Tool for Evaluating the Ways Nurses Assess Pain (TENAP): Evaluation of psychometric properties

Background and Literature Review

Older people, especially those with cognitive impairment often experience a variety of painful conditions (AGS, 2002, 2009). Poorly managed pain in older people has been associated with depression, anxiety, increased falls, impaired mobility, reduced socialization and sleep disturbances (AGS, 2002, 2009). Pain is a personal and subjective experience. The accepted standard for pain assessment developed by McCaffery (1979, p. 8) states that “pain is whatever the person says it is, existing whenever he [sic] says it does.” Accurate assessment of pain is essential for effective pain management (Buffum, Hutt, Change, Craine & Snow, 2007) and self-report is considered the most reliable source of information about pain (American Geriatric Society (AGS), 2002, 2009). However, this definition necessitates the ability of individuals to verbally report their experience. The detection and description of pain in individuals with both verbal and cognitive deficits is therefore challenging. This paper reports on development and psychometric properties of the Tool for Evaluating the Ways Nurses Assess Pain (called TENAP) which aims to assess nurses’ knowledge, attitudes, and reported practice of pain assessment in the cognitively-impaired elderly in acute care settings.

Cognitive impairment is characterized by a deterioration of memory, attention, visual spatial skills, language and/or behavior (Ferrell, 1996). Impaired memory, language and abstract thinking capabilities hinder the ability of a cognitively impaired elderly person to recall and report painful experiences using verbal pain scales (Horgas, Nichols, Schapson & Vietes, 2007). Evidence suggests that pain is under-recognized and under-treated in this population compared to those with less or no impairment (Closs, Barr & Briggs, 2004; Reynolds, Hanson, DeVellis, Henderson & Steinhauser, 2008).
Nursing assessment of pain in cognitively impaired elderly people often depends on nurses’ perceptions of patients’ pain. Negative attitudes and beliefs towards pain and pain assessment by nurses have been consistently reported (Brockopp, Ryan & Warden, 2003; Lui, So & Fong, 2008; Matthews & Malcolm, 2007). There is a tendency for nurses’ personal attitudes to adversely influence their perception of patients’ pain intensity. Such attitudes often stem from beliefs that cognitively impaired older people are unable to accurately verbalize their pain (Brockopp, et al., 2003; Murdoch & Larsen, 2004) and experience less pain than other age groups (AGS, 2002, 2009). As a result, nurses tend to underestimate pain in this population (Chen, Lin & Watson, 2010).

Despite increasing recognition of the importance of pain assessment in this population, studies with nurses across acute and long-term care settings reveal significant deficits in knowledge of pain and its management in the general patient population (Lui, et al., 2008; Zanolin et al., 2007), elderly people (Sloman, Ahern, Wright & Brown, 2001; Yu & Petrini, 2007) and cognitively impaired elderly people (Zwakhalen, Hamers, Peijnenburg & Berger, 2007). One study with cognitively impaired nursing home residents found the reliability and validity of nurses’ assessment of pain was inadequate (Cohen-Mansfield, 2005).

Although researchers have attempted to measure nurses’ knowledge and attitudes about pain, few scales investigate knowledge, attitudes, and reported practice of nurses towards pain assessment. We found no reported studies involving nurses caring for cognitively impaired elderly patients in acute care settings. There has been only one published study examining the pain management knowledge of nurses in Singapore (Naser, Sinwan & Wong, 2005), but this study focused on pain management in general and not with the cognitively impaired elderly. Furthermore, this local study involved only registered nurses which is not representative of all nursing staff providing care in acute care settings.
Methods

Research Design

An exploratory descriptive research design was used.

Target population and setting

The target population was registered nurses (RN) and enrolled nurses (EN) who worked in medical wards of public hospitals in Singapore. A convenience sample was chosen. The inclusion criteria required that participants had worked in a medical ward for at least three months with direct patient contact and could read and understand English. Three months of acute care experience was required as this is considered the end of the orientation period for new staff in local hospitals. In Singapore, registered nurses possess a diploma or bachelor degree in nursing, or other higher nursing qualifications. Enrolled nurses possess a National Institute of Technical Education certificate in nursing, and assist registered nurses in performing nursing duties.

Ethical Considerations

Ethical approval was obtained from the Review Board for the two participating hospitals. Prior to participation in the study, potential participants were given both a verbal and written explanation of the study. A Participant Information Sheet was attached to the questionnaire, and completion of the questionnaire implied consent to participate. Anonymity was guaranteed as no coding or method of individual identification was used.

Development of TENAP

TENAP was developed by adapting items from an existing tool (Sloman, et al., 2005) and generating new items drawn from theory (Ferrell,1996), available evidence (Herr et al., 2006), and clinical practice guidelines (AGS, 2002) for identifying pain behavior in the elderly with cognitive impairment. TENAP contains two sections. Section A has 23 items relating to nurses’ knowledge and attitudes towards pain assessment/management. We
adapted 14 items from the Pain in the Elderly questionnaire (with permission) (Sloman et al., 2001). This questionnaire was devised to assess nurses’ knowledge and attitudes towards pain assessment and pain management in the general elderly but not specifically the cognitively impaired elderly. Items were modified to enhance cultural and contextual relevance. Nine additional items to capture nurses’ knowledge and attitudes toward the cognitively impaired elderly were developed from the research literature. Nurses were asked to rate items on three response categories (1=True, 2=False, 3=Do Not Know). Scoring was ‘one’ for a correct and ‘zero’ for an incorrect response. Total scores ranged from 0 to 23 with higher scores signifying better knowledge and more positive attitudes.

Section B comprised two vignettes with 16 questions designed to assess reported practice of nurses on pain assessment of elderly patients with cognitive impairment. Items were based on clinical practice guidelines for identifying common pain behaviours in cognitively impaired elderly people published by the American Geriatrics Society (2002). Vignette 1 related to female patient who had a stroke. Vignette 2 related to a male patient with slight fever and mild confusion. Questions related to pain assessment practice and frequency of pain assessment. Responses were rated on a 5-point scale ranging from 0 (Unsure) to 4 (On every occasion that I offered care). Possible scores ranged from 0-64 with higher scores representing acceptable reported practice. Two open-ended questions allowed for further comment.

**Content validation by an expert panel**

Content validity of TENAP was established using an expert panel of three geriatric-qualified RN clinicians with a minimum of five years of working experience. Members of the expert panel were briefed on the purpose of the study and provided with directions for assessing the validity of each item. Items were reviewed independently followed by a discussion to achieve consensus. Content validity index (CVI) was calculated for each item.
and the total scale, forming the item-CVI and scale-CVI respectively. The expert panel rated each item on a 4-point scale of (1=not relevant, 2=somewhat relevant, 3=quite relevant, 4=highly relevant). The item-CVI was computed as the number of experts giving a rating of either 3 or 4 (“Relevant”) divided by the total number of experts. The scale-CVI for each section was calculated by summing the item-CVIs and dividing them by the number of items in each section. All but three items in Section A received an item-CVI of 1.00 and the scale-CVI was 0.84. These items were revised. For Section B, all 16 items had an average score of 1.00 each.

Pilot test

A convenience sample of ten nurses evaluated the feasibility of the TENAP, face and content validity, and completion time. The sample consisted of five RNs and five ENs who met the inclusion criteria and were working in a medical ward in a participating hospital. Feedback was obtained on how to refine the survey tool. All participants agreed that the questionnaire items were clear and easy to complete. TENAP could be completed in 10-15 minutes.

Psychometric properties of TENAP

Sample size determination

An adequate sample size for factor analysis should be in the range of 5-20 participants per questionnaire item (Nunnally & Berstein, 1994). A sample size in the range of 195-780 was deemed sufficient for testing the 39-item TENAP.

Recruitment

The study was conducted in 13 medical wards of the two participating hospitals. Nursing staff were briefed about the study and invited to participate. Volunteers provided personal and professional details and completed TENAP in their own time. Completed forms were deposited in a locked box located at the nursing station of each ward by a specified date.
Data Analysis and Results

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) Version 18.0 software. Preliminary data analysis examined the characteristics of each item. Items with missing values were replaced with the series mean of the item. Exploratory factor analysis (EFA) was conducted separately for items in Section A and Section B to establish the construct validity of the tool. The following criteria were used to determine the number of factors to extract: (1) parsimony; (2) content validity/clinical relevance; (3) conceptual interpretability; (4) theory; and (5) previous empirical evidence (Nunnally & Berstein, 1994). Principal axis factor (PAF) analysis was chosen as the extraction method (Nunnally & Berstein, 1994). One, two, three and four forced factor solutions were examined, using both orthogonal and oblique rotations. Results from all EFA were compared and contrasted. Items with factor loadings of 0.3–0.4 were considered for inclusion based on their conceptual interpretability, content validity and clinical relevance. In addition, reliability was evaluated and a Cronbach’s alpha coefficient of 0.70 was regarded as acceptable (Nunnally & Berstein, 1994).

Results

Demographic data

Of the 374 questionnaires distributed, 263 completed forms were returned, giving a response rate of 70%. Demographic characteristics are presented in Table 1. Most participants were RNs (71.1%; n=247), who had a bachelor degree in nursing (41.4%; n=109), and had attended education sessions on pain assessment/pain management (51.7%; n=136). [INSERT TABLE 1 ABOUT HERE]

Factor Analysis and Reliability Analysis
Construct validity of TENAP was determined using factor analysis. The KMO measure of sampling adequacy and the Bartlett’s test of sphericity indicated that items in Section A and B had an adequate sample and were suitable for factor analysis.

For Section A, a one-factor solution which explained 15.40% of variance and had an eigenvalue of 3.54 was the most interpretable factor pattern compared to the two-, three- and four-factor solutions attempted. The factor loadings are presented in Table 2. The factor was labelled ‘knowledge and attitudes towards pain in cognitively impaired elderly patients. Eight items had primary factor loadings ≥ 0.40, suggesting acceptable relationships between items and their underlying factor (Hair, Anderson, Tatham & Black, 1995). These items were retained. Item 31 had the highest factor loading of 0.54, whereas item 30 had the lowest factor loading of 0.01. A total of ten items (items 11, 13, 14, 15, 17, 22, 24, 26, 27, 30) failed to meet the priori criterion of having a primary factor loading of ≥0.30 and were removed from the instrument. Five items (items 19, 23, 25, 28, 29) with factor loadings of 0.30 – 0.40 were all retained based on their content validity. Cronbach’s alpha for section A was 0.71.

Reliability analyses performed with the 13 items retained after factor analysis showed an improved Cronbach’s alpha (α = 0.75). Based on the recommended criterion of 0.30 as an acceptable corrected inter-item correlation, 11 of the 13 retained items performed adequately (range = 0.31–0.48) (Table 3). Item 31 had the highest inter-item correlation of 0.48, whereas item 19 had the lowest inter-item correlation of 0.27. For all items, Cronbach’s alpha of the scale decreased (range = 0.72–0.74) when the items were deleted, indicating that all of the retained items contributed to the homogeneity of the instrument (Table 3).

For Section B twelve items for Vignettes One and Two were analyzed separately using factor analysis. The open-ended questions were not included in the factor analysis. The
KMO measure of sampling adequacy was 0.88 and 0.85 for Vignettes One and Two respectively. Results suggested that one factor was the most interpretable structure for each vignette. Vignette One labelled “nurses’ reported practice on pain assessment of the cognitive-impaired elderly with stroke” had six items with factor loadings in the range of 0.64 – 0.87 (Table 4) suggesting strong factor loading. Item-total correlations ranged from 0.53 to 0.78. Cronbach’s alpha of the six items was 0.87, signifying good internal consistency reliability. Vignette Two was labelled as “nurses’ reported practice on pain assessment of the cognitive-impaired elderly with confusion”. This factor also contained six items with factor loadings ranging from 0.74 to 0.88. Item-total correlation were in the range of 0.65 – 0.82. Cronbach’s alpha of this factor was 0.90, indicating good reliability. [INSERT TABLE 4 ABOUT HERE]

**Discussion**

This study aimed to test psychometric properties of the 39-item TENAP (See Appendix) with 263 RNs and ENs working on medical wards in two public hospitals in Singapore. The final version of TENAP had 29 items comprising 13 items in Section A and 16 items in Section B (12 closed and 4 open-ended questions). Section A assessed nurses’ knowledge and attitudes towards pain in cognitively-impaired elderly patients. Section B contained two separate vignettes assessing nurses’ reported practice of pain assessment of cognitively-impaired elderly patients. The TENAP had acceptable validity and reliability for assessing nurses’ knowledge, attitudes, and reported practice of pain assessment in cognitively impaired elderly patients. Content validity by the expert panel indicated that the instrument had an appropriate sample of items. Feasibility of the TENAP was reflected in the ease of administration and short completion time.

Construct validity of TENAP was established by factor analysis. A one-factor solution was the most appropriate and interpretable for items in Section A which supports the
conceptual framework that knowledge and attitudes of nurses towards pain are regarded as a single construct. Cronbach’s alpha of the 13-item TENAP was above 0.70 (Nunnally & Berstein, 1994) demonstrating good internal consistency reliability. Although Section A sought to examine knowledge and attitudes and appeared to have two dimensions, a one-factor solution was consistent with that of a validated and widely used tool, the Nurses’ Knowledge and Attitudes Survey Regarding Pain by McCaffery and Ferrell (2008). Those authors did not recommend separating knowledge and attitudes questions in their survey as the items measured both concurrently.

In Section A, six out of 14 items originally adapted from the Pain in the Elderly questionnaire (Sloman, et al., 2001) and 4 of the new questions were removed from the final version of TENAP due to poor factor loadings. Possible reasons for the weak contribution of the original items to the factor structure are suggested. First, the Pain in the Elderly questionnaire was developed over 10 years ago and conceptualizations in relation to pain may have changed over the decade, impacting on the knowledge and attitudes of nurses. Second, measurement errors could have occurred. Factors contributing to measurement errors could be the presence of social desirability response bias, different interpretation of questions by respondents leading to a distorted measure of the variable, or transitory personal factors such as the respondents’ mood when answering the questionnaire (Polit & Beck, 2004). Finally, as factor analysis is group-specific and time-specific, results may differ for different populations. The original population was from Australia and the current population was in Singapore.

**Implications for Nursing Education, Practice and Research**

In comparison with other available measures of nurses’ knowledge and attitudes towards pain (McCaffery & Ferrell, 2008; Zanolin, et al., 2007; Zwakhalen, et al., 2007), TENAP is the only instrument that has items specific to pain and pain assessment by nurses of
cognitively impaired elderly patients. TENAP is useful in determining nurses’ knowledge and attitudes related to this category of patients, instead of patients in general. Also, items relating to pain management in TENAP which center on the use of analgesia and their potential side effects in elderly patients have been consistently reflected in items of instruments measuring nurses’ knowledge and attitudes (McCaffery & Ferrell, 2008; Zwakhalen et al., 2007). In comparison with similar instruments, TENAP demonstrates clinical relevance in measuring pertinent issues related to pain in cognitively impaired elderly patients. The final 29-item TENAP was deemed to be a feasible, valid, and reliable questionnaire for assessing nurses’ knowledge, attitudes, and reported practice of pain assessment in cognitively impaired elderly patients. TENAP may be a valuable resource to identify the educational needs of nurses and contribute to improved quality of care.

Outcomes of the study highlight issues to be considered in future research. Additional studies are needed to investigate the actual clinical practice of nurses and evaluate the process of pain assessment in clinical settings with this population. A longitudinal observational study may provide insights into nurses’ actual behaviors and barriers to using behavioral cues for on-going pain assessment. Future research could also investigate the efficacy of different strategies to modify clinician behavior and influence changes in practice such as the requirement for nurses to document a pain assessment in conjunction with recording the patient’s vital signs.

Further research using a multi-centered approach could enhance the generalizability of findings to nurses in other countries. As this study demonstrated evidence of the validity and reliability of the TENAP, the instrument could be utilized to evaluate nurses’ pain assessment in cognitively impaired elderly people in other contexts and other countries. Future studies could be extended to nurses working in different clinical areas such as critical care so that comparisons can be made across different nursing specialties. The influence of
factors such as ethnicity and education level could also be investigated. Furthermore, correlational and predictive descriptive studies could examine if knowledge, attitudes, and reported practice are predictors of other outcome variables such as the length of hospitalisation, relatives’ satisfaction of health care service, nurses’ confidence in their practice and positive public attitudes about care.

**Limitations**

Several limitations are acknowledged. The sample was recruited from two large acute care hospitals in Singapore, and the findings may not be generalized to the broader population of nurses working in other countries. Although nursing is a female dominated profession, this sample consisted of 6.5% men which may limit generalizability of findings to other countries where more male nurses practice in acute care settings. This proportion of males was representative of the national nursing workforce in Singapore. However, Singapore is an English speaking, multicultural country with a world class medical system and the large sample size of 263 may help generalizability to some extent. Although the study examined nurses’ reported practice of pain assessment in cognitively impaired elderly patients, their actual clinical practice was not examined. There may be differences between nurses’ response to the vignettes and their actual clinical practice, affecting the validity of the results. Factors that may influence nurses’ knowledge, attitudes and reported practice of pain assessment, such as cultural influences and educational level, were not investigated in the study. Examining the influence of these variables on nurses’ knowledge, attitudes and reported practice would be useful in identifying factors affecting pain assessment.

**Conclusion**

The development of TENAP meets a need for a reliable instrument to determine the ways nurses assess pain in the cognitively impaired elderly population. The resulting 29-item TENAP has been evaluated to be a valid and reliable questionnaire for assessing the
knowledge, attitudes, and reported practice of pain assessment in cognitively impaired elderly patients for nurses working in acute hospitals. However, further testing of the tool on a larger sample of nurses is needed to confirm its psychometric properties and relevance. The TENAP is a valuable resource to identify the educational needs of nurses in relation to assessment of pain in the cognitively impaired elderly person, and improve the quality of care for this vulnerable population.
References


