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### Recommended Citation

Guttormson, Jill L., “Releasing a Lot of Poisons from My Mind”: Patients' Delusional Memories of Intensive Care” (2014). *College of Nursing Faculty Research and Publications*. 350.  
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# “Releasing A Lot of Poisons from My Mind”: Patients' Delusional Memories of Intensive Care

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## Abstract

### Objectives

To describe intensive care unit (ICU) patients' delusional memories and interpretations of those memories.

### Background

Delusional memories of the ICU are distressing for patients and may impact psychological recovery.

## Methods

This is a secondary analysis from a study of mechanically ventilated patients' recall in relation to sedation. Subjects, recruited from one medical-surgical ICU, participated in structured interviews after extubation.

## Results

Subjects ( $n = 35$ ) with a mean age of 66 (SD 12.9) and on the ventilator a median of 4.5 days provided detailed descriptions of delusional memories of being shackled, caged, strangled, or being in a foreign country. Delusions were very real and frightening in the moment. Subjects had difficulty connecting to reality to allow processing of the delusions.

## Conclusions

Patients' delusional memories of ICU share common distressing themes. Assisting patients' to connect to real ICU events and process delusional memories may help with psychological recovery after critical illness.

## Keywords

Intensive care, Critical illness, Delusions, Memory, Hallucinations

## Abbreviations

ICU intensive care unit

MAAS Motor Activity Assessment Scale

PTSD post-traumatic stress disorder

## Introduction

Delusional or unreal memories of the intensive care unit (ICU) are common, occurring for 26–75% of patients after critical illness.<sup>1, 2, 3</sup> Patients report hallucinations,<sup>4, 5, 6, 7</sup> nightmares,<sup>4, 6, 7</sup> and disorientation.<sup>8, 9</sup> Delusional memories of hallucinations and nightmares are some of the most troubling for patients. Indeed, of patients recalling nightmares in ICU, 85–88% were bothered moderately to extremely by them<sup>10, 11</sup> and hallucinations were recalled as a source of discomfort by 32% of patients.<sup>12</sup>

Delusional memories of ICU are associated with an increased incidence of post-traumatic stress disorder (PTSD) symptoms,<sup>2, 13, 14</sup> anxiety,<sup>15</sup> and depression.<sup>15</sup> It has been proposed that the presence of factual memories may have some protective effect against the development of PTSD,<sup>2</sup> however this has not been consistent across other studies. In a study by Myhren et al<sup>16</sup> memories of pain and factual recall were independent predictors of PTSD symptoms. While memory of traumatic events—a mixture of real and delusional memories including respiratory distress, anxiety/panic, pain, and nightmares—have also been linked to increased PTSD.<sup>17</sup> The presence of delusional memories may suggest ICU delirium however, a systematic review found no relationship between delirium and PTSD.<sup>18</sup>

Delusional memories—nightmares, hallucinations, or dreams<sup>19</sup>—are common and may contribute to psychological morbidity after critical illness. The purpose of this study is to describe patients' delusional memories of ICU and patients' interpretations of those memories.

## Methods

This descriptive study is a secondary analysis of data from a study of the relationship between sedation and the mechanically ventilated patients' recall of the ICU.<sup>20</sup> Although not one of the primary aims of the overall study, delusional memories were some of the most frequent and detailed descriptions provided during interviews and therefore emerged as a part of the ICU experience that is of importance to patients.

### Setting and participants

A convenience sample of patients was enrolled over 18 months from a 24-bed medical-surgical ICU in a suburban community hospital in the Midwest United States. The unit was staffed 24/7 by university affiliated intensivists. Patient to registered nurse staffing ratios were 2:1 or 1:1. The unit utilized the Motor Activity Assessment Scale (MAAS)<sup>21</sup> however, no formal delirium assessment was in place on the unit at the time of data collection (2009–2010). Patients were eligible for the study if they were greater than 18 years old, spoke English, had an anticipated duration of mechanical ventilation greater than 24 h, and had no documented mental incompetence. Patients on a ventilator in a long-term care unit or at home prior to ICU admission were not eligible.

### Ethical considerations

All aspects of this study were approved by the principal investigator's University Institutional Review Board (IRB) which serves as the IRB for the primary study site and by the IRB for the acute care rehabilitation hospital where some post-ICU interviews were also conducted. If the initial study consent was obtained from a patient's proxy, the informed consent process was repeated with patients prior to the post-ICU interview.

### Data collection

Structured interviews, conducted with subjects after extubation and transfer from ICU, included the Intensive Care Experience Questionnaire (ICEQ),<sup>22</sup> the Intensive Care Unit Memory Tool (ICUM),<sup>23</sup> and follow-up questions related to patient comments during instrument completion. Interviews were conducted after ICU discharge either on the hospital ward or on a long term ventilator unit in a rehabilitation hospital. All interviews were recorded and transcribed. Sedative and analgesic medication received, level of arousal, and restraint use was abstracted from the medical record.

### Measures

#### *ICEQ*

The ICEQ provides a global evaluation of the subject's experience and consists of 24 items in four domains: awareness of surroundings, frequency of frightening experiences, recall of experience, and satisfaction with care. Items are closed questions with a 5-point Likert response indicating level of agreement (strongly disagree to strongly agree) or measuring frequency of an event (never to all of the time).<sup>24</sup> All items are scored on a 1 to 5 point scale.<sup>22</sup> Two individual ICEQ items were included in this analysis: frequency of seeing strange things and frequency of having bad dreams.

## ICUM

The ICUM asks patients to indicate yes or no to a twenty item checklist that includes factual memories, memories of feelings, and delusional memories. Items are scored as 0 (not remembered) or 1 (remembered).<sup>2, 23</sup> The delusional memories subscale was used for this analysis. Items include: recall of hallucinations, nightmares, dreams, and patients' memories of someone trying to hurt them.

### Data analysis

Quantitative data were analyzed with SPSS version 19. Descriptive statistics were used to summarize sample characteristics and ICEQ and ICUM item responses.

Interview transcripts were analyzed using a qualitative content analysis: the interpretation of data through systematic identification of patterns or themes.<sup>25</sup> Analysis began with repeated reading of the transcripts.<sup>25, 26</sup> Transcripts were then open coded using words, phrases, or sections of text to capture meaningful units or themes related to delusional memories.<sup>25, 27</sup> The themes were then grouped or collapsed into categories based on commonalities.<sup>25</sup> Validity was enhanced by the immersion of the author into the data, with repeated readings of transcripts during all phases of analysis.

## Results

Sixty-nine subjects were enrolled into the study of whom 35 (50.7%) completed a post-ICU interview. Reasons interviews were not completed included transfer to another facility directly from ICU (32.4%), post-ICU confusion (29.4%), deceased in ICU (26.5%), hospital discharge prior to interview (5.9%), and ICU-acquired weakness with patient unable to physically sign consent form (2.9%). One subject declined to participate in the interview stating that they had “too much going on.”

Subjects completing interviews and included in this analysis ( $N = 35$ ) had a mean age of 66 years (S.D. 12.9) and were 51.4% female. Subjects were on the ventilator a median of 4.5 days (range 2–26) and in the ICU a median of 7.4 days (range 2–34). Admission diagnoses were primarily pulmonary (57.1%) and medical-cardiac (22.9%) followed by sepsis/severe infection (8.6%), cardiac-surgical (5.7%), non-cardiac surgical (2.9%), and neuromuscular (2.9%). Although not routinely assessed on the unit, none of the patients included in this analysis had a documented diagnosis of delirium in their medical record. Individuals able to complete the post-ICU interview spent less time on the ventilator and in the ICU and were more frequently admitted to ICU with a pulmonary diagnosis and less frequently admitted with sepsis/severe infection or shock. Characteristics of the study sample and comparison of those completing interviews to those unable to complete interviews are presented in Table 1. Sedative and analgesic medications received, level of arousal, and restraint use for interviewed subjects is summarized in Table 2.

Table 1. Characteristics of study sample.

	Total	Interviewed	Not interviewed	Test statistic	<i>p</i> value
Age [mean (SD)]	66.0 (12.7)	66.0 (12.9)	66.1 (12.6)	.010 <sup>a</sup>	.992
Female [ <i>n</i> (%)]	39 (59.5)	18 (51.4%)	21 (61.8%)	.750 <sup>b</sup>	.387
APACHE III [mean (SD)]	74.7 (26.0)	72.03 (23.8)	77.4 (28.2)	.857 <sup>a</sup>	.395

Ventilator days [median (IQR)]	6.2 (8.1)	4.5 (6.8)	10.2 (7.9)	-3.18 <sup>c</sup>	.001
ICU days [median (IQR)]	11.4 (12.8)	7.4 (9)	16.0 (12.1)	-3.553 <sup>c</sup>	<.001
Mortality [ <i>n</i> (%)]	9 (13.0)	0	9 (26.4%)	10.65 <sup>b</sup>	.001
Reason for ICU admission [ <i>n</i> (%)]				11.26 <sup>b</sup>	.001
Pulmonary	29 (42.0)	20 (57.1)	9 (26.5)		
Cardiac-medical	13 (18.8)	8 (22.9)	5 (14.7)		
Cardiac-surgical	4 (5.8)	2 (5.7)	2 (5.9)		
Sepsis/infection	10 (14.5)	3 (8.6)	7 (20.6)		
Other surgical	4 (5.8)	2 (2.9)	3 (8.8)		
Neuro/neuromuscular	4 (5.8)	1 (2.9)	3 (8.8)		
Shock/hypotension	2 (2.9)	0	2 (5.9)		
Other <sup>d</sup>	3 (4.3)	0	3 (8.8)		
Hispanic	0	0	0		n/a
Race [ <i>n</i> (%)]				1.11 <sup>b</sup>	.293
White	65 (94.2)	34 (97.1)	31 (91.2)		
African American	4 (5.8)	1 (2.9)	3 (8.8)		

APACHE: acute physiology and chronic health evaluation (severity of illness measure)<sup>28</sup>; IQR: interquartile range; SD standard deviations.

<sup>a</sup>t-value.

<sup>b</sup>Chi-square.

<sup>c</sup>z-value.

<sup>d</sup>Nose bleed, lower extremity ischemia, renal failure.

Table 2. Intravenous sedative/analgesic medication, level of arousal, and restraint utilization interviewed subjects (*n* = 35).

<b>Medication (% subjects receiving medication at anytime while on ventilator)</b>	
Propofol	65.7
Midazolam <sup>a</sup>	60.0
Lorazepam <sup>a</sup>	62.9
Dexmedetomidine	17.1
Fentanyl <sup>a</sup>	82.9
Hydromorphone <sup>a</sup>	45.7
Morphine <sup>a</sup>	11.4
Haldol	14.3
Continuous benzodiazepine	37.1
Continuous opioid	54.3
Level of arousal <sup>b</sup> (% of recorded MAAS scores)	
Unresponsive	15.3
Respond to pain	16.2
Respond to voice/touch	22.8
Calm/cooperative	36.3
Agitated	7.6
Dangerously agitated	1.7

Any restraint (% of subjects)	
Wrist restraint	97.1
Ankle restraint	2.9

<sup>a</sup>Includes bolus and continuous infusion dosing.

<sup>b</sup>Frequency of recorded levels of arousal for interviewed subjects based on Motor Activity Assessment Scale (MAAS) in the medical record.

### Frequency of delusional memories

Sixty-three percent of patients reported at least one delusional memory on the ICUM tool. The most common delusional memory was hallucinations (42.9% of patients) while 34.3% of patients recalled having dreams, and 31% recalled having nightmares. The least common memory was of someone trying to hurt them (14.3% of patients).

In response to ICEQ items which use broader descriptive terms, 70.3% of patients recalled seeing strange things and 53.5% of patients recalled having bad dreams at least some of the time.

### Content of delusional memories

The content of delusional memories fell into three main themes: being held prisoner, being strangled or held underwater, and being in a foreign country or other world. Patients also described seeing disturbing or strange things such as walls moving or blood on surfaces in the room.

Patients' memories of being held prisoner remained quite vivid and they were able to describe them in great detail.

“I dreamed I was in a little car, like a roller coaster, and I was being pulled... by this engine. And we were shackled down, with our wrists tied, feet tied. And this went on for several days it seemed to me” (Subject 3, 87 year-old-male admitted with pneumonia on the ventilator for 9 days).

In addition to memories of being locked up or caged, some patients also recalled people guarding or hurting them.

“I was locked up and it was like a big black cage with a black veil over it... and every time I tried to get out, that person would try and stick me with a pitchfork.” (Subject 22, 50-year-old female admitted with pneumonia on the ventilator for 10 days).

For many of these patients, the delusions seemed to occur in an unfamiliar place often another country.

“Well, one of them [delusions] was like ... I went to South America and I got some kind of jungle fever” (Subject 7, 62 year-old female admitted with pneumonia on the ventilator for 13 days).

Feeling as if they were drowning, being strangled, or held underwater was another common theme of delusional memories.

“You know, I'd wake up... well like somebody is holding your head underwater or strangulations was a major theme of the scary dreams I had” (Subject 39, 53 year-old-male admitted with pneumonia on the ventilator for 30 days in ICU prior to transfer to a long term ventilator unit).

### Patients' interpretations of delusional memories

Most patients with delusional memories described them as scary, very real, and very distressing in the moment.

“I know it's a hallucination and part hallucination, part dream, but at the time you're going through it, to me it was very, very real” (Subject 22).

“You know any dream feels real enough at the moment... When I was totally under, you don't have that waking experience then to re-establish where you are” (Subject 39).

Eventually some patients did process the memories and could cognitively if not emotionally recognize them as delusional.

“Now I realize that they were bad dreams. Up until three days ago, all that stuff actually happened to me... Now I realize I was hallucinating” (Subject 3).

Only a few patients stated that even while the delusions were occurring they were not disturbing but ‘just there’ or ‘weird.’ A 31-year-old female admitted with asthma exacerbation and pneumonia described feeling as if she was in another world or underwater however these experiences were not distressful to her:

“That's the thing, nothing was scary, it was more just weird, yeah, like something from a different universe... a totally different world” (Subject 18).

Patients exhibited a desire to share their delusional memories and expressed relief in being able to tell the interviewer about these strange memories. One patient (Subject 3) directly addressed the impact for him of being able to share his delusional memories.

Patient: “I like this interview.”

Interviewer: “Tell me why.”

Patient: “Releasing a lot of poisons from my mind.”

## Discussion

The description of patients' delusional memories of ICU and interpretations of those memories in the present study supports and expands on previous findings.<sup>5, 7, 9, 29</sup> Patients had distressing memories of being held prisoner, being strangled or held underwater, and being in a foreign country or other world. The majority of patients described the delusions as distressing, scary, and very real in the moment. Patients in this study also reported having difficulty processing the experience during their ICU stay, mirroring other patients' experiences of feeling dislocated from the real world with difficulty determining reality from unreality.<sup>4, 30</sup> Delusional memories were some of the most vivid descriptions provided by patients during interviews. The vivid detail of delusional memories has also been reported elsewhere<sup>2</sup> and may account for the persistence of delusional memories over time.<sup>1, 2</sup>

Almost two-thirds of patients in the current study had at least one delusional memory, higher than has been reported in many studies<sup>1, 3</sup> but comparable to that found by Jones et al (63 versus 76%).<sup>2</sup> More patients in this study recalled seeing strange things (70 versus 51%) while fewer recalled having bad dreams (54 versus 63%) than previously reported.<sup>24</sup> Interestingly while 43% of patients recalled having hallucinations, 70% recalled seeing strange things. One possible explanation for this discrepancy is the difficulty patients had categorizing their memories as hallucinations, dreams, or nightmares. Patients had an easier time responding to the descriptive term 'saw strange things' than in labeling some of their delusional memories as hallucinations. Similarly, 54% of patients recalled having bad dreams while only 31% recalled having nightmares. Nightmares may have been interpreted by patients as an extremely unpleasant dream while the descriptor 'bad dreams' may have been more inclusive. This difficulty with semantics and terms needs to be considered when evaluating patients for the presence of delusional memories.

This study was not designed to evaluate the association of delusional memories to real events in ICU. However, the majority of patients were restrained at some time during mechanical ventilation, certainly a potential link to delusional memories of being shackled or caged. Another common theme of being underwater or strangled is potentially associated with patient reports of moderate dyspnea and breathlessness related to mechanical ventilation.<sup>5, 31</sup> Investigation of ICU events associated with disturbing delusional memories of ICU would allow development of interventions targeting ICU experiences most likely to trigger these disturbing memories.

The development of delusional memories has been associated with sedative medication administration<sup>14, 32</sup> and decreased levels of arousal.<sup>33</sup> Increased utilization and adherence to guidelines that target light patient sedation<sup>34</sup> may help decrease the number of patients with delusional memories post-ICU.

Many patients expressed relief in sharing their delusional memories of ICU which provided them an opportunity to release these negative memories. The benefits of giving patients' the time to share their ICU experiences and delusional memories has also been reported elsewhere with opportunities provided through different forums including patient interviews<sup>4</sup> and support groups.<sup>35</sup> Ringdal and colleagues<sup>15</sup> found that patients who had shared their ICU experiences with others had less depressive symptoms. The use of intensive care diaries can provide a source of information about the patients' time in ICU, helping the patient process delusional memories<sup>36</sup> and decreasing the incidence of PTSD.<sup>37</sup> ICU follow-up care should include the opportunity for patients to talk about and process their delusional memories.<sup>19</sup> The effectiveness of post-ICU interventions to assist patients in processing memories of ICU is an area needing continued study.

There are limitations to this study. This is a secondary analysis; the original study was not designed to evaluate delusional memories of ICU. Therefore, some patients may not have shared descriptions or interpretations of their delusional memories. However, many patients provided detailed descriptions that emphasize the importance of such delusional memories to the patient experience of ICU.

The presence of delirium was not routinely assessed in the ICU where the study was conducted. Given the prevalence of delirium in the ICU population—from 32 to 82%,<sup>38, 39, 40</sup> it is very likely that some patients in this study did have delirium but were not identified. The impact of delirium during ICU on

patients' development of delusional memories could not be addressed in this study. While patients with ICU delirium are more likely to report scary dreams,<sup>41</sup> it has not been established that the presence of delusional memories always indicates delirium was present.

Patients often have delusional memories of ICU, memories that they describe as scary and distressing. Given the potential impact of delusional memories on psychological outcomes, post-ICU follow up should address these memories and assist patients to connect to real ICU events and process delusional memories. The opportunity for patients to release the poisons from their mind may improve recovery after critical illness.

## Acknowledgments

The project described was supported by an award (F31NR010809) from the National Institute of Nursing Research and by a grant from the American Association of Critical-Care Nurses. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Nursing Research, the National Institutes of Health, or the American Association of Critical-Care Nurses.

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