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The development and preliminary validation of the Taiwanese Manual Ability Measure for Burns

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ARTICLE INFO

Article history:
Accepted 18 December 2012

Keywords:
Burns
Activities of daily living
Outcome assessment
Health care evaluation
Rehabilitation

ABSTRACT

Objective: To develop and validate the Taiwanese Manual Ability Measure for Burns (T-MAM for Burns), a task-oriented functional evaluation tool to assess self-reported manual ability in burn patients.
Design: A longitudinal study.
Participants: A sample of 45 burn patients from burn rehabilitation centers with varying degrees of hand involvement.
Methods: The preliminary testing version was formed by adding burn specific items to the Taiwanese version of the Manual Ability Measure. A field test was then conducted for item reduction and psychometric properties testing.
Results: Out of 55 initial items, 20 were selected into the final version of the T-MAM for Burns. Psychometric analyses indicated that it was reliable (test–retest ICC = .99), with adequate concurrent validity with various other hand function tests ($r = -.79$ with the short form Disabilities of the Arm, Shoulder, and Hand, or, the *Quick*DASH) and discriminative validity (significant difference ($t = 2.99$, $P = .005$) between groups with unilateral vs. bilateral hand burns), and responsive (ES = .24 and .44 at one- and 3-month evaluations).
Conclusion: This study shows that the T-MAM for Burns has great potential to be a functional outcome measure for burn rehabilitation. Additional research with a larger sample should be conducted to further confirm its validity and reliability.

1. Introduction

Injuries to the hand are common among patients with burn injuries, with a reported prevalence rate of over 50% in North America [1]. Hand burns may lead to significant functional limitations and profoundly disturb a person's physical and psychological well-being [2–4].

Since the survival rate in patients with burn injuries has dramatically increased due to improved medical management in recent years, more attention is paid to rehabilitation and functional outcome enhancement [5]. Functional measurement, which assesses patients' ability to perform everyday activities and/or assume life roles [6], provides important baseline information to health care practitioners. Hand function is an important functional outcome and a top priority of rehabilitation goals. Moreover, it is a strong predictor of the physical aspect of quality of life for burn survivors [7]. An appropriate hand function outcome measure is essential to gather information needed for treatment planning and implementation.

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0305-4179/$36.00
http://dx.doi.org/10.1016/j.burns.2012.12.012

Assessments commonly used to measure hand function in patients with burn injuries can be classified into three categories: (a) tests measuring traditional components, (b) performance-based tests, and (c) patient-reported outcome measures [8]. Tests measuring traditional components (e.g., range of motion [ROM] and grip/pinch power measurements) gather information vital to clinical practice, but test results only reflect hand impairments and cannot translate into patients' functional abilities in everyday life [9,10]. Performance-based tests [11–13], assessing hand function using simulated functional tasks, are not only time-consuming to administer, but also lack flexibility in testing procedures, and therefore, cannot be used for all cases. For example, a hand-burn client may not be able to perform the Jebsen–Taylor Hand Function Test (JTHFT) due to significant finger flexion contracture. Moreover, most performance-based tests have not been validated in patients with burn injuries, nor do the results reflect patients' functional levels in the real-life context. To assess hand ability in real life, patient-reported outcome measures (i.e., rating scales in the form of questionnaires) may provide another option as they evaluate an individual's self-perceived hand function [14–16].

Furthermore, no burn-specific hand function assessments are available. To date, only two studies have investigated the psychometric properties of generic hand function assessments in the burn population [17,18], and no burn-specific hand function assessments are available. Since burn injuries have a unique impact on hand function, there is a clear and urgent need to develop a psychometrically sound hand function outcome measure for patients with hand burns. Therefore, the purpose of this study was to develop a burn-specific questionnaire, the Taiwanese Manual Ability Measure for Burns (T-MAM for Burns), that is valid, reliable, responsive and easy to use in clinical practice.

2. Methods

The study was conducted in two phases. The first phase consisted of the development of items for the T-MAM for Burns, which included development of items for the preliminary version, field testing, data analyses, and selection of items for the final version of the scale. The second phase consisted of the validation of the final assessment, including the examination of its validity, reliability, and responsiveness. The study was reviewed and approved by the ethics committees and institutional review boards of the participating institutions.

2.1. Phase 1

2.1.1. Item development for the T-MAM for Burns

The Manual Ability Measure (MAM-36), in its original English form and the revised Taiwanese (i.e., T-MAM) version were adopted as the initial item bank for this study. The MAM-36 is a rating scale of 36 everyday tasks that measures self-perceived manual ability. Each task is rated as easy (4), a little hard (3), very hard (2), cannot do (1), and almost never do (0) [19]. It has been validated in patients with a variety of conditions [9,19,20], but not in patients with burn injuries. The MAM-36 was translated into Chinese and the items (i.e., tasks) were reviewed, modified, and culturally adapted so that the Taiwanese version of the Manual Ability Measure (T-MAM) was appropriate for use with the Taiwanese population as a generic hand function questionnaire [21]. Next, nine new items were added based on a review of the literature and consultation with clinicians who treated patients with burn injuries. Some examples of the new items are: 'put on pressure garments,' 'wash hair,' and 'turn on a gas oven.'

Before finalizing the preliminary version, we administered the scale to four patients with burn injuries. The results were reviewed by an expert panel including two surgeons, two occupational therapists (specializing in treating patients with burn injuries), and two former patients. The importance of the items was rated by the panel using a 5-point rating scale (5 indicating very important, 1 not important). We considered their ratings and finally included 55 items in the preliminary version of the T-MAM for Burns.

2.1.2. Field testing

2.1.2.1. Participants. A consecutive sample of 45 patients were recruited from two major sources: (a) burn unit of a large medical center where patients received in- and outpatient rehabilitation services, and (b) a private non-profit foundation which offers community-based (outpatient- or home-based) burn rehabilitation services. The latter has well-established regional centers (in northern, middle, and southern Taiwan) where about 60% of all new patients with burn injuries are referred for rehabilitation services and monitored after acute care. Therefore, a wide variety of patients were recruited for this study, including patients treated at an acute burn unit in a major medical centre and those undertaking regional community-based rehabilitation. Consequently, the final sample comprised of patients with different burn severity, and/or patients at different stages of recovery. Data collection took place from June 9, 2010 to April 31, 2011.

2.1.2.2. Inclusion and exclusion criteria. Participants had to meet all of the following inclusion criteria:

1) Patients with burn injuries had to have had hand involvement and had rehabilitation needs as defined by the Burn Center Referral Criteria [22], including: partial thickness burns greater than 10% of their total body surface area (TBSA), third degree burns, burns that cross major joints in their hands, electrical burns (including lightning injuries) or chemical burns.
2) Received occupational or physical therapy.
3) Had some experience in activities of daily living (ADL) after burn injuries.
4) Were at least 18 years or older.
5) Were alert and oriented and able to answer questions in the questionnaire.

They were excluded if they were medically unstable, had postoperative suture removal time of less than two weeks, and/or had other co-morbidities (e.g., stroke) that might adversely affect their manual ability.