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Sleep and psychological health during early recovery from critical illness: An observational study ☆

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ABSTRACT

Introduction: Intensive care patients often report sleep disruption in ICU and during recovery from critical illness.
Objectives: To assess: (i) patients' self-reported sleep quality in ICU, on the hospital ward after transfer from ICU and two and six months after hospital discharge; (ii) whether patients who report sleep disruption in ICU continue to report sleep disruption in recovery and (iii) whether prehospital insomnia, experiences in intensive care, quality of life and psychological health are associated with sleep disruption six months after hospital discharge.
Methods: Patients completed self-report measures on sleep quality at five time points: prior to hospitalization, in ICU, the hospital ward, two months and six months after hospital discharge, their intensive care experiences two months after discharge and psychological health and quality of life six months after discharge.
Results: Patients ($n = 222$) were aged (mean ± SD) 57.2 ± 17.2 years, 35% female, had mean ICU stay of 5 ± 6 days and BMI of 26 ± 5. Over half the participants (57%) reported poor sleep at six months; for 10% this was at all time points after ICU admission. Prehospitalization insomnia ($p = .0005$), sleep quality on the ward ($p = .006$), anxiety ($p = .002$), and mental ($p = .0005$) and physical health ($p = .0005$) were independently associated with poorer sleep quality in survivors six months after ICU treatment.
Conclusions: Sleep is a significant issue for more than half of survivors 6 months after ICU treatment. Some influencing factors, such as hospital sleep quality, anxiety, physical health and mental health, are potentially modifiable and should be targeted in recovery programs.

Introduction

Critically ill patients often experience sleep disruption in the intensive care unit (ICU). An integrative review of polysomnograph (PSG) data and self-reports revealed significant sleep fragmentation and variable sleep duration [1]. Importantly, even when sleep duration was normal, it was unrestorative and characterised by fragmentation, prolonged stage 1 and 2 and little or no slow wave and rapid eye movement (REM) sleep. These findings were also demonstrated in a recent large study using PSG [2].

Notably, poor sleep quality also occurs during recovery after treatment in ICU, with two surveys suggesting prevalence of 33% [3] to 38% [4]. In follow up of survivors of ICU treatment for the acute respiratory distress syndrome, some patients reported persistent sleep problems disruption six months or more after hospital discharge [5]. Seven patients had abnormal PSG recordings and five had conditioned insomnia ("evidence of conditioned sleep difficulty and/or heightened arousal" [5]) thought to be related to their critical illness [5]. Sleep disturbances six to 12 months after ICU have been associated with lower health related quality of life (HRQOL), specifically for bodily pain and mental health (using the Short Form-36 [6] HRQOL instrument) [4]. However it was also reported that the prevalence of poor quality of sleep, 20% overall, did not change from self-reports prior to ICU to those during recovery from critical illness [4]. In a study of the effect of a home-based rehabilitation on physical function and psychological health for survivors of critical illness it was found that more than 30% of patients reported moderate to severe sleeping problems six months after hospital discharge; sleep problems at 26 weeks were independently associated with HRQOL mental health measured on the SF-36 and posttraumatic stress (PTS) symptoms measured with the Impact of Event Scale [7].

Given the few reports on sleep after ICU, there is need to further investigate the sleep of intensive care patients while they are in ICU and during recovery, and factors related to sleep during recovery. The specific aims of this study were to assess: (i) patients' self-reported sleep quality in ICU, on the hospital ward after transfer from ICU and two and six months after hospital discharge; (ii) whether patients

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who report poor sleep quality in ICU report poor sleep quality in recovery; and (iii) whether prehospital insomnia, psychological health, quality of life and experiences in intensive care are associated with poor sleep quality six months after hospital discharge.

Methods

Study design

This was a prospective observational study of patients from general, cardiothoracic and neurological ICUs of a tertiary referral hospital in Sydney, Australia. Patients completed self report measures on sleep quality prior to current hospitalization (retrosectively), sleep while in ICU, sleep on the hospital ward after transfer from ICU, sleep two and six months after hospital discharge, their intensive care experiences two months after discharge and psychological health and quality of life six months after discharge. Ethics approval was obtained from the Human Research Ethics Committees (HREC) of the Northern Sydney Local Health District and the University of Technology Sydney.

Study setting and participants

The general, cardiothoracic and neurological ICUs of the study hospital comprised of 36 beds in total and the hospital was a state-wide referral centre for spinal and burns injuries. The ICUs were closed units with an accredited intensive care specialist physician responsible for the management of all patients. The registered nurse (RN) to patient ratio was 1:1 for mechanically ventilated patients and 1:2 for patients requiring high dependency care. The RN performed all nursing care for the patient and was supported by ancillary staff such as patient services assistants and ward clerks.

Patients were eligible to participate in the study if they were treated in one of the study ICUs, aged 18 years or more, had an ICU length of stay (LOS) of ≥2 nights, were able to give informed consent to participate, were able to complete the study instruments in English, had adequate vision and hearing to complete study instruments and had been cleared for discharge from ICU to a hospital ward. Patients were excluded if they had a known history or evidence of sleep disorder (e.g. obstructive sleep apnea), if significant treatment limitations were in place (e.g. a medical order not to escalate inotropic support) and/or were receiving palliative care or were in isolation nursing for multiresistant organisms. All participants gave written informed consent using the HREC-approved information sheet and consent form after they had been designated ready for ICU discharge; continuing consent was sought verbally at each data collection time point after ICU discharge.

Measures and data collection

In ICU and prior to transfer to a hospital ward patients completed the Insomnia Severity Index (ISI) [8] reporting on their prehospital sleep quality, a 1–10 likert scale on the quality of sleep at home [9] and the Richards Campbell Sleep Questionnaire (RCSQ) [10] on their previous night's sleep in ICU. After 1–2 nights on the hospital ward they again completed the RCSQ on their previous night's sleep. Two months after hospital discharge former patients completed the Intensive Care Experience Questionnaire (ICEQ) [11] and the Pittsburgh Sleep Quality Index (PSQI) [12]. Six months after hospital discharge participants again completed the PSQI, the Depression, Anxiety and Stress Scales (DASS) [13], the Posttraumatic Stress Checklist for a Specific event (PCL-S) [14] and the SF-36 quality of life survey [15].

The Insomnia Severity Index [8]. The ISI contains seven items scored on a 0–4 scale for insomnia severity, satisfaction with sleep pattern, interference with daily function, impairment of quality of life and distress about sleep problems. Scores range from 0 to 28, with higher scores reflecting worse sleep quality and scores of 15 or more indicative of moderate to severe insomnia [8]. In the current study Chronbach's alpha was .90.

The Richards-Campbell Sleep Questionnaire [10]. The RCSQ consists of five100 mm visual analogue scales for sleep depth, falling asleep, wakefulness, going back to sleep and overall sleep quality. Scores of the five scales are averaged to obtain one score, with higher scores indicating better sleep. The RCSQ was validated using PSG in nonventilated, medical critical care patients, with the average total score having a correlation of 0.58 with the sleep efficiency index from PSG [10]. In the current study Chronbach's alpha values were .91 in ICU and .90 in the ward.

The Sleep in the Intensive Care Unit Questionnaire [9]. Only the first two items of the 7-item SICQ are reported here: 'rate the overall quality of your sleep at home' (completed in ICU) and 'rate the overall quality of your sleep in ICU' (completed in the ward). Subjective sleep quality is assessed using a 1–10 likert scale, with higher scores indicating better sleep.

At the time of data collection in the ICU the Richmond Agitation-Sedation Scale (RASS) [16] was used to assess the level of sedation, the Faces Anxiety Scale [17] was used to assess state anxiety and patients rated pain intensity on a scale of 1 to 10.

The Intensive Care Experience Questionnaire (ICEQ) [11] has 24 items with 1–5 likert responses on agreement with and frequency of occurrence of experiences in an ICU, plus three open-ended questions. The ICEQ has four domains: 1) Awareness of surroundings (nine items, scores 9–45); 2) Frightening experiences (six items, scores 6–30); 3) Recall of experiences (five items, scores 5–25); and 4) Satisfaction with care (four items, scores 4–20). Higher scores indicate greater awareness, more Frightening experiences, better Recall of experiences and greater Satisfaction with care. It has satisfactory reliability and demonstrated concurrent and predictive validity in former ICU patients [11]. In the current study Chronbach's alpha values were .83, .73, .76 and .56 respectively for the four domains.

The Pittsburgh Sleep Quality Index (PSQI) [12] consists of 10 questions with a mixture of short answers and use of a likert scale of 1–5 to assess sleep quality and habits over the preceding month. Total scores range from 0 to 21. Higher scores indicate worse sleep and scores >5 are interpreted as poor sleep quality. The PSQI has been reported to provide a specific and sensitive measure of sleep quality in community-dwelling respondents and was rated highly in a review paper for reliability, validity and responsiveness [18]. In the current study Chronbach's alpha values were .71 at two months and .79 at six months.

The Depression Anxiety and Stress Scales instrument (DASS-21) [13,19] contains 21 items, seven each for depression, anxiety and stress responded to on a 4-point 0–3 scale, yielding scores from 0 to 21 which are doubled to correspond to the 0–42 range of the original DASS. The scales have established validity and reliability [20]. In the current study Chronbach's alpha values were .91 for stress, .74 for anxiety and .92 for depression.

The Post-traumatic Stress Disorder Checklist for a Specific event (PCL-S) [14,21] contains 17 questions that correspond to the Diagnostic and Statistical Manual-IV (DSM-IV) criteria for PTSD exhibited as reexperiencing, avoidance and increased arousal [22]. Respondents rate how much they have been bothered by a symptom in the last month on a 5-point scale ("not at all" to "extremely"). Total scores range from 17 to 85; higher scores are worse. In this study total severity scores are reported on a continuous scale. The PCL-S has established reliability and validity [14,23]. In the current study Chronbach's alpha was .92.

The Medical Outcomes Trust Short Form-36 (SF-36) health survey [6] is a well validated, generic health-related quality of life (HRQOL) instrument with eight scales: Physical functioning, Effect of physical function on role (Role-physical), Bodily pain, General health, Vitality, Social functioning, Effect of emotional health on role (Role-emotional) and Mental health. The eight scales are used to calculate Physical