Association Between Burn Injury and Mental Illness among Burn Survivors: A Population-Based, Self-Matched, Longitudinal Cohort Study

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BACKGROUND: Mental health disorders are prevalent before and after burn injury. However, the impact of burn injury on risk of subsequent mental health disorders is unknown.

STUDY DESIGN: We conducted a population-based, self-matched longitudinal cohort study using administrative data in Ontario, Canada between 2003 and 2011. All adults who survived to discharge after major burn injury were included, and all mental health-related emergency department visits were identified. Rate ratios (RRs) for mental health visits in the 3 years after burn, compared with the 3 years before, were estimated using negative binomial generalized estimating equations.

RESULTS: Among 1,530 patients with major burn injury, mental health visits were common both before (141 per 1,000 person years) and after (154 per 1,000 person years) injury. Mental health visits were most common in the 12 weeks immediately preceding injury. No significant difference in the overall visit rate was observed after burn (RR 0.97; 95% CI 0.78 to 1.20), although among patients with less than 1 pre-injury visit, mental health visits tripled (RR 3.72; 95% CI 2.70 to 5.14). Self-harm emergencies increased 2-fold (RR 1.95; 95% CI 1.15 to 3.33).

CONCLUSIONS: Mental health emergencies are prevalent among burn-injured patients. Although the overall rate of mental health visits is not increased after burn, the rate increases significantly among patients with one or fewer visits pre-injury. Self-harm risk increases significantly after burn injury, underscoring the need for screening and targeted interventions after discharge. An increased rate immediately before burn suggests an opportunity for injury prevention through mental healthcare. (J Am Coll Surg 2017;■:1–9. © 2017 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)

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Burn injury is a devastating event, exposing survivors to extreme stressors that can have substantial physiological, aesthetic, and psychological consequences. After discharge, recovery can be limited by several factors, including new functional limitations, visible scarring or deformity, chronic pain, and traumatic stress related to the initial injury.1-4 Taken together, these stressors might have a detrimental impact on the mental health of burn survivors.

Many studies have attempted to describe the burden of mental illness in burn survivors, suggesting that mood- and anxiety-related disorders are prevalent,5-6 and that up to one-third of patients suffer from post-traumatic stress disorder. Unfortunately, the interpretation of these studies is limited by small sample sizes, short follow-up intervals, and high rates of loss to follow-up. More importantly, existing studies were unable to explicitly account for pre-burn mental illness; many did not collect any pre-injury data, or relied on potentially biased self-reporting of earlier psychiatric morbidity.

The objective of this study was to determine whether the rate of mental health visits increases after burn injury, and to identify risk factors for post-burn mental health disorders. To overcome the limitations of earlier studies, we used a population-based approach that facilitates capture of a large cohort of burn-injured individuals and their pre-injury mental healthcare use. These data are critical to identify opportunities for prevention through screening, and to inform the design and implementation of new initiatives to mitigate the long-term impact of burn injury on the mental health of burn survivors.

METHODS

Study design

After obtaining Research Ethics Board approval, we conducted a population-based, self-matched longitudinal cohort study in Ontario, Canada, using information from several linked administrative databases. We used an exposure crossover design, such that each patient acted as their own control; this approach minimizes confounding due to personality, genetics, socioeconomic status, and other stable characteristics that can be difficult to measure.

Data sources

Data were derived from the following sources: Discharge Abstract Database, which captures demographic, diagnostic, procedural, and discharge information on all acute care hospitalizations in the province of Ontario; Registered Persons Database, comprising vital statistics for all residents of the province of Ontario who are alive and eligible for coverage under the Ontario Health Insurance Plan; National Ambulatory Care Reporting System, which captures demographic, diagnostic, and discharge information for all emergency department visits in Ontario; and Ontario Mental Health Reporting System, which records demographic, diagnostic, and discharge information for all individuals receiving mental health services in Ontario; up to 3 diagnoses per visit are recorded, according to the Diagnostic and Statistical Manual of Mental Disorders, 5th edition.9 These datasets were linked using unique encoded identifiers and analyzed at the Institute for Clinical Evaluative Sciences. Similar to other Canadian provinces, the Ontario government administers a single-payer system that universally funds all hospital, laboratory, and physician services for eligible residents; therefore, these data sources include records for virtually all residents in the province. The diagnoses codes for burn injury in these datasets have been validated previously.10

Study patients

The study population included all patients aged 16 years and older who were admitted to hospital for treatment of major burn injury between April 1, 2003 and March 31, 2011 in Ontario, Canada. To ensure complete follow-up, only patients who remained alive and eligible for health coverage during the 3 years after the burn admission were included. Similarly, to ensure the identification of all pre-injury visits, only patients eligible for health coverage during the 3 years before the burn admission were included. Individuals lacking a valid Ontario health card or those who sustained concurrent major trauma with their burn were excluded. Major burn injury was defined as any burn injury resulting in ≥10% total body surface area (TBSA) burn; full-thickness burns to the face, feet, hands, or perineum; or any TBSA burn with inhalation injury. These criteria were chosen because they represent injuries that are severe enough to warrant referral to a burn center, and might be most associated with subsequent mental health events.11

Outcomes

The primary end point was the composite rate of mental health visits (related to mood disorder, anxiety, self-harm, substance abuse, and schizophrenia) in the 3 years after burn injury compared with the 3 years before injury. All emergency department (National Ambulatory Care Reporting System) or mental health (Ontario Mental Health Reporting System) visits with an ICD-10 or Diagnostic and Statistical Manual of Mental Disorders, 5th edition main diagnosis code designating these disorders, or those with an ICD-10 external cause of injury code designating intentional self-harm (range X61 to X84), were
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