Measuring Burn Injury Outcomes

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KEYWORDS

• Burns • Outcomes • Acute and critical care • Functional
• Health-related quality of life • Psychological

KEY POINTS

- A burn injury poses challenges to the patient at every level.
- Measuring outcomes is essential to drive improvements in clinical care.
- Measurement of burn outcomes should include acute care measures as well as functional and health-related quality-of-life indices that can only be measured long term.

INTRODUCTION

The goal of medical care, including burn care, is to enable people to lead productive lives after illness or injury. Outcomes studies inform clinicians, administrators, payers, and patients on optimizing patient care and are the foundation for quality improvement. However, what are the outcomes and who should define them? In general, a patient outcome is the status of the patient after treatment, and it thus varies depending on time after injury.[1] In order for outcome measures to be useful, they need to yield consistent results (ie, be reliable), measure the element being examined (ie, be accurate), and be able to detect meaningful changes in patient status. The study of disease-specific outcomes, each with its own unique aspects, has dominated outcome and quality-of-care initiates for many years. Burn injury is no exception. Optimizing patient outcomes, and measurement of those outcomes, has become the cornerstone for evaluating quality of care in burn treatment. This article describes outcome measurements in burn injury throughout the spectrum of care.

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TRADITIONAL OUTCOME MEASUREMENT: MORTALITY

Mortality has dominated burn outcome studies for more than a century for several reasons. First, burn injury is life threatening.[2] If the patient dies, quality of life becomes irrelevant. In the early years of burn care, mortality was the predominant outcome issue: in the 1930s the LD50 (lethal dose, 50%; the size of burn injury at which half of the patients died) was 30% total body surface area (TBSA) burn.[3] Hence, mortality was the best outcome indicator at the time. Second, mortality was a straightforward end point to measure and record. Computers were not available to early clinicians and researchers; hence, end points needed to be well defined, consistently documented, and easily audited. Third, the timing of measurement for mortality as an outcome measure was indisputable. Outcomes studies were confined primarily to the inpatient hospital stay, because this was the episode of care that was best documented and most readily available for performance improvement.

Several unique aspects of burns enabled burn practitioners to become leaders in outcomes research. Burn injury is quantifiable. The extent of burn injury can be evaluated, and the use of burn size as a percentage of body surface area enabled burn surgeons to develop some of the first injury severity scoring systems.[4–6] Burn practitioners were among the first groups with the ability to compare outcomes of different treatment paradigms for patients with similar injuries. From this, the classic triad of burn mortality determinants was developed: age, burn size, and presence of inhalation injury.[7,8] Studies of these three parameters have dominated burn literature and enabled burn surgeons to construct evidence-based disaster triage algorithms.[9]

The study of burn mortality has had tangible results. The American Burn Association (ABA) created the National Burn Repository (NBR) database in 1991, building on a preexisting but limited injury database. The NBR now contains deidentified data on individuals admitted to burn centers in North America (and Sweden in 2010). The ABA provides an annual NBR synopsis, reporting on burn injury incidence, cause, and acute outcomes.[9] From these reviews, overall LD50 after burn injury has increased to 70% TBSA.[9] For some age groups (5–18 years), more than half of the patients survive greater than a 90% burn. However, mortality as an end point for outcomes is not uniform among all age groups. In the very young (<2 years), very old (>60 years), and those with comorbidities (such as cardiac, pulmonary, or renal failure) mortality continues to be high.[9,10] The LD50 for a person greater than 60 years of age is still 30%.[10,11] Given the increasing number of elderly and the high mortality associated with burns in this age group, mortality as an outcome measure is still important in the elderly.

OTHER ACUTE PHASE BURN OUTCOME MEASURES

Objective measurement of cost and quality of burn care is frequently measured by length of stay (LOS). LOS is a reflection of injury severity, patient comorbid conditions, and treatment effects. Used in isolation, the utility of LOS is limited, because it is directly related to burn size and age.[12] Therefore, LOS is commonly described as a function of burn size using the ratio of hospital days to percent TBSA (%TBSA) burn. In general, the ratio of LOS to %TBSA should be approximately 1 (ie, 1 day of hospitalization per %TBSA burn).[13,14] The ratio becomes problematic for small burns that involve functional areas (such as bilateral hand burns, which require intensive wound care and physical therapy by skilled burn professionals for prolonged periods), for patients with social issues (eg, the homeless, those who are injured because of neglect or abuse), or patients with severe medical comorbidities (eg, diabetes, chronic obstructive lung disease). Despite these limitations, the LOS/%TBSA ratio remains an objective standard for burn patient hospitalization.[15]