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Translation, adaptation and psychometric validation of the Good Perioperative Nursing Care Scale (GPNCS) with surgical patients in perioperative care

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A B S T R A C T

Aim: To test the psychometric validity of the Good Perioperative Nursing Care Scale (GPNCS), a self-administered questionnaire, following translation and adaptation.

Introduction: Patients’ satisfaction with and experience of nursing care in orthopaedic or perioperative settings are currently not routinely measured and few standardized patient-reported experience measurement tools exist for these settings.

Materials and methods: Cross-sectional survey. The 34-question, seven-factor questionnaire was translated, adapted, and face-validated; the translated version was then validated with a group of surgical patients in perioperative settings. The internal consistency of the translated version was validated and tested using confirmatory factor analysis combined with Cronbach’s alpha.

Results: In the orthopaedic department of a regional public hospital, 361 acute, traumatic and elective surgical patients were screened for eligibility; 215 were included. The full-scale model fit estimates were moderate. Factor loadings typically ranged from 0.65 to 0.97, except for the questions concerning Technical Skills (0.38–0.63) and Nursing Process (0.28). The Cronbach’s alpha value for the total scale score was 0.92, with subfactors ranging from 0.72 to 0.87.

Conclusion: Providing evidence for quality, or lack thereof, the Danish version of the GPNCS is a valid tool for measuring surgical patients’ experiences with perioperative nursing care. The electronic version proved practical.

Relevance to clinical practice: The validated Danish version of the tool will help healthcare professionals to identify areas of nursing care that need improvement, facilitate international benchmarking of units and enable comparison of care quality, nationally and internationally.

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Introduction

The concept of quality in healthcare is complex and multidimensional and, therefore, difficult to define and assess. Healthcare quality measures have traditionally focused on structure and outcome indicators, such as morbidity, mortality and hospitalization, as well as aspects defined entirely through professional healthcare perspectives (Donabedian, 1966). When healthcare professionals define quality, there tends to be less focus is on what service users feel is important and patients’ views are not explicitly considered (Siriwardena and Gillam, 2014). Since patients tend to assess healthcare quality according to responsiveness to their specific needs, and healthcare professionals tend to define quality in terms of the attributes and results of care, the perspectives of each party are valuable and both perspectives must be considered when assessing healthcare (Piligrimiene and Buciunjiene, 2008). Consequently, quality should incorporate the perspective of the patient, but quality should also be defined in terms of the care process (Donabedian, 1966). The care process is the sum of activities that provide ‘good’ healthcare (technical skills, coordination and continuity of care) but also includes inter-professional...
processes (physical presence, maintaining privacy and emotional support) and appropriateness of information (Donabedian, 1966). The importance of incorporating the patients’ perspective and experience into assessments of healthcare quality has long been recognized internationally (Hurst and Jee-Hughes, 2001).

Despite increasing awareness of the patient perspective in quality of care, patients’ experiences are currently not routinely measured in orthopaedic patients or in perioperative settings. The large numbers of operations performed daily makes the care provided in operating departments an important aspect of modern healthcare. Most operations are performed under local or regional anaesthesia, meaning that patients are awake and able to evaluate their care for the whole duration of the process. To improve quality of care, the factors that adversely affect satisfaction and experience must be identified (Beattie et al., 2014). Patient experiences are the elements of healthcare that patients have received, whereas patient satisfaction measures the extent to which a patient is content with the healthcare they received. Satisfaction is more profound than experiences, but is vulnerable to ceiling effects (Sitza and Wood, 1997) and is more subjective and more susceptible to the effects of expectations than experience (Coulter and Fitzpatrick 2009). It is important to evaluate both, as experience measures are likely to provide a useful supplement to assessing quality of care (Jenkinson et al., 2002). Patients’ perceptions are needed to achieve unique insights into what works and what does not work in healthcare, so instruments that capture patients’ perspectives on quality of healthcare are needed.

Valid, reliable and practical patient-reported experience measures (PREMs) assess both the care process and patients’ perspectives of quality (Beattie et al., 2015). Yet the few validated and reliable PREMs available for evaluating the perioperative care setting (Caljouw et al., 2008; Donmez and Ozbayir, 2011; Jlala et al., 2010; Leinonen et al., 2001; Tinnfalt and Nilsson, 2011) have focused mainly on the anaesthetic aspects (Caljouw et al., 2008; Jlala et al., 2010) and have used restricted groups of patients (Tinnfalt and Nilsson, 2011) and some also lack psychometric quality (Tinnfalt and Nilsson, 2011). However, patients’ experiences in the perioperative setting following any type of surgery is captured by the Good Perioperative Nursing Care Scale (GPNCs) developed by Leinonen et al. (2001), a Finnish-language instrument now also available in English, Turkish, and Chinese versions (Donmez and Ozbayir, 2011; Leinonen et al., 2001; Wu et al., 2014). Use of the GPNCs to measure patients’ experiences in a Danish context requires translation, adaptation and psychometric validation with a relevant group of surgical patients.

The GPNCS questionnaire

The GPNCs is a self-administered questionnaire that assesses patients’ satisfaction and experience with perioperative nursing care (Leinonen et al., 2001). The first section of the questionnaire concerns sociodemographic characteristics (age, gender, marital status, education, etc.) and the clinical background information relevant to the surgery. The second part contains 34 questions/items grouped into seven dimensions: ‘Physical care’; ‘Giving information’; ‘Support’; ‘Respect’; ‘Personnel characteristics’; ‘Environment’; and ‘Nursing process’. Using five-point Likert scales, patients are asked to specify their level of agreement or disagreement with each of the statements in the 34 items. The responses are assigned 5 points for ‘I completely agree’, a score of 3 is given for the neutral response ‘I neither agree nor disagree’, and 1 point for ‘I completely disagree’. A score of 0 (zero) is given for ‘I cannot evaluate this aspect’. The GPNCs was developed following a literature review and qualitative interviews with healthcare professionals and by using the theoretical framework provided by Leino-Kilpi and co-workers (Leino-Kilpi, 1991, Leino-Kilpi and Vuorenheimo, 1992, 1994). The framework presents a coherent set of criteria for the quality of nursing care and, based on this framework, seven content categories (dimensions) were generated to describe quality in intraoperative nursing care. The early version of the GPNCs was then developed using these seven dimensions and 54-items (Leinonen et al., 1996). Subsequently, the 54-item instrument was validated with 874 patients in five surgical departments and, using exploratory factor analysis, the number of items was reduced to 34 (Leinonen, 2001). This 34-item version was used in the current study.

Phase 1: translation and adaptation

After obtaining permission from the developers, translation and adaptation into Danish were performed according to the ISPOR guidelines (Wild et al., 2005). Initial translations were carried out independently by two bilingual translators, both native speakers of Danish, but with different profiles and levels of awareness of the concept being examined. One translator is a registered nurse specializing in anaesthesia and has a bachelor’s degree in English business language. The other translator has a master’s degree in comparative literature studies and is an experienced translator, but was completely new to the concept being examined. Both translators were required to obtain equivalence from both a topic-specific and a language-specific perspective (Beaton et al., 2000; Wild et al., 2005). After reconciliation of the two translations by an expert panel, the reconciled version was back-translated into English by a bilingual, blinded translator, who is a native English speaker. The developers then checked the back-translated version for conceptual and semantic equivalence against the original. The expert committee subsequently reviewed the developers’ comments, and any discrepancies between the original and the back-translated version were modified to obtain consensus and ensure adaptation. The Danish GPNCs questionnaire was finally adapted for use with a tablet computer (Apple iPad), and face-validated and pilot-tested by two healthcare professionals and seven orthopaedic patients, resulting in only minor adjustments. The Danish version was named GPNCSDK.

Phase 2: psychometric validation of the GPNCSDK

The validation part of the study was conducted in the orthopaedic surgery department of a regional public hospital, where patients are admitted with acute, traumatic, or elective orthopaedic problems from a mixed rural and urban catchment area.
Study participants

All orthopaedic surgical patients aged 18 years or older, capable of reading and writing Danish, and able to complete the electronic questionnaire using a tablet computer were eligible for inclusion. The following patient groups were excluded: those with dementia or cognitive disorders; those who had previously completed the questionnaire; and those discharged or transferred to other departments (e.g., to the ICU) on the first postoperative day. Patients who had surgery on Fridays or Saturdays were also excluded for logistical reasons.

Data collection

Patients were recruited consecutively. Four experienced research nurses enrolled eligible patients by approaching them in the orthopaedic unit the day after surgery. To minimize bias and to ensure uniformity in the data collection process, the independent research nurses were instructed in the manner of approach and patient motivation, and asked to dress in plain clothes. Having introduced themselves as research nurses (unrelated to the surgical department), they handed out the tablet computer displaying the GPNCSDK questionnaire. Some older patients needed initial technical guidance to get started, but they independently completed the 34-item survey in 10–15 min. The responses were recorded and analysed using study identification numbers only and anonymity was preserved.

Statistical analysis

Sociodemographic characteristics and selected clinical background information were described using frequencies. Confirmatory factor analysis (CFA) with maximum likelihood estimation was used for validation. The response ‘I cannot evaluate this aspect’ (zero) was coded as missing. The responses were subsequently checked for completeness. If more than 50% of the items within a factor were missing, the response was considered invalid and removed prior to analysis (all responses were valid; none removed). Partly completed questionnaires were removed prior to analysis (n = 8). Factor loadings and comparative fit index (CFI), the Tucker–Lewis index (TLI), the root mean square error of approximation with 90% CI (RMSEA), and the likelihood ratio were calculated, and the cut-off values for categorical data were applied (Schreiber et al., 2006). To determine internal consistency reliability estimates, Cronbach’s alpha (Bland and Altman, 1997; Tavakol and Dennick, 2011) was calculated and described as Excellent ($\alpha \geq 0.9$), Good ($0.9 > \alpha \geq 0.8$), Acceptable ($0.8 > \alpha \geq 0.7$), Questionable ($0.7 > \alpha \geq 0.6$), Poor ($0.6 > \alpha \geq 0.5$), or Unacceptable ($\alpha < 0.5$). All statistical analyses were performed using Stata 14 (StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP).

Sample size

As the number of respondents recommended for confirmatory factor analysis is at least five times the number of items in the questionnaire, or a minimum 200 patients (Frost et al., 2007), we included 250 patients to protect against dropout and missing responses.

Ethical approval

Prior to study commencement, the developers’ authorization and consent for the adaptation were obtained. The study was approved by the Danish Data Protection Agency (2008-58-0035), No approval from the Regional Scientific Committee of Southern Denmark was required. All patients received written and verbal information about the study; response to the questionnaire was considered to be indication of voluntary consent to participate.

Results

Three hundred and sixty-one orthopaedic and trauma patients were assed for eligibility (Fig. 1). Forty-one patients were excluded, of whom five had been transferred and thirty had previously completed the questionnaire. Six patients suffered from dementia or cognitive disorders. Fifty-nine of those approached refused to participate, eight responded only partially to the questionnaire, and 38 patients were not included for other reasons (e.g., nausea, pain, early discharge, exhaustion). In total, 215 patients were available for the statistical analysis (Fig. 1).

The patients’ mean age was 53 years (17.2); 46% were female (Table 1). None were illiterate and 28% had completed year 0–9 schooling, 40% secondary education (year 10–12 and/or vocational qualification), and 32% tertiary education (bachelor’s or master’s degrees). The majority (63%) were married or cohabiting and 47% were working, while 37% had retired. General anaesthesia was the most common type of sedation (73%); surgery was primarily performed during the daytime (80%), sometimes in the evening (17%) and only a few during the night (3%). A mix of elective and acute/trauma surgery was performed (44 vs. 56%).

Translation and adaptation

Excellent agreement was obtained for most questions/items in the forward and backward translation process. However, four questions on background failed to attain semantic equivalence and adaptation. Translation is the purely linguistic transformation of words and phrases while adaptation involves modification of words and phrases into more appropriate and cultural specific words or sentences. As a result, the following modifications were made: ‘Operating Department’ was replaced by ‘Operating and Recovery Department’; we replaced ‘My operation/treatment was’ by ‘My operation/treatment was’; A) Elective (planned in advance), B) Emergency (acute, not planned in advance); with ‘My hospitalization was: A) Elective (my hospitalization for the operation was planned in advance), B) Acute (my hospitalization for the operation was NOT planned in advance); ‘fears’ (related to anaesthesia and to the operation/treatment) was replaced by ‘concerns’.

Psychometric validation: confirmatory factor analysis (CFA)

Having performed CFA with all seven factors (full scale), we calculated the model fit estimates (CFI = 0.73, TLI = 0.70, RMSEA = 0.095 [90% CI: 0.09–0.10]) and likelihood ratio = 1484 (506). However, Nursing Process (Factor 7, Item 33) was removed because of below-minimum loading (0.28). As a factor cannot consist of only a single remaining question/item, the entire Nursing process factor was removed from the model. The CFA was then repeated with the remaining six factors, giving slightly improved results (CFI = 0.73, TLI = 0.71, RMSEA = 0.097 [90% CI: 0.09–0.10]) and a likelihood ratio of 1362 (449). Each factor was then analysed individually and covariance was modelled between selected items (selection based on clinical considerations). Hence, Physical care (Factor 1, Items 1 + 2, 5 + 6, and 9 + 10), Giving information (Factor 2, Items 15 and 16), Personnel characteristics (Factor 5, Items 24 and 27), and Environment (Factor 5, Items 29 and 30) were modelled using covariance. All items with factor loadings are summarized in Table 2. The majority of Physical care (Factor 1) items had factor loadings ranging from 0.38 to 0.74. The CFI for that
factor was 0.92, the TLI = 0.88, and the RMSEA = 0.11 [90% CI: 0.08–0.13]. The lowest loadings were observed for questions on Technical skills (Items 8–10), at 0.38–0.43. The six-item factor Giving information (Factor 2) had factor loadings ranging from 0.40 to 0.88, a CFI of 0.99, TLI = 0.99, and RMSEA of 0.03 [90% CI: 0.00–0.09]. The remaining factors—Support, Respect, Personnel characteristics, and Environment (Factor 3–6)—all had factor loadings above 0.50 and CFI/TLI values above 0.96. An almost perfect fit was achieved for Respect (Factor 4), primarily because of Item 22’s loading of 0.97. Moderate RMSEA values were observed for Support and Personnel characteristics.

Reliability and internal consistency

To test internal consistency, Cronbach alpha values were calculated for each factor and for the total scale (Table 3). Coefficients ranged from 0.72 (Respect) to 0.85 (Physical care), with the total scale coefficient being 0.92.

Discussion

In this study, the GPNCS was translated, adapted into Danish, and its psychometric properties validated in perioperative settings by 215 orthopaedic patients. The study demonstrated that six out of seven factors in the GPNCSdk contribute to its validity as an assessment tool for patients’ satisfaction with and experience of perioperative nursing care. The total scale internal consistency was excellent and strong internal consistency was evident, with alpha values for all factors above the recommended thresholds. The electronic administration of the GPNCS.dk also proved practical, with incomplete responses from only eight patients (<2.5%).

Translation and adaptation

To maintain content validity at a conceptual level across different cultures, each question in a questionnaire must be given both a linguistically and culturally appropriate translation (Beaton...
et al., 2000). The translation of the GPCNCS followed the ISPOR guidelines (Wild et al., 2005). The forward translation identified ambiguous wordings, which were reconciled. The face validation identified issues with the patients’ perception of the words ‘elective’ and ‘acute’. The discrepancies in how healthcare professionals and patients perceived elective surgery were easily corrected by changing ‘elective surgery/treatment’ to ‘elective hospitalization’ (see Translation and adaptation above). In summary, the translation and adaptation raised no major concerns.

As described in the method section, the Forward-backward (FB) translation method of Beaton, Guillemin and colleagues was used in the current study. Other methods exist such as the Dual-panel method (McKenna and Doward, 2005; Swaine-Verdier et al., 2004), which utilize focus group interviews of lay persons rather
than professional translators. However, the ISPOR recommendations compare twelve different methods of translation and cross-cultural adaptation with a primary focus on patient-reported quality of life. Each phase of the translation process has been critically reviewed and the results evaluated according to the choices made (Wild et al., 2005). The ISPOR guidelines are considered the gold standard and were suitable for this study as the method meets the scientific requirements for translation of instruments dealing with latent phenomena such as patient satisfaction with perioperative nursing. Furthermore, there was a particular focus on the adaptation in several parts of the process; initially, at the synthesis meeting between the translators (one being a layperson) and the healthcare professionals; then, when the expert committee reviewed the back-translated version; and, finally, during the face-validation (patients and healthcare professionals). The FB method was the most practical tangible method and therefore applied in this study.

**Psychometric validation**

The initial analysis of missing responses revealed issues with Items 18 and 20 (‘I was given the chance to listen to music if I wanted to’ and ‘If I was anxious ...’, respectively); more than 50% of all patients felt unable to evaluate those aspects. In this particular case, only anxious patients or those with an interest in music could provide a valid response. Although factor analyses are not affected by missing responses, there are good clinical reasons to reduce the number of missing responses by rephrasing these two questions. The validity of any questionnaire is compromised if the prerequisites for correct answers are not present.

Another validity issue was presented by the initial full-scale CFA with Item 33 (Factor 7), which had a loading factor of 0.28, below the recommended 0.30 (Schreiber et al., 2006). Its removal would have left only a single item under the Nursing process factor, rendering it invalid. The slightly improved model fit achieved by removing the factor lends some support to the decision to do so. The responses were furthermore collected in elective/acute patients across both gender and range of employment and education levels. The fact that most patients had general anaesthesia (73%) could affect their judgement and may be the reason why the factor loading in the current study were below minima. Otherwise, we believe patients were in an informed position to make the evaluation. However, other nursing settings may offer different responses and factor loadings for Nursing process.

The analysis of the Physical care factor (Factor 1) showed high loadings for most items, except for three related to staff technical skills (Items 8–10). Their lower factor loadings may reflect the obvious difficulties of assessing staff performance while sedated. Furthermore, ‘staff’ and ‘staff performance’ are ambiguous terms, and may lead patients to base their responses on an overall assessment of staff work, or entirely on the performance of the anaesthetist or the surgeon, despite our intention to obtain an assessment of the care performed by nurses.

Nevertheless, questions related to technical skills address the patients’ feelings of security and confidence in the staff, which ultimately influences the patients’ perceptions of quality and satisfaction and these questions are, therefore, relevant.

The Respect factor (Factor 4) attained an almost perfect model fit, primarily because of Item 22 (loading of 0.97), while the other two questions (Items 21 and 23) added little to the factor. While exploring issues related to specific questions lies beyond the scope of this study, a rephrasing aimed at achieving a more equal loading distribution should be attempted in future validations. From a clinical perspective, two somewhat redundant items will affect the results; the assessment of Respect should consequently be interpreted with caution.

**Reliability and internal consistency**

The total scale reliability coefficient was 0.92, with factor coefficients ranging from 0.72 to 0.87 (Table 3). The items are consistent with each other, the questionnaire items are thus examining components of the same characteristic. The coefficient of 0.92 is excellent and the GPNCSDK should, therefore, be considered a valid tool for measuring perioperative patient experience and satisfaction with perioperative nursing care.

**Comparison by language version**

The Turkish version of the GPNCs omitted two items prior to validation. The items numbered here as 13 (Giving information, Factor 2) and 30 (Environment, Factor 6) were deemed by the Turkish expert panel to be covered by Items 11 and 29, respectively. As this study only removed items on the basis of the CFA results, the comparison of potential items to be removed across the two versions is not possible.

**Study population**

The deselection bias of patients challenges most tools assessing patient experiences and satisfaction. There is some evidence suggesting that assessment of quality of care in patients with mild to moderate cognitive impairment (dementia) can best be done by individual interviewing and in focus groups (Baalen et al., 2011). Cognitively impaired patients in hospital are typically fatigued and physically ill, often with delirium superimposed on dementia, resulting in fluctuations in mood and greater levels of disorientation (Goldberg and Harwood, 2013). Cognitively impaired patients, therefore, represent a challenge for self-administered surveys. Alternatively, family carers, who know the patient well and can act...
in their best interests, could complete the survey on behalf of the patient. Since the intention was to validate a self-administered questionnaire, the two above alternatives were not suitable for this study aim and patients with dementia/cognitive disorders were, therefore, excluded.

There is some evidence suggesting that demographic characteristics influence patient experience/satisfaction e.g. older patients and those with lower levels of education are generally more satisfied (Hall and Dornan, 1990). The number of responders recommended for confirmatory factor analysis validation is at least five times the number of items in the questionnaire. Consequently, a minimum of 200 patients were required and they were all consecutively included. Other sampling methods exist, but purposeful sampling is considered the most effective use of limited resources and, most importantly, purposeful sampling is widely used for the identification and selection of information-rich cases.

**Strengths and limitations**

This study is limited by its single-centre design and the exclusive use of orthopaedic surgery patients, which may weaken the strength of generalizations. Despite the inclusion of patients of different ages, gender, marital status, and conditions (acute or chronic) who received both elective and acute surgery, our findings may not apply to other groups, such as cardiovascular or otolaryngology patients. Electronic versions of questionnaires have been reported to attain superior response rates compared with traditional pen-and-paper versions; however, their use requires patients to have basic computer literacy (Bowling, 2005). Our use of an electronic version combined with a personal approach (via research nurses) may have enhanced motivation and convinced patients of the study’s legitimacy, leading to our high response rates. Differential item functioning (DIF) was not assessed in this study, nor were factor loadings or fit statistics (observed versus unobserved variables) compared across the language versions. Thus, the comparison was qualitative in nature. Comparative benchmarking requires formal tests of cross-cultural DIF and the use of GPNCs in longitudinal designed studies, without accounting for these possible sources of bias, is problematic. The strengths of the study include optimal timing of the data collection. According to the literature, surgical patients’ stress decreases after 24 h and the effect of pain and anaesthetic agents is reduced (Donmez and Ozbayir, 2011). Recall bias becomes an issue 48 h after surgery. Hence, the first postoperative day represents the ideal time for data collection. The rigorous translation process, with several revisions in consultation with language professionals and selection of information-rich cases.

**Relevance to clinical practice**

The validated Danish PREM will help healthcare professionals to identify areas in need of changes in practice and improvements in nursing care. The existence of several validated PREMs facilitates the benchmarking of units and enables a comparison of quality in care, both nationally and internationally. The PREM questionnaire helps units to record and monitor their progress on a regular basis, if desired. Future plans include the validation of the GPNCSDK in other hospitals and departments, for wider dissemination of the tool and DIF validation. The actual evaluation of quality of perioperative care from this study has led to changes in the day-to-day practice on fasting and information while waiting for surgery. In the near future, a survey will be initiated to measure the effects of those changes.

**Conflicts of interest**

No conflict of interest has been declared by the authors.

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**Ethical approval**

Prior to the study’s initiation, the developers’ authorization and consent for the cross-cultural adaptation were obtained. The study was approved by the Danish Data Protection Agency (2008-58-0035). No approval from the Regional Scientific Committee of Southern Denmark was required. All patients received written and verbal information on the study; response to the questionnaire was considered indication of voluntary consent to participate.

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