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Patient opinion of scarring is multidimensional: An investigation of the POSAS with confirmatory factor analysis

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ABSTRACT

Introduction: Scarring is a significant consequence for patients following a burn. Understanding how patients perceive the physiological scar and define scar severity may provide valuable information regarding how the scar influences quality of life after burn. The Patient and Observer Scar Assessment Scale was the first scar assessment tool validated to include the patients' evaluation of the scars physical qualities, following a burn. Validation studies of this tool have previously been conducted for a discrete scar-site after burn. The aim of this study was to assess the structural validity of the POSAS to capture the patients' evaluation of the total area of burn scar(s).

Method: Statistical analysis was based on 508 completed POSAS forms from 358 patients. Exploratory factor analysis (EFA) was used initially to identify the number of factors within the tool, then confirmatory factor analysis (CFA) using structural equation modelling explored areas of misfit within each factor and whether the model provided a predicable structure to capture patient perception of scar severity.

Results/Discussion: The CFA analysis confirmed that a two dimensional model was superior to a unidimensional model when assessing the patient opinion of their total burn scar. The two dimensions were the physical scar (color, stiffness, thickness and irregularity) and the sensory scar (pain and itch). Further strain analysis of the two factor model identified additional domains. Independent factors influenced the perception of color forming a separate subdomain within the physical domain. Color is a visual characteristic, whereas

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Abbreviations: PROM, Patient rated outcome measure; EFC, Exploratory factor analysis; PCA, Principal component analysis; CFA, Confirmatory factor analysis; SEM, Structural Equation modelling.

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the other three are predominantly tactile characteristics. A significant relationship between thickness and irregularity suggested they may form another subdomain, however further research is required to confirm this. Both pain and itch were recognized as independent, multidimensional latent variables, which require assessment tools with multidimensional structures.

Conclusions: When assessing the entire burn scar, three independent dimensions influence patient perception: (1) the physical scar, (2) pain and (3) itch. Within the physical domain, color formed a visual subdomain separate to a tactile subdomain. Further development of these domains within a high-order multi-dimensional structure is recommended.

1. Introduction

Scarring is considered one of the most devastating consequences of a burn which impacts negatively on quality of life [1–6]. Scarring has been associated with long term physical limitations including altered sensory function [7], chronic pain [8,9], chronic itch [10–14], and limitations to functional movement [15,16]. The psychosocial sequelae can include social stigmatism [3], social anxiety [17], discrimination [3,18], depression [19,20], post-traumatic stress [3,17] and poor body image [21–23]. Understanding the relationship between scar severity and quality of life outcome is integral to directing future treatment practices.

Scar severity is an ill-defined concept with little consensus regarding best practices for evaluation [6,22,24–27]. The severity of the scars physical characteristics, has traditionally been defined by clinicians [6,25,28] with clinically developed and rated scar assessment tools [29,30]. These clinically rated tools evaluate the presence, absence and the degree of pathology present [6]. Patient rated scales commonly assess the functional limitations and/or the impact of the burn as opposed to the physiological quality of the scar itself [6]. However the patients opinion on the severity of the scars physical characteristics can differ from the clinical opinion [31,32] and is therefore also important to collect in burn quality of life research [30,33,34].

Cognitive research has demonstrated that the patient's personal beliefs about the severity of their illness or injury has a greater influence on QoL than the actual severity of the illness itself [35–38]. This has been recognized in health care directives world-wide, with a emphasis on a patient-centered model of care, capturing patients opinions of their condition [39–42]. Capturing the patient rated severity ensures therapy meets the actual needs of the patients rather than the clinically perceived needs of the patient [39]. In order to further develop a patient-centered model of care in burn rehabilitation, an assessment tool capturing the patient's perception of the severity of their scar is required as an adjunct to the current assessment tools [43].

The Patient and Observer Scar Assessment Scale (POSAS) is the only validated burn scar assessment tool to include both a clinically rated component and a patient rated component of the scars physical severity. The POSAS was developed and validated to capture the patient's perceptions of a discrete scar site [30]. Quality of life outcome however is likely to be affected by the total scar produced by the entire injury. The purpose of this study was to evaluate the structural validity of the patient rated component of the POSAS, to capture the patient's perception of the quality of their total burn scar(s), irrespective of the size, or number of scar locations.

2. Methods

2.1. Study design and data collection

The POSAS was collected at Royal Perth Hospital (RPH) burn center between January 2010 and December 2013 as part of a routine battery of outcome assessments. This was a retrospective analysis of data collected prospectively during that period. Adult patients completed the POSAS during routine ambulatory clinics at five time points after the date of their burn: (1) 4–6 weeks, (2) 3 months, (3) 6 months, (4) 12 months and (5) 24 months. Some patients completed POSAS forms at multiple time points, however they were all considered as independent assessments. The purpose of this study was to evaluate the structural validity of the assessment tool as opposed to analyzing the results, therefore all completed POSAS forms across all time points were included in the structural analysis, All scar sizes were included in the study. If multiple scars sites were evident, the TBSA was calculated as a total surface area of the combined scar sites and patients were asked to rate all scars within a single score. Non-English speaking persons or persons with low literacy abilities, precluding their ability to complete the form, were excluded. Demographic details were obtained from patient medical records including their date of injury, gender, age at injury, total body surface area burned (TBSA), length of stay (LOS) and the occurrence of surgical intervention.

2.2. The POSAS

The POSAS was developed in 2004. It consists of two separate scales, the patient scale and a clinician (observer) scale. The observer scale was not evaluated in this study. The patient scale version 2.0 English (http://www.POSAS.org) consists of seven questions, six of which ask the patient to rate specific characteristics of their scar (pain, itch, color, stiffness, thickness and regularity) and the seventh question rates the overall opinion of the scar site [30]. The first six questions are well established characteristics of scar formation considered to be important in clinical burn scar assessment [3,25,26,29,30,44–49]. All questions are rated on a 10 point scale, with 1 equal to no difference between the scar and non-injured skin and