Preference of pain assessment tools among different age groups of postoperative patients

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ABSTRACT

Scale preference is an important criterion when selecting an appropriate scale for assessing pain. Western studies show that the preference of pain intensity scales used in various age groups including elderly with cognitive impairment (CI) is varied. Moreover, the previous findings regarding the age differences on scale preference are incongruent. In China, there is a lack of study to compare the scale preference in various age groups including elderly with CI. Therefore, this study compared the preference of five evidence-supported pain scales: the Verbal Descriptor Scale (VDS), the Numeric Rating Scale (NRS), the Faces Pain Scale (FPS), the Numeric Box-21 Scale (BS-21), and the Colored Analogue Scale (CAS) in the adults varying in ages including the elderly with mild CI in Chinese population.

This is a descriptive comparative study. Two hundreds surgical patients were recruited purposively from the hospital with 50 for each group: young adults, middle-aged adults, elderly without CI, and elderly with mild CI. Participants indicated scale preference after they practiced using the pain scales. Scale preference was assessed and Fisher’s exact test was used to investigate whether scale preference was related to different age groups and levels of CI. The findings support that scale preference is significantly related to different age groups and levels of CI. In addition, the FPS is the most preferred scale overall, although the young adults more prefer the NRS.

Key words: pain assessment tools, preference, age differences, postoperative patients
Background and significance of the problem

Despite progress in pain management, recent study has shown that postoperative pain is still undertreated in Chinese patients (Shen, Sherwood, McNeill, & Li, 2008). It is well established that accurate pain assessment is a prerequisite for effective pain management. In clinic, there are many pain intensity scales to quantify pain assessment and guide treatment. The Numeric Rating Scale (NRS), the Verbal Descriptor Scale (VDS), and the Faces Pain Scale (FPS) are the commonly used pain intensity scales and studies have shown that these scales are suitable for assessing pain in young and old adults (Gagliese, Weizblit, Ellis, & Chan, 2005; Herr, Mobily, Kohout, & Wagenaar, 1998; Herr, Spratt, Mobily, & Richardson, 2004; Peters, Patijn, & Lame, 2007). In addition, pain assessment in elderly with cognitive impairment (CI) which is commonly associated with advanced age is important but also challenging. Some studies have shown that patients with mild or moderate CI can use pain intensity scales including the VDS, the NRS, the FPS, the Numerical Box-21 Scale (BS-21), and the Colored Analogue Scale (CAS) to report pain effectively (Chibnall & Tait, 2001; Closs, Barr, Briggs, Cash, & Seers, 2004; Scherder & Bouma, 2000; Taylor & Herr, 2003).

Scale preference is an important criterion when selecting an appropriate scale because the scale which has high preference can keep the motivation of the participants high and consequently increase the response rates (McDonald, 2002). However, the preference of pain intensity scales used in various age groups including elderly with CI is varied. One study (Gagliese et al., 2005) found that the NRS was the most preferred scale in young and old surgical patients when compared with the Visual Analogue Scale (VAS) and the VDS. In contrast, Peters et al. (2007) compared the scales (VAS, VDS, and BS-21) in young and old patients, they reported that BS-21 was the most preferred scale overall, even patients aged over 75 years especially preferred VDS. Therefore, they recommended that BS-21 is the first choice for pain assessment in heterogeneous patients and VDS can be considered when the majority of patients are old adults. Differently, Ware, Epps, Herr, and Packard (2006) compared the VDS, NRS, Faces Pain Scale Revised (FPS-R), and Iowa Pain Thermometer (IPT) in elderly with and without CI and found that NRS was the preferred scale in the elderly without CI group and FPS-R was the preferred scale in the elderly with CI group.
Moreover, the results of age differences on scale preference are inconsistent in the previous studies. Peters et al. (2007) found an age effect on scale preference; however, some other studies found that scale preference was not related to age (Gagliese et al., 2005; Herr et al., 2004; Li et al., 2007) and cognitive status (Herr et al., 2004).

The ethnic or cultural differences might also have an effect on scale preference (Herr et al., 2004; Taylor, Harris, Epps, & Herr, 2005; Taylor & Herr, 2003). Considering the cultural difference, however, studies on pain scale use are limited in China. Li et al. (2007) compared the VAS, the NRS, the VDS, and the FPS-R in Chinese postoperative adults and reported that the FPS-R was the most preferred scale. However, in this study, the evidence-supported scales BS-21 and CAS were not included, the cognitive function was not measured, and the patients who could not complete the pain scales were excluded during the data analysis.

In conclusion, the findings of western studies have shown that the preference of pain intensity scales used in various age groups including elderly with CI is varied. Moreover, the results regarding age differences on scale preference are incongruent. Therefore, the present study would compare the preference of the evidence-supported pain intensity scales (VDS, NRS, FPS, CAS, and BS-21) in the adults varying in ages including the elderly with mild CI in Chinese population. It is a part of a larger study entitled “Psychometric properties of pain intensity scales comparing among postoperative adult patients, elderly patients without and with mild cognitive impairment in China”.

Objectives

1. To determine the level of preference of the five pain intensity scales (VDS, NRS, FPS, CAS, and BS-21) among postoperative young adult patients, middle-aged adult patients, elderly patients without CI, and elderly patients with mild CI.

2. To compare the differences in the preference of the five pain intensity scales (VDS, NRS, FPS, CAS, and BS-21) among the four groups.
Technical terms

1. Pain intensity assessment tools

Five pain intensity scales were included: VDS, NRS, FPS, CAS, and BS-21. These scales use different approaches including words, numbers, pictures, colors, and boxes to assess pain.

The VDS consists of five adjectives that describe different levels of pain intensity: no pain, slight pain, moderate pain, severe pain, unbearable pain.

The NRS is a line marked with 11 numbers (0 through 10) at equal interval where 0 is “no pain” and 10 is “worst pain”.

The FPS (Bieri, Reeve, Champion, Addicoat, & Ziegler, 1990) consists of seven line-drawn faces presented in a horizontal format with different facial expressions that include a neutral face representing no pain, a severely controlled face without tears representing worst pain, and five other facial expressions in between. Although, Hicks, von Baeyer, Spafford, van Korlaar, and Goodenough (2001) revised the seven-face FPS to the six-face FPS-R to make it possible to score on the widely used 0 - 5 or 0 - 10 metric, the seven-face FPS is considered more sensitive to represent pain intensity than the FPS-R which has six faces. Therefore, this study selected the FPS as one pain intensity scale.

The CAS is designed to assess pain intensity among children (McGrath et al., 1996). In this study, the CAS was modified in order to make it practical to be presented on the questionnaire. The modified CAS in this study consists of a vertical triangular shape, varying in width and hue and ranging from 1 cm wide and light yellow hue at the bottom to 2.5 cm wide and deep red hue at the top. These colors were selected based on the patients’ preference from a pilot study. The length of the triangular shape is 10 cm with anchors “0” and “no pain” at the bottom and anchors “10” and “worst pain” at the top. The participants were asked to mark a horizontal line on the triangular shape where best reflects their pain intensity.

The BS-21 (Jensen, Miller, & Fisher, 1998) has a horizontal row of 21 boxes with numbers labeled from 0 to 100 in increments of five. There are anchors “no pain” on the left extreme and “worst pain” on the right extreme.

2. Age groups
The subjects were classified into three age groups according to the criteria used in China: young adults (age 20-44 years), middle-aged adults (age 45-59 years), and old adults (age ≥ 60 years) (Yin, Sun, Yang, Hu, & Chen, 2000).

3. Mild cognitive impairment

Mild cognitive impairment (CI) is known as a transitional stage between normal ageing and early dementia. The Mini-Mental State Examination (MMSE) is a widely used and well-validated instrument for screening cognitive function. A Chinese version of MMSE (CMMSE) was used in this study with possible scores ranging from 0 to 30. The CMMSE cutoff points (Yang et al., 2008) were used to divide the elderly into elderly without CI group and elderly with mild CI group. The elderly without CI group included illiterate people with score > 19, people having primary school education with score > 22, and people having secondary school education or higher with score > 26. The elderly with mild CI group included illiterate people with score 17-19, people having primary school education with score 20-22, and people having secondary school education or higher with score 24-26.

Research Methodology

1. Sample

Subjects were recruited purposively from a teaching hospital in Kunming, China. Inclusion criteria were: age over 20 years, admission for scheduled operation, no more than a mild CI level for elderly according to the Chinese Mini-Mental State Examination (CMMSE) (score ≥ 17 if illiterate, ≥ 20 for people with primary school educational level, ≥ 24 for people ≥ secondary school educational level), good eyesight including those using corrective lenses but excluding color blinded patients, good hearing, and able to communicate in Mandarin. We tried for an approximately equivalent distribution of subjects across the four groups (young adults: 20-44 years, middle-aged adults: 45-59 years, elderly ≥ 60 years without CI, and elderly ≥ 60 years with mild CI). Finally, during a 12-week period, 310 surgical patients were approached, of them 200 completed the data collection process with 50 in each group.

2. Data collection

This study was approved by the Institutional Review Board (IRB) at the Prince of...
Songkla University. Potential subjects were approached and signed informed consent or patient’s verbalization of willingness to participate was obtained. Then the primary investigator interviewed the participants preoperatively. Firstly, for elderly, the CMMSE was used to screen their cognitive status and those who had more than a mild CI level were excluded. Secondly, participants were explained how to use each pain scale. On the 2nd postoperative day (POD2), participants were asked to rate their current operative pain intensity and retrospective worst, least, and average pain levels during the past 24 hours by using the five scales. Moreover, on POD3, five pain scales were presented on the paper and participants were asked to rank order from 1 to 5 when 1= most preferred and 5 = least preferred. Therefore, it is certain that the participants got enough experience in using the pain scales before they were asked to select the scale they preferred to use.

To avoid the influence of impaired visual abilities accompanying with aging or drug use, all pain scales were consistently in a large format (14-point). For the FPS, as used in previous study (Taylor & Herr, 2002), the height of the faces was increased to 4 cm and the facial markings were darkened to enhance visualization of facial characteristics.

3. Data analysis

Scale preference was assessed by the number of patients choosing each scale according to the level of preference. Fisher’s exact test was used to investigate whether scale preference was related to different age groups and levels of CI.

Results

1. Sample characteristics

The mean age of patients was 55.56 years ($SD = 15.58$, range 20-83), and 54% were male. 1.5% of patients did not have education; 21.5% had an elementary school education; 77% had a secondary school education or higher. Most of the participants (95%) did not have a religion, 4.5% were Muslim, and 0.5% was Tibetan.

2. Scale preference

Nearly half of the subjects (42.5%) most preferred the FPS, followed by the VDS (29.5%) and the NRS (20%), whereas fewer subjects selected the CAS and the BS-21 as the
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most preferred scale, 4.5% and 3.5%, respectively (Table 1). The preference of the five pain scales in each group is presented in Table 2. The NRS was selected by 36% of the patients as the most preferred scale in the young adult group. While, for the middle-aged adult, elderly without CI, and elderly with mild CI groups, the FPS was selected as the most preferred scale, by 50%, 40%, and 48%, respectively. Moreover, scale preference was significantly related to different age groups and levels of CI (Fisher’s exact: $p = .001$).

Table 1
Preference of the five pain intensity scales in all subjects (N = 200)

<table>
<thead>
<tr>
<th>Scale</th>
<th>Level of preference</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td>VDS</td>
<td>59 (29.5)</td>
<td>73 (36.5)</td>
<td>58 (29)</td>
<td>8 (4)</td>
<td>2 (1)</td>
<td></td>
</tr>
<tr>
<td>NRS</td>
<td>40 (20)</td>
<td>31 (15.5)</td>
<td>44 (22)</td>
<td>74 (37)</td>
<td>11 (5.5)</td>
<td></td>
</tr>
<tr>
<td>FPS</td>
<td>85 (42.5)</td>
<td>49 (24.5)</td>
<td>31 (15.5)</td>
<td>17 (8.5)</td>
<td>18 (9)</td>
<td></td>
</tr>
<tr>
<td>BS-21</td>
<td>7 (3.5)</td>
<td>5 (2.5)</td>
<td>28 (14)</td>
<td>69 (34.5)</td>
<td>91 (45.5)</td>
<td></td>
</tr>
<tr>
<td>CAS</td>
<td>9 (4.5)</td>
<td>42 (21)</td>
<td>39 (19.5)</td>
<td>32 (16)</td>
<td>78 (39)</td>
<td></td>
</tr>
</tbody>
</table>

Note. For level of preference, 1 = most preferred and 5 = least preferred.

Table 2
Test of the most preferred scales classified by different age groups and levels of CI, using Fisher’s exact test (N = 200)

<table>
<thead>
<tr>
<th>Scale</th>
<th>20-44 years</th>
<th>45-59 years</th>
<th>≥ 60 years without CI</th>
<th>≥ 60 years with mild CI</th>
<th>$\chi^2$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDS</td>
<td>9 (18)</td>
<td>16 (32)</td>
<td>12 (24)</td>
<td>22 (44)</td>
<td>29.79</td>
<td>.001</td>
</tr>
<tr>
<td>NRS</td>
<td>18 (36)</td>
<td>6 (12)</td>
<td>14 (28)</td>
<td>2 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FPS</td>
<td>16 (32)</td>
<td>25 (50)</td>
<td>20 (40)</td>
<td>24 (48)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS</td>
<td>4 (8)</td>
<td>1 (2)</td>
<td>3 (6)</td>
<td>1 (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BS-21</td>
<td>3 (6)</td>
<td>2 (4)</td>
<td>1 (2)</td>
<td>1 (2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Overall, the present findings revealed that the FPS was ranked best in scale preference since nearly half of the patients selected it as the most preferred scale. The reason might be that completing the FPS does not require reading, writing, and expressive ability, making it applicable for the adults, especially the old adults who had difficulty to communicate their pain by traditional scales (Herr et al., 1998). The preference of the NRS and the VDS was
similar and ranked following the FPS since they are simple and easy to understand. However, the BS-21 and the CAS were ranked last in preference. The reasons might be that some participants expressed that the BS-21 was more complex than the NRS and the CAS was difficult to understand for some patients. This is consistent with the study by Closs et al. (2004) who suggested that the CAS appeared to be conceptually more difficult to understand compared with the VDS, the FPS, and the NRS. In contrast, the findings from Scherder and Bouma (2000) showed that the CAS was easily understood and worked best compared with the FPS and the Facial Affective Scale (FAS) which is much suitable for children because of the childlike facial depictions.

The results of the present study showed that the scale preference was significantly related to different age groups and levels of CI. This is consistent with Peters et al. (2007) who found an age effect on scale preference; however, it is also contrary to some other studies which found that scale preference was not related to age (Gagliese et al., 2005; Herr et al., 2004; Li et al., 2007) and cognitive status (Herr et al., 2004). Therefore, further studies are needed to have an in-depth analysis regarding the age and CI differences on scale preference.

The present findings also confirm that the ethnic or cultural differences might have an effect on scale preference. For one thing, scale preference from the present study is quite similar to the study by Li et al. (2007) who found that 48.1% of the Chinese adults preferred the FPS-R followed by the NRS and the VDS. For another, when Taylor and Herr (2003) compared the VDS, the NRS, the FPS, and the IPT, the FPS was found to be the most preferred scale in African-American old adults including elderly with CI. However, another two studies compared the similar scales in a primarily Caucasian sample; they found that the NRS and the VDS were the most preferred scales in young and old adults with and without CI (Herr et al., 2004; Taylor et al., 2005).

Some limitations in the present study should be mentioned. Firstly, purposive sampling was used in this study which could limit the representativeness of the population. However, the researchers tried to recruit all those patients who met the inclusion criteria during the data collection to minimize this limitation. Secondly, since CI commonly happens in elderly
(Peterson & Negash, 2008), this study only screened the cognitive status among elderly. However, it is possible that CI might also happen in the young and middle-aged adults. Thirdly, although this study compared the selected pain intensity scales in various age groups including elderly with mild CI, the patients with moderate CI were not included. Since some studies supported that patients with mild to moderate CI could rate pain by using the pain intensity scales (Chibnall & Tait, 2001; Closs et al., 2004), future studies are needed to extend the comparison to moderate CI Chinese patients.

Conclusions

The present findings support that scale preference is significantly related to different age groups and levels of CI. In addition, the FPS may be the most preferred scale overall in Chinese patients, although the young adults more prefer the NRS.

Recommendations

Considering the common visual impairment in elderly, the present study used enlarged print and darkened lines to enhance visualization; therefore, it is important to incorporate these adaptations into tool development (Herr et al., 2004) as well as facilitate adequate lighting and hearing devices (Taylor & Herr, 2003) when assessing pain in elderly. This study supplies invaluable evidence for pain assessment and future studies addressing the limitations identified in this study or replicating the study in other culture are warranted.
References


