

Exploring the Effects of a Nurse-Initiated Diary Intervention on Post-Critical Care Posttraumatic Stress Disorder

Evidence shows collaborative diaries can reduce PTSD symptoms in this high-risk population.

People who experience a critical illness or injury and require hospitalization often find the experience traumatic. After coping with stays in critical care units, being subjected to invasive procedures and intensive monitoring, and facing the uncertainties of recovery, these patients may develop post-critical care posttraumatic stress disorder (PTSD). Indeed, one study found that patients admitted to the ICU for critical care were more than three times as likely to develop PTSD as those cared for outside the ICU.¹ Another study found that up to 64% of critical illness survivors developed PTSD-related symptoms.²

Symptoms of PTSD can include avoidance of trauma-related stimuli, intrusive memories or flashbacks, and hyperarousal and last more than one month after the traumatic event.³ The full diagnostic criteria can be found in the current *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) (see www.ptsd.va.gov/professional/treat/essentials/dsm5_ptsd.asp#one). Early detection and intervention are recommended to prevent long-term sequelae.^{4,5} The nurse-initiated diary intervention is emerging as one way to decrease the severity

of PTSD symptoms among survivors of critical illness hospitalizations.

BACKGROUND

The effects of trauma appear to be cumulative. In a study of military veterans and civilians, preexisting PTSD and previous trauma exposure were found to be risk factors for developing post-critical care PTSD.⁶ A recent meta-analysis found that up to 35% of veterans and military service members develop PTSD from a variety of traumatic experiences.⁷ In general, compared to their civilian counterparts, military personnel appear to be three times more likely to develop PTSD.⁸⁻¹⁰ They may also be at particularly high risk for post-critical care PTSD.

Left untreated, people with PTSD may develop further adverse consequences. Up to 80% of people diagnosed with PTSD also exhibit symptoms of other mental problems, including anxiety, depression, bipolar disorder, and substance abuse.^{3,11} Functional consequences of PTSD include occupational,¹² social,¹³ and physical disabilities.¹⁴ Such consequences further lead to increased health care utilization¹⁵ and higher economic costs.¹⁶

ABSTRACT

Background: Critical illness survivors may develop posttraumatic stress disorder (PTSD) following critical illness and hospitalization. Left untreated, PTSD may result in poor health outcomes.

Purpose: This study sought to examine the effects of a nurse-initiated diary intervention on PTSD development and symptom severity in critical illness survivors with varying levels of mentation.

Methods: The study used a pretest–posttest control group design. Patients who were hospitalized in a critical care unit for more than 24 hours were recruited at a single medical center with two such units. All participants completed a pretest on day 2 of critical care hospitalization; the intervention group participants also received a diary. All participants received a posttest one month after critical care discharge. The variables examined were PTSD severity and symptoms of avoidance, intrusion, and hyperarousal. Variables were measured using the Impact of Event Scale–Revised. Diaries were written by the patient, visitors, and interdisciplinary team members, and kept by the patient.

Results: A total of 134 participants completed the study. The intervention group participants experienced significantly fewer PTSD symptoms than the control group participants. PTSD was found to be of concern in 35 (26%) of all participants: five in the intervention group and 30 in the control group.

Conclusions: For critical illness survivors, a collaborative diary-writing intervention during hospitalization and after discharge can mitigate post–critical care PTSD. Participants who received diaries had a lower incidence of PTSD symptoms than controls; and at follow-up, they indicated that the diary intervention was worthwhile. We recommend the use of collaborative diary writing to help critical illness survivors in working through their experiences.

Keywords: critical care, diary, posttraumatic stress disorder, PTSD

Critical illness hospitalization is inherently stressful. Patients and family members may feel anxious and helpless, unable to understand or control the complexities of their illness and the intensive treatment they receive during hospitalization.¹⁷ Confusion and misunderstandings can occur because of psychological impairment caused by illness or sedation.^{18,19} Many patients experience disturbing memories and flashbacks, often hallucinatory or delusional in nature, specific to their time in intensive care.²⁰

Diaries have been used to reduce post–critical care PTSD symptoms in patients and family members.^{2,21} Studies among critical illness survivors have found that reading their diaries helps them to reflect, process, and recover from their time during hospitalization.^{22,23} These tools allow patients to use factual content to fill memory gaps and make sense of confusing recollections.^{24,25} Encouraging messages may help to improve both patients' and family members' view of the experience.²⁶

In previous research, diaries have been written by staff and family members for patients experiencing intubation and sedation during hospitalization.^{21,24,27-29} But intubated patients may account for only 21% to 39% of critical care admissions,³⁰ while sedated patients may account for about 45%.³¹ It's possible that other critical illness survivors could benefit from the keeping of diaries. To our knowledge, collaborative diary writing by *all*

stakeholders has not yet been investigated with regard to addressing PTSD among critical illness survivors.

Study purpose. The purpose of this study was to examine the effects of a nurse-initiated diary intervention on PTSD development and symptom severity in critical illness survivors with varying levels of mentation.

METHODS

Theoretical framework. This study was guided by the self-care deficit nursing theory, a theoretical framework created by Dorothea Orem.³² The theory focuses on the patient's ability to engage in self-care and on nursing support to address the patient's self-care deficits. Critically ill patients may have such deficits when the demands of self-care exceed the patients' ability to provide it for themselves. In this study, the diary is intended as a nurse-initiated intervention offering the support and agency needed to decrease patients' self-care deficits, thus reducing their risk of developing PTSD and helping to alleviate its symptoms.

Design and setting. The study used a pretest–posttest control group design. The setting was a 450-bed military level 2 trauma medical center in the Pacific region. At this facility, the critical care section (CCS) consists of two units, the progressive care unit (PCU) and the ICU. Patients include military service members, veterans, their dependents,

and area residents. Institutional review board approval was obtained from both the medical center and a university with which one author was affiliated.

Sample. Inclusion criteria were admission to the hospital's CCS for at least 24 hours; being 18 years of age or older; being able to read and understand English at an eighth-grade level; and having a Glasgow Coma Scale (GCS) score of 15 at time of enrollment and consent. Patients were excluded if they were not alert, oriented, or competent to provide consent, or if they had a current or past psychiatric history of suicide attempt, suicidal ideation, schizophrenia, or bipolar disorder. During their hospitalization, participants had varying mentation levels because of illness, medical necessity, or surgical intervention. Although the GCS has long been used to assess levels of consciousness, it's less clear how well it assesses mentation.³³ That said, we assessed mentation levels during hospitalization as follows: a GCS score of 15, alert³³; a score of 3 to 14 (with or without sedation), impaired.³⁴⁻³⁶

Using Cohen's method,³⁷ we calculated a required sample size of 128 participants, with 64 in the control group and 64 in the intervention group. To compensate for potential attrition, we recruited an additional 55 participants. Of the initial 550

potentially eligible patients, 367 were excluded: 187 did not meet inclusion criteria, 175 were unavailable for enrollment at the time of recruitment because of treatment or social activities, and five declined to participate. The final enrolled sample consisted of 183 participants admitted between December 13, 2017, and May 20, 2018. (For a flow diagram showing recruitment through follow-up, see Figure 1.)

Instrument. Overall PTSD severity and symptoms of avoidance, intrusion, and hyperarousal were evaluated using the Impact of Event Scale-Revised (IES-R). The IES-R contains 22 items that assess subjective distress after a traumatic event. For each item, the respondent uses a 5-point Likert scale, as follows: 0 = not at all; 1 = a little bit; 2 = moderately; 3 = quite a bit; and 4 = extremely.³⁸ Total possible scores range from 0 to 88. Although no clear cutoff has been established, total scores of 24 and higher are generally cause for concern.³⁹ Total scores have been used in prior studies to measure PTSD severity.^{40,41} Cronbach α has ranged from 0.79 to 0.92, indicating the IES-R is a reliable tool.³⁸

Protocol. After providing informed consent, participants were randomized as follows: a coin toss determined whether the first participant would be from the PCU or the ICU. A second coin toss ran-

Figure 1. Flow Diagram of Recruitment Through Follow-Up

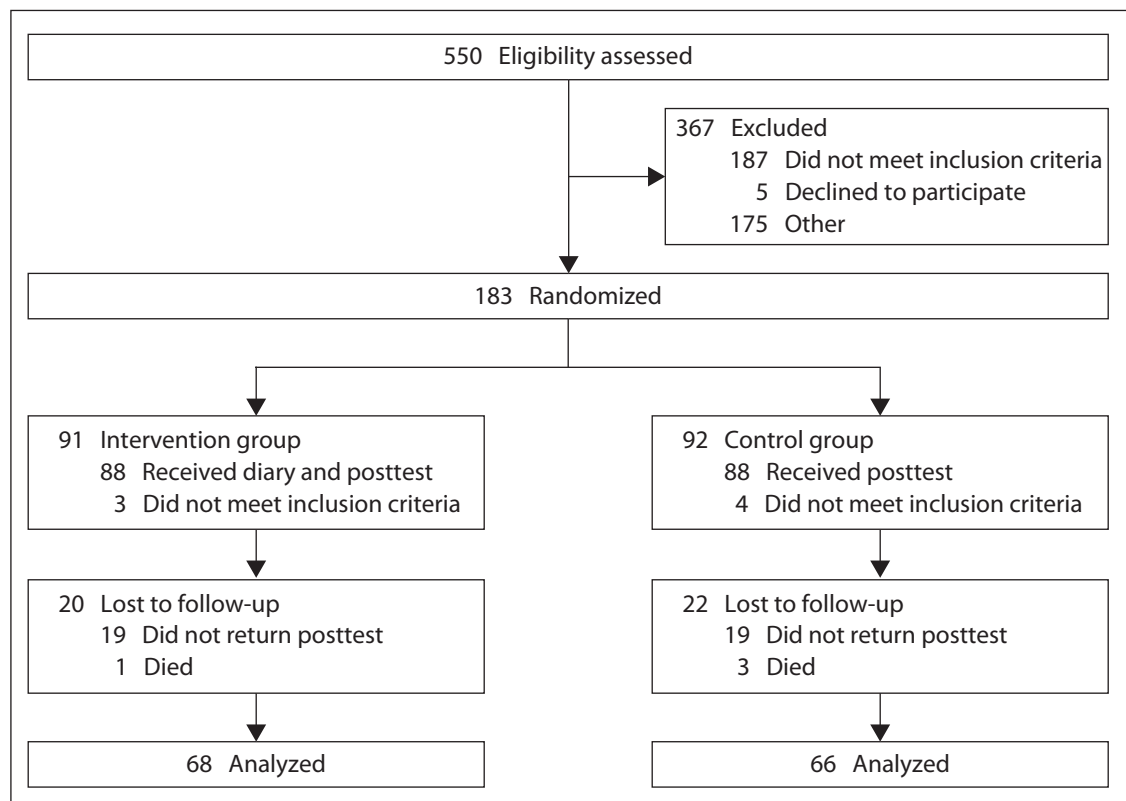
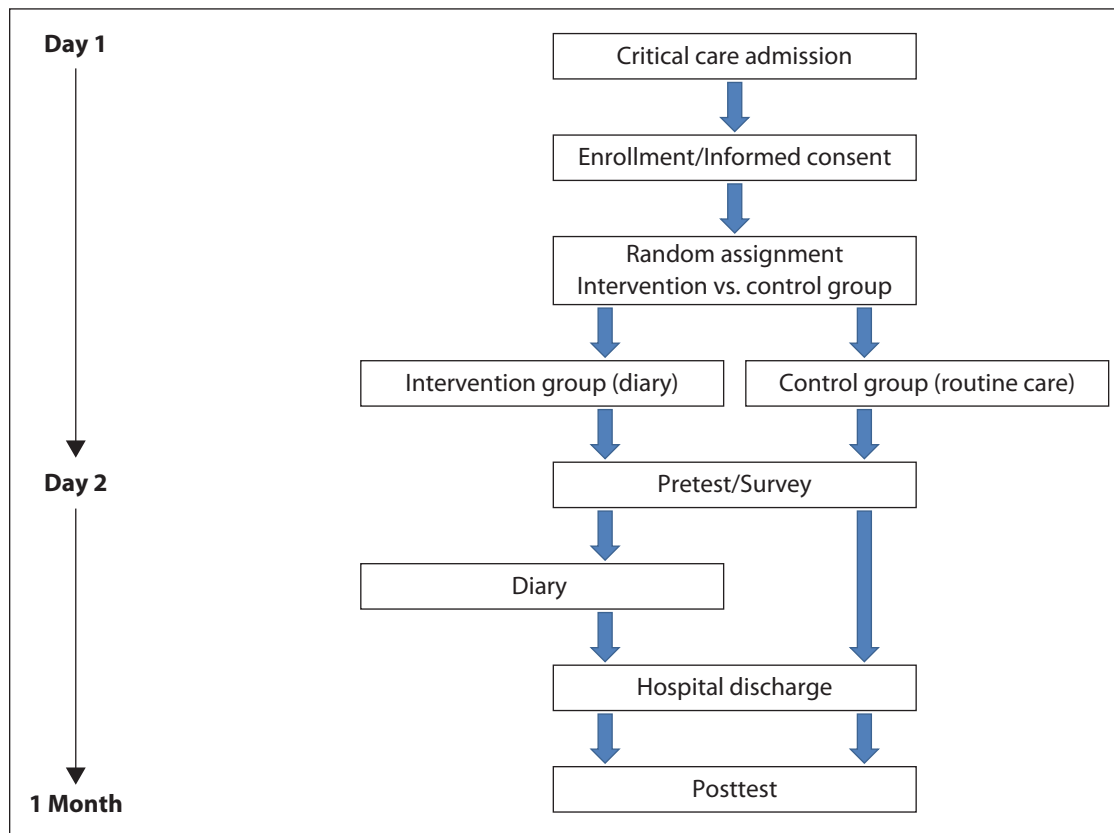


Figure 2. Flow Diagram of the Protocol Process



There were three time periods in the protocol. On day 1, a subject was admitted, enrolled, asked for informed consent, and randomized to either the intervention or the control group. On day 2, the subject completed the pretest IES-R and a demographic survey. All participants received routine care; intervention group subjects also received a diary. Hospital discharge preceded the posttest, which was completed one month later.

domized that participant into the intervention or control group. To establish equal groups, a block sampling system was followed, such that 92 participants were assigned to the control group and 91 to the intervention group.

On the day after admission, all participants completed a hard-copy pretest IES-R. An additional four control group and three intervention group participants were found not to meet inclusion criteria, leaving 88 in each group. All participants received routine care; the intervention group participants also received a diary. Depending on personal preference, at one month after discharge, participants received a posttest as either an online survey or a hard copy mailed to their home. Twenty-two control group and 20 intervention group participants were lost to follow-up. This included three control group and one intervention group deaths and 19 participants in each group who did not return the posttest. Thus, a total of 134 participants—66 control group and 68 intervention group participants—

completed the study. (For a flow diagram showing the protocol process, see Figure 2.)

Intervention. Each intervention group participant received a diary that consisted of a folder with metal fasteners and attached loose paper. To promote confidentiality and encourage participation without fear of judgment, diaries were made the property of the participant. Individual pages could be inserted or removed at the patient's will. Each diary contained standardized education material on the hospital, the critical care unit, the patient's illness, and the treatment plan. The diary also contained copies of the initial invitation letter containing information about the study, the study consent form, and diary guidelines.

Diaries were written by the patient participants, family members and other visitors, and interdisciplinary team members. The diary guidelines indicated who could make entries, asked that date and time be included; and cautioned against writing confidential information or using medical jargon

Diary Guidelines

The diary is a folder in which the patient, family, visitors, and health care personnel can write or provide generic pictures.

Please provide the following:

1. Date and time of entries.
2. For health care personnel, identify your role (for example, nurse, doctor, respiratory therapist, dietician, pharmacist, physical therapist).
3. Visitors can provide their names.
4. Please use nonmedical terminology, avoiding jargon and using common words an eighth grader would understand.
5. Examples of content are events, observations, well wishes.
6. The patient may write about feelings, thoughts, memories.
7. Avoid writing confidential information.

(see *Diary Guidelines*). It was suggested that writers use nonmedical terminology and language at the eighth-grade level. Participants were asked to write about their thoughts, feelings, and memories. Visitors and interdisciplinary team members were encouraged to include their observations, events, and well wishes. Visitors were asked to provide their names, whereas interdisciplinary team members were asked to identify themselves by their role or specialty.

Participants who received diaries had a lower incidence of PTSD symptoms than controls.

The principal investigator (one of us, LT) provided education on the diaries' purpose and use to interdisciplinary team members before the start of the study and to participants and visitors upon receipt of the diary. Further education was provided by the principal investigator and nursing staff during the course of the study to those involved, as needed.

To identify which participants had diaries, a magnet with the word "Diary" was placed outside each intervention group participant's room next to their name. An order was placed in the participant's electronic health record that stated, "Please

write in the patient's diary." Diaries were placed at the participant's bedside. Legal concerns were addressed by asking interdisciplinary team members to avoid writing their names and any confidential information.

Data analysis was conducted using IBM SPSS Statistics for Windows, Version 25. Nonparametric statistics were used in analyzing demographic information to ensure there were no significant variances between participants who completed the study and those lost to follow-up, and between the control group and intervention group participants. We used logistic regression and χ^2 tests to analyze the relationships between the independent variable (diary writing) and the dependent variables (PTSD severity and symptoms of avoidance, intrusion, and hyperarousal).

RESULTS

Sample. Of the 134 participants who completed the study, 69% were male and 31% were female. The mean age was 61 years. Regarding race and ethnicity, nearly half were white (45%), with Asians (18%) and Pacific Islanders (16%) the next most represented groups. Nearly two-thirds were married (64%) and half were retired (52%). More than half (54%) were veterans, 16% were military personnel, and 30% were dependents. There were no civilians.

There were no within-group differences between participants who completed the study and those lost to follow-up, with the exception of age. Younger people were significantly more likely to drop out of the study. In particular, participants ages 18 to 29 had the highest attrition rate (48%), while those ages 65 and older had the lowest (15%). No differences were found between the control and intervention groups, with the exception of length of stay. Control group participants were hospitalized for significantly longer than intervention group participants, with mean lengths of stay of 15 and seven days, respectively. Using logistic regression, length of stay was not found to be a covariate for avoidance, intrusion, hyperarousal, or PTSD severity. For more details on demographic characteristics, see Table 1.

PTSD symptoms and severity. Pretest scores were similar for participants in the control and intervention groups (see Table 2^{40, 42, 43}). The Wilcoxon signed rank test was used for paired analyses to compare the pretest and posttest results. For the control group, posttest scores were significantly higher than pretest scores; for the intervention group, posttest scores were significantly lower than pretest scores. Using logistic regression, we found significant differences in posttest scores between the control and intervention groups with regard to avoidance ($\chi^2 = 28.05$), intrusion ($\chi^2 = 38.83$), hyperarousal ($\chi^2 = 14.17$), and PTSD severity ($\chi^2 = 28.89$). Additionally, χ^2 tests were used to further

Table 1. Demographic Characteristics

Characteristics	Total, n (%) (N = 134)	Control Group, n (%) (n = 66)	Intervention Group, n (%) (n = 68)
Sex			
Male	92 (69)	48 (73)	44 (65)
Female	42 (31)	18 (27)	24 (35)
Age in years			
18–29	13 (10)	2 (3)	11 (16)
30–39	12 (9)	5 (8)	7 (10)
40–49	10 (8)	6 (9)	4 (6)
50–64	39 (29)	20 (30)	19 (28)
65 and older	60 (45)	33 (50)	27 (40)
Ethnicity			
Caucasian	60 (45)	24 (36)	36 (53)
African American	7 (5)	2 (3)	5 (7)
Hispanic	4 (3)	1 (2)	3 (4)
Pacific Islander	21 (16)	10 (15)	11 (16)
Asian	24 (18)	18 (27)	6 (9)
Other	18 (13)	11 (17)	7 (10)
Marital status			
Single	20 (15)	11 (17)	9 (13)
Married	86 (64)	39 (59)	47 (69)
Divorced	18 (13)	10 (15)	8 (12)
Widowed	10 (8)	6 (9)	4 (6)
Patient category			
Military service member	21 (16)	9 (14)	12 (18)
Veteran	73 (54)	38 (58)	35 (51)
Dependent	40 (30)	19 (29)	21 (31)
Civilian	0 (0)	0 (0)	0 (0)
Highest education level attained			
GED/high school diploma or less	36 (27)	17 (26)	19 (28)
Some college	53 (40)	29 (44)	23 (34)
4-year degree	26 (19)	12 (18)	15 (22)
Graduate or professional degree	19 (14)	8 (12)	11 (16)
Employment status			
Full time	39 (29)	15 (23)	24 (35)
Part time	8 (6)	2 (3)	6 (9)
Unemployed	17 (13)	9 (14)	8 (12)
Retired	70 (52)	40 (61)	30 (44)
Household income per year			
< \$30,000	30 (22)	16 (24)	14 (21)
\$30,000–\$49,999	22 (16)	10 (15)	12 (18)
\$50,000–\$74,999	32 (24)	18 (27)	14 (21)
\$75,000–\$99,999	18 (13)	6 (9)	12 (18)
\$100,000–\$150,000	17 (13)	11 (17)	6 (9)
> \$150,000	15 (11)	5 (8)	10 (15)

GED = general education diploma.

Note: Percentages may not sum to 100% because of rounding.

Table 2. Pretest and Posttest Comparison Between Control and Intervention Groups

	IES-R Score	
	Pretest, mean (SD)	Posttest, mean (SD)
Control group	15 (17.1)	23 (15.4)
Intervention group	14 (12.5)	10 (9.5)

IES-R = Impact of Event Scale–Revised; PTSD = posttraumatic stress disorder. IES-R total possible score range, 0–88. Total score \geq 24, concern for PTSD⁴²; total score \geq 33, possible PTSD diagnosis⁴⁰; total score \geq 37, possible physical impact (such as immune system suppression).⁴³

evaluate group differences in PTSD severity after dichotomizing for analysis using a cutoff score of 24. The difference between the two groups was significant ($\chi^2 = 23.26$). Clinical concern for PTSD was found in 35 (26%) of all participants, including five in the intervention group and 30 in the control group (see Table 3⁴²).

For the subscales of avoidance, intrusion, and hyperarousal, participant responses of between 1 and 4 indicated cause for clinical concern for these symptoms. Concern for avoidance was identified in 36 participants (27%), including eight intervention group and 28 control group participants. Concern for intrusion was found in 53 participants (40%), including 14 intervention group and 39 control group participants. Concern for hyperarousal was identified in 41 participants (31%), including eight intervention group and 33 control group participants.

Diary use. Posttest questions were posed to the intervention group participants aimed at determining their participation in reading or writing in the diary, the frequency of their diary entries, and whether they deemed the diary worthwhile, as well as soliciting feedback on diary use (see Table 4). Among the intervention group participants, PTSD severity scores were similar for those who indicated using the diary and those who indicated not using it. Reasons given for not using the diary included feeling fatigued, experiencing pain, being occupied with tests, and getting little sleep. Reported benefits of diary use included being able to share information, examine feelings, and record the progress of healing.

Only intervention group participants were given a posttest with a comment section for diary-related feedback. But both groups submitted comments about their experiences in the CCS. These comments

Table 3. Clinical Concerns for PTSD based on IES-R Scores

IES-R Score	Total, n (%) (N = 134)	Control Group, n (%) (n = 66)	Intervention Group, n (%) (n = 68)
Total			
< 24	99 (74)	36 (55)	63 (93)
\geq 24	35 (26)	30 (45)	5 (7)
Avoidance			
0	98 (73)	38 (58)	60 (88)
1–4	36 (27)	28 (42)	8 (12)
Intrusion			
0	81 (60)	27 (41)	54 (79)
1–4	53 (40)	39 (59)	14 (21)
Hyperarousal			
0	93 (69)	33 (50)	60 (88)
1–4	41 (31)	33 (50)	8 (12)

IES-R = Impact of Event Scale–Revised; PTSD = posttraumatic stress disorder. Total score \geq 24, concern for PTSD⁴²; subscale score 1–4, concern for PTSD symptoms of avoidance, intrusion, or hyperarousal.

showed that participants had varied perceptions of their stay, with some reporting positive experiences while others reported negative experiences.

DISCUSSION

The study findings indicated that critical illness survivors who received diaries had reduced PTSD symptoms compared with those who did not. This is similar to findings from other studies on this subject.^{2,28} Diaries can help people process what has happened to them. Critical illness survivors have reported that diaries kept by others were useful in helping them work through a traumatic hospitalization and improve their outlook on these experiences.⁴⁴ As noted earlier, the positive effects of reading one's diary can include reaching a better understanding of one's illness, clarifying hospital events, filling memory gaps, and receiving encouraging messages from visitors and caregivers.^{24,26}

Moreover, in our study, CCS patients themselves could potentially use the diary to write about their feelings and reflect on their experiences, even with a degree of impaired mentation or while feeling unwell. Some participants provided comments consistent with findings from previous studies on the benefits of diary use. Following are two examples:

The diary provides a method to record and examine feelings. For me, those feelings went from fear and helplessness to appreciation of trying to ensure that this [PTSD symptoms] never happens again.—Male veteran, white, age group 65 years and older

I can look back on my daily progress of healing. The diary helped me to keep track of those who helped in my recovery.—Female dependent, Asian, age group 50 to 64 years

Nurses can initiate and integrate collaborative diary writing both during hospitalization and after discharge. Doing so might improve patients' hospital stay and how they view their illness experience, thus decreasing or possibly preventing PTSD symptoms. Diaries are a feasible intervention. Entries can be written on anything available, such as loose paper, and stored in a simple notebook. The notebook could also be used to store educational materials given by the health care team. Because anyone—interdisciplinary team members, family members and other visitors, and the patients themselves—can write in the diary, it doesn't burden any specific group.

Areas for further research. Diaries stand to benefit all those involved, allowing them to express feelings, support one another, and improve communication.^{27,45} Their use has been shown to

Table 4. Intervention Group Diary Use (n = 68)

Diary Use	n (%)
Read or wrote in the diary	
Yes	53 (78)
No	15 (22)
No. of times wrote in the diary	
0	17 (25)
1–5	42 (62)
6–10	7 (10)
> 10	2 (3)
Was the diary worthwhile?	
Not at all	9 (13)
A little bit	39 (57)
Moderately	9 (13)
Quite a bit	6 (9)
Extremely	5 (7)

Note: Percentages may not sum to 100% because of rounding.

decrease PTSD among family members.²¹ Critical care staff, physicians, and nurses can also develop critical care–related PTSD.⁴⁶ In one study, inpatient oncology and palliative care nurses who kept a daily electronic diary reported decreased PTSD symptoms.⁴⁷ Additional research exploring the impact of diaries on PTSD among critical care providers is warranted.

In a study conducted with both military veterans and civilians, Patel and colleagues found that prior trauma exposure and preexisting PTSD were risk factors for post–critical care PTSD.⁶ Our study, conducted among current military service personnel, veterans, and civilians, found that preexisting PTSD was not a covariate. Participants with preexisting PTSD did not differ from participants without preexisting PTSD. This result might be explained by the use of the study instrument, the IES-R. The test instructions direct respondents to think about only one particular traumatic event—which in our study was the CCS hospitalization—when answering questions about PTSD symptoms. Previous trauma exposure was not evaluated. Future studies could explore whether critical care hospitalization aggravates preexisting PTSD and how diaries affect these patients.

In our study the results indicated that, compared with controls, intervention group participants had reduced PTSD symptoms. But 15 (22%) of the intervention group participants reported *not* using

the diary. Yet PTSD scores didn't differ among intervention group participants, whether they reported using the diary or not. We did not assess diary use by family members. It's possible that in some cases, even if the patient didn't write in the diary, family members did, and the patient read those entries, thus gaining some benefit. Moreover, intervention group participants who reported not using the diary still stated that it was beneficial. This could be a function of their experiencing enhanced support through entries by staff members and visitors, a finding consistent with prior research.²⁵ Reading the entries at a later date or simply discussing the diary verbally might have benefited these participants. Research indicates that social support can decrease the risk of post-critical care PTSD development.^{5,48} But our study did not include an assessment of participants' social support, and further studies might explore this.

Diaries can help people process what has happened to them.

As noted earlier, to promote confidentiality and encourage participation, diaries were made the property of the participant. Diary entries were not collected, either for data analysis or to verify diary use. Posttest questions were left open to participant interpretation and responses were not compared to diary content. Thus, it's possible that participants who reported not using the diary may have done so during hospitalization but not after discharge. It's also possible that participants who reported using the diary might have read but not written in it. Some qualitative studies have explored diary content.^{19,49} A mixed-methods research study might yield more information on the relationship between diary content and PTSD levels.

Other studies investigating the impact of diaries on post-critical care PTSD have involved patients who were sedated and ventilated.^{21,24,27-29} Our study was unique in that it focused on critical illness survivors who had varying levels of mentation during hospitalization. Within the intervention group, 42 patients were alert during their hospitalization while 24 were impaired or sedated during part of their stay. Yet most (93%) of these participants indicated having no concern for PTSD after receiving the intervention, suggesting that diaries could benefit both subgroups. This area warrants further investigation.

Lastly, diaries in other studies have been written by relatives and staff members, but not by the criti-

cally ill patients themselves.^{50,51} This study showed that collaborative diary writing, involving patients as well as others, can reduce PTSD severity and lessen symptoms. Research is needed to clarify how actively writing in one's diary, versus simply reading it, might influence these patients.

Limitations. First, because this study was conducted at one military medical center in the Pacific region, the results may not be generalizable. Additional studies conducted with participants from multiple sites and various types of facilities are needed. Second, although IES-R total scores reflecting PTSD severity have been used in previous studies,^{40,41} our use of subscale scores was not endorsed by the IES-R's creators and needs validation.^{38,39} Third, although we gave the intervention group participants the option of writing in their diaries, we didn't distinguish between those who may have simply read but not written in them. There may have been differences that did not emerge.

CONCLUSIONS

For critical illness survivors, a collaborative diary-writing intervention during hospitalization and after discharge can mitigate post-critical care PTSD. Participants who received diaries had a lower incidence of PTSD symptoms than controls, and at follow-up, they indicated that the diary intervention was worthwhile. We recommend the use of collaborative diary writing to help critical illness survivors in working through their experiences in order to decrease the severity of or prevent PTSD. By educating patients on the benefits of diary writing and encouraging their active participation, nurses can further promote diary use. More research in the aforementioned areas will aid in developing interventions tailored to specific populations, including providers. ▼

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