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# A nurse-initiated pain protocol in the ED improves pain treatment in patients with acute musculoskeletal pain

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ABSTRACT

While acute musculoskeletal pain is a frequent complaint, its management is often neglected. An implementation of a nurse-initiated pain protocol based on the algorithm of a Dutch pain management guideline in the emergency department might improve this. A pre–post intervention study was performed as part of the prospective PROTACT follow-up study. During the pre- (15 months, $n = 504$) and post-period (6 months, $n = 156$) patients' self-reported pain intensity and pain treatment were registered. Analgesic provision in patients with moderate to severe pain (NRS ≥4) improved from 46.8% to 68.0%. Over 10% of the patients refused analgesics, resulting into an actual analgesic administration increase from 36.3% to 46.1%. Median time to analgesic decreased from 10 to 7 min ($P < 0.05$), whereas time to opioids decreased from 37 to 15 min ($P < 0.01$). Mean pain relief significantly increased to 1.56 NRS-points, in patients who received analgesic treatment even up to 2.02 points. The protocol appeared to lead to an increase in analgesic administration, shorter time to analgesics and a higher clinically relevant pain relief. Despite improvements, suffering moderate to severe pain at ED discharge was still common. Protocol adherence needs to be studied in order to optimize pain management.



## 1. Background

While acute musculoskeletal pain is a frequent complaint among patients in the emergency department (ED), its management is often neglected, placing patients at risk of oligoanalgesia.

During the past decade, there has been an explosion of research on both acute and chronic pain, with significant advances in understanding its etiology, assessment, and treatment. Improvements in pain assessment and management have facilitated care improvements in the ED (Thomas, 2013). However, inadequate pain management has still not been fully eliminated. Although pain is the most prevalent and chief complaint for visiting the ED (Berben et al., 2008; Johnston et al., 1998; Tcherny-Lessenot, 2003), acute pain appears undertreated worldwide, which is reflected by the high prevalence of moderate to severe pain at discharge and the low percentage of patients receiving analgesics. The proportion of adults receiving analgesics for painful conditions varies between 19% and 64% (Berben et al., 2008; Bhakta and Marco, 2014; Brown et al., 2003; Ducharme et al., 2008; Todd et al., 2007). Moreover, the percentage of patients discharged with moderate to severe pain ranges from 52% to 74% (Berben et al., 2008; Johnston et al., 1998; Todd et al., 2007).

Adequate pain management is important, not only from the perspective of good patient care and patient satisfaction, but also from a physiologic point of view. Adverse physiological effects can result from unrelieved acute pain, such as cardiovascular side-effects and negative effects on respiratory function (Lewis et al., 1994; Liu and Wu, 2008). Failure to relieve acute pain may also result in increasing

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anxiety, inability to sleep, demoralization, a feeling of helplessness, loss of control, and inability to think and interact with others, and therefore it is likely to result in longer rehabilitation, decreased productivity and diminished quality of life (Cousins et al., 2004). The early and effective management of acute pain is obviously of critical importance in the short term, but also important in the long term: unrelieved pain is associated with the likelihood of developing chronic pain (Pierik et al., 2015; Williamson et al, 2009).

Although the importance of timely pain management in the ED is acknowledged, it is also recognized that there are barriers to effective pain relief, such as inadequate inter- and multidisciplinary communication, workload and attitude problems, lack of patient input, knowledge deficits, and misconceptions on the need for effective pain management (Berben et al., 2012; Sinatra, 2010). Different strategies to enhance pain management have been developed in response to inadequate pain relief, such as pain management protocols or clinical guidelines and staff educational interventions (Decosterd et al., 2007; Finn et al., 2012; Fosnocht and Swanson, 2007; Fry and Holdgate, 2002; Fry et al., 2004; Jackson, 2010; Kelly et al., 2005; Zohar et al., 2001). Pain management protocols have been shown to be useful. Studies indicate that a pain protocol shortens the time to analgesic administration (Finn et al., 2012; Fosnocht and Swanson, 2007; Fry and Holdgate, 2002; Kelly et al., 2005), improves the percentage of patients who received analgesics (Decosterd et al., 2007; Fosnocht and Swanson, 2007), increases pain relief (Decosterd et al., 2007; Fry et al., 2004) and shortens ED length of stay (LOS) (Sokoloff et al., 2014). Despite these efforts to increase awareness of the importance of timely and adequate pain management, inadequately managed pain is still a persistent problem.

With the implementation of a nurse-initiated pain protocol, emergency nurses are allowed to administer analgesics, including opioids, according to a pre-defined protocol, without the patient being first assessed by an ED-physician. This is important because depending on the workload of the ED staff, there can be a considerable delay between the patient's presentation and being seen by an ED-physician, and even a longer time to analgesic administration (Hoot and Aronsky, 2008). Timely analgesic administration is required because patients become increasingly more sensitive to painful stimuli if pain is uncontrolled for a longer period of time.

Musculoskeletal injuries are not only highly prevalent in ED, they are usually very painful (Berben et al., 2008). Especially in patients presenting to the ED with minor acute musculoskeletal injuries, a nurse-initiated pain protocol might be useful to optimize pain treatment. These patients are usually triaged to a low (semi-urgent) triage category, which typically results in an extended waiting time for pain relief or even oligoanalgesia (Tanabe et al., 2001).

The aim of this pre–post intervention study is to evaluate the effect of implementation of a nurse-initiated pain protocol based on the Dutch evidence-based guideline regarding analgesic provision, actual administration, time to first analgesic or opioid, ED LOS, and patient satisfaction in patients with acute musculoskeletal pain. Second, effectiveness of pain management will be determined in terms of clinically relevant pain relief. Finally, protocol deviation will be assessed.

## 2. Patients and methods

### 2.1. Study design and setting

A pre–post intervention study was performed as part of the prospective "PROgnostic factors for the Transition from Acute to Chronic pain in Trauma patients" (PROTACT) follow-up study. Adult patients with musculoskeletal isolated extremity injury attending the ED of the level one trauma center Medisch Spectrum Twente in Enschede, The Netherlands, were invited to participate. The ED functions continuously 24 hours a day, 7 days a week (24/7 ED), has a catchment area of 264,000 individuals and treats approximately 27,000 patients annually. Ethical approval for the PROTACT study was obtained from the regional Medical Research Ethics Committee on Research Involving Human Subjects (CCMO No. NL368.38044.11). All participants provided written informed consent.

### 2.2. Study population

Eligible patients between 18 and 70 years were consecutively recruited when admitted to the ED between September 2011 and July 2013. Inclusion criteria for participation were (i) musculoskeletal isolated extremity injury caused by blunt trauma; and (ii) sufficient communication skills and a basic knowledge of the Dutch language. Exclusion criteria were (i) life or limb threatening conditions; (ii) documented cognitive disability; (iii) suffering from hallucinations, delusions or suicidal ideation; and (iv) alcohol or drugs intoxication. For the purpose of this study, patients who did not provide pain scores on both ED admission and discharge were excluded.

### 2.3. Intervention

The pain protocol, an algorithm for pain assessment and pharmacological treatment in the ED (Fig. 1), was implemented in January 2013. The protocol was based on the Dutch evidence-based guideline 'Pain management for trauma patients in the chain of emergency care', which was developed to provide pain management recommendations for trauma patients (Berben et al., 2010). The new protocol leads to an important change in the current operating procedure of the ED. The structural measurement and registration of a pain score was not yet standard procedure. Major change for pain management in the ED is that with the implementation of the protocol, nurses are allowed to administer analgesics, including opioids, without the patient being first assessed by a physician. Paracetamol is the treatment of first choice, if necessary with additional use of non-steroidal anti-inflammatory drugs (NSAIDs) or opioids. Because of the implementation, this study was divided into two data collection periods separated by a one-month interval. In the pre-period from September 2011 until December 2012 (15 months) there was no standardized pain protocol available, so nurses were not allowed to give opioids on their own initiative. Paracetamol was provided by nurse's own judgment. There was no structural measurement and registration of pain in this period. In the one-month interval, time was allowed for the active and passive distribution of the protocol among ED staff. The staff was informed about the new protocol and operating procedure, and the protocol and relevant important leaflets were available at the ED. During the intervention period from February 2013 until July 2013 (6 months), patients should be given analgesics according to the algorithm of the implemented protocol.

### 2.4. Procedures and data management

Patients who met the study criteria were informed by the nurse about the purpose of the study. Participants were asked to provide informed consent and to complete a questionnaire. The questionnaire included a validated tool to measure pain intensity and questions about educational level, pre-hospital analgesic use and patient satisfaction (yes or no). Additionally, data from the ED patient registration system were used. The registry is a fully electronic emergency medical record registry where each entry, order, or activity is automatically time-stamped for pre-specified ED events. The registry includes patient demographics (date of birth, sex), urgency level, medical diagnoses (e.g. injury type), type of analgesics, type of