Research article


Difference in perception of and morphine dose administered to the patient’s self-reported pain according to the patient’s facial expression in Korea

Jeong Yun Park*, Da In Lee2
1Department of Clinical Nursing, University of Ulsan, Seoul, Korea;
2Department of Nursing, Seoil University, Seoul, Korea

* Corresponding email: pjyun@ulsan.ac.kr

Editor: Sun Huh, Hallym University, Korea

Received October 28, 2020   Accepted December 1, 2020   Published online December 1, 2020
© 2020, Korea Health Personnel Licensing Examination Institute

(cc) This is an open-access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.
Abstract

Purpose: This study aimed to compare the nurses’ perception, recording, and treatment of the patient's self-reported pain according to the patient facial expression.

Methods: It is a descriptive cross-sectional survey. Participants were 482 nurses working at a tertiary hospital in Seoul, Korea. The self-reporting questionnaire required nurses to answer the pain intensity, records, and medication for a smiling patient complaining of acute post-surgical pain and a grimacing cancer-pain patient.

Results: The pain intensity perceived by nurses in grimacing patients was significantly higher than that for smiling patients (P < 0.001). The score of pain recording was significantly higher for grimacing patients than for smiling patients (P < 0.001). There was a significant difference in the amount of morphine chosen by the nurses for pain intervention in smiling and grimacing patients (P=0.040). Higher perceived pain intensities and scores reflected in the pain record resulted in greater administered doses of morphine.

Conclusion: These findings suggest that the nurses might be affected by a patient’s facial expression when treating pain. A pain-management program should be developed that enables nurses to accurately recognize pain hidden in patients’ faces and provides them with the knowledge of how to appropriately assess and manage patients’ pain.

Keywords: Cancer pain; Facial expression; Morphine; Pain management; Republic of Korea

Introduction

Background/rationale: In 2004, the Korean Ministry of Health and Welfare developed and put into practice guidelines for cancer-pain management [1]. Since 2007, pain care has been included in the accreditation criteria of Korean medical institutions to determine if they have an appropriate system for pain assessment and management. These guidelines and criteria have led to greater awareness of the pain among medical personnel. To further develop pain guidance that is appropriate for each medical institution, multidisciplinary workshops, and education programs that include instruction in pharmacological and nonpharmacologic pain relief therapies have been developed and applied in Korea [2]. Because there was a different level of knowledge and awareness to pain control for cancer patients
between nurses and physicians, such an interventional program was necessary [3].

In the United States, approximately 75% of post-surgical patients’ experienced moderate to severe pain [4] and more than 38.0% of cancer patients suffer from severe pain [5]. The obstructive factor in pain control is an inappropriate assessment of the level of pain, especially when patients are reluctant to express their symptoms and nurses cannot accurately assess pain levels [3]. Although most nurses accept the use of analgesics to control patient pain, they tend to use fewer analgesics for fear of side effects and addiction [6]. In Korea, 50 to 80% of cancer patients do not receive proper pain treatment due to passive attitudes toward and perceptions of pain management [7]. Also, the World Health Organization (WHO) marked Korea as moderate level in the adequacy of opioid analgesic consumption, because the use of analgesics in Korea showed 47.0% in the adequacy of consumption measure (ACM) comparing the country with the highest ACM value (Canada; 312.6%) [8].

Self-reported pain scores are critical indicators of pain management [9]. Nurses must trust these pain scores and decide upon appropriate intervention accordingly. However, nurses sometimes differentiate the intensity of the pain reported by patients based on their facial expressions, and patients’ masking of pain may result in inadequate pain-management [10]. There are differences in the pain levels reported by nurses and patients, and research on pain management provided by nurses based on the behavior and facial expressions of patients has been limited [4,6].

Nurses deal with various pain symptoms in clinical practice, such as difficulty communicating pain, acute pain in cancer patients, chronic pain, and complex pain complaints, and they are required to provide appropriate intervention. Nurses' assessment of and intervention in pain plays an essential role in effective pain control for patients [11]. However, previous studies have focused on the knowledge and attitudes of patients [5] and medical staff as factors affecting self-reporting and pain evaluation [7]. There are insufficient case studies on the evaluation of pain intensity according to patients’ facial expressions or the investigation of pain management.

Objectives: This study aimed to investigate and analyze the pain intensity, records, and mediation determined by nurses in two different situations with pain patients and to provide insight for the
development of practical pain-management education programs implemented in clinical environments.

Hypothesis 1: Nurses will perceive the pain intensity as the pain rating given by the patient.

Hypothesis 2: Nurses will record the pain intensity of the smiling and the grimacing patient equally.

Hypothesis 3: Nurses will administer an appropriate dose of morphine to the smiling and the grimacing patient equally.

**Methods**

Ethics statement: Approval from the Institutional Review Board (IRB) of Asan Medical Center (No: 2013-0312) was obtained. Informed consent was obtained from the participant.

Study design: This study used a descriptive cross-sectional survey to examine nurses who work at an Asan Medical Center in Seoul, Korea.

Setting: The data collection period was from April 22 to 29, 2013. A total of 486 responses to questionnaires were collected, of which 472, data were analyzed excluding insufficient answers. The raw data can be found in Dataset 1.

Participants: A convenience sample of nurses in the nursing department of Asan Medical Center were recruited for this study. All nurses who were working in 23 clinical wards were given information about the study and asked to participate. To guarantee a wide range of experience, new-comers should be excluded. Only nurses who agreed to the survey were selected for the study. Total of 472 nurses completed the survey.

The demographic characteristics of the nurses participating in this study are presented in Table 1.

Table 1. Demographic finding of nurses (N=472)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>No. of</th>
<th>Percentage %</th>
</tr>
</thead>
</table>

## Participants

<table>
<thead>
<tr>
<th>Age (year)</th>
<th>Participants</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30</td>
<td>371</td>
<td>67.2</td>
</tr>
<tr>
<td>30–39</td>
<td>131</td>
<td>27.8</td>
</tr>
<tr>
<td>≥ 40</td>
<td>24</td>
<td>5.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Participants</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>363</td>
<td>76.9</td>
</tr>
<tr>
<td>Married</td>
<td>109</td>
<td>23.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th>Participants</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>46</td>
<td>9.7</td>
</tr>
<tr>
<td>Baccalaureate</td>
<td>349</td>
<td>73.9</td>
</tr>
<tr>
<td>≥ Master degree</td>
<td>77</td>
<td>16.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical experience (years)</th>
<th>Participants</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>72</td>
<td>15.3</td>
</tr>
<tr>
<td>1–3</td>
<td>106</td>
<td>22.5</td>
</tr>
<tr>
<td>4–5</td>
<td>119</td>
<td>25.2</td>
</tr>
<tr>
<td>6–10</td>
<td>105</td>
<td>22.2</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>70</td>
<td>14.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Position (title)</th>
<th>Participants</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff nurse</td>
<td>428</td>
<td>90.7</td>
</tr>
<tr>
<td>Charge nurse</td>
<td>22</td>
<td>4.7</td>
</tr>
<tr>
<td>Unit manager</td>
<td>15</td>
<td>3.2</td>
</tr>
<tr>
<td>Clinical nurse specialist</td>
<td>7</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Data sources/ measurement:** Pain-management assessment tools developed by McCaffery and Ferrell [12] were used with permission. The clinical cases present 2 patients with pain. The patients are identical except for their behavior. Case 1 was presented as a smiling patient complaining of acute post-surgical pain, whereas Case 2 was presented as a grimacing cancer-pain patient. The self-reporting questionnaire, requiring nurses to answer 3 questions for each case. For each patient, the participant was asked to identify their personal opinions about the patients’ pain intensity, what they will record in the patients’ records, and what opioid dose they will administer.

There is no correct answer to question 1 about personal opinion. The correct answer for question 2 for each patient is to record an 8 (the pain rating given by the patient). For question 3, the correct answer is to administer to each patient 3 mg of morphine, a 50% increase in a previously safe but ineffective opioid dose (Suppl. 1). English translation of the clinical cases is available from Suppl. 2.

A validity and reliability test of the measurement tool was done. The questions were verified, corrected,
and supplemented by consulting 1 professor, 2 unit managers, and 2 clinical nurse specialists. The Cronbach α value was 0.769.

Study size: A post hoc power calculation was conducted using G*Power ver. 3.1.9.4 (http://www.gpower.hhu.de/). For paired t-test, there were input as follows: tails =2, effect size d, = 0.5, alpha error probability = 0.05, total sample size = 472. Power can be calculated 1.0.

Quantitative variables: None.

Statistical methods: Collected data were analyzed using SPSS ver. 22.0 (IBM Corp., Armonk, NY). Descriptive statistics were used to analyze demographic data. Frequencies and independent t-tests were used to compare responses to the 3 questions for each of the cases. Paired t-tests were used to analyze the differences in nurses’ responses to 3 questions between 2 facial expressions. The correlations between perceived pain intensity, pain intensity record, and pain intervention by nurses according to the patient’s facial expressions were analyzed.

Results

Comparison of nurses’ perceived pain intensity, recording pain intensity, and pain scores between smiling and grimacing patients

The pain intensities perceived by the nurses as represented by pain scores for smiling and grimacing patients are presented in Table 2. The pain intensities of patients as perceived by nurses was significantly higher (t =-12.37, P<0.001) for grimacing patients (7.11±2.57) than for smiling patients (5.86±2.60). The pain intensities recorded by the nurses as part of the pain assessment are shown in Table 2. The pain record was significantly higher (t=5.79, P <0.001) for grimacing patients (7.97±1.93) than for smiling patients (7.71±1.96).

Table 2. Nurses’ perceptions of pain intensity and recording of pain assessment   (N=472)

<table>
<thead>
<tr>
<th>Category</th>
<th>Perceived intensity</th>
<th>Recording pain intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Smiling patients</td>
<td>Grimacing patients</td>
</tr>
<tr>
<td></td>
<td>t (p)</td>
<td></td>
</tr>
<tr>
<td>Pain assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smiling patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grimacing patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t (p)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smiling patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grimacing patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t (p)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Morphine dose administered for pain management

Table 3 shows the morphine dose nurses administered for the pain management of smiling and grimacing patients. There was a statistically significant difference ($\chi^2=-2.75, P=0.040$) in the amount of morphine chosen by the nurses for pain intervention in smiling and grimacing patients.

Table 3. Morphine dose administered by nurses to alleviate the patient’s pain  ($N=472$)

<table>
<thead>
<tr>
<th>Pain intervention</th>
<th>Smiling patients n (%)</th>
<th>Grimacing patients n (%)</th>
<th>$\chi^2 (p)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>No morphine at this time</td>
<td>106 (22.5)</td>
<td>78 (16.5)</td>
<td>-2.75 (.040)</td>
</tr>
<tr>
<td>Morphine 1 mg IV now</td>
<td>118 (25.0)</td>
<td>108 (22.9)</td>
<td></td>
</tr>
<tr>
<td>Morphine 2 mg IV now</td>
<td>171 (36.2)</td>
<td>186 (39.4)</td>
<td></td>
</tr>
<tr>
<td>Morphine 3 mg IV now†</td>
<td>77 (16.3)</td>
<td>97 (20.6)</td>
<td></td>
</tr>
</tbody>
</table>

†Correct answer.

Correlation among nurses’ perceptions of pain, records, and intervention in smiling and grimacing patients groups

In smiling patients, the pain intensity perceived by the nurse correlated significantly with the pain record ($r=0.58, P<0.001$) and intervention ($r=0.29, P<0.001$). Also, the pain record significantly correlated with
pain intervention \((r=0.28, P<0.001)\). In grimacing patients, the pain intensity perceived by the nurse also significantly correlated with the pain record \((r=0.58, P<0.001)\) and pain intervention \((r=0.15, P<0.001)\). Similarly, the pain record significantly correlated with pain intervention \((r=0.21, P<0.001)\).

**Discussion**

**Key results:** This study investigated and analyzed how nurses perceive, record, and select interventions for self-reported pain according to patient facial expressions. It is the pain rating given by the patient. The pain intensity perceived by a nurse was 7.11 points for grimacing patients, but, which was significantly higher \((t=-12.37, P<.001)\) than the perception of 5.86 points for smiling patients reporting the same pain level. The pain record indicated different scores, 7.71 points for smiling patients, and 7.97 points for grimacing patients. The pain records of grimacing patients had a remarkably high statistical score \((t=-5.79, P<.001)\). Given that patients reported their pain scores to be 8 points and that the appropriate dose of morphine for this pain level is 3 mg, nurses perceive, record, and respond to patient pain at lower levels than the actual pain intensity of the patient. Findings show that nurses may not be recording actual pain scores reported by patients and administering adequate doses of analgesics, even though they are required to do so.

**Interpretation:** We need to acknowledge and limit the negative effect subjectivity may have on patient care, but it is impossible to exclude subjective judgment completely. Nurses’ perceptions of pain intensity, the pain record, and pain intervention according to patient facial expressions show significant correlations, but the variable most significantly impacting pain intervention is the nurses’ perceptions of pain intensity. Perception is an important factor in assessing a patient’s pain. Pain intervention provided to patients may vary depending on how the nurse perceives a patient’s pain intensity, rather than on how a patient communicates their pain. The above finding shows more frequent pain intervention is given to grimacing patients than smiling patients, suggesting that a patient’s smile was interpreted by nurses as a lower pain level. A nurse needs to be able to identify hidden pain that is not evident in a patient’s facial
expression, given that continuous laughter is an effective way to relieve pain.

**Comparison with previous studies:** The McCaffery and Ferrell vignettes were used to assess nurses’ knowledge and management of pain [12]. Self-report of pain is the most reliable indicator of pain intensity. Pain knowledge is understanding the subjective experience of pain, and thus, believing and acting on patients’ self-reports [10], despite objective manifestations. There is also another factor that caused the difference in pain care. Grimacing is the most reliable expression of pain in both verbal and cognitively-impaired patients. However, people may smile, despite their pain, for reasons other than cognitive impairment. Nurses should judge carefully whether a patient’s words are reliable. Critical thinking competency in pain assessment is required for effective pain management. A gap exists between the pain intensity recorded on medical records and the pain intensity reported by patients [13]. Because nurses subjectively assess pain intensity according to patient facial expressions, subjective judgments must be excluded for patient evaluation to ensure correct pain intervention. Comparing pain intensities according to facial expressions, some patients tried to hide their pain even when it was severe. To provide appropriate intervention for these patients, it is necessary to educate nurses about pain assessment and intervention [7]. The factor most influencing inappropriate pain intervention in cancer patients was the difference between the pain intensity as assessed by medical staff and by the patients. Patients display different facial expressions and responses to the same pain intensity because of various human coping mechanisms, and nurses should be aware of the fact that they might be influenced by patients’ facial expressions when treating pain [14]. A patient’s consciousness also is expressed in a specific context. In most clinical cases, patients are assessed on one dimension of pain, but it is important to assess both sensory perceptions and perceptions of unpleasantness [15]

**Limitation:** It only investigated nurses based on a presented case study. To translate into actual patient care scenarios, further investigation should be repeated at multiple hospitals in real-time, using video recordings or a series of videos.
**Generalizability:** Even though the study subjects were all volunteers, the high response rate suggests that nurses in this hospital consider pain management a critical nursing issue. The results of this study may be applied to nurses in Korea.

**Conclusion:** The study revealed that nurses perceived a less intensity than the pain rating given by the patient and nurses record a higher intensity of pain in smiling patient than grimacing patient. Furthermore, the study confirmed the nurses administer inappropriate doses of morphine to the patient with pain. Therefore, it can be said that the first hypothesis was accepted; however, the second and third hypotheses could not be accepted. It is critical that nurses understand the patients’ various responses to pain and to assess the patient's pain intensity clearly and provide appropriate pain intervention. Nursing standards could help nurses provide treatment based on a patient’s appeal by excluding subjective judgment and recording the patient's stated pain intensity. It is necessary for nurses to carefully understand a patient’s responses to pain, assess the pain intensity clearly, and provide the appropriate intervention. To provide nurses with the knowledge of how to appropriately assess and manage patient pain, a pain-management program that enables the nurse to accurately recognize pain hidden in patients’ faces should be developed. This will lead to changes in the awareness of pain management and improve the effectiveness of pain assessment, prevention, and intervention for patients.

**ORCID**

JeongYun Park: https://orcid.org/0000-0002-0210-8213

Dain Lee: https://orcid.org/0000-0002-2371-8088

**Authors’ contributions**

Conceptualization: JYP.

Data curation: JYP, DIL.

Formal analysis: JYP, DIL.

Methodology: JYP.
Project administration: JYP.
Visualization: JYP, DIL.
Writing – original draft: JYP.
Writing – review & editing: JYP, DIL.

Conflict of interest
No potential conflict of interest relevant to this article was reported.

Funding
None

Data availability
Data files are available from Harvard Dataverse
Dataset 1. Raw data of the response from 472 participants

Acknowledgments
None

Supplementary materials
Data files are available from Harvard Dataverse
Supplement 1. Measurement tool in Korean
Supplement 2. Measurement tool translated into English

References
2. Bae SB, Lee SC. Medical treatment of cancer pain: drug therapy according to guidelines will Improve


https://doi.org/10.1016/j.nedt.2015.02.022.


