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Delirium prevention program in the surgical intensive care unit improved the outcomes of older adults

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ABSTRACT

Background: Hospital-acquired delirium is a known risk factor for negative outcomes in patients admitted to the surgical intensive care unit (SICU). Outcomes worsen as the duration of delirium increases. The purpose of this study was to evaluate the efficacy of a delirium prevention program and determine whether it decreased the incidence and duration of hospital-acquired delirium in older adults (age >50 y) admitted to the SICU.

Methods: A prospective pre- or post-intervention cohort study was done at an academic level I trauma center. Older adults admitted to the SICU were enrolled in a delirium prevention program. Those with traumatic brain injury, dementia, or 0 d of obtainable delirium status were excluded from analysis. The intervention consisted of multidisciplinary education, a pharmacologic protocol to limit medications associated with delirium, and a nonpharmacologic sleep enhancement protocol. Primary outcomes were incidence of delirium and delirium-free days/30. Secondary outcomes were ventilator-free days/30, SICU length of stay (LOS), daily and cumulative doses of opioids (milligram, morphine equivalents) and benzodiazepines (milligram, lorazepam equivalents), and time spent in severe pain (greater than or equal to 6 on a scale of 1 - 10). Delirium was measured using the Confusion Assessment Method for the ICU. Data were analyzed using Chi-squared and Wilcoxon rank sum analysis.

Results: Of 624 patients admitted to the SICU, 123 met inclusion criteria: 57 preintervention (3/12–6/12) and 66 postintervention (7/12–3/13). Cohorts were similar in age, gender, ratio of trauma patients, and Injury Severity Score. Postintervention, older adults experienced delirium at the same incidence (pre 47% *versus* 58%, $P = 0.26$), but for a significantly decreased duration as indicated by an increase in delirium-free days/30 (pre 24 *versus* 27, $P = 0.002$). After intervention, older adults with delirium had more vent-free days (pre 21 *versus* 25, $P = 0.03$), shorter SICU LOS (pre 13 [median 12] *versus* 7 [median 6], $P = 0.01$) and were less likely to be treated with benzodiazepines (pre 85% *versus* 63%, $P = 0.05$) with a lower daily dose when prescribed (pre 5.7 *versus* 3.6 mg, $P = 0.04$). After intervention, all older adults spent less time in pain (pre 4.7 *versus* 3.1 h, $P = 0.02$), received less total opioids

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(pre 401 *versus* 260 mg, $P = 0.01$), and had shorter SICU LOS (pre 9 [median 5] *versus* 6 [median 4], $P = 0.04$).

Conclusions: Although delirium prevention continues to be a challenge, this study successfully decreased the duration of delirium for older adults admitted to the SICU. Our simple, cost-effective program led to improved pain and sedation outcomes. Older adults with delirium spent less time on the ventilator and all patients spent less time in the SICU.

1. Introduction

Hospital-acquired delirium is a known risk factor for negative outcomes in patients admitted to the surgical intensive care unit (SICU). Delirium is associated with longer hospital and intensive care unit (ICU) length of stay (LOS), increased ventilator days, postdischarge institutionalization, higher costs, and development of long-term disabilities such as cognitive impairment and dementia [1–6]. More importantly, delirium is an independent risk factor for increased mortality [1]. Up to 65% of patients develop delirium once admitted to the hospital and up to 87% develop delirium after admission to the ICU [7]. Recent studies have demonstrated that outcomes worsen as the duration of delirium increases. While the presence of ICU delirium increased the 6-mo mortality threefold, every additional day spent delirious increased the 12-mo mortality by 10% [1,8].

Multiple risk factors for delirium have been identified. Many are not modifiable, such as admission to the ICU, severity of illness, increased age, and preexisting dementia [9]. However, research suggests that the correction of modifiable risk factors is an effective step in delirium prevention. These include early mobilization, identification and correction of sensory impairments, avoidance of physical restraints, and removal of unnecessary invasive tubes (including bladder catheters and nasogastric tubes) [10–12]. Environmental risk factors including absence of visible daylight, noise, lack of familiar visitors, and transfer from another ward are potentially amenable to intervention but have not been well studied [11].

Medications are a major risk factor for delirium and account for up to 12%–39% of all cases of delirium [13]. Specifically, benzodiazepines, opioid analgesics, anticholinergic agents, antihistamines, and corticosteroids have been associated with the development of delirium [8,14]. Benzodiazepine use is an independent risk factor for the development of delirium in multiple studies [15,16]. Thus, modification of a patient's medication regimen, including limiting the use of deliriogenic medications should be the first line in prevention and treatment of delirium. In practice, however, few studies have demonstrated the effectiveness of a pharmacologic agent in preventing delirium. Low dose haloperidol was considered as a potential drug for delirium prophylaxis; however, studies have failed to show a benefit to the use of low dose haloperidol on the duration of delirium [17–19].

A combination of pharmacologic and nonpharmacologic interventions therefore holds the most promise for a successful delirium prevention program. Although the Clinical Practice Guidelines for the Management of Pain, Agitation, and Delirium provides suggestions for the diagnosis, prevention, and treatment of delirium, we identified a knowledge gap [20]. Literature that specifically addresses the effectiveness of a delirium prevention program for older adults admitted to the SICU is not available. We designed a prospective multidisciplinary delirium prevention and treatment program based on both pharmacologic and nonpharmacologic interventions for surgical and trauma patients admitted to the SICU. The goal was to create a cost-effective, best practice standard of care model for the prevention and treatment of hospital-acquired delirium that could easily be adopted by other institutions. Thus, the purpose of this study was to evaluate the efficacy of the delirium prevention program in older adults (age >50 y) admitted to the SICU. We hypothesized that the incidence and duration of delirium would decrease after initiating the program.

2. Methods

The following was a prospective pre- and post-intervention cohort study evaluating the impact of a delirium prevention program on critically ill older adults who were admitted to a 14-bed SICU at an academic level I urban trauma center. The SICU in this setting is a closed unit that admits all surgical patients, including those admitted after trauma. The study was performed in accordance with the Declaration of Helsinki after approval from the Rutgers University Institutional Review Board [21].

2.1. Selection and description of participants

All older adults consecutively admitted to the SICU between March 2012 and March 2013 were enrolled in the study. Inclusion criteria: age >50 y and admitted to the SICU for ≥24 h. Exclusion criteria: age ≤50 y; diagnosed with a moderate to severe traumatic brain injury, defined as a head Abbreviated Injury Scale score of ≥3; transfer from jail or in police custody; and history of dementia. In addition, patients whose delirium statuses were recorded as "unobtainable" or undocumented for the duration of their time in the SICU were excluded from analysis. The most common reasons for delirium status unobtainable were prolonged deep sedation and chemically induced paralysis.

2.2. Delirium prevention and treatment program (intervention)

The unit-wide multidisciplinary delirium intervention was designed by the study investigators through review of the literature and modifications of best practice for delirium identification, prevention, and treatment. The intervention was implemented in the SICU in a stepwise manner. The