Original Research

The Effect of Blended Learning on Nursing Students' Knowledge

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ABSTRACT

Introduction: Blended learning is assumed to improve the students' understanding of learning at nursing school especially in the current industrial revolution 4.0 era. The combination of classroom and online activities is expected to provide better study outcomes. This research aimed to compare the knowledge scores of the nursing students in blended learning concerning a research and statistics course at a private faculty of nursing.

Methods: The knowledge scores resulted from the student's score in their mid and final examinations (0-100). A total of 474 respondents who were third year students involved in the study. This study applied a pre-experimental design. Due to the data having a significant non-normal value (p value < 0.001), this study further compared the mean-rank of the students' score using a Wilcoxon test analysis.

Results: The results of this study revealed that there was a significant difference (p value < 0.0001) between the students' score in the mid (Median 72.5; SD 9.82) and final exam examinations (Median 86.66; SD 4.75). This means that the students had a better score in their final exam.

Conclusion: Applying a blended learning method was a positive experience for the nursing students in terms of knowledge. It is needed to explore the students' understanding and interest in their learning process using blended learning.

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INTRODUCTION

Today's era of the fourth industrial revolution where human and technology are connected has had impact on all sectors, including the health system and higher education (WEF & Schwab, 2017). Regarding higher education, the current era is also known as Higher Education 4.0 (HE 4.0). The HE 4.0 requires changing skills in the industry which demands a learning system alteration in the universities (Jhingan, 2017). Universities should provide comprehensive resources based on technology that supports the students' development related to problem solving and decision-making skills in order to follow along with the globalization of education(Muawiyah, Yamtinah, & Indriyanti, 2018). The method of teaching also changes due to the current era, which it is important to consider regarding the instruments to aid the education process such as devices for supporting the teaching and learning process, such as

Massive Open Online Courses (MOOCs) applications and using of blended learning (Xing & Marwala, 2017).

The term "blended learning" is argued as being a new term in relation to the era of HE 4.0 (Wright, 2017). Blended learning is a combination of face-to-face traditional learning and online learning methods which suits the students by using various multi-media(Dziuban, Graham, Moskal, Norberg, & Sicilia, 2018; Wright, 2017). A previous study reported that 35% of courses in higher education are using a blended learning design and that 12% of 12.2 million online teaching materials are included in the blended courses (Dziuban et al., 2018).

Blended learning could improve the clinical competencies of health students as reported by Rowe and their colleagues (Rowe et al., 2012) using a systematic review. McCutcheon and their colleagues (McCutcheon, Lohan, & Traynor, 2016) further claimed in their systematic review study that there is

a minimum evaluation of blended learning needed in nursing education. Both of these systematic reviews were limited to some areas of health education and there is no study in regard to blended learning effectiveness in health professions using a quantitative synthesis. To fill in these gaps, Liu and their colleagues (Shang & Liu, 2018) conducted a systematic review to identify the effectiveness of blended learning for health professionals. Liu's study also compared blended learning with non-blended learning. Liu's study concluded that blended learning could have a positive effect in comparison with no intervention. Blended learning was also more effective than non-blended learning for knowledge achievement in health professions. However, due to the enormous heterogeneity of the chosen studies in Liu's study, the above conclusion should be interpreted with caution.

To become involved in the era of HE 4.0, the Faculty of Nursing (FoN) in Universitas Pelita Harapan (UPH) Tangerang, supported by the Directorate of Higher Education in Indonesia that known as DIKTI, developed a blended course called Research and Statistics (RS). This course is one of the mandatory nursing courses for students in their third year at FoN UPH. The RS course is designed to encourage the students to understand the interrelationship between theory, research, and practice based on scientific evidence in the development of nursing knowledge and in the improvements in the quality of the nursing services. Students are given the opportunity to develop an understanding of the stages of the research process, to gain knowledge, to apply critical thinking skills in research within the scope of nursing, and to apply skills in the development of research in an ethical way. In order for the course to be sustainable learning, a number of appropriate assessments are required in the blended learning design. The RS course provides four main assessments including a weekly quiz, mid-term exam, critique paper and final exam. However, in this study, we only compared the students' scores between the mid and final exams. The reason for this is that both scores assessed the students' knowledge in an equal time span (half semester). To pass the course, the students should get 70 or a B- for their final score. This study aims to compare the knowledge scores of the nursing students in the blended learning of their research and statistics course at FoN UPH.

MATERIALS AND METHODS

Blended learning was applied using a learning management system (LMS), Moodle, provided by the Universitas Pelita Harapan website (http://learn.uph.edu/). The LMS provides online course management, in this case, a research and statistics course which contains learning sources such as the course outline, videos, articles and assessments.

The participants were the third-year students at the Faculty of Nursing in Universitas Pelita Harapan. There were 474 students registered on the research and statistics course. Thus, the respondents of this study were all of the students who were involved in the teaching-learning of the RS course. The students were informed of the study and agreed verbally. The students were divided into 10 groups and then, were divided into three big groups for classroom activities. The following are the learning activities in the blended learning.

To achieve the objective of the current study, a pre-experimental research design was applied(Polit & Beck, 2012). A two times-test was employed to measure the students' knowledge in the mid and final examinations. The mid examinations consisted of 40 multiple choice questions which were developed by the teaching team. The questions had been developed and revised over the past three years by evaluating each item using its facility index in the LMS. The final examination score was the result of team work by developing a proposal in a group of 10 students. The rubric for the proposal evaluation was developed by team teaching, which had been evaluated over the past three years. In this study, the knowledge scores resulted from the students' score in their mid and final examinations (0-100).

Since the data distribution of the students' knowledge scores was abnormal, a Wilcoxon test was conducted to compare the mean rank of the students' scores(Field, 2013). The Wilcoxon test aimed to identify whether the mean rank of the two-times test was significantly different after experiencing blended learning (Polit & Beck, 2012).

Regarding the ethical considerations, the Mochtar Riady Institute for Nanotechnology Ethics Committee provided approval for this study (No. 016/MRIN-EC/ECL/X/2018). In addition, the private faculty of nursing in which the study took place also gave permission for this study to be conducted.

RESULTS

The 474 students completed their mid-term and final exams. The results of the students' knowledge score can be seen in Table 1. The result of this study revealed that there was a significant difference (Z= -18.43; p value < 0.0001) between the students' score in the mid-term examination (Median 72.5; Standard Deviation 9.82) and their score in the final examination (Median 86.66; Standard Deviation 4.75). This also means that the students had a better score in their final-term exam. This study also calculated the approximate effect size manually (r= Z/√N) (Field, 2013). The effect size of this study was above moderate (r= -0.85). The result shows that blended learning had a large influence on the students' knowledge. However, the final exam score was the result of team work by developing a proposal in a group of 10 students. Meanwhile, the mid-term exam was from an individual multiple choice test. This condition could be a possible difference of

Table 1. Learning activities in blended learning

Steps	Blended Learning
Prior to lesson	Students view specific presentations relevant to the upcoming tutorial via the university's learning management system (LMS)
Designated lesson	Lecturer facilitates discussion with the students on the key concepts that are to be covered in the module Students are divided into small groups
Post lesson	Lecturers facilitates discussion based on the content raised in the specific activity
Prior to lesson	Students view specific presentations relevant to the upcoming tutorial via the university's LMS
Designated lesson	Lesson repeated as per stage 2 (with new content)

Table 2. Data description of Students Knowledge Score (n=474)

Data Measurement	Mid Exam Score	Final Exam Score	Wilcoxon test results
Mean	71.38	86.75	
Median	72.50	86.38	
Mode	72.50	86.38	$Z = -18.43$
Std. Deviation	9.82	2.58	p value < 0.0001
Variance	96.55	6.70	$r = -0.85$
Minimum	45.00	81.75	
Maximum	95.00	92.50	

individual contributions (Gagnon, Gagnon, Desmartis, & Njoya, 2013) that might further influence the students' achievements.

DISCUSSION

This study showed that blended learning had an influence on the nursing students' achievements over the course of the research and in the statistics (p value < 0.0001). The findings of a previous systematic review study with a meta-analysis (Kang & Seomun, 2018) are consistent with the current study that blended learning increased the participants' knowledge in nursing education. This achievement could not be separated from the learning process of the students. The process of the student's learning included watching videos, weekly quizzes and article reading before the class meeting. A previous systematic review of blended learning in clinical practice informed us that blended learning has been implemented in many different approaches using many different tools(Rowe et al., 2012). The study further mentioned that the chosen tools in blended learning should be the best to achieve the learning outcomes(Rowe et al., 2012).

A comparison study between blended learning and traditional learning within one nursing program in China also supported that 68% of the student participants favored the blended course over the traditional face-to-face course(Shang & Liu, 2018). In addition, the final examination results revealed that the students' scores in the blended course were significantly better than students in the traditional classroom (p value < 0.01) (Shang & Liu, 2018). However, blended learning was not always evident in better scores but it can improve the clinical skills of the students(Rowe et al., 2012). This also means that using the blended learning approach could bridge the knowledge gap between theory and practice in nursing education.

Moreover, contrary to the findings of the current study, a randomized control trial study focused on one nursing program in Canada (Gagnon et al., 2013) revealed that the blended teaching method did not affect the students' knowledge directly. It was further mentioned that the learners motivation should be involved in the learning. Motivation and learning are interconnected(Schiefele, 1991), in which motivation affects the individual's ability to learn as well as the intensity and length of the individuals' learning (Bandura, 1991). Interestingly, a comparative study of the students' motivation between traditional face-to-face learning and online learning revealed that the students who did online learning had stronger intrinsic motivation than the students in traditional face-to-face classes(Rovai, Ponton, Wighting, & Baker, 2007). However, there were no significant differences for the students' extrinsic motivation and amotivation(Rovai et al., 2007). Moreover, Gagnon and their colleagues conducted a study of motivation (one-time measurement) and suggested that less motivated students could get an advantage from e-learning(Gagnon et al., 2013).

CONCLUSION

This study indicates that blended learning has influenced the students' knowledge. The most important thing to be aware of is the process of the students learning using mixed teaching methods. This means that blended learning could accommodate the student's learning by providing multiple sources. Blended learning is also a positive experience for the nursing students in term of knowledge. Further study is needed to explore the students' understanding and interest in the teaching-learning process using blended learning.

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Original Research

Effect of Foot Exercise and Care on Peripheral Vascular Status in Patients with Diabetes Mellitus

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ABSTRACT

Introduction: Diabetes mellitus is a cause of health problems which occurs in most countries. Approximately 13 - 15% of all patients with diabetes mellitus will experience peripheral circulatory disorders. Foot exercise and foot care are interventions that can be implemented to prevent foot ulcers.

Methods: This study employed a pre-post-test quasi-experimental design with a control group. The sample consisted of 94 patients with diabetes mellitus who were assigned to the intervention group (n=47) and the control group (n=47) respectively. Consecutive sampling was used to recruit the samples. The instruments used to collect the data included 10-g monofilament for the diabetic neuropathy test, a HbA1c test and a sphygmomanometer. The collected data was analyzed using a paired t-test.

Results: The results of this study showed there to be significant effects from foot exercise and foot care on the HbA1c test, in relation to the frequency of the dorsalis pedis artery and diabetic neuropathy with a significance value of 0.00 (p<0.05). However, in the ankle-brachial index measurement, there were no significant differences between the intervention and control groups with a significance value of 0.26 (p>0.05).

Conclusion: Foot exercise and foot care can be one of the independent nursing interventions used to prevent the complications of diabetes mellitus, as they have been proven to improve the peripheral vascular status of patients with diabetes mellitus by 70-80%.

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INTRODUCTION

Diabetes mellitus is a serious chronic disease that requires considerable attention. It has become a leading cause of health problems in almost all countries (Fujiwara et al., 2011). About 15% of patients with diabetes mellitus will experience foot ulcers – a serious complication that may result in the amputation of the lower extremities (Mahfud, 2012); (Kotru, Kotru, & Joshi, 2015). Seventy percent of foot ulcers can occur within a period of five years (Kotru et al., 2015). Moreover, 85% of patients undergoing amputations are associated with foot ulcers due to diabetes mellitus (Kotru et al., 2015).

The prevalence of patients with diabetes mellitus is increasing every year. According to the National Diabetes Fact Sheet (2014), the total prevalence of diabetes in America in 2012 was 29.1 million (9.3%). Of this number, 21 million were diagnosed diabetes and the remaining 8.1 million were undiagnosed with diabetes mellitus. The International Diabetes Federation (IDF) in 2013 reported that the prevalence of diabetes mellitus in Indonesia was approximately 8.5 million people and this number makes Indonesia ranked seventh in the world in terms of diabetes population (IDF, 2013). Furthermore, Perkeni (2015) reported that the number of patients with diabetes mellitus in Indonesia had reached 9.1 million people. As a result, Indonesia has shifted up from number seven to the top five countries with the highest number of diabetics in the world (Ramadhan & Marissa, 2015).

Peripheral neuropathy is one of the serious complications of diabetes. Recent data shows that one out of five people with diabetes mellitus (20%) experience peripheral neuropathy. The risk of peripheral neuropathy is two times higher in people with diabetes mellitus. A combination of peripheral neuropathy is that the problems associated with blood supply to the legs can cause foot ulcers and slow wound healing that leads to amputation. Around 40-70% of amputations in lower extremities are caused by diabetes mellitus (Studi, Ilmu, Keperawatan, & Indonesia, 2012).

The long-term vascular complications of diabetes mellitus involve small vessels, microangiopathy, medium vessels, and large vessels leading to the occurrence of macroangiopathy. In particular, macroangiopathy is a diabetes-specific lesion that attacks the retinal capillaries and arterioles (diabetic retinopathy), renal glomerulus (diabetic nephropathy), peripheral nerves (diabetic neuropathy), muscles and skin. In the neural tissue, there is an accumulation of sorbitol and fructose and a decrease in myoinositol which causes neuropathy. Biochemical changes in the neural tissues will disrupt the metabolic activities of the Schwann cells and cause a loss of axon. The speed of motoric conduction will decrease in the early stage of neuropathy, resulting in pain, paresthesias, reduced vibration, propioseptic sensations, and motoric disorders accompanied by a loss of reflex of the internal tendon, muscle weakness, and atrophy. These changes bring in higher risks of lesions which later develop into diabetic ulcers.

To deal with diabetes mellitus, the American Diabetes Association (2016) recommends a collaborative service of multidisciplinary teams involving several fields; one of which is nursing. In general, there are four main objectives related to providing the services which include health promotion, disease prevention, patient care, and the fulfillment of patient needs (Aalaa, Malazy, Sanjari, Peimani, & Mohajeri-Tehrani, 2012). One of the preventive actions to deal with diabetes mellitus is self-care. Diabetes self-care is an important factor in controlling the disease. Almost 95% of diabetes care is influenced by the consistency of the clients and their families in monitoring their blood glucose, nutrition, physical activity and treatment.

Nurses as health care providers play an important role in preventing diabetic ulcers and the risk of amputation of the lower extremities through foot care and foot exercises. Nurses should not only facilitate and provide foot care and foot exercises to the patients but they should also provide health education to the family about the importance of having their blood sugar checked and any alternative efforts made to prevent complications due to diabetes mellitus (Aalaa et al., 2012).

Practically, preventive foot care includes washing the feet properly, drying the feet carefully, keeping the area between the toes dry, using lotions as a moisturizer, using shoes and socks as recommended, cutting the nails as recommended, conducting foot inspections every day, and ensuring that the temperature of the water used to clean the feet is below 37⁰C. In addition to foot care, diabetes mellitus may be overcome by managing the factors affecting glucose reduction, namely physical activity, insulin level, diet and therapy (Kotru et al., 2015). Physical activities in the form of exercises can function as a treatment for diabetes mellitus. These exercises should be measurable, organized, controlled and regularly practiced. Foot exercises are one of the recommended activities for patients with diabetes mellitus. Diabetic foot exercises can prevent injuries and help blood circulation especially in the lower extremities and legs in patients with diabetes mellitus (Kotru et al., 2015).

A preliminary study conducted at RSUD Dr. M. Haulussy Ambon found there to be an increased number of patients with diabetes mellitus undergoing treatment in the hospital. In 2015, 773 people with diabetes mellitus were found. From January to November 2016, there were 1045 patients with diabetes mellitus undergoing treatment in the hospital; 53 of whom had diabetic ulcers. Some interviews were also conducted with the health workers and patients regarding the nursing interventions given. Of the ten patients interviewed, 100% reported that they had never had any foot care and that they did not know how to perform it. Moreover, there were no programs of foot care or foot care education implemented in the hospital units.

Studies on foot exercises and care have been conducted by some researchers. Kotru et al. (2015) conducted a study about foot care practices concerning new diabetic foot ulcers in patients with type 2 diabetes mellitus. The results revealed that 34% of 108 patients had abnormal plantar foot pressure on podiascan, 20% had foot disorders (calluses, claw toes, redness, etc.), and 17% had peripheral vascular disease. After one year was observed in the intervention group, new ulcers or diabetic feet were found in only 18% of patients whereas in the control group, new ulcers or diabetic feet developed in 31% of patients (Kotru et al., 2015).

Priyanto (2012) conducted a study on the effects of foot exercises on foot sensitivity and blood sugar levels on an aggregate of elderly people with diabetes mellitus in Magelang. The results reported that the elderly people who were given the intervention of foot exercises had better blood sugar levels (p=0.000) and better foot sensitivity (p=0.000) than those receiving no intervention. Therefore, it is important to investigate the effects of foot exercise and care on peripheral vascular status in patients with diabetes mellitus (Studi et al., 2012).

MATERIALS AND METHODS

This study used a pre-post-test quasi-experimental design with a control group and it was conducted in RSUD Dr. M. Haulussy Ambon from February to May 2017.The sample consisted of 94

patients with diabetes mellitus undergoing treatment in the hospital and they were assigned to the intervention group (n=47) and the control group (n=47). A consecutive sampling technique was used to recruit the samples. The instruments used to collect the data were 10-g monofilament of Semmes-Weinstein for the diabetic neuropathy test. This test examines the Merkel and Meissner receptor function and the relationship with the diameter of large nerve fibers and the associated guidelines for measuring sensation and pressure. The HbA1c test guidelines for taking blood samples for HbA1c examination, a sphygmomanometer for measuring blood pressure, ankle-brachial index guidelines and the measurement of the dorsalis pedis artery were used to identify peripheral blood circulation, foot care and foot exercise. The data was analyzed using a paired sample t-test. Regarding the use of monofilament, the mean difference test in the intervention group was performed using McNemar. Meanwhile, for the assessment of HbA1c, ABI, and the frequency of the pulse of the dorsalis pedis artery, the Wilcoxon test was used. The Mann-Whitney test was used to determine the mean comparison of the two groups.

RESULTS

In this study, a paired t-test was carried out to test the mean difference of the data. Prior to the test, there was an underlying assumption regarding the normality of the data which was tested using Shapiro-Wilk. If the data did not meet the assumption, then the Wilcoxon test would be used instead. In this test, the measured variables were monofilament, HbA1c, ABI

and the pulse frequency of the dorsalis pedis artery. See on Table 2.

The mean difference test for the two groups was performed to determine whether there were significant differences between the control and intervention groups based on the measured variables. Before the test, the normality of data was examined using the Shapiro-Wilk test. If the data was not normally distributed, then the Mann-Whitney test would be used. In this study, the variables were measured using a monofilament, HbA1c, ABI, and the pulse frequency of the dorsalis pedis artery. See on Table 3.

DISCUSSION

The test results for the monofilament showed that there were significant differences between the intervention group and the control group. At the time of the initial assessment, this study required that all of the respondents had to have their peripheral neuropathy status tested using a monofilament. When tested, the respondents were unable to sense four out of the ten location points examined, indicating that the patients experienced peripheral neuropathy. The patients were given the intervention of foot exercises and foot care for three months before the evaluation was carried out. The results showed there to be a significant effect in which 41 respondents experienced a positive change or their peripheral neuropathy status was improved. Meanwhile, six respondents still had a neuropathy status but their condition was getting better. This

Table 1. Description of the data in the intervention group and the control group

Variable	Intervention Group (n = 47)	Control Group (n = 47)	p-value
Monofilament*			
Negative	0%	0%	-**
Positive	100%	100%	
Vascular Status			
HbA1c	9.3 ± 2.9	8.2 ± 2.2	0.14
ABI	0.85 ±0.07	0.8 ± 0.6	0.01
Pulse frequency of the dorsalis pedis artery	58.5 ± 2.24	58.5 ± 2.2	1.00

*Monofilament measurement was performed using the Chi-Square test. The HbA1c. ABI and the frequency of the pulse of the dorsalis pedis artery were tested using the Mann Whitney test and presented as a percentage (%); **The data results from monofilament measurement were not tested as they were included in the inclusion criteria with equal values in both groups; *** Vascularity: HbA1c. ABI and the frequency of the dorsalis pedis artery pulse were presented in Mean and SD.

Table 2. The summary of the mean difference test between the intervention and control

| Variabel | Intervention | | p | Control | | P |
	Pre	Post		Pre	Post	
Monofilament						
Negative	0%	87.2%	0.00*	0%	4.3%	0.50
Positive	100%	12.8%		100%	95.7%	
Vascular Status						
HbA1c	9.32 ± 2.93	5.98 ± 0.86	0.00**	8.2 ± 2.2	8.7 ± 2.2	0.00
ABI	0.85 ± 0.07	0.94 ± 0.18	0.00**	0.8 ± 0.6	0.9 ± 0.2	0.00
Pulse frequency of the dorsalis pedis artery	58.51 ± 2.24	65.95 ± 3.42	0.00**	58.5 ± 2.2	59.8 ± 2.4	0.17

*Monofilament measurement was tested using the McNemar test; **The measurement of HbA1c. ABI. and the frequency of the dorsalis pedis artery pulse was tested using the Wilcoxon test.

Table 3. The summary of the mean difference test after the intervention in the control group and the intervention group

Variables	Groups		p-value*
	Intervention (n = 47)	Control (n = 47)	
Monofilament			
Negative	87.2%	4.3%	0.00
Positive	12.8%	95.7%	
Vascular Status			
HbA1c	5.98 ± 0.86	8.7 ± 2.2	0.00
ABI	0.9 ± 0.1	0.9 ± 0.2	0.26
Pulse frequency of the dorsalis pedis artery	65.9 ± 3.4	59.8 ± 2.4	0.00

Variables of monofilament, HbA1c, ABI, and the frequency of the dorsalis pedis artery pulse were tested using the Mann Whitney test.

result indicates that proper foot exercises and care can improve the health status of diabetic patients.

Peripheral neuropathy is a common consequence of type 1 and type 2 diabetes mellitus and chronic hyperglycemia involving the vascular pathway and metabolic disorders. There are three main ways in which diabetes mellitus is considered to damage the peripheral nerves. First, neural tissues do not require insulin to transport glucose but they use an alternative metabolic polyol pathway for glucose metabolism. Glucose is converted to sorbitol, and in turn, sorbitol is very slowly converted to fructose. The accumulation of glucose from chronic hyperglycemia combined with very slow conversion rates from sorbitol to fructose results in an accumulation of sorbitol in the peripheral nerves. The increase in sorbitol causes an interference with the ion pump by producing osmotic pressure in the fluid. This reduces the nitric oxide and causes an increase in the molecular reactive oxygen and increased oxidative stress. This substance damages the Schwann cells and this causes a disruption of nerve conduction. Second, protein kinase C is not appropriately activated as a result of hyperglycemia, which may contribute to neurological complications.

Protein kinase C is an intracellular signaling molecule that regulates many vascular functions; this rate increases in diabetes. The activation of this protein in the nerve vessels can cause vascular damage and reduce nerve conduction. Third, the end products of advanced glycosylation (AGEs) are the result of the attachment of glucose metabolites to proteins. Although it is a normal component of protein, the basement membranes of smaller blood vessels and the uncontrolled blood glucose levels support the over-production of AGEs. Increased AGEs cause a thickening of the basement membrane, contributing to a reduced oxygen supply. Neuronal dysfunction is closely related to vascular abnormalities and nerve damage due to AGEs. Other damage at the microvascular level includes protein trapping (including LDL), nitric oxide inactivation, and a loss of vasodilation due to sorbitol buildup and the polyol pathways, the activation of protein kinase C, and an excess accumulation of AGEs. All of these factors contribute to nerve damage through myelin degeneration, causing the nerves to lose their ability to transmit signals. Peripheral neuropathy occurs

when the nerves experience damage, resulting in a decrease or absence of nerve transmission with a number of possible symptoms including numbness, pain, or tingling (Harlow, Deceased, & Herman, 2012).

The presence of peripheral neuropathy will cause a loss or a decrease in pain sensation in the foot so then it will experience trauma which results in the occurrence of ulcers. The clinical manifestations of diabetic neuropathy depend on the type of nerve fibers that experience lesions. As the nerve fibers affected by lesions can be small or large, in proximal or distal, focal or diffuse, motoric or sensory or autonomous, the clinical manifestations will be varied, including tingling, numbness, and burning sensation such as being torn (Wahyuni & Arisfa, 2016). For this reason, it is necessary to have a tool that can detect the status of neuropathy in patients with diabetes mellitus.

A tool which can be used to detect diabetic neuropathy is 10 g monofilament. Monofilament is commonly used to assess the loss of protection sensation and it is recommended by several practical guidelines for detecting peripheral neuropathy in the legs (Mogre, Abanga, Tzelepis, Johnson, & Paul, 2017). This tool serves to examine the mercel and Meissner receptors to detect their sensory function and their relationship with large diameter nerve fibers (Perkins, 2001). The early detection of sensory neuropathy can reduce the incidence rate of foot ulcers. This monofilament test can be used easily to identify sensory neuropathy (Aalaa et al., 2012). Baraz et al (2012) conducted a quasi-experimental study on 150 patients with diabetes mellitus. All patients were tested using the Semmes-Weinstein 10 g monofilament to detect their sensory neuropathy. The results showed that the sensitivity of the monofilament was 38.5% - 61.5% at 1 - 8 location points, while the specificity was 77.5% - 95.5%.

The measurement tools mentioned in this study are recommended for use to detect diabetic neuropathy, which should be performed by the health workers to minimize the further impact occurring due to the negligence of the patients in performing health care. The role of nurses is to prevent the occurrence of diabetes mellitus by conducting health education along with preventive efforts against the risk of foot ulcers. Thus, patient screening is highly recommended for detecting neuropathy immediately

after being diagnosed with diabetes mellitus to prevent the risk of foot ulcers (Jyotsna, Kishore, & Upadhyay, 2015)

In this study, the assessment of vascular status was performed using three measuring variables, i.e., HbA1c, brachial index or ABI and pulse frequency. The researchers collaborated with laboratory assistants to carry out blood sampling. The laboratory assistants took blood samples for the HbA1c test. Regarding the vascular status, in the beginning of the study, 94 respondents in the two groups showed poor HbA1c values (HbA1c >6.5). In the intervention group, only eight patients were indicated to have HbA1c values below 6.5. The mean value of the ankle-brachial index and pulse rate did not show a significant difference and it was still within the normal threshold in both groups. After the intervention and evaluation was conducted for three months, there was a significant change in the intervention group. It was shown that the HbA1c level improved but there were still 14 respondents with HbA1c values above 6.5. This showed that there were significant changes in the vascular status of the patients after regularly performing the recommended intervention.

Based on the theory, an ischemic state is a condition due to a lack of blood in the tissue that causes the tissue to have a minimum supply of oxygen. This condition happens due to a macroangiopathic process in blood vessels that leads to decreased circulation as indicated by the loss of pulse in the dorsalis pedis artery, tibialis and poplitea, atrophic and cold feet and thickened nails. The process of angiopathy in people with diabetes mellitus includes the narrowing and blockage of peripheral arteries in the lower limbs, especially the legs, due to the reduced perfusion of the distal tissue from the legs and thus diabetic foot ulcers occur (Mahfud, 2012).

The level of blood sugar in patients with uncontrolled diabetes mellitus will cause a thickening of the intima (hyperplasia of the basal artery) in the large blood vessels and capillaries. It can also cause a leakage of albumin out of the capillaries, and thereby disrupt the blood distribution to the tissues. As a result, tissue necrosis may occur, resulting in diabetic ulcers. Erythrocytes in people with uncontrolled diabetes mellitus can increase the HbA1C which causes deformability of the erythrocytes and the disrupted release of oxygen in the tissues, resulting in blockages that interfere with tissue circulation and a lack of oxygen. Such a condition may cause the death of the tissue which subsequently causes the development of diabetic foot ulcers. Increased levels of fibrinogen and increased platelet reactivity will cause a high aggregation of red blood cells so then the blood circulation becomes slow. This condition facilitates the formation of platelets in the walls of the blood vessels which will interfere with blood circulation. People with diabetes mellitus usually have a high level of cholesterol, LDL, and plasma triglyceride. Poor circulation to most tissues will cause hypoxia and tissue injury, stimulating an inflammatory reaction which stimulates atherosclerosis. Changes or inflammation in the walls of blood vessels will cause an accumulation of fat in the blood vessel lumen and a low concentration of HDL (high-density lipoprotein) as a plaque cleanser. The presence of another risk factor, which is hypertension, will increase susceptibility to atherosclerosis. Atherosclerosis may lead to decreased circulation so then the feet become atrophic, cold and the nails thicken. Another subsequent abnormality is tissue necrosis, which results in ulcers that usually starts on the lower legs (Mahfud, 2012); (Studi et al., 2012)

Vascular disease can interfere with the biomechanics in the foot which causes the risk of diabetic ulcers. This is in line with Norwood (2011), who stated that one of the risk factors which can lead to diabetes mellitus foot ulcers is peripheral vascular disease. For this reason, the routine examination of the vascular status of patients with diabetes mellitus is needed. A study conducted by Sihombing (2008) showed that the ABI and HbA1c values affected the risk of developing diabetic foot ulcers. In addition, a study by Liu et al (2010) reported that 63% of 1,524 subjects with type 2 diabetes mellitus had complications related to glycemic control levels with HbA1c >7.5 and where the mean of the HbA1c levels were 9.63%, resulting in foot ulcers (Wahyuni & Arisfa, 2016).

Assessing the vascular status of patients with diabetes mellitus is important as it is one of the risk factors for diabetic ulcers. Patients with poor vascular status will experience a worsening circulation especially in the peripheral area. Furthermore, old age factors and illness (cardiovascular) also worsen the condition of the arteries. If such a condition continues to be untreated, then it will increase the risk of foot ulcers. For this reason, it is necessary to take preventative measures in the form of foot care and foot exercises. Such treatments can prevent the emergence of injury as there is the protection of the barrier system (skin) and an increased strength of the foot muscles, which improves foot mobility and blood circulation in the legs.

Foot care and foot exercises are effective at improving vascular status in patients with diabetes mellitus. In this study, the effectiveness is evidenced by the decreased number of patients with diabetic neuropathy status and increased vascular status (frequency of the dorsalis pedis artery and the HbA1c and ABI values). A study conducted by Saurabh et al. (2014) found that 5-6 minutes of time devoted to providing foot care to individuals created healthy habits which could prevent disability and reduced medical expenses in the long term. Furthermore, a training program involving more than 3,000 primary care doctors in India showed that diabetic foot care was found to be very educational and this became a priority for diabetes control strategies (Saurabh et al., 2014).

The results of this study support a research hypothesis which states that there is an effect of foot care and foot exercise on the efforts to prevent the risk of foot ulcers in patients with diabetes mellitus. The results of this study also confirm the theory that 85% of amputations of diabetic feet can be prevented by proper care and education. This study proved that performing foot care and foot exercises could prevent the risk of foot ulcers by 50 - 70%. According to Perkeni (2015), the management of diabetes mellitus begins with applying healthy lifestyles and pharmacological interventions. The knowledge of independent monitoring, the signs and symptoms of hypoglycemia and its treatment should be given to patients. The education used to promote healthy living needs to be implemented as a part of preventive efforts. It is a very important part of holistic management of diabetes mellitus; one of which is foot care (Chiwanga & Njelekela, 2015). Black and Hawks (2009) explained that the proper handling of foot care and the initial treatment can prevent the risk of foot infection. Effective foot care prevents the risk of ulcers turning into amputations. This is supported by Chiwanga and Njelekela (2015), who stated that practicing proper foot care reduced the risk of developing diabetic foot ulcers. Knowledge of foot care is important for health care providers in order to increase the public knowledge about the benefits of foot care (Chiwanga & Njelekela, 2015). This is congruent with a study conducted by Netten et al. (2016) which reported that proper foot care and adherence to foot care could reduce the impact of ulcerations on the feet by 3.1% in the intervention group compared to the control group which experienced increased ulceration in the feet by 31.6% (Group, 2015). Another study conducted by Kotru et al. (2015) on foot care showed that 18% of patients in the intervention group receiving foot care developed a new ulceration. In contrast, in the control group, 31% of patients developed new ulcerations on the legs (Kotru et al., 2015). Another study by Chiwanga and Njelekela (2015) also revealed that out of the 404 respondents involved in the study, 15% had foot ulcers, 44% had neuropathy and 15% had a history of peripheral vascular disease. The rate of peripheral neuropathy affects the emergence of foot ulcers. About 48% of respondents receiving foot care education could perform foot care independently at home and adhered to the recommended advice. Meanwhile, 27% of the respondents checked their feet at the doctors at least once after being diagnosed(Chiwanga & Njelekela, 2015).

In addition to foot care, physical exercises can be used as part of the treatment of diabetes mellitus. Performing exercises (including weight-bearing activities) is recommended as it can improve glycemic control. The exercises should be measurable, organized, controlled, and continuously practiced. The recommended intensity is 40-70% of mild to moderate activity (Studi et al., 2012).

Diabetes causes weakness in the legs. It also changes the function of the legs and therefore it is necessary to emphasize the importance of exercising the lower limbs (Kivlan, Martin, & Wukich, 2011). However, there has been no evidence of studies that have adapted specific foot training as recommended in this study; only indications for regular exercises were found (18). Nonetheless, regular exercise which is supervised by professionals is very important for the improvement of muscle strength, mobility, peripheral pulses, and risk assessment. Increased muscle strength is not expected to occur since there is no use of burden when the exercise is performed. Ankle biomass in diabetic clients is detached from neuropathy as there is decreased mobility, increased plantar pressure and changes in foot kinematics (18). These changes can affect the patients when it comes to increasing pressure on the fifth toe and medial area of the heel, which is associated with the risk of plantar ulceration (Gurney, Marshall, Rosenbaum, & Kersting, 2013).

The results of the study conducted by Iunes et al. (2014) showed that the guidelines of self-care could change the leg alignment and reduce the amplitude of lateral oscillation of the lower limb when home exercises are performed. However, it was found that foot evaluation and self-care guidelines were not frequently carried out by the health workers even though the practice of preventing diabetic foot complication has been found to be very important (Iunes et al., 2014). Performing exercises is the first line action in the treatment of diabetes. Exercises can reduce blood glucose levels by taking the glucose to the active muscles. Exercises also stimulate the translocation of glucose transporter type 4 (GLUT4), increase glucose uptake into the muscle cells and compensate for the insulin sensitivity disorders associated with diabetes (26). Although exercises and detainees provide benefits for diabetic patients, the combination of both is more effective at controlling blood glucose. Exercises also increase insulin action from 2 up to 72 hours(Shrivastava, Shrivastava, & Ramasamy, 2013).

In addition to a short-term improvement in glucose control and insulin action, long-term exercise reduces low-density lipoprotein cholesterol and systolic blood pressure in diabetic patients. It also corrects the symptoms of depression and improves quality of life related to health. Given its influence on blood glucose regulation and the role of glycemic control in preventing diabetic neuropathy, exercises should be considered as a treatment for diabetes complications (Fox, 2014). One of the recommended exercises for patients with diabetes mellitus is foot exercises (Akhtyo, 2009). Foot exercises are one of the therapies which can be provided by the nurses with the aim of launching the disrupted blood circulation as they help to strengthen the leg muscles. This is consistent with the study conducted by Wibisono (2009) as cited in Priyanto (2012) which stated that diabetic foot exercises aimed to improve blood circulation to create a smooth transport of nutrients to the tissues, to strengthen the small, calf and thigh muscles, and to overcome the limitations of

joint motion experienced by people with diabetes mellitus. In addition, foot exercises also increase endoneurial blood flow, nitric oxide synthesis and Na + / K + -ATPase activity with the given training (Gulve, 2008).

Priyanto (2012) reported that the blood sugar levels and foot sensitivity improved in the elderly who performed the foot exercises. Wahyuni and Arisfa (2015) also found that diabetic foot exercises were effective at increasing the brachial-ankle index in patients with type 2 diabetes mellitus (Priyanto., 2012). Another study conducted by Diliberto et al (2016) also reported that performing leg exercises improved plantar foot pressure and foot biomechanics, in addition to changes in leg strength, and muscle strength(Studi et al., 2012).

In this study, it was proven that regular and continuous foot care and exercises increased the vascular status of patients by 70 - 80%; this was reflected in the decreasing frequency of neuropathy by 70% and the increasing vascular status by 50% that using the HbA1c test and the frequency of the pulse in the dorsalis pedis artery.

In this study, a variable which showed no different in the results in the intervention group and the control group was the ankle bracelets index. This is because, at the beginning of the examination, the mean values of the brachial index ankle in the two groups before the intervention were no different. Thus, the results after the intervention were also not significantly different. However, in the intervention group, there was a significant relationship between the values of the pre- and post-intervention as there was an increase of ABI in the normal range of 0.9 to 1.2.

CONCLUSION

This study concluded that foot care and foot exercises effectively increased the patient's vascular status by 70 - 80% in patients with diabetes mellitus. Foot exercise and foot care can be one of the independent nursing interventions used to prevent the complications of diabetes mellitus. Further research can consider the findings in this study and involve more types of laboratory tests such as cholesterol, HDL, LDL and triglyceride tests. These affect the peripheral circulatory status of the patients.

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Original Research

Related Factors of a Nurse Handover Implementation in the Inpatient Ward of Ulin Hospital, Banjarmasin

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ABSTRACT

Introduction: Ideally, a handover is carried out through three stages: preparation, implementation, and post-handover. However, some handovers only consist of one phase. The aim of the study was to identify and analyze the factors related to the implementation of nurse handover.

Methods: This was a correlative analytic research method with a cross-sectional approach. The population in this study was all of the nurses with at least a Diploma III inpatient ward education. The sample totaled 174 nurses in the inpatient ward of Ulin Hospital Banjarmasin, recruited through proportionate stratified random sampling. The data was collected by spreading the questionnaire and the data collection took place from December 2017 to January 2018.

Results: There was a correlation between education level (p= 0.036) and role model (p= 0.021) with the implementation of handover. The most dominant factor associated with the implementation of handover was role model (p= 0.031: OR= 6.089).

Conclusion: The nurses who had a good role model performed th handover 6.089 times better than the nurses with an inadequate role model. Adversely, a poor role model might result in a poor handover.

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INTRODUCTION

Targeting patient safety is a requirement to be applied in all hospitals accredited by the Hospital Accreditation Commission. The preparation of this target refers to the Nine Life-Saving Patient Safety Solutions from Organization and others (2007), which was also used by the PERSI Hospital Patient Safety Committee (KKPRS PERSI) and by the Joint Commission International (JCI) (Permenkes RI, 2011).

The importance of effective communication is certainly inseparable from the nurses or other health workers. Nurses, in this case, are very good at communicating when doing nursing care, one of which is the handover. In line with (Safitri, 2012), it was revealed that the main thing needed by each inpatient is nursing care. One of the nursing care methods provided is the handover procedure, which is a daily activity that must be carried out by the

nurse. The handover implementation carried out by the nurses is a nursing action that will directly impact on patient care. Besides that, the patient handover is built as a means to convey responsibility and it is a submission of legality related to the nursing services and the patients.

Professionalism in the nursing services can be achieved by optimizing the role and functions of the nurses, especially when they are more independent. This can be realized well through effective communication, as well as with other health teams. One form of communication that needs to be improved is when changing shifts (weighing the patients) (Nursalam, 2015).

Alvarado et al (2006), in their (Triwibowo, Harahap, & others, 2016) study, revealed that inaccurate information can have a serious impact on the patients. Almost 70% of sentinel events are those that result in death or serious injury in the hospitals due to poor communication. The statement of the

researchers above is in line with the statement of Angood (2007). In the research of Dewi (2012), they revealed that there are adverse events, near miss and sentinel events in hospitals. The problem that is the main cause is poor communication.

The World Health Organization (WHO) (2007) reported that in 1995-2006, 11% out of 25.000 to 30.000 cases of communication errors during the handover of patients caused permanent disabilities which actually prevented side effects.

The second nurse said that the patient's handover was done at the nurse's table and then with the patient with each team. The nurse returned to the nurse's table after the patient was finished, but when weighing in the patient's room, they only observed the patients who reported it. They delivered the information in more detail and with priority, while for the patients who were safe to just continue with the therapy, sometimes at the time of the handover being completed from the patient to the nurse's desk, the nurses who had served previously immediately went home and did not sit together again at the nurses' table with the nurses who served next. The third nurse said that the handover was indeed done at the nurse's desk. After the handover was finished at the nurse's desk, the night service went home. There was no patient interaction along with the morning service, even when the nurse said that he was only patient after the night service returned.

Based on the data above, it shows that the behavior of the nurses in applying the handovers has not been carried out maximally. This shows that the communication at the time of the shift exchange between the nurses and between the patients and nurses has not gone well. The handover should not only be done at the nurse station but rather, it should be carried out directly in the patient's room. This phenomenon is in line with the research of Triwibowo & Harahap (2016) about qualitative studies.

Based on the results of the observations conducted by the researchers at the end of the morning service, it was found that the nurses serving on the next shift did not arrive earlier. This could also affect the handover and the handovers were not done on time. The time was limited so then the handovers were only done at the nursing station. It was observed that when the room nurse passed between the morning shift, the handover performed by the nurse was only done at the nurse's desk. The results of the observations were also supported by the interviews with the nurses who were in the afternoon service. When asked whether the handovers were also carried out by the patient, the nurse answered no. The results of the observations carried out above are inversely proportional to what was stated by (Nursalam, 2014) and (Nursalam, 2015), in that the handovers are carried out in three stages. The first stage of preparation was carried out at the nurse station. The second stage was the implementation carried out at the nurse station and also in the room or bed of the patient and the third stage was post-weighing what

was carried out at the nurse station. From this description, it can be concluded that the handovers performed by the nurses were not carried out in full according to the set stages. The second stage was cut off at the patient's room or bed directly, which included the head of room delivering greetings and the primary nurse (PP) asking for the patient's basic needs. The nursing nurse will further examine the nursing problems, needs, and actions that have been or have not been implemented, in addition to other important things that need to be noted during the treatment period.

The nurses' knowledge in the application of the handover of the patients is useful for the nurses so then the nurses can play a role in patient safety. This is because the nurses have a large role in collaborative actions with their clients, families and other health workers in accordance with their responsibilities based on the weighing process carried out. The variables were weighed and received as being effective, timely, accurate, complete, with clear communication and the handover was able to be understood by the patients. This will reduce errors, and result in improved patient safety. For the nurses themselves to weigh it, it served as a support for their colleagues in carrying out the nursing care actions. This can reduce the anxiety that occurs in the nurses, as well as providing motivation, improving the communication skills between nurses and establishing a cooperative and responsible relationship between the nurses. The nurses can comprehensively follow patient development, the patients get optimal health care and they can convey any problems directly if there is something that has not been revealed. It also allows the hospital to be able to improve the nursing services to the patients comprehensively. Based on the description above, the researcher is interested in examining more deeply the factors associated with the implementation of nurse handover.

MATERIALS AND METHODS

This research was a correlative analytical research study conducted using a cross-sectional design. This study used a cross-sectional approach because this study intended to identify whether there was a relationship between the level of education, attitude, motivation, intention, workload, role model and a strict time limits on the nurses' handover as the implementation variables. This study analyzed the factors associated with the implementation of the nurse handover in the Inpatient Ward of Ulin Hospital Banjarmasin.

The sample in this study consisted of the implementing nurses in the inpatient ward of Ulin Hospital Banjarmasin. The sample size in this study totaled 174 people. The research was conducted from the beginning of the planning and proposals, namely in April 2017, and then the data collection was carried out from December 2017 to January 2018.

Table 1. Distribution of the respondents according to education level, motivation, attitude, intention, role model, strict time constraints, workload and the handover implementation of nurses in the inpatient ward of Ulin Hospital Banjarmasin; 174 respondents.

Variable	Category	n	(%)
Level of education	Professional Education (Ners and Specialist Ners)	29	16.7
	Academic Education (Bachelor of Nursing and Masters in Nursing)	14	8.0
	Vocational Education (Intermediate nursing and applied science graduates)	131	75.3
Motivation	High	142	81.6
	Moderate	32	18.4
	Low	0	0
Attitude	Positive	98	56.3
	Negative	76	43.7
Intention	Strength	166	95.4
	Weak	8	4.6
Role model	Well	167	96.0
	Not good	7	4.0
Strict time limits	Right	160	92.0
	Not exactly	14	8.0
Workload	High	67	38.5
	Low	107	61.5
Handover implementation	Good	157	90.2
	Poor	17	9.8

Table 2. Relationship between education level and the handover implementation of nurses in the inpatient ward of Ulin Hospital Banjarmasin.

Level of education	Handover implementation				Total	
	Well		Not good			
	n	%	n	%	n	%
Professional Education & Academic Education	35	81.4	8	18.6	43	24.71
Vocational Education	122	93.1	9	6.9	131	75.29
Total	91	52.3	83	47.7	174	100
Fisher's exact test p value 0.036	OR= 0.323 (0.116-0.898)					

The variables were level of education, attitude, motivation, intention, workload, role model and strict time limits. The instrument in this study was a questionnaire.

The procedures in this study were where the researcher chose one nurse in each room who worked in the inpatient ward of Ulin Banjarmasin Hospital as an assistant in this study. The research assistant had the same role as the researcher. This role was carried out when the researcher was not in the hospital. They were to provide guidance and understanding to the research assistants about the procedures and how to fill out the questionnaires. The determination of the respondents was done by the means of researchers / research assistants according to the names registered as the research population. They provided an explanation of the objectives, benefits and research procedures carried out and presented to the respondents. We asked the respondent to fill in the consent sheet in order to become a respondent after agreeing to be a participant in the research conducted.

The data analysis in this study included univariate, bivariate and multivariate analysis. Univariate analysis aimed to describe the characteristics of each variable studied. The bivariate analysis used to test hypotheses with α 0.05 was intended to test the relationship of each independent variable and dependent variable using a Chi-square test and Fisher's exact test. Multivariate analysis was performed to assess the variables that had the most influence on the implementation of nurse handovers. The multivariate analysis used was a multiple logistic regression test, because in this study it was used to analyze the relationship of one or several independent variables with a categorical variable. This is said to be regression logistics and the variable was used to get the best model that can describe the relationship between the independent and dependent variables.

The researcher noted that ethical clearance consists of the right to self-determination, the right to privacy and dignity, the right to anonymity and confidentiality, the right to fair treatment and the right to protection from discomfort and harm.

RESULTS

The respondents' distribution, level of education, motivation, attitude, intention, role model, strict time limits, workload and handover implementation have been examined. See on table 1.

The results of the bivariate analysis found that motivation, attitude, intention, strict time limits and workload were not related to handover implementation. The level of education and role model were related to the

Table 3. Relationship between role models and the implementation of handover in the inpatient ward of Ulin Hospital Banjarmasin

| Role model | Handover implementation | | | | Total | |
| | Well | | Not good | | | |
	n	%	n	%	n	%
Well	153	91.6	14	8.4	167	95.98
Not good	4	57.1	3	42.9	7	4,02
Total	157	90.2	17	9.8	174	100
Fisher's exact test p value 0.021	OR= 8.196 (1.665-40.384)					

Table 4. The recapitulation of the relationship between the level of education, motivation, attitude, intention, role model, strict time constraints and workloads with the implementation of the handover in the inpatient ward of Ulin Hospital Banjarmasin

Variable	P value	OR	95%CI
Level of education	0.094*	0.639	0.111 – 3.661
Motivation	0.243*	2.006	0.653 – 6.165
Attitude	0.768	1.163	0.427 – 3.173
Intention	0.797	1.339	0.155 – 11.587
Role model	0.018*	8.196	1.665 – 40.348
Strict time limits	0.574	1.611	0.329 – 7.889
Workload	0.204*	1.920	0.702 – 5.251

implementation of the handover. The related factors have been illustrated in Table 2. The results of the analysis conducted by the researchers using Fisher's exact test had a p-value = 0.036 (α 0.05). It can thus be concluded that there is a relationship between the level of education and the implementation of handover in the inpatient ward of Ulin Hospital Banjarmasin.

The results of the analysis with Fisher's exact test obtained a p-value = 0.021 (α 0.05), which means that it can be concluded that there is a relationship between role models and the implementation of handover in the inpatient ward of Ulin Hospital Banjarmasin. The results of the analysis based on OR obtained a result of 8.196 (1.665-40.384). This is statistically significant and it is believed that 95% of the respondents have good role models and that by 8.196 times, they perform better handovers than the nurses who have bad role models. See on table 3.

The results of the bivariate analysis carried out based on Table 4 above indicates that the variables level of education, motivation, role model and workload can be included in the multivariate modeling because the p-value <0.25. Other variables such as attitude, intention and strict time limits have a p-value> 0.25. The selection of the candidates for the variables cannot be entered into multivariate modeling. However, these variables were still analyzed using the multivariate method because in substance, the attitudes, intentions and time limits are variables that are very important when related to the implementation of handover.

Multivariate modeling was done by all of the candidate variables being tested together using multiple logistic regression tests. The variables that are considered valid were the variables with a p-value <0.005 and p-value> 0.005 issued sequentially from this model. The results of the multiple logistic regression analysis obtained have been shown in Table 5.

The results of the last modeling analysis after the education level were released showing the results of the motivation variables with a p-value = 0.318, workload variables with p-value = 0.301 and role models with p-value = <0.05, 0.031. The conclusion of the multiple logistic regression tests are that role model is the factor that is very dominantly associated with the implementation of handover.

Based on the results, the most dominant factor from the analysis was the role model variable, which had the highest OR value of more than 10%, meaning that nurses with good role models in the room have a chance that is 6.089 times greater at the implementation of good handover compared to nurses who have a role model that is not good. See on table 6.

DISCUSSION

The results showed that the majority of respondents had vocational education (131 people; 75.3%). This can be seen from the implementation of handover, which has a less good value, at 52.9%. Based on this, the level of education greatly determines the ability of the nurses to carry out handover. Ihsan (2007) said that education is very important in influencing one's mind. An educated person, when encountering a problem, will try to think as clearly as possible when solving a problem. Educated people tend to be able to think calmly about a problem. This statement is in line with what Hidayat (2008) revealed, in that education is the first element that must be structured because through education, the development of the nursing profession will be directed and developed in accordance with the advancements in science and technology.

The level of education greatly determines the ability of the nurses to understand and apply the handover. Nurses who have a higher level of education will find it easier to understand the implementation of handover compared to nurses who have a lower level of education, in this case, vocational education. The ability of the nurse to understanding the handover concept can increase the nurses' knowledge in terms of handover implementation. This will have an effect on nurse

Table 5. The results of the last multivariate modeling selection were the factors related to the handover implementation of nurses in the inpatient ward of Ulin Hospital Banjarmasin

Variable	Sig	Exp(B)	CI 95%	
			Lower	Upper
Motivation(1)	0.318	1.835	0.558	6.042
Role model	0.031	6.089	1.178	31.469
Workload	0.301	1.750	0.606	5.050
Constant	0.000	0.006		

Table 6. Comparison of OR before and after the education level variable is excluded from the model of the relationship between the independent variables and the dependent variable on the handover implementation of nurses in the inpatient ward of Ulin Hospital Banjarmasin

Variable	OR variable complit	Education has been issued	Calculation	Change OR
Level of education (1)	0.777	-	-	-
Level of education (2)	0.376	-	-	-
Motivation (1)	1.999	1.835	(1.835-1.999)/1.999x100%	8.2%
Attitude	0.967	-	-	-
Intention	2.584	-	-	-
Role model	3.397	6.089	(6.089-3.397)/3.397x100%	79.2%
Strict time limits	0.988	-	-	-
Workload	1.895	1.750	(1.750-1.895)/1.895x100%	7.6%

compliance in terms of them implementing their duties and responsibilities when carrying out the handover.

The results of this study also showed that 43.7% of nurses had a negative attitude. This is based on the questionnaire focused on the handover procedure. Handover procedures, especially those related to the time of handover, require the nurses to arrive early to see the patient's condition. There are still nurses that have expressed disagreement with this. According to the researcher, this was not in line with the handover SPO in the hospital. The implementation of the handover, if carried out in accordance with the SPO, will reduce the errors involved in delivering the information both to the patient and to the nurse. Thus, the patient's safety can be protected.

Based on this study, most of the respondents had good role models, totaling 167 people (96.0%) but there were still 4% nurses who had bad role models. Based on the results of the questionnaire, it was found that nurses who had role models that were not good did so because the implementing nurse saw that the head of the room did not carry out the handover in any situation. In this case, the researcher assumed that the implementation of a good handover is supported by a good role model, be it the head of the room, the supervisor or the team leader. On the other hand, when the implementation of handover is not good, the head room nurse factor has responsibility. As the head of the space, this nurse should be a good example of the implementation of handover.

The results of this study are in line with Bandura's Social Learning Theory (in Ashford, 2010) which suggests that individual behavior is formed through the imitation of environmental behavior. Individuals will observe the behavior in their environment as a model, meaning that support from peer nurses can also be used as role models in the implementation of handover. The nurse will imitate how his partner did

the handover. If this is given reinforcement by the environment, then the behavior will become attached.

The attitude and behavior of the other officers is a role model for the other health workers. In line with Lankford et al's (2003) study stating that the compliance of janitors and health workers was significantly affected by the behavior of other health care workers, the compliance of the health workers is directly affected by the behavior of other health care workers. In this case, senior nurses can be the role models for other nurses. The more often that the junior nurses see the positive behavior of the senior nurses, the more positive the junior nurse's behavior is tied into what senior nurses do in terms of handovers. Conversely, if the behavior shown by the senior nurses is negative, then the junior nurses will behave like the senior nurses.

The results showed that the majority of respondents were there at the right time, totaling as many as 160 people (92.0%). There were still 8% who, in the handover, were not on time. The inaccuracy, based on the results of the questionnaire, found that the respondents could not finish the handover well within a short period of time. The results showed that the respondents who were unable to carry out the handover in a timely manner made up 8%.

The research results showed that the majority of respondents carried out handover well, by as much as 157 (90.2%) but there were still 19.8% of respondents whose operations were not good. This was due to the procedures implemented, based on the results of the questionnaire, namely signing the handover book at the end of the shift. The signing of the handover book is the most important part in the existing standard operating procedures (SPO), meaning that the nurses often carry out the handover not in accordance with the SPO of the hospital. Many factors have resulted in this, including the

unavailability of an operative SPO in each room and non-compliant nurses.

Based on the results of the research that the implementing nurses who do the handover are mostly good, many factors can influence this, including high nurse motivation, positive nurse attitudes toward handover, having the intention to carry out the handover and having good role models in the implementation of handover such as from the headroom, supervisor and team leader. For most nurses carrying out handover, a lot of nurses have a low workload so the implementation of handover can be implemented properly.

The results of this study show that the education level of the respondents is more in terms of vocational education or Nursing DIII for as many as 75.3%. Although the level of education is not the main factor that influences the implementation of handover for the nurses, the level of education and the knowledge of a person can influence a person's behavior. Ihsan (2007) argues that education is a very important thing when it comes to influencing one's mind. An educated person, when encountering a problem, will try to think as clearly as possible when solving the problem. Educated people tend to be able to think calmly about a problem.

The results of Fisher's analysis of the exact tests in this study indicated that there is a relationship between the level of education and the implementation of nurse handover with a p-value 0.025. The level of education greatly determines the ability of the nurses to carry out the handovers. This is in line with what Hidayat (2008) revealed, in that education is the first element that must be structured because through education, the development of the nursing profession will be directed and developed in accordance with the advancement of science and technology so then the nursing staff can be qualified.

The results of this study indicate that the majority of respondents (56.3%) had a positive attitude towards the implementation of handover. The Chi-square statistical test results obtained p-value 0.767, means that H_o is accepted. It can thus be concluded that there is no relationship between attitude and nurse handover implementation.

Although in the research conducted by the researchers there was no relationship between attitude and the implementation of nurse handover, the attitude formed in a person can influence someone in carrying out their daily tasks. With a positive attitude, it is expected that someone has a high standard of performance and motivation. Attitude clearly indicates the connotation of the suitability of the reaction to a particular stimulus which in everyday life is an emotional reaction to a social stimulus.

Based on the results of the cross-tabulation analysis between attitude and handover, it was found that the nurses had a negative attitude towards handover. For the nurses who had a negative attitude, there were still nurses among them who performed the handover well (89.5%) while the rest did it less so

(10.5%). Handover procedures, especially those related to the timing of the handover, require the nurse to arrive early and to see the patient's condition firsthand. However, there are still nurses who state that they do not agree with this. According to the researcher, this was not in line with the handover protocol in the hospital. It should have been carried out according to the existing protocol to reduce the errors involved in delivering information to both the patients and nurses and to ensure patient safety.

The attitude of the nurses in the implementation of handover can be influential. The attitude that has been formed in and by the nurse can affect the nurses when they are carrying out their daily duties in the hospital, one of which in this case is the implementation of handover. Attitude significantly shows the connotation of the suitability of reactions to certain stimuli in daily life and it is an emotional reaction to social stimulus.

The attitude and behavior of other officers is a role model for other health workers as a role model. In line with Lankford et al's (2003) study that stated that the compliance of janitors and health workers was significantly affected by the behavior of other health care workers, the compliance of health workers is directly affected by the behavior of other health care workers. In this case, senior nurses can be role models for other nurses. The more often that junior nurses see the positive behavior of senior nurses, the more positive the junior nurse's behavior will be and vice versa.

Based on the results of the study indicating that there is a relationship between role models and the implementation of handover, this means that the better the role models are that are possessed by junior nurses in the handover, the better the handovers are performed. Role models have a very important role in an organization, especially for hospital nurses. The more good nurse role models there are, the more likely it is that other nurses will follow them. Role models in this study are the factor most associated with the implementation of handover from other factors like the level of education, motivation, attitudes, intentions, strict time limits and workload.

Based on the results of the multivariate analysis of the seven independent variables (level of education, motivation, attitudes, intentions, role models, strict time constraints and workload), only one was the most dominant one related to nurse handover, namely role models with an OR of 6.089. This reveals that role models are the most dominant variable in relation to nurse handover.

The results of testing all of the variables that are related or not by entering all of the variables in the first stage turned out to be a time limit that has a larger value, so that it was excluded from the analysis. In the second stage, the attitude value with the largest value was excluded from the analysis, and then after the time limit variable and the attitude variable were issued, there was still no change. It can be seen from the results of the OR comparison in Table 5.12 that

there is no change in OR that is > 10%, so the strict time limit variable was removed from the model. Furthermore, the biggest variable p-value is the attitude variable with a p-value 0.955. Thus, the next modeling attitude variable was removed from the model.

Through the next stage after the time limit with the attitude being released, it turns out that the level of education is greater in value so the model was released but from the results of the OR comparison in Table 5.16, there were changes in OR> 10% including in the intention variables and role models variable. Thus, the education level variable was included again in the model. The analysis was carried out again by entering the education level variable but when we issued an intention variable, the results of the OR comparison in Table 5.19 showed no change in OR which> 10% of them. Thus, the intention variable is excluded from the modeling and as can be seen from the p value of the largest level of education, the education level was released from the model. The results of the last modeling analysis after the education level were released show that the results of the motivation variables are p-value 0.318, the workload variables are p-value 0.301 and only role models are p-value <0.05, 0.031. The conclusion of the multiple logistic regression tests are that role models are the factor that is very dominant when related to the implementation of handover.

Based on the results of the analysis, it can be seen that the level of education and intention can influence the role model, as evidenced that when analyzed, there was a change in the percentage of the variable for role models after the education level was released as well as the intention variable. As a nurse who is a role model for other nurses, they must be supported with a higher level of education and accompanied by good intentions. The hospital management must be able to determine and choose those who not only see the seniority of the person who is the team leader or head of the room as a role model for other nurses and they must also look at the education of the nurses, but the management must also consider the level of education of a nurse who wants to be the team leader or head of the room and see the education level of the nurse in question. This is because with education being in terms of academic and professional stages, there are a few people who, when they are educated in college, have already exposed to science. However, this may not be obtained more deeply when they are studying in the vocational stage in the case of some handovers. Likewise, with the nursing nurse, the education level of the implementing nurse can affect the nurse who is a role model, which in this case is the head of the room, supervisor or team leader. The higher the level of education of the executive nurses, the more they are able to respect their superiors, imitate the best and leave the bad ones. In contrast, a low level of nurse education from their superiors will make it difficult for them to imitate and obey their superiors.

Based on the research conducted by Vrischa (2015), it was found that there was a significant relationship between the factors that influence handover - one of which was education. In line with the research mentioned above, the results of the research conducted by the researchers in this study also showed that the level of education in terms of the relationship of the implementation of handover in the treatment room was related, The more specialist the level of education of a person, the more that someone's knowledge increases. The increase in knowledge will lead to an awareness of a person which will cause people to behave, whereas for the higher levels of knowledge of the nurses, it will result in a more positive and higher motivation in those carrying out the handover. With a high level of education in someone knows theoretically about handover, they will know more about their professional work. Education has also been regulated in terms of ongoing professional development for Indonesian nurses (2013), in order to maintain and enhance their professionalism as a nurse according to the established competency standards. This has been done through education and training. For the development of continuous professionalism for nurses in accordance with Law No. 36 of 2009 concerning Health Article 27, it states that health workers - in carrying out their duties - are obliged to develop and improve their knowledge and skills. With the ongoing professional development and mandate of Law No. 36 of 2009, nurses are required to always develop themselves in this matter through continuing their education. If the knowledge of handover has not been obtained during the vocational education they have undergone, then the nurses are required to undertake professional education.

Hayes (2016) stated that the continuation of education and professional development / Continuing Professional Development (CPD) will improve the professionalism of a nurse in the cognitive, psychomotor and affective domains. The competencies possessed by the nurses will be increased or decreased. Various methods are needed, including formal education, seminars, training and workshops, so then they will provide benefits relate to staff development in terms of knowledge, skills, and attitude.

Social Learning Theory Bandura (1971), which is a Bandura modeling that is a a combination of habit factors with cognitive factors, revealed that in learning, there are six ways that it can be done, namely 1) trial-and-error experience; learning through trial and error, 2) the perception of the object,; learning is done by giving an opinion or estimate of an object, 3) observations of another's response to the object; learning can also be done through studying the opinions or responses of others, 4) modeling; learning can also be done by creating or determining a model or example, 5) exhortation; learning can also be based on the various advice obtained, both directly and indirectly, and 6) instructions about the object; learning can be through

various commands that are deliberately given based on the object or thing that is to be learned. The learning done by a nurse in handover is, according to the results of the research and Bandura theory, through models. Modeling in this case is learning through a model or example, which is where someone often sees someone taking an action in the case of a nurses' handover. Then the other nurse will pass along these actions as well.

This research had various limitations, even though efforts have been made to overcome them. These limitations included that this research was carried out in all inpatient rooms so the filling in the questionnaire by the executive nurses meant that the researchers were unable to fully oversee the filling in of the questionnaires. The researchers also could not fully control and see directly when the respondents answered the questionnaire.

CONCLUSION

Motivation, attitude, intention, strict time limits and workload were not related to the implementation of nurse handover. The level of education and role model were related to the implementation of handover. Having a role model was the most dominant factor associated with nurse handover implementation. The suggestions of this study are that the nurses who serve as the head of the room, supervisor and team leader should provide an example or role model to the nurses in relation to the implementation of handover. For other researchers, they should develop research with a qualitative design that can explore the various phenomena regarding the perception, experience and contribution of nurses related to the implementation of handover as performed by the nurses.

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Original Research

Triggered Recurrence Factors of Mental Illness Patients in an Emergency Unit in a Psychiatric Hospital

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ABSTRACT

Introduction: Understanding the trigger recurrence factors of mental illness patients is important because the number of mental hospital visits has been increasing every year, especially in mental illness patients who have experienced recurrence. This research aimed to identify and describe some of the types of trigger that result in recurrent readmission to the emergency unit of a psychiatric hospital.

Methods: The study was designed using a quantitative method with a univariate and bivariate analysis approach using a cross-sectional design. The researcher conducted the study in the Emergency ward of Surakarta mental hospital for 2 months and obtained 71 total samples on patient readmission where there was a recurrent mental illness. The samples were taken using the accidental sampling technique. The data was taken using a questionnaire and analyzed using narrative description and central tendencies.

Results: The results showed that the highest trigger recurrence factors were 58% related to patient compliance when taking medication. The results showed that there are various triggers for the recurrence of mental illness.

Conclusion: These were evidenced by the family members who stated that they found the medication around the house or in the patient's shirt pocket. The other trigger recurrence factors which were categorized as less influential were family support and the environment of society, which were 4%.

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INTRODUCTION

According to the Indonesian Big Dictionary, being healthy is a state where the whole body feels fit and comfortable. This feeling of being fit and comfortable is relative because it differs according to people who interpret those feelings (Yusuf, PK, & Nirhayati, 2017). Clausen defines healthy people as people who can prevent mental disorders that are due to various stressors and that are influenced by the size of the stressors, in addition to religion, culture, beliefs, meanings etc (Yusuf et al., 2017).

Psychological factor has a great impact on someone mental health. According to Law Number 18 2014 concerning mental health, mental health is a condition where a person can develop physically, mentally, spiritually and socially so then the person is aware of his own abilities, so then they can overcome stress, so then they can work productively and so they are able to contribute to their environment. Ironically, mental health is still one of the most common health problems in the world, including in Indonesia. On the other hand, when someone has a mental illness, it means that they are experiencing disorders in terms of their behavior, thoughts, and feelings that are manifested in the form of a set of symptoms and/or behavioral changes that are meaningful, and that can cause obstacles and suffering when they are carrying out their functions as humans(Indonesian Ministry of Health, 2014).

According to WHO data (2016), there are around 60 million people affected by bipolar disorder, 47.5

million people affected by dementia, 35 million people affected by depression and 21 million people affected by schizophrenia in the world. The 2013 Riskesdas data showed that mental-emotional disorder are indicated by symptoms of anxiety and depression in people aged 15 years and over reaching around 14 million people (6%) of the total population of Indonesia. The incidence of severe mental disorders such as schizophrenia reached around 400,000 people or as many as 1.7 per 1,000 population(Indonesian Ministry of Health, 2016).

These numbers are very concerning. When the number of people who have mental illness increases, this means that people's well-being has decreased while their stress level has increased. This is because mental disorders can occur due to precipitating factors, which then trigger the factors that will later cause emotional stress or the appearance of stress. If this emotional pressure is experienced by someone who has low coping, then this will cause someone to experience mental disorders (Kanel, 2015). Therefore, the trigger or the cause's factors that cause the patient to have mental illness were various.

The data from the Central Java Provincial Health Office shows that the number of mental patients has increased. In 2015, there were 317,504 people who visited with mental disorders with the largest percentage of visits being in hospitals, at 60.59 percent. In 2016, the number of visits to hospitals due to mental disorders was 413,612 people with the largest percentage of visits to psychiatric patients in hospitals being 68.33 percent (Ministry of Health, n.d.). Based on data from the Regional Mental Hospital Dr. Arif Zainudin Surakarta, the number of mental patients in 2015 was 3,298 people and this increased in 2016 to 3,394 people. A large number of patients with mental disorders were not new patients experiencing mental disorders. There were also mental patients experiencing recurrence (Surakarta Mental Hospital, 2017).

Recurrence in mental patients occurs because of the appearance of the same symptoms as before. The frequency of recurrence is the period of times when the previous symptoms experienced by the client reappear and cause those with a mental disorder to need to be treated again (Kelliat, 2011). A preliminary study conducted by the researcher in the Surakarta Regional Mental Hospital in the Emergency Room in May 2018 was where the data was obtained that when the patient comes into the emergency room, the nurse asked the patient or the family of the patient about several things, namely when they had their last treatment, what medication the patient consumed, when they were last in control, and the symptoms experienced by the patient that caused the patient to relapse and be taken to a mental hospital. There were many causes of patient recurrence but we did not examine the cause of the patient's recurrence, as the study only examined the symptoms that caused the patient to be taken to a mental hospital. From the phenomena above, the researcher became interested in conducting research on the triggered recurrence factors of mental illness patients in the Emergency Unit of a Psychiatric Hospital.

MATERIALS AND METHODS

The research design was quantitative and descriptive with *a cross-sectional* design approach. This research was done between July and August 2018 in the Emergency ward of Surakarta mental hospital. The total sample involved consisted of 71 mental illness patients in the Emergency ward taken through accidental sampling technique. This research used a single variable. The variable was the triggering recurrence factors of the mental illness patients. The instruments that were used were the components required to examine the patients in the emergency room, including patient identity, the history of the current disease, the trigger factors for the recurrence of patients while in the emergency room and the frequency of patient recurrence in the past year.

Furthermore, the other instrument was a Guttman scale questionnaire which consisted of yes or no answers. This instrument was used to identify the causes of relapse of mental disorders in order to determine the classification of the patients who were studied to discuss the findings from the patient's history, where the instrument was chosen accordingly. Later on, the data was analyzed using the univariate and bivariate methods.

RESULTS

In this research study, the respondents consisted of 71 mental illness patients who came to the Emergency unit of Surakarta mental hospital. Furthermore, the table below (Table1) describes the characteristics of the respondents based on their age, gender, education level and occupation. Table 1 showed that for mental illness, 63% of the patients who came to the emergency ward were in the productive age range between 25-35 years old. Based on gender, there were more male than female patients, which reached up to 58%. Furthermore, the mental illness patients who had an educational background of senior high school had the top percentage (42%) above the other educational backgrounds. Even though most of them were well-educated, according to the occupation survey, most of the patients did not work to meet their daily needs. This means that other family members are the ones who work to meet the family needs.

Based on the frequency distribution table for patient recurrence, it was found that the majority of patients who experienced recurrence in the category of infrequent relapse were 62%, which means that they were readmitted 2 times or less a year. On the other hand, there were 38% categorized in the frequent recurrence category, which means that they were readmitted 3 times or more in a year. Based on Table 2, focused on the distribution of patient recurrence, it was found that the majority of patients

Table 1. Characteristic respondents (n=71)

Characteristics of respondents	n	%
Ages:		
25 – 35 years old	45	63
36 – 45 years old	16	23
46 – 55 years old	6	9
56 – 65 years old	3	4
76 – 85 years old	1	1
Gender:		
Male	41	58
Female	30	42
Education Level:		
Elementary School	21	30
Junior High School	19	27
Senior High School	30	42
University/college	1	1
Occupation:		
Does not work	61	86
Private sector worker	3	4
Entrepreneur	6	9
Labourer	1	1

Table 2. Frequency Distribution of Patient Recurrence (n=71)

Frequency of Recurrence in a Year	n	%
Rarely relapse (<2x)	44	62
Relapse often (>3x)	27	38

who experienced recurrence in the category of infrequent relapse made up 62%, which means that they were readmitted 2 times or less in a year. On the other hand, there were 38% categorized in the frequent recurrence category, which means that they were readmitted 3 times or more in a year.

Based on Table 3, it can be seen that there were some trigger factors which lead the patients to the recurrence of their mental illness. The first factor was the patient's compliance when it came to taking their medication. Most of them were not taking their medications routinely. These cases were evidenced by 58% of them throwing their drugs around the house or keeping the drugs in their pocket. The percentage of patients who irregularly took their medication was 56%.

The next factor was the utilization of health facilities. For this factor, it showed that 49% of them were rarely in control of the health facilities, while the rest (24%) were rejected when it came to handing control over to the health facilities. The third was family support. In this section, 31% of the patient's families were locking up the patients at home. Furthermore, most of them also did not take the time to communicate with the patients. In those cases, the patients might feel abandoned. It could also make the patients become isolated and feel that there is a lack of family support, which could increase their stress and make their mental illness recur.

The last trigger factor came from the community environment. This factor indicated how society supports the patients with mental illness. The result showed that 42% of society preferred to avoid the patients when they cross paths; 38% of society also felt that the patients were disturbing the community.

This means that most of the people surrounding where the patients lived did not support them.

Based on the table above, it can be explained that the strength of the influence of the patient compliance factors in taking their medication, the utilization of health facilities and family support with the frequency of frequent recurrence were obtained as follows:

$$y = 2,197 - 2,610 \ (kep\_minum\_obat) - 2,736 \ (duk\_kel) + 0,408 \ (pem\_faskes)$$
$$y = 2,197 - 2,610 \ (0) - 2,736 \ (0) + 0,408 \ (0)$$
$$y = 2,197$$

Thus, the probability is:
$$p = 1 \ / \ (1 + ey) = 1 \ / \ (1 + 2.7 \ (2,197)) = 1/1 + 8.865 = 1 \ / \ 9.865 = 0.101$$

Thus, the probability of recurrence in the patients suffering from mental disorders is 10.1%. Based on the above equation, the conclusions are as follows: 1) The probability of patient recurrence is 10.1%, which means that when medication compliance, family support and the utilization of health facilities is constant (= 0), then the patient's recurrence rate is 10 times. 2) The logistic regression coefficient patient compliance factor for taking their medicine was -2,610, which means that per increase alongside one unit of medication compliance, the recurrence rate drops by 2,610 units. 3) The logistic regression coefficient of the family support factor is -2.736, which means that an increase in one unit of medication compliance follows a recurrence rate of 2.736 units. 4) The logistic regression coefficient of the utilization of health facilities was 0.408, which means that an increase in one unit of compliance with the

Table 3. Distribution of the Frequency Factors that triggers a relapse in the Mental Patients (n=71)

Triggering Factor	n	%
Patients compliance in taking medication		
Irregular in taking medicine every day	38	56
Do not want to take medicine at all	28	39
Feel tired of taking medicine every day	37	52
There are drugs around the house or patient's pocket	41	58
Patients do not want to be reminded if they have not taken medication	12	17
Patients do not want to be monitored when taking medication	13	18
Utilization of health facilities		
Rarely control to health facilities	35	49
Do not want to go to control to the health facility	17	24
Family support		
Don't take the time to communicate with patients	21	30
Do not give medication and do not supervise patients in taking medication	13	18
Do not accompany the patient during control	3	4
Do not pay attention to when patients must control	9	13
Locking up patients at home	22	31
Community Environment		
Is considered disturbing the community	27	38
Avoid when meeting patients	30	42
Ridicule patients when meeting	3	4
Talk about the patient's condition in front of the patient	5	7

Table 4. Logistic Regression Test Results (n=71)

Trigger Factor	B	p-value	Exp (B)
Patients compliance in taking medication	-2,610	0,002	0,074
Utilization of health facilities	0,408	0,603	1,503
Family support	-2,736	0,001	0,065
Constant	2,197	0,12	8,998

medication will reduce the recurrence rate by 0.408 units. 5) The strength of the influence of the precipitating factors on the frequency of frequent recurrence is known from the value of Exp (B) obtained from the largest trigger factor (1), namely patient compliance with medication for 0.074, (2) family support at 0.065 and then (3) the utilization of health facilities at 1.503. The factor related to the utilization of the health facilities is a trigger factor with little influence. This is because the significance value is more than 0.05. The researcher did not include the community environmental factors because the significant values per sub-factor have a value that is close to 1.

DISCUSSION

A mental emergency is a condition that is characterized by a disturbance in a person's feelings, thoughts and behaviors that requires immediate attention and therapeutic action. This includes conditions related to anxiety, noise (agitation, aggression, violent behavior) and attempted suicide. This condition can occur outside or inside a health service building (Direktorat Bina Kesehatan Jiwa, 2015).

The patients who came to the Emergency ward had various types of mental illness. For each of them, there was a specific trigger factor which caused them to have their mental illness. The grouping of the mental disorders was based on the results of the 2013 Basic Health Research and divided into two parts, namely severe mental disorders (psychotic groups) and mild mental disorders which included all mental-

emotional disorders in the form of panic, anxiety, disturbance and so on. Schizophrenia is included in the group of severe mental disorders (Yusuf et al., 2017).

From the data analysis above, the results show that there were some triggers factors for recurrence in the mental illness patients. Out of the 41 respondents (58%), they broke the rules of drug compliance by throwing their drugs around the house or keeping the drugs in their pocket. This is in line with the study of Fitra (2013), who found that most of the patients had a low level of patient adherence. This is because there was a change in the patient's cognitive abilities which caused them to no longer be able to control themselves in all of their actions. They become unable to properly assess reality so then they are unable to take care of their own health. Therefore they need help from others(Fitra, M. S., Widodo, A., Zulaicha, 2013).

Furthermore, there were 35 respondents (49%) who stated that they rarely controlled for the health facilities. According to the research conducted by Aji (2010), he also found that the more there was an absence of the health services as received by the respondents or the more difficult it was to get to the health services, the more likely that recurrence occurs. The better and more affordable the available health services, the greater the chance of preventing recurrence(Aji Wijaya & Soewadi, 2010).

Moreover, a patient family tended to lock up patients at home (31%) rather than take care of them well and full of attention. This result was in

accordance with the research of Pratiwi, McEldowney, Richardson and He (2014) who found that the families always lock their patients in when the family members suffering from mental disorders have a relapse. The families always lock the patients in a room to prevent the patients from injuring the environment. They limit the patient movements to protect both the patients and their environment, and they fear the consequences of unexpected recurrence. Family behavior is based on a daily reality, attention paid to protecting the patients, and feeling anxious about the patient's condition. The way that the family members play a role in providing nursing care is needed by schizphrenics while at home. This shows that the higher the role of the family, the lower the recurrence(Pratiwi, Mceldowney, Richardson, & He, 2014).

The other factor of recurrence of patients in the community is that most people avoid when meeting patients (42%). The patient's family said that the people around them avoided them when meeting the patients because they feared that the patient would relapse when out socializing with the community. Some people avoided the patient due to their behavior in the community as the community often considered the patient's presence to be a nuisance. According to Yosep (2011), treatment is a process or method of healing a disorder caused by a source of interference. Therapeutic sources can be people in their environment or objects and activities that lead to healing. The psychological and physical environment is a condition that has a major influence on the healing process, especially for patients with mental disorders(Yosep, 2011).

The limitations of this research were 1.) That some of the families of the patients were not willing to be the subject of the research because of the condition of the patients who were experiencing recurrence in the Emergency Room of the Mental Hospital. They did not want to be interviewed, causing the researchers to look for other respondents who are willing. 2.) The researcher must interview and fill out the questionnaire instrument based on the patient's family response due to the limited time to care in the emergency room and the condition of the patient's family members who are anxious about the patient's condition, making it impossible for the patient's family to complete the questionnaire. 3.) Community environmental data obtained from family perceptions of people's attitudes would be better if it could be observed in the community around the patient.

CONCLUSION

Based on the research data that was collected, a conclusion can be drawn from the study which found that the characteristics of the patients who experienced a relapse in their mental disorders who come back to the Emergency Room of the Surakarta Mental Hospital were mostly patients aged 25-35 years, of the male sex, who were last educated in high school and who didn't work. Most of the recurrence frequency of the mental health patients were in the category 'rarely recur' and the rest were in the category 'often recur'. The description of the trigger factors can be used to conclude that the biggest trigger factor was the patient's compliance in taking medication, which showed that 58% of them threw their drugs around the house or that they kept the drugs in their pocket. The other recurrence factors included family support, in which 31% of the family preferred to lock the patient up at home. Furthermore, the utilization of the health facilities was also a recurrence factor, in which 49% of the respondents rarely went to the health facilities. The last factor was environmental factors, in which most (42%) were caused by a society that preferred to avoid meeting patients when they saw each other. This factor remained influential in recurrence even with a small value of influence.

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Original Research

Development of Detection Instrument Models for Mobility Impairment in The Older Adults Based on A Mobile Health Nursing Application in A Public Health Center

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ABSTRACT

Introduction: Mobility impairment is a problem in the older adults who have decreased in mobility as it may affect their daily activity. The development of a detection model to identify the problem of mobility impairment in older adults has become a solution that can increase the health care for older adults. This study aimed to develop a health detection instrument models using a mobile health nursing application to detect mobility impairment in older adults.

Methods: This study used action research through a purposive sampling method involving three nurses and twenty-seven cadres to perform the detection process of mobility impairment focused on one hundred and seventy-five older adults in three public health centers in two provinces using an m-health application.

Results: Based on direct observation and questionnaires addressed to the user of the m-health nursing application, 80% stated that the information contained in the mobile health nursing application was appropriate. In terms of speed, only 43.33% stated that the application worked fast, but overall, 66.67% of users stated that they were delighted with the application-based of the instrument model and that they were helped in detecting the mobility disorders that occurred in the older adults.

Conclusion: These applications can be developed into a model that can help nurses, older adults and their family to detect other older adult problems in addition to mobility problems like cognitive function etc.

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INTRODUCTION

Indonesia, as one of the countries with a high population growth rate for the older adult percentage, is estimated to be included in the top 5 countries with an older adult population of 18.1 million or around 9.6% of the total population. This number will continue to increase up to 28.8 million people or around 11.34% of the total population in Indonesia in 2020 (Kementerian Koordinator Bidang Kesejahteraan Rakyat RI, 2013).The increase in the number of older adult people will also have an impact on increasing the dependency ratio, where Indonesia

in 2008 was at the level of 0-17%. This number will continue to increase year to year. In the years 2020-2030, dependence between productive and non-productive ages will reach 44%(Department of Economic and Social Affairs (DESA) United Nations, 2013).

Health problems are problems that cannot be avoided by older adults. The health problems of the older adults are characterized by various complaints that are multi-pathologic, thus being caused by the multiple impairments suffered by older adults. This can have an impact on the occurrence of dysfunction, disability, disease and complications(Boehlke, 2015).

Based on the data from the Basic Health Research (Riskesdas) of the Ministry of Health of the Republic of Indonesia, it showed that the most common cause of death in older adult people over the age of 65 years was a stroke, with an occurrence of 20.6% in men and 24.4% in women(Kementerian Kesehatan RI, 2018).

The impairment of the musculoskeletal system of older adults is one of the problems faced by the older adults. Difficulty walking, stiffness in the lower legs and soreness are some of the problems that are often reported. Some of these complaints are associated with several joint degenerative diseases such as rheumatoid arthritis, polymyalgia rheumatic and osteoarthritis. The biggest problem of mobility experienced by the older adult majority is in the lower body functions, where the older adults have difficulties walking. The level of difficulty in walking is essential in measuring the health status of the older adults. The older adults who cannot walk are indicated as older adults with a poor health status and they have worse overall functions compared to those who do not experience mobility problems(Satariano et al., 2016).

Seeing the magnitude of the impact caused by the occurrence of impairments in older adults, the role of health workers is essential so then the process of impairment experienced by the older adults does not continue to worsen. The role of the health services starts from the level of the most basic health care, which is the primary health care level. It is indispensable at performing the early detection of problems. In Indonesia, efforts to detect impairment in older adults have not been made even at the level of primary care. Older adult services refer to a service that cannot be considered easy that is especially related to the function and role of the health center which aims to provide promotive and preventive services. The problems and organ function decline experienced by the older adults, until now, had not received special attention in the majority of health centers in Indonesia so the services provided by the health center are still complained about. The absence of a system that functions to detect the setbacks that occur in the older adults is an unusual concern for researchers, considering that the decline process experienced by the older adults will have a considerable impact on the older adults themselves. The occurrence of various organ dysfunctions will have an impact on the inability of older adults to function, as they may experience pain and various complications.

The purpose of this study is to develop a system of services and further health protection by using information systems and technology applications called m-health nursing. The prototype software that will be made is expected to assist the officials in the primary health center as primary health care is able to conduct the early detection of mobility impairment in older adults. The m-health nursing prototype is expected to be used independently by the public health center officers to detect older adult mobility problems directly in the community.

MATERIALS AND METHODS

This research was carried out to detect the deterioration problem of the musculoskeletal system that occurs in older adults by using an instrument developed based on several instruments that have been used in general. The development of these instruments is expected to assist the health workers at the primary service level such as nurses and cadres in order for them to carry out early detection, monitoring and alertness in the process of the mobility impairments experienced by the older adults. The development of a software prototype application to detect the mobility impairments experienced by the older adults requires several stages, where at each stage, an evaluation will be carried out to achieve the desired results.

In the first stage, the researchers conducted a preliminary study on the locations that were used as the research sites to carry out the process of observing and recording the activities carried out by the officers when providing services to the older adults at the public health center and posyandu. At this stage, the researcher aimed to look at the process that had been carried out by the public health center officers in detecting the problems of mobility experienced by the older adults such as moving disorders, walking disorders or the ability to perform their daily activities.

In the second stage, the researcher created an early detection system model by compiling instruments made by researchers based on the older adult health cards issued by the Indonesian Ministry of Health, ICF Checklist version 2.1a, the Older Adult Mobility Scale, and the Barthel Index Modified Instruments. In the third stage, a trial of the implementation of the compiled instrument model was conducted to measure the effectiveness of the instrument model in the effort to detection mobility impairments in older adults. In this stage, the instruments were analyzed for validity and reliability in order to assess the feasibility of the instruments.

The fourth stage, the implementation of the early detection instrument model, was evaluated to translate the findings that can be applied into the trial phase carried out in the next stage in the form of a software prototype. The fifth stage, after the software prototype was assessed to see if it was able to function to translate the information collected by the officers in the early detection of the mobility impairments experienced by the older adults, the prototype software will be applied in the mobile health nursing application system. In the sixth stage, the researcher evaluated the effectiveness of the use of the m-health nursing application by comparing the effectiveness and efficiency between the users.

The entire research process was carried out in two different provinces, namely Gamping 1 Health Center in the special region of Yogyakarta, Pondok Ranji Health Center and Serpong 1 Health Center located in the South Tangerang City area. The sample in the study consisted of three nurses and twenty-seven

Table 1. Validity and reliability test results of the m-health nursing instrument questionnaire

Variable	Item	r-value (nurse)	r-value (cadres)
History of falls	Question 1	0.904	0.972
	Question 2	0.990	0.998
	Alpha-Cronbach	0.667	0.686
History of the disease	Question 1	0.917	0.807
	Question 2	0.988	0.974
	Alpha-Cronbach	0.720	0.608
History of smoking	Question 1	0.869	0.944
	Question 2	0.999	0.975
	Question 3	0.999	0.966
	Question 4	0.999	0.657
	Alpha-Cronbach	0.941	0.856
Rest pattern	Question 1	0.973	0.858
	Question 2	0.995	0.995
	Question 3	0.998	0.995
	Alpha-Cronbach	0.882	0.837
Exercise pattern	Question 1	0.885	0.813
	Question 2	0.704	0.791
	Question 3	0.737	0.769
	Question 4	0.925	0.874
	Question 5	0.674	0.806
	Question 6	0.566	0.806
	Alpha-Cronbach	0.781	0.867
Current complaints	Question 1	0.972	0.997
	Question 2	0.828	0.788
	Question 3	0.683	0.841
	Question 5	0.722	0.476
	Question 6	0.811	0.936
	Question 7	0.976	0.996
	Alpha-Cronbach	0.815	0.776
Mobility assessment on bed	Question 1	0.788	0.738
	Question 2	0.79	0.74
	Question 3	0.867	0.817
	Question 4	0.896	0.846
	Question 5	0.885	0.835
	Question 6	0.58	0.53
	Alpha-Cronbach	0.685	0.612
Mobility assessment while standing	Question 1	0.763	0.737
	Question 2	0.763	0.682
	Question 3	0.763	0.694
	Question 4	0.999	0.998
	Question 5	0.923	0.895
	Question 6	0.937	0.885
	Question 7	0.939	0.889
	Alpha-Cronbach	0.884	0.865
Mobility assessment in walk	Question 1	0.886	0.873
	Question 2	0.803	0.802
	Question 3	0.887	0.987
	Question 4	0.877	0.988
	Alpha-Cronbach	0.689	0.792
Activity daily living assessment	Question 1	0.761	0.892
	Question 2	0.701	0.892
	Question 3	0.701	668
	Question 4	0.701	0.892
	Question 5	0.701	0.892
	Question 6	0.701	0.892
	Question 7	0.987	0.995
	Question 8	0.974	0.988
	Question 9	0.958	0.955
	Alpha-Cronbach	0.774	0.841

posyandu cadres who were responsible for implementing the older adult program in the community. The sample in the study identified mobility impairments using m-health nursing for one hundred seventy-five older adults in the community.

RESULTS

Based on the results of the validity and reliability tests conducted as many as two times, the tests carried out show that all items in the instrument applied to the

Table 2. User evaluation of the ability of the m-health nursing application

Aspects evaluated	Nurse %	Cadre %
M-health nursing system:		
Not in line with expectations	0	7
Less in line with expectations	33	34
In line with expectations	67	52
Exceed expectations	0	7
Information content		
Not in line with expectations	0	4
Less in line with expectations	67	11
In line with expectations	0	81
Exceed expectations	33	4
Accuracy		
Not in line with expectations	0	0
Less in line with expectations	33	4
In line with expectations	67	92
Exceed expectations	0	4
Form		
Not in line with expectations	0	0
Less in line with expectations	67	19
In line with expectations	33	77
Exceed expectations	0	4
Ease of use		
Not in line with expectations	0	4
Less in line with expectations	33	15
In line with expectations	67	59
Exceed expectations	0	22
Timeliness		
Not in line with expectations	0	0
Less in line with expectations	33	15
In line with expectations	67	59
Exceed expectations	0	26
The speed of the system		
Not in line with expectations	67	22
Less in line with expectations	0	8
In line with expectations	33	59
Exceed expectations	0	11

m-health nursing application meet the requirements. The development of instrument models that have been tested for validity and reliability in software prototype m-health nursing has been carried out by involving the programmer in the data flow diagram (DFD) created by the researcher. Once DFD is completed by the researcher, the researcher then scores for each question that will be displayed on the software. This scoring functions is so then the researchers and programmers can summarize the overall results of the observations and the filling in of the nurses and cadres of the medical history, lifestyle, current health conditions and assessment of mobility in older adults. From the total 48 items that will be presented in m-health nursing, only 11 items were used as the basis for scoring for the m-health nursing application, while the 37 other items were additional information for the health workers.

The use of m-health applications in the medical world is not a new thing. Some countries have even made use of this technology for a long time. The research conducted by Moore, Holaday, Meehan, & Watt (2015) shows that the use of m-health technology is one of the most promising new advances in the field of nursing. The effectiveness of the use of technology engaged in health, in addition to

being used to collect data and information about the patients, is that it can now also be used to provide timely and appropriate interventions that are interactive and adaptive so then efforts to deal with one's health condition can be made more quickly. In this study, the 66.67% level of satisfaction of the users after using the m-health nursing system shows that this m-health-based mobility impairment detection model has exceeded user expectations. The satisfaction of these users is not without reason. Because the evaluation of the M-Health nursing system is related to information content, accuracy, format, convenience, speed, and renewability; most of it has been adjusted to the user's input during the preparation of the instrument. Some things are perceived as lesser by the user because there is still some feedback needed from the users to further develop it. Some of these inputs, among others, include that this application has not usually applied to the IOS operating system, the addition of client photos as an identifier and the client's location positioning using a global positioning system (GPS). Based on this study, we propose a new model of Posyandu services that combines the concept of health center program services with an application following m-health nursing.

DISCUSSION

The older adult health program is a development program in the public health center area where the health services not only provide services related to curative efforts but where they also focus on promotive and preventive efforts. This shows that the rate of development of health centers that provide older adults health services and the formation of older adults groups is not in line with expectations with an even distribution(Kemenkes RI, 2015). The mechanism for organizing the older adults posyandu itself is done by collecting the older adults into one particular place to check their health. Based on previous studies, it was shown that many older adult people did not want to come to the posyandu because of the location being far from their homes. Ideally, health workers will go to the older adult people to check their health, especially those who do not go to the older adult posyandu, but they come back again because of the limited number of health workers in the public health center and the uneven distribution of older adult people, making this impossible(Syahid, 2015). Based on the observations within preliminary studies conducted at three public health center, it was found that the services provided at the posyandu included only the measurements of height and weight, in addition to blood pressure checks and noting the general complaints of the older adults. It shows that the treatment of older adults in Indonesia is still focused on treatment; there are no preventive health measures and a comprehensive promotion for the older adults to use to keep themselves productive and happy. Another problem found is that the services of the older adults' posyandu are only done once a month; this is due to the limited human and material resources in the services of the posyandu itself.

With increasing age, functional disorders will increase as indicated by disability. Basic Health Research reported in 2013 that mild disability is measured by the ability to carry out daily living activities or Activity of Daily Living (ADL) and that this is experienced by 51% of older adults. According to the phenomenon, older adult health services should prioritize promotion and prevention with the support of quality curative and rehabilitative services. This is because the efforts and programs that have been provided by the Indonesian government are not enough to deal with the problems of the older adults related to immobilization. One program in the life cycle approach system is older adult health by screening or early detection. The implementation of early detection related to the older adults is considered to be capable of maintaining the health condition of older adults and furthermore it is expected to prevent the occurrence of disease or further complications of illness in the older adults.

The use of information technology in the present condition is something that cannot be avoided in the development of a detection system. The research conducted by Wang & Bai, (2013) shows that the application of technology has begun to be able to identify the risk of older adults falling. Research conducted by Aran, Sanchez-Cortes, Do & Gatica-Perez (2016) developed the use of computerized applications to build smart homes that aim to improve the quality of everyday life for older adults. Research conducted by Hou, Lu, Liang, Chen & Xu (2016) developed a system that can monitor the daily lives of older adults. This system can detect and activate alarms when the parents fall. This system can detect the ability to balance in older adults to prevent them from becoming senile. Based on several models that have been developed, it shows that prevention or screening efforts with a notification system against
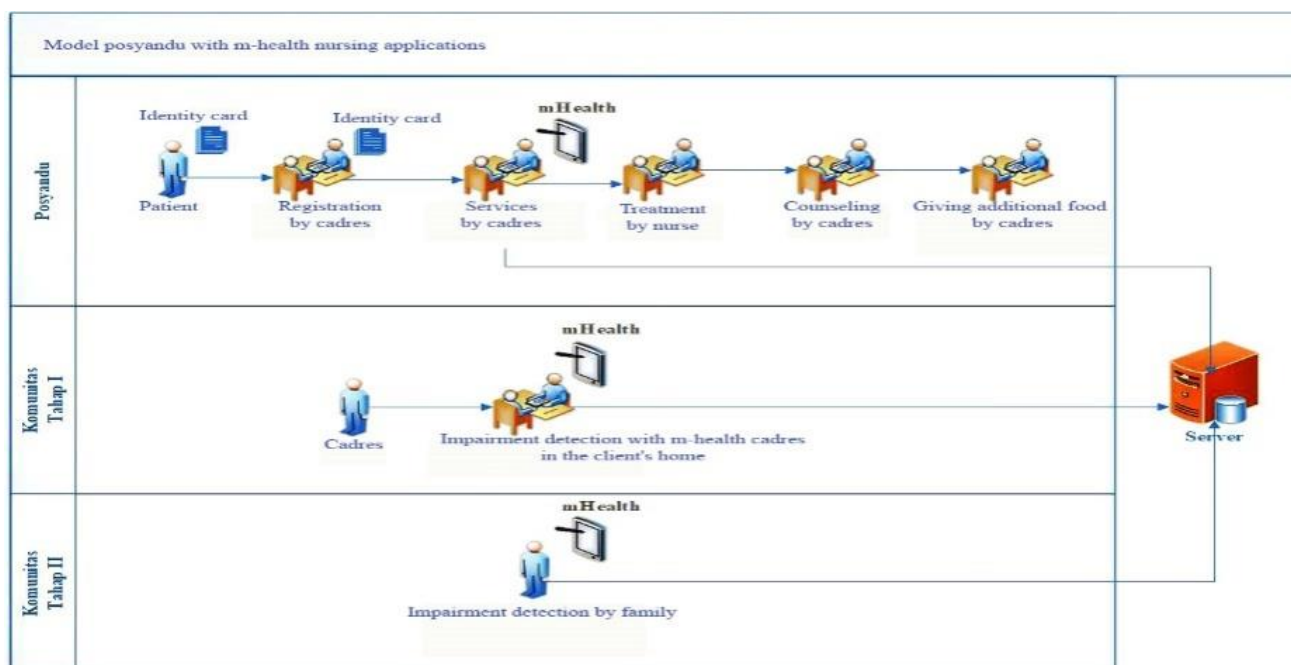

Figure 1. Model posyandu with m-health nursing applications

the possibility of risks to the older adults are a significant concern. The development of this model is the basis for researchers to develop other detection models that aim to be able to detect mobility problems in older adults, which will have an impact on the possibility of other risks in older adult decreasing, including the risk of falling. The development of the detection model of mobility impairments conducted by the researchers aims to enable older adult people to recognize mobility problems that the families and older adults may not be aware of themselves.

The development of the research instruments was carried out by adopting several instruments. After carrying out the development, a draft instrument for mobility impairment was produced in the form of a manual instrument that was then discussed with the puskesmas officers. After the discussion, the researchers made changes to the instrument by including items that explored the ability of the older adults in carrying out their daily movements and activities. To facilitate data collection in conducting the trial instruments made, the researchers collected data online with the help of a Google form. Based on the results of the preparation and trial of several instruments used in general to be able to detect problems with mobility impairments in older adults, the results of the validity and reliability tests are as follows in Table 1.

After the m-health nursing software prototype was completed and could be appropriately used, the researchers conducted socialization and education focused on the nurses and cadres who will use the m-health nursing application. Based on the results of the training and the use of m-health nursing to detect mobility impairments as carried out by the posyandu nurses and cadres on one hundred seventy-five older adult people, the researchers evaluated the users. This evaluation aimed to determine the function of the m-health nursing prototype to help in the early detection of mobility impairments experienced by older adults and the ease of the data presented by the nursing m-health prototype will be used to be easily understood and operationalized when used. The evaluation was conducted using the method of end-user computing satisfaction.

Apart from user input, another limitation felt by the researchers was that the application has not been able to thoroughly identify all impairment problems faced by the older adults. Further development is needed concerning the content and interface aspects of this application. The researchers also realize that this application still has to be tested more extensively to be able to see the various shortcomings that exist and so then it can also accommodate the various needs desired by the users when detecting impairment problems in older adults.

CONCLUSION

The use of mobile technology in the detection of mobility impairment is a choice of model that can be applied in a variety of situations including through mechanisms and the utilization of the cadres' role directly in the community. Prototype m-health nursing can help the nurses and cadres in detecting older adult mobility impairment faster, allowing them to be able to provide recommendations for the nurse and cadres in an intervention for older adults. Based on the results of this study, it showed that m-health nursing applications can be used as one method of detection that can be developed to maintain and improve the health of older adult people in Indonesia. This application is expected to be a basis for the development of other application models that can be used to detect various health problems for older adults. The development of nursing mHealth applications is expected to participate in the national health insurance program so then efforts to improve the health status of the older adults can be more comprehensive and integrated into the national health insurance system to help reduce the health budget nationally.

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Original Research

The Effect of Ergonomic Gymnastics on Joint Pain in Community-Dwelling Elderly

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ABSTRACT

Background: The aging process that occurs in the elderly is characterized by a decreasing immune system and physical impairment. The most common complaint is joint pain. The aim was to determine the effect of ergonomic gymnastics on the elderly who experienced joint pain.

Method: The samples totaled 110 respondents who had joint pain at Krembangan-Surabaya obtained through the total sampling technique. The data was collected through observation sheets with one group pre-post-test design, and it was analyzed through the Wilcoxon text. The result showed that after 9 sessions of 60 minutes each for two months found that ergonomic gymnastics could influence the reduction of joint pain with a significance level of 0.00 (p<0.05).

Discussion: There were a decreasing number of respondents that felt moderate pain (82 to 44) and this automatically meant that there was an increasing number of mild pain respondents (28 to 66).

Conclusion: Exercising regularly and with the correct methods could provide an excellent benefit to maintain bodily health, especially to reduce joint pain in the elderly. It is expected that all health care providers in primary health services or in a private clinics should know and be able to conduct ergonomic gymnastics using the correct methods.

INTRODUCTION

The increasing elderly population needs to get attention because the elderly group is a high-risk group that experiences an increase of various health problems, especially degenerative diseases(RI, 2006).The emergence of various diseases increases because of someone's age and because of that the body's immune system getting slightly down, that's why our body easily gets ill, becomes fatigued and can't do heavier or regular activity anymore. Old age is a natural process that cannot be avoided. The aging process that occurs in the elderly is characterized by biological deterioration that is seen by the symptoms of physical deterioration, among others including the skin begins to relax, wrinkles, gray hair, teeth begin to fall out, hearing and sight loss, and being more easily tired.

One disease that often occurs in old age is joint pain. Joint pain is a result of bone calcification or it can be due to other diseases (Muttaqin, 2010). Joint disorders in general provide symptoms in the form of pain that can disturb the patient, so the patients cannot work or move comfortably. Some of the factors that cause joint pain include the mechanisms of immunity, metabolic factors, age, excessive and repeated joint burden, genetic factors and environmental trigger factors (Uliya, S., Soempeno, B., 2007). Elderly people who experience joint pain disorders should exercise across a range of active motion so then there is no decrease in the range of motion in the elderly or no decrease in their muscle strength(Stanley, M & Beare, 2010). Based on this problem, the researcher wanted to find some other ways to increase the independence of the elderly people by reducing the number of joint pain.

One of the exercises for active motion is by doing ergonomic exercises. Ergonomic gymnastics is one method that is practical and effective at maintaining

bodily health. Ergonomic gymnastic movements are movements that are in accordance with the rules of creation of the body and this movement is like a prayer movement. Ergonomic gymnastics can directly open, cleanse and activate all body systems such as the cardiovascular, urinary and reproductive systems (Liu, Wan, Zhou, Feng, & Shang, 2017). Ergonomic gymnastics consists of movements that resemble prayer movements so then the elderly can easily apply these gymnastic movements in their daily life (Gerais, 2017). Based on the preliminary study at the Wredha Mojopahit orphanage, Mojokerto Regency, it was obtained that 80 elderly individuals had joint disease (joint pain) by around 70%.

There are several service researchers at the Krembangan Health Center that are concerned with the elderly people who have joint pain. Based on the research conducted by Wratsongko, there is the effect of ergonomic exercise on pain complaints referring to the increasing range of motion in elderly people who have experience of rheumatic pain at the Bhakti Dharma in Surakarta Hospital(Wratsongko, 2010). According to the World Health Organization (WHO), they reported that 20% of the world's population is affected by joint pain. From the study on the socio-economic and health conditions of the elderly carried out by the National Commission on Elderly in 10 provinces in 2006, it became known that the majority of illnesses suffered by the elderly were 69.39% for joint pain, after which came hypertension, anemia, and cataracts (Walker, Sibley, Carter, & Hurley, 2017). According to the District Health Office data in 2010, the number of elderly people suffering from joint disease was 2.3%. Based on the results of a recent study about the prevalence of joint pain in Indonesia, it has reached 23.6% to 31.3%. Based on health diagnosis and symptoms, the national prevalence of joint disease is 30.3%, and the prevalence of joint disease in East Java specifically is 30.9% (Zeng, Q.Y., Chen, R., Darmawan, 2008). Therefore the authors are interested in conducting research on the effect of ergonomic exercise on the elderly who experience joint pain in the Krembangan Health Center for the elderly.

MATERIALS AND METHODS

Research Design, Population, Sample, and Variables

The design used was one group pre-post test design. The population of this research was all of the elderly that visited the Primary Heath Service regularly for routine activities or to check their health condition. The sample obtained was 110 respondents through the total sampling technique. This research was conducted at the elderly care service in Krembangan (Integrated health service for an elderly) from September 3rd - October 29th, 2018. The inclusion criteria in this research were as follows: 1) elderly patients with an average age < 60 years old and >71 years old, 2) all genders (Male and Female), 3) elderly with moderate and mild pain, 4) all levels of education

(from elementary up until a Bachelor's degree), 5) all working statuses (private/public employee or retired), 6) they were able to communicate verbally well, and they were able to read, and write and 7) they were willing to participate and had a strong commitment to join us for two months. The exclusion criteria were 1) the elderly who had severe pain and 2) the elderly who visited the elderly care service centre irregularly. The independent variable was the application of ergonomic gymnastics and the dependent variable was joint pain.

Instruments

The research used a leaflet module as the media that was given to the respondents. The module consisted of information about the aging process, diet, common behaviors for the elderly, bein elderly with regular activity or elderly with less activity, and elderly nutrition status (underweight, normal, overweight, obese). This was in addition to simple instructions about ergonomic exercise. Other instruments that were used included an observation sheet that contained how long the elderly had to be able to follow the instructions and VDS (*verbal descriptor scale*) for measuring the joint pain scale(Walker et al., 2017), which was modified and translated into the Indonesian language. The respondents were asked to show how severe their joint pain was on a 1-10 scale and this scale indicated mild pain, moderate pain, and severe or uncontrolled pain. After we finished the interviews and the observation, we demonstrated ergonomic exercise, and asked them to follow it step by step.

Research Procedures and Analysis

This research was carried out in collaboration with Krembangan, Surabaya Primary Health Service in order to increase the knowledge of the elderly people surrounding the public health service and to encourage the elderly to be more active when visiting through empowerment and health education. The research passed the ethical review and obtained an Ethical Approval certificate, which was No. 197/STIKesWB/PPM/2018 issued by the Health Research Ethics Committee of Institute of Health Science for the Nursing department, William Booth Surabaya in East Java Province, Indonesia. The research was conducted with one treatment group by providing some leaflets and demonstrate ergonomic exercises with some observations and interviews (questions about their pain scale) within a module for 9 meetings across 2 months, which were conducted once a week for 60 minutes, with an evaluation before and after the treatment (pre-post test design).The first week was the introduction to the programs, and an ergonomic gymnastics demonstration and leaflet were given to the respondents. Weeks 2 - 8 provided the health education, explored the elderly comprehension of being elderly and all the related problems, ergonomic gymnastics were demonstrated and there was an observation of the pain scale. Week

9 was monitoring evaluation and ergonomic gymnastic demonstration. Data were analyzed by using IBM SPSS Statistic 24. The statistical analysis used the Wilcoxon Signed Rank Test. The confidence interval was 100% with p = 0.00.

RESULTS

Characteristics of the respondents as shown in Table 1. The majority of the respondents were aged 61-70 years, female, educated to elementary level and un-working/retired. From the data, we can assume that this is typical of the elderly people in Krembangan; this may influence how their thinking and interpretation about pain. All of the participants - 110 elderly in total - were very pleasant toward the program.

It can be seen that the results of the research at elderly care service in Krembangan Surabaya before the ergonomic exercise for all of the elderly respondents was that those in mild pain totaled 28 people and that those with moderate pain totaled 82 people. After the implementation of ergonomic gymnastics, mild pain was experienced by 66 people and moderate pain was experienced by 44 people. The data was analyzed using the Wilcoxon statistical test with a significance degree of $p < 0.05$ and a significance level of p = 0.00. Thus, H1 was accepted, where the conclusion was that there is some effect from doing ergonomic gymnastics on the elderly who experienced joint pain at the elderly care service in Krembangan, Surabaya.

DISCUSSION

The VDS scale with observations and an interview approach explains the basic principles of the prevention of joint pain in the elderly(Lincoln, Radford, Game, & Jeffcoate, 2008) to prevent a higher risk of injury. It is highly dependent on the elderly people by giving them solutions and interventions focused on reducing joint pain by providing integrated health education and ergonomic gymnastics demonstration(Schaper, Van Netten, Apelqvist, Lipsky, & Bakker, 2017). The aging process will cause anatomical, physiological, and biochemical changes in the body so this affect the body's functions and abilities as a whole (Primana, 2006). All systems in the body experience setbacks, including the musculoskeletal system, in which the elderly often experience rheumatism, gout, joint pain and lumbar pain (Pudjiastuti, S.S., & Utomo, 2003). One of the other factors in the musculoskeletal system is the bone loss in terms of density and the more fragile knee and wrist movements. The wrist and finger movements become limited, the joints enlarge and become stiff, the tendons constrict, and they experience sclerosis and an atrophy of muscle fibers (muscle fibers shrinking). Movement becomes sluggish, as the muscles become cramped and tremor. A common disease that often occurs in old age is joint pain. There was evidence of this happening when the

Table 1. Characteristics of the Respondents

Characteristics	Treatment Group	
	n	%
Age		
< 60year	8	7.3
61-70 year	79	71.8
> 71 year	23	20.9
Gender		
Male	26	23.6
Female	84	76.4
Level of Education		
Elementary	34	30.9
Junior High	10	9.09
Senior High	28	25.4
Diploma	25	22.7
Bachelor	13	11.9
Working Status		
Yes (Private)	14	12.7
Yes (Public)	3	2.7
No	93	84.6

Table 2. Effect of Ergonomic Gymnastics on Joint Pain in the Elderly

Variable	Pre		Post	
Joint Pain	n	(%)	n	(%)
Mild Pain	28	26	66	60
Moderate Pain	82	74	44	40
Total	110	100	110	100
Statistic test results - Wilcoxon p=0				

researcher engaged in the the observation-interview with the respondent to look or find out the scale of the pain in the elderly at the elderly care service focused on in Krembangan-Surabaya. When the researchers asked the respondents questions, mostly the elderly people answered as to when they had joint pain. Ordinarily, they just let it go and rested for a while, minimizing their activity.

The respondents who were younger than 60 years old totaled 8 people (7%), those aged 61-70 years old totaled 79 people (72%) and those who were more than 71 years old totaled 23 people (20%). Almost 8% of people aged 50 years and over had complaints about their joints, especially rheumatic pain and aches. All of the elderly people often suffered from pain in the joints. This is because the musculoskeletal system decreases in its functions due to changes in the collagen. The impact of this change decreases joint flexibility in addition to the erosion of the joint capsules resulting in decreased joint movement and pain(Albargawi, Snethen, Gannass, & Kelber, 2017).

The majority gender in this study was mostly female, amounting to 84 people (76%). Women are susceptible to severe osteoarthritis caused by a decrease in the estrogen hormone during menopause. Hormones play a role in the loss of bone mass which results in joint pain sensations in the elderly(Sanou et al., 2018). Other research shows that the incidence rate of joint pain is greater in women, which is caused by a dramatic decrease in estrogen hormone levels. Meanwhile in men, the hormone estrogen decreases very slowly. The decrease in the hormone estrogen plays an important role in maintaining bones. The protection from pain also diminishes as women get

older. In women, the hips are more shaped so the buildup of fat in the hips increases the burden of the joints and muscles in the legs. This causes joint pain, while men have a straighter posture and it is the male tendency to maintain an ideal posture(Vivi Meliana Sitinjak, Maria Fudji Hastuti, 2016).

For level of education, 34 of the elderly were elementary school graduates (30%), 1 graduated junior high school (10%), 3 were senior high school graduates (25%), 25 (22.7%) had a diploma and 13 (12%) had an undergraduate program background. Education status affects the opportunity to obtain information about the management of disease. Elderly people who have a low level of knowledge can influence the limited information available when getting the knowledge to prevent the disease, to protect themselves, and on how to manage their own pain to improve their health status. This is what causes the elderly who experience joint pain to be supportive of the daily activities that are needed [16]. The level of education of a person is very influential on changes in their attitude and the behaviors related to healthy living. Higher levels of education will make it easier for a person or community to absorb information and to implement it in daily behavior and lifestyle, especially in terms of health. Based on the information obtained by the researchers through questions and answers with the respondents, the respondents said that they always tried to maintain or lessen the level of their joint pain by exercising.

Looking into working status found that most of the elderly people were not working, although some of them were house-wives, totaling as many as 93 people (85%) out of the 110 respondents. According to (Muttaqin, 2010), activity will also activate the immune system and prevent inflammation in the joints. One of the factors that impacts on joint pain in the elderly is physical exercise, as it trains the body to move which will have an impact on the production of synovial fluid which functions as a lubricant and prevents friction in the joints. This shows that if the elderly do not carry out activities such as exercise or gymnastics, then the lubricant in the joint will decrease and cause stiffness. Conversely, if the elderly often exercise, then the synovial fluid will increase and reduce the risk of injury, which will prevent joint pain in the elderly. It is very important to maintain health by doing bodily exercises safely to avoid injury. At the time that the aging process happens, their physical activity level will be decreasing due to physical deterioration and this could promote bone calcification in the long term if there are no interventions. Exercise is very beneficial for improving blood circulation, losing weight and producing synovial fluid to reduce joint pain in the elderly.

Physical activity is included in research such as ergonomic gymnastics to maintain blood circulation and to prevent bone contracture. Maintaining physical activity will increasing the sensitivity of the insulin receptors in the active muscle(Vivi Meliana Sitinjak, Maria Fudji Hastuti, 2016). The main

problem that occurs in the elderly is the occurrence of joint pain, which is caused by the aging process and the loss of synovial fluid from the joint. This means that the bones rub easily against each other. When a person performs physical activity, there will be a muscle contraction which will eventually make it easier for glucose to enter the cell(Jankowska-Polaska et al., 2015). This means that when a person engages n physical activity, it will reduce their insulin resistance and eventually reduce blood sugar levels. There are other factors that influence blood sugar levels. In addition to SGFDP implementation, there are several things that cause blood sugar to rise, namely a lack of exercise, an increased amount of food consumed, increased stress and emotional factors, weight gain and age, and the impact of treatment from drugs, such as steroids(Iljaž, Brodnik, Zrimec, & Cukjati, 2017).

The driving factor is that obtained from the closest person and social support given to the individual such as their family, friends and teachers, and especially in this case, the health workers who can strengthen the behavior of the elderly. With the support provided by their closest people, it is expected to encourage behavior change(Nursalam, 2016). In the prevention of joint pain in the elderly, ergonomic gymnastics can be one of the solutions that consist of the identification of the risk of joint pain. Routine examinations of their exercise and giving health education to the patients about diet and all of the problems related to being elderly will increase the meaning of life of an elderly person.

CONCLUSION

Ergonomic exercises can cause a decrease in joint pain in the elderly in the care service provided in Krembangan Surabaya. Elderly people experience joint pain due to their synovial fluid being reduced due to the aging process. Sharing information and the attention given by the nurses with regular meetings can increase their knowledge and cause behavior changes in the elderly to encourage them to take positive actions. This proved that ergonomic gymnastic can prevent or reduce joint pain in the elderly by doing this type of exercise regularly. Family with elderly members inside should maintain a good lifestyle including good food, a balanced diet, and routine exercise and activities. The next researchers should be able to improve the treatment of joint pain in the elderly based on their culture and by evaluating the qualitative data.

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Original Research

A Case Control Study on Physical Activity and Body Mass Index Associated with Hemorrhoids

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ABSTRACT

Introduction: Body mass index (BMI) and physical activity are the controversial risk factors that cause hemorrhoids. This study was conducted to determine the association between body mass index and physical activity.

Methods: This was a case-control study which involved two hundred and two patients using convenience sampling. They had to answer a questionnaire consisting of the International Physical Activity Questionnaire (IPAQ) which monitored their physical activity and their BMI was also measured. For the descriptive analysis, Chi square and an odd ratio were carried out.

Results: There was a significant association between age and hemorrhoids (p=0.02), in which the patients who were younger than 50 years old were more likely to have hemorrhoids compared to those who were older than 50 years old (OR=2.268, 95%CI: 1.107-4.630). For the risk estimation calculation, the Chinese individuals were found to have a higher risk compared to non-Chinese individuals (OR=2.056, 95% CI: 1.174-3.601). BMI was proven to be significantly associated with hemorrhoids (p=0.043). Physical activities were found to not be statistically significant (p=0.209). Those with a low and moderate physical activity level were 1.24 times more likely to have hemorrhoids compared to those with a high level of physical activity (OR=1.243, 95%CI: 0.697-2.217). The confidence interval was between 0.697 and 2.217, therefore it was not statistically significant.

Conclusion: Physical activity was not associated with the hemorrhoids. However, it was shown that good physical activity could help to regulate bowel function and therefore, the occurrence of hemorrhoids would be less likely. BMI was significantly associated with hemorrhoids.

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INTRODUCTION

Hemorrhoids are defined as enlarged congested patches of mucosa and submucosa of the anal cushions which can further be divided into external and internal hemorrhoids. Hemorrhoids are a very common benign anorectal disease (Lohsiriwat, 2015) and a common anorectal problem (Jay et al., 2019). This condition can be an acute or chronic in which can be categorized into four degrees on the basis of the history given by the patient (Ratto et al., 2011).

Hemorrhoids are a common condition, especially in Western countries. About half of the population over 40 years of age suffer from the disease, from mild through to a more severe form (Dimmer, Martin, Reeves, & Sullivan, 1996). A statistical value for Malaysia and hemorrhoids was not found. However, a previous study showed the risk factors which consisted of obesity, irregular bowel habits (either constipation or diarrhea), s lack of exercise, a low fiber diet, increase intra-abdominal pressure due to prolonged straining, pregnancy, position during defecation, prolonged sitting or standing, and aging (Zeinab, El-Sayed, & Taha, 2011). The current situation in Malaysia is that there is an increase of

people who are overweight and obese among the population because of the lifestyle of having a low level of physical activity and their eating preferences (Lee, Kim, Kang, Shin, & Song, 2014). Most of the hemorrhoid cases preferred to be self-medicated rather than seeking hospital treatment or management (Lohsiriwat, 2012). Thus, the prevalence of hemorrhoids remains unknown (Jacobs, 2018).

Even though the mechanism of obesity causing hemorrhoids is controversial, there have been several hypotheses formulated. First, it is believed to cause an increase in the intra-abdominal pressure due to the high body weight and visceral fats in which are thought to provoke the venous congestion of the distal rectum. Obesity will induce the release of inflammatory cytokines and acute phase proteins which will eventually activate the innate immune system and affect metabolic homeostasis, which contributes to the formation of hemorrhoids (Lee et al., 2014). It was proven by two studies conducted in Australia and Korea that there was an association between obesity and hemorrhoid (Lee et al., 2014; Riss et al., 2012). However, there was a study in which contradict showed that, there was no association of obesity and hemorrhoid (Peery et al., 2015).

Normally, people classify a person with a high BMI as having a low physical activity level. Nonetheless, people who are overweight or obese with an appropriate BMI will always encounter cardiovascular or metabolic disease where the main culprit is caused by low physical activity (Gang et al., 2005). A previous study proved that a sedentary lifestyle or person with a low physical activity level was found to be aligned with a low risk of developing hemorrhoids (Jacobs, 2018), whereas several studies showed that there was no association between physical activity and the risk of getting hemorrhoids (Lee et al., 2014). In relation to that, the current study is interested in finding out if there is a relation between BMI and physical activity and its effect on hemorrhoids to determine the association between the level of physical activity with the occurrence rate of hemorrhoids.

MATERIALS AND METHODS

This was a case-control study design with a convenience sampling technique approach. The study setting was at the Surgery Clinic Universiti Kebangsaan Malaysia Medical Centre (UKMMC). This study used the sample size calculation formula of case control to calculate the estimated sample size. The sample required was two hundred and two patients for both groups; hemorrhoids and non-hemorrhoids. They were invited and consented to answering a questionnaire regarding their physical activity using a standardized International Physical Activity Questionnaire (IPAQ) (Booth, 2000). Their BMI was measured and classified based on the Malaysian Clinical Practice Guideline on the Management of Obesity (Lim et al., 2000). Ethical approval was

acquired from the ethical committee board UKMMC (UKM PPI/111/8/JEP-2016-172).

Body Mass Index was calculated using the following formula: weight in kilograms divided by height in meters squared. The results were classified based on the Malaysian Clinical Practice Guidelines (CPG) on the Management of Obesity (Lim et al., 2000). The weight of the participants was measured using a weighing machine where the participants were required to remove their outer garments (jacket, coat, etc), shoes and any heavy things on their body (wallet, phone, etc). For the measurement of height, the stadiometer in the clinic was used. The respondents were given 15 minutes to complete the questionnaires. The results were classified under 3 categories; low, moderate and high. Low (category 1) was for the individuals who did not meet the criteria for categories 2 or 3, who were thus considered to be inactive. The moderate (category 2) was for any one of the following 3 criteria, which was 3 or more days of vigorous activity for at least 20 minutes per day, 5 or more days of moderate-intensity activity or walking for at least 30 minutes per day or 5 or more days of any combination of walking. High (category 3) was for any one of the following two criteria, which was a vigorous-intensity activity on at least three days or more days in any combination of walking, moderate-intensity or vigorous intensity activities.

The statistical analysis was conducted using IBM SPSS software version 20.0 (SPSS Inc., Chicago, IL). This study categorized the value of interest into the categorical variables which included gender, ethnicity, body mass index and physical activity, whereas age was the continuous variable. Chi Square was used to analyze the categorical variables. The mean or median was determined from the inter-quartile range for both parametric and non-parametric variables. An independent student t-test was used to test for differences in the analyzed parametric parameters between the groups. The Odd Ratio was used to allow for a comparison of the hemorrhoid patients relative to the control/placebo of non-hemorrhoid patients. A p-value of less than 0.05 for the two-tailed test was to be considered significant. Bar charts were used for each variable of interest to further explore them and to have a clearer view of the results.

RESULTS

Upon the questionnaire being given, the study had a total number of respondents consisting of (male=108, female=94) between 101 patients with hemorrhoids and 101 patients without hemorrhoids. The mean age of the respondents was 57.52±15.15 years for hemorrhoids and 62.33±13.86 years for those without hemorrhoids. There was a significant association between age and hemorrhoids (p=0.02), whereby the patients who were younger 50 years old were more likely to have hemorrhoids compared to the patients who were older than 50 years old (OR=2.268, 95%CI: 1.107-4.630). The Pearson Chi-

Table 1. Background of Hemorrhoids and without Hemorrhoids

Characteristic	Hemorrhoids		Without hemorrhoids		Total	P value
	n	5	n	%		
Gender						
Male	52	48.1	56	51.9	108	0.573
Female	49	52.1	45	47.9	94	
Age						
Low Age (<50 years old)	27	65.9	14	34.1	41	0.023
High Age (≥50 years old)	74	46.0	87	54.0	161	
Ethnicity						
Malay	37	40.2	55	59.8	92	
Chinese	59	59.0	41	41.0	100	0.049*
Indian	4	44.4	5	55.6	9	
Others	1	100.0	0	0	1	
Chinese	59	59.0	41	41.0	100	0.011
Non-Chinese	42	41.2	60	58.8	102	
Body Mass Index (BMI)						
Underweight	3	21.4	11	78.6	14	
Normal	32	48.5	34	51.5	66	0.043
Overweight	45	60.0	30	40.0	75	
Obese	21	44.7	26	55.3	47	
Obese	66	54.1	56	45.9	122	0.15
Non-obese	35	43.8	45	56.3	80	
Physical Activity Class						
Low	25	62.5	15	37.5	40	
Moderate	43	47.3	48	52.7	91	0.209
High	33	46.5	38	53.5	71	

0.049*= significant association, but 50% of cells have an expected count less than 5, therefore the result was not taken as Chi square cannot be used.

Square Test was used (Table 1 & Table 2). For ethnicity, the numbers of respondents according to race was tabulated in Figure 1. Following the risk estimation calculation, those of Chinese ethnicity were found to have a higher risk compared to non-Chinese (OR=2.056, 95%CI: 1.174-3.601) (Table 2).

There was a significant association between BMI and hemorrhoids (p<0.05). Underweight individuals were less likely to have hemorrhoids compared to non-underweight people (OR=0.250 95%CI 0.068-0.927) (Table 2). Being of a non-underweight status was therefore concluded as the total of the normal weight, overweight and obese respondents.

Physical activity was found to not be statistically significant (p=0.209) (Table 1). Since it was p>0.05, there was no significant association between the level of physical activity and hemorrhoids. Those with low and moderate physical activity (Class1) were 1.24 times more likely to have hemorrhoids compared to those with a high level of physical activity (Class 2) (OR=1.243 95%CI 0.697-2.217). The confidence interval was between 0.697 and 2.217, therefore it was not statistically significant compared to those with low activity and those with a moderate level of physical activity (Class 1) were more likely to have hemorrhoids (Table 2).

There was also found to be no significant association between gender and hemorrhoids (p=0.573) (Table 1). This study looked for a correlation between BMI and physical activity, and there was an inverse correlation found between BMI and physical activity, but it was not significant at p=0.57 (Table 3).

DISCUSSION

In this study, it was found that BMI was significantly associated with hemorrhoids. However, obesity was not proven to be an associated risk factor for hemorrhoids. Similar to this study, (Peery et al., 2015) showed there to be no association between obesity and the presence of hemorrhoid. However, this was in contrast with the postulated theory that obesity was associated with hemorrhoids (Lee et al., 2014; Riss et al., 2012). Obese people will have high intra-abdominal pressure, contributed by their high level of body fat and visceral fat, therefore provoking venous congestion of the distal rectum and contributing to the development of hemorrhoid (Lohsiriwat, 2012). Obesity will induce the release of inflammatory cytokines and acute phase proteins, which eventually will activate the innate immune system and affect metabolic homeostasis, which contributes to the formation of hemorrhoids (Lee et al., 2014).

Nevertheless, the current study found that being underweight was less likely to predispose the individual to hemorrhoids whereas being overweight had the highest distribution among hemorrhoid patients. According to (Carter, Gabel, Zbar, Segev, & Kopylov, 2013), there was a small but significant inverse correlation between BMI and hemorrhoids. Therefore, even though obesity was not strongly associated with hemorrhoid, it was recommended that patients with hemorrhoids should control their BMI in order to prevent the recurrence of hemorrhoids in the future.

Table 2. Odd Ratio between Hemorrhoids and without Hemorrhoids

Characteristics	Odd ratio/OR (95% CI)	OR Significance
Gender (Female/ male)	1.172 (0.674-2.041)	Not significant
Age (less than 50/ more than 50)	2.268 (1.107-4.630)	Significant
Ethnicity (Chinese/ Non-Chinese)	2.056 (1.174-3.601)	Significant
BMI (Obese/Non obese	1.515 (0.859-2.674)	Not significant
BMI (Underweight/ Non-underweight	0.250(0.068-0.927)	Significant
Physical activity (Class 1/Class 2)	1.243 (0.697-2.217)	Not significant

Table 3. Odd Ratio between Hemorrhoids and without Hemorrhoids

Dependent variable	Independent variable	r^2	P-value in final equation	B value
BMI	Physical Activity	0.003	0.57	-0.057

In terms of age group, the current study indicated that age had a significant association with hemorrhoids. Among the patients who were younger than 50 years old, the hemorrhoid patients consisted of 65.9% compared to those without hemorrhoids which was only 34.1%. Being related, patients who were younger than 50 years old were more likely to have hemorrhoids compared to those who were 50 years old and older. Clinically, hemorrhoids occur due to high anal canal pressure and it remains higher in the younger age group. This is because they have tight internal sphincter (high tone) compared to the older age group (Carter et al., 2013). This study also found that those who were Chinese had a higher risk of hemorrhoids compared with other races in Malaysia, including Malay, Indians and other races.

Surprisingly, this study found that physical activity was not associated with the risk of hemorrhoids. Similarly, a study by (Lee et al., 2014) stated that there was no significant association of the condition. A sedentary lifestyle was also associated with a reduced risk of hemorrhoid (Peery et al., 2015). However, prolonged sitting was postulated to increase the pressure on the anus, therefore resulting in hemorrhoids. It was also shown that good physical activity could help to regulate bowel function (Zeinab et al., 2011) and therefore, the occurrence of hemorrhoids would be less likely. Moreover, there were many other risk factors of hemorrhoid that were not studied in this research such as diet. A diet of high fiber is thought to reduce the risk of constipation, thus improving bowel function (Peery et al., 2015).

There were no discrepancies in terms of the presence of hemorrhoid between males and females. This study found that both genders were almost equally affected. Among the hemorrhoid patients, males made up 51.5% whereas females made up 48.5%. This was in contrast to some studies which stated that females had a higher prevalence of hemorrhoids (Lee et al., 2014; Riss et al., 2012). However, it was important that this current study asked about history of pregnancy. This is because pregnancy was a well-known risk factor to contribute for hemorrhoid and estimated 85% of them would have hemorrhoid during their second or third trimester (Peery et al., 2015) therefore, pregnant woman was excluded in this study.

In short, this study concluded that BMI and age were related to the occurrence of hemorrhoid but physical activities, and obesity showed no significance. Yet, BMI and physical activity would always be related. With good and frequent physical activity, body mass index would be lower and therefore, lower risk of hemorrhoid. Hemorrhoid are one of the most common gastrointestinal diseases throughout the world (Jacobs, 2018). All of the risk factors should be studied for a better understanding of the disease in order to reduce morbidity.

CONCLUSION

Physical activity was not associated with the hemorrhoids. However, it was shown that good physical activity could help to regulate bowel function and therefore, the occurrence of hemorrhoids would be less likely. BMI was significantly associated with hemorrhoids. Therefore, health practitioners should portray their role of educating the public to change their sedentary lifestyle and unhealthy diet in order to prevent hemorrhoids for better health. This study evaluated all patients irrespective of age and gender based on the colonoscopy results to confirm the diagnosis of hemorrhoids and non-hemorrhoids, which means that we did not miss internal hemorrhoids, which would have led to a misdiagnosis and falsified data in the study. Plus, this study did not restrict the inclusion criteria as our exclusion criteria were non- Malaysians and pregnant women only. This was to ensure that we had large sample population, increasing the confidence intervals and thus increasing the precision.

The limitation of this study was age, as most of the participants were older than 50 years old. Moreover, as the International Physical Activity Questionnaire (IPAQ) Long Form (2011) measured the level of physical activity for the last 7 days, this study was unable to determine whether the patient's hemorrhoid problem was due to their past or present level of physical activity. Since the population of this study was more focused on the Chinese community, it could influence the results of the study.

This study used convenience sampling. It could be suggested to use simple random sampling in order to avoid bias in sampling techniques for future use. In addition, a multi-centre design could be suggested for further study to get a clearer picture of the issue since

the number of obese individuals is increasing every year.

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Original Research

Implementation of the CIPP evaluation model in Indonesian nursing schools

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ABSTRACT

Introduction: The implementation of the Indonesian National Nursing Competency Test (INNCT) has faced several challenges, especially related to the low pass rate. The pass rate has decreased over time, but the number of examinees has increased. The aim of this study was to evaluate the nursing schools' performance in INNCT using the Context Input Process Product (CIPP) evaluation model.

Methods: A quantitative description was used in this study. The Performance Evaluation of Nursing Program Questionnaire based on CIPP was developed and used to collect the data. The participants in this study were faculty members and alumni from the nursing schools that were a member of AINEC within region V. The variables of this study were the nursing school pass rate and the school's performance.

Results: 320 participants were involved in this study. The passing rate of the nursing school in INNCT was in the moderate category. The CIPP evaluation shows that out of the four aspects, there were two (2) aspects, namely "context and input" that were in the category of having met the requirements and two (2) aspects, namely "process and product", were in the category exceeding the requirements.

Conclusion: Nursing schools have fulfilled the government regulation based on the CIPP evaluation and the nursing schools need to make a strategic plan to improve their performance and to increase their pass rate in INNCT.

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INTRODUCTION

The Indonesian National Nursing Competency Test (INNCT) has been implemented since 2014. The INNCT is part of a standardization of registration and practices for nurses in Indonesia. The INNCT has been developed as a computer-based test. All Indonesian nursing students must take this test at the end of their program to get their nursing license. The Indonesian government expecting that by implementing INNCT, this will increase the quality (Ristekdikti, 2016). The implementation of the NNCT has been beset with several challenges, especially the declining passing rate. The passing rate in the period IV/2015 was 53.61% or 6,222 out of 10,571 examinees and in the period XI/2018, it was 41.41%, where 5,957 had passed out of the 14,383 examinees (Ristekdikti, 2018).

Low exam pass rates in the licensure examination have the potential for serious negative adverse effects on the school's reputation, student body, accreditation and the continuity of a school's program (Brown-O'Hara, 2013; Grant, 2015; Wade, 2011). The quality of a nursing education program is evidenced by the performance of its graduates on the licensure examination (Bahari, 2015).

From the Indonesian perspective, a low passing rate indicates that there are gap and disparities in the performance of nursing education. On other hand, this will impact on the availability of nurses to fulfill the needs of the country. A low passing rate will impact on the availability of nurses to fulfill the needs of the country. Indonesia has a lack of nurses; there is gap between the target and reality in term of nurses and the population ratio. The Ministry of Health stated that the nurse : population ratio was 158/100.000 in 2014 but the reality was that it was 87.65/100.000 in 2015. This means that there was a lack of 70.35 nurses. In 2019, the target is 180/100.00 (Ministry of Health of the Republic of Indonesia,

Table 1. Frequency and Percentage Distribution of the Socio-Demographics of the Participants according to Faculty (n=56)

Characteristics	n	%
Sex:		
Male	7	12.50
Female	49	87.50
Age:		
25 year and below	1	1.78
26 – 35 years old	29	51.78
36 – 45 years old	14	8.13
46 – 55 years old	7	12.50
56 – 65 years old	3	5.34
66 years and above	2	3.57
Education Background:		
Bachelor (S1)	10	17.85
Master (S2)	42	75.00
Doctor (S3)	4	7.15
Teaching Experience:		
5 years and below	22	39.28
6 – 10 years	18	32.14
11 – 19 years	8	14.29
20 years and above	8	14.29

Table 2. Frequency and Percentage Distribution of the Socio-Demographic Qualities of the Participants who were Alumni (n=264)

Characteristics	n	%
Sex:		
Male	51	19.31
Female	213	80.69
Age:		
25 year and below	209	79.17
26 – 35 years old	41	15.53
36 – 45 years old	12	4.54
46 – 55 years old	2	.76
Alumni type:		
Regular	226	85.60
Non-regular	38	14.40
INNCT Status:		
Pass	201	76.13
Fail	63	23.87

2016). Failures in the INNCT potentially add to the number of unemployed and this could be a burden for both their family and country. Based on this background, there is a pressing need to evaluate the Indonesian Nursing School Performance in the INNCT. The purpose of this study was to provide an insight into the Indonesian nursing school performance focused on the Indonesian National Nursing Competency Test (INNCT) using the CIPP evaluation model.

MATERIALS AND METHODS

A descriptive quantitative design was used in this study. The population of this study consisted of the faculty staff and alumni from the nursing schools who were a member of AINEC within region V. The convenience sample included all faculty staff and alumni who took part in the INNCT in the period 2017 through to 2018 and who either failed or passed. Variables of the study were the nursing school passing rate and school performance in INNCT. The Performance Evaluation of Nursing Program Questionnaire (PENPQ) based on the CIPP evaluation model was developed and used as an instrument in the data collection. The results are categorized based on mean score: exceeded requirement = 3.26-4.00; met requirement = 2.51 – 3.25; partially met requirement = 1.76 – 2.50; and did not meet requirement = 1.00 – 1.75. The validity test of the instrument showed that the Cronbach's Alpha value was .977. The data collection was done by SurveyMonkey. The link to the instrument was sent to the faculty and alumni coordinator or person in charge as assigned by the nursing school administrator through SMS or Whatsapp. The informed consent form was done electronically. The participants were required to fill out the informed consent form by clicking on the "AGREE" button on the screen after reading the research information and before being given full access to the instrument. The data was analyzed using the frequency, percentage and mean. The study was approved by the institutional review board of the Mochtar Riady Institute of Nanotechnology (MRIN) protocol number 04.1807188.

Table 3. Percentage Distribution of the Nursing School Grouped According to Passing Rate

School	Passing Rate			Average	Category
	2017-1	2017-2	2018-1		
A	94.03	81.58	93.65	91.07	High
B	59.09	28.57	45.83	45.63	Moderate
C		50.38	62.26	53.76	Moderate
D	30.77	32.73	43.37	37.80	Moderate
E	93.18	81.07	75.00	82.17	High
F	63.16	53.13	37.14	54.29	Moderate

Table 4. Mean Distribution of the Assessment of the Participants with Respect to School Performance based on CIPP Evaluation

Aspect	Mean			Category
	Alumni	Faculty	Overall	
Context	3.17	3.17	3.17	Met Requirement
Input:	3.25	2.23	3.24	Met Requirement
Curriculum	3.30	3.35	3.32	Exceeded Requirement
Leadership	3.26	3.22	3.24	Met Requirement
Student	3.25	3.23	3.24	Met Requirement
Faculty	3.23	3.19	3.21	Met Requirement
Facility	3.25	3.18	3.22	Met Requirement
Process	3.29	3.24	3.27	Exceeded Requirement
Product	3.23	3.38	3.30	Exceeded Requirement

RESULTS

A total of 320 participants from six different nursing schools were involved in this study. The participants were both faculty staff (17.50%) and alumni (82.50%). Most of the faculty staff were female (49 or 87.50%). The age of the majority of the participants ranged from 26 – 35 years old 29 (51.78%. Only 2 or 3.57% were 66 years old and above. In terms of educational background, most of the participants had finished a Master's degree or S2 with 42 (75%); 4 or 7.15% hadf inished a doctorate, or S3. With regard to teaching experience, 22 or 39.28% had experience of 5 years and below, followed by 18 participants or 32.14% who had 6 – 10 years. See on Table 1.

The table shows that that the majority of the participants were 213 (80.69%). The majority of the alumni were 25 years old and below (209 or 79.17%). The alumni-participants were mostly of the regular type (226 or 85.60%) and the non-regular type consisted of 38 or 14.40%. The majority of them had passed the NNCT (201 or 76.13%), while 63 or 23.87 failed (Table 2).

Table 3 shows there were two (2) nursing schools in the high category for their passing rate and four (4) nursing schools who were in the moderate category. The highest average passing rate was 91.07% and the lowest was 37.80%.

Table 4 shows that the overall mean of the aspects "Context" and "Input" were in the met requirement category, while the aspects of "Process" and "Product" were in the exceeded requirement category. The sub Aspect of "Input", such as leadership, student, faculty staff and the facility, were in the met requirement category.

DISCUSSION

The results of the study show that the majority (four; 66.66%) of the nursing schools were at a moderate level in terms of the average passing rate of INNCT. The highest passing rate was 91.07% and the lowest was 37.80%. These results show that there are disparities in terms of the passing rate and the gap was 56.5%. These disparities corroborate that there is still variety in the process of learning and in the education standard for every nursing program. The government, professional organization and nursing school association have released guidance or regulations such as the national standard of education and the blue print of INNCT as the basis for running a nursing program. The results also show that there were many retakes because of failure in the INNCT. This means that there were those who cannot work as professional nurses who could be potentially be an unemployed person. A strategy plan could be performed to support and help those who fail the NNCT and the nursing school should have the responsibility to help them.

The preview studies confirm that many contributing factors are involved in the licensure examination. These factors can be categories sorted into academic and non-academic. The academic factors include cumulative GPA (CGPA). CGPA significantly contributes to the success of the licensure examination (Amankwaa, Agyemang-Dankwah, & Boateng, 2015; Foley, 2016; Grant, 2015; Penprase, Meghan Harris, & Qu, 2013; Ristekdikti, 2018; Siswadi Y, 2018). Moreover, the nursing subject grade was a significant predictor for licensure examination (Breckenridge, Wolf, & Roszkowski, 2012; McGahee, Gramling, & Reid, 2010; Schooley & Dixon Kuhn, 2013; Simon, McGinniss, & Krauss,

2013). Other studies found differently, in that there were no significant correlations between CGPA and academic achievement (Siswadi Y, Sommers L C, 2017; Ukpabi, 2008). Non-academic factors that contribute to the licensure examination include socio-demography, which includes gender, age and the educational background of the parent (Amankwaa et al., 2015; Breckenridge et al., 2012). School accreditation level also contributed to the performance of the licensure examination (Dator, 2016; Gutierrez N P, 2016).

The results of the CIPP evaluation showed that two aspects (50%) such as "Context" and "Input" were in the met requirement category. The aspect "context" was the focus on the vision, mission and objective of the study program. Clarity and socialization of the vision, mission and objectives to all civitas academica is needed to ensure the school's achievements. Vision helped the administrator and their team to become inspired and committed concerning a shared goal. The vision was a strong driving force for ongoing and systematic practice development and thus it established a culture that favored quality and safety improvement in patient care (Martin, Mccormack, Fitzsimons, & Spirig, 2014). The finding implies that the nursing school has not yet reached the highest standard or exceeded requirements.

The aspect "input" includes the curriculum, administrator, students, faculty and facilities. Four (4) sub aspects such as the administrator, students, faculty and facilities were rated as having met the requirements, and only curriculum exceeded requirements with a mean score 3.32. The category mean of the students and faculty was closed (3.25:3.23). The majority, or 4 out of 5, category means of the alumni were higher compared to the category mean of faculty. The overall category mean of the aspect "input" was 3.24 or met requirement. These findings corroborate that nursing schools have a problem in the majority sub aspect of "input". The previous studies utilized the aspect of "input" and the relevant evaluation data for several proposes, such as to make decisions regarding subsequent program implementation regarding End-of-Life education program (Lippe M, 2017), for structuring decisions (Patil Y, 2015), and to help prescribe a project to address the identified needs ("Using the Context, Input, Process, and Product Evaluation Model (CIPP) as a Comprehensive Framework to Guide the Planning, Implementation, and Assessment of Service-learning Programs," 2011). Moreover, this evaluation was used as the bases for the recommendation of revising the course's curriculum and for increasing the facilities that included a library (Mohebbi, Akhlaghi, Yarmohammadian, & Khoshgam, 2011).

The aspect "process" covers the implementation of the program either in the classroom activities, in the class laboratory and or in clinical practice; it also covers the monitoring, documentation and evaluation of the implementation of the program. There were 19 items used to evaluate the implementation of the process. The category mean was 3.27, or exceeded requirement. This finding implies that the nursing schools have exceeded the requirements of the national standard in terms of the aspect of "process". The program evaluation monitors the project implementation process to help the staff carry out activities and for users to be able to judge the program's performance (Stufflebeam, 2003). The "process" evaluation is important in order to provide feedback to allow the program to be implemented correctly, to improve the program and to verity accountability in the work plan (Chinta, Kebritchi, & Ellias, 2016; Kahn et al., 2014; O'Sullivan, 2013; Pfitzinger M, 2016). In addition, another researcher explained that the "process" evaluation concerns the link between theory and practice and the implementation of the curriculum (Stavropoulou & Stroubouki, 2014).

The aspect "product" is focused on the graduation rate, CGPA, passing rate and employment rate. There were 6 items reated to the 'product' aspect where the overall category mean was 3.30, or exceeded requirement. This implies that the aspect "product" was evaluated as having exceeded requirements but there was still problems related to the passing rate on the INNCT. The majority of the passing rates of INNCT were moderate. The passing rate is an indicator of the school's quality. The quality of a nursing education program is evidenced by the performance of its graduates on the licensure examination (Bahari, 2015). A nursing school's reputation and standing with the national board can be at risk; students have a lot of money invested in their education and they may have to wait to gain employment (Wade, 2011).

The CIPP Evaluation Model has been accepted worldwide and it is used in several settings. A clear picture and detailed explanation of the application of the CIPP Evaluation model in the nursing education setting was presented (Singh, 2004). A limitation is that since the data collection used an online survey, it was a challenge to encourage the participants to participate in this study. Not all alumni were a part of the WhatsApp group or other social media in related groups.

CONCLUSION

The nursing schools have been fulfilling the national standard of education based on the CIPP evaluation model. There are areas of CIPP that need to be improved in order to provide a higher level of standard, especially for the aspects of "context" and "input". Nursing schools should make a strategic plan to increase the pass rate of INNCT.

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Original Research

The Impact of Independent of Activity Daily Living among Stroke Patients on Caregivers Burden

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ABSTRACT

Introduction: Weakness among stroke patients causes obstacles when fulfilling their activities in daily living (ADL). This condition also has an impact on the caregivers who provide daily care at home. The purpose of this study was to analyze the effect of independent ADL among the stroke patients on caregiver burden.

Methods: The study used an analytical design through a cross-sectional approach. The variables included independent ADL and caregiver burden. A sample of 120 caregivers was taken from 2 community health centers in Surabaya through simple random sampling. The instruments used were Zarit Burden's Interview Schedule and the Katz Index of Independent for ADL. Regression ordinal was used to analyze the influence of independent ADL among stroke patients on caregiver burden.

Results: The results showed that the caregiver who take care of stroke patients with severe functional impairment will feel burdened 3 times more than no burden. Post-stroke care at home through a rehabilitation program plays an important role in improving the condition of patients and their families at home, especially the caregivers.

Conclusion: Nurses in a community health center through the family health care pathway provide comprehensive bio-psycho-socio-spiritual care in the rehabilitation period as expected. They are expected to improve and maintain the fulfillment of human needs comprehensively for stroke patients and their caregivers, so the quality of life of stroke patients, caregivers and their families remains optimal.

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INTRODUCTION

Brain damage due to non-traumatic cerebral circulatory disorders is increasing in society today. This is known as a stroke, which can happen suddenly, progressively and quickly. The prevalence of stroke in East Java in 2013 was 16 and it was included in the top four causes of death in Indonesia. Although the prevalence decreased in 2018 which was equal to 12.4%, East Java was still included in the 8 major provinces concerning the prevalence of stroke cases. Stroke attacks cause symptoms in the form of paralysis of the face or limbs, the speech not being smooth or clear (disartria), changes in consciousness, impaired vision, difficulty in swallowing and speaking and difficulty understanding the conversations of other. These symptoms can settle after the acute phase (RISKESDAS, 2018)(Badan Penelitian & dan Pengembangan Kesehatan, 2013). Changes in the conditions experienced by post-stroke patients, especially the presence of weakness or paralysis of the limbs, causes the patients to experience obstacles when fulfilling their activities of daily living. Some of them experience dependency in living their lives and some even claim that their quality of life decreases(Bakas et al., 2014)(Handayani & Dewi, 2009)(Karunia, 2016)(Ogunlana, Dada, Oyewo, Odole, & Ogunsan, 2014).

Stroke patients and families feel that they are in a crisis situation, not only in the acute phase of hospital care. This situation may continue until after the treatment in the hospital, namely the rehabilitative

period. The condition of the patients with sequelae after a stroke is a new situation for the patients and their families. Changes in their physical health condition, especially weakness or paralysis, are also a crisis situation for the patients. The family will carry out additional roles to maintain a more healthy condition for their family member with a stroke, especially when it comes to providing care to meet the basic needs of the stroke patients at home. A previous study showed that 10% of stroke patients were dependent on meeting their ADLs in the category of moderate dependence, severe dependence and total dependence, while mild dependence reached 70% (Setyoadi & Wihastuti, 2018). The dependence on fulfilling ADL causes burnout syndrome for caregivers. The study by Kumar (2015) of 100 caregivers looking after stroke survivors from a selected community setting and the outpatient department of different tertiary care hospitals in Punjab showed that 63% experienced a mild to moderate burden, 28% experienced no burden, 7% experienced a moderate to severe burden and 2% experienced a severe burden(Kumar, Roy, & Kar, 2012). Other previous studies about the burden of the informal caregivers of stroke survivor in secondary and tertiary health institutions experiencing the physiotherapy service in Lagos State Nigeria showed that 80 caregivers (50,6%) expressed a mild burden, 75 caregivers (47,3%) expressed that they experienced a moderate burden and 2 caregivers (2%) expressed that they experienced a severe burden (Gbiri, Olawale, & Isaac, 2015).

Continuous stressors among the stroke patients and their caregivers are a trigger for the burden of both, in the form of physical, emotional, social and financial burdens(Gbiri et al., 2015)(Kumar et al., 2012)(Pesantes, Brandt, Ipince, Miranda, & Diez-Canseco, 2017)(Vincent, Desrosiers, Landreville, & Demers, 2009). The burden experienced by the caregivers is influenced by gender (female), age (elderly), low education, employment (retired), the hours of care given and mental health. The characteristics of stroke patients that influence the burden of the caregivers includes physical disorders and motor weakness and the cognitive functioning of stroke patients, depressive symptoms, decreased verbal ability, walking difficulties and neurological deficits.

Advanced stroke treatment, known as the rehabilitative phase, is a treatment that requires a long time. Patience and the continuity of care by the family needs to be applied at home. Data on the control of stroke patients to health care facilities among the population aged ≥15 years in Indonesia were routinely controlled 39.4% (n = 8,042), and in East Java patients who routinely controlled were slightly 40% (n = 1,452) (RISKESDAS, 2018). The low patient data for routine control shows that the possibility of patients not getting maximum care may mean that they do not receive further treatment. This condition will result in the physical weakness and paralysis of stroke patients continuing to worsen,

leading to complications and death. The caregivers will feel that the burden continues to increase and extend. In the end, the whole family feels the impact.

Stroke patients, caregivers and/or their families together need a comprehensive bio-psycho-socio-spiritual care intervention to overcome the crisis situation created due to a stroke. Various interventions for stroke patients and their families can be obtained from the time of hospitalization up until the rehabilitation phase which continues to coordinate with public health facilities (Puskesmas). Discharge planning interventions given at the end of the acute phase of hospital care and interventions during the rehabilitation phase in the form of physiotherapy for patients, therapeutic counseling, psycho-education, skills training, and family and group supportive therapy are alternative interventions that have been proven to improve the physical condition of patients, reduce the burden of care, improve satisfaction, well-being and the quality of life of patients and their caregivers (Damawiyah, 2015)(Björkdahl, Nilsson, & Sunnerhagen, 2007)(Suprobo, Wiyono, & Setyanto, 2015)(Wahyuningsih, 2011). The purpose of this study was to analyze the effect of the independent ADL of the stroke patients on the burden of caregivers among the patients suffering from a stroke at home

MATERIALS AND METHODS

The study used an analytical design through a cross-sectional approach. The variables included the independent activities of daily living and caregiver burden. The sample consisted of 120 informal caregivers of stroke survivors that were their relatives who stayed at home with the stroke survivor for at least 3 months. The samples were taken in 2 community health centers in Surabaya (Puskesmas Pegirian and Puskesmas Pucang Sewu) using the simple random sampling technique in the period of July - September 2018. The burden of caregiver was measured using Zarit Burden's Interview Schedule designed by Steven H Zarit with a 5 point rating scale ranging from never (0) through to rarely (1), sometimes (2), quite frequently (3) and nearly always (4). The burden score was categorized in 4 categories: no burden (0-21), mild to moderate burden (22-40), moderate to severe burden (41-60) and severe burden (61-80) (Kumar et al., 2012). The activities of Daily Living of the stroke survivors were measured using the Katz Index of Independence in Activities of Daily Living. It measured the 6 functions of bathing, dressing, toileting, transferring, continence and feeding. The stroke survivors were scored yes (independence/no supervision, direction or personal assistance/score 1) or no (dependence/with supervision, direction, personal assistance or total care/score 0) for the independence of each function. This was then classified into full function (5-6), moderate impairment (3-4) or severe functional

impairment (2 or least)(Wallace & Shelkey, 2006). The regression ordinal test was used to analyze the influence of the independent ADL among the stroke patients and how it related to the caregivers' burden. The ethical approval letter was granted by the Health Research Ethics commission of Health, Ministry of Health, Surabaya number: 194/S/KEPK/V/2018 date 8th June, 2018.

RESULTS

Table 1 showed that most of the stroke patients were 56-65 years old (late elderly) (40,8%), male (64,2%) and with an illness lasting1-2 years (58,3%). Almost all of the patients had had a stroke once (95%) and most of the stroke patients had 1-2 deficit neurological conditions related to having a stroke (56,7%).

Table 2 shows that most of the caregivers are 46-55 years old (early elderly) (40,2%), women (75,2%), the wife of the stroke patient (53%), educated up t senior high school (35%) and not an employee (housewives) (47,9%). They had been caring for 1-2 years (58,1%), the longest duration of caring was 1-2 hours a day (62,4%) and most of them had 1-2 health problems (42,5%).

Table 3 showed that most of the independent ADLs were full functioning (60,8%) while it was almost the same between moderate impairment and severe functional impairment at 19,25% and 20%. The burden of the caregivers was mild to moderate (50%), next to no burden at 44,2% and moderate to severe burden at 5,8%.

Table 4 shows that the Chi-square value through the deviance method is 1.057 with df 2 and a significance value of 0.589, it is concluded that the model is feasible to use.

Table 1. Characteristics of the Stroke Patients (n=120)

Variable	n	(%)
Age (year):		
36-45 years old	9	7.5
46-55 years old	39	32.5
56-65 years old	49	40.8
>65 years old	23	19.2
Gender:		
Male	77	64.2
Female	43	35.8
Length of illness (year):		
<1 years	23	19.2
1-2 years	70	58.3
3-4 years	17	14.2
>4 years	10	8.3
Frequency of attacks:		
1-2 times	114	95
3-4 times	5	4.2
>4 times	1	0.8
Deficit neurology of stroke		
0 symptom	10	8.3
1-2 symptoms	68	56.7
3-4 symptoms	35	29.2
>4 symptoms	7	5.8

Table 2. Characteristics of the Caregivers (n=120)

Variable	n	(%)
Age (year)		
<26 years old	10	8.5
26-35 years old	14	12.0
36-45 years old	22	18.8
46-55 years old	47	40.2
56-65 years old	19	16.2
>65 years old	5	4.3
Gender		
Male	29	24.8
Female	88	75.2
Family relationship		
Husband	16	13.7
Wife	62	53.0
Child	25	21.4
Others	14	12.0
Education		
Not school	10	8.5
Elementary school	33	28.2
Junior high school	24	20.5
Senior high school	41	35.0
Diploma or Bachelor's	5	4.3
Postgraduate	4	3.4
Employment		
No employee	56	47.9
Pensioner	2	1.7
Government employee	6	5.1
Private employee	18	15.4
Entrepreneurship	34	29.1
Others	1	0.9
Length of caring (year)		
<1 year	22	18.8
1-2 years	68	58.1
3-4 years	17	14.5
>4 years	10	8.5
Duration of caring (hour/day)		
1-2 hours/day	73	62.4
3-4 hours/day	27	23.1
5-6 hours/day	9	7.7
>6 hours/day	8	6.8
Health problems		
No problem	41	34.2
1-2 problems	51	42.5
3-4 problems	25	20.8
>4 problems	3	2.5

Table 3. Variable Descriptions (n=120)

Variable	n	%
Independent of ADL:		
Severe functional impairment	24	20
Moderate impairment	23	19.2
Full function	73	60.8
Caregiver Burden:		
No burden	53	44.2
Mild to moderate burden	60	50
Moderate to severe burden	7	5.8
Severe burden	0	0

Table 4. Goodness of Fit

	Chi-Square	df	Sig.
Pearson	1.105	2	0.575
Deviance	1.057	2	0.589

Table 5. Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	38.430			
Final	19.698	18.731	2	.000

Table 6. Wald Test

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[No burden = 1.00]	.265	.235	1.275	1	.259	-.195	.726
	[Mild to moderate burden = 2.00]	3.734	.506	54.497	1	.000	2.743	4.725
	[Severe functional impairment =1.00]	2.162	.554	15.215	1	.000	1.076	3.248
Location	[Moderate impairment=2.00]	.809	.479	2.853	1	.091	-.130	1.748
	[Full function=3.00]	0[a]	.	.	0	.	.[a]	.

Table 7. Pseudo R-Square

Cox and Snell	0.145
Nagelkerke	0.175
McFadden	0.089

Table 5 shows that the statistical value G is 18.731, thus it can be concluded that there is one βp≠0 (H1 accepted). Table 6 shows that the ADL variable within the severe functional impairment category has a significant effect on the burden of the caregiver (p value = 0.000) while the ADL variable within the moderate impairment category did not have a significant effect on the burden of the caregiver (p value = 0.91).

Table 7 shows the determinant coefficient value of Negelkerke 0.175 or 17.5%. It can be concluded that ADL with a severe functional impairment category affects the burden of the caregiver by only 17.5%, while 82.5% are affected by other factors that were not included in the model test.

The interpretation of the model was done using the odds ratio test. The odd ratio of ADL with the severe functional impairment category was 3, so it can be concluded that a caregiver who takes care of a stroke patient in the severe functional impairment category will feel burdened 3 times more than no burden. The Odd ratio of ADL within the moderate impairment category was 1, so it can be concluded that a caregiver who takes care of stroke patients in the moderate impairment category will feel only a small burden or no burden.

DISCUSSION

The research data shows that almost all of the patients (91.7%) had deficit neurology symptoms, with the most common symptoms being foot and/or hand weakness or paralysis (81.67%). The characteristics of the patients included aggravated physical weakness experienced by the elderly patients (40.8%) and most were dependent for 1-2 years after the stroke attack (58.3%). Ischemia in most lesions in the right hemisphere or parietal lobe due to stroke biologically affect the inability of the patient to perform several physical functions such as limb movements, speech changes and changes in memory (Munir, 2018). The neuromuscular process will reduce the physiological functions of the extremities which effects the independent of ADL among the stroke patients(& & Bunner, 2013). Their health conditions change due to deficit neurology symptoms. There are severe stressors not only for the patients but also for their families.

The research data shows that for almost all of the patients who experienced the first attack (95%), most of the patients were male (64.2%) and almost all of them were the head of their family. This data can be used to aggravate the feelings of disability and helplessness due to stroke attacks. The data on the independent ADL is based on the Katz Independence Index in which the ADL shows that the 3 lowest ADLs are bathing, dressing and toilets that require adequate limb function. A real feeling of a lack of pleasure in reference to the physical difficulties after illness makes the patient feel disabled and helpless, which can improve the feelings of depression in the patients. The study by Ratnasari concluded that the majority of stroke patients had moderate depression (60%). Their experience was that they were very dependent in terms of ADL (45%) (Ratnasari, P; Kristiyawati, S.P.; Solechan, 2015). The weakness in the motor function is aggravated by psychological disorders.

The majority of caregivers in this study were 46 - 55 years old (early elderly) (40.2%). Women were the most common gender (75.2%), most of the patient's education was elementary school level (36.7%), most of the caregivers were the wife of the stroke patient (53%), most were not employees (housewives) (47.9%), the longest treatment was 1-2 years (58.1%), the most common duration of treatment was 1-2 hours a day (62.4%) and most of them had 1-2 health problems (42.5%). The results of this study are in line with the previous research which states that caregiver burden is influenced by age (elderly), gender, low education, employment (retirement), the hours spent taking care and mental health (Chow, Wong, & Poon, 2007)(Rigby, Gubitz, & Phillips, 2009)(Vincent et al., 2009). Family members who mainly take care of stroke patients at home feel continued stress due to their role. They can also experience strain and burden.

The regression ordinal test was computed between the independent ADL among stroke patients and caregiver burden. The results of the testing showed that ADL in the severe functional impairment category affects the burden of the caregiver by only 17.5%, while 82.5% were affected by other factors that were not included in the model test. The interpretation of the model using the odds ratio test concluded that a caregiver who takes care of a stroke patient in the severe functional impairment category will feel burdened 3 times more than no burden. The results of this study are in line with the predicting factor of caregiver burden according to the characteristics of the stroke patients. This includes physical disorders such as weaknesses in the motor and cognitive functions of the stroke patients, decreased verbal ability, walking difficulties and neurological deficits (Vincent et al., 2009)(Rigby et al., 2009)(Chow et al., 2007). Independence in fulfilling the ADL, especially those that require adequate physical functioning, namely bathing, dressing and toileting, are the 3 types of ADL with the lowest independence, thus increasing caregiver burden, especially in the physical burden (1.24 ± 67.56) and emotional burden category (0.96 ± 74,632). These 3 ADL activities require greater energy related to motion and mobilization, thus aggravating the physical fatigue of the caregivers. The burden of the caregiver got worse because the caregivers also suffered from diseases including non-communicable diseases. The diseases suffered by the caregivers in this study included hypertension, diabetes mellitus, gastritis, hypercholesterolemia and hyperuricemia.

The financial burden of the patients was felt by males the most (64.2%). They have a family role as the patriarch or husband. One of the roles of the patriarch based on the family functions is that of a wage earner (Friedman, Marilyn M; Browden, Vicky R; Jones, 2010). This condition is in line with the previous research which states that all of the families of stroke patients experience family economic changes. This is considered to be a high stressor for families (Hariyati, Sumarwati, & Handiyani,

n.d.)(Pambudi, 2009)(Asrul Sani, 2018). Almost all of the stroke patients in this study (91.7%) reported the presence of sequelae, with the most common symptoms being weakness and paralysis of the feet and hands (81.67%). The weakness or paralysis that occurs causes the patients to no longer be able to work to earn an income to finance the needs of all family members, so their role is ultimately assisted or replaced by other family members (the wife or child of the patients) through small traders at home while caring for the patient. Continued stroke care that requires long term attention will also increase the family financing both in terms of medical/control costs and the cost of transportation to visit the health care facilities.

Feelings of being helpless even related to the condition of depression in stroke patients will have an impact on the interaction of the patients and their caregivers. The caregiver in this study revealed that the patients often showed an irritable response when treated and assisted. They did not regularly take their medication, they did not want to routinely control their feelings and they did not regularly do physiotherapy or a range of motion exercises. The anger responses shown by the patients often trigger the caregivers to respond angrily. If the caregivers feel tired or bored, they may leave the patient for a moment. This is in line with the predicting factor of the caregiver symptoms of depression(Rigby et al., 2009)(Chow et al., 2007)(Vincent et al., 2009). The efforts of stroke patients to meet their needs independently according to their ability are gradually needed in the rehabilitation phase, especially related to neuro-muscular function so then the remaining symptoms of weakness/paralysis are reduced. A previous study states that stroke patients are advised to continue trying to carry out the routine control of medical personnel in order to monitor repairs or the deterioration caused by a stroke (Fadilah, Kusnanto, Nursalam, Minarti, & Asnani, 2018). Efforts to increase independence in ADL will have a broad impact on the patients, not only related to the impact of increasing the motor skills but it will also increase self-esteem, confidence and reduce anxiety due to feelings of helplessness (Rigby et al., 2009).

The nursing interventions for families, especially for the caregivers of stroke patients, also need to be carried out together with interventions focused on the patients. The previous studies concluded that the families are more motivated and more ready to provide care at home with the provision of discharge planning at the end of the acute phase of hospital care (Damawiyah, 2015). Interventions during the rehabilitation phase come in the form of therapeutic counseling, psycho-education, skills training, family supportive therapy and health education through home visits which are alternatives that are proven to reduce the burden of care and to improve caregiver satisfaction and quality of life (Björkdahl et al., 2007). Post-stroke care at home through rehabilitation programs plays an important role in treating patients and their families at home, especially when related to

the caregivers. Nurses at the community health center, through family health care, can provide comprehensive bio-psycho-socio-spiritual care in the rehabilitation period. This is expected to improve and maintain the fulfillment of human needs for stroke patients and their caregivers. This means that the quality of life of stroke patients, their caregivers and their families members remains optimal(Fadilah et al., 2018).

CONCLUSION

A caregiver who takes care of stroke patients with severe functional impairment will feel burdened 3 times more than feeling like there is no burden. Changes in the physical and psychological condition of stroke patients cause difficulties in terms of the independent fulfillment of ADL stroke patients. This situation causes stress to be experienced by the caregivers when caring for patients with stroke. This means that caregiver burden occurs. Nurses as family health care providers can play an important role in providing comprehensive bio-psycho-spiritual care in the rehabilitation period for stroke patients and their nurses. This is so then related diseases can reduce and improve the quality of life for stroke patients and nurses to remain in an optimal living situation.

LIMITATION

The Activities of Daily Living of stroke survivors were measured only once by the Katz Index of Independence in ADL; this was a limitation of this study. The data should be measured focused on home care and more than once, so then we can progressively evaluate the patient and caregiver's condition.

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