Validity and reliability instruments m-health nursing as a mobility elderly detection tool

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Abstrak

Deteksi lebih dini secara tepat pada jenjang pelayanan kesehatan primer di masyarakat merupakan upaya yang dapat menjaga kesehatan penduduk lanjut usia. Mengembangkan dan melakukan validasi instrumen yang akan digunakan untuk penyusunan *M-Health nursing* sebagai alat deteksi mobilitas lansia. Pengujian instrumen menggunakan korelasi *product moment* yang akan digunakan dalam pembuatan *M-Health nursing* berdasarkan data 30 kader untuk mendeteksi 60 penurunan mobilitas lansia pada tiga wilayah kerja puskesmas di Kota Tangerang Selatan dan Yogyakarta. Nilai uji validitas 0,693 dengan reliabilitas 0,702. Instrumen dapat digunakan untuk penyusunan dan pengembangan *M-Health nursing* sebagai alat deteksi mobilitas lansia.

Kata kunci : validitas; *M-Health nursing*; mobilitas; lansia

Abstract

Appropriate early detection at the level of primary health care in the community is one effort that can maintain elderly health. To develop and validate an instrument to be used for the preparation of nursing M-Health as a detection tool mobility of the elderly. The instrument tested by using product moment correlation which will be used to make M-Health nursing based on 30 cadre data to detect 60 decreased in elderly mobility in three working areas of puskesmas in South Tangerang and Yogyakarta. Validity test value 0,693 with reliability 0,702. Instruments can be used for the preparation and development of M-Health nursing as an elderly mobility detection tool.

Keywords: validity; M-Health nursing; mobility elderly

INTRODUCTION

Growth in the number of Elderly in the world today is a problem faced by most countries in the world along with the increase in life expectancy. Based on data from the United Nations Department of Economic and Social Affairs Population Division, showed that in 2015 the world population reached 7 billion and the figure will continue to increase to 9 billion people by 2050.

Increased age of the elderly has a significant impact on the status of mobility in the elderly which also affects the quality of life of the elderly themselves. Based on WHO data on Global Report on Falls Prevention in Older Age, it shows that about 28-35% of individuals with age 65 have a risk of falling and will increase by 32-42% by age 70. Based on survey data, shows that 72.4% of the elderly in Indonesia having problems in mobilisation (United Nation, 2015).

Early detection is one way to perform immediate treatment for any mobility problems experienced by the elderly. Appropriate and early treatment is expected to prevent various diseases and complications that will be faced by the elderly further. The process of detection through the card to healthy elderly conducted for once a month and examination of bone density every six months at the time of the implementation of Integrated Service Post (Posyandu) elderly still felt cannot detect the problem of mobility faced by elderly in the community. Posyandu service process during this run is still more focused on efforts to monitor the health and treatment of the elderly in terms of blood pressure and mild complaints such as headaches and other pains that are often experienced by the elderly. The service process happens due to the limitations of skilled health human resources to perform detection or health services in the community. To anticipate the shortage of human resources, Community Health Center as a container that wins and builds Posyandu located in the region of work involving people who trained periodically called cadre. The problem of shortage of human resources can be helped by making a tool that can be used easily by the elderly in performing detection independently of the status of mobility. In addition to ease of use, measuring instruments must be made accountable legality or validity, so that the device can help the elderly to be able to know the status of their movement and can seek help if needed before his condition worsened again (Kesmas, 2014).

Development of various applications available that can help detect health problems faced by the elderly in the community, one of which can be developed with the application of M-Health Nursing. McCartney, (2015) stated that some mobile health-based software applications had been designed and developed to expand data collection and detection of health problems faced by communities.

M-Health nursing is an application developed from several tools that have been used to detect the deterioration of old body functions. With m-health nursing expected to decrease mobility function faced by the elderly can be immediately known and followed up by the nearest primary health service. Therefore, the main objective of this study was to test the validity and reliability of the instruments used in the M-Health nursing as elderly mobility detection application that can be used by older people directly on their smartphone (Doswell, Braxter, DeVito Dabbs, Nilsen, & Klem, 2013).

METHOD

The trial in this study conducted with the involvement of all cadres in charge of the elderly in three working areas of the community health centre. The study differs consisting of 15 cadres of community health centres of Pondok Ranji, and seven cadres community health centres of Serpong 1 which are in the region of South Tangerang City and eight cadres community health centres of Gamping 1 located in the territory of Yogyakarta Special Region. In the process, the cadres perform the detection process using M-Health nursing application to 30 seniors residing in the community in their respective working areas. The elderly who became the object of detection by the cadres are the elderly who are active and who are not actively visit the posyandu elderly or follow the activities carried out by posyandu in their respective working areas. Before the experimental process took place, the researcher got written approval from all participants and the Ethics Committee of the Faculty of Medicine and Health Sciences of Gadjah Mada University to conduct the study.

The cadres involved in this study were the cadres directly appointed by the Community Health Center in charge of the old posyandu program located in their respective working areas that have experienced more than one year as cadre. Before using the M-Health nursing application, all cadres are given training and socialisation in using the application. The training and dissemination process carried out differently in each working area, for the Pondok Ranji Community Health Center (Puskesmas Pondok Ranji) was held on 26 May 2017, Serpong 1 Public Health Center was held on 16 June 2017, and the Gamping 1 Community Health Center was held on July 24, 2017. Also, during the implementation process if found problems that are not understood by the cadres in detecting the mobility of the elderly.

The instrument used for the preparation of M-Health nursing is an instrument developed from WHO-ICF version 2.1a, clinician form for international classification of functioning, disability and health, card to healthy elderly, Agile-elderly mobility scale version 2 and Time up and test. Various forms developed in this M-Health nursing application include reviewing various history related to possible mobility problems occur in the elderly such as the history of milk consumption, history of falls and some diseases which may affect the mobility problems in elderly.

In the process, the trained cadres then perform the process of identification and detection of the elderly who were in the community environment which is their responsibility by using applications that have been installed on their smartphones. During the detection process, the researchers give cadres assistance in order to avoid any misunderstandings or obstacles encountered during the assessment process by using the M-Health Nursing application.

After the charging process took place on all respondents, then the data collected on the M-Health nursing application server was downloaded and analysed using IBM SPSS version 24.0 statistical software. The M-Health nursing instrument is considered to be reliable if every variable in the instrument has an alpha Cronbach value higher than 0.60, whereas for validity value based on R-table comparison according to degrees of freedom with 5% significance value must have a value higher than 0.30.

RESULT AND DISCUSSION

In general, the majority of respondents residing in three research areas, aged between 60 to 75 years old with the majority of the female gender. Of the total respondents, 55% of them had suffered a fall that caused the respondents disrupted the process of activity, but nowadays daily activities can be done by the elderly usually are. In addition to a history of falls, 25% of respondents had experienced diseases associated with various kinds of trauma such as bumps and falls either during adolescence or adulthood, while 20% of them had experienced health problems associated with the disease-cerebrovascular disease such as hypertension and a mild stroke. Also, the elderly who became respondents in this study some of them have lived alone or lived with their children.

Health problems such as stroke significantly affect the mobility status of the elderly. Elderly with a stroke can lead to limitations or even disruptions in the mobility process of the elderly and may increase other problems such as the risk of falling and weakness in the elderly. Based on Soto-Varela (2014), stated that individuals who have suffered a stroke have problems with their mobility that can be reflected in a decrease in walking speed, increased risk of falling and the possibility of developing a fear of falling that will lower their motivation to move.

In addition to the problems associated with cerebrovascular disease (CVD), other problems faced by the elderly that other trauma problems such as having experienced a fall are also a big problem faced by the elderly. According to Tareef, (2011), stated that the experience of falling experienced by the elderly could have an impact on the increased incidence of mobility limitations in the elderly.

Table 1. Validity and reliability instrument for elderly health assessment on M-Health Nursing

Variable	Test 1 Mean (SD)	Validity	Test 2 Mean (SD)	Validity	ICC (95%CI)
1. History of birth and immunization	5.1 (2.77)	.946	5.05 (2.80)	.938	.935 (.835-.974)
2. History of falls	14.05 (1.986)	.868	14.3 (1.867)	.956	.920 (.843-.965)
3. Hospital sheets	6.95 (3.379)	.752	7.45 (3.502)	.867	.646 (.105-.860)
4. Smoking habit	6.4 (2.798)	.533	6.8 (2.858)	.619	.619 (.036-.849)
5. Pattern of rest	10.95 (3.332)	.815	11.45 (3.591)	.887	.833 (.648-.929)
6. History of activities and exercises	9.0 (4.623)	.930	9.10 (4.745)	.943	.922 (.846-.966)
7. Current muscle complaints	17.1 (4.436)	.865	16.4 (4.639)	.885	.863 (.749-.938)
8. Other health complaint	6.9 (1.804)	.792	6.95 (1.761)	.830	.796 (.571-.913)

Based on data from the trial results to the 60 respondents in the three areas of health centres in two distinct areas, the results show that the instrument used to assess the health history experienced by the elderly on the application of M-Health nursing has a value Interclass correlation coefficient between 0619 up to 0.935 with a 95%

confidence degree. Based on data from the first and second test results showed that a mean value on every aspect studied in elderly health history component shows that the value of the test experienced similar mean values ranging from 5.05 until 17.1 with a standard deviation range from 1,761 up to 4,745.

Component History of activities and exercises is a component with high validity value. It shows that the component has a strong connection to the mobility problems that occur in the elderly with the ICC value of 0.922. Studies conducted by Pedreira, Rocha, Santos, Vasconcelos, and Reis, (2016), showed that the average value of the validity of the instrument used to assess the health status of the elderly is 0.934. It shows that the elderly health status assessment instrument can be used and developed in order to identify the various problems faced by the elderly and assist in determining a strategy associated with the health of the elderly. According to Desiane, Uda, Aquino, & Amigo, (2016) shows that the efforts of one effort that can be done to maintain physical mobility capabilities of the elderly can be made by doing the increased range of motion, increased capacity and capability hatched smooth running, even posture and muscle strength in the elderly has not changed.

Besides the sports activities, the history of fall events experienced by the elderly at the stage of growth and development before, also a factor that has a strong relationship to mobility problems experienced by the elderly today with a value of 0.920. According to Indarwati & Caraka Kristi, (2017), stated that the elderly who have experienced falls tend to decrease the mobility function and prone to repetition of events that will have an impact on the ability of mobility and gait of the elderly and the elderly physical fitness. Falling is a situation that will have an impact on the mobility of a person changes caused by trauma to the musculoskeletal system so that the trauma experienced by the elderly will be able to affect the status of mobility experienced by the elderly today.

Table 2. Validity and reliability test of the instrument of elderly mobility assessment used in M-Health Nursing

Variable	Test 1 Mean (SD)	Validity	Test 2 Mean (SD)	Validity	ICC (95%CI)
1. Assessment mobility on bed	8.9 (1.744)	.678	7.4 (1.875)	.725	.730 (.431-.885)
2. Assessment while seating	6.14 (1.082)	.687	5.95 (1.191)	.732	.683 (.198-.874)
3. Assessment while standing	9.45 (2.139)	.681	9.55 (2.163)	.709	.679 (.366-.859)
4. Assessment while walking	4.00 (1.773)	.822	3.73 (1.907)	.846	.819 (.564-.925)
5. Assessment of daily activities	12.45 (3.069)	.997	12.70 (2.774)	.995	.940 (.887-.973)

The components used for performing mobility function in this study are divided into five major components, namely the assessment of elderly mobility function on the bed up to the assessment of activities performed by the elderly in their daily life. Thoroughly instrument used in M-Health nursing based on the results of two tests at three health centres in two different regions shows that all the components used in the

M-Health nursing instrument have been declared invalid by the results of ICC values above 0.600. Several studies related to the components used in this instrument ever tested the validity and reliability of the instrument to measure the mobility status of the elderly. According to Fukunaga, Saitou, Harada, Hakamata, & Kagawa, (2015) stated that the mobility measurement instrument has an ICC value higher than 0.8 so it can be recommended to be used to measure the status of elderly mobility by testing on various units or research sites. Pieber, Herceg, Paternostro-Sluga, (2015) stated that the measuring instrument used to measure the mobility status of the elderly that is based on the International Classification of Functioning, Disability and Health useful and reliable measuring instrument with a valid ICC value of 0.85 (95% CI: 0.81-0.88). Studies conducted by Park, (2017) showed that the intraclass correlation used in the Timed Up and Go Test measuring instrument has a value higher than 0.90 so that the instrument can be used as a reference in the preparation of another mobility measurement instrument.

Based on data from the study showed that the ageing mobility assessment process in an activity is a variable that has the highest level of validity. That is because the majority of the elderly living in the community still has a good mobility capability so that they can perform their daily activities. Even everyday activities undertaken by the majority of the elderly is a mild activity such as walking ushering grandchildren, doing gymnastics elderly held by the health centre every single week, and perform daily activities in their homes. According to some studies showed that older adults who are still actively involved in performing daily activities, tend to have good mobility status. According to Susilowati and Suratih, (2017) stated that older adults who regularly do gymnastics elderly could improve mobility and enhance their daily activities in the community.

Table 3. Total item used in M-Health Nursing software

Categories	Sub Categories	Number of Question
Elderly health record	History of birth	1
	History of Polio Immunization	1
	History of falls	2
	Hospital sheet	2
Elderly life pattern	Smoking habit	7
	Pattern of rest	4
	Milk consumption	3
	Activities and exercise	8
Elderly current condition	Health complaint	5
	Muscle complaint	5
Elderly mobility	Mobility on bed	2
	Seating mobility	2
	Standing and walking	2
	Daily activities	4

Based on the results of tests conducted in this study, the instrument used is arranged into a series of measuring tools that can be used to identify mobility status, including various health problems that are owned by the elderly in the previous stage of growth. That may be a factor that affects the condition of mobility that occurs in the current of the elderly.

Overall questions contained in M-Health nursing consists of 48 items that are arranged in a series of the questions assessment process. The overall arrangement of questions contained in the application M-Health nursing can be seen in Table 3. In the final stage of the assessment process, every elderly will acquire the status of their mobility in the form of scoring and class of their mobility status following the recommendations can be done by older people and families in order to maintain or increase their mobility status.

Application of a valid instrument in the form of an application can help shorten detection time so that it can help the individual in taking the right decision. Efforts to develop mobile health applications that integrate with smartphones is an effort made to detect mobility problems faced by the elderly in the community can be immediately known. Madhushri, Dzhagaryan, Jovanov, & Milenkovic, (2016), indicated that the application of the detection instrument of mobility problems in older adults using mobile applications integrated into a smartphone could shorten the analysis time and helps in monitoring continuously and can assess the effectiveness of exercise or therapy program being undertaken by the elderly. Based on the results of studies conducted by Blackman, Zoellner, Berrey, et al., (2013) shows that the effectiveness of data reporting using M-Health application reaches 53.3% to 60% with reliability level above 90%. It shows that the efforts of the development of detection systems with applications can be developed by considering several aspects that can simplify the user so that the effect obtained can be further improved.

CONCLUSION

Application of M-Health applications nursing as an elderly mobility detection model based on a model of mobile applications can be implemented because the instrument used has had a degree of validity and reliability is quite good. Use of this application is intended so that the elderly can know the condition of their mobility so that the elderly can make efforts to maintain or increase their mobility status.

These applications always require development in attempt effectiveness of achievements that can be obtained for the elderly in monitoring health conditions, especially on issues related to the mobility problems of the elderly.

RECOMMENDATION

Use of this application by the old cadres in Posyandu is expected to help the volunteers to intervene to enhance the mobility status of the elderly residing in the community. Also, further research efforts in order to develop applications that are also made very expected that the function of this application can help improve the mobility status of the elderly, especially elderly residing in the community.

REFERENCE

Blackman, K. C. A., Zoellner, J., Berrey, L. M., Alexander, R., Fanning, J., Hill, J. L., & Estabrooks, P. A. (2013). Assessing the internal and external validity of mobile health physical activity promotion interventions: A systematic literature review using the RE-AIM framework. *Journal of Medical Internet Research*,

15(10).

Desiane, H., Uda, H., Aquino, T., & Amigo, E. (2016). Latihan Range of Motion berpengaruh terhadap Mobilitas Fisik pada Lansia di Balai Pelayanan Sosial Tresna Werdha Unit Abiyoso Yogyakarta. *Jurnal Ners Dan Kebidanan Indonesia*, *4*(3), 169–177.

Doswell, W. M., Braxter, B., DeVito Dabbs, A., Nilsen, W., & Klem, M. Lou. (2013). M Health: Technology for nursing practice, education, and research. *Journal of Nursing Education and Practice*, *3*(10).

Fukunaga, Y., Saitou, K., Harada, K., Hakamata, M., & Kagawa, K. (2015). Reliability and construct validity of observational measures of mobility of elderly inpatients with dementia. *Rigakuryoho Kagaku*, *30*(1), 1–6.

Indarwati, R., & Caraka Kristi, M. (2017). Berg Balance Test (BBT) dan Time Up and Go Test (TUGT) sebagai Indikator Prediksi Jatuh Lansia. *Journal Ners*, *3*(2).

Kesmas. (2014). Pengertian, Bentuk Pelayanan, dan Syarat Posyandu Lansia | The Indonesian Public Health Portal. Retrieved April 16, 2015

Madhushri, P., Dzhagaryan, A., Jovanov, E., & Milenkovic, A. (2016). A mHealth tool suite for mobility assessment. *Information (Switzerland)*, *7*(3).

McCartney, P. (2015). mHealth and Collecting Research Data From Patients With Mobile Tablet Apps. *MCN, The American Journal of Maternal/Child Nursing*, *40*(6), 397.

Park, S.-H. (2017). Tools for assessing fall risk in the elderly: a systematic review and meta-analysis. *Aging Clinical and Experimental Research*.

Pedreira, R. B. S., Rocha, S. V., Santos, C. A. dos, Vasconcelos, L. R. C., & Reis, M. C. (2016). Content validity of the Geriatric Health Assessment Instrument. *Einstein (São Paulo)*, *14*(2), 158–177.

Pieber, K., Herceg, M., Paternostro-Sluga, T., Pablik, E., Quittan, M., Nicolakis, P., Crevenna, R. (2015). Reliability, validity, sensitivity and internal consistency of the ICF based Basic Mobility Scale for measuring the mobility of patients with musculoskeletal problems in the acute hospital setting: a prospective study. *BMC Musculoskeletal Disorders*, *16*(1), 1–8.

Soto-Varela, A., Faraldo-García, A., Rossi-Izquierdo, M., Lirola-Delgado, A., Vaamonde-Sánchez-Andrade, I., del-Río-Valeiras, M., … Santos-Pérez, S. (2014). Can we predict the risk of falls in elderly patients with instability? *Auris Nasus Larynx*.

Susilowati, T., & Suratih, K. (2017). Senam Rematik Tingkatkan Kemandirian Lansia Dalam Melakukan Activity Daily Living Di Panti Wreda Dharma Bakti Surakarta. *Gaster*, *15*(1), 28–36.

Tareef, A. A. (2011). Falls in the elderly: Spectrum and prevention. *Canadian Family Physician*.

United Nation. (2015). World population, ageing. *Suggested Citation: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Ageing*, *United Nation*, 164.