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Validity of a single PTSD checklist item to screen for insomnia in survivors of critical illness

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ABSTRACT

Background: There is no insomnia screening tool validated in intensive care unit (ICU) survivors.
Objectives: To examine the validity of a single item from the PTSD checklist-Civilian version (PCL-C) to detect insomnia by Insomnia Severity Index (ISI)
Methods: We performed a secondary analysis of data from a longitudinal investigation in 120 medical-surgical ICU survivors. At 1 year post-ICU, patients completed ISI, PCL-C, and Medical Short-Form 12 (SF-12) by telephone. A single PCL-C item rates difficulty initiating or maintaining sleep over the past month. We compared performance characteristics of this PCL-C item to ISI-defined insomnia (ISI ≥15).
Results: A score of ≥3 on the PCL-C sleep item exhibited 91% sensitivity and 67% specificity for ISI-defined insomnia (ISI ≥ 15), and it demonstrated construct validity by correlation to related QOL indices.
Conclusions: A single PCL-C sleep item score ≥ 3 is a reasonable screen to identify insomnia symptoms in ICU survivors.

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Introduction

As more patient survive the intensive care unit (ICU),[1] there is growing recognition of the physical, cognitive, emotional and socioeconomic sequelae commonly experienced by ICU survivors.[2,3] One aspect that has been understudied is insomnia. Insomnia, clinically defined as difficulty falling or staying asleep,[4] affects 6–15% of the general population and is even more common among patients with chronic medical and psychiatric conditions.[5]

Insomnia among ICU survivors may reflect a variety of etiologies, including a pre-existing sleep disorder, maladaptive sleep behaviors, sleep-related breathing disorders, circadian dysregulation,[6,7] or post-ICU sequelae including pain,[8] anxiety, depression, and PTSD.[9,10] Prior work demonstrates that insomnia symptoms are reported by 28% to 50% of ICU survivors, depending on the measure used.[11,12] Identifying and treating insomnia in ICU survivors carries public health importance. Patients with insomnia are at risk for quality of life impairment and accidents.[13] Evidence-based insomnia treatment (cognitive behavioral therapy) has proven effective in a variety of populations to improve sleep quality, depression, pain, and cancer-related fatigue.[14–19]

A brief screen to identify ICU patients with insomnia would be useful. Unfortunately no insomnia screen has been validated in the post-ICU population. Existing literature on sleep after ICU is limited by a lack of standardized or validated metrics.[20,21] The gold standard for diagnosis of insomnia is clinical interview by a trained mental health or sleep specialist, frequently infeasible in the research setting.[22,23] In clinical practice, the 7-item Insomnia Severity Index (ISI) is often used. Validated as a research measure of insomnia, the ISI is helpful to identify symptom burden at diagnosis and to follow changes with treatment.[24,25] While the ISI itself is fairly brief, ICU survivor evaluations typically involve lengthy surveys to assess multiple aspects of disability. Survey fatigue must be carefully considered when proposing yet another metric for evaluation. To facilitate more widespread screening of insomnia in ICU survivors, we sought to identify a single item that could easily be incorporated in the research or clinical setting.

Abbreviation: AUC, Area under the receiver operating characteristic curve; HMC, Harborview Medical Center; ICU, intensive care unit; ISI, insomnia severity index; PCL-C, PTSD checklist – civilian version; PHQ-9, Patient Health Questionnaire 9-item depression scale; SF-12, Medical Short Form 12 health-related quality of life questionnaire; QoL, quality of life; ROC, Receiver operating characteristic.

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In this analysis, we took advantage of an existing ICU cohort that examined psychiatric sequelae after critical illness. Based on previous work, we chose a single item on the Posttraumatic Stress Disorder (PTSD) Checklist-Civilian Version (PCL-C)[26] as a simple, rapid screen for difficulty falling or staying asleep. We validated this single PCL-C against the 8-item Insomnia Severity Index (ISI). In subset analyses, we examined the validity of this screen in patients with significant depressive and/or PTSD symptoms.

Methods

Study population

Our study is a secondary analysis of data from a longitudinal investigation of health outcomes in 120 medical-surgical ICU survivors admitted to a single tertiary care hospital, Harborview Medical Center, between September 2010 and July 2011.[27] Study inclusion and exclusion criteria have been previously described.[27] Subjects completed a baseline interview at enrollment and a follow-up interview at 12 months post hospital discharge. Informed consent was obtained from all subjects at enrollment. The focus of the original study was psychiatric sequelae of critical illness. Sleep was not a primary outcome of the original study; insomnia was captured at follow-up as a common comorbidity and sometimes sentinel symptom of mental health diagnoses. Capture of pre-existing health focused on mental health diagnoses. The University of Washington Institutional Review Board approved the study.

Sleep indices

The reference standard screen for insomnia in our study was the Insomnia Severity Index (ISI),[24] a brief self-report instrument measuring subjects' perceived insomnia symptoms over the preceding 2 weeks. The content of this 7-item instrument corresponds in part to diagnostic criteria used in standard structured interviews, based on the DSM-V[28] and ICSD-3.[4,22] Items cover severity of sleep problems (onset and maintenance); impact of sleep problems on daily life (daytime impairment, noticeability of sleep problem to others); and patients' level of distress due to the sleep problem. Each item is rated on a 5-point Likert scale [0 = not at all, 4 = extremely] with a total score range from 0 to 28 (higher scores reflecting greater insomnia severity). ISI scores ≥ 15 are generally considered a reasonable cutoff to detect clinically significant insomnia, exhibiting 78% sensitivity and 100% specificity compared to standard clinical interview among subjects presenting for sleep evaluation.[24] The ISI performs with moderate concurrent validity compared to a sleep diary in clinical samples[25] and is sensitive to change after treatment.[25]

Our screening tool for validation in this study was a single sleep item on the PTSD Checklist – Civilian version (PCL-C). The PCL-C is a 17-item scale evaluating symptoms of post traumatic stress disorder which has been used extensively in the acute care setting.[29,30] A single sleep item on the PCL-C rates subjects' difficulty initiating or maintaining sleep over the past month (0 [not at all] to 5 [extremely]). This single item has been used previously by our research group to identify insomnia among survivors of critical illness[12] and by other authors to identify insomnia among military service members.[31]

PTSD symptom, quality of life, and depressive symptom indices

We defined PTSD by an algorithmic score of the PCL-C that approximates the DSM diagnosis (scores of >= 3 on at least 1 intrusive symptom cluster item, at least 3 avoidance symptom cluster items, and at least 2 arousal symptom cluster items).[27] The quality of life (QOL) index measured concurrently with the ISI and PCL-C was the Medical Short-Form 12 (SF-12). The SF-12 is a 12-item instrument rating health-related quality of life across 8 physical and mental domains.[32] SF-12 domain scores are reported on a scale from 0–100 (higher scores reflecting better quality of life), standardized to the US population with a mean score of 50 and standard deviation of 10.[32] Depressive symptoms were assessed with the Patient Health Questionnaire-9 (PHQ-9) depression scale. PHQ-9 is a 9-item instrument rating depressive symptoms on a Likert scale, with total scores ranging from 1 to 27 (higher scores reflecting more severe symptoms).[33]

Tests of validity

We examined criterion validity of the PCL-C sleep item to detect insomnia by comparison to an ISI total score ≥15 as the reference standard. We examined convergent validity of the PCL-C sleep item by comparison to QOL indices we expect to be linked to insomnia, such as SF-12 domains as well as the PHQ-9. Lastly, we performed a sensitivity analysis examining whether the validity of the PCL-C sleep item differed in subjects with substantial comorbid psychiatric symptoms. We defined substantial depressive symptoms by a PHQ-9 total score ≥10.[33] and substantial PTSD symptoms using the PCL-C algorithmic definition.[27]

Statistical analyses

To examine criterion validity, we performed receiver operating characteristics (ROC) analyses to examine the performance of the PCL-C sleep item to detect insomnia defined by an ISI score ≥15 (reference standard). We calculated Spearman's rank correlation to examine convergent validity between PCL sleep item scores and indices with expected connections to sleep (PHQ-9 and SF-12 domain scores). Finally, we examined the performance characteristics of two PCL-C sleep item cutoff scores (defined *a priori*) reflecting either moderate (PCL-C item score >= 3) or severe (PCL-C item score >= 4) insomnia symptoms. We have previously shown that these cutoffs are associated with QOL decrements on the SF-36.[12,34] We used simple 2x2 tables to estimate sensitivity, specificity, predictive values, overall accuracy, and likelihood ratios using standard definitions. We calculated 95% confidence intervals using *diagt* and *sepsci_i* commands in STATA.[35] All statistical tests were two-sided, with statistical significance determined by a P value < 0.05. We performed all analyses using Stata 11 SE (Stata, College Station, Texas, USA).

Results

Patient characteristics

Of 150 patients enrolled, 10 subjects died, and 2 subjects withdrew from the study before 12-month follow-up (Figure 1). Of the remaining 138 subjects, 120 (87% eligible) completed 12-month evaluations and were included in our analysis (3 incarcerated, 15 lost to follow-up). Characteristics of the 120 subjects included in our analysis are presented in Table 1. Subjects were predominately white males; 37.5% had a prior substance abuse or mental health diagnosis. At 12-month follow-up, subjects had a mean ISI score of 8.2 [SD 8.5].

Insomnia symptoms at 12-month follow-up

At 12-month follow-up, 33 subjects (28%) met ISI criteria for clinically relevant insomnia (ISI ≥ 15). By the PCL-C sleep item, 49% reported at least moderate insomnia symptoms (score ≥ 3) while 28% reported severe symptoms (item score ≥ 4).