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## Pain in young children with burns: Extent, course and influencing factors



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### ABSTRACT

Little evidence is available on the extent, course and influencing factors of pain in young children with burns. At present, reliable and valid measurement instruments to assess pain behavior in these children are available, implying that valuable insight into these questions can now be obtained. The aim of this study is to document the extent and course of pain behavior with the COMFORT-B, and to assess factors that may influence procedural pain. First, cutpoints for COMFORT-B scores were established by Rasch analysis to assess clinically relevant changes. Second, the extent of background and procedural pain behavior was assessed by descriptive statistics. Third, the course and factors that may influence procedural pain behavior were investigated by latent growth modeling. Trained nurses collected pain behavior data in 168 children (mean age 20 months, mean TBSA 6%, mean length of stay 10 days). Cutpoints of COMFORT-B scores were as follows: 6–13 (mild pain), 14–20 (moderate pain) and 21–30 (severe pain). This study suggests that background pain is more adequately treated than procedural pain. Factors that influenced baseline pain scores and/or the course over 8 days included TBSA, the number of surgical procedures, acetaminophen administration by the referring hospital, and the application of hydrofiber dressings. The implications of these findings are discussed.

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## 1. Introduction

Burns are often associated with pain. Perry et al. [1] reported in 1981 that pain in burns was undertreated. Choinière [2] stated in 2001 that little had changed in the management of burn pain, whereas Martin-Herz et al. reported in 2003 [3] that there had been advances in pediatric burn pain control. This shows promise, since approximately 30% of the admitted patients are children up to 4-years old [4]. Inadequate pain treatment namely conditions anxiety and heightens arousal for subsequent wound care procedures and reduces the effectiveness of analgesia for subsequent procedures [5,6]. Inadequate pain management also has long-term consequences. It has been demonstrated that infants and children who experienced pain in early life, show long-term changes in pain perception and related behaviors [7]. It was also suggested that severe burns at 6–24 months of age might cause long-term alterations in sensory and pain processing later in childhood and adolescence [8,9].

At present, we assume that the current knowledge on adequate pain management should be gradually implemented in daily burn care to optimize pain treatment. The state of art is that adequate management of burn pain should consist of early treatment starting at the referring hospital [10] and an individualized multimodal approach, i.e., using two or more drugs with different mechanisms of action, combined with non-pharmacological interventions [2,11–13]. Non-pharmacological interventions for young children with burns are scarcely investigated. A specific non-pharmacological intervention is the presence of parents during wound care. Although there are several assumptions of beneficial effects [14], currently available studies in burn care do not provide evidence for or against parental presence [15,16]. Another scarcely investigated intervention that may influence pain is the use of advanced synthetic wound dressings that remain in place for several days, requiring less extensive dressing changes [2].

To date, documentation on pain severity and the adequacy of pain management in young children, considerably represented in burn centers [4,17], is limited. Latarjet and Choinière [18] identified the typical characteristics of burn pain in adults based on patient self-reports, including the fluctuation between and within patients and the relationship of pain with repetitive daily wound care procedures [2]. We assume that pain in children demonstrates similar characteristics. However, although some 3-year-olds and many 4-year-olds may be capable of providing self-reports, the commonly used method of pain assessment, most children are too young to express background and procedural pain by self-reports. Within the past decade, pain behavior observation instruments for pain assessment in young children have been tested for reliability and validity [19,20]. Recently, the COMFORT-B was identified as useful for pain assessment in both background and procedural pain in young children with burns [21,22], which provides avenues to optimize pain treatment in this group.

The aim of this study was to document the extent and course of pain behavior in children during hospitalization in Dutch burn centers, in order to assess the current state of pain

management, and to determine, if necessary, the next steps for research. The classification of COMFORT-B scores into descriptive adjectives that are connected to cutpoints may be useful in the evaluation of pain behavior [23]. Classification by cutpoints may help to evaluate clinically relevant changes in pain severity for research into pain interventions. It is especially useful for daily practice to evaluate pain behavior and to adapt pain treatment by including the cutpoints in treatment guidelines and flowcharts. Often, a classification of pain into mild, moderate and severe is used [24–27]. Cutpoints may differ across patient groups [23]. As far as is known, cutpoints for pain behavior in young children with burns have not yet been assessed.

Our research questions were therefore as follows: What are the cutpoints of the COMFORT-B scores? To what extents do background and procedural pain behavior occur? What is the course of procedural pain behavior? Which factors influence the occurrence of procedural pain behavior?

## 2. Methods

This study includes a secondary analysis of data collected in 2007–2008 for a prospective multicenter cohort study. The aim of the study was to obtain evidence for the reliability and validity of pain behavior measurement instruments for young children aged 0–4 years with burns [21,22]. In the study, paired pain behavioral observations were collected. As good inter-rater reliability was obtained, for the present study, only one of the paired observations, randomly selected, was used for analyses. Approval of the medical ethics committees of the three participating hospitals with a burn center (the Red Cross Hospital in Beverwijk, the Maasstad Hospital in Rotterdam and the Martini Hospital in Groningen) was obtained. Parents received written and verbal information about the study and were asked to give verbal consent. The parents were assured that standard medical and pain treatment remained unchanged and that the study would not cause any burden to their child. This study was performed in accordance with the guidelines of the Declaration of Helsinki.

### 2.1. Measure

The COMFORT-B [19] was used to assess pain behavior. The instrument is a pain behavioral observation scale and is a reliable and valid instrument to measure pain behavior in children with burns [21,22]. The COMFORT-B comprises six behavioral items with five answer categories per item. The total score of the COMFORT-B can vary between 6 and 30 (Table 1).

### 2.2. Data collection procedure

This study includes pain behavior observations by nurses who were trained in the use of the COMFORT-B [21]. As burn pain is divided into background (experienced while resting) and procedural pain (caused by manipulation of the burn during wound care, which leads to additional stimulation of the nociceptors) [18], nurses assigned to the child's care recorded background pain behavior for two minutes at a time at least

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