

Rehabilitation of the Complex Burn Patient with Multiple Injuries or Comorbidities

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KEYWORDS

- Burn • Rehabilitation • Impairment • Reconstruction • Recovery • Brain injury • Nerve injury
- Amputation

KEY POINTS

- Burn patients require interdisciplinary rehabilitation to maximize functional recovery.
- The loss of protective, mechanical, and cosmetic function of the skin and its underlying structures, such as the nervous and musculoskeletal system, must be identified, managed, and corrected.
- Full recovery involves restoration of functional mobility, self-care skills, and psychological well-being.

INTRODUCTION

The rehabilitation of a patient with burns can be one of the most complex, time-consuming, and costly endeavors in rehabilitation medicine. Extensive burns and associated injuries often lead to long-term physical and psychological dysfunction. As the mortality from burn injuries has decreased over time because of the development of comprehensive burn centers,¹ there is continued need for well-designed rehabilitation protocols and care pathways from the acute stabilization phase through the patient's return to the community. Superficial partial-thickness burns that avoid critical body areas such as the face, hands, feet, genitalia, perineum, or major joints typically require acute treatment and short-term multidisciplinary management and follow-up. In contrast, deep partial-thickness or full-thickness burns, burn injuries requiring substantial grafting, and burns over critical areas are all indications for referral to a burn

center to ensure that the patient has access to comprehensive burn-focused care. Complex burn injuries require an interdisciplinary effort in which the stabilization, reconstruction, and rehabilitation process is carefully planned among the burn physicians, nurses, therapists, social workers, and other support services.² The group activity of this interdisciplinary team is synergistic, producing more than what the team members could produce separately.³ This article presents an overview of the rehabilitation medicine approach to the care of patients with extensive burns with additional focus on the neurologic or musculoskeletal complications.

FUNCTIONAL LOSS CAUSED BY A BURN

The World Health Organization provides a contextual framework through the terms *impairment*, *activity*, and *participation* to understand how a burn injury affects a person's ability to move, care for

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him or herself, and fulfill a role in society. The terms *activity* and *participation* have replaced the older terms of *disability* and *handicap*, respectively (Table 1).⁴

Burn care in terms of reconstruction, rehabilitation, and recovery can also be understood in this model. Reconstruction can be defined as the restoration of the skin and related structures that are causing the loss of function and impairment. Rehabilitation is then necessary to regain the ability to perform a functional activity with that body part. With ongoing comprehensive care, a person then can move toward recovery of meaningful participation in life in his or her home community and potentially place of employment.

FUNCTIONAL ASSESSMENT OF A BURN PATIENT

Burn rehabilitation starts with assessing the location of the burns, the total body surface area involved, and the depth of the burn. Burn and graft donor sites, areas of contracture, and scar development must be assessed with particular attention to how the burn affects range of motion (ROM) and function of the body part. In complex cases, the rehabilitation professional must account for other organ system injuries and complications, including inhalation injuries, central and peripheral nervous system injuries, musculoskeletal trauma, and heterotopic ossification.

The burn team must also learn about the person with the burn, taking into account a person's pre-morbid functional status, current functional status, social and caregiver support, living environment, and goals of care. In general, burn patients who are younger, higher functioning at baseline, married, and employed have the best functional outcomes.⁵

Age and Preburn Functional Status

A person's functional status before the burn is one of the most important factors in determining

his or her rehabilitation potential. Most children and young adults have high functional reserve to overcome obstacles. For example, an otherwise healthy young adult who loses a leg because of a burn usually has the strength in the unaffected leg and arms to be able to stand and walk with an assistive device. In contrast, an elderly person who is frail at baseline and confined to a wheelchair, has a poor prognosis for ambulation after a burn and is at higher risk for continued functional decline because of injury, immobility, and comorbidities.

Current Functional Status

The state of a person's burn injuries, including the presence of scars and contractures; past and planned reconstructions; and current functional status determine what rehabilitation interventions are necessary. Many instruments measure and communicate function. Some instruments measure function of specific body parts, such as the hand in burn patients.⁶ Other instruments give a more global assessment of a person's function. One comprehensive measure of function used by inpatient rehabilitation facilities is the Functional Independence Measure (FIM Instrument; Uniform Data System for Medical Rehabilitation, Amherst, NY), which has been validated for burn patients⁷ but does not correlate with the size of the burn injury.⁸ The instrument quantifies the amount of assistance a person needs across 18 functional domains, which are divided into 5 mobility categories, 8 activities of daily living categories, and 5 cognitive/communication categories (Fig. 1). Each functional domain is scored from 0 to 7, with 0 signifying that the activity does not exist and 7 indicating that the person is fully independent. The terms and definitions that correspond to the numerical scores are part of the normal functional vocabulary of rehabilitation and are useful in describing a patient's ability to perform any type of activity (Table 2).

Table 1
Definitions of impairment, activity, and participation

Term	Definition	Example	Intervention
Impairment	Loss of body part or function	Third-degree burn of hand	Surgical reconstruction of hand
Activity (disability)	Loss of ability to perform an activity	Inability to perform basic manipulations with hand and self-care	Occupational therapy to rehabilitate hand function
Participation (handicap)	Loss of ability to participate in a life situation	Unable to work as a mechanic	Vocational training to recover ability to work

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