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Assessing the Attitudes of Greek Nurses Toward Computerized Dementia Screening

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Abstract.
Background: Despite the abundance of research on computerized dementia screening tests, the attitudes of hospital personnel toward this screening method have not been investigated.
Objective: 1) To conduct a confirmatory factor analysis of the first part of a two-part questionnaire about computerized dementia screening. 2) To assess the attitudes of Greek nurses toward computerized dementia screening. 3) To assess barriers to future implementation of computerized dementia screening in the Greek healthcare system, as reported by nurses.
Methods: 161 Greek nurses from two urban public general hospitals who participated in a dementia training program were recruited. They were asked to complete a two-part questionnaire about computerized dementia screening. The first part of the questionnaire assesses attitudes toward dementia screening while the second part of the questionnaire assesses barriers to its implementation.
Results: Confirmatory factor analysis on the first part of the questionnaire suggested a two-factor structure (feasibility/acceptability). The total score of all items loading on each factor was calculated. For feasibility, scores ranged between 10 and 25 (M = 19.38, SD = 3.80). For acceptability, scores ranged between 6 and 20 (M = 15.27, SD = 2.76). The main barriers to implementation were cost of equipment, insufficient training, lack of a plan for the integration of computerized screening tests in the daily routine of the hospital and time needed for staff training.
Conclusion: The positive attitude of nurses supports the implementation of computerized dementia screening in public hospitals as long as identified barriers are addressed.

Keywords: Attitude of health personnel, cognitive assessment screening instrument, dementia, geriatric nursing, hospitals, neurocognitive tests, questionnaire design, questionnaires, screening

INTRODUCTION

Dementia is a global public health priority as its impact in individuals, families, and health care systems is enormous [1]. Despite a marked reduction in the prevalence of dementia, the number of people with dementia (PwD) is expected to double by 2050 [2]. Underdiagnosis remains an issue with more than half of dementia cases being undiagnosed [3, 4]. As older adults make frequent use of healthcare services, undiagnosed dementia in a hospital environment can affect patients, healthcare personnel, and the healthcare system in general. Dementia can affect all aspects of therapy and care from communication with hospital staff to adherence to therapy. PwD are more likely to experience longer hospital stays and worse clinical outcomes compared to their cognitively healthy counterparts [5]. The majority of people with dementia admitted to an emergency

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department will exhibit behavioral and psychological symptoms of dementia (BPSD) [6] comprising agitation, aggression, mood disorders, wandering, and sleep disorders [7]. BPSDs complicate patient management, create significant distress for family and professional caregivers, and are often aggravated during an acute hospital admission [8–10]. Furthermore BPSDs are a major source of stress for PwD as BPSDs are usually a response to an environment that fails to fulfill the PwD's needs [11]. At the same time, PwD experience difficulties in many aspects of their communication with hospital staff [12] further complicating treatment.

As national dementia plans are being implemented, one of their core goals in many countries is dementia training for nurses [13, 14] and lately a large number of training programs for hospital staff has been implemented [15]. At the same time, despite the beneficial effect of training for the management and support of PwD in a hospital environment, there is a lack of brief, accurate, and easy to use cognitive screening tools for dementia detection that can be administered by non-specialists such as nurses [16]. Existing screening tools for use by non-specialists rely on assessment of a patient's behavior by an informant and not on a direct assessment of the patient's cognitive functioning. Furthermore they are designed to detect cognitive impairment at the dementia stage, where behavioral disturbances are more pronounced, and thus are not suited to detecting subtler impairment [17]. The lack of appropriate screening tools affects the ability to detect clinical and pre-clinical dementia in the hospital (and also in primary care facilities which are staffed mainly by nurses and general practitioners). Indeed, primary care services and primary care physicians often fail to diagnose dementia and provide appropriate follow-up and referrals to specialist services for comprehensive assessment and support [18–21]. Detecting cognitive impairment before it starts affecting a patient's behavior could allow for better patient management and reduced stress for patients, caregivers, and healthcare personnel.

Computerized dementia screening comprises the use of cognitive screening tests that are administered in a digital format and has been proposed as a way to enable non-specialists to screen for dementia by directly assessing a patient's cognitive functioning [16, 22]. Lately, computerized cognitive test designers have been focusing on screening and are creating tests that are brief and can be administered by non-specialists such as nurses and healthcare assistants. The latest generation of computerized tests are usually administered in a tablet PC in the span of 10–15 minutes, comprise of tasks assessing all major cognitive domains, and can adapt to the ability level of the examinee [16, 23]. While they do not replace a neurologist's diagnosis they often provide an interpretive report at the end of testing which provides information for further assessment and follow-up thus allowing for better care for patients with probable dementia [23]. Implementation studies in primary care have assessed the feasibility of computerized dementia screening by non-specialists with promising results [24, 25]. At the same time patients themselves are exhibiting positive attitudes toward computerized screening [26]. Still the attitude of nurses toward computerized dementia screening has not been studied as studies assessing attitudes of hospital personnel toward technological solutions have focused mostly on the use of technology for administrative purposes such as the implementation of digital patient records [26–28].

The eventual adoption and effectiveness of computerized dementia screening will be influenced by various parameters. Primary care studies have demonstrated that length of administration, including time needed for interpretation of test results can be a significant barrier to adoption [24, 25]. Research on the acceptance of other technological tools, such as electronic medical records (EMRs), by nurses provides useful information. Underutilization after initial implementation remains an issue [27]. Healthcare professionals accept change at different rates [27] and utilization and acceptance of novel tools are influenced by the way they are perceived by healthcare personnel [28]. Computer literacy and familiarity lead to better attitudes toward technology and support technology acceptance, thus it could be beneficial to provide information and communication technology (ICT) training to nurses before the implementation of computerized dementia screening [27, 29]. The overall culture and work environment of the hospital also has an effect on the acceptance and utilization of new technologies [27]. The concept of nurses acting as "ICT champions" promoting the use of new technologies has been proposed [30]. Since the concept of "dementia champions" has already been successfully implemented in hospitals [31, 32], it could be combined with the concept of an "ICT champion" to train nurses who will act as "digital dementia champions" supporting their colleagues in using new technologies to better care for people with dementia.

This study aims to assess the attitudes of Greek nurses toward computerized dementia screening using a novel validated questionnaire [22]. Furthermore, it aims to conduct a confirmatory factor analysis of the questionnaire being used to assess the attitudes of participating nurses. For the aforementioned purpose, the study was designed to investigate: 1) Whether the originally calculated 1-factor structure of the questionnaire is confirmed in a large sample of nurses, as the initial validation of the questionnaire was conducted in a sample of psychology students. We hypothesized that validation in a large sample of nurses could lead to a more detailed factor structure, based on the fact that, in the initial validation, questions describing two distinct aspects of attitudes towards computerized testing (feasibility and acceptability) loaded on the same (single) factor [22]. 2) What is the overall attitude of Greek nurses toward computerized dementia screening. We hypothesized that the attitude of nurses in this study will be similar to the attitude of nurses recorded in a previous published study using the same questionnaire. In that study, a small sample of nurses presented an overall positive attitude toward computerized dementia screening [22]. 3) Barriers to future implementation of computerized dementia screening in the Greek healthcare system (as reported by nurses). We hypothesized that the barriers reported in this study will be similar to the barriers reported by a small sample of nurses in a previous published study using the same questionnaire. These were found to be mainly cost of equipment, lack of a plan for the integration of computerized screening tests in the daily routine of the hospital and time needed for staff training [22].

MATERIALS AND METHODS

Participants

Participants were recruited from a convenience sample of nurses, from two public general hospitals in Thessaloniki Greece, who participated in a dementia training program. They were administered this questionnaire along with other scales and a demographics questionnaire as part of an assessment of their overall knowledge of dementia. The study was approved by the Greek Association of Alzheimer's Disease and Related Disorders (GAADRD) ethical committee and the scientific council of each of the two hospitals where nurses were recruited from, and all participants provided informed consent. This study followed the methodological recommendations regarding the sample size needed for validation studies [33].

Questionnaire

Participants were administered a questionnaire that measures the attitudes of nurses toward computerized dementia screening. The design and validation of the questionnaire has been described in a previous study. In that study, the questionnaire was validated on a sample of 212 psychology students and subsequently administered to a sample of 19 nurses [22]. The 12-item questionnaire is divided in two parts. The first part comprises eight items scored on a Likert scale and assesses the overall attitude of nurses toward computerized testing. The second part comprises one item scored on a binary scale and three items scored on an ordinal scale and assesses barriers to the implementation of computerized dementia screening. Initial factor analysis of the first part of the questionnaire has indicated that the eight items scored on a Likert scale are loading on a single factor (acceptability - feasibility) assessing the feasibility and acceptability of computerized dementia screening. The questionnaire's reliability had been calculated using Cronbach's alpha and was found to be good (alpha = 0.762) [22]. The questionnaire is included in the Supplementary Material.

Statistical analyses

Analysis was conducted in three stages. In the first stage, the factorial structure of the questionnaire was tested using confirmatory factor analysis, in order to examine whether the unifactorial structure of it which reflects an overall concept of 'feasibility - acceptability' is verified in a nurses' sample [34]. This analysis was conducted in EQS (version 6.1) statistical software [35]. Specifically, structural equation modeling (SEM) on covariance matrices was used. A maximum likelihood estimation procedure was performed. Regarding the confirmation of a structural model, a non-significant level of Goodness of Fit index χ^2, that is $p > 0.05$, is indicative of a good fit of the model to the data. In addition, when the value of Root Mean Square Error of Approximation (RMSEA) is < 0.05, it is also an indication of the good fit of the model to the data. RMSEA values ranging from 0.06 to 0.08 indicate a reasonable and therefore acceptable approximation error. Comparative Fit Index (CFI) examines whether the data

Table 1
Demographic characteristics of participants

Age (y)	15–25	26–35	36–45	46–55	56–65
	1 (0.6%)	5 (3.1%)	38 (23.6%)	106 (65.8%)	11 (6.8%)
Work experience (y)	1–5	6–10	11–15	>15	
	5 (3.1%)	8 (5.0%)	17 (10.6%)	131 (81.4%)	

Table 2
Comparisons of fit indices of various models of the factor structure of the questionnaire

Model (factor)	χ^2	*p*	*CFI*	*SRMR*	*RMSEA*
1-F (Fe + Ac)	χ^2 (20, N = 161) = 142.992	<0.001	0.722	0.135	0.196(90% CI: 0.166–0.226)
2-Fa (Fe Vs Ac: measurement model)	χ^2 (20, N = 161) = 62.137	<0.001	0.905	0.133	0.115(90% CI: 0.083–0.147)
2-Fb (Fe Vs Ac: structural model)	χ^2 (17, N = 161) = 23.403	0.137	0.986	0.056	0.049(90% CI: 0.000–0.092)

1-F, one-factor model; 2-Fa & 2-Fb, two-factor models. Measurement model: the factors were defined without any covariance between them; structural model: the factors were allowed to freely covary. Fe, Feasibility; Ac, Acceptability; CFI, comparative fit index; SRMR, standardized root mean-square residual; RMSEA, root mean-square error of approximation.

fit a hypothesized measurement model compared to the basic model. Values greater than 0.90 indicate adequate fit of the model to the data, whereas values close to 1.00 indicate a good fit [36]. Moreover, to improve model fit, we examined the modification indices, namely the Wald and the Lagrange tests, which represent frequently used statistics to identify focal areas of a misfit in a confirmatory factor analysis (CFA) solution [36].

In the second stage, the total score for each factor was calculated. In the third stage, frequencies were calculated for those items that were not included in the factor analysis because they were not scored on a Likert scale. The second and third stage analyses were conducted in SPSS (version 24.0) statistical software [37].

RESULTS

Demographic characteristics of participants

173 participants completed the questionnaire but 12 participants were excluded from analysis due to missing data in their answers. The final study sample included 161 nurses from two public general hospitals. Demographic characteristics of participants are shown in Table 1. The majority of the participants were female (149 persons). All participating nurses had completed post-secondary education of some form.

Confirmatory factor analysis

The one-factor model revealed in the original validation study of the questionnaire using exploratory factor analysis was firstly examined [22]. Due to non-acceptable fit of the uni-factorial model to the data of the nurses' sample, a two-factor model without any covariance between the factors (measurement model) and a two-factor structural model where the factors were allowed to freely covary were tested. As shown in Table 2 the fit indices of the one-factor model and the two-factor model without any covariance between the factors indicate non-acceptable fit of the models to the data, with the exception of the CFI of the two-factor measurement model, which was found to indicate adequate fit. Based on the Wald test, the addition of interrelation between latent factors and between the variables Q2a and Q2b as well as the double loading of the variable Q2c increased the two-factor model's (2-Fb model) fit to a good level. After following these steps, the Wald Test and the Lagrange Multiplier Test did not support the elimination or the addition of other parameters, respectively. The factor structure and correlations between variables and factors for that model are presented in Table 3.1 and Table 3.2. Cronbach's alpha for the scale was a = 0.794 while Cronbach's alpha for factor 1 (Feasibility) was a = 0.826 and Cronbach's alpha for factor 2 (Acceptability) was a = 0.707.

Questionnaire score

The score for each factor was calculated. Furthermore, the total score of all the questionnaire items loading on either factor was calculated in order to facilitate a comparison with a previous study where all these items loaded on a single factor. The scores for each factor, and the total score, are presented in Table 4.

Frequencies analysis

Frequencies were calculated for those items that were not included in the factor analysis because they were not scored on a Likert scale. Frequencies for each answer on dichotomous questions (or dichotomous sub-items of questions) are presented in Table 5.1 while frequencies for ordinal questions are presented in Table 5.2. The most common answer to Question 3 (How much time could you devote to training in the use of computerized dementia screening tests?) was "1–2 days". The most common answer to Question 4 (How much time could you devote during your shift to examine an older adult with a computerized dementia screening test?) was "10–20 minutes".

DISCUSSION

This study expands the results of a previous effort to create and validate a questionnaire for the assessment of attitudes of Greek nurses toward computerized testing [22]. It is the first study that has recorded and analyzed the attitude of a sufficiently large sample of Greek nurses toward computerized dementia screening.

It is worth noting that the study sample was quite homogenous displaying certain demographic characteristics. Almost 90% of participants were 36–55 years old with the majority (65.8%) being 46–55 years old. Also, the overwhelming majority (81.4%) of participants had more than 15 years of work experience. The absence of younger and less experienced nurses is noteworthy. Since this sample represents a sample of nurses that are interested in dementia training, this raises questions about the attitude of younger and less experienced nurses toward dementia training. Literature supports the notion that younger nurses focus on gaining competency in core aspects of nursing thus enabling them to feel comfortable in their professional role [38]. It is unclear, however, whether younger nurses feel that dementia training is not necessary or relevant to their work or whether they believe they should first gain experience in core aspects of nursing before getting specialized train-

Table 3.1
The structure of the questionnaire: Standardized solution (2-Fb model)

Items	Factors			
	Fe (F1)	Ac (F2)	E	R
Q2a	0.464		0.886	0.215
Q2b	0.611		0.791	0.374
Q2c	0.763	0.196	0.550	0.698
Q2d	0.841		0.540	0.708
Q2e	0.734		0.679	0.539
Q5		0.610	0.792	0.372
Q6		0.705	0.709	0.497
Q7		0.800	0.600	0.840

Q2a, Question 2a; Q2b, Question 2b; Q2c, Question 2c; Q2d, Question 2d; Q2e, Question 2e; Q5, Question 5; Q6, Question 6, Q7, Question 7. Fe, Feasibility; Ac, Acceptability. Factor loadings are statistically significant ($p<0.05$).

Table 3.2
Factor and variable correlations

F1 – F2	0.259*
Q2a – Q2b	0.352*

*Correlation is significant at the $p<0.05$ level.

Table 5.1
Frequencies analysis for dichotomous questions/sub-items

	Yes	No
Q1	36.0%	64.0%
Q8a	69.6%	30.4%
Q8b	42.2%	57.8%
Q8c	66.5%	33.5%
Q8d	63.4%	36.6%
Q8e	59.6%	40.4%
Q8f	51.6%	48.4%

Q1, Question 1; Q8a, Question 8a; Q8b, Question 8b; Q8c, Question 8c; Q8d, Question 8d; Q8e, Question 8e; Q8f, Question 8f.

Table 5.2
Frequencies analysis for ordinal questions

Q3	<4 h	4–8 h	1–2 days	3–4 days	1 week
	8.1%	21.3%	30.6%	15.6%	24.4%
Q4	<5 min	5–10 min	10–20 min	20–40 min	40–60 min
	2.5%	28.8%	31.9%	25.0%	11.9%

Q3, Question 3; Q4, Question 4.

Table 4
Factor score and total score

	N	Minimum	Maximum	Median	Mean	Std. Deviation
Factor 1 (Feasibility)	161	10	25	19	19.38	3.80
Factor 2 (Acceptability)	161	6	20	15	15.27	2.76
Total score	161	17	40	31	30.85	4.93

ing. Furthermore, other issues such as job insecurity or temporary employment in the group of younger or less experienced nurses may be affecting their attendance in dementia training programs. Therefore, we can only report the noteworthy absence of younger and less experienced nurses without coming to any conclusion about its causes.

The confirmatory factor analysis revealed a different factor structure compared to the previous study, and that could be attributed to the fact that initial validation was conducted in a sample of psychology students. Since the questionnaire has been designed for nurses, it was expected that psychology students might not have a clear picture of the latent variables measured by the questionnaire and that was evident in the factor structure revealed in the initial validation study of the questionnaire [22]. In that study a single factor was revealed with all items included in the factor analysis loading on a single factor. The single factor (acceptability-feasibility) combined items describing two distinct aspects of attitude toward computerized dementia screening, feasibility, and acceptability. Essentially it acted as an indicator of the overall attitude of nurses toward computerized dementia screening [22].

A more detailed factor structure was expected in the present study since the items included in the factor analysis assess two distinct aspects of attitudes toward computerized dementia screening. We expected nurses to be able to better differentiate between these two latent variables in comparison with psychology students. The items loading on the first factor (feasibility) are the sub-items of Question 2. All of them assess how desirable are the core characteristics of computerized dementia screening tests. For computerized dementia screening to be feasible, core characteristics of computerized tests, which make them unique and differentiate them from other instruments, must be desirable and relevant to nurses. Thus, this factor assesses the feasibility of computerized dementia screening. The items loading on the second factor (acceptability) comprise questions 5, 6, and 7 and Question 2c. Questions 5, 6, and 7 assess how interested nurses would be in using self-administered computerized tests and how interested they believe their patients and their relatives would be in using those tests. Question 2c assesses how desirable is automated administration and scoring of computerized tests. Essentially this factor assesses the acceptability of self-administered computerized tests which represent the latest generation of computerized dementia screening tests.

At the same time, the two distinct aspects of attitudes assessed by the first part of the questionnaire (and their respective factors) are closely related and this is reflected in the current factor structure where there is correlation between the two factors. As expected, screening tools that have certain characteristics (ease of administration, ability to be used in different environments) that increase the feasibility of their use tend to be more acceptable by nurses. It is also worth noting that a correlation between questions 2a and 2b was detected in the confirmatory factor analysis. Question 2a pertains to brief administration while question 2b pertains to the ability to be administered by most members of staff. These two characteristics are correlated since more lengthy computerized screening tests are generally suited to administration in specialist settings by neurologists and neuropsychologists while brief screening tests are usually designed to be administered in various settings by non-specialist healthcare personnel [16, 23]. Indeed, implementation studies of brief computerized screening tests have indicated that they can be used effectively by non-specialists such as family doctors [24, 25]. Another noteworthy finding is the double loading of question 2c which loads on both factors even though its loading on the acceptability factor is minimal. Question 2c pertains to automatic scoring and administration which is the core attribute of computerized screening tests that are designed to be used by non-specialists [16, 23, 24, 39]. Being the most important quality enabling the use of such tests by nurses in a hospital environment, its double loading is not surprising. Still, in a revised version of the questionnaire, it could be beneficial to modify the question in order to better assess one of the two aspects reflected in the two factors.

The attitudes of nurses toward computerized dementia screening, in our study sample, are overall positive. Both feasibility and acceptability scores are high. Also, the total score of the questionnaire, expressing overall attitude toward computerized dementia screening, is high. The findings of this study, concerning the attitudes of nurses, are in line with those of a previous study using the same questionnaire despite the fact that in that study the nurses' sample was very small comprising only 19 nurses. In that study, the nurses' sample was not used for validation of the questionnaire, as validation was conducted on a sample of psychology students, but was used to assess nurses' attitudes toward computerized dementia screening [22]. The total score of the questionnaire in the present study ($\mu = 30.85$, $SD = 4.93$)

is similar to the total score calculated in the previous study ($\mu = 29.50$, SD = 3.20) [22]. This indicates that the previous study provided a good initial overview of nurses' attitudes despite its limited nurses' sample.

At the same time there were some differences in reported barriers to implementation of computerized testing between the present study and the previous study. In this study the main reported barriers were cost of equipment, insufficient training, lack of a plan for the integration of computerized dementia screening in the daily routine of the hospital and time needed for staff training. In the previous study the main reported barriers were cost of equipment and lack of a plan for the integration of computerized dementia screening in the daily routine of the hospital [22]. It can be argued that, while the overall attitude of nurses was not different in the two studies, this study provided a more accurate assessment of barriers to implementation of computerized dementia screening due to its larger sample. A comparison of the percentage of nurses that replied "Yes" in dichotomous questions assessing potential barriers to implementation, in the present study and in the initial validation study of the questionnaire, is presented in Table 6.1.

Concerning time-related barriers to implementation of computerized dementia screening, in the present study, nurses reported that they could devote more time to training in the use of computerized dementia screening tests (1–2 days) in comparison to the previous study (4–8 h). Furthermore, they reported that they could devote more time during their shift to examine an older adult with a computerized dementia screening test (10–20 min) in comparison to the previous study (where the most frequent response was tied between "5–10 minutes" and "10–20 minutes"). A comparison of frequencies of answers to ordinal questions assessing time-related potential barriers to implementation, in the present study and in the initial validation study of the questionnaire, is presented in Table 6.2.

Strengths of this study include the large number of nurses from public hospitals who have good knowledge of the daily routine of hospitals, their needs and limitations (in general and in regards to computerized dementia screening). Furthermore, this study addresses the limitations of a previous study conducted with the same questionnaire, namely the fact that on that study validation was conducted on a sample of psychology students and the questionnaire was then administered to a small sample of nurses that was not included in the initial validation [22]. Limitations of this study include the fact that all participating nurses were recruited from general hospitals in a major urban center therefore the results of this study may not reflect the attitudes of nurses in other healthcare services (rural hospitals, primary care services, etc.). Furthermore, the overwhelming majority of participating nurses had more than 15 years of work experience thus their attitudes may not be indicative of the attitudes of more junior nurses. Additionally, all participating nurses were recruited from nurses participating in a dementia training program therefore they may represent a sub-sample of nurses who display a particular interest in dementia. Finally, due to the small sample of the previous study, its results concerning attitudes of nurses and possible barriers to the implementation of computerized dementia screening may be inaccurate therefore comparisons with the present study may be of limited value.

Table 6.1
Percentage of nurses who replied "Yes" in dichotomous questions in the present study and in the initial validation study of the questionnaire

	Present study	Initial validation study
Q1	36.0%	36.8%
Q8a	69.6%	68.4%
Q8b	42.2%	15.8%
Q8c	66.5%	42.1%
Q8d	63.4%	63.2%
Q8e	59.6%	52.6%
Q8f	51.6%	47.4%

Q1, Question 1; Q8a, Question 8a; Q8b, Question 8b; Q8c, Question 8c; Q8d, Question 8d; Q8e, Question 8e; Q8f, Question 8f.

Table 6.2
Frequencies of answers to ordinal questions in the present study and in the initial validation study of the questionnaire

Q3	<4 h	4–8 h	1–2 days	3–4 days	1 week
Present study	8.1%	21.3%	30.6%	15.6%	24.4%
Initial validation study	5.3%	31.6%	26.3%	21.1%	15.8%
Q4	<5 min	5–10 min	10–20 min	20–40 min	40–60 min
Present study	2.5%	28.8%	31.9%	25.0%	11.9%
Initial validation study	0%	31.6%	31.6%	26.3%	10.5%

Q3, Question 3; Q4, Question 4.

Conclusion

This study provides additional validation of a novel questionnaire designed to assess attitudes of healthcare personnel toward computerized dementia screening. Study results indicate that the overall attitude of nurses from two major urban Greek hospitals toward computerized dementia screening is positive. Additionally, this study identified possible barriers to the implementation of computerized dementia screening. The findings of this study support the implementation of computerized dementia screening in public hospitals as long as potential barriers are addressed.

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SUPPLEMENTARY MATERIAL

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REFERENCES

[1] World Health Organization (2017) *Global action plan on the public health response to dementia 2017–2025*.

[2] Alzheimer Europe (2019) *Dementia in Europe Yearbook 2019*.

[3] Lang L, Clifford A, Wei L, Zhang D, Leung D, Augustine G, Danat IM, Zhou W, Copeland JR, Anstey KJ, Chen R (2017) Prevalence and determinants of undetected dementia in the community: A systematic literature review and a meta-analysis. *BMJ Open* **7**, e011146.

[4] Amjad H, Roth DL, Sheehan OC, Lyketsos CG, Wolff JL, Samus QM (2018) Underdiagnosis of dementia: An observational study of patterns in diagnosis and awareness in US older adults. *J Gen Intern Med* **33**, 1131-1138.

[5] Moyle W, Olorenshaw R, Wallis M, Borbasi S (2008) Best practice for the management of older people with dementia in the acute care setting: A review of the literature. *Int J Older People Nurs* **3**, 121-130.

[6] Sampson EL, White N, Leurent B, Scott S, Lord K, Round J, Jones L (2014) Behavioural and psychiatric symptoms in people with dementia admitted to the acute hospital: Prospective cohort study. *Br J Psychiatry* **205**, 189-196.

[7] Lyketsos CG, Steinberg M, Tschanz JT, Norton MC, Steffens DC, Breitner JCS (2000) Mental and behavioral disturbances in dementia: Findings From the Cache County Study on Memory in Aging. *Am J Psychiatry* **157**, 708-714.

[8] Banerjee S (2010) Living well with dementia—development of the national dementia strategy for England. *Int J Geriatr Psychiatry* **25**, 917-922.

[9] Freeman C, Joska J (2012) Management of behavioural and psychological symptoms of dementia. *Contin Med Educ* **30**, 110-113.

[10] Kales HC, Gitlin LN, Lyketsos CG (2014) Management of neuropsychiatric symptoms of dementia in clinical settings: Recommendations from a multidisciplinary expert panel. *J Am Geriatr Soc* **62**, 762-769.

[11] Halek M, Holle D, Bartholomeyczik S (2017) Development and evaluation of the content validity, practicability and feasibility of the Innovative dementia-oriented Assessment system for challenging behaviour in residents with dementia. *BMC Health Serv Res* **17**, 554.

[12] Caramelli P, Mansur LL, Nitrini R (1998) Chapter 32 - Language and communication disorders in dementia of the Alzheimer type. In *Handbook of Neurolinguistics*, Stemmer B, Whitaker HA, eds. Academic Press, San Diego, pp. 463-473.

[13] Australian Government (2015) *National Framework for Action on Dementia 2015-2019*.

[14] United Kingdom Department of Health (2009) *Living Well With Dementia: A national dementia strategy* Department of Health Publications, London.

[15] Dewing J, Dijk S (2016) What is the current state of care for older people with dementia in general hospitals? A literature review. *Dementia (London)* **15**, 106-124.

[16] Zygouris S, Tsolaki M (2015) New technologies and neuropsychological evaluation of older adults: Issues and challenges. In *Handbook of Research on Innovations in the Diagnosis and Treatment of Dementia*, Bamidis PD, Tarnanas I, Hadjileontiadis L, Tsolaki M, eds. IGI Global, USA, pp. 1-17.

[17] Köhler L, Weyerer S, Schäufele M (2007) Proxy screening tools improve the recognition of dementia in old-age homes: Results of a validation study. *Age Ageing* **36**, 549-554.

[18] Turner S, Iliffe S, Downs M, Wilcock J, Bryans M, Levin E, Keady J, O'Carroll R (2004) General practitioners' knowledge, confidence and attitudes in the diagnosis and management of dementia. *Age Ageing* **33**, 461-467.

[19] Mitchell AJ, Meader N, Pentzek M (2011) Clinical recognition of dementia and cognitive impairment in primary care: A meta-analysis of physician accuracy. *Acta Psychiatr Scand* **124**, 165-183.

[20] Koch T, Iliffe S, the E-EDp (2010) Rapid appraisal of barriers to the diagnosis and management of patients with dementia in primary care: A systematic review. *BMC Fam Pract* **11**, 52.

[21] Giezendanner S, Monsch AU, Kressig RW, Mueller Y, Streit S, Essig S, Zeller A, Bally K (2019) General practitioners' attitudes towards early diagnosis of dementia: A cross-sectional survey. *BMC Fam Pract* **20**, 65-65.

[22] Zygouris S, Gkioka M, Moraitou D, Teichmann B, Tsiatsos T, Papagianopoulos S, Tsolaki M (2019) Views of nursing staff on computerized dementia screening. *Z Gerontol Geriatr* **52**, 258-263.

[23] Zygouris S, Tsolaki M (2015) Computerized cognitive testing for older adults: A review. *Am J Alzheimers Dis Other Demen* **30**, 13-28.

[24] Tierney MC, Charles J, Naglie G, Jaakkimainen L, Moineddin R (2017) The effects of computerized cognitive testing of older patients on primary care physicians' approaches to care: A Canadian Study. *Alzheimer Dis Assoc Disord* **31**, 62-68.

[25] Millett G, Naglie G, Upshur R, Jaakkimainen L, Charles J, Tierney MC (2018) Computerized cognitive testing in primary care: A qualitative study. *Alzheimer Dis Assoc Disord* **32**, 114-119.

[26] Robillard JM, Lai J-A, Wu JM, Feng TL, Hayden S (2018) Patient perspectives of the experience of a computerized cognitive assessment in a clinical setting. *Alzheimers Dement (N Y)* **4**, 297-303.

[27] Ifinedo P (2018) Empirical study of Nova Scotia nurses' adoption of healthcare information systems: Implications for management and policy-making. *Int J Health Policy Manag* **7**, 317-327.

[28] Safi S, Thiessen T, Schmailzl KJG (2018) Acceptance and resistance of new digital technologies in medicine: Qualitative study. *JMIR Res Protoc* **7**, e11072.

[29] Ifinedo P (2016) The moderating effects of demographic and individual characteristics on nurses' acceptance of information systems: A canadian study. *Int J Med Inform* **87**, 27-35.

[30] Kuo K-M, Liu C-F, Ma C-C (2013) An investigation of the effect of nurses' technology readiness on the acceptance of mobile electronic medical record systems. *BMC Med Inform Decis Mak* **13**, 88-88.

[31] Crabtree J, Mack J (2010) Developing champions to enhance the care of people with dementia in general hospitals. *Nurs Times* **106**, 13-14.

[32] Banks P, Waugh A, Henderson J, Sharp B, Brown M, Oliver J, Marland G (2014) Enriching the care of patients with dementia in acute settings? The Dementia Champions Programme in Scotland. *Dementia (London)* **13**, 717-736.

[33] Polit DF, Beck CT (2008) *Nursing Research: Generating and Assessing Evidence for Nursing Practice*, Wolters Kluwer Health/Lippincott Williams & Wilkins, Philadelphia.

[34] Brown TA (2006) *Confirmatory factor analysis for applied research*, Guilford Press, New York.

[35] Bendler PM (2005) *EQS 6 structural equation program manual*, Multivariate Software, Encino, CA.

[36] Bollen KA (1990) Overall fit in covariance structure models: Two types of sample size effects. *Psychol Bull* **107**, 256-259.

[37] IBM Corp. (2016) IBM SPSS Statistics for Windows (V 24.0)

[38] Price S, Reichert C (2017) The importance of continuing professional development to career satisfaction and patient care: Meeting the needs of novice to mid- to late-career nurses throughout their career span. *Adm Sci* **7**, 17.

[39] Tsolaki M, Zygouris S, Lazarou I, Kompatsiaris I, Chatzileontiadis L, Votis C, Tzovaras D, Karakostas A, Karagkiozi C, Dimitriou T, Tsiatsios T, Dimitriadis S, Tarnanas I, Dranidis D, Bamidis P (2015) Our experience with informative and communication technologies (ICT) in dementia. *Hell J Nucl Med* **18**, 131-139.