

POLICY FORUM

Defining Adequate Quality and Safety Metrics for Burn Care

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Abstract

While current evidence-based practices might be applicable to caring for patients with routine diseases and common injury patterns, their application to burn care is less clear. Quality metrics created for large patient populations have failed to account for diseases that are not included in landmark research. Tasked to provide not only medically appropriate but also high-quality and cost-effective care for patients, burn clinicians must find a balance between patient-specific quality metrics and external quality metrics.

Evolution of Burn Care

Burn injury treatments have been documented since the beginning of recorded history and have occupied the minds of great historical figures in the practice of medicine: Paré, Marjolin, Dupuytren, and Curling, to name a few. In the last 100 years, foundational work in the understanding of fluid and electrolyte imbalances, shock, and metabolism was done by surgeons managing patients with thermal injury.¹⁻⁷ Dramatic reductions in morbidity and mortality have been made possible through a combination of aggressive goal-directed resuscitation coupled with early surgical management. The transition from conservative to aggressive surgical management in the 1970s to 1980s, coupled with advances in our understanding of critical care and the formation of dedicated burn centers, has decreased mortality in even the largest injuries.⁸

As the burn community has finally begun to come up for air and look across the horizon of health care, it struggles to apply current metrics of quality care to its patient population. We review these quality metrics, which are based on large patient populations with routine diseases and common injuries, arguing that they are not applicable to management of burn patients. Tasked to provide not only medically appropriate but also high-quality and cost-effective care for patients, burn clinicians must find a balance between these external quality metrics and patient-specific quality metrics.

Origins of Quality Metrics

Parsimony in the practice of health care has become increasingly relevant in the last decade. Defined by the American College of Physicians as care that “utilizes the most

efficient means to effectively diagnose a condition and treat a patient," parsimonious care is one facet of the movement to balance quality and cost in medical care.⁹ Programs such as the [Choosing Wisely® campaign](#), established in 2012 and participated in by over 70 medical societies and society collaboratives,¹⁰ encourage physicians to rely on evidenced-based guidelines to limit costly, unnecessary, and potentially dangerous care.^{10,11} Effective implementation of these guidelines requires patient education and involvement as well.

Attention to the costs of care has been coupled with increasing attention to the quality of care. The 2000 Institute of Medicine Report, *To Err is Human*,¹² suggested significant opportunities for improvement in the delivery of health care that were framed in a subsequent report as containing 6 elements: safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity.¹³ The growing complexity of science and technology, the increase in chronic conditions, a poorly organized delivery system, and constraints on exploiting the revolution in IT were cited as reasons for the inability to improve quality of care.¹³ [Quality and safety departments](#) are now a standard part of most hospitals and do significant work to support initiatives ranging from hand washing to the prevention of central line-associated blood stream infections (CLABSI) and catheter-associated urinary tract infections (CAUTI).¹² Treatment "bundles" exist to minimize post-intensive care unit (ICU) syndrome, enhance recovery after gastrointestinal surgery, and standardize pneumonia prevention in intubated patients.¹³⁻¹⁴ Unfortunately, 15 years after the publication of *To Err Is Human*, a National Patient Safety Foundation (NPSF) report suggested there is still significant work to be done, including creating appropriate metrics that reflect meaningful outcomes in safe patient care and supporting health care practitioners to "fulfill their highest potential as healers."¹⁵

Available Quality Metrics

Despite the conclusion of the NPSF report, the practice of delivering high-quality medical care already had some metrics ascribed to it. The 2008 Hospital-Acquired Conditions Initiative attempted to define preventable adverse events and motivate hospitals and clinicians to eliminate them by establishing limits on reimbursement for certain preventable hospital-acquired conditions, such as deep pressure wounds, infections associated with indwelling catheters, surgical site infections, and deep vein thrombosis, to name a few.¹⁶ Arguably, as a result of this initiative, hospital patient safety initiatives targeting documentation of preexisting pressure wounds, nurse-driven catheter removal, and perioperative antibiotic dosing have increased in volume and frequency.²⁰ With further awareness of the consequences of extended critical illness, it is not a stretch to imagine current ICU best practices being turned into metrics of quality care.

Quality Metrics Applied to Burn Care

The paradox of the current health care environment is the application of quality metrics created for large populations to a population of patients routinely excluded from the development of those metrics. Sepsis response teams patrolling the hospital will routinely identify markers of sepsis in patients with thermal injury that prompt extra blood tests that are inevitably negative—despite the American Burn Association’s 2007 consensus guidelines on the differences between standard markers and those that are useful in the population of patients with burn injury.²¹ Repeatedly, burn patients are noticeably absent in the data supporting the implementation of quality care. At the top of every list of exclusion criteria for large system studies in critical disease, surgical site infection management, and sepsis is burn injury.²²⁻²⁴ While the alphabetical order of these lists by nature results in these patients coming at the top, nevertheless the exclusion of burn patients from these large studies merits evaluation.

Why Exclude Burn Patients from Data for Metrics?

Burn patients spend a significant amount of time in the hospital during the acute phase of their care, averaging around one hospital day per percent area injured.²⁵ In an era of minimally invasive, same-day or short-stay surgery for hernias and cancer, how does a system prepare itself to handle a 2-month minimum stay in the hospital for a young patient with a 60% total body surface area (TBSA) burn? The hypermetabolic response to burn injury results in the most pronounced catabolism of any clinical condition studied in medicine; without adequate nutritional supplementation, this profound tissue breakdown for energy generation can leave patients unable to heal even the smallest of wounds. While burn surgeons have the luxury of daily visualization of the burn and donor wounds to determine if nutritional support is adequate, it becomes impossible to generalize burn healing success to wound healing success in cardiac or gastrointestinal (GI) surgery. Can mediastinitis or an anastomotic leak after GI surgery be compared to failure of burn wounds and grafts to heal? In the delicate balance between patient and microbe, alterations in the integrity of the skin and mucus membranes can have significant consequences for the ability of patients to maintain their normal microbiome. Infection control practices are predicated on the idea of intact or minimally damaged skin; can these criteria be applied when the single largest organ in the human body is damaged?

Ultimately, the lack of large populations of patients with thermal injury, coupled with these patients’ extreme response to injury and their treatment in specialized centers, limits the ability to include these patients in larger cohort studies examining processes and practices that do have substantial impact on outcomes. On average, roughly 486 000 burn injuries receive medical treatment per year; of these cases, roughly 3% die and 8% are hospitalized.²⁶ In 2005, there were approximately 5 times as many trauma centers in the United States as there were burn centers²⁷; while burn centers see over 60% of acute hospitalizations, acute care hospitals each typically average 3 burn admissions per

year.²⁶ The small number of burns treated outside of regional burn centers contributes significantly to the inability to standardize practice and outcome metrics for burn injury management. While data suggests that every 42 seconds an American will suffer a myocardial infarction, giving physicians in hospitals around the country the opportunity to hone their clinical management skills, those same physicians can go years without seeing a burn injury.²⁸ The number of surgeons interested in treating burn injuries remains small; the authors have personally had conversations with colleagues who express a variety of emotional responses to the idea of managing burn injuries, very few of which are positive. With clinical care taking precedence, it becomes difficult to pursue the large-scale studies necessary to define and refine quality metrics for burn care.

Problems in Defining Quality Burn Care

The hyperfocus on quality and safety, appropriately necessary for both life-saving and cost-saving reasons, has resulted in metrics that are not applicable to teams managing burn patients. For example, extrapolating from the CLABSI and CAUTI prevention initiatives, zero infections is not a reasonable metric in a patient with a 70% TBSA burn²⁹; appropriate antibiotic stewardship with the avoidance of multidrug-resistant microbe evolution over a hospital stay could be. By failing to educate our colleagues, administrators, and the public on disease-specific deviations from quality care and instead spending much of our focus on burn injury prevention, the burn community has left itself open to undeserved criticism and financial penalties under the Hospital-Acquired Conditions Initiative, whose incentives are based on metrics that have no bearing on burn patient outcomes.

Meanwhile, despite trying to provide cost- and resource-conscious care, clinicians are often left tilting at windmills flying insurance company flags. Although novel therapies have emerged that have been shown on a small scale to significantly improve patient function without costly and complex staged reconstructive surgery, their adoption by the burn community at large is hampered by the lack of studies necessary to produce evidence-based guidelines, complicating reimbursement. Laser scar revision is a good example; the authors have personally been told on the same phone conversation for preauthorization that the procedure would be denied because it was experimental, and then when papers suggesting it was routine were provided, they were quickly told it was cosmetic, with the result that preauthorization was again denied. While [cosmesis](#) might be a valuable benefit, there is no part of the surgical management of burn patients that does not have roots in functionality. This disparity in burn patients' access to novel therapies, as well as a lack of transparency by insurance companies, contributes to the failure to standardize care for this patient population. It also, unfortunately, contributes to potentially preventable variation in patient outcomes, the very thing the focus on quality care works to avoid.

Fulfilling Burn Care's Potential

While the numbers of practicing burn surgeons, nurses, therapists, pharmacists, and other allied health professionals—all of whom are dedicated to the management and study of these complicated patients—is barely enough to keep all the centers staffed, as a community we are perhaps the closest to achieving the NPSF's goal to "fulfill [our] highest potential as healers" through teamwork.¹⁸ Burn patients by their very nature demand a multidisciplinary team; functional recovery requires attention to details ranging the gamut of joint positioning in bed, micronutrient deficiency impact on skin healing, manifestations of posttraumatic stress disorder (PTSD), transportation to and from the burn center for outpatient follow up, and the optimal timing of scar revision therapy. While many other disease processes are managed by multidisciplinary physician teams, team members are often siloed based on the phase of care the patient is undergoing. There is no silo in burn care—everyone is involved from the day of admission. Interestingly enough, in a survey of burn surgeons spanning the gamut of experience (5 to 40 years in practice), there was very little evidence of burnout (L.S.J., unpublished data, 2015-2016). Similarly, a comparison of nurses on a burn unit to other nursing groups demonstrated lower risk of burnout; this was primarily attributed to high sense of personal accomplishment.³⁰ The focus on quality medical care for patients cannot neglect the nurturing of the medical team along the way; the sum of these individual parts will truly be greater for the attention paid to each.

Conclusion

Medicine in general and burn care specifically continues to walk a fine line between applying population-based health metrics and providing individualized care. As health metrics are being developed for broad application based on science, it is important to have flexibility in applying them to account for the art of caring for the sick. While quality and safety are core tenants of patient care, it remains to be seen if markers that make sense from a 30 000-foot view are just as applicable at the foot of a burn patient's bed.

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