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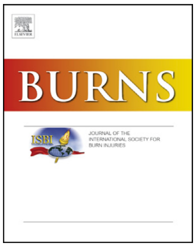

Health-related quality of life (EQ-5D) early after injury predicts long-term pain after burn

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ABSTRACT

Background: Chronic pain after burn can have severe physical and psychological effects on former patients years after the initial injury. Although the issue of pain after burn has gained increased attention over the past years, prospective, longitudinal studies are scarce. Our aim was to prospectively investigate consecutive burn patients for pain severity over time and to evaluate the prevalence and characteristics of post-burn pain to 2–7 years after the burn. As an additional aim, the effects of burn and individual-related factors, especially health-related Quality of Life (HRQoL), were investigated.
Method: Sixty-seven consecutive burn patients were assessed during acute care at 3, 6, 12 and 24 months, as well as at 2–7 years post-burn. HRQoL, symptoms of post-traumatic stress disorder (PTSD) and other psychiatric disorders were investigated. During the interviews that took place 2–7 years after the injury (mean 4.6 ± 1.9 years), current chronic post-burn pain was assessed using the Brief Pain Inventory-Short Form (BPI-SF).
Results: One-third of the patients still reported pain 2–7 years after the injury. Pain severity and interference with daily life were mainly mild to moderate though they were found to be associated with significantly lower HRQoL. Chronic pain after burn was associated with both burn- and individual-related factors. In logistic regression analysis HRQoL at 3 and 12 months and symptoms of PTSD at 12 months were independent factors in predicting chronic pain after burn.
Conclusion: Pain after burn becomes a chronic burden for many former burn patients and decreases HRQoL. A novel finding in this study was that HRQoL assessed early after burn was a predictor for the development of chronic pain. This finding may help to predict future pain problems and serve as an indicator for pain preventive measures.

1. Introduction

Despite intensive analgesic treatment, most burn patients suffer from severe pain during the acute phase [1]. This is not only a result of the burn itself but also of the procedures applied to treat the burns (e.g., dressing changes, surgery, wound closure, scar maturation, movement and stretching exercises) [2]. It is known that persistent pain of a peripheral origin may induce pathological changes on a spinal and

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supraspinal level, leading to central sensitisation and pain maintenance [3]. Indeed, for many burn patients, the pain becomes chronic [4–6], with prevalence rates as high as 52% after an average of 12 years [1].

Living with pain is a challenge and chronic pain can have a negative impact on health-related quality of life (HRQoL) [7,8]. Several studies have reported that, over time, the HRQoL of burn patients approaches the HRQoL levels of the general population [9–12]. However, in those burn patients reporting lower HRQoL larger total body surface area (TBSA) [9,11,12], presence of mental disorders such as major depression [9] or PTSD [10], and higher pain levels [12] are important determining factors.

Severe acute burn pain also seems to have an impact on the development of psychological problems such as post-traumatic stress disorder, PTSD) [13] and the high comorbidity between pain and depression in different populations is well documented [14]. Both of these conditions, which are relatively prevalent among burn patients [15–18], reciprocally seem to influence the development or perception of pain [19,20].

Although the issue of pain after burn has been addressed in the past, prospective, longitudinal studies with consecutive patients are rare. Postal questionnaires are frequently used, but such questionnaires are likely to increase the attrition rate. The different dimensions of pain are rarely assessed and the potential role of individual-related factors is seldom thoroughly investigated.

The aim of this study is therefore to prospectively investigate consecutive burn patients admitted to the Uppsala University Hospital Burn Centre for pain severity over time as well as to evaluate the prevalence and characteristics of pain 2–7 years after the injury. A further aim was to assess the impact of burn- and individual-related factors (e.g., HRQoL, PTSD and depression) on chronic post-burn pain.

2. Participants

Former burn patients, admitted to Uppsala University Hospital Burn Centre between March 2000 and March 2007, were asked to participate in an ongoing prospective study that focused on the long-term impact of burns. Patients were eligible if they fulfilled the following criteria: (1) $\geq$18 years of age, (2) Swedish speaking, (3) without documented mental retardation or dementia and (4) had a 5% TBSA burn or a length of stay (LOS) at the Burn Centre of more than 1 day. Patients admitted on a temporary basis and who had their main care provided elsewhere were not included.

All assessments were done during hospitalisation at 3, 6, 12 and 24 months post-burn. Between April 2007 and August 2008, 2–7 years after their burn, the patients were again contacted and assessed during a series of follow-up interviews. These interviews took place in the patient's home or at another location chosen by the patient.

The study was approved by the Uppsala University Ethics Committee and conducted according to the principles of the Helsinki Declaration.

3. Measures

Sociodemographic information, including age, gender, time since injury and working status at the time of the follow-up interviews 2–7 years after the injury, was collected. Data from patient medical records on such injury characteristics as TBSA-full thickness (TBSA-FT), LOS, location of the burn and whether the injury was visible were also obtained.

Pain was assessed at the 2–7-year follow-up after-injury using the Brief Pain Inventory-Short Form (BPI-SF) [21]. The BPI-SF is a validated, self-administered questionnaire designed to evaluate the severity of pain and the impact of pain on the patient's daily functions. Burn-related pain was considered if the patient answered ''yes'' on the first question: ''*Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, toothaches). Have you had pain other than these everyday kinds of pain today?*'' It was further specified and ensured by the interviewer (CÖ) that the pain reported was burn-specific. Four 11-point linear scales were used to assess pain severity at its worst, least and average during the previous week, as well as current pain level, with 0 representing no pain and 10 the worst pain imaginable. Seven linear scales were used to assess pain interference with general activities, mood, walking ability, normal work, relationships with other people, sleep and enjoyment of life on an 11-point scale, where 0 = no interference and 10 complete interference. The scale scores can be averaged to obtain a Pain Severity Index and a Pain Interference Index. In addition, the BPI-SF contains questions about the location of the pain and the treatment used. The BPI was originally developed and validated to assess cancer pain [21–23] but has also been used to assess non-malignant pain [24,25], including chronic post-burn pain [4].

HRQoL was assessed at baseline and during acute care at 3, 6, 12 and 24 months post-burn. Further, assessment was done at the 2–7-year follow-up with the EQ-5D, a widely used and valid instrument to measure HRQoL [26]. The patient is asked to describe problems associated with five dimensions: mobility, self-care, usual activities, pain/discomfort and depression/anxiety using a rating scale from 1 to 3, with 1 indicating none, 2 indicating moderate and 3 indicating severe. Because the BPI-SF was administered only at the 2–7-year follow-up, the EQ-5D pain dimension was used to follow pain severity over time.

The results of the EQ-5D dimensions can be transformed into a weighted index ranging from −0.594 (death or worse than death) to 1 (full health). This index is based on norm values in the general population [27]. A 20-cm vertical VAS scale with endpoints of 'worst possible health state' set at 0 to 'best possible health state' set at 100 was used to assess self-rated health status. The EQ-5D has recently been used in adult burn patients [10,28], where it also has been validated showing good psychometric properties [29].

Symptoms of post-traumatic stress disorder (PTSD) were assessed at 3 and 12 months after burn with the Swedish version of the Impact of Event Scale-Revised (IES-R) [30]. The 22-item IES-R is an extended version of the original 15-item IES. The three clusters of PTSD (Intrusion, Avoidance and Hyper-arousal) are assessed using scale ratings of 0 (no symptoms), 1,