing experts. The writing sessions included topics such as challenges faced at work, feeling incapacitated, feeling conflicted, and ruminating about sensitive topics. The writing experts would provide feedback to each participant that would encourage resilience building.

**MBSR Practices.** Stress-reduction techniques that were based on mindfulness were introduced and practiced during the 2-day educational workshop. The techniques used for this study included the body scan and sitting meditation. The techniques were demonstrated by an experienced professional who was formally trained in MBSR. Participants were also given a guided compact disc (a step-by-step audio guide of the MBSR techniques) to assist with the techniques when they returned home. Each participant was asked to practice these techniques for 15 minutes at least 3 times per week during the 12-week intervention period. The actual length of time spent practicing these techniques was entered into an electronic diary in the REDCap database.

**Exercise.** A 3-month membership to the institution's wellness center was provided at no cost to all participants, or the participant could choose to use a personal gym. We asked participants to engage in 30 to 45 minutes of aerobic exercise at least 3 days per week, and the time spent exercising was entered into the database. Exercising by using the treadmill, elliptical machine, stair climbing, stationary bicycle, or rowing machine was suggested.

**Event-Triggered Counseling Sessions.** Each ICU nurse was asked to participate in an event-triggered cognitive behavioral therapy session with an experienced licensed clinical social worker trained in traumatic stress and working with a variety of health care professionals. The events that triggered these therapy sessions included a patient's death, participating in end-of-life family discussions, performing cardiopulmonary resuscitation, performing futile care with a terminal patient, caring for a patient with massive bleeding, or caring for a patient with traumatic injuries. Each therapy session lasted approximately 30 to 60 minutes and used a cognitive behavioral approach to challenge negative thoughts and promote resilience through cognitive flexibility and restructuring. The counselor did not record any of the content discussed during these sessions but provided the honest broker with the participant's name and number of sessions attended during the 12-week intervention. The honest broker entered the number of sessions into the REDCap database by using the participant's unique study identification number.

## Control Arm

No interventions were associated with the control arm. However, we did ask for each participant to enter the amount of time spent exercising per week into the REDCap database. We elected to have a control arm to identify the effect size of the intervention and the prevalence of psychological disorders in persons who would enroll in a randomized clinical trial.

## Statistical Analysis

Descriptive statistics, including means and standard deviations or frequency distributions, were produced for the entire cohort and for the individual treatment and control arms of the study. For the analysis of the expressive writing sessions, an interpretive qualitative approach was used by grouping the writing examples into themes and into larger categories or major domains, by using a deductive coding framework. Missing items on scales were inferred by using the mean of the remaining items on the scale.<sup>33</sup> Univariate analysis between patients assigned to the treatment and control arms of the study was done by using the Wilcoxon rank sum test for continuous variables that were not normally distributed. Categorical variables were compared by using the  $\chi^2$  test. To determine the effect of the intervention, a repeated measure pretest-posttest analysis was conducted. SAS was used for all analyses and *P* less than .05 was considered statistically significant. Because the intent was to determine feasibility and acceptability, our recruitment was not based on a power calculation.

Four ICU nurses were excluded because they were scored as being resilient.

## Results

We found 33 eligible ICU nurses who were interested in participating in the trial and provided informed consent. Four of these ICU nurses were subsequently excluded because they were scored as being resilient on the CD-RISC. Of the 29 remaining ICU nurses, 14 were randomized to the intervention arm and 15 were randomized to the control arm. Two participants withdrew from the study before the start of the 12-week training period: 1 from the intervention arm and 1 from the control arm. Therefore, 27 participants participated in the 12-week trial (intervention arm, *n* = 13; control arm, *n* = 14). The demographic characteristics of the enrolled ICU nurses are summarized in Table 1. These 27 ICU nurses represented the medical, surgical, burn, and cardiac ICUs.

**Table 1**  
Demographics of the 27 participants in the study

Category	Intervention group (n = 13)	Control group (n = 14)
Sex, %		
Female	92	86
Marital status, %		
Single	42	50
Race, %		
White	100	100
Children, %		
Yes	25	14
Years practicing in intensive care unit, mean (SD)	4.88 (4.16)	5.81 (7.36)
Highest nursing degree, %		
Bachelor's	100	100

The prestudy questionnaires demonstrated that 100% of the ICU nurses (n = 27) were positive for symptoms of anxiety (HADS score  $\geq 8$ ) and 77% were positive for symptoms of depression (HADS score  $\geq 8$ ). These are accepted and validated cut points that have been commonly used in the medical literature.<sup>21,22</sup> There was a high rate of burnout syndrome: 81% were positive for emotional exhaustion, 77% were positive for depersonalization, and 77% were positive for a decrease in personal accomplishment. The median CD-RISC resilience score was 73

(range, 67-77), and 44% of the ICU nurses met the diagnostic criteria for PTSD. Measures of PTSD, burnout syndrome, resiliency, and symptoms of anxiety or depression did not differ significantly between the 2 groups (see Table 2).

### Feasibility and Acceptability

The intervention was successfully implemented in the treatment arm with 100% attendance at the 2-day workshop, 100% of the participants completing all of their weekly written exposure sessions (12 writing sessions per participant), 88% of the expected exercise sessions completed with a mean of 210 (95% CI, 177-244) minutes of exercise per week. In comparison, only 42% of the control group exercised at least 3 times a week. Overall, 66% of the MBSR sessions were completed with a mean of 65 (95% CI, 59-65) minutes per week. Finally, each participant attended a mean of 2 event-triggered cognitive behavioral therapy sessions, and only 2 participants did not require an event-triggered session.

No participants dropped out of the study. The level of satisfaction with each component of the intervention was high, as evidenced by the mean scores on the client satisfaction measure: 25.15 (SD, 4.62; range, 15-32) for the 2-day workshop, 22.62 (SD, 8.08; range, 11-32) for the written exposure therapy sessions, 28.23 (SD, 4.30; range, 20-32) for the exercise regimen, and 24.46 (SD, 5.36; range, 15-32)

**Table 2**  
Repeated measures before and after the intervention

Category	Intervention group (n = 13)			Control group (n = 14)		
	Before	After	P	Before	After	P
HADS: anxiety scores, median score (25th-75th quartiles)	12 (10-13)	12 (10-13)	.62	11 (10-12)	11 (10-12)	.87
Positive for symptoms of anxiety on HADS, %	100	100		100	92	
HADS: depression scores, median score (25th-75th quartiles)	10 (8-13)	9.0 (7-10)	.03	10.0 (9-11)	9.0 (8-11)	.06
Positive for symptoms of depression on HADS, %	69	54		85	69	
MBI: emotional exhaustion, median score (25th-75th quartiles)	9 (5-16)	13.0 (8-28)	.14	10.0 (7-15)	25.0 (13-28)	.51
Positive for emotional exhaustion, %	69	38		92	69	
MBI: depersonalization, median score (25th-75th quartiles)	12.0 (7-13)	9 (5-16)	.09	12 (7-13)	10 (7-15)	.52
Positive for depersonalization, %	69	62		85	77	
MBI: lack of personal accomplishment, median score (25th-75th quartiles)	11 (10-13)	37 (30-42)	.61	12 (11-13)	32 (28-40)	.31
Positive for lack of personal accomplishment, %	77	69		77	69	
PTSD symptom score, median score (25th-75th quartiles)	11.0 (5-18)	2.0 (3-10)	.01	8.0 (4-16)	7.0 (3-10)	.02
CD-RISC, median score	71	78	.05	72	79	.03

Abbreviations: CD-RISC, Connor-Davidson Resilience Scale; HADS, Hospital Anxiety and Depression Scale; MBI, Maslach Burnout Inventory; PTSD, posttraumatic stress disorder.

for the event-triggered counseling sessions. The Likert scores concerning the acceptability of each of the individual components are displayed in Table 3.

Four main themes were identified in the written exposure sessions: patient centric (death and dying, justice, interactions with patient and family), cognitive processing (rumination, guilt, and regret), work structure (understaffing, cumulative stress), and workplace relationships (conflict with peers, personal and professional boundaries). Table 4 includes exemplars related to each theme.

A repeated-measure analysis was conducted after the 12-week intervention period was over. Nurses in the intervention group had a significant reduction in symptoms of depression ( $P = .03$ ) when compared with nurses assigned to the control arm of the study. Both the intervention arm and the control arm had a significant reduction in PTSD

**Table 3**  
Satisfaction with intervention<sup>a</sup>

Category	Likert score, mean (range)			
	Introductory session	Counseling	Writing	Exercise
Would you <i>recom-</i> <i>mend</i> this training to another nurse?	4 (3-4)	3 (3-4)	4 (2-4)	4 (3-4)
How <i>satisfied</i> are you with the instruction that you received?	3 (3-4)	3 (3-4)	4 (2-4)	4 (3-4)
Did the training help you <i>deal more effec-</i> <i>tively</i> with work?	3 (3-4)	3 (2-4)	3 (1-4)	4 (3-4)
Overall, general <i>satisfaction</i> with this training.	3 (3-4)	3 (3-4)	3 (1-4)	4 (3-4)

<sup>a</sup> Scored on a Likert scale of 1 to 4: 4 = excellent, 3 = good, 2 = fair, 1 = poor.

**Table 4**  
Exemplars from written exposure sessions

Themes (subthemes)	Exemplars
Patient-centric (death and dying, justice/fairness, futility, interactions with patients and family members)	"...for all of our hard work and physical and emotional investment to our patients—many, many of them really are never expected to walk out our doors. We try and try because it is what's honorable, 'right,' and gives the family peace, but we're never really expected to be successful. I think that we feel like failures when our patients die, but in truth death is the expected outcome for so many of them."
Cognitive processing (rumination, guilt, and regret)	"I feel that I am usually a very calm, easy-going person but when it comes to having someone judge me or look down on me for any reason I get this terrible feeling in my gut and just want to crawl into a hole until it is all taken care of. I have actually started looking into other jobs because I don't want to be in this situation ever again. I just keep reminding myself that I am human and I make mistakes no one is harmed by this error and if it was really a big deal someone would be talking to me about it."
Work structures (understaffing, schedules, shifts, cumulative stress)	"The last 2 days have been hell. We've been short-staffed for months and somehow the help is in the works. I haven't seen extra hands or new hires yet, but what I have seen every night is the text message saying that the unit needs 2, 3 ICU nurses today, tonight, this weekend . . . When do we as a unit get to say, 'these beds are closed until you can provide the staffing for them' . . . the night shift is slowly killing me. I struggle to stay awake on my drive home that first night . . . I've usually been up for close to 30 hours, and then sleep for 4-5 and then back again. My husband worries about me. He says I'm cranky but rightly so, but worries about my health. We know that night work increases many health risks, and this coupled with the stress of the combative patient, the death and dying patient . . . I continually struggle with the question of 'is it worth it?' The abuse my body is taking both mentally and physically . . . am I doing harm to myself?"
Workplace relationships (conflicts with co-workers, medical staff, personal and professional boundaries)	"A co-worker recently became a full-time charge nurse and does our schedule. Now her ego is so big that I can't stand it . . . it causes much angst when I work with her. I feel like she is hunting for things to get me in trouble over. Our jobs are hard enough . . . we need to be supportive of each other. Not a bunch of hens."  "I was ready to discuss and implement our typical list of heart failure interventions . . . the intern said he would think about it and talk with his resident. The resident didn't come back. At this point, I started to wonder what was going on with the medical staff. I work with these people intimately. I know they are excellent. Why was this man so mismanaged?"

symptoms (treatment  $P = .01$ ; control  $P = .02$ ) and improved resilience scores (treatment  $P = .05$ ; control  $P = .03$ ; Table 2).

An informal review of this multimodal intervention by the ICU nurses randomized to the intervention arm highlighted several important concerns that will be used to modify the intervention for a larger randomized controlled trial. First, the 2-day educational workshop was thought to be too long and would have been better received if the training had been condensed into a 1-day session. Although participants thought that the introductory session was too long, they also thought that the content was important but wanted the information spread out over several sessions. Second, the nurses thought it

was important to have a supportive professional network and recommended having short, monthly booster sessions throughout the course of the study. Third, the written exposure assignments were too closely spaced together. The participants also would have preferred to write only about traumatic work experiences instead of both professional and personal experiences.

Fourth, several participants arranged to meet as a group to perform their mindfulness training. They reported perceiving a benefit to performing the mindfulness sessions collectively. Finally, the participants preferred to have scheduled counseling sessions instead of waiting for a specific event that triggered the sessions. It was thought that scheduling the sessions in advance would help ensure that sufficient time was reserved for the session.

## Discussion

We have described a multimodal intervention to promote resilience in ICU nurses. The results of our study indicate that the resilience training program is both feasible and acceptable to ICU nurses.

This is the first intervention, in ICU nurses, that has adopted specific coping mechanisms and cognitive behavioral therapy as a multifaceted approach to teaching resilience. The specific components of the intervention were chosen on the basis of evidence supported in the literature,<sup>12,34,35</sup> and from our qualitative assessments of resilient ICU nurses.<sup>10</sup> Resilience can be strengthened and taught through cognitive flexibility, learning to be adept at facing fear, developing active coping skills, having a supportive social network, exercising, and having a sense of humor.<sup>35</sup>

Writing about traumatic and stressful events has been associated with improved physical and

mental health.<sup>13,35</sup> Additionally, written exposure therapy significantly reduces symptoms of PTSD by emphasizing the importance of confronting traumatic memories instead of avoiding the memories.<sup>34</sup>

In ICU nursing, resilience is associated with a positive social network that includes communication, connectivity, and emotional support, which is attained through strong personal, family, and professional relationships.<sup>10</sup> The 2-day resilience training workshop allowed ICU nurses to meet and discuss similar problems related to trauma in the workplace. Informal feedback from participants suggested that it was comforting to learn that fellow nurses had similar reactions to traumatic experiences at work, and the group sessions made the nurses feel less isolated and more connected with their peers. Additionally, the event-triggered counseling sessions used cognitive behavioral therapy to reinforce existing personal and professional relationships and promote resilient strategies to overcome negative cognitive appraisal of work-related events that were viewed as traumatizing.

Finally, self-care and balance help maintain a healthy lifestyle by incorporating psychological, physical, and emotional mechanisms into daily practice.<sup>10</sup> Highly resilient ICU nurses have described healthy coping mechanisms that include exercise and engaging in spiritual resources to promote a balanced lifestyle.<sup>10</sup> The interventions adopted for this resilience training program included a fairly rigorous exercise component and MBSR practices. MBSR is used to develop enhanced awareness of "in-the-moment" experiences and reduces negative affect and improves coping<sup>12</sup> in persons with a variety of chronic health issues such as pain,<sup>36</sup> cancer,<sup>37</sup> anxiety disorders,<sup>38</sup> depression,<sup>38</sup> and situational stresses<sup>39</sup> such as the ICU work environment.

Reductions in symptoms of PTSD and increases in resilience scores were noted in the control group. These findings may be the result of a lack of treatment fidelity and intervention contamination in the control group as members of both treatment groups worked together in the ICU. Examining the potential role of assessment reactivity was important and will help inform a better designed and powered study. The alternative trial designs such as cluster randomization or a stepped-wedge design may be needed to control for assessment reactivity and treatment fidelity.<sup>40,41</sup>

Our study has several limitations. This was a pilot study to determine the feasibility and acceptability of incorporating a resilience training program for ICU nurses. The small sample size does not allow us to make generalizations to other institutions nor

Forty-four percent of the ICU nurses met the diagnostic criteria for posttraumatic stress disorder.

was the study sufficiently powered to reach statistical significance for changes in resilience scores or reductions in psychological symptoms. Future research is needed to address this issue. Second, the intervention may be too complex because it includes multiple components that could be quite time-consuming. However, our feasibility testing revealed that the intervention was implemented successfully and the multiple components have the potential to be tailored to the strengths and weaknesses of the individual nurse. Additionally, other interventions could perhaps be incorporated in a resilience training program with benefits equal to the interventions chosen for this study. However, on the basis of published reports and the acceptability of the intervention in this pilot study, we believe that the components of the intervention captures resilient strategies that are important for successful coping in the ICU work environment. The prevalence of PTSD in the study participants was high, perhaps because the participants with the most marked symptoms were more likely to self-select for the study. We also did not try to differentiate which component of the intervention was most effective. The overlap in some of the principles and techniques served to reinforce and enhance the multimodal program. Further studies are needed to identify methods to personalize the various interventions for specific ICU nurses. This training program was aimed toward promoting individual coping strategies as a mechanism to enhance resilience. We did not incorporate training on the basis of contextual work or environmental factors. However, study participants provided feedback that will be incorporated into a larger randomized trial. Another limitation is that we did not collect information after the 12-week program was completed to assess the extent to which participants had adopted aspects of the training program, nor did we assess what effect the training had on their thoughts about leaving the ICU or their satisfaction with their job. Finally, we did not investigate the potential impact of PTSD, anxiety, depression, or burnout syndrome on the ability to deliver reasonable patient care. Future research is needed to explore this potential association.

We developed a multifaceted resilience training program for ICU nurses that was both feasible to implement and acceptable to participants. Nurses in the intervention group had nonsignificant trends towards improvement in the presence of the emotional exhaustion component of burnout syndrome and a diagnosis of PTSD when compared with nurses assigned to the control arm of the study. In addition, nurses in the intervention group were more

likely to be resilient than were nurses assigned to the control arm of the study. A sufficiently powered, randomized clinical trial is needed to assess the effect of the intervention on improving individual nurses' level of resilience and psychological outcomes such as symptoms of anxiety, depression, burnout syndrome, and PTSD.

#### FINANCIAL DISCLOSURES

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