# Development and Usability of the Knowledge about Older Patients Quiz (KOP-Q).

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**Abstract**

Background: Due to the aging of society there is an increased need for nurses who can adequately provide care for older persons. Several studies have shown that nurses and nursing students' knowledge of health problems related to aging must improve. However none of the current questionnaires that measure this knowledge were specifically developed to test nurses' and nursing students' knowledge on aging and/or meets the standards of the Consensus-based Standards for the selection of health Measurements Instruments (COSMIN) criteria. The aim of this study is to assess the quality of a newly developed questionnaire, the Knowledge about Older Persons Quiz (KOP-Q).

Methods: Content validity was confirmed using the Delphi technique. A panel of six experts in geriatric care and vocational education evaluated the content validity. The Average Content Validity Index was used for making assessments. Eight nursing students performed readability tests. A cross-sectional, explorative study was conducted to assess the underlying construct, item reduction and internal consistency of the KOP-Q. The internal consistency was measured by Cronbach's alpha. Explorative factor analysis was used for item reduction and assessing underlying construct. A total of 232 nursing students from ten nursing schools completed the KOP-Q questionnaire.

Results: After two Delphi rounds, consensus was reached. Content validity was good (S-CVI/Ave = 0.87). The overall usability was rated as positive (23 items;100%). Explorative factor analyses failed in revealing different underlying constructs. The Cronbach's alpha was moderate after extracting nine items (.634), finally resulting in a 21-item questionnaire.

Conclusion and implications: The KOP-Q is a well-developed evaluative instrument, usable in the context of vocational nursing students. For additional validation, item response theory analysis is recommended for item evaluation. Further, structural updating is recommended in order to be certain of the tenability of the questionnaire.

**Keywords: Knowledge measurement, elderly care, vocational nursing students, factor analysis**

## INTRODUCTION AND RATIONALE

The aging population is one of the most challenging issues of contemporary societies (1). The population of aging persons in the Netherlands will significantly increase in the coming years. Persons aged 65 years and older represent 16.8% of the population in the Netherlands, and by 2040 that number will have increased to 26.5% (2). The aging of the population affects the health care systems by increasing demand on services. Nurses have a pivotal role in the care of older persons. In 2008, almost 37,000 of the total of 216,250 nurses in the Netherlands were working in elderly care and this number is increasing (3). Nurses in hospitals, nursing homes and home care should be prepared to take care of this growing population of older persons who have complex care needs (4), and nursing schools should adapt to the growing need for competent nurses in geriatric care. Geriatric care is carried out by nursing assistants, registered nurses (with vocational diplomas or bachelor degrees) and nurse specialists.

To measure the required knowledge of health professionals about the elderly, several measurement instruments exist. The Palmore Facts of Aging Quiz (PFAQ) is an extensively-used test for diagnostic studies (5-7), but it has been criticized in multiple studies for reliability and wording (6-9); the PFAQ also does not focus on nurses and nursing students. A second instrument is the Knowledge of Aging and Elderly questionnaire (KAE), developed by Kline et al. (10). No description of the content development of the KAE exists in the literature. There was a low correlation between KAE and the PFAQ due to different content and differences in rating of the items with similar content. The Kline et al. recommended the development of a better test to measure knowledge. In 2006, Mellor et al. developed the Nursing Knowledge of Elderly People Quiz (NKEPQ) to address the PFAQ's lack of focus on nursing. Development of the NKEPQ tool consisted of an extensive literature review and input from one geriatrician. Research showed the presence of only face validity, a small sample size (n=31) and no psychometric analyse (9). A fourth measurement instrument is the Deconditioning in Older Adults Survey, which was developed by Gillis et al. to assess nurses' and students' knowledge, attitudes, beliefs and demographic data about treating and preventing deconditioning in older hospitalized adults (11). The content of this survey was restricted to deconditioning and it was developed using a literature review and standard methods of operation and best practices. The survey was reviewed by three experts, and a fair methodological quality was established (12). However, psychometric analysis was lacking.

None of the existing instruments detailed above has proven to be reliable or valid in developing content and/or psychometric analyses according the Consensus-based Standards for the selection of health Measurements Instruments (COSMIN) nor are they focused on measuring nurses' and nursing students' knowledge about older people.

Therefore, a decision was made to develop a new instrument, the Knowledge about Older Patients Quiz (KOP-Q), for nurses and nursing students. The KOP-Q is a 29-item questionnaire that focuses substantively on nursing knowledge.

The KOP-Q was originally developed to diagnose the knowledge of hospital nurses graduate. However, nursing students should also improve their knowledge level (13). Therefore, a measuring instrument that is valid and reliable, and useful for both nurses and nursing students to guarantee the quality of elderly care now and in the future, is needed. This study focuses on the content validity, reliability and usability of the KOP-Q. The research population in this study has been restricted to vocational students. Graduate nurses and baccalaureate students will be tested in a similar study in a PhD program. Therefore, the aim of this research is to assess the internal consistency, content validity and feasibility of the KOP-Q for vocational nursing students.

## METHODS

### Design

To meet the standards of good methodological quality for developing measurement instruments, the COSMIN checklist on measurement properties was followed. For a rigorous research design, this study contains four steps: development by Delphi rounds and review of associated literature; content (and face) validity testing by experts, usability testing by students; and cross-sectional research on a large sample of the population to evaluate the internal consistency, item reduction and checking of underlying domains (Figure 1) (12,14).

Step 1: Developing process

The content of KOP-Q was developed by interviewing experts (PhDs) in geriatrics, geriatric nurse specialists in hospitals (MSc level) and older patients. Analysis of these interviews led to themes which were crosschecked in the literature. Questions were developed using the literature, after which a Delphi round was organized with three nurse specialists and two researchers to delete, rephrase and add questions. The final exclusion of questions was discussed until consensus was established. Answers were dichotomous: ‘true’ or ‘false’. Each item should be scored on certainty of answer on a Likert-scale from 0% (absolutely not certain) to 100% (absolutely certain).

Step 2: Content validity

Content validity for vocational nursing students was determined on the basis of expert opinions. Rating of the items was conducted by a multidisciplinary group of six experts who are experienced in elderly care and have completed nursing education at the vocational level. They completed the questions of probability of the items and of wording. The panel consisted of six experts (two nurse specialists and four RNs, all teachers) with actual knowledge of in vocational education and care for older persons who are in homecare,

psychiatric hospitals, elderly homes, hospitals and or mentally disabled. They reviewed whether the items addressed all aspects of knowledge about older persons for newly graduated vocationally trained nurses. A Likert scale rating ranging from 1 (not relevant) to 4 (very relevant) was scored, and items scored at 3 and 4 were considered positive.

Step 3: Feasibility

Readability and usability of the survey was carried out on a convenience sample of eight nursing students from each study year of two schools. The inclusion criteria was Dutch language level of at least 2F, as 2F is considered a minimal level to function in Dutch society (15). The students completed the questionnaire and, by combining both the 'think aloud' method and the probing method (16), their experiences were assessed. Interviews were recorded. Each question was scored on readability and usability, with the possible scores being either positive or negative. If words in a question were pronounced incorrectly or students said, "I don't understand", and if questions were read twice or students asked, "What is the meaning of this question?", the question was marked as negative. In the subsequent interview, students were asked, "Did you not understand the question or did you not know the answer?". Because discussion was allowed, the researcher obtained a clear understanding of the difference in knowledge or the understanding of words or questions. The interviews were recorded and subsequently used to evaluate the written notes. The proportion of positively rated items was calculated. Secondly, an expert, experienced in examining students in the Dutch language at the vocational level, rated the questionnaire as pertinent to students at the 2F level, and the expert was asked to score the questionnaire in terms of wording with positive and negative. The two ratings were compared and the results were discussed with other researchers for possible causes.

Step 4: Psychometric testing

To establish factor analyses and internal consistency, data were collected in May 2015 using a convenience sample of 43 ROCs and a second convenience sample of 1,238 nursing students. After institutional approval, the survey was anonymously administered to nursing students in all four years of education. Questionnaires were distributed and collected during allocated class time under the supervision of a teacher. The test required approximately 20 minutes to complete. The questions captured information about age, gender, place of birth, experiences with geriatric patients and the academic year the student currently attends. The geographical spread of the ROCs, their signature and their degree of urbanization were taken into account.

**Statistical analyses**

Content validity was measures by the Average Content Validity Index(S-CVI/Ave), a score greater than 0.80 is considered to be sufficient (23). Items scored 'Fair' if Kappa was from 0.40 to 0.59, 'Good' for Kappa from 0.60 to 0.74 and 'Excellent' with Kappa greater than 0.74

(17,18). Exploratory factor analysis was performed to explore the underlying constructs of the items and to reduce data. A Principal Axis Analysis (PAA) was conducted on 29 items, together with oblique rotation (direct Oblimin). Based on extraction (based on eigenvalues > 1 and a screeplot flexion) and factor clarity (loadings > 0.5), an attempt was made to compose an optimal factor solution and number of items. The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for analysis, (KMO > 0.5) (18).

Reliability was tested by calculating the Cronbach's Alpha, between 0.7 and 0.9 is considered as good(16). In case of missing values for Factor analysis items were deleted, otherwise the intention-to-treat-method was used and missing data were analysed. All analyses were conducted with IBM Statistics SPSS Version 23.

**Participants**

The study population consisted of all first, second, third and fourth year vocational nursing students from 43 Regional Education Centres (ROCs) in the Netherlands. In March 2015 all ROCs received information (by mail and during a meeting) about the study's objective and were invited to collaborate. Each ROC was asked for a contact person.

**Vocational education**

Students studying at the vocational level are educated at ROCs accredited by the Dutch Government. Educational programmes are multidisciplinary, since the students are educated to work in the field of care, welfare and housekeeping and to be active in various professional practices, in hospitals, in nursing homes, home care, in mental health care facilities or in institutions for people with intellectual or physical disabilities. (4). According to European guidelines, the length of the education is four years with a minimal of 4,600 hours (1,535 hours of professional education and 2,300 hours of internship) (19). There are two ways to become a registered nurse, either by vocational education (VN) or by baccalaureate education (BN). Currently, differences in tasks and responsibilities between BN and VN are proscribed. Entering each of these educational programmes is determined by a high school diploma. After obtaining a VN diploma, there is the possibility to continue education at the baccalaureate level and obtain a BN diploma in 2 or 3 years.

The content of the education is recorded in Qualification Structure Files (QSFs), which are developed by labour marketing organisations and nursing schools (20). Schools base their educational content on these files. The QSF states core tasks, work processes and global lesson content. Subsequently, schools are free to determine the hours of classes, distribution within the curriculum and the covering of specific topics (4).

## ETHICAL CONSIDERATIONS

In this study, which neither subjects people to treatment nor imposes it on them, the occurrence of adverse effects is not to be expected and therefore no consent of the Medical

Research Ethical Committee (MREC) for this study was necessary in order to be in compliance with the Dutch law on Medical Research on Humans. In the case of storage of personal information, privacy is protected for schools according to the Personal Data Protection Act in the Netherlands.

The management staff of the ROCs were asked for their approval. A week prior to the actual distribution of the questionnaire, students received an information email explaining the study. Before completing the questionnaire, informed consent was provided by the opt-out regime for students younger than 18 years and their parents. Parents were informed by letter with a request to respond if they rejected participation of their child in the research. Informed consent for students who are 18 years or older was provided on the first page of the survey. Assurance was given that participation is voluntary, and students could decide to stop at any time and that this would not influence their progress in the nursing programme, and all information would be treated in a confidential manner.

## RESULTS

Step 1: Developing process

After two Delphi rounds, consensus was reached and 29 questions that diagnosed the knowledge about elderly persons were established.

Step 2: Content validity

The S-CVI/Ave of expert rating was 0.86, which means good content validity. Item values varied from Fair (6 item) to Excellent (22 items), and one item should be excluded (21). Therefore the conclusion can be made that the content validity of the KOP-Q for the population of vocational nursing students is good, as presented in Table 1.

Step 3: Readability and usability

A positive rating of readability and usability of the 29 items of the KOP-Q were assessed; 23 items scored 100%, three items 75%, one item 25% and two items scored 0%. Reasons for less readability and usability were “don’t know the meaning of one or two words” (items 6 and 29) or the sentence was unclear (items 1, 10, 12 and 24). Due to the small sample size (eight students) and the fact that the score of the experts for wording differed from the students’ scores, no changes were made in this phase of the research.

Step 4:

Of the 43 Regional Education Centres (ROCs) in the Netherlands, 10 agreed to participate (response rate = 23%). This resulted in a sample of 232 students and a response rate of 18.7% who completed the questionnaire. Of this sample, 204 students were female (87.9%) and the mean age was 22 (range 16 – 54). The sample consisted of 76 first-year, 54 second-year, 75 third-year and 27 fourth-year students. Most students were full-time students

(78.9%). A complete description of the participants is provided in Table 2. There were no missing values on the items. There were no floor or ceiling effects.

The KMO for sampling adequacy for analysis was 0.572, which is barely acceptable (22). An initial analysis was run to obtain eigenvalues for each factor of the data. Eleven factors have eigenvalues over Kaiser's factor of 1 and, in combination, they explained 56.748% of the variance. The scree plot shows inflexion at four factors. Because of this difference in factor counts, a third instrument was used, the Monte Carlo PCA for Parallel Analysis (22). This analysis shows five factors. Therefore, the PAA was rerun for four and five factors in search for an optimal result. At four factors, only 26.635% is explained and only 11 items of the 29 are loaded with a loading of minimal 0.3. With five factors, 31.861% is explained, and rotation was not possible. Therefore no clear determination of factors was possible at this point. For further analysis the communalities were explored; in the case of a sample size of 200, loading > 0.5 is appropriate (22), but loadings were low (0.058 - 0.362). This could indicate outliers, ungagged responses (all true or false) or a lot of missing data. None of these situations were at issue.

The internal consistency is low (total questionnaire, α=.580). After reduction of number of items from 29 to 21 items, alpha increased from 0.580 to 0.634. After rerunning PAA with 21 items, KMO increased to 0.634 and the proportion of explained variance increased to 39.3%. The overall conclusion of the analysis showed that, for the sample of vocational nursing students, the content validity was good and the usability was good, though the factor analysis showed no clear factors and the internal consistency for 21 items for educational evaluation is moderate.

To evaluate the discriminative properties, an ANOVA analysis was conducted and showed a significant effect of year of education on results and a significant difference between part-time and full-time students on results (both p<.000). A multiple comparison test (corrected for Bonferroni) showed a significant difference between first and other years, there was no significant difference between the other years. Further research for correlations and effect measuring will follow in a PhD program.

## DISCUSSION

Main findings:

In this study, the development and usability of the KOP-Q questionnaire about elderly persons when applied to vocational nursing students was documented. Research was conducted on content validity, usability, internal consistency and item reduction following the COSMIN standards. The results showed a 21-item questionnaire with good multidisciplinary content validity, good usability and moderate consistency.

Comparison with prior research

Due to the rigorous theoretical background, two Delphi rounds and a rating by multidisciplinary and experienced experts in elderly care and vocational education, a strong content validity is ensured (23, 24). Prior research development was based on an extensive research of the literature (FACTS, NKEPQ) and the opinion of a geriatrician, face validity of geriatric nurses (NKEPQ). Therefore, comparing content validity is limited of a variety of research steps. Content validity was determined by the S-CVI/A-Ave; in most research the CVI is more common (23). Comparison based on CVI is therefore limited.

The usability and readability was sufficient but there were remaining ambiguities. These ambiguities were also mentioned in the research of O' Hanlon, where the question was raised whether items test measure knowledge or reaction to terminology (7).

The internal consistency of the KOP-Q in vocational nursing students was 0.631, and a well-accepted guideline is between 0.7 and 0.9. The conclusion can be made that internal consistency is low to moderate (12). Previously developed questionnaires on general knowledge also showed low alpha rates (0.5 to 0.8) (6). Some possible explanations are the number of items, the homogeneity of the sample or poorly chosen items. Palmore states that if reliability is defined as the degree to which a test measures a single dimension, it will show low to moderate reliability. The FACTS as well the KOP-Q measure several dimensions, thus low alphas are to be expected and a test-retest reliability analysis is recommended (6).

To ensure the correctness to use Factor analysis, Fields and Vet recommend to research the correlational between the items and the KMO. The correlation matrix showed low correlations; almost none exceeded 0.3 (12, 22). In the case of good research, no further analysis should be conducted. Also, communalities were low (between 0.0 and 0.04). Thus, variables struggled to load significantly on any factor (0.058 - 0.362) as shown in Table 4.

As expected on low correlations and low communalities, explorative factor analysis failed to produce a simple structure. In addition, for higher loaded factors, is was difficult to determine factors. Based on the results of Van der Elst, Palmore and Lusk (8, 25, 26), it is surmised that the overall underlying concept could therefore be related more to general knowledge about older persons. This suggested that the underlying concept is very broad and covers many different concepts, as shown in de eigenvalues >1, where 11 factors were shown.

The strength of this research

Existing instruments for measuring knowledge lacked systematically rigorous methods according to COSMIN standards. For use in population and research purposes, a measurement instrument which aims to be evaluative or discriminative should meet all criteria for usability, reliability and validity for the population (12).

Previous surveys on aging lacked methodologic evidence or were restricted to one geriatric item or were multidisciplinary. This research addressed to nursing students consisted of basic general geriatric facts and covered all criteria of rigorous research for developing a questionnaire for a different population, such as development by Delphi rounds and review of associated literature, content (and face) validity testing by experts, usability testing by students and a cross-sectional research on a large sample of the population to evaluate the internal consistency, item reduction and underlying domains.

Steps 1 and 2 are qualitative research, translated in quantitative outcomes. To guarantee the validity and reliability, different instruments (at least three) were used as advised by Creswell to look for conformability rather than objectivity (27). Data triangulation in Step 1 was performed through rating by experts, asking their opinions and using prior research. Step 2 was a combination of rating by students and experts, as well as interviewing. The expert group represented all areas of care and was well experienced in care as well as in education. And by recording the interviews and making notes (thinking out loud), outcomes of usability testing increased in accuracy.

Limitations

The limitations of this research are the small sample size of the usability group. Using independent researchers to review the interviews would have strengthened the validation by intercoder agreement.

The sample size was 18.7%, which is too low to be able to generalize it to the general population. The number of responders is a rule of thumb and varies from four to 10 subjects per variable, with a minimum of 100 subjects to ensure stability (14). For generalizability, sample sizes of 300 and more are appropriate but as the KMO (0.572) was sufficient (22), analysis was therefore adequate.

The sample contained students of all four years of an educational programme and both full-time and part-time students, so the sample showed different characteristics and is heterogeneous. Analysis per group is more appropriate but is not possible with a sample size that is too small.

Implications for clinical practice

The KOP-Q questionnaire was developed to test knowledge of hospital nurses about care for older persons. The experts suggested to broaden the scope of the KOP-Q to other care settings to enhance clinical use. They also recommended that items should be evaluated on uniformity and actuality. Changes in care restrict the tenability of the survey.

Based on moderate Cronbach's alphas and low correlation the conclusion could be made that the usability of KOP-Q is restricted to use as an evaluation instrument and as a discussion paper for educators. This new instrument offers nursing education and care

residences facilities the opportunity to obtain useful information about level of knowledge, since there was a significant difference between different groups as shown in Table 3.

Furthermore, based on the strong content validity, literature showed that a confirmative factor analysis in that case is also appropriate (12). It is recommended to improve validation by conducting a confirmative factor analysis, test-retest design or Item Response Theory (IRT) analysis (6,18,28).

The response rate was 18.3%, and prior research response rates were also low for vocational students (17.3%)(13). Therefore, research conducted on vocational schools needs attention.

## Conclusion

The KOP-Q was developed to measure the knowledge of nurses in hospitals. On the basis of the findings of this study, the conclusion can be made that the KOP-Q can be used for evaluation of educational needs of vocational nursing students. Future research on psychometric properties will show more results on reliability and validity. As this study is a part of a PhD program, comparison outcomes and characteristics will provide more detailed information, which will lead to conclusions on the matter of discrimination, sensitivity and generalizability.


## Competing interests;

There were no competing interests.

## Acknowledgement;

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## Author contributions;

AB, JD, BM, JM: study design; AB, JD, MS: data gathering. All contributed to the drafting and revising the manuscript and approved to the final version.

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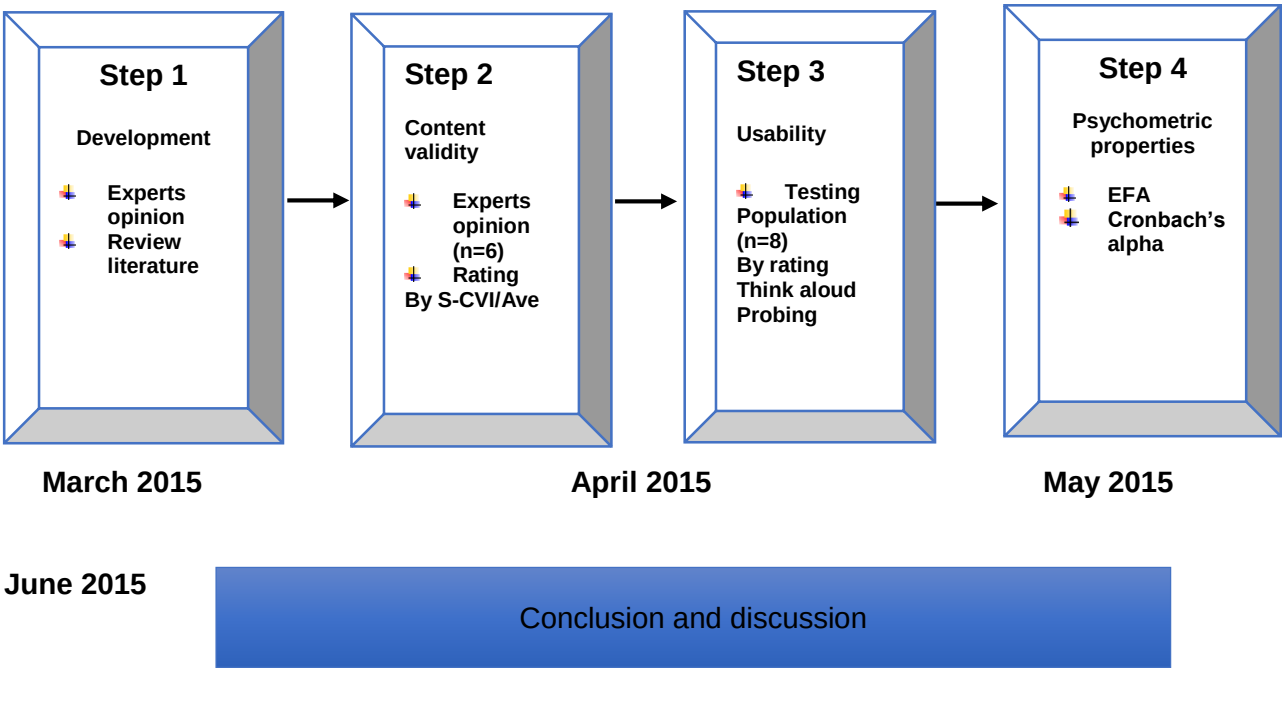
***Figure 1. Procedure of validating KOP-Q in vocational nursing students***



## Table 1: Ratings on a 29-item scale by 6 experts

| Item | Expert 1 | Expert 2 | Expert 3 | Expert 4 | Expert 5 | Expert 6 | I-CVA/UA | I-CVI | Kappa |
|---|---|---|---|---|---|---|---|---|---|
| **aging** | ✓ | ✓ | ✓ | ✓ | - | - | 4 | 0.67 | 0.57 |
| **incontinence** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 | 1.0 | 1.00 |
| **delirium** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 | 1.0 | 1.00 |
| **nutrition** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 | 1.0 | 1.00 |
| **medication** | ✓ | ✓ | ✓ | ✓ | ✓ | - | 5 | 0.83 | 0.81 |
| **dementia** | ✓ | ✓ | ✓ | ✓ | - | ✓ | 5 | 0.83 | 0.81 |
| **delirium** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 | 1.0 | 1.00 |
| **nutrition** | ✓ | ✓ | ✓ | ✓ | - | - | 4 | 0.67 | 0.57 |
| **falling** | ✓ | ✓ | ✓ | ✓ | - | ✓ | 5 | 0.83 | 0.81 |
| **pressure ulcers** | ✓ | ✓ | ✓ | ✓ | ✓ | - | 5 | 0.83 | 0.81 |
| **depression** | ✓ | ✓ | ✓ | ✓ | ✓ | - | 5 | 0.83 | 0.81 |
| **medication** | ✓ | ✓ | ✓ | ✓ | ✓ | - | 5 | 0.83 | 0.81 |
| **incontinence** | ✓ | - | ✓ | ✓ | - | - | 3 | 0.50 | - |
| **nutrition** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 | 1.0 | 1.00 |
| **delirium** | ✓ | ✓ | ✓ | ✓ | ✓ | - | 5 | 0.83 | 0.81 |
| **medication** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 | 1.0 | 1.00 |
| **family care** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 | 1.0 | 1.00 |
| **communication** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 | 1.0 | 1.00 |
| **communication** | ✓ | ✓ | - | ✓ | ✓ | - | 4 | 0.67 | 0.57 |
| **nutrition** | ✓ | ✓ | ✓ | ✓ | - | ✓ | 5 | 0.83 | 0.81 |
| **medication** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 | 1.0 | 1.00 |
| **depression** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 | 1.0 | 1.00 |
| **family care** | ✓ | - | - | ✓ | ✓ | ✓ | 4 | 0.67 | 0.57 |
| **communication** | ✓ | ✓ | - | ✓ | ✓ | - | 4 | 0.67 | 0.57 |
| **medication** | ✓ | ✓ | ✓ | ✓ | - | - | 4 | 0.67 | 0.57 |
| **pressure ulcer** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 | 1.0 | 1.00 |
| **delirium** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 | 1.0 | 1.00 |
| **falling** | ✓ | ✓ | **Mv** | ✓ | ✓ | ✓ | 5 | 1.0 | 1.00 |
| **incontinence** | ✓ | ✓ | ✓ | ✓ | - | ✓ | 5 | 0.83 | 0.81 |
| **Proportion relevant** | **1.0** | **0.93** | **0.90** | **1.0** | **0.72** | **0.62** | | **S-CVI/Ave 0.86** | |

✓ Items rated 3 and 4 on 4-point relevance scale; - items rated 1 and 2; MV = missing value.

*S-CVA/Ave: Content Validity Index for the whole scale for Average agreement (> 0.80 is acceptable)*

*S-CVI of 0.5 or less are excluded. K* = Kappa designating agreement on relevance = (I-CVI-pc)/(1-pc). Pc = [N!/A!(N-A)!]*5 $^{n}$*

**Table 2 Characteristics of study population (n= 232)**

| **Demographic characteristics** | | **N (%)** | **%** |
|---|---|---|---|
| **Gender** | Female | 204 (87.9) | 87.9% |
| **Age in years** | Mean (SD) | 22[1] (8) | |
| | SD | 8 | |
| | range | 16 till 54 | |
| **Year of education** | First year | 76 | 32.8% |
| | Second year | 54 | 23.3% |
| | Third year | 75 | 32.3% |
| | Fourth year | 27 | 11.6% |
| **Education** | Full time | 183 | 78.9% |
| | Part-time | 47 | 20.3% |
| **Working experience[2]** | Yes | 92 | 39.7% |
| | SD | 10.2 | |
| | Average | 1.22 | |
| **Working experience** | **- nursing home** | 165 | 71.7% |
| | **- home care** | 71 | 30.6% |
| | **- hospital** | 37 | 15.9% |

[1]*missing values=7, imputed like mean values*

[2]*working experiences in elderly care in hours per week*

**Table 3 Knowledge Older Persons Quiz scores**

| Education | n | Mean good answers | SD |
|---|---|---|---|
| 29 questions | 232 | 19.35 (66%) (range 11- 27) | 3.4 |
| First year | 76 | 17.18 | 3.1 |
| Second year | 54 | 20.22 | 2.8 |
| Third year | 75 | 20.89 | 2.8 |
| Fourth year | 27 | 19.41 | 3.8 |
| Part-time students | 47 | 21.83 | 3.1 |
| Full time students | 183 | 18.79 | 3.3 |

**Table 4 Pattern Matrix : Summary of exploratory factor analyse results for five factors, after extraction and rotation for the KOP-Q questionnaire (n= 232)**

| Items | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 |
|---|---|---|---|---|---|
| Als ouderen onverwacht incontinent zijn kan er sprake zijn van een urineweginfectie. | **,558**[1] | ,123 | ,116 | -,137 | ,041 |
| Bij slikproblemen moeten alle medicijnen gemalen worden zodat de patiënt de medicijnen binnen krijgt. | ,418 | -,146 | ,063 | ,137 | ,060 |
| De meeste mantelzorgers hebben geen behoefte aan extra hulp van de thuiszorg. | ,414 | ,118 | -,091 | ,136 | -,175 |
| Pijnmedicatie moet zo min mogelijk aan ouderen worden toegediend vanwege de grote kans op een verslavende werking. | ,346 | -,102 | -,033 | ,070 | ,074 |
| Depressies worden bij ouderen minder vaak herkend. | ,290 | -,045 | ,096 | -,082 | -,008 |
| Als weefsel onder invloed van druk twee uur geen bloedtoevoer krijgt kan decubitus ontstaan. | ,152 | ,372 | ,002 | ,013 | ,171 |
| Omdat ouderen minder bewegen hebben zij minder vocht nodig. | -,068 | ,368 | -,109 | ,159 | ,170 |
| Wanneer een patiënt apraxie heeft is het goed om uitgebreide instructies te geven over wat hij moet gaan doen. | ,130 | -,346 | ,057 | ,225 | ,186 |
| Bij een delier moet gezorgd worden voor een evenwichtige verdeling van activiteiten over de dag. | -,054 | ,338 | ,148 | ,208 | -,077 |
| Bij slechthorende oudere patiënten kun je het beste op normaal volume spreken. | -,097 | -,086 | **,625** | ,033 | -,126 |
| Bij slechthorende oudere patiënten moet je als verpleegkundige goed verstaanbaar in het oor van de patiënt spreken. | ,095 | -,055 | **,529** | -,075 | ,070 |
| We spreken pas van decubitus als er sprake is van blaarvorming of ontvelling. | ,131 | ,202 | ,262 | -,015 | ,090 |
| Vragen aan de patiënt of hij de afgelopen 6 maanden is gevallen, is een goede manier om een verhoogd risico op vallen in kaart te brengen. | ,035 | ,056 | ,231 | ,101 | ,062 |
| Een heteroanamnese is alleen noodzakelijk bij dementerende mensen. | -,030 | ,019 | -,009 | ,476 | ,140 |
| Bij een delier moet gezorgd worden voor felle verlichting zodat alle hoeken van de kamer verlicht zijn. | ,110 | ,048 | ,010 | ,346 | -,017 |
| Overbelasting van de mantelzorger kan leiden tot mishandeling van degene die zij verzorgen. | ,039 | ,091 | ,259 | ,295 | ,130 |
| Ondervoeding kan een negatief effect hebben op denken en waarnemen. | ,065 | ,053 | ,153 | ,224 | -,051 |
| Vergeetachtigheid, concentratieproblemen en besluiteloosheid behoren meer bij het ouder worden dan bij een depressie. | -,042 | -,034 | ,113 | -,066 | **,591** |
| Bij een depressie kunnen geheugenproblemen voorkomen. | ,230 | ,131 | ,045 | -,256 | ,297 |
| Een oudere met een BMI van >25 kan niet ondervoed zijn. | ,040 | -,006 | -,110 | ,140 | ,289 |
| Een incontinente patiënt moet je wel verschonen maar hoef je niet meer op het toilet te laten zitten. | -,035 | ,082 | -,017 | ,112 | ,198 |
| Eigenvalues > 1[2] | 2.6 | 1.6 | 1.4 | 1.3 | 1.3 |
| % of variance[3] Total : 39.3% | 12.5% | 7.8% | 6.8% | 6.2% | 6.0% |

Extraction Method: Principal Axis Factoring.  Rotation Method: Oblimin with Kaiser Normalization.

- Rotation converged in 56 iterations.

[1]Numbers in bold; > 0.5, more than three items > 0.5 are necessary for explaining a factor

[2]Factor eigenvalue > 1 are appropriate

[3]Proportion of explained variance per factor