



ORIGINAL ARTICLE

Daily text messages used as a method for assessing low back pain among workers

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Abstract

Objectives: To evaluate a method for collecting data concerning low back pain (LBP) using daily text messages and to characterize the reported LBP in terms of intensity, variability, and episodes.

Study Design and Setting: We conducted a cohort study of LBP among workers used by a mining company. The participants were asked to answer the question “How much pain have you had in your lower back in the last 24 hours on a scale from 0 to 10, where 0 = no pain and 10 = the worst pain imaginable” once a day for 5 weeks, with this process being repeated 6 months later.

Results: A total of 121 workers participated in the first period of data collection, and 108 participated in the second period. The daily response rate was 93% for both periods, and cluster analysis was shown to be a feasible statistical method for clustering LBP into subgroups of low, medium, and high pain. The daily text messages method also worked well for assessing the episodic nature of LBP.

Conclusion: We have demonstrated a method for repeatedly measuring of LBP using daily text messages. The data permitted clustering into subgroups and could be used to define episodes of LBP. © 2015 Elsevier Inc. All rights reserved.

Keywords: Low back pain; Text messaging; Cluster analysis; Episode; Temporal characteristics; Pain intensity

1. Introduction

Low back pain (LBP) is a common health problem with widely varying symptoms and severity that imposes a huge economic burden on society [1]. In most cases, the pathophysiology behind LBP is unknown, and for those, the disorder is referred to as nonspecific [2–4]. Nonspecific LBP is considered to be a fluctuating condition that is recurrent in a large proportion of cases and is only truly persistent in a minority of cases [5,6]. The pain can also linger for some time and flare-up periodically. If these flare-ups are bothersome, this can prompt the patient to seek medical care or to

take time off from work. LBP can be characterized as an episodic disease [7].

There is currently no universal agreement about what constitutes episodic LBP. An episode of LBP could be described as a short period of time during which there is pain that deviates in some way from the “normal” pattern of variability in LBP. de Vet et al. [7] suggested a definition of an episode of LBP “as a period of pain in the lower back lasting for more than 24 hours, preceded and followed by a period of at least 1 month without low back pain.” McGorry et al. [8] suggested that an episode be defined “as 2 to 9 consecutive days of pain scores equal to or greater than two pain-score units (on the 0 to 10 scale) above the participant’s median pain score.” In both cases, the level of resolution in the data collection is critical, and higher resolution analysis techniques could provide further insight into the effect of the variability and episodic nature of LBP. Accordingly, daily self-reporting of pain by individuals has been conducted using diaries [9]. As mobile phones are common among workers in many countries, data can now be collected cheaply and frequently using text messages. Text messaging makes it possible to collect data on a monthly, weekly, daily,

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What is new?**Key findings**

- We found that the method of collecting data using daily text messages had the unique property of allowing detailed pain ratings to be obtained with a high response rate and short response time.
- We found that cluster analysis proved to be a feasible statistical method for clustering pain into subgroups among workers in the cohort.

What this adds to what was known?

- The evaluation of the method used shows that daily ratings provide a much more detailed picture of the fluctuating nature of low back pain.
- The method and analysis provide the opportunity to study episodes of pain with a shorter duration than the method and analysis normally used.

What is the implication and what should change now?

- The use of text messages is a simple method of data collection that could be used for in-depth analysis when studying a variety of human responses that fluctuate on a daily basis.

or even an hourly basis. The method is also promising in that it has a low cost, takes a minimal amount of time, and involves minimal data handling [10,11].

Because little has been done to describe the daily progress of LBP in a working cohort, the aim of the present study was twofold (1) to evaluate a method for collecting data on LBP using daily text messages in the form of the response rate, both as a total and over time and distributed between the genders, as well as the response time and the reasons for dropout and (2) to characterize the reported LBP in terms of its intensity, variability, and episodes. The clinical aspect of this study will be reported elsewhere.

2. Materials and methods

The participants in this study were used by a mining company in northern Sweden. The study was part of the Mine-Health project [12], which includes studies of mine workers in Finland, Norway, Russia, and Sweden. The project, funded by Kolarctic ENPI CBC, seeks to improve the sustainability of miners' well-being, health, and work ability in the Barents region. In the Swedish mine, employees working as drivers of heavy machinery or working most of the day outdoors—mainly mechanics and electricians—were invited to participate in the study. Of the 374 workers listed on the

employee rosters, 153 (about 40%) agreed to take part and were included in the study population. In November 2012, the participants were examined by an occupational physician, underwent a variety of clinical tests, and answered questionnaires that included data such as age, work history, exposure to physical load and whole-body vibration, and recreational physical activity. The health investigations were mostly conducted during the workers' leisure time, just before or after their shift, between 6 a.m. and 11 p.m.

The 153 workers who participated in the health investigation were all invited to participate in the daily text messaging study lasting 5 weeks, which corresponded to the longest scheduled shift periods. The workers were informed about the study verbally and in writing and received an information leaflet containing details of the study's aim, methods, and length. Of the 153 workers, 126 (82%) gave their written consent to take part in the text-messaging study. The Regional Ethical Review Board for medical research in Umeå, Sweden, approved the study (2012-365-31M).

The first period of data collection started on February 11, 2013, and continued until March 17 (35 days). The second measurement period started 6 months later and ran from September 9 2013 to October 13 (35 days). Before the first and second measurement periods, all the participants were contacted via text message to confirm their continued participation. Those who did not want to continue in the study were asked to call to provide confirmation of their decision and also to state the reason for this.

Once a day, the participants were asked to reply to the following message: "How much pain have you had in your lower back in the last 24 hours on a scale from 0 to 10 where 0 = no pain and 10 = the worst pain imaginable? Reply with a number." This numerical rating scale was based on experience gained from the evaluation of different pain scales for which the predictive validity and sensitivity were investigated [9]. The text messages were sent 15 minutes before the end of the participants' shifts every day (23 different shifts). On days off from work, the text message was sent at 4 p.m. No reminders were sent. The software used for the text message data collection was SMS Connect (Munkedal, Sweden) [13]. This facilitated two-way text messaging with schedule text message distribution. The system stored the time history and delivery status of sent and received text message, as well as the respondents' answers. The data were automatically transferred to a data file and stored securely. The researcher in charge was able to view the answers from each respondent online in real time. Before using this technique, the system was tested in two 1-week pilot investigations, each involving 10 respondents in each study. The respondents were both experienced and less experienced cell phones users according to their own appraisals. Based on their comments regarding user friendliness and an evaluation of technical quality and prerequisites, minor changes were implemented by changing the question's time frame from "last day" to "last 24 hours."

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