

## Original Research Report

# A Retrospective Analysis of Neurocognitive Impairment in Older Patients With Burn Injuries



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**Background:** Older adults comprise a growing proportion of the United States population that is at risk for burns. However, few studies have examined cognitive function in this patient population. **Objective:** The purpose of this study was to measure the prevalence and incidence of dementia and delirium in older adults admitted for burn injuries. **Methods:** This was an Institutional Review Board-approved, retrospective study of all patients 65 years and older admitted to the University of North Carolina Jaycee Burn Center from 2005–2015. Data extracted from the medical records included patient demographics, characteristics of the burn injury, incidence of delirium, incidence of psychiatric consultation, diagnosis of dementia, disposition, and mortality. The primary outcomes of interest were the prevalence and incidence of dementia and delirium. Secondary outcomes included length of stay

and cost of hospitalization. **Results:** A total of 392 patients were included. These patients had a median age of 74 years and a median total body surface area burn of 7%. On admission, 44 patients (11%) had a diagnosis of dementia. An additional 28 patients were diagnosed with dementia during hospitalization for a total of 72 patients (18%); 154 patients (39%) were diagnosed with delirium. After controlling for burn severity, dementia and delirium were significantly associated with length of stay, incidence of psychiatry consultation, and discharge to a skilled nursing facility.

**Conclusions:** Physicians should have high suspicion for dementia and delirium in older patients admitted for burn injuries. Dementia and delirium are associated with morbidity in older patients with burn injuries.

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**Key words:** Neurocognitive disorder, Dementia, Delirium, Burn.

### INTRODUCTION

It is expected that 20% of the nation's population will be older than 65 years by 2030.<sup>1</sup> In these older adults, impaired vision, delayed reaction time, cognitive impairment, and other factors could increase the risk for accidents and burns. As the population ages, it is anticipated that an increasing number of older adults will be admitted to hospitals for burn injuries.

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Among patients with burn injuries, older adults are at risk for a number of adverse outcomes including longer length of stay (LOS) and increased risk for rehospitalization, even up to 2 years after a burn injury.<sup>2-4</sup> Additionally, older patients with burn injuries have not seen the decreases in mortality rates that have been observed in younger populations since the 1970s, and there is evidence that older adults have poorer survival compared with younger patients with burn injuries, even after controlling for the total body surface area (TBSA) affected by the burn.<sup>5,6</sup>

Dementia is a common comorbidity in older adults. In a nationally representative, population-based study, the prevalence of dementia was 8.8% amongst adults 65 years and older in 2012. In that same study, the prevalence of dementia was 29.3% in adults 85 years and older.<sup>7</sup>

Despite the high prevalence of dementia in older adults, only a few studies have investigated cognitive impairment in older patients with burn injuries. One study reported that, compared to other patients admitted to an inpatient rehabilitation facility, older patients with burn injuries had lower scores on cognitive testing, suggesting that this patient population is more cognitively impaired than other patient cohorts.<sup>8</sup> In older patients with burn injuries, a diagnosis of dementia has been associated with increased hospital LOS.<sup>9</sup> These findings suggest that older patients with burn injuries may have a higher prevalence of cognitive impairment and worse outcomes than the poor outcomes observed among older adults in general.

The primary purpose of this study was to measure the prevalence and incidence of dementia and delirium in older patients with burn injuries. The secondary objective of this study was to describe associations among dementia, delirium, and patient outcomes.

## MATERIAL AND METHODS

### Setting

The study was conducted at the North Carolina (NC) Jaycee Burn Center at the University of North Carolina (UNC) at Chapel Hill, NC. The NC Jaycee Burn Center is an accredited Burn Center with 36 inpatient beds, including a 21-bed intensive care unit (ICU), and more than 1300 admissions per year.

### Study Design and Subjects

This study was a descriptive, retrospective analysis of patients 65 years and older who were admitted to the NC Jaycee Burn Center from August 2005 until June 2015. Study subjects were identified using the NC Jaycee Burn Center Registry, which includes all patients admitted to the Burn Center from 1994 to the present. This registry supplies data to the National Burn Repository of the American Burn Association and is maintained by a full-time registrar. The electronic medical record was reviewed to verify information obtained by the registry.

### Inclusion and Exclusion Criteria

All patients 65 years and older admitted to the NC Jaycee Burn Center were included in the study, including patients with fire/flame, contact, scald, chemical, electrical, and radiation-related burns. The Burn Center also admits patients who have serious cutaneous reactions, such as Stevens-Johnson Syndrome and erythema multiforme, and these patients were excluded as the purpose of this study was to investigate patients with burn injuries specifically.

### Study Measures

Basic demographics and characteristics of the burn injury including total body surface area (TBSA) burned and presence of inhalation injury were obtained from the burn registry. The use of a psychiatry consultation, days spent in the ICU, days on mechanical ventilation, total hospital LOS, cost of hospitalization, and disposition were also extracted from the registry. The cost of hospitalization includes the total charges for the inpatient stay that are billed to the insurance company or patient. The cost of hospitalization does not include the physician fees that are billed separately.

Age, TBSA burned, and inhalation injury are the primary factors that influence mortality due to burn injury.<sup>10</sup> The Baux score, which is the sum of a patient's age plus TBSA burned, was developed in 1961 and has been used to predict mortality due to burns for decades.<sup>11,10</sup> Subsequently, the revised Baux score, which incorporates the presence of inhalation injury by adding 17 points to the patient's age and TBSA, was developed and validated as a predictor of mortality in patients with burn injuries.<sup>12</sup> In older

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