The Checklist of Nonverbal Pain Indicators (CNPI): testing of reliability and validity in Norwegian nursing homes

SIR—Studies have shown that 45–80% of nursing home (NH) patients complain of pain [1], and that demented and mentally impaired NH patients are inadequately treated with regard to pain compared with mentally intact patients [2–4]. Assessing and uncovering pain in demented patients is a challenge. Among other things, experience, staff attitudes [5] and communication difficulties [3] are a part of the problem.

To overcome difficulties with verbal communication, several observational instruments have been developed to facilitate the detection of pain among mentally impaired NH patients [6–8]. The instruments vary in their comprehensiveness, and none of these is commonly used.

Auxiliary nurses and nurses’ assistants are groups of caring personnel that are in close contact with patients in situations that frequently give rise to pain, e.g. during daily activities. However, the ability to sense and interpret vague symptoms and signs varies among nursing personnel.

A pain assessment instrument for use in daily practice should be simple and short so that it can be kept in mind. A common understanding of the patients’ verbal and nonverbal expressions is a prerequisite for proper pain assessment of mentally impaired NH patients. The Checklist of Nonverbal Pain Indicators (CNPI) is a tool that may meet these requirements. Against this background we wanted to study the test–retest and inter-rater reliability, and the concurrent validity of a Norwegian version of the CNPI, when the assessments were carried out by nursing staff caring daily for the patients.

Methods

The CNPI, an observational tool, is a modified version of the University of Alabama Pain Behavior Scale [9]. The tool incorporates six behaviours that are commonly considered to be associated with pain in demented persons: vocalisation, grimaces, bracing, rubbing, restlessness and verbal complaints [10, 11]. In order to make the CNPI more easy to use, each behaviour item is accompanied by characteristic key words, e.g. for ‘restlessness’: constant or intermittent shifting of position, rocking, intermittent or constant hand motions, inability to keep still; for ‘vocal complaints’: words expressing discomfort or pain, e.g. ‘ouch’, ‘that hurts’, cursing during movement, or exclamations of protest, e.g. ‘stop’, ‘that’s enough’. Each behaviour is scored ‘yes’ = 1 or no = 0’, giving a maximum sum score of six.

Seven NHs were invited to participate in the study. A ward nurse chose a convenient sample among patients, who, according to medical records, were diagnosed as demented, or who were considered to be mentally impaired, defined as having two or more errors on the Short Portable Questionnaire (SPMQ) [12]. Based on nurses’ records, the ward nurse who did not participate in the assessments recorded whether the patients had been suffering from pain during the week prior to assessment and performed the SPMQ.

One of the authors instructed the nursing staff on each participating ward how to use the CNPI. The patient behaviour was assessed while staying in bed, and thereafter during the regular morning grooming and mobilising. The same person made the assessments on two consecutive days. Blinded to these judgements, another carer repeated the assessment on the third day. The assessments were performed by carers with varying degree of training (nurses, auxiliary nurses, nurses’ assistants), who were regularly doing the patient care. This setting was chosen in order to reflect everyday practice in a NH.

Each assessment was introduced with the question: ‘Have you any pain or aches today?’ Patients who could not clearly answer ‘yes’ or ‘no’ were defined as ‘non-communicative’. After the assessment was done, the assessors rated their own opinion of pain intensity on a visual analogue scale (VAS).

Statistics

Descriptive and non-parametric statistics were applied. Wilcoxon signed rank test was used to compare sum scores of CNPI assessments at rest and during movement. Internal consistency was measured by Cronbach’s α, agreement between ratings was assessed by Cohen’s κ and concurrent validity by means of Spearman’s rank
correlation. Interpretation of $\kappa$ was: $0.2 = \text{poor}$, $0.2<\kappa\leq0.4 = \text{fair}$, $0.4<\kappa\leq0.6 = \text{moderate}$, $0.6<\kappa\leq0.8 = \text{good}$, $0.8<\kappa = \text{excellent agreement}$ [13]. $P\leq0.05$ was considered statistically significant.

**Ethical approval**

The regional ethics committee approved the protocol and the procedure of the study.

**Results**

A total of 46 patients aged 65 years and over, and who were admitted to long-term stay in a NH were included in the study. Demographic information is shown in Table 1.

Nurses performed 42 assessments, auxiliary nurses 89 and nurses’ assistants seven. Occupational category was not indicated for five carers. Ward nurses reported pain in 31 patients, all with persistent pain. No pain was reported for 12 patients and in three no remarks were made to this question.

For each of the three assessments, the median CNPI sum score at rest was zero (inter-quartile range 0–1) and during movement one (inter-quartile range 0–3) (signed rank test all $P<0.001$). Due to low frequency of behaviours at rest, only results for assessments during movements were analysed further. The results of tests for test–retest and inter-rater reliability are shown in Table 2. Except for one item (rubbing) for which the agreement was fair, the test–retest assessments were moderate or good. The inter-rater reliability was moderate or good for all six items (Table 2). Vocalisations, grimacing and verbal complaints were the most common registered behaviours. Separate examination of test–retest reliability for nurses and auxiliary nurses revealed $\kappa = 0.20–0.63$ and $0.46–0.63$, respectively. Comparison of inter-rater reliability between nurses and auxiliary nurses was available for 14 assessments. Due to low frequency of behaviour items, these comparisons were appropriate only for vocalisations and verbal complaints ($\kappa 0.57$ and 0.71, respectively).

The correlation between each CNPI sum score and VAS rating was taken as a measure of concurrent validity of the CNPI. Spearman’s rank correlations for the first, second and third assessment, respectively, were $r = 0.88 \ (n = 43)$, $r = 0.82 \ (n = 42)$, and $r = 0.69 \ (n = 39)$ (for all $P<0.001$).

Six patients who were not considered as being in pain expressed behaviours that could be associated with pain, and six patients deemed as having chronic pain did not express any behaviour symptoms.

**Discussion**

Pain assessment tools are rarely used in daily practice in Norwegian NHs. An enquiry carried out in seven NHs revealed that 92% of 112 of the nursing staff did not use any kind of pain assessment tool in their daily practice, and 64% did not know of any assessment tool at all (unpublished data).

Our study shows an acceptable test–retest and inter-rater reliability and concurrent validity of the CNPI when used by ordinary NH staff in their daily practice. The test–retest reliability was slightly better for auxiliary nurses than for nurses. Agreement between nurses and auxiliary nurses was moderate, but this could only be assessed for two of the behaviours. Our results are somewhat poorer

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**Table 1.** Demographic and clinical data for 46 nursing home patients participating in the assessment of pain related behaviour by means of the CNPI

<table>
<thead>
<tr>
<th>Behaviour present (a)</th>
<th>Number (%</th>
<th>agreement</th>
<th>$\kappa$</th>
<th>$1^a$</th>
<th>$2^a$</th>
<th>$1&amp;2^b$</th>
<th>$\chi^2$</th>
<th>$P$</th>
<th>$1^a$</th>
<th>$2^a$</th>
<th>$1&amp;2^b$</th>
<th>$\chi^2$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocalisations</td>
<td>39 (84.8)</td>
<td>0.66</td>
<td>15</td>
<td>16</td>
<td>12</td>
<td>0.88</td>
<td>0.001</td>
<td>37</td>
<td>0.60</td>
<td>21</td>
<td>12</td>
<td>14</td>
<td>0.69</td>
</tr>
<tr>
<td>Grimaces</td>
<td>34 (73.9)</td>
<td>0.47</td>
<td>21</td>
<td>19</td>
<td>14</td>
<td>0.71</td>
<td>0.01</td>
<td>34</td>
<td>0.45</td>
<td>17</td>
<td>14</td>
<td>12</td>
<td>0.63</td>
</tr>
<tr>
<td>Bracing</td>
<td>40 (87.0)</td>
<td>0.55</td>
<td>8</td>
<td>8</td>
<td>5</td>
<td>0.71</td>
<td>0.01</td>
<td>40</td>
<td>0.50</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>0.63</td>
</tr>
<tr>
<td>Restlessness</td>
<td>40 (87.0)</td>
<td>0.43</td>
<td>5</td>
<td>7</td>
<td>3</td>
<td>0.71</td>
<td>0.01</td>
<td>40</td>
<td>0.49</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>0.63</td>
</tr>
<tr>
<td>Rubbing</td>
<td>41 (89.1)</td>
<td>0.23</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>0.57</td>
<td>0.12</td>
<td>43</td>
<td>0.69</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>0.63</td>
</tr>
<tr>
<td>Verbal complaints</td>
<td>37 (80.4)</td>
<td>0.59</td>
<td>18</td>
<td>17</td>
<td>13</td>
<td>0.88</td>
<td>0.001</td>
<td>37</td>
<td>0.58</td>
<td>16</td>
<td>13</td>
<td>12</td>
<td>0.69</td>
</tr>
</tbody>
</table>

$^a$Number of patients where the behaviour was observed at the first, second and third assessment, respectively.

$^b$Number of patients where the behaviour was observed both at the first and second, the first and third, and second and third assessment, respectively.
than those reported by Felt et al. [14] who reported inter-rater reliability (κ) of 0.63–0.82 (test–retest not reported). The setting in Felt et al.’s study was, however, different. Their participants were patients who had undergone surgery after a hip fracture, and the assessors were master-prepared gerontological nurses [14]. The frequency of reported behaviours is, however, equivalent to previous findings [9]. The modest internal consistency, which matches the results from the original presentation of the tool [9], may be explained by the low number of items of the scale.

Most patients were suffering from chronic pain, but symptoms can vary from day to day. This may partly account for the variation in frequency of individual behaviours. However, inability to assess behaviour symptoms properly is probably of greater importance.

The CNPI sum score correlated significantly with the VAS. This indicates that the number of behaviours is related to pain intensity. It is, however, important to bear in mind that the presence of one or more signs on the CNPI is not identical to the presence of pain. The presence of a given behaviour must individually be valued whether it can be related to pain or not. In this respect, depression is an important issue [15]. Nursing personnel who identify any of these behaviours have to take action, e.g. changing present pain treatment. Twenty-seven patients in this study who showed behaviour symptoms did not receive prescribed analgesics until after they had got up (data not shown). Most NHs have part-time engaged physicians who do not regularly see every patient, unless it is required. Adequate pain assessment therefore depends on the alertness of the caring staff to consider pain as a possible explanation when behaviour symptoms occur or persist without a plausible reason, and to bring this information to the physician’s attention.

Conclusion

The CNPI is a simple and short assessment tool with potential to facilitate nursing staff’s alertness regarding pain behaviours in NH patients and it can be managed by various categories of nursing personnel. The CNPI is a reliable and valid instrument for assessing pain in demented and mentally impaired NH patients. Due to the small number of comparisons between various groups of nursing personnel, our results cannot be generalised.

Key points

- The CNPI is a simple pain assessment tool that can be used at the bedside.
- The CNPI reveals an acceptable test–retest and inter-rater reliability and concurrent validity when used by regular nursing home carers.

Conflicts of interest declaration

The authors have no conflicts of interest.

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