

How to measure nurses' knowledge and attitude regarding older patients?

Jeroen Dikken

How to measure nurses' knowledge and attitude regarding older patients?

Hoe meet je kennis en attitude van verpleegkundigen met betrekking tot de oudere patiënt?

(met een samenvatting in het Nederlands)

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“Why, when you squeeze an orange as hard as you can squeeze it, does orange juice come out?” ~ dr. Wayne Dyer.

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GENERAL INTRODUCTION

General Introduction

It is 7:30 AM. I enter the room of my patient Mr. Kelders, who is trying to get out of bed. However, he is not yet allowed to do so. I grab his shoulder, gently pushing him back in the bed, but immediately he starts shouting and kicking against the blankets. "Who do you think you are?", "I want to go, let me out of here!"... I try to explain who I am, but he is not listening. I panic, what can I do? I call for backup and together with colleagues we restrain him using straps tying his wrist and ankles to the bed. Mr. Kelders is not calming down, actually, the restraining is making his aggression even worse. For now I did everything I can do. Mr. Kelders is safe and has to wait till the doctor arrives. In the meantime, I have to take care of the other patients who are waiting for me.

Around noon Mrs. Kelders comes over and gets very angry with me. She asks why her husband is tied down like an animal and she wants him out of the restraining aids. I have to defend myself. I tell her this was the only thing we could have done and the doctor has not come yet. But I start doubting, was this really everything we could have done? Maybe there are alternatives? Is this state of the art care? Anyhow, I'm a professional and I cannot let her know my doubts.

"Mr. Kelders need to stay restrained till the doctor arrives!"

Anonymous hospital nurse.

Why nurses need sufficient knowledge about older patients

The world population is aging, with in recent years mostly an increase in the number of the very old (those aged 80 years or over).¹ In the Netherlands, the aged population (aged 65 and older) accounted for 18% in 2015 and is predicted to be 26% by the year 2040.² This increase of older people is also reflected in the number of older patients admitted to general hospitals.³

Previous research has demonstrated that the acute-care setting is a potentially dangerous place for many older patients. A higher percentage of multimorbidity⁴ and frailty⁵ is reported in older people resulting in a higher likelihood for older hospitalized patients developing one or more postoperative complications,⁶ such as delirium, depression, pressure ulcers or infections.⁷⁻¹⁰ These complications have a negative effect on recovery of patients and are associated with functional and cognitive decline, institutionalization and mortality after discharge.^{6,11-15} Getting older causes physical, social, psychological and emotional changes that are different for each individual. Older patients are thus a heterogeneous patient population, with individual and therefore diverse care needs: one size does not fit all. Guidelines and protocols are often not applicable to the situation of the individual older patient, suffering from multimorbidity and a mixture of geriatric problems. Because older patients are so diverse and their problems complex, they are dependent on knowledgeable and competent nurses for a good recovery.¹⁶

Current knowledge and attitudes of nurses in the acute-care setting

The growing population of older patients admitted to hospitals is in need for nurses who are knowledgeable and committed to work in geriatric and gerontological care.¹⁷ Nurses have a key role in delivering high quality care to older adults,^{18,19} as they are accountable for providing physical, social, psychological and emotional care to older patients. Implementation of education and quality improvement programs can help to improve nurses' knowledge about and attitudes towards older patients,²⁰ influencing the quality of care they provide.²¹

A systematic review by Liu et al. 2013 described that knowledge regarding older people is only investigated in a few studies.²² Results from the included studies indicated that nurses and nursing students have low to average knowledge levels with regards to physical, psychological (mental) and social aspects of aging and key clinical areas of geriatric nursing care. Moreover, several misconceptions exist.²³⁻²⁵ These results however, are based on measurement instruments which are considered outdated and insufficiently validated, too country specific, mixing the measurement of knowledge with measurements of opinions, beliefs and experiences, or lacking inclusion of care perspectives.^{22,26}

Studies have identified negative attitudes of registered nurses and nursing students towards geriatric nursing and other work with older patients since the 1950s. These attitudes are prevailing in recent years^{22,26} and highlight the low appreciation of working with older

patients for nurses and student nurses. Older patients are often considered as a burden and obstacle to the more important work of caring for younger adults, with some nurses finding care for cognitive declined older people difficult and frustrating.²⁷ Fear, frustration and other negative attitudes can lead to reinforcement of dependency of older patients. Especially in the acute-care setting, dependent patients are easier and quicker to handle for nurses.²⁸ Studies have demonstrated that older patients experience lower levels of functioning at discharge in comparison with admission and prior to admission, leading to an increased dependency and a decline in quality of life.²⁹ Furthermore, they are often uninformed about their illness and recovery, medications and recommended lifestyle changes, leading to high readmission rates.³⁰

The concepts: knowledge and attitudes

Measuring concepts as knowledge and attitudes is complex. Knowledge is described as the theoretical or practical understanding of a phenomenon using facts, information, and skills acquired through experience or education.³¹ Four knowledge dimensions are described in the revised taxonomy of Bloom.³² *Factual knowledge* (the basic elements that students must know to be acquainted with a discipline or solve problems in it), *conceptual knowledge* (the interrelationships among the basic elements within a larger structure that enables them to function together), *procedural knowledge* (how to do something: methods of inquiry, and criteria for using skills, algorithms, techniques, and methods) and finally *metacognitive knowledge* (knowledge of cognition in general as well as awareness and knowledge of one's own cognition).³² Another important aspect for learning are thinking skills described in several dimensions from lower thinking skills to higher thinking skills in the cognitive process dimension: remember, understand, apply, analyze, evaluate and create.³² Relevant knowledge plays a causal role in attitude-behavior consistency,³³ as new information can influence a person's beliefs, thoughts and associated attributes.³⁴

In the literature there is an ongoing debate about the precise definition of attitudes. A broad definition described in social psychology is: "*attitude is an evaluation of an attitude object, ranging from extremely negative to extremely positive*".³⁵ A more detailed model defining attitude is the multicomponent model.^{36,37} Dawson (1992) described attitude using this model as the way a person thinks about something or someone and that attitudes consists of a *cognitive, affective and behavioral component*. The *cognitive component* of attitude refers to the beliefs, thoughts and attributes that we would associate with an object. The *affective component* of attitudes refers to your feelings or emotions linked to an attitude object. Finally, the *behavioral component* refers to past behaviors or experiences regarding an attitude object. These three components influence each other and ultimately determine the attitudes of nurses.³⁸

Current measurement of nurses' knowledge and attitudes regarding older patients

To be able to measure knowledge and attitudes, often self-assessment scales are used. Almost all studies aiming to measure nurses' knowledge about older patients used the Palford Facts of Aging Quiz (PFAQ),^{39,40} even though the PFAQ did not prove reliable or valid in several other studies.⁴¹⁻⁴⁹ A few other (newer) instruments are developed (such as the Knowledge of Aging and Elderly questionnaire [KAE],⁴⁹ Nursing Knowledge of Elderly People Quiz [NKEPQ],²⁵ the Deconditioning in Older Adults Survey⁵⁰ and Geriatric Institutional Assessment Profile [GIAP]). However, some are based on the PFAQ which is why validity for these instruments remains questionable, i.e. they include items which do not measure the construct 'knowledge' solely, but include aspects such as opinions, beliefs and experience which makes it difficult to determine nurses' knowledge separately. Furthermore, most of these instruments don't provide a good overview of the content and the development process and/or were proven invalid or unreliable in replication studies.^{41,51-56} For these reasons, the decision was made to develop a new instrument measuring nurses' knowledge about older patients.

For measuring nurses' attitudes towards older people, some instruments exist. The Kogan's Old People Scale (KOP)⁵⁷ and the Aging Semantic Differential (ASD)⁵⁸ are the two instruments most frequently used. Both instruments are extensively validated and tested on reliability, however considered for a specific target group (the KOP was developed for American population), and both miss a caring dimension (assess stereotypes regarding older people, not patients).²⁶ Because no instrument was found which examines attitudes and practices towards older patients in a hospital setting, the Older Patient in Acute Care Survey (OPACS) was developed.⁵⁹ Although not extensively examined, the OPACS is promising to measure nurses' attitudes towards older patients because it is specifically designed to do so.

Objectives of this thesis

Because nurses' knowledge and attitudes are essential for quality of care provided to the growing number of older hospitalized patients, it is important to be able to measure knowledge and attitudes of nurses regarding older patients. Therefore, the objectives of this thesis are as follows:

1. *Develop, validate and assess the reliability of a new measurement instrument measuring hospital nurses' knowledge regarding older patients in the Netherlands and the United States of America.*
2. *Assess the level of validity and reliability of an existing instrument measuring nurses' attitudes towards older patients in the Netherlands and the United States of America.*

To achieve these objectives, all studies were conducted based on the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) checklist.^{60,61} Developing a new instrument involves several steps and takes considerable time due to the iterative process. De Vet et al.⁶² described the development process in six steps being intertwined, going back and forth between the steps in a continuous process of evaluation and adaption (Figure 1). After the development process, it is important that measurement instruments are tested for validity, reliability, responsiveness and interpretability continuously, because these outcomes are often time, setting and population dependent.⁶² Because there is a demand for (new developed) rigorously tested knowledge and attitudes instruments across the world, the choice was made to validate the instruments for two countries: the Netherlands and the United States of America (USA). All studies regarded nurses working in the hospital setting. Students were included in several studies because being knowledgeable and having positive attitudes is not restricted to registered nurses only and should already be trained during the formal education period.

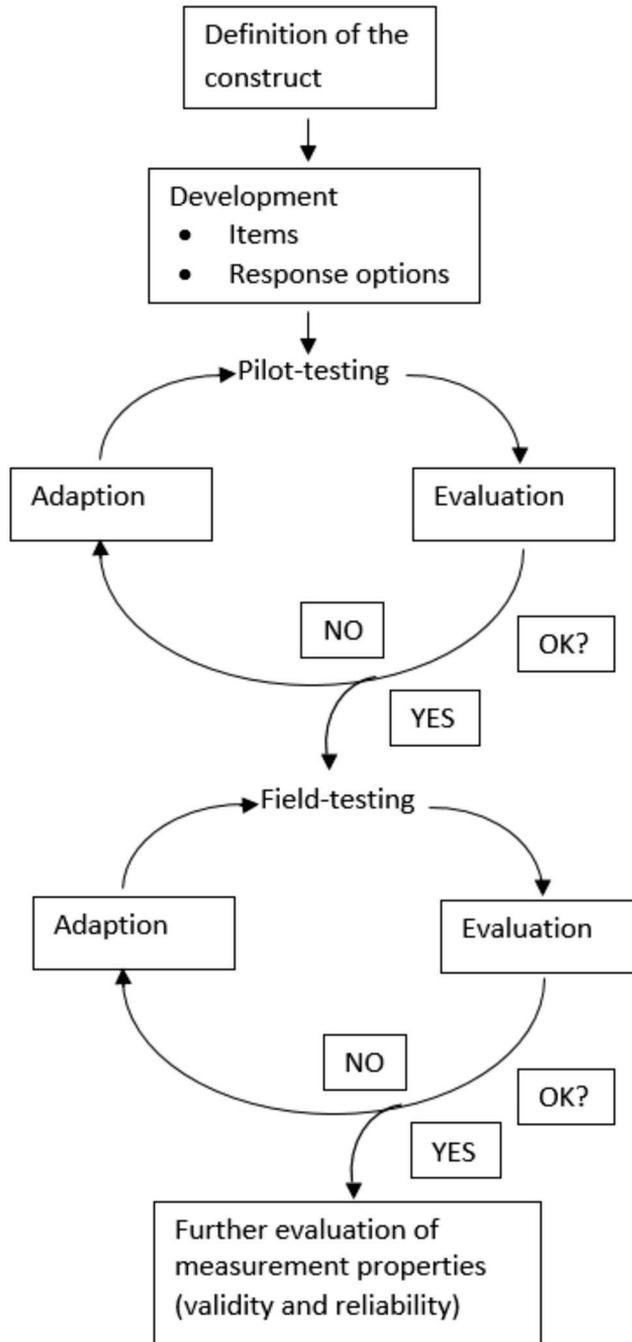


Figure 1. Overview of steps in the development and evaluation of a measurement instrument.⁶²

Outline of this thesis

The first part of the thesis addresses the development process and validation of an instrument measuring nurses' knowledge about older patients. In **chapter 1**, insight in the difficult process of developing an instrument in a rigorous and transparent manner is presented based on a reflection on a newly developed instrument measuring the care that older adults receive in the hospital and nurses' attitudes toward and perceptions about caring for older adults. In **chapter 2**, the question is addressed which knowledge is required for hospital nurses in order to provide optimal care for older patients, combined with a detailed description of the development and initial validation of the new developed instrument measuring knowledge of nurses: the Knowledge about Older Patients – Quiz (KOP-Q). Next, in **chapter 3**, a study is described which assesses the content validity and psychometric characteristics of the KOP-Q, presenting the level of validity for using the KOP-Q to assess registered nurses in the hospital setting, first-, final years bachelor of nursing students and nursing specialists knowledge levels regarding older patients. In **chapter 4**, a cross-cultural validation study is described, presenting the validation of the KOP-Q for use in the USA. Finally, in **chapter 5**, a study is described in which the current knowledge levels of nursing students (first- final year) and registered nurses is assessed in relation to their educational level and work experience.

The second part of the thesis focuses on the validation of an instrument measuring practice experiences and the general opinion of nurses towards older patients: the Older Patient in Acute Care Survey – United States (OPACS-US). **Chapter 6** describes the psychometric validation of the OPACS-US, improving the construct validity and reliability. Moreover, combining the OPACS-US with a valid knowledge instrument, the KOP-Q, is explored. In **chapter 7**, the translation process of the OPACS-US towards a Dutch version and an assessment of the content validation is described. This is followed in **chapter 8**, with an exploration of the structural validity and reliability of the Dutch OPACS. In the general discussion, the main findings, methodology, future research and implications for clinical practice and education are discussed.

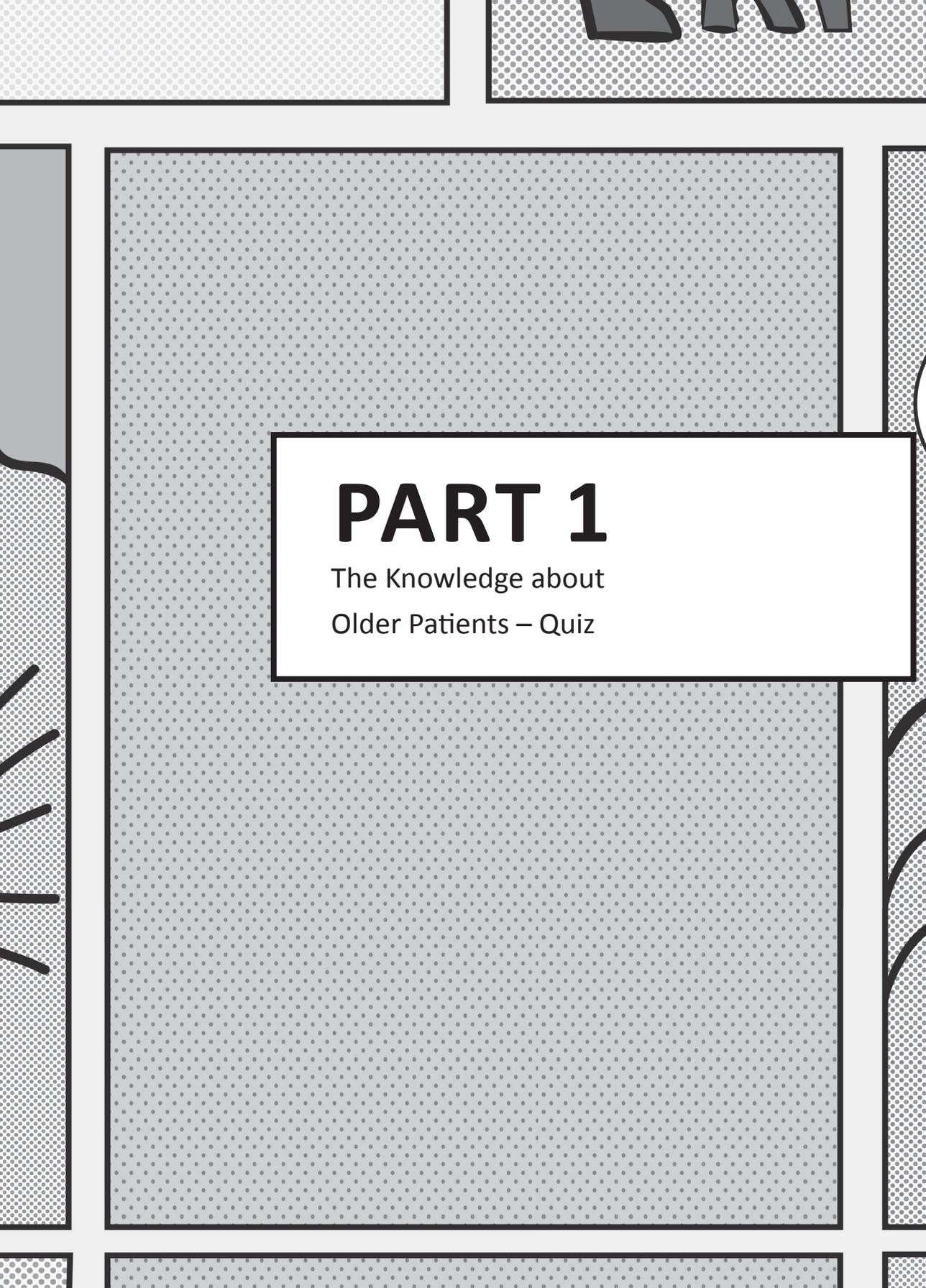
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PART 1

The Knowledge about
Older Patients – Quiz

CHAPTER 1

Comment on “development and validation of the geriatric in-hospital nursing care questionnaire”

Dikken J

Ettema RG

Hoogerduijn JG

Schuurmans MJ

*Journal of the American Geriatrics Society 2015;
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To the editor

Attitudes and perceptions of nurses are thought to influence the quality of care of the growing number of older hospitalized adults. We read with interest the article by Persoon et al,¹ who developed and validated the Geriatric In-Hospital Nursing Care Questionnaire (GerINCQ). According to the authors, the GerINCQ measures the care older hospitalized adults receive and nurses' attitudes toward and perceptions about caring for older adults. Following the COnsensus-based Standards for the selection of health Measurement Instruments checklist,² which can be used to assess the methodological quality and measurement properties of studies, we have concerns regarding the methodological quality and measurement properties of the GerINCQ and therefore its value for practice.

First, an important step in the development of a new instrument is an analysis of the construct that is being measured. For the development of the GerINCQ, two investigators selected two instruments eligible for use based on literature review: the Geriatric Institutional Assessment Profile³ and Older Patient in Acute Care Survey (OPACS).⁴ Two researchers identified whether items fit well with specified domains, but the domains of the construct and the way the construct and domains were determined are not described. In the case of the OPACS, researchers selected only 18 items from the 36 original items without describing inclusion and exclusion criteria (other than too long). Because selection criteria were not reported, from the viewpoint of internal validity of the instruments and reliability of the scales, psychometric analyses should have guided the choice of items.

Second, measuring dimensionality is an important step in instrument development. This methodological step provides insight into the dimensions of the newly developed instrument and whether items of the instrument are useful for the constructs to be measured. It also has an effect on measuring reliability (Cronbach alpha) because this outcome is interpretable only if a scale is unidimensional. In developing the GerINCQ, researchers did not describe how they came to five subscales. Furthermore, results of the dimensionality, such as factor analysis, have not been described. If researchers choose dimensions of the GerINCQ, the nature of the original instruments and their subscales might have changed by selecting questions and adding other questions for unreported reasons. For example, the OPACS originally had a one-factor Cronbach alpha of 0.88,⁵ which drops to 0.64 in the GerINCQ,¹ with an unreported number of factors. Because results of a factor analysis are not reported, it is unknown how much a fewer number of items or the change of construct caused this.

Third, nonresponse and missing values affect the results of instrument development, such as selection bias of items and type I failures. For example, if listwise deletion of items was used, that reduces the accuracy of parameter estimates and the power of statistical tests and often the reason for producing biased statistical analysis results.⁶ Because how nonresponse and missing items were addressed was not described, the appropriateness and the influence on results is unknown.

Fourth, statistical tests for intrarater reliability and construct validity were executed with the intraclass correlation coefficient (ICC) for two repeated measurements in a group of surgical nurses in two separate weeks. Furthermore, to measure construct validity, a hypothesis on differences in scores of three nursing groups was tested using analysis of variance (ANOVA). Regarding the ICC, the two-way random version seems to be the appropriate choice, but neither the version of the ICC nor whether the group of surgical nurses consisted of the same persons was reported. In the latter case, a two-way mixed version of the ICC would be appropriate. Using ANOVA is conditional on a normal distribution of the scores of the three included groups of nurses. The reported significant differences between the three groups of nurses in the ANOVA could be mainly due to distribution differences of the scores. Results of test of normality of the distribution of the scores in each group were not reported.

Finally, translation procedures of instruments, subscales and items are not described in the study methodology. Because of language and cultural differences between countries, a simple one-way translation of questionnaires is insufficient, and forward and backward translation by translators working independently from each other reporting an adequate description of differences needs to be done. Such a translation process, revealing linguistic and conceptual equivalence, was not reported. Usability of the scale for the Netherlands and the United States can therefore not be judged.

Measuring attitudes and perceptions is complex but important in addressing the quality of care of older adults. Given this importance, we hope the authors can address our concerns regarding the value of the GerINCQ.

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CHAPTER 2

Construct development, description
and initial validation of the
Knowledge about Older Patients Quiz
(KOP-Q) for nurses

Dikken J

Hoogerduijn JG

Schuurmans MJ

Abstract

Background: Literature shows that nurses have a negative attitude toward older patients. Increasing nurses' knowledge (part of attitudes) may affect hospital nurses' attitudes and improve the quality of care for older patients. A first step is understanding nurses' current knowledge. This can be achieved by using a measurement instrument with good validity and reliability.

Objectives: This study explains the content development and initial validation of the 'Knowledge about Older Patients Quiz' (KOP-Q) for nurses, describing the first step in developing a valid and reliable instrument.

Design: Qualitative method followed by 2 pilot studies.

Methods: Open interviews were conducted with 7 scientific experts and 10 nurse specialists in gerontology, geriatrics, and/or nursing and 5 older patients, 70+ with hospital experience in the last two years. The data were analyzed using thematic analysis. Items were generated from literature on themes derived from interviews. A Delphi round with three nurse specialists and two researchers was organized for item reduction. Two pilot survey studies were conducted for measuring readability and face validity of the KOP-Q. Readability was examined by a Dutch language specialist and 7 nurses working on a cardiovascular ward. Face validity was tested in two hospitals with 22 nurses working on geriatric wards.

Results: Identified themes were: normal aging, geriatric conditions, signaling problems in old age, interventions, family interventions, vulnerable patients versus older patients and internal motivation for learning and reflection. 185 questions on these themes were developed. After conceptualization, generation and reduction of questions in the Delphi round 52 questions remained eligible for use. Readability and face validity of this initial version of the KOP-Q proved good.

Conclusions: Content development of the KOP-Q is of good methodological rigor and each step is carefully described, therefore it can be of use for future diagnostic instrument developers, curriculum developers and educators.

Keywords

Attitude, Knowledge, Instrument development, KOP-Q, Hospital, Nurses, Older patients, Educators

Introduction

Due to an aging population,¹ a higher percentage of multimorbidity has been reported.² Because the numbers of older patients are growing, more hospital nurses will encounter these patients in their daily work.^{3,4} Research in western society shows that many nurses have a negative attitude toward older patients.^{5,6}

Attitude is described as the way a person thinks about something or someone and consists of behavioral, emotional, and cognitive components.⁷ The behavioral component involves the intention of how to behave. The emotional component involves a person's likes or dislikes based on feelings. The cognitive component involves the knowledge and value of a phenomenon. These three components influence each other and ultimately determine attitude.^{7,8} Knowledge, as part of the cognitive component, might affect hospital nurses' attitudes.⁹ Healthcare providers need to understand nurses' current knowledge. This can be achieved by measuring knowledge using an instrument with good psychometric qualities.^{10,11}

In the literature, a number of measurement instruments have been discussed that measure knowledge about older people. However, none of these measures knowledge as a construct on its own. A widely used instrument is the Palmor Facts of Aging Quiz (PFAQ), which is described as a reliable and valid research instrument for diagnostic studies on nurses' and nursing students' knowledge.^{12,13} A large number of studies have found the reliability of the PFAQ to be poor.¹⁴⁻²¹ Furthermore, the validity of the PFAQ has been criticized by multiple studies.^{19,21,22} A second instrument found in the literature is the Knowledge of Aging and Elderly questionnaire (KAE), developed by Kline et al.²² O' Hanlon and Camp²³ found a low correlation between the KAE and the PFAQ due to different content and recommended the development of a better test to measure knowledge. No description of the content development of the KAE exists in the literature. In 2006, Mellor et al²⁴ developed the Nursing Knowledge of Elderly People Quiz (NKEPQ) to address the PFAQ's lack of focus on nursing. Although the NKEPQ improves the PFAQ for use with hospital nurses, it does not improve the validity and reliability of the PFAQ. The Deconditioning in Older Adults Survey was developed by Gillis²⁵ as a measurement instrument to assess nurses and student's knowledge, attitudes, beliefs, and demographic data about deconditioning in older hospitalized adults. This instrument was developed for Canadian context which make it country specific. In 2010, the Nurses Improving Care for Healthsystem Elders (NICHE) program developed the Geriatric Institutional Assessment Profile (GIAP) for evaluation purposes. The GIAP is an extensive instrument that should enable hospitals to quantify staff knowledge, attitudes and perceptions in the care for older patients. Part of the GIAP is the Geriatric Nursing Knowledge/Attitudes scale. This scale showed a Cronbach's alpha of 0.60 which could reveal some inconsistency in the item response.²⁶ The results of a test-retest design confirmed these outcomes.²⁷ Furthermore, authors who used this scale did not report any psychometric characteristics.^{14,28-30}

None of the existing instruments has proven to be reliable or valid in developing content and/or psychometric analysis to measure hospital nurses' knowledge about older patients. Given the paucity of methodological rigor in the development of measurement instruments, we chose to develop the Knowledge about Older Patients Quiz (KOP-Q) in line with state of the art methodology described in literature,³¹ providing transparency and reproducibility. Describing the content of the KOP-Q in detail is useful for two practical applications. First, it provides a fundamental first step in instrument development, namely providing a clear description of the construct to be measured.³¹ Second, content description could be a theoretical base for education of nurses, curriculum development and training in the hospital setting.

Methods

The development of the KOP-Q consisted of four steps (Figure 1).

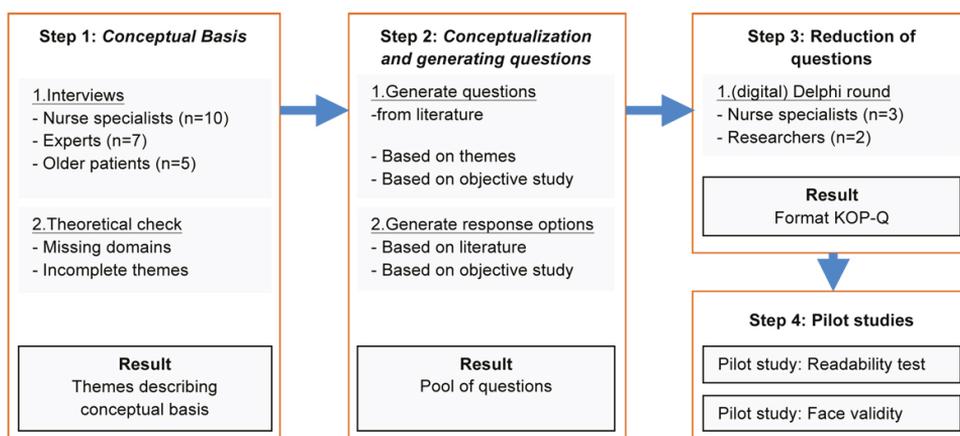


Figure 1. Sequence for development of the KOP-Q

Step 1. Conceptual basis of the KOP-Q

The conceptual basis of the KOP-Q involved semi-structured interviews with nurse specialists (registered nurses with a master's degree and geriatric education, experience and expertise) conducted by fourth-year (final year) bachelor students of nursing supervised by the main researcher. Scientific experts (professors and PhDs with expertise in gerontology, geriatrics, and/or nursing) and older patients (aged 70 years and over with hospital experience in the last two years who were able to be interviewed) were interviewed by the main researcher. Input of spouses (if present) was appreciated during the interviews providing a different

perspective on the hospital admission. In addition, presence of the spouse helped the (often sicker) older patient telling the story. This was especially useful with one patient who experienced a delirium during hospital admission. All interviewers were trained by a specialist in qualitative interviewing. The interviews with the experts and nurse specialists focused on the construct 'knowledge of nurses' and what nurses should explicitly know about older patients. The interviews with older patients were about their hospital experience (focused on nursing care) and served as both data triangulation and examples of deficits in nurses' knowledge. The interviews lasted approximately 1 h after informed consent was given. All interviews were recorded with a voice recorder and stored as a digital file on a protected network attached storage of the university.

The collected interviews were analyzed using QSR International's NVivo 10 qualitative data analysis software,³² following thematic analysis.³³⁻³⁵ First, the researchers familiarized themselves with the data by transcribing all the interview material and reading the transcribed material. Second, initial codes were generated by organizing a Delphi round (three researchers, one nurse specialist). Four interviews were coded independently, followed by discussion to establish consensus. These initial codes formed a list of ideas about the information in the data and were used to search for themes. All other interviews were analyzed by two researchers independently using the list of initial codes from the Delphi round. Again, discussion was used to reach consensus. When searching for initial codes, the research question was kept in mind, but codes were primarily data driven. These initial codes were then organized into broader categories based on repeated patterns across the data set (the themes). In this phase, the analysis was refocused at a broader level, and codes were sorted into sub-themes and themes. The (sub) themes were then reviewed in light of the coded data extracts. Lastly, the themes were defined and renamed. Themes derived from the interviews were crosschecked in the literature for completeness and missing themes by reviewing books used in nursing education about geriatrics in the hospital setting.

Step 2. Conceptualization and generating questions

A total of 185 questions (true/false) were generated from literature on themes derived from the interviews. The content and objectives of the questions were discussed by three researchers (including one critical peer). Due to the objective of the study an additional scale for 'certainty' was added. Respondents were asked to first choose one of the alternatives (true/false) as the 'correct' answer and then indicate on a secondary numerical scale (0 = total guess and 100 = completely sure) how certain they felt about this response.

Step 3. Reduction of questions

To reduce the list of questions, a (digital) Delphi round was organized with three nurse specialists and two researchers. Participants were asked to score the 'degree of relevance' of

the questions on a four-point Likert scale (1 = not relevant to 4 = highly relevant). Questions with a mean value of at least 3 were retained. In the second phase of the Delphi round (face-to-face), questions were discussed and selected based on appropriateness, wording and ordering. During this process, questions were deleted; rephrased and new questions were added. Two researchers proposed further exclusion of questions based on whether the question was too easy, culture specific, too theoretical, not specific to older patients or whether it measured opinions rather than knowledge. All members scored again the degree of relevance and included feedback. The final exclusion of items was discussed until consensus was established.

Step 4. Pilot studies: readability and face validity of the KOP-Q

Readability: Because the original KOP-Q was written in Dutch, readability was established through examination by a Dutch specialist on wording level (including richness of vocabulary), sentence level (including number of subordinate clauses), and text level (cohesion and structure). This examination was followed by a study in which nurses working on a cardiovascular ward in one hospital in the middle of the Netherlands scored all items of the KOP-Q on difficulty in wording, interpretation of wording and sentences, length of sentences, construction of the KOP-Q, length of the KOP-Q and instructions for answering the KOP-Q.

Face validity: Face validity was established with a pilot study. Nurses working on geriatric wards in two different hospitals in the middle of the Netherlands, were asked whether they thought the test was appropriate to measure hospital nurses' knowledge about older patients using a ten-point Likert scale (1 = not appropriate at all to 10 = highly appropriate). A score above 5.5 was considered acceptable. The nurses were also asked whether themes or specific items were missing in the KOP-Q. This study was approved by the medical ethics committee of the University Medical Centre (METC protocol number: 12-302/C).

Results

Step 1. Conceptual basis of the KOP-Q

A total of 22 interviews were conducted with seven scientific experts, ten nurse specialists and five older patients (with two interviews the spouse was present). Four older patients experienced problems during their hospital admission. By contrast, one patient did not experience any problems. Seven themes emerged from the interviews. Nurses should have knowledge about normal aging, geriatric conditions, signaling problems with old age, interventions, family interventions, vulnerable patients versus older patients, and internal motivation for learning and reflection.

Normal aging

Knowledge about normal aging was a strong theme expressed by nurse specialists as well as scientific experts. They stated that knowledge about anatomy and physiology related to aging is a fundamental basis for nurses' clinical reasoning.

Nurse specialist: *"It is important that you understand all the ins and outs of certain organs and how they work. So, clinical reasoning, that should be in your head."*

Furthermore, the scientific experts emphasized that knowledge about the epidemiology of aging in society is important. From this fundamental knowledge, nurses should be able to understand why older patients are more vulnerable than other patients and why some conditions and diseases have a higher prevalence among older patients.

Geriatric conditions

Knowledge about various geriatric conditions was also commonly mentioned. A lack of information provided was described by older patients, raising the question whether nurses know enough about geriatric conditions to provide patients with sufficient information. In an interview with an ex-patient, who had experienced delirium (for which nurses restrained the patient), and the patient's spouse, the spouse said the following:

Interviewer: *"Did someone explain to you what was happening?"*

Spouse of patient: *No... No, nothing."*

Interviewer: *"Nobody explained what was happening with your husband?"*

Spouse of patient: *"No...that he was confused, but even I was able to see that with no knowledge about nursing at all."*

Knowledge about geriatric conditions is an important theme that includes causes, risk factors, and the pathology and effects of geriatric conditions. Furthermore, knowledge about multimorbidity and the way conditions manifest in old age was considered important.

Specific conditions mentioned by respondents were depression, delirium, dementia, pressure ulcers, incontinence, nutrition, polypharmacy and falling. Respondents described clinical reasoning as an important competence for nurses in the theme 'normal aging'. Knowledge about specific (geriatric) conditions is also a prerequisite for understanding the concepts of multimorbidity and for clinical reasoning.

Signaling problems with old age

The theme of signaling problems with old age was mentioned frequently. However, the question is whether this issue reflects knowledge or competence. The respondents mentioned two knowledge elements within this theme (in addition to knowledge about geriatric conditions) as prerequisites for signaling problems in old age. First, nurses should have knowledge about the various measurement instruments available, including how to use them for early detection of diseases/conditions and why it is important to use them.

Nurse specialist: "Most nurses on our ward know the DOS (Delirium observation scale). Yet, not everybody knows how it works. We also use the SNAQ (Simplified Nutritional Appetite Questionnaire) immediately when an older patient arrives at the ward. Furthermore, we use the KATZ-ADL (Katz Index of Independence in Activities of Daily Living) score. This way we can measure whether physical therapy or ergo physical therapy is needed. All these instruments are just implemented. It is only a matter of asking the questions to the patient and his/ her family, that way you should be able to fill in the instrument. I assume that everybody is able to do that."

This quotation indicates that most nurses do fill in instruments as a list of questions, however interpretations of the results and take action on the outcome is not yet implemented.

Second, the respondents mentioned knowledge about family assessments, particularly knowledge concerning the importance of including family members in assessment and why it is important to ask about the home situation and the patients' vulnerable areas.

Interventions

Many respondents described interventions as a logical step in the nursing process. Many types of interventions were mentioned, such as calculating, communication techniques, providing information, self-management, working multidisciplinary, and knowledge about aids for older patients. Interviews with patients showed that nurses have deficits in their knowledge about what type of interventions are possible and what is evidence based. Too often, nurses use interventions based on experience, availability, ward culture and habits.

Spouse of patient: "It became even worse... at some point, he became a little crazy, was talking gibberish, and then he wanted to get out of bed. He was lying in a four-person room, but it became so bad that they said, "No, you go to a single room. And then it

became even worse because they had to put him in a straitjacket.”

Knowledge about interventions includes knowledge about laws and regulations concerning interventions as custodial measures and treatment cessation. Furthermore, nurses should be able to prioritize their interventions and oversee the consequences of the interventions on their patients.

Family interventions

Family interventions are often described in literature in combination with specific chronic disorders, diseases (i.e. cancer, dementia, other mental disorders) or addictions.³⁶ For the hospital setting, this theme was described by the respondents in two ways. First, it was mentioned in terms of involving the family in the care of their family member (the older patient), such as meeting with families during patient assessment or helping the nurse with the morning care for patients with dementia. Second, it was mentioned as the hospital nurse's task to determine whether the family caregiver was overloaded. The family caregiver is often an important person in the patients' network and is essential for the discharge of the older patient. Knowledge about the role of the nurse in this task was considered important.

Vulnerable patients versus older patients

The respondents described enormous differences between older patients. Nurses should be able to distinguish between vulnerable patients and older patients. Therefore, nurses need to use knowledge about normal aging to determine what is aberrant and which patients are at risk. A geriatric assessment using valid and reliable measurement instruments is necessary to identify these types of patients. Risk assessment should be followed by targeted interventions to prevent complications and to provide patient-centered care. This theme is part of more fundamental knowledge about 'normal aging, signaling problems, and interventions' and is therefore not included in the KOP-Q as a separate theme.

Internal motivation for learning and reflection

The respondents mentioned internal motivation for learning as an important competence for nurses. First, nurses should know the importance of using evidence-based practice (EBP) in their daily work. Second, to identify the causes of problems with patients, they need to be internally motivated to "solve the riddle" and help patients. This internal motivation helps nurses to develop a vision of their own, to act on what they know (EBP), and to dare to go against the culture of the ward. Nurses learn from the mistakes they make in the care of older patients through reflection. Furthermore, they learn about themselves, what they know, and what they still need to develop. Although this is not knowledge but rather competence, it was frequently mentioned by the respondents.

Scientific expert: *“We added reflection in our education system for medicine students because we believe that you cannot learn from experience if you are not able to reflect on your actions. In that case, you become even worse by experience, and that is what happens with all the professors in medicine or say nurses. They think they are so good because they have so much experience. However, most of them have become worse because they do not reflect on their performance.”*

Steps 2 and 3. Conceptualization, generation, and reduction of questions

For better interpretation of the questions by the respondents, three themes (signaling problems in old age, interventions and vulnerable patients versus older patients) were embedded in the eight sub-themes from the theme ‘geriatric conditions’ (depression, delirium, dementia, pressure ulcers, incontinence, nutrition, polypharmacy, and falling). An example of these combination questions is ‘Asking patients whether they have fallen in the past 6 months is a good way of assessing increased risk of falling’. In this example, the themes ‘vulnerable patients versus older patients’ and ‘signaling problems in old age’ were embedded in the sub-theme ‘falling’. The separate geriatric conditions together with normal aging, family interventions, and communication totaled eleven themes.

A total of 185 questions were generated from the literature by the first author on all eleven themes, all of which were appropriate for the objective of the study (Figure 2). In the first (digital) phase, 94 questions were excluded by the researchers and experts due to low scores on relevance (91 questions remained). In the second phase (face to face), 44 questions were discussed, 28 questions were excluded, and 10 questions were newly developed (73 questions remained). A proposal for the further exclusion of questions was made (n = 25). In the third (digital) phase, 29 questions were excluded (low relevance), and new questions were developed (n = 8) due to feedback. Consensus was reached, and 52 questions remained in the KOP-Q. In addition, a scale for ‘certainty’ was added to all questions. This scale helps to assess the accuracy of nurses’ assessments of their knowledge and provides insight into nurses’ ability to reflect on their own knowledge as reflection was a theme which was often mentioned.

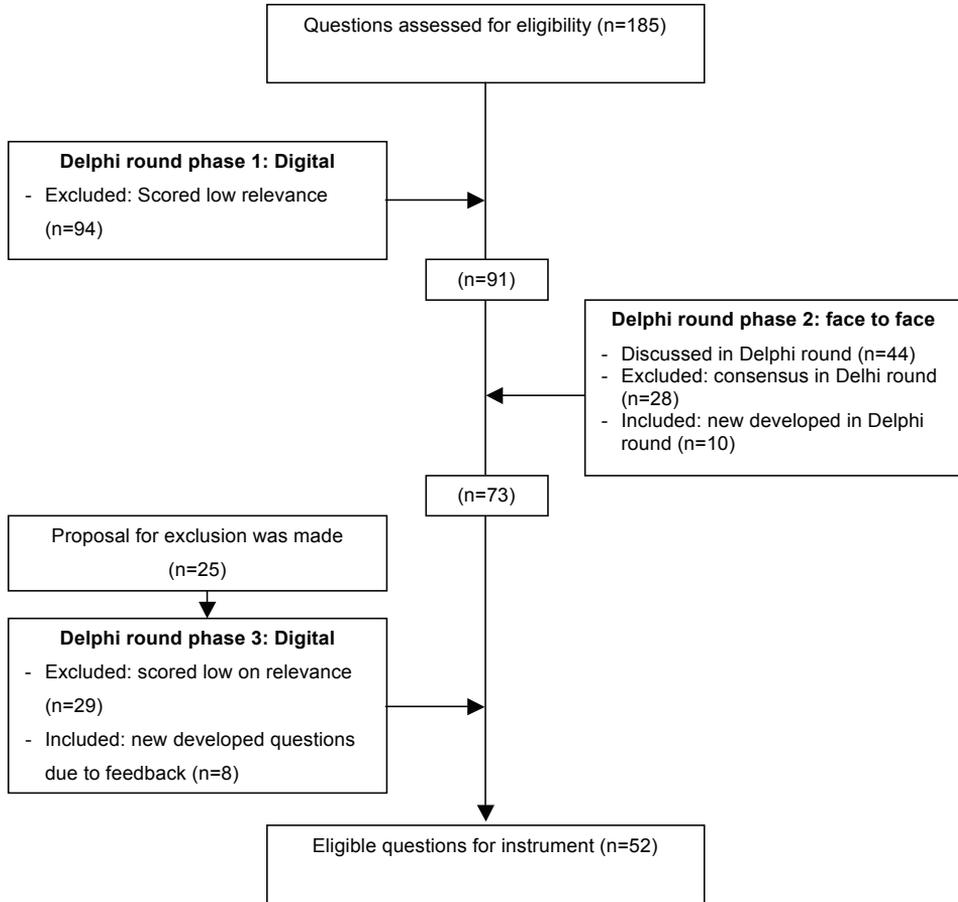


Figure 2: Flowchart exclusion and inclusion questions of the KOP-Q



Step 4. Pilot studies: readability and face validity of the KOP-Q

Readability: The nurses (n = 7) considered a few words difficult: cognitive (n = 1), vascular (n = 1), apraxia (n = 1), functional incontinence (n = 6), moisture-related skin damage (n = 1) and family assessment (n = 3). All of these words are terms used in the nursing profession. Therefore, no changes in the KOP-Q were made concerning terminology. Three nurses considered one question too long. This question was deleted from the KOP-Q.

Face validity: A total of 22 nurses from both hospitals (n = 9 and n = 13) scored the KOP-Q on face-validity. No significant differences were found between the scores in the hospitals. The appropriateness for measuring nurses' knowledge about older patients was acceptable, with a mean of 6.84 (scale 1 to 10) and a range from 4 (n = 1) to 8 (n = 7). When nurses were asked to explain their scores, the results indicated that the nurses thought the questions were relevant and all aspects of geriatric care were included. The nurse who scored a 4 did not provide support for the score. No changes in the KOP-Q were made after this pilot study.

Table 1: Nurses' scores on appropriateness for the KOP-Q (scale 0 – 10)

Mark	Number of Nurses (N=22)
4	1
4.5	0
5	0
5.5	2
6	4
6.5	2
7	5
7.5	1
8	7
Mean: 6.84	

Discussion

This study describes the extensive methodology used to develop the content of the KOP-Q. A total of eleven domains derived from interviews with scientific experts, nurse specialists and older patients. After conceptualization, generating and reduction of questions, 52 questions remained eligible for use in the KOP-Q. In addition, a numerical 'certainty' scale was added. This second scale provides insight into the ability of nurses to reflect on their own knowledge, which was an important theme, derived from the interviews but was not considered part of knowledge. Furthermore, readability and face validity were assessed in pilot studies. This resulted in exclusion of one question but no other changes were made.

The decision to develop a new instrument was made for several reasons. First, most instruments measuring knowledge find their origin in the PFAQ^{12,13} which did not prove reliable or valid in other studies.¹⁴⁻²² Second, most items in other instruments do not measure the construct 'knowledge' solely but include aspects such as opinions, beliefs and experience. This makes it difficult to determine nurses' knowledge separately. Third, there are no other instruments found in literature which provide a good description of the content development, which measures (hospital) nurses' knowledge about older patients. A surprising result in the analysis of the interviews was that functional decline was not mentioned by respondents. In addition, this theme was not assessed by the researchers as a separate theme during the literature review, but mostly in relation with other themes causing functional decline (e.g. multimorbidity, falling, cognitive decline, incontinence etc). Because several themes derived from interviews were related to functional decline, we believe that functional decline is represented implicitly in items of the KOP-Q.

During the development process of the KOP-Q, various types of triangulation were used. Data triangulation was established by interviewing scientific experts, nurse specialists, and older patients. During the analysis of the interviews, investigator triangulation was established using a Delphi round to create the initial codes and analysis of the other interviews by two researchers using this initial code list. By implementing a critical peer discussion and verifying whether the content of the themes represented the study's objectives, validity and reliability were ensured. Older patients volunteered for the interviews, which might have led to selection bias. However, we feel that they do represent older patients in hospitals because of saturation and a deviant case who was satisfied with the care from the hospital nurses, experiencing no problem at all. This contradictory finding might be the result of that patients condition (no use of medicine and no chronic diseases) and helped to ensure that researcher bias did not interfere with the perception of the data. Interviews with nursing specialists were conducted by fourth-year (final year) students. Interviewing was new to them, which may have influenced the quality of the interviews. To maximize the quality of the interviews, the students were trained by a qualitative expert and guided by

the main researcher, who organized weekly consultations and reviews to discuss parts of the interviews conducted by the students. In addition, all the nurse specialists knew why the students were there and what they would ask, making sure the content of the interviews was on topic. The interviews show that the nurse specialists told their stories and checked that the students obtained all of the necessary information.

Questions were generated from the literature by three researchers to prevent researcher bias. In the third step of the development process, triangulation was established by use of a Delphi round with three nurse specialists and two researchers to delete questions, rephrase the generated questions, and add new questions. Because of this extensive process, we feel comfortable that only the most relevant and methodologically correct questions remained in the KOP-Q. Readability was tested with only seven nurses on one ward. However, saturation was established, with nurses making minor remarks on the questions, sentences, and scale when scoring the readability. Three researchers discussed the findings and assessed the 'difficult words' that the nurses indicated as essential knowledge for nurses to know. Face validity of the KOP-Q indicated that nurses felt that the questions were relevant and appropriate for measuring knowledge (mean 6.84). Some nurses argued that it can be difficult to respond with true or false answers because the answer can depend on the situation. Furthermore, some respondents experience the number of questions as too few. In spite of these results, we feel comfortable that the questions represent the most common situations in practice and theory because all questions were extensively discussed with nurse specialists. The decision to develop fewer questions was intended to ensure the usability of the scale. Further testing of the KOP-Q will provide evidence whether the number of questions is too few or sufficient to assess nurses' knowledge about older patients in the hospital setting.

In conclusion, based on an extensive qualitative methodology and a literature review, we developed a questionnaire (7 themes, 52 items) measuring knowledge about older people in the hospital setting. The study provides a good fundament for further validation of the KOP-Q. Description of the development process could be of use for future diagnostic instrument developers. Furthermore, content description of the KOP-Q can be of use for curriculum development and educators.

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CHAPTER 3

Content validity and psychometric characteristics of the “Knowledge about Older Patients Quiz” for Nurses using Item Response Theory

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Abstract

Objectives: To assess the content validity and psychometric characteristics of the Knowledge about Older Patients Quiz (KOP-Q), which measures nurses' knowledge regarding older hospitalized adults and their certainty regarding this knowledge.

Design: Cross-sectional.

Setting: Content validity: general hospitals. Psychometric characteristics: nursing school and general hospitals in the Netherlands.

Participants: Content validity: 12 nurse specialists in geriatrics. Psychometric characteristics: 107 first-year and 78 final-year bachelor of nursing students, 148 registered nurses, and 20 nurse specialists in geriatrics.

Measurements: Content validity: The nurse specialists rated each item of the initial KOP-Q (52 items) on relevance. Ratings were used to calculate Item-Content Validity Index (I-CVI) and average Scale-Content validity Index (S-CVI/ave) scores. Items with insufficient content validity were removed. Psychometric characteristics: Ratings of students, nurses, and nurse specialists were used to test for different item functioning (DIF) and unidimensionality before item characteristics (discrimination and difficulty) were examined using Item Response Theory. Finally, norm references were calculated and nomological validity was assessed.

Results: Content validity: Forty-three items remained after assessing content validity (S-CVI/ave = 0.90). Psychometric characteristics: Of the 43 items, two demonstrating ceiling effects and 11 distorting ability estimates (DIF) were subsequently excluded. Item characteristics were assessed for the remaining 30 items, all of which demonstrated good discrimination and difficulty parameters. Knowledge was positively correlated with certainty about this knowledge.

Conclusion: The final 30-item KOP-Q is a valid, psychometrically sound, comprehensive instrument that can be used to assess the knowledge of nursing students, hospital nurses, and nurse specialists in geriatrics regarding older hospitalized adults. It can identify knowledge and certainty deficits for research purposes or serve as a tool in educational or quality improvement programs.

Keywords

KOP-Q; Knowledge; Certainty; Nurses; Older adults; Item response theory

Introduction

As a result of demographic changes, nursing care in hospitals increasingly involves older adults.^{1,2} Several studies suggest that nurses' negative attitudes toward and limited interest in older adults affects quality of care.³⁻⁵ Because increasing nurses' knowledge of geriatrics might positively influence attitudes,⁶ measuring nurses' knowledge is the first step toward change.

Although a number of instruments that measure the knowledge of hospital nurses regarding older adults are available, they are considered outdated or too country specific; they mix the measurement of knowledge with measurement of opinions, beliefs, and experiences; or they lack inclusion of care perspectives.^{3,4,7} Furthermore, the absence of a clearly described content development often limits their validity. To address these concerns, a new measurement instrument was developed: the Knowledge about Older Patients Quiz (KOP-Q). The content and development processes have been described, and initial validity studies demonstrated promising results.⁷ The KOP-Q (in Dutch) contains 52 dichotomous items (true/false) measuring general knowledge regarding older hospitalized adults. Each item is combined with a certainty scale that allows respondent to indicate their level of certainty regarding the answer given (0–100% certainty). This rating is helpful in increasing awareness of one's personal knowledge level.

The studies described in this article assess the content validity and psychometric characteristics of the KOP-Q.

Method

Two studies were conducted, each using a cross-sectional design. The medical review board of the University Medical Center Utrecht reviewed and approved the studies (METC protocol numbers: 12–302/C and 14–345/C). All participants provided informed consent.

Study 1: Content validation

Participants and Measurement

Content validity was assessed using a previously developed method.^{8,9} Dutch nurse specialists ($n = 60$) with a master's degree in geriatric or gerontological nursing or a doctorate in nursing or a related field were contacted through their formal network. Nurse specialists who were willing to participate received an e-mail invitation to rate the relevance of the KOP-Q items regarding construct, study population, and purpose on a 4-point Likert scale (highly relevant = 4, quite relevant = 3, somewhat relevant = 2, not relevant = 1). Comprehensiveness was measured by asking the nurse specialists whether the items covered the entire construct measured.

Statistical Analysis

The Item Content Validity Index (I-CVI), defined as the proportion of experts who rate the content as valid (relevance rating of 3 or 4), was calculated for each item.^{8,9} Items were rated excellent when the I-CVI value was greater than 0.78. The Fleiss kappa statistic (k^*), an index of agreement among experts regarding the relevance of an item, was calculated to correct for chance agreement. Items considered excellent ($k \geq 0.74$, $I-CVI \geq 0.78$)^{10,11} were retained for Study 2. Items on the threshold ($k = 0.74$, $I-CVI = 0.75$, having 12 raters) were individually assessed. For complete scale validation, all I-CVI values were averaged to calculate a Scale Content Validity Index (S-CVIave), for which a value greater than 0.90 is considered excellent.⁹ Data were analyzed using SPSS version 22.0 (IBM Corp., Armonk, NY).

Study 2: Psychometric characteristics, norm references, and nomological validity

Participants and Measurement

Psychometric testing of the KOP-Q was conducted using the KOP-Q ratings of first- and final (fourth)-year bachelor of nursing students, hospital registered nurses (AD or BSN), and nurse specialists (MSc) in geriatrics to ensure a wide range of knowledge ability and to conduct known group validation. All of the nursing students were recruited at one university of applied sciences. Students were asked to participate by e-mail and to complete the KOP-Q online. Over a 3-month period, registered nurses working with older adults on different wards were recruited from two general hospitals. Nurses received an e-mail from their ward manager inviting them to participate and asking them to complete the KOP-Q online. Nurse specialists attending a formal nurse specialist in geriatrics network meeting were requested to complete a paper-and-pencil version of the KOP-Q. None of the participants in Study 2 participated in Study 1.

Statistical Analysis

Step 1: Unidimensionality and Psychometric Characteristics

First, missing values were assessed to determine whether list-wise deletion could be used. Second, unidimensionality, which is a critical assumption for Item Response Theory (IRT), was assessed. Items were first tested regarding the demonstration of uniform differential item functioning (DIF) using the transformed item difficulties (TID) method.¹² An item is said to function differently (to be a DIF item) when individuals from different groups have different probability distributions of answering an item correctly despite having the same knowledge level.¹³ For example, a first-year student having the same knowledge level as a fourth-year student should have the same probability distribution of answering an item correctly, if not, the item presents DIF. DIF suggests that the item is measuring an additional construct or dimension that may or may not be relevant to the intended construct and that it, therefore, violates the unidimensional assumption.¹² The default value or cutoff score for classifying items as DIF was set at 1.5, which is a commonly used value.^{14–17} All items demonstrating DIF were extensively discussed until consensus was reached among two nurse specialists and two researchers, validating DIF item removal. Modified parallel analysis (MPA) was then used to examine the (uni)dimensionality of remaining items;^{17,18} this analysis tests whether the explained variance of the dimensions is significantly higher than expected. For the unidimensionality assumption to hold, the p-value for the second factor (or higher) must be nonsignificant.^{17,18}

Third, several parameters can be assessed in IRT. The alpha parameter (α) is the discrimination factor, and high α values indicate that the item is better at discriminating between knowledgeable and less-knowledgeable respondents. The beta parameter (β) corresponds to the knowledge level at which the probability of answering correctly is the same as answering incorrectly; it is also called the difficulty parameter. The c parameter (c) represents a guessing factor and describes the probability that a respondent with no knowledge will answer the item correctly.¹⁹ Before the parameters can be estimated, it is important to assess the fit of the data to the model. A Rasch model, which postulates a one-parameter model (only the alpha parameter is present), was tested against a two-parameter model (PL2, containing the alpha and beta parameters). Next, the two-parameter model was tested against a three-parameter model (PL3, containing the alpha, beta, and c parameters). These different models were compared by applying a deviance test (likelihood-ratio test) and comparing the differences in the Akaike information criterion (AIC). The AIC uses a penalty term for the number of estimated parameters in different models to prevent the model from overfitting a statistical problem that occurs when the fitted model describes noise instead of the true structure of the data; lower AIC values indicate a better fitting model.²⁰

Step 2: Norm References

In IRT, the estimates of discrimination and difficulty parameters are analyzed at the

individual level,¹⁹ but for practical use, classical test theory (CTT) is more appropriate. In CTT, a test scores is simply the sum of correctly answered items. These summed scores are then compared with the test scores generated through IRT analysis using a Pearson correlation test. The CTT approach can be used if the CTT scores are close to the scores of the IRT-derived tests. First, a normal distribution of CTT test scores was assessed. Then, norm references (group level), threshold scores, and adjusted Cohen d effect sizes were calculated. Cohen d was used to estimate the (standardized) differences between groups.

Step 3: Nomological Validity

Unidimensionality of the KOP-Q construct “certainty” was tested using confirmatory factor analysis. The fit of the model was assessed using the comparative fit index (CFI) and the root mean square error of approximation (RMSEA). Values greater than 0.90 for CFI and less than 0.06 for RMSEA were considered to indicate acceptable model fit.²¹ The hypothesis that higher knowledge scores would be positively correlated with higher certainty (reflection) scores was tested using a Pearson correlation test. Ltm, an R package for latent variable modeling and item response theory,¹⁷ was used to assess the dimensionality of knowledge and certainty items and to perform the model fit and IRT analysis. SPSS version 22.0 was used to test the correlation between IRT test scores and CTT test score; to calculate norm scores, threshold scores, and adjusted Cohen d effect sizes using CTT test scores; and to assess the nomological validity of the knowledge construct.

Results

Study 1: Content Validity

Of the 60 nurse specialists invited, 12 (20.0%) agreed to participate. Respondents were primarily female (n = 9) and had a mean age of 52.0 ± 5.7 , a mean 25.0 ± 9.8 years of experience in nursing, and an average 7.6 ± 4.6 years of experience in their current area of practice geriatric nursing (n = 9) or teacher in geriatrics at the bachelor level (n = 2); data on experience were missing for one nurse specialist. Nine items were excluded from the initial KOP-Q after assessment of content validity (Appendix S1). The S-CVlave was 0.91 (range 0.75–1.00). Items of the KOP-Q were considered comprehensive, and no suggestions for extension were made.

Study 2: Psychometric Characteristics, Norm References, and Nomological Validity

Of the invited participants, 130 first-year students (69.1%), 90 fourth-year students (57.7%), 179 registered nurses (50.0%), and 21 nurse specialists (35%) agreed to participate. In the participating sample, list-wise deletion was used when nonresponse occurred; this was the case for 12 first-year students (9.2%), nine fourth-year students (10%), and seven registered nurses (3.9%) and when respondents had missing values in the KOP-Q items (11 first-year

students (8.5%), 3 fourth-year students (3.3%), 24 registered nurses (13.5%), one nurse specialist (4.8%). The sociodemographic characteristics of respondents with missing values were not significantly different from those with complete data (all $P > .05$). Sociodemographic characteristics for the 353 respondents with no missing data on the KOP-Q are presented in Table 1.

Table 1. Characteristics of participants with no missing Knowledge about Older patients-Quiz values (n=353)

Characteristic	Nursing Students, First Year, n = 107	Nursing Students, Final Year, n = 78	Registered Nurses, n =148	Nurse Specialists, n = 20
Female, %	89.6	90.7	88.5	95.0
Age, mean±SD	18.6 (1.8)	22.5 (2.5)	34.7 (11.0)	45.6 (8.8)
Hours per week working as a nurse, mean±SD	-	-	29.2 (7.0) ^a	31.9 (4.6) ^b
Highest qualification, n (%)	-	-		
Associate degree			59 (39.9)	1 (5.0)
Bachelor of science in nursing			59 (39.9)	2 (10.0)
Post-bachelor of science in nursing			25 (16.9)	-
Master of science in geriatric or gerontological nursing			4 (2.7)	15 (75.0)
Doctorate in nursing or related field			-	2 (10.0)
Other			1 (0.6)	
Type of ward where currently working, n (%)	-	-		
Critical care unit			12 (8.1)	
Orthopedics			6 (4.1)	1 (5.0)
Internal medicine			26 (17.6)	
Geriatric medicine			7 (4.7)	17 (85.0)
Cardiology			12 (8.1)	
Neurology			14 (9.5)	
Lung diseases			19 (12.8)	
Gastrointestinal, liver			38 (25.7)	
Surgical			13 (8.8)	
Education				1 (5.0)
Missing			1 (0.6)	1 (5.0)

Missing: n=3, ^a2. SD= standard deviation.

Step 1: Unidimensionality and Psychometric Characteristics

Of the 43 KOP-Q items resulting from Study 1, 12 demonstrated distorted ability estimates (DIF score >1.5), suggesting that the item was measuring an additional construct or dimension. Eleven of these were excluded. The DIF item “For older people, bed rest is important to enhance recovery” was considered too important to exclude because the content of no other item in the KOP-Q covered this question. Two additional items demonstrated ceiling effects and were excluded. As a result, 13 items (7, 9, 17, 21, 23, 26, 28, 30, 40, 41, 43, 44, 51) were excluded from the KOP-Q (Appendix S1), leaving 30 items for further analysis. The MPA test of unidimensionality for the 30 KOP-Q items was not significant ($P = .29$), which supports the assumption of unidimensionality.

Finally, the best-fitting model for the data was assessed. The 2PL model demonstrated a significantly better fit ($P < .001$) than the 1PL model. The 3PL model demonstrated no significantly better fit than the 2PL model ($P = .66$) and had a higher AIC, so the 2PL model (estimating discrimination and difficulty parameters) was considered the best fit. Table 2 presents the discrimination parameter (α) and difficulty parameter (β) estimates of the resulting 30 items of the KOP-Q. Most items had moderate to high discrimination values. The range at which the KOP-Q retrieves information about the knowledge level of participants is a β of -10.2 to 0.7, indicating that most items are easy to answer even if knowledge levels are low. The reliability of the final set of knowledge items was good (Kuder-Richardson formula 20 = 0.70).

Table 2: Item characteristics of the 30-item true-false Knowledge about Older Patient-Quiz

Item	Short item description (originally written in Dutch)	Discrimination parameter	Difficulty parameter
1	Forgetfulness, concentration problems, and indecisiveness are parts of aging rather than indicators of depression.	0.812	0.037
4	For older people, bed rest is important to enhance recovery.	1.396	-1.579
5	Individuals with a cognitive disorder, such as dementia, are at greater risk for delirium.	0.754	-3.026
6	In general, older people are more sensitive to medication because their kidney and liver functions are declining.	0.787	-1.806
8	People rarely remember that they were anxious or restless during delirium.	0.932	-0.070
10	In the case of delirium, bright lighting should always be used to illuminate all of the corners of the room.	0.369	-3.254
11	In the case of delirium, activities should be spread out evenly over the day.	0.677	-4.590
12	Depression is recognized in older people less frequently than it is in younger people.	1.593	-1.828
13	In the case of depression, memory problems may occur.	0.473	-5.711

Table 2: (continued)

Item	Short item description (originally written in Dutch)	Discrimination parameter	Difficulty parameter
19	It is good to provide extensive instruction about how to complete tasks to individuals with apraxia.	1.038	0.713
20	Pressure that cuts off the blood supply to tissue for two hours may result in pressure ulcers.	0.287	-7.424
22	Identify pressure ulcers only if blister formation or abrasions have occurred.	0.722	-3.134
24	Stress incontinence may occur in people who are not capable of opening their own trousers.	0.227	-2.276
25	Unexpected urinary incontinence in an older person may indicate that the person has a urinary tract infection.	1.040	-2.002
27	Incontinent individuals must have their soiled clothing changed but do not need to be placed on the toilet afterward.	0.843	-3.609
29	Malnutrition can have negative effects on thinking and observation skills.	0.374	-10.207
31	An older person with a body mass index greater than 25 kg/m ² cannot be undernourished.	1.156	-2.029
32	Older people need less fluid because they exercise less.	0.855	-3.839
33	It is good to have older people drink more often because they have a reduced thirst sensation.	0.423	-5.846
35	Lowering the frequency of a medication is an effective intervention to achieve (medication) adherence by patients.	0.949	-1.125
36	Medication may cause geriatric problems such as memory deficits, incontinence, falling, and depression.	0.985	-1.933
37	In the case of difficulty swallowing, all medicines must be ground to ensure that patients ingest them.	1.042	-0.297
38	Pain medication should be administered to older people as little as possible because of the possibility of addiction.	0.717	-2.769
39	Risk of falling is higher for people in the hospital setting than those living at home.	1.155	0.624
42	Asking an individual whether he or she has fallen in the past 6 months is a good way of assessing for risk of falling.	0.934	-2.274
45	Meeting with families during patient assessment is required only for persons with dementia.	1.020	-2.590
46	Overburdening of family caregivers may lead to abuse of the person for whom they are providing care.	1.614	-1.728
49	Most family caregivers do not need additional support from homecare services.	0.632	-3.612
50	As a nurse, you have to speak clearly into the ear of a hearing-impaired older adult.	0.419	-0.301
52	When speaking to hearing-impaired older adults, it is best to speak at normal volume.	0.586	0.476

The item numbers shown correspond to those in online Appendix 1.

Step 2: Norm References

The CTT scores were compared with the IRT knowledge ability estimates. The correlation between the two approaches for total individual scores was high (correlation coefficient (r) = 0.975, $P < .001$). Table 3 presents the normative data for interpreting test scores based on the CTT scores. Each group (fourth-year students, registered nurses, nurse specialists) had significantly higher test scores than its reference group (first-year students, fourth-year students, registered nurses, respectively) (all $P < .001$). The optimal threshold scores between first- and fourth-year students (21.09), fourth-year students and registered nurses (24.25), and registered nurses and nurse specialists (26.77) represent the scores at which the shift to a more (or less) knowledgeable group occurs. The standardized differences between the four groups (Cohen d effect sizes) demonstrated large effect sizes for the KOP-Q between the different groups.

Table 3: Norm Reference Scores, Threshold Scores, and Cohen d Values

Norm reference KOP-Q	First-Year Students	Final-Year Students	Registered Nurses	Nurse Specialists
KOP-Q score mean \pm standard deviation	19.05 \pm 2.83	23.13 \pm 2.82	25.14 \pm 2.25	27.70 \pm 1.30
Threshold score		21.09	24.25	26.77
Cohen d		1.44	0.79	1.39

Threshold scores identify the cut-off value between that group and the preceding group. A Cohen d of greater than 0.80 indicates a large effect size (group mean scores differ substantially).

KOP-Q = Knowledge about Older Patient Quiz

Step 3: Nomological Validity

“Certainty” proved to be unidimensional (CFI = 0.996, RMSEA = 0.031, $P \leq .05$) and is considered a second dimension of the KOP-Q. The reliability of the final set of certainty items was excellent (Cronbach alpha = 0.94). The hypothesis that a higher knowledge level is positively correlated with a higher certainty level was confirmed ($r = 0.547$, $P < .001$).

Discussion

The final 30-item KOP-Q appears to be a valid, reliable instrument to measure nurses' knowledge regarding older adults and their level of certainty regarding that knowledge. Nurses with various levels of knowledge can be discriminated from one another adequately, and their certainty of their knowledge is correlated with the knowledge construct. These findings suggest that increasing nurse knowledge might improve the confidence of nurses in providing quality care to hospitalized older adults. The KOP-Q can discriminate adequately between nurses of various levels of knowledge and is therefore useful for research purposes or as a tool in educational or quality improvement programs.

Certain aspects of this study must be considered to interpret the results fully. To assess the psychometric characteristics, IRT was used to offer several advantages over CTT. In CTT, the true scores are assumed to be measured at an interval level and to be normally distributed. This criterion is impossible to meet using absolute true/false questions in knowledge instruments such as the KOP-Q. Furthermore, in CTT, respondents' test scores are test dependent, item and test parameters are sample dependent, and parallel measurements must be available. Although IRT provides workable solutions for all of these problems,²² it could be difficult to perform the analysis and interpret the results in practice. Therefore, CTT analysis was used as a complement to the IRT, because the calculations for CTT analysis are easier to perform than IRT; each correct response receives a score of 1, and each incorrect response receives a score of 0.

Some limitations of this study should be considered. First, considering the response rate and sample size of the nurse specialist group for testing the psychometric characteristics, the representativeness of this population can be questioned, although no sample size problems were indicated in analysis of the data. Second, because the KOP-Q has been developed and tested in the Netherlands only, further cross-cultural validation is needed. Finally, this study was designed to distinguish between different levels of nurse knowledge using readily identified groups that presumably encompass a wide range of knowledge (bachelor of nursing students in their first and fourth years, registered nurses, and master's-prepared nurse specialists). The study ascertained that the KOP-Q is valid for these groups, but from a clinical and educational perspective, there are more healthcare professions and settings (e.g., nursing homes, home care) for which the KOP-Q can be useful and for which further validation is required.

In conclusion, the revised KOP-Q is a valid, psychometrically sound, comprehensive instrument that can be used to assess the knowledge of nursing students, hospital nurses, and nurse specialists in geriatrics regarding older adults in the hospital setting. The KOP-Q can identify knowledge and certainty deficits for research and for educational and quality improvement programs.

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Appendix1.

Appendix 1. Item Content Validity Index scores and reasons for item exclusion for the Knowledge-about-Older-patient-Quiz (KOP-Q) for nurses

Item	Item text	I-CVI ^a	P _c ^b	k ^{*c}	DIF	Reason for exclusion
1	Forgetfulness, concentration issues and indecisiveness are parts of aging rather than indicators of depression.	.83	.016	.83		included
2	Being physically active, older people experience sooner a shortness of breath due to failure of the autonomic response which correct for shortness in oxygen levels	.55	.226	.42		Content validity
3	You cannot influence the aging process	.75	.054	.74		Content validity
4	For older people, bed rest is important to enhance recovery.	.92	.003	.92	<0.001	Included (consensus Delphi round)
5	Patients with a cognitive disorder, such as dementia, are at increased risk for delirium.	1.00	.000	1.00		Included
6	In general, older people are more sensitive to medication because their kidney and liver functions are declining.	1.00	.000	1.00		Included
7	Confused patients should be monitored for urinary retention.	.92	.003	.92	<0.001	DIF >1.5
8	Patients rarely remember that they were anxious and/or restless during delirium.	.92	.003	.92		Included
9	In the case of delirium an environment lacking stimuli always has a positive effect on patients.	.92	.003	.92	<0.001	DIF >1.5
10	In the case of delirium, bright lighting should be used to illuminate all of the corners of the room.	.83	0.016	.83		Included
11	In the case of delirium, activities should be spread out evenly over the day.	.92	.003	.92		Included
12	Depression is recognized in older people less frequently than it is in younger people.	1.00	.000	1.00		Included
13	In the case of depression, memory problems may occur.	1.00	.000	1.00		Included
14	A complete recovery from depression is almost impossible in older people.	.75	.054	.74		Content validity
15	Alzheimer's disease is more common in men than in women.	.33	.238	.24		Content validity
16	When an elderly patient makes a lot of sexual comments, a form of dementia should be considered.	.67	.121	.63		Content validity
17	Sudden confusion only occurs in delirium and is not part of dementia.	1.00	.000	1.00	<0.001	DIF >1.5
18	Slowness in thinking, acting and motor skills and changes in functioning are symptoms of vascular dementia.	.67	.121	.63		Content validity
19	It is good to provide extensive instruction about how to complete tasks to patients suffering from apraxia.	.92	.003	.92		Included

20	Pressure that cuts off the blood supply to tissue for two hours may result in pressure ulcers.	.83	.016	.83		Included
21	Blister formation on the skin indicates category 2 pressure ulcers.	.75	.054	.74	<0.001	DIF >1.5
22	We identify pressure ulcers only if blister formation or abrasions have occurred.	.75	.054	.74		Included
23	Incontinence products should always be used when people have functional incontinence.	.83	.016	.83	<0.001	DIF >1.5
24	Stress incontinence may occur in patients who are not capable of opening their own trousers.	.75	.054	.74		Included
25	Unexpected urinary incontinence in an older person may indicate that the person is suffering from a urinary tract infection.	1.00	.000	1.00		Included
26	A urinary catheter is a good method to prevent moisture related skin damage.	1.00	.000	1.00	<0.001	DIF >1.5
27	Incontinent patients must have their soiled clothing changed but do not need to be placed on the toilet afterwards.	.92	.003	.92		Included
28	Malnutrition can have a negative effect on mobility due to its impact on response time.	.92	.003	.92	<0.001	DIF >1.5
29	Malnutrition can have negative effects on thinking and observation skills.	1.00	.000	1.00		Included
30	Malnutrition impedes the healing rate and rehabilitation, and it increases the risk of complications.	.75	.054	.74		Ceiling effect
31	An older person with a BMI of >25 cannot be undernourished.	1.00	.000	1.00		Included
32	Older people need less fluid because they exercise less.	.83	.016	.83		Included
33	It is good to have older people drink more often because they have a reduced thirst sensation.	1.00	.000	1.00		Included
34	The more medications that a patient uses, the higher the risk of under-treatment.	.75	.054	.74		Content validity
35	Lowering the frequency of a medication is an effective intervention to achieve (medication) adherence by patients.	.83	.016	.83		Included
36	Medication may cause geriatric problems, such as memory deficits, incontinence, falling and depression.	.83	.016	.83		Included
37	In the case of difficulty swallowing, all medicines must be ground to ensure that patients ingest them.	.83	.016	.83		Included
38	Pain medication should be administered to older people as little as possible, due to the possibility of addiction.	1.00	.000	1.00		Included
39	Risk of falling is higher for people in the hospital setting compared with those who are living at home.	1.00	.000	1.00		Included
40	The use of opiates, antidepressants and/or diuretics increases the risk of falling.	1.00	.000	1.00	<0.001	DIF >1.5
41	To diagnose orthostatic hypotension, blood pressure should be measured 3 times a day.	1.00	.000	1.00	<0.001	DIF >1.5

42	Asking patients whether they have fallen in the past 6 months is a good way of assessing an increased risk of falling.	1.00	.000	1.00		Included
43	If a patient has fallen out of bed several times, it is good to raise the bed rails and place the bed in its lowest position, provided that there is mutual agreement between patient and nurse.	.83	.016	.83	<0.001	DIF >1.5
44	Nursing responsibility for fall prevention is limited to the hospitalization period.	.83	.016	.83	<0.001	DIF >1.5
45	Meeting with families during patient assessment is only required for persons suffering from dementia.	.92	.003	.92		Included
46	Overburdening of family caregivers may lead to abuse of the person for whom they are providing care.	1.00	.000	1.00		Included
47	Most family-caregivers are older than 65 years.	.67	.121	.63		Content validity
48	Because of the increasing role of women in the workplace, less informal care is provided to older people than was before.	.75	.054	.74		Content validity
49	Most family caregivers do not need additional support from homecare services.	.75	.054	.74		Included
50	As a nurse, you have to speak clearly into the ear of the hearing-impaired older patient.	.83	.016	.83		Included
51	A patient, who does not want to get out of bed, should be allowed to stay in bed.	.92	.003	.92		Ceiling effect
52	When speaking to hearing-impaired older patients, it is best to speak at normal volume.	1.00	.000	1.00		Included

The gray shaded values' indicate included items

^aI-CVI (Item Content Validity Index) = number of experts rating a 3 or 4 / total number of experts

^bPc (probability of a chance occurrence) = $[N! / A! (N - A)!] \times 0.5^N$ where N= number of experts and A = number agreeing on good relevance.

^ck* = kappa designating agreement on relevance: $k^* = (I-CVI - Pc) / (1 - Pc)$

DIF = Different Item Functioning

Knowledge about Older Patient-Quiz S-CVIave = 0.90 (43 items), after psychometric assessment: S-CVIave = 0.91 (30 items)



Appendix 2

Knowledge-about-Older-Patients Quiz (KOP-Q) for Nurses

For each statement, please answer “True” or “False”. Along the certainty bar, please indicate how certain you are about your answer (ranging from 0 – 100% certain).

		True	False
1.	Forgetfulness, concentration issues and indecisiveness are parts of aging rather than indicators of depression.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
2.	Unexpected urinary incontinence in an older person may indicate that the person is suffering from a urinary tract infection.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
3.	Patients with a cognitive disorder, such as dementia, are at increased risk for delirium.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
4.	Malnutrition can have negative effects on thinking and observation skills.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
5.	In general, older people are more sensitive to medication because their kidney and liver functions are declining.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
6.	Meeting with families during patient assessment is only required for persons suffering from dementia.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			

		True	False
7.	For older people, bed rest is important to enhance recovery.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
8.	Patients rarely remember that they were anxious and/or restless during delirium.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
9.	Older people need less fluid because they exercise less.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
10.	Asking patients whether they have fallen in the past 6 months is a good way of assessing increased risk of falling.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
11.	Pressure that cuts off the blood supply to tissue for two hours may result in pressure ulcers.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
12.	Depression is recognized in older people less frequently than it is in younger people.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
13.	Lowering the frequency of a medication is an effective intervention to achieve (medication) adherence by patients.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
14.	Incontinent patients must have their soiled clothing changed but do not need to be placed on the toilet afterwards.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			



		True	False
15.	It is good to have older people drink more often, because they have a reduced thirst sensation.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
16.	In the case of delirium, bright lighting should be used to illuminate all of the corners of the room.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
17.	Medication may cause geriatric problems such as memory deficits, incontinence, falling and depression.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
18.	Overburdening of family caregivers may lead to abuse of the person for whom they are providing care.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
19.	It is good to provide extensive instruction about how to complete tasks to patients suffering from apraxia.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
20.	When speaking to hearing-impaired older patients, it is best to speak at normal volume.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
21.	An older person with a BMI of >25 cannot be undernourished.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
22.	In the case of difficulty swallowing, all medicines must be ground to ensure that patients ingest them.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			

		True	False
23.	In the case of depression, memory problems may occur.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
24.	Most family caregivers do not need additional support from homecare services.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
25.	As a nurse, you have to speak clearly into the ear of the hearing-impaired older patient.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
26.	Pain medication should be administered to older people as little as possible, due to the possibility of addiction.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
27.	We identify pressure ulcers only if blister formation or abrasions have occurred.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
28.	In the case of delirium, activities should be spread out evenly over the day.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
29.	The risk of falling is higher for people in the hospital setting compared with those who are living at home.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
30.	Stress incontinence may occur in patients who are not capable of opening their own trousers.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			



Answer Key KOP-Q (30 item)

Every correct answer on the knowledge questionnaire receives 1 point, and every incorrect answer receives 0 points (total score: minimum = 0, maximum = 30). The average of the certainty scores can be calculated by summing all of the percentages provided per question divided by 30.

1	FALSE	11	TRUE	21	FALSE
2	TRUE	12	TRUE	22	FALSE
3	TRUE	13	TRUE	23	TRUE
4	TRUE	14	FALSE	24	FALSE
5	TRUE	15	TRUE	25	FALSE
6	FALSE	16	FALSE	26	FALSE
7	FALSE	17	TRUE	27	FALSE
8	FALSE	18	TRUE	28	TRUE
9	FALSE	19	FALSE	29	TRUE
10	TRUE	20	TRUE	30	FALSE



CHAPTER 4

The knowledge about older patients
– quiz for nurses: cross-cultural
validation between the Netherlands
and the United States of America

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Abstract

Background: The Knowledge about Older Patients-Quiz (KOP-Q) is designed as a unidimensional scale measuring knowledge of hospital nurses about older patients. Furthermore, the KOP-Q measures a second unidimensional construct, certainty of hospital nurses about their knowledge. The KOP-Q is developed and validated in the Netherlands. Whether the KOP-Q can be used in other countries is unknown given the cultural and language differences.

Objectives: Investigate the level of measurement invariance of the KOP-Q between the Netherlands and United States of America (USA).

Design: A multicenter international cross-sectional design.

Settings: Four general hospitals in the Netherlands and four general hospitals in the USA.

Participants: Nurses from the Netherlands (n = 201) and the USA (n = 130) were invited to participate by email from the ward manager, distributing flyers and present messages on the online hospital communication boards. Questions of the KOP-Q were completed online.

Method: The level of measurement invariance (configural, metric or scalar invariance) across countries was tested by running increasingly constrained structural equation models, and testing whether these models fitted the data.

Results: Both the knowledge and certainty construct of the KOP-Q proved unidimensional in the Netherlands and USA sample. Testing results of the measurement invariance across the Netherlands and USA indicated a stable, partial scalar invariance (15 items full scalar invariance) for the knowledge items and full scalar invariance for the certainty items.

Conclusions: The KOP-Q shows to function uniformly across both language groups and can therefore be used to assess nurses' knowledge and their certainty about this knowledge which can be important for educational and/or quality improvement programs in the USA. Furthermore, the KOP-Q is suitable to make comparisons between the Netherlands and the USA using latent variable models. Before the KOP-Q can be used in other countries, cross-cultural tests should again be performed.

Keywords

Cross-cultural validation, KOP-Q, Knowledge, Measurement invariance, Nurses, Older patients

Introduction

Worldwide, an epidemiological shift in age results in an increase of older patients admitted to hospitals. Consequently, the encounters nurses have with older people are also increasing.^{1,2} Several studies indicate that nurses have a negative attitude towards, and lack of knowledge about, older people which affects the quality of care provided.³⁻⁷ Increasing nurses' knowledge is a promising first step for positively influencing the attitudes towards older patients.³

The Knowledge about Older Patients-Quiz (KOP-Q) is a comprehensive, reliable and valid instrument developed in the Netherlands to asses hospital nurses 'knowledge about older patients'.^{8,9} Whether the KOP-Q measures the same construct, in the same manner, across different cultures and languages, is unknown. This is why a cross-cultural validation study is necessary, to ensure outcomes of the KOP-Q reflect real differences in knowledge and certainty rather than cultural or language differences.

Measurement invariance (MI) assesses whether different groups respond in a similar way to a measurement instrument and its items.¹⁰ Although seldom addressed, MI is a critical issue in cross-cultural testing. Only when measurement instruments have a certain level of MI, average scores on (sub)scales between different countries/cultures can be compared and meaningful interpretations of results can be made. If subjects from different countries, often having different languages, do not interpret items in the same way, the underlying structure of the instrument differs and the instrument is not suitable for comparisons between those different countries.

Therefore, the aim of the current study was to investigate the level of measurement invariance of the KOP-Q between the Netherlands and United States of America (USA).

Methods

Design

This study followed a multicenter international cross-sectional design.

Setting and subjects

In this study, data of nurses from the Netherlands and USA were collected over a three-month period. For the Dutch sample, registered nurses working in three general hospitals located in the middle of the Netherlands were recruited. For the USA sample, registered nurses in four general hospitals located in the Northeast and Midwest regions of the USA were recruited. Only wards having older patients admitted regularly were included. Both nurses from the Netherlands and the USA were invited to participate by email from the ward manager. Furthermore, flyers were distributed and messages were presented on the online hospital communication boards. Registered nurses were included only after informed consent was obtained. Questions of the KOP-Q were completed online.

The study was approved by the medical review board of the University Medical Center Utrecht, the Netherlands (METC protocol number: 14-345/C), Pace University Institutional Review Board, New York, USA (IRB protocol number: 14-85) and Bronson Methodist Hospital Institutional Review Board, Kalamazoo, USA (IRB protocol number: BMH-2014-0753). Furthermore, all participating hospitals provided formal approval for this study.

Measurement

The KOP-Q was developed and validated in the Netherlands.^{8,9} It is composed of 30 knowledge items that are scored on a dichotomous true/false scale with every correct answer receiving 1 point, and every incorrect answer receiving 0 points (total score: minimum = 0, maximum = 30). The 30 knowledge items are considered to measure a unidimensional construct 'knowledge about older patients in the hospital setting'. The KOP-Q measures a second construct 'certainty'. The certainty scale provides insight into nurses' ability to reflect on their own knowledge by asking how certain respondents are about every answer given (ranging from 0 to 100 percent certainty). The KOP-Q demonstrated adequate face-validity, good readability, a good Scale-Content Validity Index/average ($S-CVI/ave = .91$), measuring adequately lower knowledge level (range discrimination parameter = 0.227 – 1.614, range difficulty parameter = -10.207 – 0.624) and demonstrated good reliability for the knowledge items (Kuder-Richardson Formula 20 = .70) and excellent reliability for the certainty items (Cronbach Alpha = .94).

For translation of the original Dutch version of the KOP-Q into American English, the forward-backward translation method was used.^{11,12} One independent bilingual person translated the KOP-Q into the American English language. This translation was evaluated and finally determined by three Dutch researchers. The American English translation of the KOP-Q was

translated back into the Dutch language by one translator who did not see the wording of the original version of the KOP-Q. The American English back-translation was compared with the original Dutch version to detect possible alterations in meaning. Ambiguities and discrepancies were discussed by three researchers until consensus was achieved. Finally, the wording of the American English version of the KOP-Q was discussed with 2 academic researchers and 4 researchers working in the hospital setting in the USA until consensus was achieved.

Levels of measurement invariance

For testing the level of MI, an Item Response Theory (IRT) model was fitted using the principles of Confirmatory Factor Analysis (CFA) that reflects the theoretical construct. The different levels of MI are tested by increasing the constraints across the two models, and therefore, the level of MI is determined by testing the fit of the three models to the data.

The three levels of measurement invariance often described in literature are configural-, metric- and scalar invariance.^{10,13,14} *Configural invariance* assesses whether the same set of questions is related to the same concepts/constructs in each country/culture. *Metric invariance* assesses whether loading weights of items are identical across countries/cultures. As a result, a comparison of different scores (e.g. means-corrected scores) across countries can be made. Furthermore, an instrument demonstrating metric invariance enables researchers to make valid comparison of relationships of the latent variable with other variables of interest.¹⁵ Even with equal measurement units however, latent scores can still be uniformly biased upward or downwards.¹⁶ Meaning that respondents from a different country/culture might have systematically higher or lower observed values, preventing a meaningful comparison of means from being made.¹⁷ Only if the scales of the latent constructs have the same origin, can a full comparison between countries/cultures be made. This is called *scalar invariance*. Ideally all the items are equivalent across countries, because then the latent means are estimated more reliably, i.e. they are based on many cross-culturally comparable items. Equivalence of parameters for all items however, is very unlikely in many situations and not necessary for substantive analysis to be meaningful.^{13,15} Researchers can resort to *partial equivalence* as a compromise between full measurement equivalence and complete lack of measurement equivalence. At least two items per construct are to be equivalent for a valid comparison. One item (the so called “marker”) has to be fixed to define the scale of each latent construct. In order to test the equivalence of the marker item, a second item needs to be equivalent. This way, researchers can control for a limited number of violations of the equivalence requirements and proceed with substantive analysis of cross-cultural data.¹⁵

Statistical analysis

Step 1: data preparation and screening

First, following data collection, cases with missing values were deleted and data of both groups was properly screened for respondents with an implausible answer pattern based on Person Fit measures.¹⁸ This is important because any bias in one of the groups due to deviant answer patterns will affect factor loadings (discrimination parameter), intercepts (difficulty parameter) and error variances, which are used to assess MI.¹⁰ Then, the number of parameters that could be assessed with the available data were tested.

Step 2: level of MI knowledge construct

Unidimensionality (one construct) of the knowledge construct was tested in both groups separately using the Covariance Sum score Non-positive (CSN). This function tests whether the eigenvalue of a second construct is not relevant (significant) and therefore whether the data supports the unidimensional model. Non-significant p values for the CSN statistics indicate a good fit. To assess the level of MI, several increasingly constrained models were compared as described by Van de Schoot.¹⁰ The fit of the different models was indicated by chi-square statistics, Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC). A non-significant chi-square or lower AIC and BIC values compared with the previous model, are justification that the tested model fit the observed data well.

Step 3: Level of MI certainty construct

First, the certainty variable was recoded into 4 percentile groups due to low frequencies on the 0-100 scale causing problems in the analysis. Then, unidimensionality of the certainty construct was assessed using the comparative fit index (CFI), the Tucker Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA). Values of > 0.90 for the CFI/TLI and < 0.06 for the RMSEA were considered to indicate acceptable model fit.¹⁹ The fit of the increasingly constrained models was assessed using CFI/TLI, RMSEA and Chi-square statistics.

Step 4: Knowledge and certainty differences between Dutch and USA sample

Finally, per individual the total number-correct score is computed based on the IRT parameters of each item. This “score” is based on the Item Response Functions and not comparable with traditional scores like percent correct. After estimating these weighted scores, one knowledge score and one certainty score for each participant is calculated. These factor scores are defined using a normally distributed z-score (mean = 0, SD = 1). The factor scores are calculated in a quite similar way as usual CFA. In CFA the factor scores are calculated by the sum of all items after multiplying the factor loading with the standardized scores of each item. However, when IRT is used, the difficulty parameter is also included in the calculation. While scoring is much more sophisticated with IRT, for interpretation reasons scores based on Classical Test Theory were also calculated (sum of participants total

scores on the KOP-Q devided by number of participants). The equality of knowledge and certainty mean factor scores of the Dutch and USA groups was tested using an independent samples *t* test.

Several software packages in R²⁰ were used to perform the analysis. To assess the number of parameters that can be assessed, ltm: a package for latent variable modeling and item response theory analyses,²¹ was used. Sirt package: Supplementary Item Response Theory Models²² was used to assess unidimensionality. PerFit: Person Fit package¹⁸ was used to detect respondents with a deviant answer pattern. Mirt: a Multidimensional Item Response Theory package²³ was used to assess the MI of the knowledge construct and Lavaan: an R package for structural equation modeling²⁴ was used to assess MI of the certainty construct.

Results

Survey response and sample characteristics

Table 1 presents the characteristics of the respondents and statistically significant differences between the Dutch and USA sample. The USA sample had a higher education level than the Dutch sample (higher percentage of nurses with BSN, master and doctorate degrees) and worked more hours a week.

Table 1. Descriptive sample statistics for the Netherlands and USA samples

	Dutch respondents (n= 201)	USA respondents (n= 130)	<i>p</i>
Gender, female n (%)	185 (92.0)	119 (91.5)	0.933
<i>Missing, n</i>	1	1	
Age, mean (SD)	38.7 (12.3)	39.9 (13.1)	0.400
Highest education, n (%)			
AAS,	113 (56.2)	39 (30.0)	<0.001 ^a
BSN	80 (39.8)	72 (55.4)	
MSc/PhD	6 (3.0)	17 (13.1)	
<i>Missing, n</i>	2 (1.0)	2 (1.5)	
Years of experience, mean (SD)	16.0 (12.0)	14.6 (13.0)	0.305
<i>Missing, n</i>	5	1	
Hours a week, mean (SD)	26.7 (8.7)	35.6 (10.3)	<0.001 ^b
<i>Missing, n</i>	1	1	

p values refer to χ^2 test (gender, education) and *t* test outcomes.

^a Cramers *v* (effect size for χ^2 test) = 0.28 (indicating a small effect).

^b Cohen *d* = 0.93 (indicating a large difference).

AAS= An Associate of Science in Nursing BSN= Bachelor of science in nursing, MSc= masters of science in nursing or related field, PhD= doctorate in nursing or related field, SD = Standard deviation

Measurement invariance of the Knowledge-About-Older-Patient-Quiz

Step 1: data preparation and screening

Twenty-four Dutch respondents (10.7%) and 16 USA respondents (10.9%) were excluded from the complete cases as they were considered having deviant answer patterns. The proportion of cases with deviant answer patterns proved not country/culture dependent ($X^2 = 0.081, p = 0.767$). Furthermore, the two parameter model, meaning that the guessing parameter is constrained to 0.5 and the discrimination and difficulty parameter were unconstrained, fitted both groups best.

Step 2: level of measurement invariance: knowledge

The unidimensionality of the CSN test demonstrated that the data fit the unidimensional model in both samples (Dutch sample: *CSN statistic* = 0.072, $p = 0.975$ USA sample: *CSN statistic* = 0.122, $p = 0.165$). Next, the level of measurement invariance was assessed, see Table 2 for fit indices. Full metric invariance was established, as demonstrated by the tradeoff between model fit and model complexity, which did not significantly worsen (Model 2: $\Delta X^2 = 48.482$ [$df = 30$], $p = 0.053$). Partial scalar invariance was established after the intercept of 15 items were unconstrained (Model 3: $\Delta X^2 = 22.941$ [$df = 15$], $p = 0.085$). Four items were not scalar invariant on both the discrimination and difficulty parameter. Eleven items were not scalar invariant because one of the two parameters was invariant between the two samples. These items demonstrate that some cultural differences between the two countries exist. For example item four, “Malnutrition can have a negative effect on thinking and observation skills”, is considered extremely difficult in the USA compared to the Netherlands (Table 3).

Table 2. Testing the level of measurement Invariance of the knowledge construct.

	Model Comparison				
	AIC	BIC	X ²	df	p
Model 1: Baseline model	6878.838	7348.032	NA	NA	NA
Model 2: Metric invariance	6862.320	7217.999	48.482	30	0.053
Model 3: Partial scalar invariance (15 items unconstrained)	7278.174	7278.463	22.941	15	0.085

The non-significant X² for all models are justification that the tested models fit the observed data well compared with the previous model (model 2 versus model 1; model 3 versus model 2).

AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion X² = Chi-square statistics, df = degree of freedom

Table 3. Final model IRT parameters for the Netherlands and USA samples on the knowledge items in the Knowledge about Older Patients – Quiz (KOP-Q)

	Discrimination		Difficulty	
	<i>NL</i>	<i>USA</i>	<i>NL</i>	<i>USA</i>
Q1	0.01	3.02	0.47	0.47
Q2*	1.67	1.67	2.04	2.04
Q3*	0.43	0.43	2.37	2.37
Q4	0.69	37.97	3.87	58.56
Q5	0.09	0.09	1.70	2.73
Q6	0.11	-0.70	2.75	2.75
Q7	1.09	1.09	2.64	1.72
Q8*	1.48	1.48	0.28	0.28
Q9	-1.87	2.03	4.48	4.96
Q10*	0.14	0.14	1.62	1.62
Q11	1.83	-0.30	3.43	3.43
Q12	1.24	1.24	3.48	1.37
Q13*	0.87	0.87	1.13	1.13
Q14*	2.25	2.25	5.38	5.38
Q15	0.00	0.00	2.88	1.74
Q16*	0.51	0.51	0.70	0.70
Q17*	0.18	0.18	2.83	2.83
Q18	12.25	3.48	11.03	6.21
Q19*	0.70	0.70	-0.24	-0.24
Q20*	0.21	0.21	0.17	0.17
Q21*	1.63	1.63	2.73	2.73
Q22*	1.38	1.38	0.50	0.50
Q23*	0.43	0.43	2.75	2.75
Q24	0.93	0.93	2.27	3.98
Q25*	0.95	0.95	-0.24	-0.24
Q26	0.07	1.49	2.53	2.53
Q27	1.20	4.95	2.34	6.69
Q28	-0.93	-0.93	3.83	1.26
Q29*	1.03	1.03	-0.50	-0.50
Q30	0.09	0.09	0.50	-0.86

Step 3: level of measurement invariance: certainty

Certainty proved to be unidimensional with good model fit for the samples ($CFI = 0.961, TLI = 0.963, RMSEA = 0.047$ with $p \leq 0.05$) and internal consistency (Cronbach's alpha Dutch sample: 0.97, USA sample: 0.94). Next the level of MI was assessed, see Table 4 for fit indices. The more constrained models (Model 2 and Model 3) did not worsen the fit indices, Model 2 ($CFI = 0.965, TLI = 0.963, RMSEA = 0.046$ with $p \leq 0.05$) and Model 3 ($CFI = 0.969, TLI = 0.967, RMSEA = 0.044$ with $p \leq 0.05$). Therefore, full scalar invariance was established.

Table 4. Testing the level of measurement invariance of the certainty construct.

	Model Fit					
	χ^2	df	p	CFI	TLI	RMSEA (90% CI)
Model 1, Baseline model	1224.435	898	<0.001	0.961	0.963	0.047 (0.040 – 0.053)
Model 2, Metric invariance	1138.200	839	<0.001	0.965	0.963	0.046 (0.039 – 0.053)
Model 3, Scalar invariance	1072.738	810	<0.001	0.969	0.967	0.044 (0.037 – 0.051)

Fit indices CFI, TLI and RMSEA demonstrated adequate model fit for all models.

χ^2 = Chi-square statistics, df = degree of freedom, CFI = comparative fit index, TLI = Tucker Lewis Index, RMSEA = root mean square error of approximation, CI = Confidence Interval

Step 4: Knowledge differences between Dutch and USA sample

Table 5 presents the mean differences between the Dutch and USA samples on the observed KOP-Q scores (knowledge and certainty). Compared to the Dutch sample, the USA sample score significantly lower on the knowledge construct (IRT based $\Delta M = -0.453$; $p < 0.001$, CTT based $\Delta M = -1.500$; $p < 0.001$). There was no significant difference in certainty between the two samples ($\Delta M = 0.056$; $p = 0.354$). However, this mean difference was significant based on CTT scores ($\Delta M = 4.520$; $p < 0.003$).

Table 5. Mean differences for knowledge and certainty between the Netherlands and the USA, based on Item Response Theory (IRT) and Classical Test Theory (CTT).

	Dutch mean	USA mean	Mean difference	p
IRT knowledge	0.176	-0.277	-0.453	<0.001
IRT certainty	-0.170	-0.114	0.056	0.354
CTT knowledge	25.16	23.66	-1.500	<0.001
CTT certainty	80.51	85.03	4.520	0.003

IRT knowledge and certainty are standardized scores; CTT knowledge score is a score out of 30 and CTT certainty is a score out of 100.

Discussion

This study assessed the level of measurement invariance of the KOP-Q between the Netherlands and the USA. Results indicated that it is safe to use the translated KOP-Q in the USA. Full configural invariance (the same CFA is valid in each group) and full metric invariance (equal factor loadings, respondents across groups attribute the same meaning to the latent construct) were established across countries. Thus, the knowledge and certainty constructs exists in both groups and subjects in each group interpreted and respond to each item in a similar way. Certainty mean scores can be compared between the Netherlands and the USA, and despite partial scalar invariance of the knowledge construct (50% of items were scalar invariant) also the latent mean scores of the knowledge construct can be compared adequately as literature describes that full scalar invariance is not necessary to make substantive analysis, provided that at least two items are invariant.^{14,15} However, if comparisons between the Netherlands and the USA are to be performed without using latent variable models, the items which are not invariant should be taken into account. The average knowledge level of nurses in the Netherlands was higher than the average of the USA nurses, even though nurses in the USA sample were higher educated. Both groups demonstrated knowledge deficits regarding care for older patients. No differences were found in confidence regarding their knowledge. The unweighted score calculated with the less sophisticated Classical Test Theory approach was significant demonstrating how choice in approach can influence results and interpretation.

In the literature, several studies were found that describe the development and validation of instruments measuring nurses' knowledge about older patients, such as the Palmore Facts on Aging Quiz,^{25,26} Knowledge of Aging and Elderly Questionnaire,²⁷ Nursing Knowledge of Elderly People Quiz²⁸ and The Deconditioning in Older Adults Survey.²⁹ Often, studies using these instruments demonstrated that when an instrument has been found to show adequate psychometric properties in one cultural group, these instruments are translated and administered to another cultural group without further testing. When (average) scores are presented and/or groups are compared, researchers assume that the instrument measures the same constructs in all groups and those items are interpreted the same way by respondents. This assumption however, is not justified. This study indicated that these assumptions can be made when using the KOP-Q in (cross-cultural) research and in the clinical setting in the USA because the level of measurement invariance of the KOP-Q is assessed, which is a highly rigorous method in cross-cultural research.

Some limitations of the study should be mentioned. Although the multicenter study design increased the generalizability of the study results, the number of participants per hospital was relatively small, which possibly led to selection bias and most likely an overestimation of effect (nurses with interest in older patients are more likely to participate). This is not

considered a problem as the primary focus was on cross-cultural validation of the KOP-Q and not an exploration of knowledge and certainty of nurses in the USA and the Netherlands. Furthermore, performance of analysis was not affected by sample size. Next, USA nurses were more highly educated than Dutch nurses. However, the effect size indicated no relevant difference in educational level between the samples therefore the bias is limited. Finally, removing 10% of the participants could have created a bias in relation to representativeness of the study. However, it is extremely important to exclude these cases because using cases having a deviant answer pattern could lead to spurious within-group variability and lower reliability.³⁰ Some studies have examined the prevalence of inattentive response (having a deviant answer pattern). The prevalence ranges between 3,5% within a highly motivated sample³¹ up towards 5%, 20% or 50%, depending on the criteria by which they assessed inattentive response.³² Based on the results of these studies, a 10% exclusion prevalence of inattentive response is not aberrantly high.

Conclusion

This study identified that the KOP-Q measures the same constructs across the Netherlands and USA samples, indicating that it yields valid results when assessing nurses' knowledge and certainty outcomes in the countries separately or when making comparisons between the two countries. Therefore, the study supports the validity of using the KOP-Q in the USA for educational and/or quality improvement programs or for research purposes. Furthermore, scores between the Netherlands and the USA can be compared when using latent variable models. Before the KOP-Q can be used in other countries, cross-cultural tests should be performed again if language and cultures are different from the Dutch or American language and culture.

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Appendix 1

Knowledge-about-Older-Patients Quiz (KOP-Q) for Nurses

For each statement, please answer “True” or “False”. Along the certainty bar, please indicate how certain you are about your answer (ranging from 0 – 100% certain).

		True	False
1.	Forgetfulness, concentration issues and indecisiveness are parts of aging rather than indicators of depression.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
2.	Unexpected urinary incontinence in an older person may indicate that the person is suffering from a urinary tract infection.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
3.	Patients with a cognitive disorder, such as dementia, are at increased risk for delirium.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
4.	Malnutrition can have negative effects on thinking and observation skills.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
5.	In general, older people are more sensitive to medication because their kidney and liver functions are declining.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
6.	Meeting with families during patient assessment is only required for persons suffering from dementia.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			

		True	False
7.	For older people, bed rest is important to enhance recovery.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
8.	Patients rarely remember that they were anxious and/or restless during delirium.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
9.	Older people need less fluid because they exercise less.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
10.	Asking patients whether they have fallen in the past 6 months is a good way of assessing increased risk of falling.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
11.	Pressure that cuts off the blood supply to tissue for two hours may result in pressure ulcers.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
12.	Depression is recognized in older people less frequently than it is in younger people.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
13.	Lowering the frequency of a medication is an effective intervention to achieve (medication) adherence by patients.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
14.	Incontinent patients must have their soiled clothing changed but do not need to be placed on the toilet afterwards.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			



		True	False
15.	It is good to have older people drink more often, because they have a reduced thirst sensation.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
16.	In the case of delirium, bright lighting should be used to illuminate all of the corners of the room.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
17.	Medication may cause geriatric problems such as memory deficits, incontinence, falling and depression.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
18.	Overburdening of family caregivers may lead to abuse of the person for whom they are providing care.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
19.	It is good to provide extensive instruction about how to complete tasks to patients suffering from apraxia.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
20.	When speaking to hearing-impaired older patients, it is best to speak at normal volume.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
21.	An older person with a BMI of >25 cannot be undernourished.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			
		True	False
22.	In the case of difficulty swallowing, all medicines must be ground to ensure that patients ingest them.	<input type="checkbox"/>	<input type="checkbox"/>
How certain are you about this answer? 			

		True	False
23.	In the case of depression, memory problems may occur.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
24.	Most family caregivers do not need additional support from homecare services.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
25.	As a nurse, you have to speak clearly into the ear of the hearing-impaired older patient.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
26.	Pain medication should be administered to older people as little as possible, due to the possibility of addiction.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
27.	We identify pressure ulcers only if blister formation or abrasions have occurred.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
28.	In the case of delirium, activities should be spread out evenly over the day.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
29.	The risk of falling is higher for people in the hospital setting compared with those who are living at home.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			
		True	False
30.	Stress incontinence may occur in patients who are not capable of opening their own trousers.	<input type="checkbox"/>	<input type="checkbox"/>
<p>How certain are you about this answer?</p>			



Answer Key KOP-Q (30 item)

Every correct answer on the knowledge questionnaire receives 1 point, and every incorrect answer receives 0 points (total score: minimum = 0, maximum = 30). The average of the certainty scores can be calculated by summing all of the percentages provided per question divided by 30.

1	FALSE	11	TRUE	21	FALSE
2	TRUE	12	TRUE	22	FALSE
3	TRUE	13	TRUE	23	TRUE
4	TRUE	14	FALSE	24	FALSE
5	TRUE	15	TRUE	25	FALSE
6	FALSE	16	FALSE	26	FALSE
7	FALSE	17	TRUE	27	FALSE
8	FALSE	18	TRUE	28	TRUE
9	FALSE	19	FALSE	29	TRUE
10	TRUE	20	TRUE	30	FALSE



CHAPTER 5

Dutch nursing students and hospital nurses' knowledge regarding older patients in relation to educational level and work experience: a cross-sectional study

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Abstract

Even though there is a growing population of older adults admitted to the hospitals, literature demonstrates knowledge deficits of (student) nurses regarding older patients. Today, a lot is unknown on how the knowledge levels of nurses can be positively influenced. Therefore, using a cross-sectional design, this study investigated the knowledge levels of (student) nurses about older hospitalized patients. Knowledge levels were assessed in relation to their educational level and work experience. First-, final-year vocational and bachelor nursing students and associate degree and bachelor degree nurses working in the hospital setting with 0-5 years, 6-15 years and <15 years of experience have completed the Knowledge about Older Patients - Quiz. Test results were compared using an independent sample t test. A substantial proportion of participants in all groups demonstrated insufficient knowledge about older patients. A difference in knowledge is found in (student) nurses having different educational qualifications and a link between years of experience and higher knowledge levels of nurses was found. However, even nurses with more experience did not reach optimum knowledge levels. Results indicate that basic care topics in relation to care for older patients should remain to play a key role in educational programs in clinical practice.

Keywords

Knowledge, Certainty, Older patients, Students, Nurses

Introduction

The world population is aging¹. In the Netherlands, 18% of the population is aged 65 years and over and predicted to raise till 26% by the year 2040.² This increase of older people is also reflected in the number of older patients admitted to general hospitals.^{3,4} In 2012, more than half of all hospital beds were occupied by patients 65 years or older⁵ and all predictions point out that this number will rise.

Older patients in the hospital setting are considered highly complex, being more likely to develop one or more postoperative complications⁶ such as delirium, depression, pressure ulcers and infections.⁷⁻¹⁰ These complications have a negative effect on recovery of patients and are associated with functional and cognitive decline, institutionalization and mortality after discharge.^{6,11-15} Given the changing population and increase in complexity, there is a growing need for registered nurses who are knowledgeable and committed to work with older patients¹⁶ as older patients are highly dependent on knowledgeable and competent nurses for a good recovery.¹⁷ The key role nurses play in delivering care to older people is that they are accountable for providing physical, social, psychological and emotional care.^{18,19} Although nurses are encouraged to update their knowledge and maintain clinical competence throughout their career, whether and how nurses do this has to our knowledge not been researched before.

Knowledge regarding older people is only investigated in a few studies.²⁰ Results from these studies indicate that nurses and nursing students have low to average knowledge levels with regards to physical, psychological (mental) and social aspects of aging and key clinical areas of geriatric nursing care. Moreover, several misconceptions still exist.²¹⁻²³ These results however, are based on measurement instruments which are considered outdated and insufficiently validated, too country specific, mixing the measurement of knowledge with measurements of opinions, beliefs and experiences, or lacking inclusion of care perspectives^{20, 24} and should therefore be interpreted with caution. Furthermore, many questions regarding the impact of education and what happens with nurses' knowledge gained in school after graduation are still unanswered.²⁵

Recently the Knowledge about Older Patients-Quiz (KOP-Q) is developed. The KOP-Q has a clearly described theoretical basis finding its origin in nursing care knowledge regarding older patients and has good content and construct validity results.^{26,27} The aim of this study is to investigate the knowledge level of (student) nurses with regard to care for older hospitalized patients in relation to their educational level and work experience using a up-to-date, valid instrument designed to measure (student) nurses knowledge regarding older patients.

Method

Design

The study followed a cross-sectional design.

Setting and participants

First- and final (fourth)-year students in nursing following a vocational program (AD) were recruited at ten (out of 43) different schools at the end of the second semester. Schools were recruited through the 'MBO Raad' (the Netherlands Association of VET colleges), representing all government funded colleges for secondary vocational education and training and adult education in the Netherlands. Participating schools were verified on diversity in location and metropolitan versus rural. First- and final (fourth)-year Bachelor of Nursing (BN) students were recruited at one university of applied sciences at the beginning of their first semester which was recruited by the researchers to participate. Students were asked to participate by e-mail and during regular education lessons to complete the questionnaire online. All students participated voluntarily and permission was received from the responsible course managers.

Over a three-month period, registered nurses (AD and BN) working with older patients on different wards were recruited from two general hospitals recruited by the main researcher to participate. Nurses received an email from their ward manager inviting them to participate and asking them to complete the questionnaire online. This study was reviewed and approved by the medical review board of the University Medical Center Utrecht (METC protocol number: 14-345/C). All participants provided informed consent.

Associate Degree and Bachelor of Nursing in the Netherlands

Both the Associate Degree (terminal/vocational program) in nursing (AD) and the Bachelor of Nursing program (BN) are four-year educational programs. Students enrolled in the AD program are between 16 and 35 years old. Previous to the AD education program, they followed a 4 year lower vocational education program. Students can enroll the Bachelor of Nursing program after they followed a 5 year higher general secondary education program or when they received their Associate Degree in nursing. After the bachelor (regular program is four years), students can enroll in a (professional) master's program (1–2 years). Hospitals currently do not differentiate between nurses having an AD or BN degree regarding their tasks and responsibilities.

Data collection: the Knowledge about Older Patients – Quiz

To measure knowledge, the Knowledge about Older Patients-Quiz (KOP-Q) was used. The KOP-Q is developed and validated in the Netherlands.^{26,27} The KOP-Q contains 30 dichotomous items (true/false) measuring knowledge about normal aging, geriatric conditions, signaling problems in old age, interventions, family interventions and vulnerable patients versus older patients²⁶ with every correct answer assigned 1 point and incorrect answer 0 points. The KOP-Q demonstrated adequate face-validity, good readability, a good Scale-Content Validity Index/average (S-CVI/ave = .91), good item characteristics (psychometric validity) and reliability for the knowledge items (Kuder-Richardson Formula 20 = .70). The KOP-Q measures a second construct ‘certainty’. The certainty scale provides insight into (student) nurses ability to reflect on their own knowledge by asking how certain respondents are about every answer given (ranging from 0 to 100 percent certainty). The certainty items demonstrated excellent reliability (Cronbach alpha = .94).

A previous study on the KOP-Q presented norm-groups to compare individual scores on the KOP-Q.²⁷ To explore and denote group mean scores, KOP-Q sum scores of participants were converted to the Dutch grading system. The following formula was used: $\text{Grade} = (x - 15) / 1,5$, where x is the number of points achieved by the respondent and 15 is the minimum grade a student can receive. Dutch grades range from 1 (extremely poor) to 10 (outstanding). The lowest passing grade is 5.5 (see Table 1 for a full conversion overview of Dutch grades).

Table 1. Conversion of Dutch grades

Dutch	Quality Assessment	USA	UK	ECTS
10	Outstanding	A+	A+	A
9.5		A+	A+	A
9.0	Very good	A+	A+	A
8.5		A+	A	A
8.0	Good	A	A/A-	A
7.5		A/A-	B+	B
7.0	Very satisfactory	B+	B	C
6.5		B	C+	D
6.0	Satisfactory	B-/C	C/D	E
5.5		D	D	E
5.0	Unsatisfactory	F	F	FX-F
4.5		F	F	FX
4.0	Very unsatisfactory	F	F	FX
3.5		F	F	FX
3.0	Poor	F	F	FX
2.5		F	F	FX
2.0	Very poor	F	F	FX
1.5		F	F	FX
1.0	Extremely poor	F	F	FX

USA = United States of America, UK = United Kingdom,
ECTS= European Credit Transfer and Accumulation System

Analysis

The data analysis was performed using Statistical Package for the Social Sciences (SPSS) version 22.0.²⁸ The sum scores from the first- and final-year nursing students and registered nurses on the KOP-Q were compared. An independent sample t test was used to determine whether the knowledge regarding older patients of (student) nurses was different between the first-, final-year students and nurses with 0-5 years of experience, 6-15 years of experience and <15 years of experience. A difference was statistically significant for p-values less than 0.05.

Results

Of the participating sample, list-wise deletion was used when nonresponse occurred; this was the case for 22 first year AD nursing students (15.8%), 24 final year AD nursing students (17.8%), 4 first year BN students (3.0%), 5 last year BN nursing students (5.6%) and 47 hospital nurses (13.1%). All other participants were complete cases on the KOP-Q items and therefore included. Characteristics of the first- and final year AD and BN nursing students and hospital nurses are presented in Table 2.

Table 2. Characteristics of first- and final year nursing students and hospital nurses.

	Gender. woman (%)	Mean age (<i>SD</i>)	Mean years of experience as a nurse (<i>SD</i>)
First year AD (n=117)	87.2	18.0 (2.6)	
First year BN (n=126)	87.3	19.9 (1.8)	
Final year AD (n=111)	90.1	26.1 (10.1)	
Final year BN (n=85)	90.6	22.5 (2.5)	
Hospital nurses AD (n=171)	91.8	39.8 (12.6)	15.6 (12.4)
Hospital nurses BN (n=140)	92.2	36.5 (11.5)	13.1 (10.9)

SD= Standard deviation, *AD*= Associate Degree, *BN*= Bachelor of Nursing

Knowledge about older patients

Figure 1 presents that all groups have a substantial proportion of participants demonstrating insufficient knowledge about older patients. Almost all first year students (both AD and BN) score insufficient – extremely poor (≤ 5.4). More than 50% of the final year BN students and 75% of final year AD students score insufficient – extremely poor (≤ 5.4). Most nurses working in the hospitals pass the KOP-Q, although a considerable proportion still scores insufficient – extremely poor (ranging from 10.4% - 54.4% in different groups).

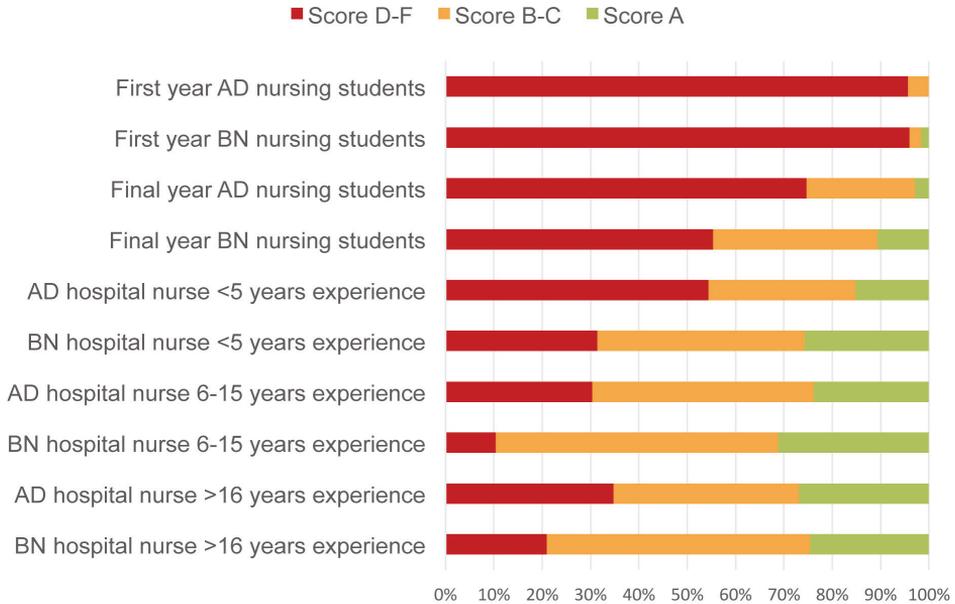


Figure 1. Percentage of Associate Degree (AD) and Bachelor of Nursing (BN) (student) nurses scoring a unsatisfactory - extremely poor ($\leq F - D$), satisfactory – very satisfactory ($C - B$) and good – outstanding ($\geq A$) on the Knowledge about Older Patients – Quiz.

During the 4 year vocational and bachelor program, there is a steep increase in knowledge about older patients (Figure 2). During the whole educational period, there is a significant difference in knowledge between AD and BN students (± 2 points, $p < .001$). After graduation, this steep increase in knowledge continues for AD nurses in their first 5 years of working in practice where for BN nurses there is a smaller increase of knowledge. The group of nurses (both AD and BN) having 6-15 years of experience have the highest mean knowledge score. The mean difference in knowledge between AD and BN nurses remains significant ($p < .001$) in the first 15 years of experience, but is no longer significant between nurses having >15 years of experience ($p = .257$).

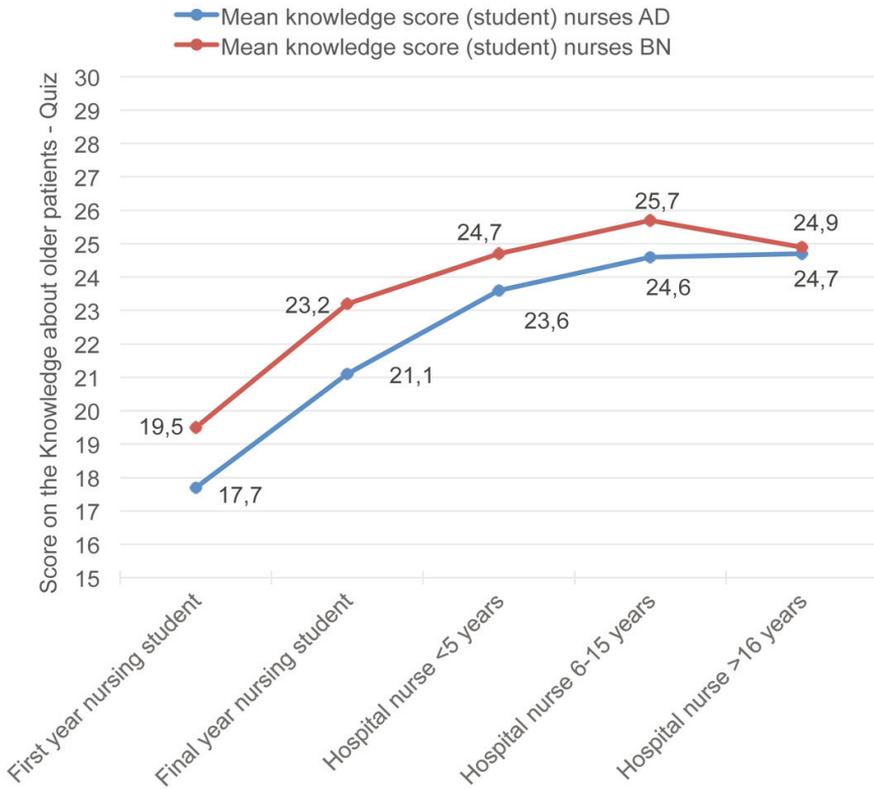


Figure 2. Knowledge about older patients of first- and final year nursing students and associate degree (AD) and Bachelor of Nursing (BN) nurses working in clinical practice.



Certainty regarding own knowledge about older patients

Figure 3 presents insight in the certainty levels of (student) nurses regarding their knowledge about older patients. During the four year educational programs students certainty increases, which is consistent with the steep increase in knowledge. Final your BN nursing students present significant higher certainty levels than final year AD nursing students ($p < .001$). This difference is the same for AD and BN nurses with < 5 years of experience in nursing. The certainty regarding their knowledge stabilizes after working in clinical practice for 5 years, no differences between AD and BN nurses >5 years of experience is observed ($p > .050$).

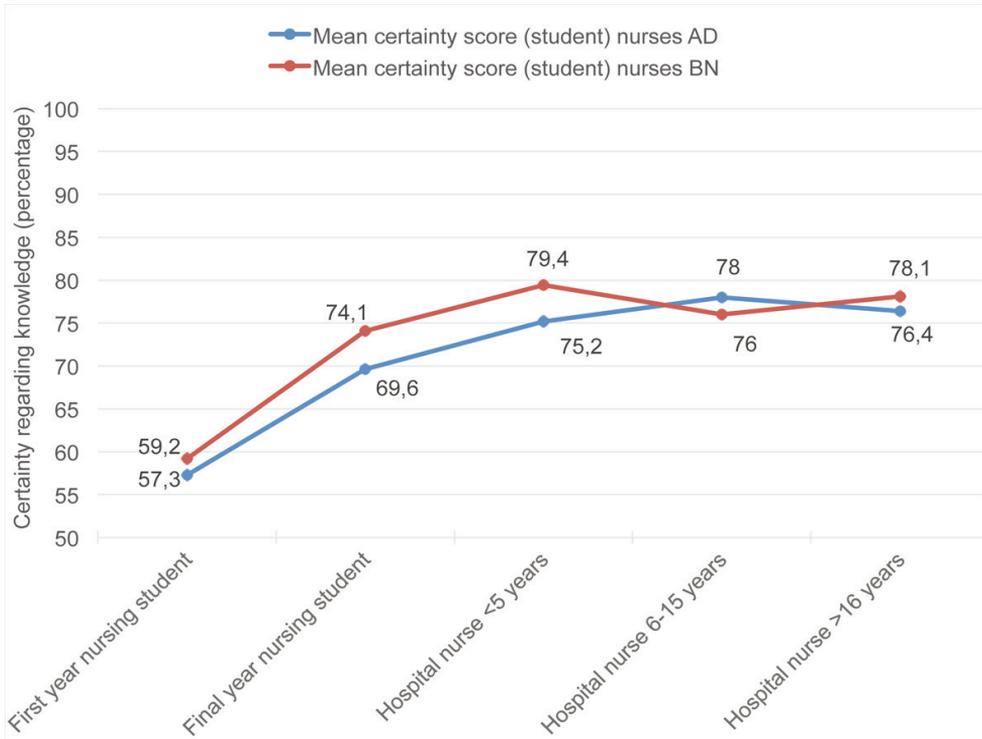


Figure 3. Certainty regarding knowledge about older patients of first- and final year nursing students and associate degree (AD) and Bachelor of Nursing (BN) nurses working in clinical practice.

Discussion

This study described the current nursing student and registered nurses' knowledge and certainty regarding older patients in relation to their educational level and years of experience. Several results should be discussed further. First, a substantial proportion of students and nurses demonstrated insufficient knowledge about older patients. This result is alarming because more nurses will encounter older patients as their number will remain to increase in future years and nurses' knowledge (education level) is associated with the quality of care received by older patients.²⁹ The KOP-Q is designed to measure basic care topics such as normal aging, various geriatric conditions, signaling problems in old age, interventions and family care.²⁶ These topics are already taught in the first year of education and nurses encounter these care topics throughout their career from the start of their education till retirement. This frequent exposure however, is not reflected in the results. Therefore, basic care topics are not only important for nursing students but should play a key role in educational programs in clinical practice as well.

Second, literature present that every 10% increase in bachelor's degree nurses is associated with a decrease of likelihood in mortality of older patients by 7%,²⁹ indicating that educational qualification is important in relation to hospital patients outcomes. This study confirms that there is a difference in educational qualification as results show higher knowledge scores of bachelor (student) nurses compared to AD (student) nurses. To close the knowledge gap, educational efforts should start at the beginning of the four years AD education as recommended by Tullo et al.³⁰ This study confirms this as the largest knowledge difference exists between the first year student groups. Closing this gap however, might be challenging as first year AD students might not be ready to learn about older patients, demonstrated by the result that bachelor students which did not follow any lessons regarding older patients still scored significantly higher than AD nursing students which followed one year of education (2 semesters) including a 10 week internship (mostly in a nursing home). Additional research is needed to establish more insight in possible didactic strategies to enhance learning of AD nursing students.

Third, after graduation the slope of the knowledge levels declines in both groups as they gain more years of experience. Indicating that learning opportunities regarding basic care themes is insufficient in clinical practice. Furthermore, the differences in knowledge about older patients between AD and BN nurses declines with increased years of experiences, possibly indicating that nurses learn mostly from each other resulting in a general mean knowledge level even though baseline qualification differs.

Results from this study demonstrated that most (student) nurses are certain about their answers given on the KOP-Q, even when answers were wrong. Insight in certainty of (student) nurses can be a useful addition for educational interventions. The certainty results can be used by educators to provide (student) nurses with meaningful feedback about their

certainty level, giving them insight in their “over”confidence or “under” confidence possibly motivating them for learning, because it is unlikely that motivation for learning increases when people think they already possess the knowledge needed for providing optimal care.³¹

Several limitations of the present study should be mentioned to interpret the results. The mean age of final year AD nursing students was significantly higher than the mean age of final year BN students. Almost 30% of the AD final year students was older than 25 years indicating that this subgroup followed an educational program before and probably had more practice experiences than other final year students. However, no differences were found in knowledge and certainty levels between the final year AD nursing students < 25 years or ≥ 25 years, which is why the final year AD nursing students group remained one group in the analysis of this study. Second, the number of participants per school (educating AD nursing students) and the two hospitals were small, possibly resulting in an overestimation of effect with the better (more motivated) students and nurses participating in the study. Although the performance of analysis was not affected by sample size, the overestimation should be taken into consideration when interpreting the results and generalizability is therefore limited. Finally, this study followed a cross-sectional design providing insight in the current knowledge and certainty levels of students and nurses. A longitudinal design would provide more conclusive information regarding the development of knowledge and certainty levels through a nursing career, but is often expensive in time and money. An opportunity for using this design lies in clinical practice. When individuals are obligated to keep track of what they learn during their nursing career, they continue to demonstrate what they have learned, ensuring that learning does not stop after graduation, possibly motivating a lifelong learning attitude.

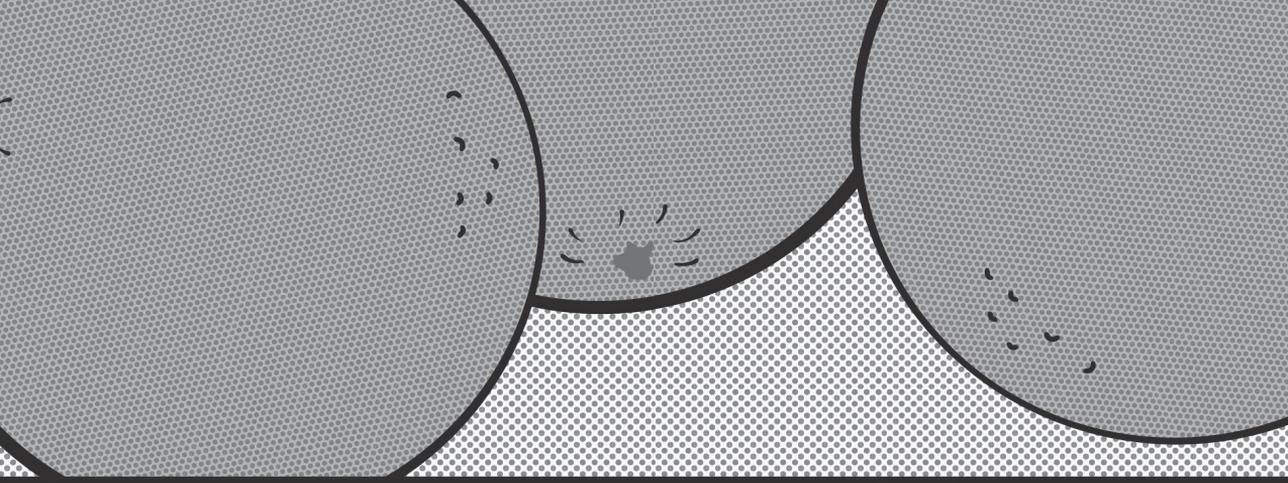
In conclusion, this study investigated the knowledge levels of student and registered nurses about older hospitalized patients. Knowledge levels were assessed in relation to their educational level and work experience. Three important results were found. First, in all groups a substantial proportion of participants demonstrated insufficient knowledge about older patients. Second, results demonstrated higher knowledge levels for bachelor (student) nurses compared to AD (student) nurses, confirming that educational qualifications play a role in the quality of care older people receive. Finally, the learning curve of nurses in clinical practice declines as they gain more years of experience emphasizing the importance for a focus on life long learning in the nursing profession.

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PART 2

The Older Patient in Acute Care
Survey

CHAPTER 6

Measurement of nurses' attitudes and knowledge regarding acute care older patients: psychometrics of the OPACS-US combined with the KOP-Q

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Abstract

In clinical practice, identifying positive and negative attitudes toward older patients is very important to improve quality of care provided to them. The Older People in Acute Care Survey - United States (OPACS-US) is an instrument measuring hospital nurses attitudes regarding older patients. However, psychometrics have never been assessed. Furthermore, knowledge being related to attitude and behavior should also be measured complementing the OPACS-US. The purpose of this study was to assess structural validity and reliability of the OPACS-US and assess whether the OPACS-US can be complemented with the Knowledge about Older Patients-Quiz (KOP-Q). A multicenter cross sectional design was conducted. Registered nurses (n = 130, mean age 39,9 years; working experience 14,6 years) working in four general hospitals were included in the study. Nurses completed the OPACS-US section A: practice experiences, B: general opinion and the KOP-Q online. Findings demonstrated that the OPACS-US is a valid and reliable survey instrument that measures practice experiences and general opinion. Furthermore, the OPACS-US can be combined with the KOP-Q adding a knowledge construct, and is ready for use within education and/or quality improvement programs in the USA.

Keywords

Attitude, Knowledge, Hospital, Nurses, Older Patients, OPACS-US, KOP-Q

Introduction

Worldwide the average age of hospitalized patients is increasing as a result of demographic changes, leading to a growing need for nurses committed to work with older people. Several studies reported nurses' negative attitudes toward and reluctance to work with older patients.^{1,2} Because attitudes are related to behavior,³ negative attitudes may affect the quality of care older patients in the acute care setting receive, particularly from nurses who prefer not to be working with them.⁴ Studies included in a systematic review by Liu et al presented a slightly more negative attitude of nurses toward older patients in recent years, which is considered alarming.⁴ However, results from the included studies should be interpreted with caution as most of them were methodologically flawed.⁴ One reason for this, is a lack of well-designed and (psychometrically) validated instruments measuring attitudes of nurses.^{1,5}

The lack of suitable well designed instruments might be caused by the complexity of the attitude construct itself. A broad (simple) definition described in social psychology is: "attitude is an evaluation of an attitude object, ranging from extremely negative to extremely positive".⁶ After careful examination of operationalizations used in attitude research, Ajzen and Fishbein found that most investigators assess attitudes in these terms of overall evaluations.⁷ Therefore, they proposed to use the term "attitude" when referring to the evaluation of an object along a dimension such as: favor or disfavor, good or bad, like or dislike. For example the liking or disliking of a group of people (patients). In nursing research, most self-assessment instruments have outcomes using this definition when describing "attitudes".

Measurements of nurses' attitudes are important because they are associated with behavior toward "attitude objects" (such as patients). Results from a meta-analysis by Glasman and Albarracin demonstrated that the attitude-behavior association was strongest when attitudes were confident, when participants formed their attitude based on behavior-relevant information, and when they received or were induced to think about one-sided information regarding the attitude object.³

A few measurement instruments measuring attitudes of health care professionals toward older people exist. Although they are validated and considered reliable instruments, they are either too long (e.g. Tuckman and Lorge),⁸ developed for a particular audience (e.g. Kogan's old people Scale [KOP], developed for American audiences),⁹ or do not include a caring dimension.¹⁰ In nursing research, the KOP is mostly used to identify nurses' attitudes toward older people.¹ However, as most instruments, it identifies attitudes and knowledge about older people, not older patients. Already in 1984, Penner discovered that even though nurses may have positive attitudes toward older people, their attitudes toward older patients were not as positive, and, attitudes toward their own patients were even more

negative,¹¹ making a distinction between people and patients in measurement instruments a necessity. Measurement instruments used today are often considered invalid for use because outcomes are time, setting and population dependent.¹²

One (more recent) developed instrument measuring hospital nurses' attitudes toward older patients is the Older Patient in Acute Care Survey (OPACS).¹³ The OPACS consists of two sections: nurses 'practice experiences' and 'general opinion' toward the care for older patients in the hospital setting. The OPACS was developed with a care perspective using focus groups with 16 nurses discussing their experience of caring for older patients in the acute care setting. The final OPACS consisted of 86 items relating to 13 different aspects influencing the nursing care of older patients. Verbal statements regarding these 13 aspects are scored on a 5 point Likert scale ranging from strongly disagree to strongly agree. The OPACS demonstrated good content validity in Australia¹³ and was translated and tested on content validity for use in the United States, resulting in the OPACS-US.¹⁴ Further research regarding the psychometrics of the OPACS and OPACS-US is not yet performed.

Relevant knowledge regarding the attitude object proved to play a causal role in attitude-behavior consistency.¹⁵ Not only the amount of information matters, also the content of knowledge. Specifically, the relevance of the content of knowledge often plays a role in the impact of attitudes on attitudinal processes (e.g., attitude-behavior consistency, resistance to persuasive messages). To measure nurses' knowledge about older patients in the OPACS, the Palfrey Facts of Ageing Quiz (PFAQ)¹⁶ was used. The PFAQ, however, is considered outdated (developed in 1978) and lack inclusion of care perspectives, resulting in irrelevant content for the attitudes under study.^{1,4,5} Furthermore, Malmgreen et al¹⁴ did not find the knowledge construct to be clearly measured by the OPACS. Recently the Knowledge about Older Patients-Quiz (KOP-Q) is developed. The KOP-Q has a clearly described theoretical basis finding its origin in nursing care knowledge regarding older patients, has good construct validity, is psychometrically validated and cross-culturally validated for use in the United States (US).^{5,17,18} Whether the KOP-Q can be combined with the OPACS, is not measured before.

The aims of the present study were 1) to assess the structural validity and internal consistency of the OPACS-US and 2) to validate the combination of the OPACS-US (measuring practice experiences and general opinion) with the KOP-Q (measuring knowledge).

Method

Design

This study followed a multicenter cross-sectional design.

Setting and participants

Four general hospitals located in the US were approached for participation. Approximately 650 registered nurses (AD or BSN) working on 11 different wards having older patients admitted regularly were approached over a six-month period. Wards included in every hospital were: geriatrics, orthopedics, oncology, cardiac, surgical, operating room, ambulatory surgery, intensive care unit, emergency department, internal medicine and psychiatry. Nurses were invited to participate through email from the unit manager, flyers and a message on the online hospital communication boards. Participants first provided informed consent online before they could proceed to the survey. Then, the sociodemographic characteristics, OPACS-US and KOP-Q were completed online. Of the participating sample, only complete cases on the KOP-Q and OPACS-US items were included in this study. The study was approved by the medical review board of Pace University Institutional Review Board, New York, US (IRB protocol number: 14-85) and Bronson Methodist Hospital Institutional Review Board, Kalamazoo, US (IRB protocol number: BMH-2014-0753). Furthermore, all participating hospitals provided formal approval for this study.

Measurement

The Older Patient in Acute Care Survey-United States (OPACS-US)

The OPACS-US consists of two scales; section A measuring practice experiences (36 items) and section B measuring general opinions toward older patients' needs (50 items). Items of section A and B were answered on a five point Likert scale (1 = never and 5 = very frequent). The OPACS demonstrated adequate face validity, high reliability (Kappa = .76) in Australia¹³ and the OPACS-US scored high Scale-Content Validity Index/universal agreement (S-CVI/ua = .92) in the United States after minor language changes.¹⁴ For this study the OPACS-US was used for data collection.

The Knowledge about Older Patient-Quiz (KOP-Q)

The KOP-Q was developed and validated in The Netherlands.^{5,17} The KOP-Q contains 30 dichotomous items (true/false) measuring knowledge with every correct answer assigned 1 point and incorrect answer 0 points. The KOP-Q demonstrated adequate face-validity, good readability, a good Scale-Content Validity Index/average (S-CVI/ave = .91), good item characteristics (psychometric validity) and reliability for the knowledge items (Kuder-Richardson Formula 20 = .70). Furthermore, the KOP-Q was considered valid for use in the United States.¹⁸

Analysis

Validity and reliability of the OPACS-US

Confirmatory factor analysis (CFA) was used to assess the construct validity of the OPACS-US. The aim of CFA is to test a hypothesized factor structure or model and assess its fit to the data. Relations of indicators (observed variables) to factors (latent variables) as well as the correlations among the latter were tested in the measurement model.

First, missing values were assessed to determine whether listwise deletion could be used. Then CFA was performed for OPACS-US section A, OPACS-US section B and finally section A and section B combined by testing several models using Lavaan: an R package for structural equation modeling.¹⁹ Evaluation of each model was based on considering a variety of fit measures: the χ^2 minimum fit function test; the Comparative Fit Index (CFI); the Tucker Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA). Values of $>.95$ for the CFI/TLI indicate a good fitting model. The RMSEA should be $<.06$ indicating a good fitting model.^{20,21}

A hypothesis was formulated that OPACS-US section A (practice experiences), section B (general opinion) and the KOP-Q (knowledge) were positively correlated. The Pearson correlation test was used to test this hypothesis.

Results

Of the approached participants, 365 nurses provided informed consent and proceeded to the survey. However, 124 cases were non-response (no sociodemographic, KOP-Q and OPACS items answered). Of the participating sample ($n = 241$), 130 complete cases were included. Sociodemographic characteristics of respondents with missing values ($n = 111$) were not significantly different from complete cases (all $p > .05$). Sociodemographic characteristics are presented in Table 1.

Table 1. Sample characteristics

	USA respondents (n= 130)
Gender, female n (%)	119 (91.5)
Missing, n	1
Age, mean (SD)	39.9 (13.1)
Highest education, n (%)	
AAS,	39 (30.0)
BSN	72 (52.4)
Masters	15 (11.5)
PhD	2 (1.5)
Missing, n	2 (1.5)
Years of experience, mean (SD)	14.6 (13.0)
Missing, n	1
Hours a week, mean (SD)	35.6 (10.3)
Missing, n	1

AAS = An Associate of Science in Nursing BSN = Bachelor of science in nursing, PhD = completed a doctoral program in nursing or related fields, SD = Standard deviation

Validity and reliability of the OPACS-US section A (practice experiences)

In Table 2, the different CFA models assessing section A are presented. The unidimensional model for OPACS-US section A (Model 1) did not fit the data well (χ^2 [df = 594] = 2775.98, $p < .001$, CFI = .79, TLI = .78, RMSEA = .17). Therefore, items having a negative loading on the factor “practice experiences” were excluded ($n = 3$) and a second model (Model 2) was tested. Exclusion of the three items (31, 32, 33, see online Appendix 1) made a significant improvement in the fit of the model to the data, although values of fit indices were still insufficient (χ^2 [df = 495] = 1759.38, $p < .001$, CFI = .87, TLI = .86, RMSEA = .14). Next, items that did not significantly contribute to the factor “practice experiences” were excluded ($n = 3$) and a third model (Model 3) was tested. Exclusion of these three items (13, 20, 22, see online Appendix 1) further improved the model fit to the data (χ^2 [df = 405] = 1399.69,

$p < .001$, CFI = .89, TLI = .88, RMSEA = .14). Model 3 assumes independence of the items (except for the overall dependence on the factor “practice experiences”). This constraint was sequentially removed for those pairs of items that showed a significant covariance, until no significant covariances remained in the modification indices and good model fit to the data was obtained. This final model (Model 4) was consistent with the observed data and the unidimensionality of OPACS-US section A was confirmed (χ^2 [df = 357] = 549.00, $p < .001$, CFI = .98, TLI = .97, RMSEA = .06). Reliability of this 30 item OPACS-US section A was good (Cronbach’s alpha = .89 [.86 – .93]).

Table 2. Confirmatory Factor Analysis model fit statistics for OPACS-US section A (practice experiences) 36 items

Model	Model fit statistics						Items deleted
	χ^2	df	p	CFI	TLI	RMSEA (95% CI)	
Model 1. 36 items, only factor structure constrained	2775.98	594	<.001	.79	.78	.17 (.16-.17)	31, 32, 33
Model 2. 33 items, without items loading negative on factor	1759.38	495	<.001	.87	.86	.14 (.13-.15)	13, 20, 22
Model 3. 30 items, exclusion of non-significant loading of items on construct	1399.69	405	<.001	.89	.88	.14 (.13-.14)	
Model 4. 30 items, addition of 48 of 255 unconstrained residual covariance terms	549.00	357	<.001	.98	.97	.14 (.05-.07)	

χ^2 = Chi-square statistics, df = degree of freedom, CFI = Comparative Fit index, TLI = Tucker Lewis Index, RMSEA = Root Mean Square Error of Approximation, CI = Confidence Interval

Validity and reliability of the OPACS-US section B (general opinion)

The same sequence of models was used for determining unidimensionality of the OPACS-US section B (Table 3). Model 1 did not fit the data well (χ^2 [df = 1175] = 3820.98, $p < .001$, CFI = .77, TLI = .76, RMSEA = .13). A second model (Model 2) with exclusion of 5 items (19, 21, 22, 36, 42, see online Appendix 1) loading negative on the factor “general experiences” was tested (χ^2 [df = 989] = 3053.78 $p < .001$, CFI = .81, TLI = .80, RMSEA = .13). Seven items (2, 3, 16, 18, 20, 30, 34, see online Appendix 1) did not significantly contribute to the factor and were subsequently excluded from the third model (Model 3) which improved the model although some degree of model misfit still remained (χ^2 [df = 702] = 2275.42, $p < .001$, CFI = .84, TLI = .84, RMSEA = .13). Unconstraining 151 of the 531 error covariance terms (Model 4) significantly improved the fit of the model to the data (χ^2 [df = 551] = 647.38, $p = .003$, CFI = .99, TLI = .99, RMSEA = .04) resulting in a unidimensional OPACS-US section B. Reliability of the OPACS-US section B was good (Cronbach’s alpha = .89 [.85 – .92]).

Table 3. Confirmatory Factor Analysis model fit statistics for OPACS-US section B (general opinion) 50 items

Model	Model fit statistics						Items deleted
	χ^2	<i>df</i>	<i>p</i>	CFI	TLI	RMSEA (95% CI)	
Model 1. 50 items, only factor structure constrained	3820.98	1175	<.001	.77	.76	.13 (.12-.14)	19, 21, 22, 36, 42
Model 2. 45 items, without items loading negative on factor	3053.78	989	<.001	.81	.80	.13 (.12-.13)	2, 3, 16, 18,20, 30, 34
Model 3. 38 items, exclusion of non-significant loading of items on construct	2275.42	702	<.001	.84	.84	.13 (.12-.14)	
Model 4. 38 items, addition of 151 of 531 unconstrained residual covariance terms	647.38	551	.003	.99	.99	.04 (.02-.05)	

χ^2 = Chi-square statistics, *df* = degree of freedom, CFI = Comparative Fit index, TLI = Tucker Lewis Index, RMSAE = Root Mean Square Error of Approximation, CI = Confidence Interval

Cross-loadings of the reduced OPACS-US sections A and B

Although model fit to the data was good for the first model (χ^2 [*df* = 2042] = 2934.15, *p* < .001, CFI = .97, TLI = .96, RMSEA = .06), several items demonstrated cross-loadings between the factors (OPACS-US section A and B). After removal of 6 items (OPACS-US section A: 2, 28, OPACS-US section B: 11, 38, 39, 45, see online Appendix 1), the final model (Model 2) had good model fit to the data (χ^2 [*df* = 1699] = 2349.75, *p* < .001, CFI = .97, TLI = .97, RMSEA = .05). Reliability of the OPACS-US section A and B was excellent (Cronbach’s alpha = .93 [.90 – .95]) (Table 4).

Table 4. Confirmatory Factor Analysis model fit statistics for OPACS-US section A (practical experience) and B (general opinion)

Model	Model fit statistics						Cross-loading items section A	Cross-loading items section B
	χ^2	<i>df</i>	<i>p</i>	CFI	TLI	RMSEA (95% CI)		
Model 1. 68 items, only two factor structure constrained	2934.15	2042	<.001	.97	.96	.06 (.05-.06)	2, 28	11, 38, 39, 45
Model 2. 62 items, without cross-loading items	2349.75	1699	<.001	.97	.97	.05 (.05-.06)	2, 3, 16, 18,20, 30, 34	

χ^2 = Chi-square statistics, *df* = degree of freedom, CFI = Comparative Fit index, TLI = Tucker Lewis Index, RMSAE = Root Mean Square Error of Approximation, CI = Confidence Interval



Combining the OPACS-US with the KOP-Q

Table 5 presents the correlations between the reduced OPACS-US section A (practice experiences), section B (general opinion) and KOP-Q (knowledge) constructs, controlled for age and education. The hypothesis that a higher score on the OPACS-US section A is positively correlated with a higher score on OPACS-US section B ($r = .79, p < .01$) and knowledge ($r = .35, p < .01$) is confirmed. OPACS-US section B and the KOP-Q knowledge construct are also positively correlated ($r = .25, p < .05$).

Table 5. Latent means and correlations between the OPACS-US subscales and KOP-Q, controlled for gender and age

Variable	1	2	3
1. OPACS-US section A: practical experiences			
2. OPACS-US section B: general opinion	.79**		
3. KOP-Q knowledge	.35**	.25*	

Note. * indicates $p < .05$; ** indicates $p < .01$.

Discussion

This study presents a structural valid and internally consistent OPACS-US measuring the practice experiences and general opinion of hospital nurses toward older patients. It demonstrated that the OPACS-US can be complemented with the KOP-Q measuring nurses' knowledge about older patients. Subscales of the OPACS-US and the KOP-Q can also be used separately as the constructs proved to be unidimensional, which improves the usability of the OPACS-US and KOP-Q to serve as a tool in educational or quality improvement programs or for research purposes.

Although the subscales "practice experiences" and "general opinion" range from highly negative to highly positive, and thereby evaluate nurses attitudes regarding care for older patients,⁶ this definition of attitude might be too simplistic. A more detailed model defining attitude is the multicomponent model.²² The three components presented in this model (affective, behavioral and cognitive) are widely acknowledged and used in psychology and sociology research. The affective component of attitudes refers to the feelings or emotions linked to an attitude object. The behavioral component refers to past behaviors or experiences regarding an attitude object. Finally, the cognitive component of attitude refers to the beliefs, thoughts and attributes that we would associate with an object.⁶ All three components consist of both an explicit level (attitudes formed on a conscious level, deliberately and easy to self-report) and an implicit level (attitudes formed unconsciously, involuntarily and typically unknown to us).²³

Most items in the OPACS (both subscales) measure verbal statements which one could relate to the behavioral and/or cognitive (i.e. beliefs) components of the multicomponent model. This underlying measurement of behavioral and cognitive components of attitudes by items of the OPACS can possibly explain the high inter-correlation between the two subscales. However, items fail to address the affective component (emotions/feelings) of attitude toward older patients. Furthermore, the OPACS measures only explicit attitudes (verbal statements) not the implicit attitudes of nurses toward older patients. It is however, possible that explicit and implicit attitudes contradict each other, meaning that even if nurses score positive on the OPACS instrument, saying that they do like to work with older people, their implicit attitudes might be negative, possibly influencing their behavior in clinical practice as co-existence of the two is not uncommon.²³

Measuring the affective component and implicit levels of attitude would be tremendously difficult, if not impossible, with a self-assessment scale such as the OPACS. Observational research would provide insight in these aspects of attitude, but in clinical practice, observational methods are less suitable because of the costs and time consuming features. The OPACS is considered useful in clinical practice, as it provides insight in the self-assessment of nurses about their beliefs and behavior (aspects of attitude) regarding

older patients. Furthermore, by discussing their OPACS results with colleagues, nurses can receive feedback on their actual behavior, providing more insight in the implicit levels of their attitude, which is normally unknown to oneself. The discrepancy between what nurses think they do and what they actually do would become apparent. These insights gained by discussion with colleagues can help nurses to reflect on their care for older patients, possibly influencing their behavior toward them.

In a systematic review described by Liu et al,⁴ the urgent need for well-designed studies investigating the attitudes and associated factors of nurses (and nursing students) regarding older patients was expressed if workforce strategies are to be implemented. Adding to this appeal, measurement instruments used to assess nurses' attitudes toward and knowledge about older patients should be up-to-date, fully tested on validity and reliability, using rigorous statistical procedures, that are described in a transparent manner. Hospital nurses' attitudes toward and required knowledge regarding older patients are situation and time dependent, which makes it possible that instruments become quickly out of date. For this reason, researchers should reflect on the instruments used when attitudes and/or knowledge of (students) nurses toward older patients are assessed. For example, the Kogan's Old People Scale⁹ developed in the United States in 1961, is often used in studies being translated in various languages.⁴ However, the question remains whether the construct being measured (what society thinks is a positive or negative attitude) has not changed over time, and whether the same construct is still being measured in all settings (countries, care practices, educational settings). These questions make the validity of instruments used in the studies doubtful even though psychometric properties are acceptable.

Content of the OPACS-US, has been validated by a small group of experts (n = 4) relatively recently for the United States in 2009,¹⁴ making it likely that the construct being measured reflects reality as it is unlikely that values and standards have changed much in recent years. However, measures cannot be validated based on content validity evidence alone, especially when a small number of experts are used. The statistical analysis testing the content in this study (using data collected in 2015, having a multicenter study design and a good distribution of sample characteristics increasing the generalizability) demonstrated that the OPACS is measuring two solid constructs, which enhances the previous qualitative evaluation of the OPACS. The KOP-Q can complement the OPACS, because content of this instrument measures relevant knowledge of hospital nurses about older patients which is in line with OPACS outcomes "hospital nurses attitudes toward older patients". Complementing attitude instruments with knowledge instruments is important due to its relation with attitudes, influencing both attitude and behavior and/or nurses resistance to persuasive messages.¹⁵ Although structural validity and internal consistency of the OPACS-US demonstrated to be solid, further validity and reliability testing is recommended including criterion validity, hypotheses testing, test-retest reliability, responsiveness and interpretability.

Some considerations regarding this study should be discussed. First, considering the response rate and sample size used of nurses from the different centers, the representativeness (having a convenience sample) can be questioned and selection bias could have led to an overestimation of effect as nurses with interest in older patients are more likely to participate. However, sample size did not affect the performance of analysis. Furthermore, the primary focus was on structural validation of the OPACS and not an exploration of attitudes of hospital nurses in the USA or the different hospitals. Second, missing data were not imputed and cases were excluded (even though missing values were completely at random) to maximize the validity of the item selection during the item reduction process. This is considered acceptable as no differences were found in characteristics between full cases and cases having missing values and performance of analysis was not affected by sample size. Now that the OPACS-US is considered psychometrically valid, imputation of data can be performed by researchers in future studies focused on measuring the attitudes of nurses although attention should be paid to representativeness of the sample under study.

In conclusion, the OPACS-US proved to have good structural validity and reliability, measuring two components of the attitudes of hospital nurses toward older patients: 'practice experiences' and 'general opinion'. These two components can be combined with a knowledge construct measured by the KOP-Q. In clinical practice, identifying attitude problems is an important step to improve the quality of care for older patients. Using demonstrably valid and reliable instruments doing so is a prerequisite that is often neglected or not addressed in the literature. The OPACS-US can provide insight in nurses explicit feelings and thoughts regarding their 'practice experiences' and 'general opinion' toward older patients, and can therefore be used for educational and/or quality improvement programs. The knowledge construct measured by the KOP-Q can be used for retrieving additional information, as knowledge is considered associated with both attitudes as behavior.

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Appendix 1

Appendix 1. Excluded items of the Older Patient in Acute Care Survey – United States

Item	Item text section A (Practice experiences)	Reason for exclusion
2.	I find older patients more time consuming than younger patients	Cross-loading of item
13.	I use information gathered during an older patient's admission to plan their care	Non-significant loading on construct
20.	I ask younger patients if they have incontinence problems	Non-significant loading on construct
22.	I involve a younger patient's family/care-giver in their care	Non-significant loading on construct
28.	I check an older patient's understanding of patient controlled analgesia(PCA) more often than a younger patient's	Cross-loading of item
31.	I involve younger patients in decision-making relating to their health	Loading different construct(s)
32.	I involve older patients in decision-making relating to their health	Loading different construct(s)
33.	I encourage older patients to maintain their independence while in the hospital	Loading different construct(s)
Item	Item text section B (General opinion)	Reason for exclusion
2.	Older patients adapt easily to the role of being sick	Non-significant loading on construct
3.	Older patients tend to have similar needs in the hospital	Non-significant loading on construct
11.	Older patients are less likely to become addicted to pain relieving medications than younger patients	Cross-loading of item
16.	Older patients are embarrassed when their bodies are exposed	Non-significant loading on construct
18.	An older patient's family/care-giver should be involved in their care	Non-significant loading on construct
19.	Older patients, if not confused, are capable of making decisions about their care	Loading different construct(s)
20.	Family members/care-givers should be involved in the decision making process for all older patients	Non-significant loading on construct
21.	Rehabilitation of older patients is part of the doctors'/nurses role	Loading different construct(s)
22.	Older patients should have a say in whether they receive life-sustaining treatments	Loading different construct(s)
30.	Older patients tend to be less anxious than younger patients when they are admitted to the hospital	Non-significant loading on construct
34.	In the hospital, older patients tend to socialize with other older patients	Non-significant loading on construct
36.	Older patients have healthy eating habits	Loading different construct(s)
38.	Older patients have impaired peripheral circulation	Cross-loading of item
39.	Poor nutrition is a problem associated with aging	Cross-loading of item
42.	Older patients are at less risk of falling than younger patients	Loading different construct(s)
45.	Older patients' health problems are often incurable	Cross-loading of item

Appendix 2

Appendix 2. The Older Patient in Acute Care Survey – United States (OPACS-US)						
<p>Section A. The following items ask about your PRACTICE EXPERIENCE when caring for older patients (those 65 and older) in the acute care setting. There are no right or wrong answers. We are interested in learning what you have <i>experienced</i> when caring for older patients in the acute care setting.</p> <p>Please circle the number that best describes your practice experience on each question. <i>(SD = Strongly disagree; D = Disagree ;U = Unsure; A = Agree; SA = Strongly agree)</i></p>						
		SD	D	U	A	SA
1.	*I find older patients difficult to care for	1	2	3	4	5
2.	I find it necessary to observe older patients more closely than I observe younger patients	1	2	3	4	5
3.	I am more likely to speak in simple language to an older patient than to a younger patient	1	2	3	4	5
4.	I tend to speak slower when I talk with an older patient	1	2	3	4	5
5.	I tend to speak louder when I talk with an older patient	1	2	3	4	5
6.	I tend to speak more socially with an older patient	1	2	3	4	5
7.	I tend to speak more socially with a younger patient	1	2	3	4	5
8.	*I am more likely to use terms of endearment (i.e. sweetie, honey”) with older female patients than with younger female patients	1	2	3	4	5
9.	*I am more likely to use terms of endearment (“pops” , “gramps”) with older male patients than with younger male patients	1	2	3	4	5
10.	I allow extra time when I am going to admit an older patient	1	2	3	4	5
11.	I find it more difficult to obtain a comprehensive health history from an older patient than a younger patient	1	2	3	4	5
12.	I use a health assessment tool specifically designed for older patients	1	2	3	4	5
13.	I find it necessary to watch confused older patients closely	1	2	3	4	5
14.	*I am more likely to use some form of restraint on an older patient than on a younger patient	1	2	3	4	5
15.	I offer/order personal hygiene assistance for older patients more often than for younger patients	1	2	3	4	5
16.	I ask older patients if they require assistance with their activities of daily living more often than I ask younger patients	1	2	3	4	5
17.	*I have difficulty finding an older patient’s pulse	1	2	3	4	5
18.	I ask older patients if they have incontinence problems	1	2	3	4	5
19.	I involve an older patient’s family/care-giver in their care	1	2	3	4	5
20.	I explain medications more than once to older patients to ensure understanding	1	2	3	4	5
21.	I am less likely to encourage self-medication (i.e. PCA, insulin pump, inhaler) while in the hospital to an older patient than a younger patients	1	2	3	4	5
22.	I ask older patients if they have pain more often than I ask younger patients	1	2	3	4	5
23.	I ask older patients if they require pain relieving medication more often than I ask younger patients	1	2	3	4	5



CHAPTER 6

24.	I am more likely to ask an older patient if they would like something to help them sleep than I ask a younger patient	1	2	3	4	5
25.	I am more likely to ask an older patient if they would like to see a chaplain or clergy person than a younger patient	1	2	3	4	5
26.	I begin discharge planning earlier in an older patient's stay than in a younger patient's stay	1	2	3	4	5
27.	I allow more time to prepare an older patient for discharge than a younger patient	1	2	3	4	5
28.	I find it easier to cope with the death of an older patient than a younger patient	1	2	3	4	5

Section B. The following items ask for your **GENERAL OPINION** about caring for older patients (those aged 65 years and older) in acute care setting. There are no right or wrong answers. We are interested in your *general opinion* about the following:

Please circle the number that best describes your general opinion on each question.

(SD = Strongly disagree; D = Disagree ;U = Unsure; A = Agree; SA = Strongly agree)

		SD	D	U	A	SA
1.	I like to care for older patients	1	2	3	4	5
2.	*Older patients are confused	1	2	3	4	5
3.	*Older patients pretend not to hear you	1	2	3	4	5
4.	*Older patients are a nuisance to care for	1	2	3	4	5
5.	*Older patients are more likely to be depressed than younger patients	1	2	3	4	5
6.	*Older patients have to follow special diets	1	2	3	4	5
7.	*Older patients do not know the actions and interactions of their medications	1	2	3	4	5
8.	*Older patients require less pain relieving medication than younger patients	1	2	3	4	5
9.	*Older patients become addicted to sleeping medications easily	1	2	3	4	5
10.	*Incontinent patients are bothersome	1	2	3	4	5
11.	*Urinary incontinence is part of the aging process	1	2	3	4	5
12.	Older patients are more concerned with their bowel habits than younger patients	1	2	3	4	5
13.	Younger patients are embarrassed when their bodies are exposed	1	2	3	4	5
14.	*Too many older patients receive life-sustaining treatment	1	2	3	4	5
15.	Older patients have more discharge problems than do younger patients	1	2	3	4	5
16.	At the time of discharge older patients are likely to be more dependent than younger patients	1	2	3	4	5
17.	Older patients require placement in long term care following a hospital admission	1	2	3	4	5
18.	*Older patients have extensive lengths of stay and take up beds that could be used for sicker patients	1	2	3	4	5
19.	*There are too many older patients in acute care hospitals	1	2	3	4	5
20.	It would be a good idea for all hospitals to have an acute geriatric unit	1	2	3	4	5
21.	Older patients are likely to be on more medication when admitted to the hospital than younger patients	1	2	3	4	5
22.	Older patients become confused in a new setting	1	2	3	4	5

23.	Older patients feel isolated in the acute care setting	1	2	3	4	5
24.	*In the hospital, eating and drinking are the most common activities performed by older patients	1	2	3	4	5
25.	Older patients have more skin problems than younger patients	1	2	3	4	5
26.	Older patients are more likely to require assistance with mobility than younger patients	1	2	3	4	5
27.	A lot of older patients have stiff joints	1	2	3	4	5
28.	Older patients tend not to tell health professional if they are incontinent	1	2	3	4	5
29.	Older patients experience changes in bowel elimination patterns in the acute care setting	1	2	3	4	5
30.	Older patients are more likely to have open surgical procedures than laparoscopic surgery	1	2	3	4	5
31.	Older patients become confused after operations/procedures	1	2	3	4	5
32.	Older patients are more likely to develop post-operative complications	1	2	3	4	5
33.	Older patients are particularly prone to nosocomial infections	1	2	3	4	5
34.	Early discharge is difficult to achieve with older patients	1	2	3	4	5

SCORING SYSTEM:

Items with a star * should be recoded in opposite direction (5=1, 4=2, 3=3, 2=4, 1=5)

Sum all scores on the OPACS-US section A.

Sum all scores on the OPACS-US section B.

Divide the sum score section A by 28 (is average score on a scale from 1 - 5)

Divide the sum score section B by 34 (is average score on a scale from 1 - 5)

Interpretation:

Practice experience / General opinion				
Mean score	Mean score	Mean score	Mean score	Mean score
1	2	3	4	5
Very negative	Negative	Neutral	Positive	Very positive



Appendix 3

Appendix 3. Final model, item factor loadings on the Older Patient in Acute Care Survey – United States

Latent factors		<i>Factor loading</i>	<i>SE</i>	<i>Z</i>	<i>p</i>	<i>Standardized FL</i>
Practice experience						
	Item 1*	1.00				0.56
	Item 3	-1.09	0.14	-7.96	0.00	-0.61
	Item 4	-1.26	0.16	-7.79	0.00	-0.71
	Item 5	-1.10	0.15	-7.21	0.00	-0.62
	Item 6	-1.08	0.15	-7.47	0.00	-0.61
	Item 7	-0.43	0.16	-2.73	0.01	-0.24
	Item 8	-0.75	0.16	-4.64	0.00	-0.42
	Item 9	0.68	0.16	4.20	0.00	0.38
	Item 10	0.55	0.15	3.74	0.00	0.31
	Item 11	-0.98	0.14	-6.97	0.00	-0.55
	Item 12	-1.17	0.16	-7.54	0.00	-0.66
	Item 14	-0.31	0.16	-1.90	0.06	-0.17
	Item 15	-0.56	0.19	-3.01	0.00	-0.31
	Item 16	0.86	0.15	5.92	0.00	0.49
	Item 17	-1.07	0.17	-6.43	0.00	-0.60
	Item 18	-1.16	0.16	-7.21	0.00	-0.65
	Item 19	0.80	0.15	5.34	0.00	0.45
	Item 21	-0.81	0.15	-5.56	0.00	-0.46
	Item 23	-0.62	0.17	-3.61	0.00	-0.35
	Item 24	-0.76	0.17	-4.56	0.00	-0.43
	Item 25	-0.70	0.15	-4.67	0.00	-0.39
	Item 26	-0.87	0.16	-5.46	0.00	-0.49
	Item 27	-0.79	0.15	-5.28	0.00	-0.45
	Item 29	-0.71	0.17	-4.27	0.00	-0.40
	Item 30	-0.73	0.17	-4.32	0.00	-0.41
	Item 34	-0.92	0.16	-5.61	0.00	-0.52
	Item 35	-1.26	0.19	-6.82	0.00	-0.71
	Item 36	-0.85	0.15	-5.87	0.00	-0.48
General opinion						
	Item 1*	1.00				0.19
	Item 4	2.72	1.28	2.12	0.03	0.51
	Item 5	1.71	0.84	2.05	0.04	0.32

Appendix 3: (continued)

Item 6	2.11	0.86	2.45	0.01	0.40
Item 7	2.74	1.32	2.08	0.04	0.51
Item 8	2.39	1.20	1.99	0.05	0.45
Item 9	2.79	1.33	2.10	0.04	0.52
Item 10	1.21	0.70	1.74	0.08	0.23
Item 12	1.42	0.68	2.10	0.04	0.27
Item 13	1.34	0.64	2.10	0.04	0.25
Item 14	2.52	1.23	2.04	0.04	0.47
Item 15	-2.02	1.10	-1.84	0.07	-0.38
Item 17	-0.99	0.60	-1.67	0.10	-0.19
Item 23	2.89	1.38	2.10	0.04	0.54
Item 24	-3.71	1.77	-2.10	0.04	-0.70
Item 25	-2.56	1.22	-2.09	0.04	-0.48
Item 26	-2.99	1.41	-2.12	0.03	-0.56
Item 27	2.64	1.14	2.31	0.02	0.50
Item 28	2.51	1.06	2.38	0.02	0.47
Item 29	-2.22	1.04	-2.13	0.03	-0.42
Item 31	-2.15	1.08	-2.00	0.05	-0.40
Item 32	-3.78	1.74	-2.17	0.03	-0.71
Item 33	-3.04	1.47	-2.07	0.04	-0.57
Item 35	2.06	1.01	2.04	0.04	0.39
Item 37	-2.81	1.33	-2.12	0.03	-0.53
Item 40	-3.52	1.68	-2.10	0.04	-0.66
Item 41	-3.26	1.54	-2.12	0.03	-0.61
Item 43	-0.82	0.46	-1.81	0.07	-0.16
Item 44	-1.98	1.09	-1.82	0.07	-0.37
Item 46	-2.26	1.06	-2.14	0.03	-0.42
Item 47	-2.54	1.20	-2.11	0.04	-0.48
Item 48	-2.95	1.40	-2.12	0.03	-0.55
Item 49	-3.45	1.62	-2.12	0.03	-0.65
Item 50	-3.44	1.61	-2.14	0.03	-0.65

CHAPTER 7

Content validation of the Dutch version of the “Older Patients in Acute Care Survey”, an instrument to measure the attitude of hospital nurses towards older patients

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Abstract

Aims and objectives: The aim of this study is to validate the “Older Patients in Acute Care Survey” (OPACS) in the Netherlands.

Background: Worldwide the population of older people with multi-morbidity increases which results in an increase of older hospitalized patients. Literature shows that nurses have a negative attitude towards older patients. To get insight and improve the attitude of nurses, a validated measurement instrument is needed. The OPACS measures hospital nurses’ attitudes towards older patients and has proven good content validity in the USA and good face validity and reliability in Australia.

Design: A cross-sectional study.

Methods: First the OPACS was translated using forward-backward method and testing clarity of wording with a pilot. Second content validity was determined using “Method Lynn” and clarity of wording and appropriateness for measuring attitude were identified.

Results: The OPACS showed acceptable content validity ($CVI \geq 0.78$) for 14 items (out of 36) of Section A and 22 items (out of 50) of Section B. The content validity for the entire OPACS was ($CVI = 0.62$). 89.2% of the participants scored “clear in wording” and 75.6% of the participants qualified the OPACS appropriate for measuring attitude.

Conclusions: The OPACS has good clarity of wording and good appropriateness for measuring attitude. The content validity is low which makes the current Dutch version not appropriate for measuring attitude of nurses in Dutch hospitals. Relevance to clinical practice: A measurement instrument to get insight in the attitude of nurses is a first step to improve a negative attitude. A positive attitude of nurses is important to provide good quality of care to the increasing population older people in hospitals. Working with reliable and validated scales is important. This study gives direction to make the OPACS suitable for the Dutch situation.

Keywords

Attitude, Nurses, OPACS, Content Validity, Translation

Introduction

Worldwide, the population of older people is increasing.¹ In the Netherlands, the number of people aged 65 and over is expected to increase from 16% of the population in 2011 to 26% of the population in 2039.² Of these, 20% have two or more chronic diseases which will increase to one in three in the age of 75. In other countries high percentages of multimorbidity are also described.³⁻⁷ As a result of aging and multimorbidity, more hospital nurses are confronted with older patients and more nurses are needed to provide in this care of the future.^{8,9}

A lot of nurses have a negative attitude towards older patients.^{10,11} They are more interested in technical specialties such as intensive care, surgery and emergency than in working in geriatrics, which contributes to less popularity of care for older patients.¹⁰⁻¹³ However, in intensive care, general surgery care and other medical wards, the number of older patients will increase because of aging and multimorbidity, emphasizing the need for nurses who demonstrate a positive attitude towards older patients.^{5,6,8,9}

Attitude is described as the way a person thinks about something or someone and is consisted of a behavioral, emotional and cognitive component.¹⁴ The behavioral component implies the intention to behave regarding the attitude object. The emotional component implies a person's liking or disliking, based on feelings. The cognitive component implies knowledge and value of a phenomenon. These three components influence each other and ultimately determine the attitude of nurses.^{14,15}

The negative attitude towards older patients is caused by the association with deterioration of health, decreased mobility and declining mental state and often a negative experience with older people.^{16,17} Research suggests that there is also a lack of geriatric knowledge. Nurses have insufficiently focused on multiple geriatric health problems among older people. The care of older patients requires a high level of expertise because of multipathology, polypharmacy and behavioral changes.^{10,16-18} Ultimately the negative attitude of nurses will have a negative impact on the quality of care and on the quality of life of older patients.^{12,18}

Background

To improve the attitude of nurses, healthcare providers first need to understand the current attitude,⁹ which can be achieved by measuring attitude using a measurement scale with good clinimetric qualities.^{19,20} In the literature a number of measurement scales are known.^{12,21-23} Only one scale, however, measures the behavioral, emotional and cognitive component of attitude. This is the “Older Patients in Acute Care Survey” (OPACS).^{9,11,21}

The OPACS consist of two scales. Section A measures practical experience (36 items) and Section B measures general opinions and knowledge of older patient’s needs (50 items). The items in both Sections A and B consist of thirteen different aspects influencing the nursing care of older patients in the hospital: 1) ageist stereotypes; 2) older patients in the acute care setting; 3) ageing-related issues; 4) communication with older patients; 5) admitting an older patient; 6) discharge planning; 7) decision making; 8) medications; 9) pain management; 10) psychological status; 11) hygiene and ADL; 12) continence; and 13) mobility. Items of Section A and B are answered by a five point Likert scale (1 = never and 5 = very frequent).^{9,21} The OPACS is developed in Australia and validated in the United States. The Australian and United States versions both showed adequate clinimetric qualities. The Australian version showed good face validity and high reliability (Kappa 0.76).²¹ The United States version had a high content validity (CVI 0.92).⁹

Before the OPACS can be applied in countries other than Australia or the United States, the OPACS should be translated into the language of that country and the validity and reliability of this version of OPACS should be examined. Cultural norms and values play important roles in attitude, and a measurement scale should be validated when it is used in different countries or cultures. Determining the content validity is a critical important first step in this validation process.²⁴

The aim of this study is to determine the content validity of the OPACS in the Dutch situation after translation of the measurement scale into the Dutch language.

Methods

The study consisted of a two-phase process: translation of OPACS into Dutch, and determining the content validity of OPACS into the Dutch healthcare system setting.

Translation of OPACS

For translating the OPACS into the Dutch language, the United States version was chosen because the American English usage is more familiar to Dutch translators than Australian English usage. Both Section A and Section B were translated into the Dutch language using the forward-backward translation method (Figure 1).^{25,26} Two independent bilingual persons translated the OPACS into the Dutch language. These translations were compared with each other and with the English version of the OPACS and finally determined by two researchers. The Dutch translation was translated back into the English source language by one translator who did not see the original wording. The English back-translation was compared with the first English version to detect possible alterations in meaning. Ambiguities and discrepancies were discussed by two researchers until consensus was achieved.

A pilot among five registered nurses, all working with older patients, was used to test the clarity of wording of all items of the Dutch OPACS using labels 0 = not clear and 1 = clear.

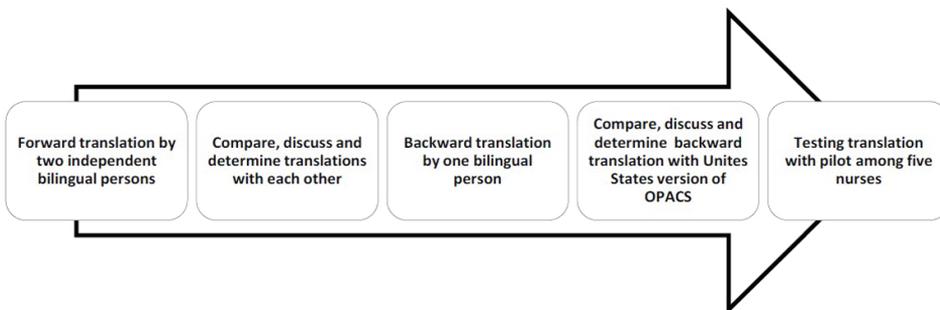


Figure 1. Method translation ambiguities and discrepancies were discussed whereby consensus was achieved.

Validation

The content validity of the OPACS was studied using a cross-sectional design.

Data Collection

A panel of Dutch experts in geriatric nursing was contacted from the professional network of the two researchers and included teachers, geriatric nurses and geriatric experts from the Geriatric Network of the Dutch Nurses Association. Inclusion criteria were: be able to speak, read and write Dutch, a bachelor degree in nursing, working as a registered nurse in geriatrics for at least five years or worked in a profession that requires knowledge of geriatric nursing for at least five years. All participants received an invitation letter with extended information, response instructions, the Dutch OPACS and an informed consent form. All respondents, signed and returned the informed consent-form before participating in the study.

Content validity was tested using a score of degree of relevance using a four-point Likert scale (1 = not relevant and 4 = highly relevant) shown in Figure 2.²⁷ The clarity of wording and appropriateness for measuring attitude was also determined using a two-point Likert scale (0 = not clear/not appropriate and 1 = clear/appropriate).

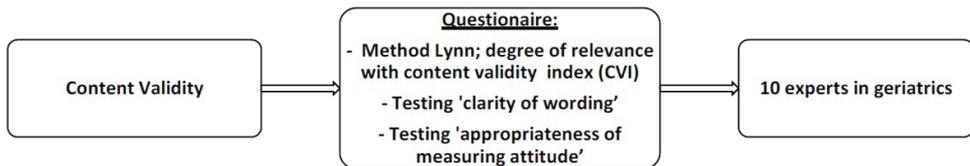


Figure 2. method content validation

Analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 18.0.²⁸ For the degree of relevance scores the items were dichotomized by summarizing score 1 and 2 (not relevant) and summarizing score 3 and 4 (relevant). The Individual-Content Validity Index (I-CVI) was the result of the scores of one item divided by the number of participants. For an individual question to be considered relevant, its I-CVI should be ≥ 0.78 .²⁷ The Scale-Content Validity Index (S-CVI) is the mean of all I-CVI. For the entire scale to be considered relevant, the S-CVI should be ≥ 0.90 .²⁷ Percentage and mean were used for analyzing the variable clarity of wording and variable appropriateness for measuring attitude. If an expert did not grade a question, the missing value was imputed in two different datasets based on the original database whereby the worst possible score and the best possible score were imputed. Differences between original, worst case and best case database were analyzed with the Kruskal Wallis test to decide if imputation was reliable and which dataset should be used for further analyzing.²⁸

Results

Translation of OPACS

Small differences and errors were found between forward and backward translation on 24 (out of 36) items of Section A and 40 (out of 50) items of Section B. Nine (out of 36) items of Section A and six (out of 50) items of Section B were completely corrected. Three (out of 36) items of Section A were unchanged and in Section B four items (out of 50). All participants of the translation clarity pilot evaluation returned the questionnaire (n = 5) with no missing values. The five participants made 19 suggestions for improvement for Section A and 36 suggestions for Section B. These suggestions included changes in words and sentence structure. The authors adopted 19 of the suggested changes for the first Dutch version of OPACS which was used for content validity.

Validation

Ten participants were included in the validity portion of the study. Nine participants completed the demographics, one participant completed the questionnaire without completing the demographics section (Table 1). The participant demographic showed that five participants were educated at Master of Science-level. The average length of time working in healthcare was 24 years (SD 8.7; range 9 - 32). Seven participants worked in geriatric nursing and two were lecturers in geriatric nursing.

Table 1. Demographic characteristics (n = 10)

	n
Age	44.11 (9.28)*
Gender Female	8
Highest Qualification	
Bachelor in Nursing	1
Post-Bachelor in Nursing	2
Master of Science in Nursing	5
Different	1
Current Area of Practice	
Geriatric Nursing	6
Teaching on Bachelor Level	2
Other in Healthcare	1
Job	
Geriatric Nursing Specialist	4
Teaching Geriatrics	2
Geriatric Nursing Expert	1
Nurse Practitioner	1
Geriatric Nurse & Student Nursing Science	1
Employment	
Fulltime	5
Post Registration Experience	24.22 (8.70)*
Post Registration Experience Current Area of Practice	6.22 (3.84)*

(n = 9 as result of one missing value); *Mean (SD).

All missing values of the outcome variables “relevance”, “clarity of wording”, “appropriateness for measuring attitude” were excluded from analyzing because imputation was not relevant: The Kruskal Wallis test showed no significant difference ($K \geq 0.15$) which means that there was no difference between the original, the worst case database and best case database. The degree of relevance for the entire OPACS was S-CVI = 0.62. The score for Section A was S-CVI = 0.61 and the score for Section B was S-CVI = 0.64 (Table 2).

Table 2. Content validity Index

	Relevance S-CVI (SD)
OPACS Section A (Item 1 - 36)	0.61 (0.31)
OPACS Section B (Item 1 - 50)	0.64 (0.25)
OPACS Section A (Item 1 - 36) and B (Item 1 - 50)	0.62 (0.28)

Content validity for individual items (I -CVI): 6 items of Section A and 5 items of Section B showed an I-CVI = 1.00. A total of 14 out of 36 items of Section A and 22 of 50 items of Section B showed an I-CVI ≥ 0.78 (Table 3).

The entire OPACS was scored as clear in wording by 89.20% of the participants. Section A was scored as clear in wording by 92.07% of the participants and section B 87.13% of the participants (Table 4). Two individual items scored low on clarity in wording by $\leq 30\%$ of the participants. The entire OPACS was scored as appropriate for measuring attitude by 75.55% of the participants. Section A was scored as appropriate according to 73.64% of the participants and Section B by 76.93% of the participants (Table 3). Eight individual items scored low on appropriateness for measuring attitude by $\leq 30\%$ of the participants.

Table 3. Items of the OPACS with an acceptable I-CVI

OPACS section A		Relevance I-CVI
Item 01	I find older patients difficult to care for.	0.90
Item 02	I find older patients more time consuming than younger patients.	0.90
Item 11	I allow extra time when I am going to admit an older patient.	1.00
Item 12	I find it more difficult to obtain a comprehensive health history from an older patient than a younger patient.	0.80
Item 13	I use information gathered during an older patient's admission to plan their care.	1.00
Item 14	I use a health assessment tool specifically designed for older patients.	1.00
Item 15	I find it necessary to watch confused older patients closely.	1.00
Item 16	I am more likely to use some form of restraint on an older patient than on a younger patient.	0.80
Item 23	I involve an older patient's family/care-giver in their care.	0.90
Item 24	I explain medications more than once to older patients to ensure understanding.	0.90
Item 32	I involve older patients in decision-making relating to their health.	1.00
Item 33	I encourage older patients to maintain their independence while in the hospital.	1.00
Item 34	I begin discharge planning earlier in an older patient's stay than in a younger patient's stay.	0.80
Item 35	I allow more time to prepare an older patient for discharge than a younger patient.	0.80
OPACS section B		Relevance I-CVI
Item 01	I like to care for older patients.	1.00
Item 06	Older patients are a nuisance to care for.	0.80
Item 09	Older patients do not know the actions and interactions of their medications.	0.80
Item 12	Older patients become addicted to sleeping medications easily.	0.80
Item 18	An older patient's family/care-giver should be involved in their care.	1.00
Item 19	Older patients, if not confused, are capable of making decisions about their care.	1.00
Item 20	Family member/care-givers should be involved in the decision making process for all older patients.	0.90
Item 21	Rehabilitation of older patients is part of the doctors'/nurses' role.	0.80
Item 22	Older patients should have a say in whether they receive life-sustaining treatments.	1.00
Item 23	Too many older patients receive life-sustaining treatment.	0.78
Item 24	Older patients have more discharge problems than do younger patients.	0.80
Item 25	At the time of discharge older patients are likely to be more dependent than younger patients.	0.80
Item 27	Older patients have extensive lengths of stay and take up beds that could be used for sicker patients.	0.80
Item 28	There are too many older patients in acute care hospitals.	0.90
Item 29	It would be a good idea for all hospitals to have an acute geriatric unit.	0.80
Item 32	Older patients become confused in a new setting.	0.80
Item 40	Older patients are more likely to require assistance with mobility than younger patients.	0.90
Item 45	Older patients' health problems are often incurable.	0.90
Item 47	Older patients become confused after operations/procedures.	1.00
Item 48	Older patients are more likely to develop post-operative complications.	0.90
Item 49	Older patients are particularly prone to nosocomial infections.	0.80
Item 50	Early discharge is difficult to achieve with older patients.	0.80



Table 4. Clarity of wording and appropriateness

	Clarity of Dutch wording	Appropriateness for measure attitude
	Mean%, (SD)	Mean%, (SD)
OPACS Section A (Item 1 - 36)	92.07 (16.65)	73.64 (25.75)
OPACS Section B (Item 1 - 50)	87.13 (14.22)	76.93 (21.08)
OPACS Section A (Item 1 - 36) and B (Item 1 - 50)	89.20 (15.37)	75.55 (23.06)

Discussion

This study presents the production and validation of a Dutch version of OPACS (see Appendix 1). The pilot showed a good translation of OPACS into Dutch. Content validity was determined by method Lynn which is commonly used and well described in the literature.²⁷ According to this method, an optimal content validity should be $S-CVI \geq 0.90$. This study did not meet this criterion ($S-CVI = 0.62$) which means that this version of the Dutch OPACS is not yet adequate for use in the Dutch health care system. However, the entire OPACS scored well on clarity of wording (89.20% of participants) meaning that most items are correctly formulated. The results for appropriateness for measuring attitude were also good for the entire OPACS (75.55% of participants) meaning that experts think that multiple items seem to be adequate for measuring the attitude of nurses. Analysis for the entire scale compared to section A and section B shows the same results.

The results of this study are incongruent with the results of Malmgreen (2009),⁹ who found high content validity of the United States version of OPACS (entire scale $CVI = 0.92$; Section A $CVI = 0.92$; Section B $CVI = 0.97$). The content validity of the Dutch version of OPACS is low (entire scale $CVI = 0.62$; Section A $CVI = 0.61$; Section B $CVI = 0.64$) when evaluated by Dutch experts in geriatrics. These large differences between the content validity of the English and Dutch versions might be caused by cultural differences between the two settings. The differences between the assessed validity of the two versions could also be caused by the number of participants in each study. Content validity should be assessed by between five and ten participants.²⁷ This study used ten participants, where Malmgreen (2009)⁹ used a smaller number of participants ($n = 4$). A smaller number of participants increases the coincidence of like-minded outcomes which has an influence on the statistical outcome using method Lynn.

Limitations of this study should be taken into account. During the translation the two researchers discussed many items which showed that certain items were difficult to translate into the Dutch language. The Dutch language does not have sufficient specific and unambiguous words for certain translations such as "I tend to..." which might be culture related. It also explains the number of changed items and might had an effect on the translation.²⁶ However, consensus was always achieved. Furthermore both the pilot and the results of this study showed a good translation by showing a good clarity of wording and appropriateness for measuring attitude.

Conclusion

In this study, the English OPACS was translated into Dutch, resulting in the first non-English version of this instrument measuring the attitude of nurses towards older hospitalized patients. The pilot of the translated OPACS confirmed that it was a good translation from the American-English version. When the instrument was assessed by a panel of Dutch experts in geriatric patients care, the content validity measurement showed a low score for relevance, but a high score for clarity of wording and appropriateness for measuring attitude for the entire scale, Section A and Section B. The current Dutch translation of OPACS does not meet all criteria for good content validity and does not justify the use of this Dutch version of OPACS.

Relevance to Clinical Practice

Measuring attitude of nurses is important to provide good quality of care to the increasing population of older hospitalized patients. Only with a good attitude it is possible that the care of nurses will meet the nursing needs of older patients. That is why the attitude of nurses should be measured. In this process, it is important to work with reliable and valid measurement scales. This study shows that the Dutch version of OPACS is not yet applicable for clinical practice, however, it is promising. This study gives an overall direction to optimize and improve the content of OPACS. Further research is necessary to determine the most appropriate items to measure the cognitive, emotional and behavioral component of attitude of nurses towards older patients in the Dutch setting. Finally, future research should be focusing on further assessing the validity and reliability of the improved version of the Dutch OPACS.

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Appendix 1

OPACS deel A: Praktische Ervaringen		Nooit	Zelden	Soms	Vaak	Zeer vaak
1.	Ik vind het moeilijk om voor oudere patiënten te zorgen					
2.	Ik vind dat oudere patiënten meer tijd in beslag nemen dan jongere patiënten					
3.	Ik vind het nodig oudere patiënten nauwkeuriger te observeren dan jongere patiënten					
4.	Ik zou eerder eenvoudige taal gebruiken bij een oudere patiënt dan bij een jongere patiënt					
5.	Ik heb de neiging langzamer te praten wanneer ik met een oudere patiënt spreek					
6.	Ik heb de neiging harder te praten wanneer ik met een oudere patiënt spreek					
7.	Ik ben geneigd socialer te praten met een oudere patiënt					
9.	Ik ben geneigd socialer te praten met een jongere patiënt					
10.	Ik zou eerder troetelwoorden (bv. liefde, schatje) gebruiken bij oudere vrouwelijke patiënten dan bij jongere vrouwelijke patiënten					
11.	Ik zou eerder troetelwoorden (bv. opa, schat) gebruiken bij oudere mannelijke patiënten dan bij jongere mannelijke patiënten					
12.	Ik neem extra de tijd wanneer ik een oudere patiënt opneem					
13.	Ik vind het moeilijker een uitgebreide gezondheidsanamnese te verkrijgen bij een oudere patiënt dan bij een jongere patiënt					
14.	De informatie die ik gekregen heb bij de opname gebruik ik om de zorg voor de oudere patiënt te plannen					
15.	Ik vind het nodig om verwarde oudere patiënten nauwkeurig in de gaten te houden					
16.	Ik zou eerder enige vorm van vrijheid beperkende maatregelen gebruiken bij een oudere patiënt dan bij een jongere patiënt					
17.	Ik biedt vaker hulp bij persoonlijke hygiëne aan oudere patiënten dan aan jongere patiënten					
18.	Ik vraag vaker aan oudere patiënten of zij ondersteuning bij de activiteiten van het dagelijks leven nodig hebben dan aan jongere patiënten					
19.	Ik heb moeite om de pols van oudere patiënten te voelen					

Vervolg OPACS deel A: Praktische Ervaringen						
Items		Nooit	Zelden	Soms	Vaak	Zeer vaak
21.	Ik vraag oudere patiënten of ze incontinentieproblemen hebben					
22.	Ik betrek de familie/ mantelzorger bij de zorg van een jongere patiënt					
23.	Ik betrek de familie/ mantelzorger bij de zorg van een oudere patiënt					
24.	Aan oudere patiënten geef ik meer dan eens uitleg over hun medicatie om er zeker van te zijn dat ze het begrijpen					
25.	Ik zou aan een oudere patiënt minder snel zelfmedicatie (bv. pijn-pomp, insulinepomp, inhaler) in het ziekenhuis aanmoedigen dan aan een jongere patiënt					
26.	Ik vraag vaker aan oudere patiënten of ze pijn hebben dan aan jongere patiënten					
27.	Ik vraag vaker aan oudere patiënten of ze pijnstilling nodig hebben dan aan jongere patiënten					
28.	Ik controleer vaker bij oudere patiënten of ze de werking van de pijn-pomp (PCA) begrijpen dan bij jongere patiënten					
29.	Ik zou eerder aan een oudere patiënt vragen of ze iets willen hebben om te slapen dan aan een jongere patiënt					
30.	Ik zou eerder aan een oudere patiënt vragen of deze contact wil met een geestelijk verzorger dan aan een jongere patiënt					
31.	Ik betrek jongere patiënten bij besluitvorming met betrekking tot hun gezondheid					
32.	Ik betrek oudere patiënten bij besluitvorming met betrekking tot hun gezondheid					
33.	Ik moedig oudere patiënten aan hun onafhankelijkheid te behouden terwijl ze in het ziekenhuis zijn					
34.	Bij de opname van een oudere patiënt begin ik eerder met de ontslagplanning dan bij de opname van een jongere patiënt					
35.	Ik neem meer tijd om het ontslag bij een oudere patiënt voor te bereiden dan bij een jongere patiënt					
36.	Ik vind het gemakkelijker met de dood van een oudere patiënt om te gaan dan met de dood van een jongere patiënt					

OPACS deel B: Algemene Opvattingen		Nooit	Zelden	Soms	Vaak	Zeer vaak
1.	Ik zorg graag voor oudere patiënten					
2.	Oudere patiënten passen zich gemakkelijk aan aan de patiënten rol					
3.	Oudere patiënten hebben vergelijkbare behoeften in het ziekenhuis					
4.	Oudere patiënten zijn verward					
5.	Oudere patiënten doen alsof ze je niet horen					
6.	Oudere patiënten zijn een last om voor te zorgen					
7.	Oudere patiënten zijn eerder depressief dan jongere patiënten					
8.	Oudere patiënten moeten speciale diëten volgen					
9.	Oudere patiënten kennen de werking en bijwerkingen van hun medicijnen niet					
10.	Oudere patiënten hebben minder pijnstilling nodig dan jongere patiënten					
11.	Oudere patiënten raken minder snel verslaafd aan pijnstillers dan jongere patiënten					
12.	Oudere patiënten raken gemakkelijk verslaafd aan slaapmiddelen					
13.	Patiënten die incontinent zijn, zijn lastig					
14.	Urine-incontinentie hoort bij het verouderingsproces					
15.	Oudere patiënten maken zich meer zorgen om hun darmwerking dan jongere patiënten					
16.	Oudere patiënten schamen zich wanneer hun lichaam ontbloot is					
17.	Jongere patiënten schamen zich wanneer hun lichaam ontbloot is					
18.	Familieleden/mantelzorgers zouden betrokken moeten zijn bij de zorg van oudere patiënten					
19.	Oudere patiënten die niet verward zijn, zijn in staat beslissingen te nemen over hun zorg					
20.	Bij alle oudere patiënten zouden familieleden / mantelzorgers betrokken moeten zijn bij het besluitvormingsproces					
21.	Revalidatie van oudere patiënten is onderdeel van de rol van artsen/ verpleegkundigen					
22.	Oudere patiënten zouden moeten meebeslissen of ze essentiële behandelingen gericht op levensbehoud willen ondergaan					
23.	Te veel oudere patiënten krijgen essentiële behandelingen gericht op levensonderhoud					

Vervolg OPACS deel B: Algemene Opvattingen		Nooit	Zelden	Soms	Vaak	Zeer vaak
25.	Bij hun ontslag is het waarschijnlijker dat oudere patiënten meer afhankelijk zijn dan jongere patiënten					
26.	Oudere patiënten hebben plaatsing in langdurige zorg nodig na ontslag uit het ziekenhuis					
27.	Oudere patiënten hebben een langere opnameduur en bezetten bedden die voor ziekere patiënten gebruikt zouden kunnen worden					
28.	Er liggen teveel oudere patiënten in de ziekenhuizen					
29.	Het zou een goed idee zijn om in alle ziekenhuizen een geriatrische afdeling te hebben					
30.	Oudere patiënten zijn geneigd om minder angstig te zijn bij een opname dan jongere patiënten					
31.	Oudere patiënten gebruiken bij opname in het ziekenhuis meestal meer medicijnen dan jongere patiënten					
32.	Oudere patiënten raken in de war in een nieuwe omgeving					
33.	Oudere patiënten voelen zich geïsoleerd in het ziekenhuis					
34.	In het ziekenhuis zullen oudere patiënten vaker omgaan met andere oudere patiënten					
35.	In het ziekenhuis zijn eten en drinken de meest voorkomende activiteiten voor oudere patiënten					
36.	Oudere patiënten hebben gezonde eetgewoontes					
37.	Oudere patiënten hebben meer huidproblemen dan jongere patiënten					
38.	Oudere patiënten hebben een verminderde perifere circulatie					
39.	Een slechte voedingstoestand hoort bij het verouderingsproces					
40.	Het is waarschijnlijker dat oudere patiënten ondersteuning nodig hebben bij mobiliteit dan jongere patiënten					
41.	Veel oudere patiënten hebben stijve gewrichten					
42.	Oudere patiënten lopen minder risico op vallen dan jongere					
43.	Oudere patiënten hebben de neiging om zorgverleners niet te vertellen dat ze incontinent zijn					
44.	In het ziekenhuis ervaren oudere patiënten een verandering van het ontlastingspatroon					

Vervolg OPACS deel B: Algemene Opmvattingen		Nooit	Zelden	Soms	Vaak	Zeer vaak
46.	Het is waarschijnlijker dat oudere patiënten (open) chirurgische ingrepen hebben dan laparoscopische chirurgie					
47.	Oudere patiënten raken verward na operaties/ procedure					
48.	Oudere patiënten hebben de neiging vaker postoperatieve complicaties te ontwikkelen					
49.	Oudere patiënten zijn bijzonder vatbaar voor nosocomiale infecties (ziekenhuisinfecties)					
50.	Een vroeg ontslag is moeilijk te realiseren bij oudere patiënten					

CHAPTER 8

Structural validity and reliability of the Dutch Older Patient in Acute Care Survey (OPACS), measuring nurses' attitude towards older patients

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Abstract

Background: In clinical practice, nurses' attitudes regarding older patients are important in relation to quality of care. The Older People in Acute Care Survey (OPACS) is an instrument measuring hospital nurses attitudes regarding older patients and is validated in Australia and the USA. The OPACS is translated in Dutch language and content validity of this translation is previously assessed, presenting questionable results. Measurement instruments, however, cannot be "validated" based on content validity evidence alone. Judgmental evidence and statistical analysis should be combined to fully evaluate content domain definition and representation and guide further development.

Objective: Assess structural validity and reliability to fully evaluate the OPACS for use in the Netherlands, complementing previous conducted content validity results.

Design: Cross-sectional.

Setting: Three general hospitals in the Netherlands.

Participants: 201 registered nurses.

Methods: Confirmatory factor analysis was used to assess the structural validity. Reliability was assessed with Cronbach's alpha.

Results: OPACS Section A (measuring practice experiences) demonstrated to have acceptable structural validity- and good reliability outcomes after exclusion of two items (model fit: χ^2 (df = 537) = 8475.40, $p < 0.001$, CFI = 0.96, TLI = 0.96, RMSEA = 0.21; Cronbach's alpha = 0.82). Section B (measuring general opinion) demonstrated to have inadequate structural validity outcomes (model fit: χ^2 (df = 1127) = 9200.29, $p < 0.001$, CFI = 0.68, TLI = 0.67, RMSEA = 0.15). None of the items contributed significant to the factor and therefore no further analysis could be performed (range $p(>|z|) = 0.551 - 0.788$).

Conclusion: Even though structural validity for section A was acceptable, content validity scores of a majority of items in this subscale were low, resulting in questionable use of this subscale for the Dutch context. The findings of this study, in relation to the earlier findings regarding content validity, justify the conclusion that use of the Dutch OPACS in clinical practice and research is not recommended. Given these findings, future research should pursue the development or (cross-cultural) validation of other instruments measuring hospital nurses attitudes towards older patients for the Dutch cultural context. Furthermore, this study demonstrated the influence of cultural differences on measurement instruments and the need for rigorous research before using a measurement instrument in a new culture or context.

Keywords

OPACS, Attitude, Experience, Opinion, Netherlands, Nurses, Hospital, Cross-cultural

Introduction

Worldwide, people are aging.¹ This demographic change results in an increase of older people admitted in hospitals. A growing number of registered nurses will encounter older patients in their daily work and a positive attitude is often promoted.^{2,3} Healthcare professionals need to understand current attitudes regarding older patients when workforce strategies for promoting positive attitudes are to be implemented.^{4,5}

The Older Patient in Acute Care Survey (OPACS), developed in Australia, measures hospital nurses practice experiences and general opinion regarding older patients which are considered aspects of attitude.^{6,7} The OPACS was developed using focus groups with 16 nurses discussing their experience of caring for older patients in the acute care setting. The final OPACS consisted of 86 items related to 13 different aspects influencing the nursing care of older patients. Verbal statements regarding these 13 aspects are scored on a 5 point Likert scale ranging from strongly disagree – strongly agree.⁶ The OPACS has been translated and content validity is assessed in the United States. Results demonstrated excellent content validity scores.⁸ Furthermore, structural validity and reliability outcomes for the American OPACS proved to be good.⁷ After translation towards the Dutch language, however, a majority of items were considered “not to be relevant” by experts, resulting in low content validity scores even though translation was considered good.⁹ Why the content was not considered relevant for the Netherlands, and whether or not this is reflected in the construct is unknown, making it difficult to adjust the OPACS to the Dutch context.

In literature, the concept of content validity has been controversial since its inception and it is described that although content validity is a fundamental requirement of all assessment instruments, measures cannot be considered “valid” based on content validity evidence alone.¹⁰ Both judgmental and statistical analysis of test content provide important information regarding content- and construct validity and both approaches have their limitations. Therefore it is recommended to use both types of analysis to fully evaluate content domain definition and representation.¹¹⁻¹³ With assessment of the structural validity and reliability of the Dutch OPACS, content validity results of a previous study will be complemented, resulting in a full evaluation of the OPACS content and use for the Dutch cultural context.

The aim of this study is therefore evaluating the construct validity and reliability of the Dutch OPACS, complementing previous study results.

Methods

Design

This study followed a multicenter cross-sectional design.

Setting and subjects

Data of nurses from the Netherlands were derived over a six-month period. Registered nurses working in three general hospitals located in the middle of the Netherlands were recruited and included after informed consent was obtained. Nurses were invited to participate through e-mail from their ward manager, flyers, and a message on the online hospital communication boards. Nurses completed the Dutch OPACS and several questions regarding their socio-demographic characteristics online. The study was approved by the medical review board of the University Medical Center Utrecht, the Netherlands (METC protocol number: 14-345/C).

Measurement

The OPACS is originally developed in Australia.⁶ It consists of two scales; section A measuring practical experience (36 items) and section B measuring general opinions towards older patient's needs (50 items) on a 5 point Likert scale. The Australian OPACS demonstrated good face validity and high reliability scores (Kappa 0.76). The United States version of the OPACS showed a high Scale-Content Validity Index/universal agreement (S-CVI/ua) score (S-CVI/ua = 0.92)⁸ and good structural validity and excellent reliability scores (Cronbach's alpha = 0.93).⁷ The American OPACS was translated and validated on content in the Netherlands, demonstrating positive translation but alarming content validation results (S-CVI/average 0.62) with major differences in rating of relevance between experts (S-CVI/ua = 0.13).⁹ The same Dutch OPACS was used for data collection in the present study to assess the construct validity.

Analysis

Confirmatory factor analysis (CFA) was used to assess the construct validity of the Dutch OPACS. The aim of CFA is to test a hypothesized factor structure or model and assess its fit to the data. Relations of indicators (observed variables) to factors (latent variables) as well as the correlations among the latter are tested in the measurement model.¹⁴

First, missing values were assessed to determine whether list-wise deletion could be used. Then CFA was performed for Dutch OPACS section A and section B by testing several models using Lavaan: an R package for structural equation modeling.¹⁵ Evaluation of each model was based on considering a variety of fit measures: the χ^2 minimum fit function test; the Comparative Fit Index (CFI); the Tucker Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA). Values of $> .95$ for the CFI/TLI indicate a good fitting model. The RMSEA should be $< .06$ indicating a good fitting model.^{14, 16} All analysis are performed using R.¹⁷

Results

Of the participating sample, only complete cases were included in this study (73,6%). The socio-demographic characteristics of respondents with missing values were not significantly different from complete cases (all $p > .05$). Socio-demographic characteristics are presented in Table 1.

Table 1. Sample characteristics

	NL respondents (n= 201)
Gender, female n (%)	185 (92.0)
<i>Missing, n</i>	1
Age, mean (SD)	38.7 (12.3)
Highest education, n (%)	
AAS,	113 (56.2)
BSN	80 (39.8)
Masters/PhD	6 (3)
<i>Missing, n</i>	2 (1.0)
Years of experience, mean (SD)	16.0 (12.0)
<i>Missing, n</i>	5
Hours a week working, mean (SD)	26.7 (8.8)
<i>Missing, n</i>	1

AAS = An Associate of Science in Nursing BSN = Bachelor of science in nursing,
 PhD = completed a doctoral program in nursing or related fields,
 SD = Standard deviation

Validity and reliability of the Dutch OPACS section A (practice experiences)

In Table 2, the different CFA models assessing section A (practice experiences) are presented. The unidimensional model for the Dutch OPACS section A (Model 1) did fit the data (χ^2 (df = 594) = 9088.53, $p < .001$, CFI = .96, TLI = .96, RMSEA = .21). There were no items with a negative loading on the factor “practice experiences”. However, 2 items (items 20, 22) did not significantly contribute to the factor and were therefore excluded. As expected, exclusion of these two items did not worsen the model fit to the data in Model 2 (χ^2 (df = 537) = 8475.40, $p < .001$, CFI = .96, TLI = .96, RMSEA = .21). Internal consistency was considered good (Cronbach’s alpha = .82 (.79 – .84)).

Table 2. Confirmatory Factor Analysis model fit statistics for OPACS-NL section A (practical experience) 36 items

Model	Model fit statistics						Items deleted
	χ^2	<i>df</i>	<i>p</i>	CFI	TLI	RMSEA (95% CI)	
Model 1. 36 items, only factor structure constrained	9088.53	594	<.001	.96	.96	.21 (.20-.21)	20, 22
Model 2. 34 items, exclusion of non-significant loading of items on construct	8475.40	527	<.001	.96	.96	.21 (.21-.22)	

χ^2 = Chi-square statistics, *df* = degree of freedom, CFI = Comparative Fit index, TLI = Tucker Lewis Index, RMSAE = Root Mean Square Error of Approximation, CI = Confidence Interval

Validity and reliability of the Dutch OPACS section B (general opinion)

The same CFA model was used to assess the Dutch OPACS section B: general opinion. The unidimensional model for the Dutch OPACS section B (Model 1) did not fit the data well (χ^2 (*df* = 1127) = 9200.29, p < .001, CFI = .68, TLI = .67, RMSEA = .15). When looking at the items separately to assess which items should be excluded to improve the model fit to the data, it appeared that none of them contributed significant to the factor (Table 3) and therefore no further analysis could be performed (range $p(>|z|)$ = .551 - .788).

Table 3. Final item loadings and test statistics for the Dutch OPACS section B (general opinion) 50 items

	Estimate	Std Error	Z-value	P(> z)
Q1	1	-	-	-
Q2	-20.06	33.891	-0.592	0.554
Q3	-9.958	16.882	-0.59	0.555
Q4	0.573	2.131	0.269	0.788
Q5	26.751	45.199	0.592	0.554
Q6	30.953	52.279	0.592	0.554
Q7	8.453	14.256	0.593	0.553
Q8	10.749	18.103	0.594	0.553
Q9	-13.898	23.583	-0.589	0.556
Q10	23.934	40.431	0.592	0.554
Q11	23.611	39.897	0.592	0.554
Q12	4.598	7.967	0.577	0.564
Q13	31.201	52.612	0.593	0.553
Q14	0.655	1.934	0.339	0.735
Q15	-8.616	14.639	-0.589	0.556
Q16	-2.405	4.284	-0.561	0.574
Q17	-1.866	3.507	-0.532	0.595
Q18	-3.493	6.235	-0.56	0.575
Q19	-1.196	2.848	-0.42	0.675
Q20	-5.06	8.888	-0.569	0.569

Table 3. (continued)

	Estimate	Std Error	Z-value	P(> z)
Q22	-1.657	3.383	-0.49	0.624
Q23	-10.25	17.253	-0.594	0.552
Q24	-13.517	22.697	-0.596	0.551
Q25	-15.165	25.516	-0.594	0.552
Q26	-13.69	23.159	-0.591	0.554
Q27	2.459	4.563	0.539	0.590
Q28	10.073	17.208	0.585	0.558
Q29	-10.526	18.017	-0.584	0.559
Q30	16.081	27.096	0.593	0.553
Q31	-7.984	13.58	-0.588	0.557
Q32	-18.842	31.723	-0.594	0.553
Q33	-14.303	24.088	-0.594	0.553
Q34	-1.889	3.997	-0.473	0.637
Q35	-13.25	22.46	-0.590	0.555
Q36	3.412	5.8	0.588	0.556
Q37	-9.591	16.294	-0.589	0.556
Q38	-13.721	23.176	-0.592	0.554
Q39	-6.706	11.330	-0.592	0.554
Q40	-13.078	22.037	-0.593	0.553
Q41	-14.787	24.927	-0.593	0.553
Q42	22.193	37.456	0.593	0.554
Q43	-5.629	9.474	-0.594	0.552
Q44	-9.484	15.958	-0.594	0.552
Q45	-10.363	17.511	-0.592	0.554
Q46	-5.939	10.171	-0.584	0.559
Q47	-17.327	29.16	-0.594	0.552
Q48	-18.535	31.355	-0.591	0.554
Q49	-17.146	29.049	-0.59	0.555
Q50	-16.246	27.387	-0.593	0.553

Discussion

This study assessed the structural validity and reliability of the Dutch OPACS measuring practice experiences and general opinion of hospital nurses regarding older patients. The items of section A: practice experiences, demonstrated to measure one construct. Only two items did not contribute to the construct and were therefore excluded. None of the items in OPACS section B, contributed significant to the factor general opinion, meaning that none of the items measured the construct solely making it impossible to include good items and exclude bad items using statistics.

In a previous study by van Schelven et al.,⁹ low content validity scores for 20 (58.8%) of the 34 items were presented for subscale A: practice experiences. By assessment of items with low content validity, several cultural reasons were found explaining the low rating by experts. First, 26 items (72.2%) mentioned a difference in care giving between old and young patients with only 5 (19.2%) of these items considered relevant. Focusing on the difference in care giving between old and young patients undermines the Dutch vision that care should be adjusted to the need of the individual patient (the same basic principle for old and young) which is taught in education and in clinical practice in the Netherlands. For example the item: "I ask older patients if they have pain more often than I ask younger patients", with total agreement reflecting a positive attitude, is considered not to be relevant because nurses should assess pain three times a day in every hospitalized patient regardless their age according to Dutch quality systems. Second, the relation between several items and "positive or negative attitude" was unclear for experts resulting in a questionable scoring system. For example, the question: "I am more likely to speak in simple language to an older patient than to a younger patient" with total agreement reflecting a positive attitude. However, language used by nurses should always be adjusted to the individual patient, and not be based on age alone because this can lead to a feeling of stereotyping by the older patient influencing the perceived quality of care.¹⁸ Therefore, not agreeing on this item can also be explained as "good attitude" by nurses respecting the older patient and approach him/her as an adult. This makes it disputable what "good attitude" is in relation to the item as presented by the OPACS. Before this subscale can be used in clinical practice in the Netherlands, items should be re-examined, discussed and adjusted by experts on content. The number and form of adjustments needed is so rigorous that this will result in a new instrument which means that 1) it will not be comparable with the OPACS-US or any other existing instrument making cross-national comparisons impossible and 2) might not be worth the effort with other existing instruments possibly more suited to the Dutch culture in its origin. The study by van Schelven et al.⁹ also presented low content validity scores for 60% of the items in section B: general opinion for comparable reasons as with section A. Results from the content validity study by van Schelven.⁹ combined with this study suggest that the translated version of the OPACS in the Netherlands should not be used.

This study demonstrated that assessment of both content- and structural validity are necessary to fully comprehend the validity of an instrument in a particular culture.¹⁰ Content validity is considered a fundamental requirement.¹⁰ Our results support this, demonstrated by the Dutch OPACS section A which would be assessed valid if only structural validity and reliability scores would have been conducted. Too often, instruments are tested only using quantitative tests to assess validity and reliability when used in different cultures, settings and groups. Our studies demonstrate that validity and reliability of instruments can differ substantial between countries emphasizing the importance for rigorous cross-cultural validation before an instrument should be used in clinical practice in different cultures and in research. Researchers should therefore always assess content validity and describe possible (cultural) differences on item and scale level, as this influences the results (and interpretation of results) of the study conducted.

Some considerations regarding this study should be discussed. Missing data were not imputed and cases were excluded (even though missing values were completely at random) to maximize the validity of the item selection during the item reduction process. This is considered acceptable as no differences were found in characteristics between full cases and cases having missing values and performance of analysis was not affected by sample size. Furthermore, considering the response rate and sample size of nurses from the different centers, the representativeness (having a convenience sample) can be questioned and selection bias could have led to an overestimation of effect as nurses with interest in older patients are more likely to participate. However, this is not considered a problem as the primary focus was on structural validation of the Dutch OPACS and not an exploration of attitudes of Dutch hospital nurses. Furthermore, no sample size problems were indicated in analysis of the data. Third, OPACS section A proved unidimensional. However, whether the same construct is measured in the United States as in the Netherlands is not assessed in this study. Measurement invariance between items should always be assessed before comparisons between countries can be performed.¹⁹ With regards to the Dutch OPACS, it is likely that the Dutch subscale measures a different construct taking content validity results into account.

Conclusion

In conclusion, in clinical practice, identifying attitude problems is an important step to improve the quality of care for older patients.⁴ However, it is important that valid and reliable instruments are used to do so. The results from this study cannot justify the use of the Dutch OPACS in clinical practice and/or research. Even though section A (measuring practice experiences) demonstrated to have good structural validity results, items measuring practice experiences are considered unclear in interpretation and scoring and therefore not ready for use in the Netherlands. Section B (measuring general opinion) also demonstrated not to be applicable for use in the Netherlands as a result of low structural validity and reliability. Although section A might have some pointers for developing a new instrument, it might not worth the effort having other instruments potentially more suited to the Dutch culture in its origin.

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GENERAL DISCUSSION

General Discussion

The opening question of this thesis was simple: “Why, when you squeeze an orange as hard as you can squeeze it, does orange juice come out?”. The answer is equally simple, it is because that is what’s inside. So the reality is, what comes out is what’s inside, and if you want something else to come out, you should change the inside.

There is a relation between this metaphor and nursing care. The anonymous nurse, quoted at the beginning of this thesis, was in panic. Together with her colleagues she did what was familiar to her: restraining. Her knowledge and attitudes influenced her behavior. Possibly, if she had knowledge regarding signaling the true problem of the patient, alternative interventions might have come up, enabling her to avoid the restraints on Mr. Kelders.

In the hospital setting deficits in knowledge and negative attitudes of nurses regarding the care for older patients are widely acknowledged, influencing the quality of care that older patients receive and emphasizing the importance that knowledge and attitude of nurses should be optimized. When nurses gain insight in their knowledge and attitudes, knowledge gaps and negative attitudes will be revealed which in turn can stimulate a desire to acquire knowledge and/or change towards a positive attitude.

The objective of this thesis was therefore to find a way to measure knowledge and attitudes of hospital nurses regarding older patients, or in other words, determine their orange juice enabling them to change the inside.

Introduction

Negative attitudes and knowledge deficits of nurses regarding older patients are described in literature since the 1950s, mentioning that these attitudes and knowledge deficits influence the quality of care received by older patients in the acute care setting.^{1,2} These results however, are based on several measurement instruments which are now considered outdated, too country specific, mixing the measurement of knowledge with measurements of opinions, beliefs, and experiences or they lack inclusion of care perspectives.^{1,2} The demand for new, rigorously tested knowledge and attitudes instruments across the world is urgent. Especially with an increasingly aging population,³ higher numbers of older patients admitted to hospitals being more complex with individual care needs, and more hospital nurses encountering older people in their daily work.⁴⁻⁶

The final objective for clinical practice and education is to improve all nurses and student nurses' knowledge and attitudes regarding older people. But we can't assess their needs if we continue to use instruments which might be invalid and/or (therefore) unreliable. Instruments measuring current knowledge and attitude levels of nurses should be developed and/or validated rigorously, making it possible to make true, rightful assumptions. Only then, effects of educational and quality improvement programs regarding nurses and student nurses' knowledge and attitudes towards older patients can be measured and designated as (un)successful.

Because of this, the objectives of this thesis were as follows:

1. *Develop, validate and assess the reliability of a new measurement instrument measuring hospital nurses' knowledge regarding older patients in the Netherlands and the United States of America.*
2. *Assess the level of validity and reliability of an existing instrument measuring nurses' attitudes towards older patients in the Netherlands and the United States of America.*

In the studies described in this thesis we used the definition of the revised taxonomy of Bloom⁷ to fully comprehend the cognitive domain for the development of the knowledge instrument. The taxonomy of Bloom is divided into two dimensions: the knowledge dimension (factual knowledge, conceptual knowledge, procedural knowledge and metacognitive knowledge) and the cognitive process dimension (remember, understand, apply, analyze, evaluate and create).⁷ This taxonomy enabled us to rephrase items in such a manner that they also measured the more abstract knowledge domains of (student) nurses. Thus, not only factual knowledge, but also conceptual and procedural knowledge in relation to aspects of the cognitive process dimensions. By including a second construct "certainty regarding own knowledge", we aimed to gain insight in the metacognitive knowledge levels of (student) nurses.

To study nurses' attitudes we started with a broad definition described in social psychology: "attitude is an evaluation of an attitude object, ranging from extremely negative to extremely positive".⁸ During the conduction of the studies we felt the need to look for a more detailed definition of attitudes: the multicomponent model.^{9,10} The components described in this model (affective, behavioral and cognitive) influence each other and ultimately determine the attitudes of nurses.^{11,12}

All studies were conducted based on the guidelines and criteria stated by the Consensus-based Standards for the selection of health Measurement Instruments (COSMIN).^{13,14} The COSMIN initiative aimed to reach consensus about which measurement properties are considered to be important, their most adequate terms and definitions, and how they should be assessed in terms of study design and statistics.¹⁵

Main findings of the thesis

In general, the studies in this thesis regarded two instruments. First, the newly developed Knowledge about Older Patients-Quiz (KOP-Q), which measures hospital nurses' knowledge about older patients and certainty regarding this knowledge. To ensure that a wide range of knowledge-levels can be assessed using the KOP-Q, bachelor of nursing students and nurse specialists in geriatrics were also included in the validation study. The current knowledge of (student) nurses is presented in a study using the KOP-Q. The second instrument, the already existing Older Patients in Acute Care Survey (OPACS), measures nurses' practice experiences and general opinion towards older patients in the acute care setting. This instrument was statistically validated for use in the USA and cross-culturally validated for use in the Netherlands.

The main findings regarding the Knowledge about older Patients – Quiz (KOP-Q), were as follows:

- Hospital nurses knowledge regarding the care for older patients is operationalized in seven themes: normal aging, geriatric conditions, signaling problems in old age, interventions, family interventions, vulnerable patients versus older patients and internal motivation for learning and reflection, which formed the conceptual basis of the KOP-Q (Chapter 2).
- The 30-item KOP-Q is considered to be valid, psychometrically sound and comprehensive for assessing 'knowledge about older patients' of hospital nurses, nursing students and nurse specialists in geriatrics in the Netherlands (Chapter 3).
- The 30-item KOP-Q is considered to be valid, psychometrically sound and comprehensive for assessing 'certainty regarding own knowledge' of hospital nurses, nursing students and nurse specialists in geriatrics in the Netherlands (Chapter 3).
- The KOP-Q is considered to be cross-culturally valid to assess hospital nurses' knowledge regarding older patients and 'certainty regarding their knowledge' in the United States of America (Chapter 4).

Main findings regarding the knowledge and certainty of (student) nurses in the Netherlands:

- A substantial proportion of registered hospital nurses and first- and final year nursing students demonstrated insufficient knowledge about older patients (Chapter 5).
- Registered nurses and final year nursing students are certain regarding their knowledge about older patients (Chapter 5).
- There is a difference in knowledge levels for registered nurses and nursing students, based on their different educational qualifications (Associate Degree versus Bachelor of Nursing degree) (Chapter 5).
- There is a link between years of experience and higher knowledge levels of nurses, however even nurses with more experience do not reach optimum knowledge levels (Chapter 5).

The main findings regarding the Older Patients in Acute Care Survey (OPACS):

- The OPACS-US is considered to have good psychometrics for use in the United States measuring two solid constructs: 'practice experiences' and 'general opinions' (Chapter 6).
- The translation of the OPACS-US towards the Dutch language was considered good by experts (Chapter 7).
- Experts considered a substantial proportion of questions of the OPACS not to be relevant for the Dutch context (Chapter 7).
- The 'practice experiences' subscale of the Dutch OPACS measured one construct with 34 (of the original 36) items contributing to the construct. Structural validity scores of the 'general opinion' subscale proved invalid for use in the Netherlands (Chapter 8).

Reflections on the KOP-Q

For the development and validation of the KOP-Q, we based our methods in line with the criteria stated by the COSMIN (Figure 1).^{13,14}

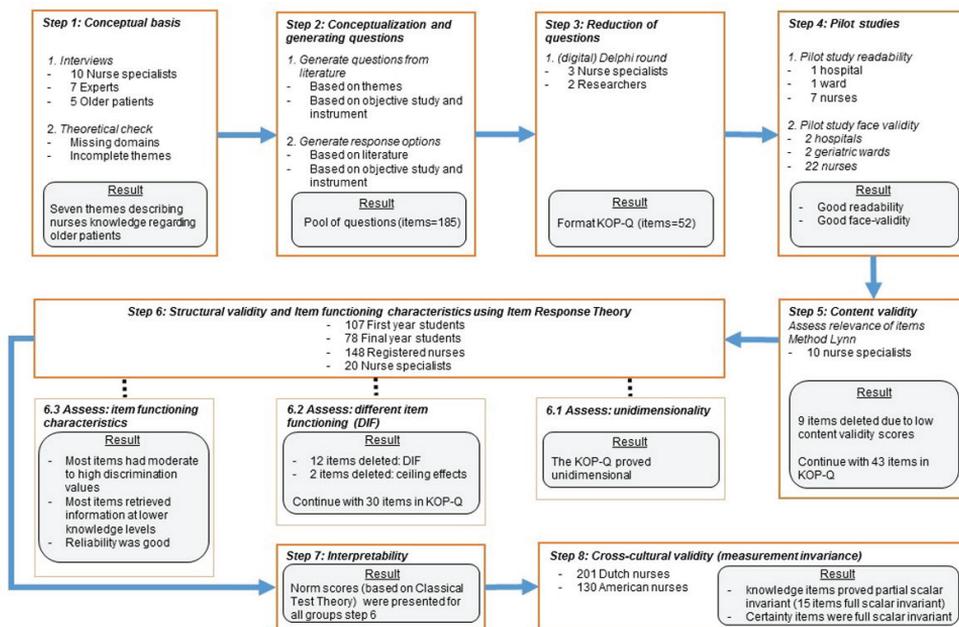


Figure 1. Development and validation steps of the Knowledge about Older Patients – Quiz.

Our studies demonstrated that the rigorously developed and described origin of the KOP-Q (Figure 1, steps 1,2,3) was helpful in later phases of evaluating the measurement properties, in both the decision making processes and minimizing the number of adjustments made to the instrument (Figure 1, steps 4-8). During the development and validation of the KOP-Q, several types of triangulation (data-, investigator-, theory- and methodological triangulation) were applied. Doing so, the KOP-Q overcame weaknesses and intrinsic biases and/or other problems that can occur when performing single-data, single-investigator, single-theory and single-method studies.¹⁶ Furthermore, by including clinical practice into a variety of the study designs, the content and use of the KOP-Q is acknowledged by the target group, which increases the use of the instrument in clinical practice.

Psychometricians have developed a number of different measurement theories. In our studies we discussed only two different approaches: Item Response Theory (IRT) and Classical Test Theory (CTT).¹⁷ We used IRT to assess the measurement properties of the KOP-Q (Figure 1, step 6) for two main reasons. In IRT, parameters used in the models (difficulty/discrimination) are not sample- or test-dependent, whereas the true-scores defined in CTT are always in the context of a specific test, meaning that results only apply to those students taking that test influencing generalizability.¹⁸ A second reason for using IRT, was because in

literature it is described that factor analysis (CTT based) of dichotomous items can produce factors that reflect the distributions of the items more than the content of the items resulting in uninterpretable or even misleading factors.¹⁹ Despite the advantages IRT offers,¹⁸ results are difficult to interpret, influencing interpretability and usability of the KOP-Q. In CTT, a test score is simply the sum of correctly answered items. Given the complex interpretation of IRT results, we compared summed scores (CTT) with the test scores generated through IRT analysis. Because the CTT scores were closely correlated with the IRT-derived test scores in our study, the CTT approach can also be used. This way, educators, researchers but also respondents themselves can calculate, interpret and compare the knowledge levels achieved fairly easy. Furthermore, we analyzed CTT based scores of several norm-groups (Figure 1, step 7) which enables educators and/or researchers with sufficient information how to interpret scores or change in scores of respondents (interpretability).¹⁵

Cross-cultural studies are getting more attention by researchers.²⁰ Because these studies are useful to verify differences and similarities between individuals and cultures, we must have instruments that are properly adapted and can provide measurement equivalence (whether the instrument, items or scale, functions in exactly the same way in different populations) regardless of the context in which they are used.²⁰ We followed all essential steps in the translation process of the KOP-Q as described in literature.^{21,22} Furthermore, to test whether the translated KOP-Q was valid for use in the USA (Figure 1, step 8), we assessed the level of measurement invariance using IRT techniques which are considered a powerful method for cross-cultural validation.¹⁵ This evaluation of psychometric properties is essential and ensures that the KOP-Q is in usable condition for the USA. No cultural adaptations were necessary.

In our studies, a substantial proportion of registered nurses and nursing students (first and final year) demonstrated insufficient knowledge regarding the older patients, even though they were certain about their knowledge. The topics which form the conceptual basis of the KOP-Q are taught to students in the first year of the bachelor of nursing program and nurses encounter these topics throughout their career from the start of their education till retirement. This frequent exposure however, is not reflected in the results. Therefore, we believe that basic care themes (such as: normal aging, geriatric conditions [delirium, depression, dementia, pressure ulcers, incontinence, nutrition, polypharmacy, falling], signaling problems in old age, interventions and family interventions) are not only important for nursing students but should repeatedly play a key role in educational programs for registered nurses working in clinical practice as well.

Motivation for learning was frequently mentioned by experts in the developmental phase of the KOP-Q as a prerequisite for gaining knowledge. Our results demonstrated that most (student) nurses are certain about their answers given on the KOP-Q, even when answers

were wrong. Insight in the metacognitive knowledge dimension (knowledge of cognition in general as well as awareness and knowledge of one's own cognition)⁷ of (student) nurses can be a useful addition for educational interventions, because it is unlikely that motivation for learning increases when people think they already have the knowledge and positive attitudes.²³ Providing (student) nurses insight in their performance can stimulate motivation if applied correctly (e.g. never compare (student) nurses unfavourably and publicly with their peers).²⁴

Gaining insight in the knowledge of (student) nurses and how nurses develop professionally and learn across a nursing career is important. This way, effective educational interventions (formal and informal) can be developed and tested to improve the knowledge of (student) nurses. Evidence regarding care for older patients should be used in the development of educational curricula, so that new (and experienced) registered nurses are correctly prepared for contributing to the needs of older patients in future health care systems.²⁵

Reflections on the OPACS-US and Dutch OPACS

The OPACS subscales "practice experiences" and "general opinion" range from highly negative to highly positive, and for this reason one could say that the OPACS evaluates nurses attitudes regarding care for older patients. However, findings of our cross-cultural validity studies raised questions regarding the use of this simple definition of attitudes, as results from our content-validity study and structural validity study could not be fully explained. Attitudes proved to be well defined concepts based on robust theoretical and empirical work in other fields of research. Using a more operationalized model of attitudes in our studies helped to understand our results, but raised questions regarding the OPACS origin. It was not described in literature in what manner the original OPACS was based on a theoretical operationalization of attitudes. This makes it difficult to justify the assumption that nurses' scores on the OPACS instrument measures the whole construct of attitudes and whether the scores are related to actual behavior or care related outcomes in clinical practice.

The OPACS is developed in 2000²⁶ and is used in clinical practice and research today. To our knowledge, no statistical validation and reliability evidence such as structural validity, criterion validity, test-retest reliability, measurement error, responsiveness and interpretability has been described in literature to support the use of this instrument. We did assess the structural validity of the OPACS-US, which is only a minor step in the process of validation (Figure 2, step 2). Further validity and reliability testing of the OPACS-US is therefore recommended. Even though translation of the OPACS-US towards the Dutch language was considered good, the content validity and structural validity results for the Dutch OPACS were poor, meaning that cultural adaption is still necessary before the OPACS can be used in the Netherlands (Figure 2, step 3 and 4).

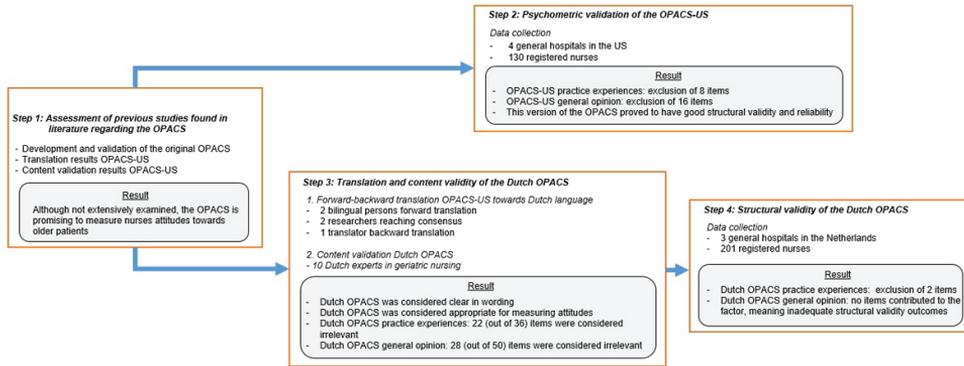


Figure 2. Validation steps of the OPACS-US and Dutch OPACS

Our studies demonstrate that the constructs “practice experience” and “general opinion” are more sensitive to cultural differences than the construct “knowledge” measured by the KOP-Q. This difference in cultural sensitivity can possibly be explained by the origin of both instruments. Items of the KOP-Q are developed based on facts, therefore it is difficult for one’s culture to influence the answers given. The OPACS asks respondents thoughts about their behavior and beliefs, which are highly influenced by culture (values and norms).²⁷ A second reason can be found in decisions made in the development process of both instruments. The KOP-Q was developed with global use in mind, by deleting possible cultural sensitive items during the reduction of questions phase (Figure 1, step 3). The OPACS however, was developed to assess the difference in attitudes between rural and metropolitan nurses in Australia,²⁶ indications for global use are not mentioned in the studies. We chose to start with all the items from the original OPACS-US and not to continue with the structural validated OPACS-US (which has items eliminated) for the cross-cultural validation in the Netherlands (Figure 2, step 2). This decision was made, because we did not know on forehand to what extent items were cultural sensitive (It could be possible that items which did not contributed to the factors in the USA, were important in the Dutch cultural context and vice versa). Therefore, by making this decision we ensured that no items were excluded on forehand which might have been important to measure practice experiences or general opinion in the Netherlands. Our experiences during the cross-cultural validation process and findings emphasize the importance that instrument developers should decide whether or not an instrument is supposed to be used globally prior to development. Decisions in the development process should be made accordingly, so researchers performing future cross-cultural validation studies know whether items are (not) expected to be cultural sensitive. Moreover, our results demonstrate that rigorous cross-cultural research regarding instrument validity and reliability should not be neglected if researchers or practice wants to use them in their own culture/context.

Reflections on using the COSMIN

Developing and testing measurement instruments is a complex and methodological challenging task, which has been demonstrated in chapter 1 of this thesis. We used the COSMIN checklist as a guideline in the development and validation of the KOP-Q and validation of the OPACS-US and Dutch OPACS. The aim of the COSMIN initiative is to improve the selection of health measurement instruments, and the focus is on Health-Related Patient-Reported Outcomes.¹⁵ However, the consensus based standards are also useful for evaluating studies on other kind of health measurement instruments, such as clinical rating scales or performance-based tests.¹⁵ The COSMIN checklist (a standardized tool developed using an international Delphi study) is based on standards for design requirements and appropriate statistical methods for assessing measurement properties and can be used to evaluate the methodological quality of studies on measurement properties or serve as a guidance for designing or reporting studies on measurement properties.¹³ Using the COSMIN assured us that all necessary steps were conducted, studies met the standards for excellent quality and all information necessary to evaluate the quality of our studies, were reported. As an abundant amount of measurement instruments (also for measuring one single concept) used in research and clinical practice exist,²⁸ it is important that only high quality measurement instruments are used. The COSMIN checklist can enable evidence-based instrument selection and is useful as a checklist to develop, validate and report outcomes of (new) measurement instruments ensuring researchers and/or other users of the instrument that quality standards are met.

Recommendations for future research

In literature, there is limited evidence from well-designed studies regarding the knowledge and attitudes of nurses. Only if we fully understand the factors associated with knowledge levels of nurses and positive/negative attitudes, nurses behavior and the impact on quality of care can be assessed and improved by implementing effective workforce strategies.² Using up to date, valid and reliable measurement instruments is a prerequisite for making rightful assumptions as a researcher, and for measuring the effect of interventions aiming to increase knowledge and attitudes of (student) nurses regarding the care for older patients. Therefore, the quality of the instruments used should remain under study and reported. One way to do this is assessing and reporting validity and reliability results every time an instrument is used in a new dataset (replication).²⁹ Not as a goal in itself of which outcomes are published separately, but rather as a section in papers when reporting on quality and use of the instrument. To encourage researchers in doing this, instrument developers could deliver standard queries, which help researchers to perform validity and reliability analysis in their datasets. By reporting these results, regarding the validity and reliability of the instrument, a reader can comprehend the results under study much better because interpretation of results can differ considerable when validity and reliability outcomes of the instrument change (they often do as a lot of instruments are test and sample dependent).¹⁵

Moreover, because validity and reliability of instruments are under constant assessment in new datasets, a distinction in literature will occur between high and low quality instruments, which helps researchers in choosing the right instrument for their study purpose.

A limitation of (all) knowledge instruments used in studies is that required knowledge changes over time and can become out of date. The origin of the KOP-Q for example, is developed through both judgmental (interviews) and theoretical checks (literature). The items find their origin only in literature (protocols, guidelines, systematic reviews). However, since evidence in nursing continues to develop rapidly, also the validity and relevance of KOP-Q items can change over time and should therefore remain under study. The extensive description of the KOP-Q origin and development process is useful for future researchers when validating or updating the content.

When researchers aim to measure attitudes of nurses, it is recommended that the origin and item development of the instrument used is based on a theoretical framework of existing attitude models. Today, existing self-assessment instruments presume to measure “attitudes” as a whole. However, when critically assessed, they measure only parts of the attitude construct. To overcome this problem, study designs can incorporate methodological triangulation (for example: combining questionnaires with observational research designs) to fully evaluate the attitude of nurses. We believe the use of self-assessment scales alone is not sufficient.

Implications for clinical practice and education

A substantial proportion of nursing students (first and final year) demonstrate insufficient knowledge regarding older patients, even though we know they did pass exams during their education. This raises the question what the difference is between multiple choice exams students take during initial education and the KOP-Q. One explanation lies in the origin of the instruments. In exams, often items are drawn from classroom material (i.e. PowerPoints, articles, books etc). By doing so, the origin of the exams shifts towards the ability of students to reproduce what is taught. So exams assess whether students can remember and understand factual and/or conceptual knowledge rather than apply, analyze and evaluate procedural and metacognitive knowledge. The KOP-Q however, finds its origin in what nurses need to know about older patients in clinical practice and questions are developed in cooperation with experts in clinical practice resulting in items measuring procedural knowledge, meaning that the KOP-Q measures a wider range of knowledge dimensions. Lower order thinking skills (remember/understand) are equally important as they provide the foundation for higher order thinking skills (apply, analyze and evaluate).⁷ However, if the more abstract knowledge dimensions and higher order skills are never assessed during education, students might experience difficulties in clinical practice after graduation as they might not be able to transfer their knowledge in clinical practice. By

involving experts for clinical practice in examination, exams can possibly be improved with regards to relevance and appropriateness, measuring a wider range of knowledge and cognitive processes dimensions.

Student nurses and registered nurses should know (or learn to know) what they can do and even more important, what they can't do, so mistakes can be avoided which is especially important when caring for older patients which are highly dependent on them.⁶ An educational bonus provided by the KOP-Q is the 'certainty bar' which provides information on (student) nurses insight in his/her level of knowledge. It gives educators the unique opportunity to provide meaningful feedback fitted on the student needs, for example: 'You are overconfident, you don't know as much as you think' (unconscious incompetent), or, alternatively, 'You underestimate your capabilities. You know more than you think' (unconscious, competent). Using this information, educational interventions can be fitted to individual (student) nurses knowledge levels and self-reflection on their knowledge levels, possibly increasing the relevance.

Knowledge and attitudes are topics frequently reported in today's curricula (both in clinical practice and in nursing school). Instruments measuring knowledge are often used to test student and/or registered nurses knowledge levels which can be passed or failed rather than to reflect. The KOP-Q however, is especially useful when used and experienced by (student) nurses as an educational tool, enhancing discussion and learning from each other on the wards and in the nursing schools. To measure and/or discuss attitudes, no valid tool exist in the Netherlands. As possessing positive attitudes towards older patients are considered highly important in the nursing care, other methods can be applied to educate students, such as mirror interviews, shadowing, training with simulation patients, and so on. Literature describes that in all methods, providing feedback and reflection (in-action and on-action) should play a key role but are often not applied correctly.³⁰⁻³² By discussing results from knowledge tools and reflecting on their attitudes with colleagues, (student) nurses can receive feedback from each other on their actual knowledge, attitudes and behavior they present, which is normally unknown to oneself. This insight can help (student) nurses reflect on their care for older patients, increase their motivation for learning and by doing actual learning and reflecting on the care they give, influence the quality of care older patients receive.

Conclusion

The KOP-Q (Knowledge about Older Patients-Quiz) is a valid and reliable measurement tool which can be used for both education purposes in clinical and educational practice as well as for research purposes. The KOP-Q enables educators/researchers to measure knowledge and certainty regarding this knowledge, to give feedback on (student) nurses' knowledge and self-reflection levels or to use as an instrument to provoke discussion between (student) nurses enabling them to learn from each other. The OPACS (Older Patient in Acute Care Survey) can be used in the USA to assess nurses practice experiences and general opinion regarding older patients and can be used for educational purposes. However, more evidence regarding validity, reliability, responsiveness and interpretability is needed. In the Netherlands, there is still a need for a rigorous developed instrument measuring attitudes of nurses towards older patients. If we are able to measure and understand the knowledge and attitude levels of (student) nurses using measurement instruments which can make true, rightful assumptions, shortcomings of (student) nurses can be addressed in educational and quality improvement programs positively influencing the quality of care older patients receive. Given the described changes in the hospital populations combined with the societal challenges, this should be the priority concern of professionals, educators and policymakers.

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SUMMARY

SUMMARY

The world population is aging, with in recent years mostly an increase in number among the very old (those aged 80 years or over). This increase of older people is also reflected in the number of older patients admitted to general hospitals. Older patients are a highly diverse patient population, with every patient having different care needs: one size does not fit all. Because of this, guidelines and protocols are often not applicable to the situation of the individual older patient, suffering multimorbidity and an individual mix of geriatric problems. To prevent development of new geriatric problems or complications during hospitalization, older patients are highly dependent on nursing care. Nurses have a key role in risk assessment, performing interventions for prevention purposes, signaling and screening for potential problems and care related complications and performing suitable interventions when problems and complications do occur. Nurses with good knowledge and a positive attitude regarding older patients are essential for the quality of nursing care because both their knowledge and attitude are related to their behavior.

Since the 1950s studies have identified knowledge deficits and negative attitudes of registered nurses and nursing students towards geriatric nursing and other work with older patients. These attitudes are prevailing in recent years and highlight the low status of working with older patients. However, the instruments used in these studies show lack of validity and reliability. For example, instruments that measure knowledge are outdated; too country specific; mix measurement of knowledge with opinions, beliefs and experiences; or do not include care perspectives.

To measure attitude, two instruments are mostly used (the Kogan's Old People Scale [KOP] and the Aging Semantic Differential [ASD]). Both instruments, in contrast to the knowledge instruments, are extensively validated and tested on reliability. They are valid and reliable, however, considered for a specific target group and both miss a caring dimension (assess stereotypes regarding older people, not patients). One instrument was found which examines attitude and practices towards older patients in a hospital setting, the Older Patient in Acute Care Survey (OPACS). Although not extensively examined, the OPACS is promising to measure nurses attitudes towards older patients because it is specifically designed to do so.

Therefore the aim of this thesis was:

1. *Develop, validate and assess the reliability of a new measurement instrument measuring hospital nurses' knowledge regarding older patients in the Netherlands and the United States of America (USA).*
2. *Assess the level of validity and reliability of an existing instrument measuring nurses' attitudes towards older patients in the Netherlands and the United States of America.*

For the development and evaluation of both instruments, we used the COnsensus-based

Standards for the selection of health Measurement Instruments (COSMIN), which is a checklist that can be used to assess the methodological quality and measurement properties of studies when selecting or assessing published measurement instruments. We based our methodology and reporting's on the COSMIN checklist because it can also be used as a guidance for designing or reporting studies on measurement properties.

Not all studies use the criteria as described by the COSMIN group. Possible consequences of not doing so, are described in a letter to the editor regarding the development and validation of a recently developed instrument which measures the care older hospitalized adults receive and nurses' attitudes toward and perceptions about caring for older adults (**Chapter 1**). This chapter demonstrates the importance of new instruments being rigorously developed and described to enhance transparency and reproducibility. The letter presents how some decisions the researchers made in this study possibly influenced the validity and reliability outcomes of the developed instrument. Furthermore our assessment described that key elements regarding the instrument were not reported at all, such as: selection criteria used by researchers, several validity outcomes, how nonresponse and missings were addressed, and the translation process towards the Dutch language of used existing instruments. When such information regarding instruments is not (or insufficiently) described, it is difficult to assess the value and use for clinical practice and/or research.

Chapter 2 describes the development of a new measurement instrument that measures hospital nurses' knowledge regarding older patients. The first step in the development process was to operationalize and describe the origin (the construct) of the instrument. Open interviews were conducted with 7 scientific experts and 10 nurse specialists in gerontology, geriatrics and/or nursing and 5 older patients, 70+ with hospital experience in the last two years. Using thematic analysis, seven themes derived from the data: normal aging, geriatric conditions, signaling problems in old age, interventions, family interventions, vulnerable patients versus older patients and internal motivation for learning and reflection. Then, 185 items were generated from literature. A Delphi round with three nurse specialists and two researchers was organized for item reduction. After conceptualization, generation and reduction, 52 items remained eligible for use forming a first format of the Knowledge about Older Patient – Quiz (KOP-Q). Because reflection derived from the interviews as an important theme, a scale for 'certainty' was added to all questions (0% - 100% certainty). This scale helps to assess the accuracy of nurses' assessments of their knowledge and provides insight in nurses' ability to reflect on their own knowledge (measuring the metacognitive knowledge dimension). Finally, a readability study (with seven nurses working on a cardiovascular ward in one hospital) and face validity study (22 nurses working on two geriatric wards, two hospitals) were performed, providing sufficient evidence that the KOP-Q was ready for further validation (after minor language adaptations).

Chapter 3 describes the content validation and assessment of the psychometric characteristics of the 52 item KOP-Q. Twelve nurse specialists in geriatrics rated each item on relevance. Then the item-content validity index (I-CVI) and average scale-content validity index (S-CVI) were calculated resulting in the removal of nine items (43 items remained). To assess the psychometric characteristics of the items of the KOP-Q, data was collected with 107 first-year students and 78 final-year bachelor of nursing students, 148 registered nurses and 20 nurse specialists in geriatrics completing the KOP-Q online. After results were analyzed using Item Response Theory (IRT), 11 items were excluded because they did not meet the validity requirements. The remaining 30 items demonstrated good discrimination and difficulty parameters. Knowledge and the certainty constructs were positively correlated, meaning that respondents with higher knowledge levels, also demonstrate more certainty regarding their knowledge, and vice versa. Norm references (based on Classical Test Theory) were calculated per group for easier interpretation of scores in clinical practice and education. Now, the KOP-Q is ready for use in the Netherlands.

Chapter 4 describes the cross-cultural validation of the KOP-Q between the Netherlands and the United States of America (USA) by investigating the level of measurement invariance. For translating the Dutch KOP-Q into American-English, the forward-backward translation method was used. Then, data was collected in four general hospitals in the Netherlands and four general hospitals in the USA. In the Netherlands, 201 nurses and 130 nurses from the USA completed the KOP-Q online. By testing the level of measurement invariance between countries, we assess whether respondents from different countries, often having different languages, interpret the items in the same way and whether the same underlying structure is measured. Results demonstrated that the KOP-Q is valid for the assessment of nurses' knowledge and certainty outcomes in the USA and for making comparisons between the Netherlands and USA.

Chapter 5 describes the current knowledge levels of nursing students (first- final year) and registered nurses in relation to their educational level and work experience. First-, final-year vocational (AD) and bachelor nursing (BN) students and associate degree and bachelor degree nurses working in the hospital setting with 0-5 years, 6-15 years and <16 years of experience completed the KOP-Q. Knowledge and certainty levels of the different groups were compared using an independent sample t-test. A substantial proportion of participants in all groups demonstrated insufficient knowledge about older patients. Almost all first year students (both AD and BN) score insufficient – extremely poor (95%). More than 50% of the final year BN students and 75% of final year AD students score insufficient – extremely poor. Most nurses working in the hospitals “pass” the KOP-Q, although a considerable proportion still scores insufficient – extremely poor (ranging from 10.4% - 54.4% depending on work experience and educational level). A difference in knowledge was found between (student) nurses having different educational qualifications (AD versus BN). Finally, there is

a link between years of experience and higher knowledge levels of nurses. However, even nurses with more years of experiences do not reach optimum knowledge levels. Indicating that basic care topics regarding the care for older patients remain to play a key role in educational programs in clinical practice.

Chapter 6 describes the assessment of construct validity and reliability of the Older Patient in Acute Care Setting – United States (OPACS-US) and assess whether the OPACS-US can be extended with the KOP-Q. The OPACS is developed to measure attitudes of hospital nurses regarding older patients. It is developed in Australia by Courtney et al in 2000 and the original OPACS consists of 86 questions measuring practice experience (36 items) and general opinion (50 items) of nurses. In 2010, the OPACS was translated towards the American language by Melmgreen et al. Content-validity of the Australian and American OPACS was excellent. However, to our knowledge, no statistical validity and reliability evidence has been described in literature to support the use of this instrument. Therefore, the same 130 nurses which completed the KOP-Q, completed the OPACS-US online. Findings demonstrated that the OPACS-US is a valid and reliable survey instrument that measures two important components of hospital nurses' attitudes regarding older patients: practice experiences, general opinion (after exclusion of some items that did not contribute to the constructs). Furthermore, the OPACS-US can be combined with the KOP-Q adding a knowledge construct. Results from this study indicate that the OPACS-US can be used within education and/or quality improvement programs concerning care for older hospitalized patients in the USA.

Chapter 7 describes the assessment of the content-validity of the Dutch OPACS. The OPACS-US was first translated using the forward-backward method, then the clarity of wording was tested in a pilot study among five registered nurses. Then, ten experts in geriatric nursing were asked to rate each item on relevance, appropriateness and clarity of wording after which item- and scale content validity were calculated using the relevance scoring of experts. The Dutch OPACS scored good on clarity of wording and appropriateness for measuring attitudes. However, the content validity scores (I-CVI) of many items demonstrated not to be acceptable (practice experience: 22 out of 36 items, and general opinion: 28 out of 50 items) meaning that experts did not consider all Dutch OPACS items relevant for measuring attitude (i.e. practice experience and general opinion).

Chapter 8 describes the statistical validation of the Dutch OPACS. From four general hospitals, 201 nurses participated and were included in the study. Confirmatory factor analysis was used to assess the structural validity. Reliability was assessed with Cronbach's alpha. Even though the construct practice experiences demonstrated to have good structural validity results, 22 out of 36 items measuring practice experiences are considered unclear in interpretation and scoring and therefore not ready for use in clinical practice and research

SUMMARY

in the Netherlands. The construct measuring general opinion also demonstrated not to be applicable for use in the Netherlands as a result of low content and structural validity and reliability results. The results from this study cannot justify the use of the Dutch OPACS in clinical practice and/or research.

To conclude; with regard to prevention of problems and care-related complications during hospitalization, older patients are highly dependent on care provided by nurses. Good knowledge and a positive attitude are important conditions to provide high quality care. Existing instruments measuring knowledge and attitudes were not considered sufficiently valid and reliable. The development and validation of the KOP-Q, enables nurses, educators and researchers in the Netherlands and the US gaining insight in current knowledge levels of nurses regarding older patients. Attitude (practical experience and opinion) can be measured in the US using the OPACS-US. The need for an instrument measuring attitude remains relevant to the Dutch situation, because results concerning the validity and reliability of the Dutch OPACS provides insufficient evidence to justify conclusions regarding attitudes of nurses.

With an urgent need for nurses having high knowledge levels and a positive attitude towards older patients, there is a focus for research, in collaboration with clinical practice, to search for effective ways to increase knowledge and to measure/improve attitudes which are related to behavior. The KOP-Q and OPACS-US offer insight into the knowledge and attitude of nurses creating opportunities for improving the care older people receive. The search for a valid and reliable instrument measuring nurses attitude regarding older patients for the Dutch context remains urgent. Using the KOP-Q and OPACS-US, effects of educational interventions and quality improvement projects can be evaluated. In addition, these kind of tools can provide individual nurses insight in their knowledge and attitude with respect to older patients. This insight is a first step in the learning process. All this, aiming to provide high quality care towards older patients.

SAMENVATTING

Wereldwijd groeit het aantal ouderen. Daarbij vormen ouderen van 80 jaar en ouder de snelst groeiende groep. Deze groei is ook duidelijk zichtbaar in de toename van het aantal ouderen dat wordt opgenomen in het ziekenhuis. Ouderen lijden vaker aan multimorbiditeit (de aanwezigheid van meerdere chronische ziekten tegelijk). Daarnaast hebben ze vaker te maken met zogeheten geriatrische problemen zoals mobiliteitsproblemen, vallen, incontinentie, eenzaamheid, geheugenverlies, somberheid en zinsgevingsvragen. Tijdens ziekenhuisopnames kunnen deze problemen samenhangen met veel voorkomende diagnoses als delirium, dementie en depressie. De ziekenhuis opname zelf is ook een risicofactor voor het ontwikkelen van nieuwe geriatrische problemen of zorgcomplicaties. De combinatie van multimorbiditeit, geriatrische problematiek en het risico op het ontwikkelen van nieuwe problemen en zorg gerelateerde complicaties vraagt een individuele benadering omdat richtlijnen en protocollen regelmatig niet toepasbaar zijn op de complexe situatie van de individuele oudere patiënt. Veel nieuwe problemen en complicaties zijn te voorkomen door tijdige en passende preventieve zorg. Verpleegkundigen spelen een belangrijke rol als het gaat om het inschatten van het risico, het inzetten van preventieve zorg, het vroegtijdig signaleren van problemen en het inzetten van passende interventies. Ouderen zijn dus in belangrijke mate afhankelijk van verpleegkundige zorg wanneer het gaat om het voorkomen van problemen en zorg gerelateerde complicaties tijdens een opname in het ziekenhuis. Goede verpleegkundige zorg kan alleen worden gegeven wanneer de verpleegkundige kennis heeft van de (kwetsbare) oudere patiënt, zowel lichamelijk als psychisch, sociaal en emotioneel. Naast kennis is een positieve attitude ook noodzakelijk om kwalitatief goede zorg te verlenen. Zowel kennis als attitude zijn geassocieerd met gedrag dat verpleegkundigen laten zien in de zorg voor de oudere patiënt.

Sinds 1950 worden kennis tekorten en negatieve attitudes van geregistreerd verpleegkundigen en studenten verpleegkunde met betrekking tot oudere patiënten beschreven. Ook recente studies laten zien dat (student) verpleegkundigen negatieve attitudes hebben en/of kennistekorten. Echter, in deze studies zijn meetinstrumenten gebruikt die vaak onvoldoende gevalideerd zijn of tegenstrijdige resultaten laten zien met betrekking tot de validiteit en betrouwbaarheid.

Voor het meten van attitudes worden twee instrumenten veelvuldig beschreven in de literatuur (de Kogan's Old People Scale en de Aging Semantic Differential). Hoewel beide instrumenten valide en betrouwbaar zijn, zijn ze ontwikkeld voor een specifieke groep en missen ze de zorgdimensie. Eén instrument is gevonden dat de attitude meet van verpleegkundigen in het ziekenhuis met betrekking tot de oudere patiënt, de Older Patiënt in Acute Care Survey (OPACS). Dit instrument is echter nog niet voldoende onderzocht op validiteit en betrouwbaarheid om gebruik in onderzoek en de praktijk te rechtvaardigen.

De doelstelling van dit proefschrift was dan ook:

1. *Het ontwikkelen en valideren van een nieuw meetinstrument dat de kennis van ziekenhuis verpleegkundigen ten aanzien van oudere patiënten in Nederland en de Verenigde Staten van Amerika kan vaststellen.*
2. *Het beoordelen van de validiteit en betrouwbaarheid van een bestaand meetinstrument dat de attitude met betrekking tot de oudere patiënt vast stelt van verpleegkundigen in Nederland en de Verenigde Staten van Amerika.*

Voor de ontwikkeling en evaluatie van beide instrumenten is de Consensus-based Standards for the selection of health Measurement INstruments (COSMIN) checklist gebruikt. De COSMIN groep heeft deze checklist ontwikkeld met behulp van een internationale Delphi studie. De checklist is gebaseerd op standaarden om de methodologische kwaliteit van gepubliceerde instrumenten te beoordelen, maar deze standaarden kunnen ook gebruikt worden in de ontwikkeling van nieuwe instrumenten.

Niet alle studies die de ontwikkeling van een meetinstrument beschrijven gebruiken de criteria zoals beschreven door de COSMIN groep. Dit kan mogelijk nadelige gevolgen hebben voor de validiteit en betrouwbaarheid zoals duidelijk wordt uit een ingezonden brief betreffende de recente ontwikkeling en validering van een nieuw meetinstrument dat onder andere de attitude van verpleegkundigen met betrekking tot oudere patiënten meet (**Hoofdstuk 1**). Dit hoofdstuk toont aan dat het bij het ontwikkelen van kwalitatief goede instrumenten belangrijk is om de juiste stappen te nemen en deze goed te beschrijven om daarmee de transparantie en reproduceerbaarheid te vergroten. De ingezonden brief beschrijft hoe sommige beslissingen van de onderzoekers mogelijk van invloed zijn op de validiteit en betrouwbaarheid van het ontwikkelde instrument. Verder beschrijven we dat een aantal belangrijke elementen met betrekking tot het ontwikkelde instrument helemaal niet gemeld zijn, zoals: selectiecriteria gebruikt door onderzoekers, een aantal validiteit resultaten, hoe non-respons en missings werden aangepakt en het vertaalproces naar de Nederlandse taal van gebruikte bestaande (Engelstalige) vragenlijsten. Omdat dergelijke informatie niet of onvoldoende beschreven is, is het moeilijk de waarde van het gebruik van dit instrumenten voor praktijk of onderzoek te beoordelen.

Hoofdstuk 2 beschrijft de ontwikkeling van een meetinstrument dat kennis over oudere patiënten meet bij verpleegkundigen werkzaam in het ziekenhuis. De eerste stap was het operationaliseren en beschrijven van het construct. Het construct kan opgevat worden als dat wat het instrument dient te meten. Open interviews zijn afgenomen met zeven wetenschappelijke experts en tien verpleegkundig specialisten in gerontologie, geriatrie en / of verpleging en met vijf oudere patiënten, 70+, met een ziekenhuis ervaring in de afgelopen twee jaar. Met behulp van thematische analyse zijn zeven thema's afgeleid uit de interviews: normale veroudering, geriatrische aandoeningen, signaleren van problemen

op oudere leeftijd, interventies, familie interventies, kwetsbare patiënten versus oudere patiënten en interne motivatie om te leren en reflectie. Vervolgens zijn 185 items, concrete vragen, over die onderwerpen gegenereerd op basis van de literatuur. In een Delphi-ronde met drie verpleegkundig specialisten en twee onderzoekers is dit aantal gereduceerd, aangepast, en opnieuw geformuleerd. Dit heeft geleid tot 52 vragen die met elkaar de eerste versie van de Kennis over de Oudere patiënten - Quiz (KOP-Q) vormden. Omdat reflectie vaak werd benoemd in de interviews als belangrijk thema, zijn alle 52 kennisvragen uitgebreid met een 'zekerheid' vraag: "hoe zeker bent u over uw gegeven antwoord" op een schaal van 0% tot 100% zekerheid. Dit tweede construct (zekerheid) geeft inzicht in het bewustzijn van verpleegkundigen over hun eigen kennis (het meet daarmee metacognitieve kennis). Tenslotte is een leesbaarheid studie (met zeven verpleegkundigen werkzaam op de cardiologie afdeling in één ziekenhuis) en een face-validiteit (indruk-validiteit) studie (22 verpleegkundigen werkzaam op twee geriatrische afdelingen in twee ziekenhuizen) uitgevoerd. Na enkele (kleine) tekstuele aanpassingen is de KOP-Q met 52 vragen geschikt bevonden om verder te valideren.

Hoofdstuk 3 beschrijft de content-validiteit (inhoud-validiteit) en de psychometrische eigenschappen van de KOP-Q. Twaalf verpleegkundig specialisten in de geriatrie scoorden elk item op relevantie. Van deze scores werden de "item-content validity index" (I-CVI) en "scale-content validity index" (S-CVI) berekend wat resulteerde in het verwijderen van negen vragen (waardoor 43 vragen over bleven). Om de psychometrische eigenschappen van de KOP-Q vragen te beoordelen, werden gegevens verzameld van 107 eerstejaars bachelor studenten en 78 laatste jaar bachelor studenten, 148 geregistreerde verpleegkundigen en 20 verpleegkundig specialisten in de geriatrie. Zij vulden de KOP-Q online in. Na analyse van de resultaten met behulp van de Item Response Theory (IRT) werden nogmaals 11 vragen verwijderd die niet voldeden aan de gestelde validiteit eisen. De resterende 30 vragen toonden goede uitkomsten op de discriminatie en moeilijkheid parameters. De kennis en de zekerheid constructen waren positief gecorreleerd, wat betekent dat wanneer een respondent een hoger kennis level (of niveau) heeft, hij/zij ook meer zekerheid heeft over zijn/haar kennis en visa versa. Om in de praktijk en in het onderwijs beter de scores te kunnen interpreteren zijn norm referenties per groep berekend, gebaseerd op de Classical Test Theory. Deze validering en vaststelling van psychometrische eigenschappen liet zien dat de KOP-Q valide en betrouwbaar is voor gebruik in Nederland.

Hoofdstuk 4 beschrijft de cross-culturele validatie van de KOP-Q in de Verenigde Staten van Amerika (VS). Voor het vertalen van de Nederlandse KOP-Q naar het Amerikaans-Engels, is de "forward-backward-methode" gebruikt. Vervolgens is de KOP-Q vragenlijst online ingevuld door verpleegkundigen in vier algemene ziekenhuizen in Nederland (n=201) en vier algemene ziekenhuizen in de VS (n=130). Om de cross-culturele validiteit vast te stellen is de meetinvariantie van de KOP-Q getest tussen Nederland en de VS. Door het testen

van de meetinvariantie wordt vastgesteld of respondenten uit verschillende landen alle vragen gelijk interpreteren en of hetzelfde construct wordt gemeten. Uit analyse van de vragenlijsten bleek dat de KOP-Q valide is voor gebruik in de VS. Daarnaast kan de KOP-Q gebruikt worden voor het maken van vergelijkingen tussen Nederland en de VS.

Hoofdstuk 5 beschrijft het kennis niveau van eerste en laatstejaars studenten verpleegkunde en van geregistreerde verpleegkundigen in relatie tot hun opleidingsniveau en werkervaring. Eerste- en laatstejaars MBO- en HBO verpleegkunde studenten, en MBO en HBO verpleegkundigen die werkzaam zijn in het ziekenhuis, vulden de KOP-Q vragenlijst in. Kennis en zekerheid niveaus van de verschillende groepen werden vergeleken met een onafhankelijke t-test. Een aanzienlijk deel van de deelnemers in alle groepen toonde onvoldoende kennis betreffende oudere patiënten. Voor beide groepen eerste jaars studenten (MBO en HBO) was dit 95%. Voor laatste jaars studenten was dit 75% (MBO), en 50% (HBO), en voor verpleegkundigen in de praktijk 10,4% tot 54,4% afhankelijk van werkervaring en opleidingsniveau. Daarnaast werd een verschil in kennis gevonden tussen (student) verpleegkundigen met een MBO en HBO achtergrond waarbij MBO opgeleide (student) verpleegkundigen significant lager scoorden. Tot besluit lijkt een relatie te bestaan tussen het aantal jaren ervaring en hogere kennis levels van verpleegkundigen, echter de verpleegkundigen met veel ervaring demonstreerde niet het optimale kennis level op de KOP-Q waardoor ook voor deze groep groei in kennis level mogelijk is.

Hoofdstuk 6 beschrijft de beoordeling van de construct validiteit en betrouwbaarheid van de “Older patients in Acute Care Survey – United States” (OPACS-US) en beoordeelt of de OPACS-US kan worden uitgebreid met de KOP-Q. De OPACS is ontwikkeld om attitude te meten van ziekenhuis verpleegkundigen met betrekking tot de oudere patiënt. Het is ontwikkeld in Australië door Courtney et al. in 2000 en bestaat oorspronkelijk uit 86 vragen die zowel de ervaring als mening van verpleegkundigen meten. De OPACS is in 2010 vertaald naar het Amerikaans door Malmgreen et al. De content-validiteit van zowel de Australische als de Amerikaanse versie is goed, echter de validiteit en betrouwbaarheid zijn nog niet eerder statistisch getest. Daarom hebben dezelfde 130 verpleegkundigen uit de VS die de KOP-Q ingevuld hebben, ook de Amerikaanse OPACS ingevuld. Na analyse , waarbij een aantal vragen die niets toevoegden verwijderd werden, bleek dat de OPACS-US een valide en betrouwbaar meetinstrument is dat twee belangrijke onderdelen van de attitude ten aanzien van oudere patiënten meet: praktijkervaring en mening. Bovendien kan de OPACS-US gecombineerd worden met de KOP-Q. De resultaten van dit onderzoek geven aan dat de OPACS-US gebruikt kan worden binnen het onderwijs en / of verbetering van de kwaliteit programma’s met betrekking tot de zorg voor oudere ziekenhuispatiënten in de VS.

Hoofdstuk 7 beschrijft de inhoudsvaliditeit van de Nederlandse vertaling van de OPACS-US. De OPACS-US is eerst vertaald met behulp van de “forward-backward-methode”, daarnaast

is de helderheid van formulering getest in een pilotstudie onder vijf geregistreerde verpleegkundigen. Tien verpleegkundige geriatrie experts werden gevraagd om elke vraag op relevantie, geschiktheid en duidelijkheid van de tekst te scoren, waarna met behulp van de I-CVI en S-CVI de content-validiteit is vastgesteld. De Nederlandse vertaling van de OPACS-US scoorde goed op duidelijkheid van de tekst en de algemene geschiktheid voor het meten van attitude. Echter, de I-CVI score voor veel vragen (praktijkervaring: 22 van de 36 vragen, mening: 28 van de 50 vragen) was onvoldoende, wat betekent dat de deskundigen vinden dat verschillende OPACS vragen irrelevant zijn voor het meten van attitude (praktijkervaring en mening).

Hoofdstuk 8 beschrijft de statistische validatie van de Nederlandse OPACS. De OPACS is ingevuld door 201 verpleegkundigen van vier algemene ziekenhuizen. “Confirmative factor analysis” werd toegepast om de structurele validiteit te bekijken. Betrouwbaarheid werd bekeken door middel van de Cronbach’s alpha. Hoewel het construct praktijkervaring wel een goede structurele validiteit bleek te hebben, blijkt uit resultaten van de content validiteit studie dat 22 van de 36 vragen beschouwd worden als onduidelijk in interpretatie en wijze van scoren. De structurele validiteit en betrouwbaarheid van het deel dat de mening bevraagt in de OPACS bleek niet geschikt voor de Nederlandse situatie omdat al deze vragen niet het construct meten dat werd verondersteld. De resultaten van deze studie kunnen het gebruik van de Nederlandse OPACS in de klinische praktijk en / of onderzoek daarom niet rechtvaardigen.

Tot besluit: wanneer het gaat om het voorkomen van problemen en zorg gerelateerde complicaties tijdens een opname in het ziekenhuis, zijn oudere patiënten in grote mate afhankelijk van zorg gegeven door verpleegkundigen. Goede kennis en een positieve attitude zijn belangrijke voorwaarden om goede zorg te kunnen verlenen. De instrumenten waarmee kennis en attitude werd gemeten waren tot op heden onvoldoende valide en betrouwbaar. Met de ontwikkeling en validering van de KOP-Q, kunnen verpleegkundigen, opleiders en onderzoekers in zowel Nederland als de VS inzicht krijgen in huidige kennislevels van verpleegkundigen met betrekking tot de oudere patiënt. Attitude (praktijk ervaring en mening) kan gemeten worden in de VS met behulp van de OPACS-US. De vraag naar een instrument dat attitude meet blijft relevant voor de Nederlandse situatie, omdat resultaten betreffende de validiteit en betrouwbaarheid van de Nederlandse OPACS onvoldoende bewijs bieden om uitspraken over attitude te kunnen doen.

Met een hoge urgentie voor verpleegkundigen die beschikken over goede kennis en een positieve attitude met betrekking tot de oudere patiënt, ligt er een focus voor onderzoek om samen met de praktijk te zoeken naar effectieve manieren om kennis te vergroten en attitudes te meten/verbeteren wat zich uit in een verandering in gedrag van verpleegkundigen met betrekking tot de oudere patiënt. De KOP-Q en OPACS-US (de laatste

alleen bruikbaar in de VS) bieden inzicht in de kennis en attitude van verpleegkundigen waardoor mogelijkheden ontstaan om de zorg te verbeteren. Een valide attitude instrument voor de Nederlandse situatie blijft urgent. Met behulp van de KOP-Q en OPACS-US kunnen de effecten van educatieve interventies en kwaliteitsprojecten geëvalueerd worden. Daarnaast kunnen dergelijke instrumenten inzichtelijk maken aan individuele verpleegkundigen hoe hun kennis en attitude is met betrekking tot de oudere patiënt, wat hen handvatten biedt tot leren. Dit alles met het doel kwalitatief goede, op maat gerichte zorg aan oudere patiënten te kunnen verlenen.

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Na het invullen van deze vragenlijst weet je precies hoeveel Jeroen jou bedankt. De vragenlijst bestaat uit drie onderdelen welke van groot belang waren voor het succesvol behalen van zijn PhD. Tel per onderdeel je punten op. Deel door het aantal vragen en kijk op de thermometer hoeveel en waarvoor Jeroen jou bedankt.

DE BETROKKENHEID-FACTOR

Ik heb Jeroen tijdens zijn PhD proces **aandacht** gegeven (belangstelling getoond in wat hem bezig hield).

1 2 3 4 5 6 7 8 9 10

Ik heb Jeroen tijdens zijn PhD proces **geconfronteerd** (het expliciet benoemen van emoties) en **geholpen** met handelingen in het dagelijks leven.

1 2 3 4 5 6 7 8 9 10

Ik was gedurende Jeroen zijn PhD proces **aanwezig** (fysiek, emotioneel en mentaal).

1 2 3 4 5 6 7 8 9 10

Ik was gedurende Jeroen zijn PhD proces **opmerkzaam** (wist en benoemde als er wat aan de hand was) en **begripvol**.

1 2 3 4 5 6 7 8 9 10

DE FUN-FACTOR

Ik heb mijn best gedaan Jeroen tijdens zijn PhD proces zoveel mogelijk **af te leiden** van zijn werk.

1 2 3 4 5 6 7 8 9 10

Ik heb mijn best gedaan om met Jeroen zoveel mogelijk op **vakantie** te gaan of andere **activiteiten** te ondernemen (surfen, eten en drinken, feestjes, spelletjes spelen etc.).

1 2 3 4 5 6 7 8 9 10

Ik heb mijn best gedaan om zoveel mogelijk met Jeroen in **contact te komen** tijdens **werkuren***.

1 2 3 4 5 6 7 8 9 10

DE CONTENT-FACTOR

Ik heb **intellectueel eigendom** in dit werk van Jeroen (ideeën, tekstueel bijgedragen etc).

1 2 3 4 5 6 7 8 9 10

Ik heb onderdelen in dit werk van Jeroen **voorzien van** negatieve en/of positieve **feedback****.

1 2 3 4 5 6 7 8 9 10

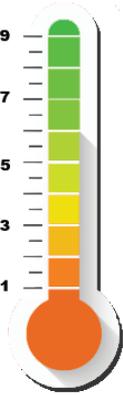
Ik heb Jeroen **begeleiding geboden** tijdens het PhD proces (hij heeft mogen leren)***.

*Let op: voor een PhD student zijn alle uren werkuren.

**Let op: in geval van positieve feedback mag je jezelf één bonuspunt toekennen.

***Let op: score niet van toepassing, deze mensen verdienen oneindig veel punten.

BETROKKENHEID

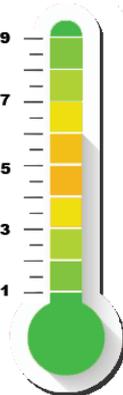


Dank je wel voor jouw enorme betrokkenheid. Je wist me aandacht te geven, je was aanwezig, opmerkzaam en begripvol. Je kon me ook confronteren en je hielp fantastisch! Héél héél héél erg bedankt.

Natuurlijk is hier sprake van regression to de mean. Of te wel, je had eigenlijk groen moeten zijn, je hebt als beschaafde respondent jezelf te kort gedaan. Wees eerlijk, kan er nergens een puntje bij? Ik denk van wel. Héél héél erg bedankt.

Je hoeft niet op alle drie de factoren groen te scoren. Iedereen heeft zo zijn eigen rol. Ik ben blij dat ik je mag bedanken voor het invullen van deze vragen. Bedankt.

FUN

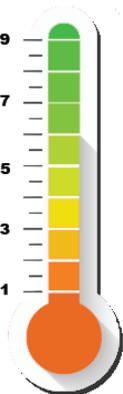


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Natuurlijk is hier sprake van regression to de mean. Of te wel, je had eigenlijk groen moeten zijn, je hebt als beschaafde respondent jezelf te kort gedaan. Wees eerlijk, kan er nergens een puntje bij? Ik denk van wel. Héél héél erg bedankt.

Je hoeft niet op alle drie de factoren groen te scoren. Iedereen heeft zo zijn eigen rol. Ik ben blij dat ik je mag bedanken voor het invullen van deze vragen. Bedankt.

**LIST OF
PUBLICATIONS
AND
PRESENTATIONS**

Scientific publications

Dikken J, Hoogerduijn JG, Klaassen S, Lagerwey MD, Shortridge-Baggett LM, Schuurmans MJ. (2017) The knowledge about older patients – quiz for nurses: cross-cultural validation between the Netherlands and the United States of America. *Nurse Education Today* (55)26-30

Lalleman PCB, Smid GAC, **Dikken J**, Lagerwey MD, Schuurmans MJ. (2017). Nurse middle managers contributions to patient-centred care: A ‘managerial work’analysis. *Nursing Inquiry* (in press)

Dikken J, Hoogerduijn JG, Lagerwey MD, Shortridge-Baggett LM, Klaassen S, Schuurmans MJ. (2017) Measurement of nurses’ attitudes and knowledge regarding acute care older patients: Psychometrics of the OPACS-US combined with the KOP-Q. *Geriatric nursing* (in press)

Dikken J, Hoogerduijn JG, Klaassen S, Schuurmans MJ. (2017) Structural validity and reliability of the Dutch Older Patient in Acute Care Survey (OPACS), measuring nurses’ attitude towards older patients. *Journal of Gerontology & Geriatric Research* (6)1: 393

Dikken J, Hoogerduijn JG, Kruitwagen CLJJ, Schuurmans MJ. (2016) Content validity and psychometric characteristics of the “Knowledge about Older Patients Quiz” for Nurses using Item Response Theory. *Journal of the American Geriatric Society* (64) 11:2378-83

Dikken J, Ettema RG, Hoogerduijn JG, Schuurmans MJ. (2015) Comment on “Development and Validation of the Geriatric In-Hospital Nursing Care Questionnaire. *Journal of the American Geriatrics society* (63) 11:2441-2443

Dikken J, Hoogerduijn JG, Schuurmans MJ. (2015) Construct development, description and initial validation of the Knowledge about Older Patients Quiz (KOP-Q) for nurses. *Nurse Education Today* (35) 9:54-59

Schelven van AR, **Dikken J**, Sillekens LGM, Oldenhuis DD, Schuurmans MJ, Hoogerduijn JG. (2015) Content Validation of the Dutch Version of the “Older Patients in Acute Care Survey”, an Instrument to Measure the Attitude of Hospital Nurses towards Older Patients. *International Journal of Clinical Medicine* (6) 7-18

Heß M, **Dikken J**. (2010) The Influence of Ageism on Group Identification and Subjective Age of Older People in Europe. *International journal of social sciences and humanity studies* 2: 1

Submitted

Dikken J, Bakker A, Hoogerduijn JG, Schuurmans MJ. Dutch nursing students and hospital nurses' knowledge regarding older patients in relation to educational level and work experience: a cross-sectional study

Abstracts

Dikken J, Hoogerduijn JG, Oeseburg B, Venables H, Habes V, Bakker A, Schuurmans MJ. (2016) Educating for an aging society: competencies, knowledge and attitude and how to motivate students. *Journal of Advanced Nursing* 72 (Suppl. S1) 8-8

Dikken J, Hoogerduijn JG, Schuurmans MJ. (2016) Development,(cross-cultural) validation and reliability of the Knowledge-about-Older-Patient Quiz. *Journal of Advanced Nursing*, 72 (Suppl. S1) 8-8

Dikken J, Hess M. (2010) Risk of mortality rates in older people due to grief. Partner loss, under the consideration of habits and change in lifestyle after the loss of the partner. *Zeitschrift fur gerontologie und geriatric* (43) p 47-47

Practice publications

Dikken J, Bakker A, Hoogerduijn JG, Schuurmans MJ. (2016) Verpleegkundige, blijf leren!. *TVZ-Tijdschrift voor verpleegkundige experts* 126 (6)44-47

Dikken J, Hoogerduijn JG, Schuurmans MJ. (2015) Kennis over de oudere patiënt in het ziekenhuis, hoe meet je dat eigenlijk? *TVZ-Tijdschrift voor verpleegkundige experts* nummer 6, p. 44-47

Lalleman P, **Dikken J**. (2015) Invloed van de VAR op zorgbeleid, een landelijke inventarisatie. *TVZ-Tijdschrift voor verpleegkundige experts* nummer 2 p. 44-47

Van der Cingel CJM, **Dikken J**. (2013) "Compassie, Het belang van opmerkzaamheid" *Denkbeeld* jaargang 25, nummer 3 p. 26-29

Other publications

Dikken J. *Samenvatting: Kun je verpleegkundige competenties meten?* (2017) *Onderwijs en Gezondheidszorg* jaargang 41, nummer 1 p. 29

Dikken J. *Samenvatting: Medicatietoediening veiliger door onderwijs?* (2016) *Onderwijs en Gezondheidszorg* jaargang 40, nummer 5 p. 25

Dikken J, Hoogerduijn JG, Schuurmans MJ. (2016) *Effectief leren: 'Iemand elke de dag een vis brengen of hem leren vissen' Handreiking voor praktijkopleiders in het ziekenhuis*. Online publication: <https://www.onderzoek.hu.nl/Projecten/Nurses-and-Older-Patients-Reducing-Stress-Study>

Books

Dikken J. Normale Veroudering, chapter 6: pag 109 – 127 in *Klinisch redeneren bij ouderen: functiebehoud in levensloopperspectief* Ton Bakker, Vera Habes, Germieke Quist, Judith van de Sande en Wim de Vrie, (2015): Reed Business Education, Amsterdam. ISBN: 9789035238152

Scientific presentations

Development,(cross-cultural) validation and reliability of the Knowledge-about-Older-Patient Quiz. Presentation 5th European Congress for Older People. Rotterdam, October 2016.

Educating the Essential Competencies Nurses Need Regarding Care for Older Adults and How to Measure Hospital Nurses' Knowledge and Attitude. Presentation STTI congress. Utrecht, June 2016.

Development and validation of the Knowledge about Older Patient - Quiz (KOP-Q). Presentation expert meeting onderzoek in progress, Utrecht Medisch Centrum. Utrecht. February 2016

Excellente zorg voor ouderen vraagt excellent opgeleide verpleegkundigen: Ontwikkelingen in en rond de verpleegkundige opleidingen. Presentation Geriatriedag,'s-Hertogenbosch, February 2015.

The nurses and older patients reducing tress study (NO PRESS). Presentation consortium meeting Dutch partners. Utrecht, July 2014.

The nurses and older patients reducing stress study (NO PRESS). Multiple presentations Western Michigan University, Michigan, United States. May 2014.

The nurses and older patients reducing stress study (NO PRESS). Presentation Bronson Hospital, Michigan, United States. May 2014.

The nurses and older patients reducing stress study (NO PRESS). Multiple presentations Pace University, New York, United States. May 2014.

The nurses and older patients reducing stress study (NO PRESS). Presentation Hudson Valley Hospital Center, New York, United States. May 2014.

The nurses and older patients reducing stress study (NO PRESS). Presentation St John's Riverside Hospital, New York, United States. May 2014.

The nurses and older patients reducing stress study (NO PRESS). Presentation Overlook Medical Center, New York, United States. May 2014.

The nurses and older patients reducing stress study (NO PRESS). Poster presentation kennis centrum. Utrecht, September 2014.

Ageism in Europe: New findings from the Cultural Map of the World and the European Social Survey. Presentation 20th World Congress of Gerontology and Geriatrics of the International Association of Gerontology and Geriatrics, Seoul, Korea. June 2013.

Ageism and Subjective Health in Europe. Poster presentation International Congress of the International Association of Gerontology and Geriatrics, Bologna, Italy. April 2011.

The Influence of Ageism on Group Identification and Subjective Age of Older People in Europe. Presentation International conference on social sciences, Izmir, Turkey. October 2010.

Der Einfluss von Lebensstil und Veränderungen im Lebensstil auf das Mortalitäts Risiko bei in Trauer Lebenden Älteren. Poster presentation congress der Deutsche Gesellschaft für Gerontologie und Geriatrie, Berlin, Germany. July 2010.

Practice presentations

Vertrouw op ons, wat moet ik daarvoor doen dan? Presentation mini-symposium Ouderen zorg... een prachtig vak. De Haneprij en Prinsenhof, Gouda, Februari 2017.

Kennis en attitude binnen het Groene Hart Ziekenhuis. Presentation Groene Hart Ziekenhuis. Gouda, March 2016.

Uitkomsten onderzoek kennis, mening en ervaring van verpleegkundigen met Ouderen. Presentation Tergooi. Hilversum, March 2016.

Evidence Based Practice (EBP) en Klinimetrie. Presentation St Antonius Ziekenhuis. Nieuwegein, January 2016.

Kennis van verpleegkundigen over de ouderen patiënt. Presentation St Antonius Ziekenhuis. Nieuwegein, June 2015.

Kennis & Attitude van ziekenhuis verpleegkundigen. Hoe meet je dit eigenlijk? Multiple presentations zorg totaal, Jaarbeurs. Utrecht, March 2015.

Attitude van verpleegkundigen een probleem? Presentation Netwerk Utrecht Zorg voor Ouderen, Utrecht, June 2013.

Zorg symposia: Met verstand, vallen en opstaan Samen op (zorg)pad de toekomst In. Utrecht Medisch Centrum. Utrecht, February 2013.

Educational presentations

How to measure nurses' knowledge and attitudes regarding older patients? Presentation studiedag verpleegkunde University of applied sciences Utrecht. Utrecht, November 2016.

How to develop quality questions in multiple choice exams. Workshop studiedag verpleegkunde University of applied sciences Utrecht. Utrecht, November 2016.

Proactieve ouderenzorg eerstelijns – Interprofessionele nascholing. Poster presentation Kennis centrum. Utrecht, September 2016.

Content Validity and Psychometric Characteristics of the “Knowledge about Older Patients Quiz” for Nurses Using Item Response Theory. Presentation expert meeting, University of applied sciences Utrecht. Utrecht, September 2016.

Leren in de verpleegkundige praktijk. Presentation alumni dag gedifferentieerd verpleegkundige, University of applied sciences Utrecht. Utrecht, April 2016.

Leren in de verpleegkundige praktijk. Workshop alumni dag gedifferentieerd verpleegkundige, University of applied sciences Utrecht. Utrecht, April 2016.

Developed educational courses

van Wijk M, **Dikken J.** (2017) Summerschool program: Healthy Aging, Care for the Chronically ill Research Group, Hogeschool Utrecht: Utrecht

Dikken J, van Wijk M. (2016) Summerschool program: Healthy Aging, Care for the Chronically ill Research Group, Hogeschool Utrecht: Utrecht

Dikken J, Hoogerduijn JG. (2013; 2014) Summerschool program: Healthy Aging, Care for the Chronically ill Research Group, Hogeschool Utrecht: Utrecht

Dikken J, Hoogerduijn JG. (2013) Elevate Course: The Aging Society. Care for the Chronically ill Research Group, Hogeschool Utrecht: Utrecht

Lectures in Bachelor, Master and Post Undergraduate programs

Kenniscentrum Masterclasses (KMC)

HBOV (Bachelor Nursing)

Master Nursing science

Utrecht Summerschool, Nursing leadership

Utrecht Summerschool, Healthy Aging

CURRICULUM VITAE

CURRICULUM VITAE

Jeroen was born on May 19th 1986 in Dronten, the Netherlands. After completing his senior general secondary education (HAVO) in 2003 at the 'Almere College' in Dronten, he started to study nursing at the University of Applied Sciences Windesheim in Zwolle and in 2006, he started the pre-master in health sciences at the Free University Amsterdam and began to work as a care helper at nursing home 'de Regenboog' in Dronten (2006 – 2010). In January 2008 he obtained his bachelor's degree in Nursing and finished his pre-master.

Then he proceeded with the master Health Sciences. During this program, Jeroen started a European Master's program in Gerontology (EuMag) at the Free University Amsterdam. He finished both master's programs in 2010. In the same year, he started working as a lecturer at the Bachelor of Nursing and Bachelor of Applied Gerontology at the University of Applied Sciences Windesheim.

Since august 2011, he moved to the University of Applied Sciences-Utrecht as a lecturer at the Bachelor of Nursing and subsequently in April 2012 he started his PhD-project within the Research Centre for Innovation in Healthcare of the University of Applied Sciences Utrecht and Nursing Science at the University Utrecht. With a passion for quality nursing care for older people and how this is related to nursing education, Jeroen is determined to continue his work in research, education and clinical practice.