Original Study

Impaired Arousal in Older Adults Is Associated With Prolonged Hospital Stay and Discharge to Skilled Nursing Facility

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A B S T R A C T

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Background: Poor cognitive function is associated with negative consequences across settings of care, but research instruments are arduous for routine clinical implementation. This study examined the association between impaired arousal, as measured using an ultra-brief screen, and risk of 2 adverse clinical outcomes: hospital length of stay and discharge to a skilled nursing facility (SNF).
Design, Setting, and Participants: A secondary data analysis was conducted using 2 separate groups of medical ward patients: a Veterans Affairs medical center in the northeast (N = 1487, between 2010 and 2012) 60 years and older and a large tertiary care, university-based medical center (N = 669, between 2007 and 2013) 65 years and older in the southeastern United States.
Measurements: The impact of impaired arousal, defined by the Richmond Agitation Sedation Scale as anything other than "awake and alert," was determined using Cox Proportional Hazard Regression for time to hospital discharge and logistic regression for discharge to a SNF. Hazard ratios (HRs) and odds ratios (OR) with their 95% confidence intervals (CI) are reported, respectively. Both models were adjusted age, sex, and dementia.
Results: The 2156 total patients included in these groups had a mean age of 76 years, of whom 16.4% in group 1 and 28.5% in group 2 had impaired arousal. In the first group, patients with normal arousal spent an average of 5.9 days (standard deviation 6.2) in the hospital, while those with impaired arousal spent 8.5 days (9.2). On any given day, patients with impaired arousal had 27% lower chance of being discharged (adjusted HR 0.73 (95% CI 0.63–0.84). In the second group, individuals with normal arousal spent 3.8 (4.1) days in the hospital compared with 4.7 (4.6) for those with impaired arousal; indicating a 21% lower chance of being discharged [adjusted HR 0.79 (95% CI 0.66–0.95). With regard to risk of discharge to SNF, those with impaired arousal in group 1 had a 65% higher risk than those without impaired arousal [adjusted OR 1.65 (95% CI 1.21–2.25)], and those in group 2 had a nonsignificant 27% higher risk [adjusted OR 1.27 (0.80–2.03)]. Because of the quality improvement nature, this analysis did not control for comorbidities, which is a significant limitation.
Conclusions: In this study of over 2000 older hospitalized patients, the simple observation of an abnormal arousal level may be an independent predictor of a longer hospital stay and discharge to SNF.
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For older patients, poor in-hospital cognitive function is associated with negative outcomes, such as longer lengths of stay, increased morbidity and mortality, and higher costs of care.[1–4] Such assessments of cognition during hospitalization are often conducted just once over a period of 5 to 15 minutes, compared with routinely, and only by those with a special understanding of instruments such as a Mini-Mental State Examination or more in-depth tools.[5–8] If bedside clinicians, such as registered nurses, could apply a bedside clinical tool that took only a few seconds, patients' prognosis could be more routinely determined.

The Richmond Agitation Sedation Scale (RASS) was developed as a measure of arousal, sedation, and consciousness in critically ill individuals in the intensive care setting,[9] and a modified version exists for hospitalized older patients.[10] The RASS been suggested as an ultra-brief monitor for mental status, an important indicator of overall function.[11] Arousal is conceived as the ability to respond to or interact with the environment[10] and is an important component of cognition because it is generally preserved in chronic cognitive disorders, such as dementia.[12] Thus, an alteration in arousal may be a harbinger of more acute impairment in need of evaluation.[9] This study examined the association between the RASS and the hospital outcomes of length of stay and new discharge to a skilled nursing facility (SNF) using 2 distinctly different groups. Findings from this study provide clinicians with an ultra-brief, less than 15 seconds, measure to identify individuals with impaired arousal who would benefit from additional cognitive evaluation, assessment, and discharge planning to potentially avoid adverse clinical events.[11]

Methods

This is a secondary analysis of data collected from 2 groups at different sites. The RASS was conducted upon admission, discharge outcomes were collected, and covariates were abstracted from the medical record.

Setting

Group 1

A quality improvement database from a delirium risk modification program was used to conduct this secondary data analysis. This project was conducted from October 2010 through September 2012 at a Veterans Affairs tertiary referral center for the New England region. A convenience sample of patients aged 60 or older and admitted to medical wards were screened upon admission or transfer to the facility and provided appropriate interventions to modify delirium risk. Excluded were individuals admitted as observational status or those readmitted within 30 days of initial screening. The facility Institutional Review Board reviewed and approved secondary data analysis of the quality improvement project.

Group 2

A prospective group study database from studies evaluating delirium in an emergency department was used to conduct this data analysis.[13,14] These studies were conducted from May 2007 until February 2013 at a large, tertiary care, university-affiliated medical center located in the southeastern US. For this analysis, patients were included if they were aged 65 or older, in the emergency department for less than 12 hours, and admitted to the hospital. Individuals who were excluded were non-English speaking, deaf or blind, those who could not or would not consent, comatose, or unable to follow simple commands prior to their acute illness. Vanderbilt University Institutional Review Board- approved the study with a requirement for verbal consent to be obtained.

Measures

Arousal

The assessment of arousal utilized the RASS. The RASS is an ultra-brief, reliable, observational tool used to determine level of arousal.[9,10] Administration of the RASS was done across both sites by trained study staff that approached patients, using verbal and tactile stimuli as necessary. The RASS was scored using the −5 to +4 rating scale. Alert and calm (RASS equal to zero) is considered normal, with positive numbers related to increased arousal, while negative numbers denote decreased levels. In group 1, a modified version of the RASS[10] was used for assessment, which also includes an informal test of attention while in group 2 the original version was used.[9] For the regression analysis, the level of arousal was dichotomized if the score was not zero because of the U-shaped relationship with arousal and outcome.

Outcomes

Two outcomes were measured in both groups using chart review: (1) hospital length of stay and (2) new discharge to a SNF. Hospital length of stay was calculated as the number of days between screening and discharge. New discharge to a SNF refers to individuals previously community-dwelling who were transferred to a SNF for rehabilitation after hospitalization.

Covariates

Covariate data included age, gender, and dementia status. Age and gender were obtained from patient chart and medical record. Pre-existing dementia status was recorded as the presence of a pre-existing dementia diagnosis in the medical record history and physical or by the use of a medication typically prescribed for dementia (ie, a cholinesterase inhibitor).

Analysis

Measures of central tendency and dispersion for continuous variables were reported as mean and standard deviation (SD) for parametric data or as median and interquartile range for nonparametric data. Proportions were reported for categorical variables. To determine if impaired arousal was associated with hospital length of stay, the cumulative probability of remaining in hospital was obtained using a Cox proportional hazards regression model was performed. The dependent variable was time to hospital discharge; patients were considered to be censored if they died in the hospital or after 25 days. Hazard ratios (HRs) with 95% confidence intervals (CIs) were reported. A HR less than 1 indicated that patients with impaired arousal were less likely to die. To determine if impaired arousal was

Table 1
Baseline Characteristics

Characteristic	Cohort 1 (N = 1487)	Cohort 2 (N = 669)
	Result Median (IQR) or % (N)	
Age, years	77 (68,84)	75 (60,81)
Sex, male	98.5% (1,465)	46.6% (312)
Pre-admission SNF	4.1% (95)	10.0% (67)
Dementia, in medical record	15.0% (223)	12.0% (80)
RASS		
≤−2	2.1% (31)	4.2% (28)
−1	10.0% (148)	22.4% (150)
0	83.6% (1,243)	71.5% (478)
1	4.0% (59)	1.6% (11)
≥2	0.4% (6)	0.3% (2)
Length of stay, days	4 (2,7)	3 (2,6)
Death or hospice	2.1% (31)	1.4% (9)

IQR, interquartile range.