Development of the Erdanela model for stroke prevention in the elderly: Effectiveness Test

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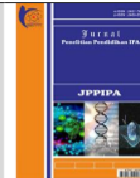Erdanela Setiawati[1*], Nur Indrawaty Lipoeto[2], Yuliarni Syafrita[3], Adang Bachtiar[4]

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Abstract: A new stroke-prevention service (ERDANELA model) has been developed at nursing homes by empowering elderly caregivers to become service-implementing cadres. The aim of this study is to investigate the effect of empowerment on the knowledge, attitude, skill, and behavior of elderly caregivers about stroke-prevention services in nursing homes. A quasi-experimental study was conducted on 52 elderly caregivers who were working at 3 nursing homes in West Sumatra Province, Indonesia. The questionnaire design consists of knowledge, attitudes, skills, and behavior variables. Intervention in the form of training was carried out for three days, using pre-test and post-test methods. The results of this research are the majority of caregivers are 40-49 years old (34.60%), male (51.9%), have middle school education (48.10%), have monthly income bigger than the RMW (75.00%), worked in nursing home>5 years (67.30%), and never attended training while working at nursing-home (73,10%). Caregivers knowledge, attitude, skill, and behavior mean are 18.23 ± 1.89, 7.65 ± 1.22, 6.75 ± 1.37 and $6.00\pm0,91$ respectively before training, and significantly it has increased to 25.48 ± 3.38, $10.15\pm.09$, 9.10 ± 0.96, and 7.06 ± 1.43 respectively after training with sig=0.000<0.05. Empowerment has succeeded in increasing the knowledge, attitudes, skills, and behaviors of elderly caregivers to become service-implementing cadres of the new stroke-prevention service at nursing homes.
Keywords: Empowerment, ERDANELA model, elderly caregivers

Introduction

Stroke is the third most common non-communicable disease among the elderly in Indonesia. The prevalence of stroke in Indonesia continues to increase from 7 per mile in 2013 to 10.9 per mile in 2018. Stroke prevalence is based on the age group of the elderly as follows: for age >75 years is 50.20 mileage age 65-74 is 45.30 per mile, and for age 55-64 years is 32.40 per mile. Half of the strokes occur in those over the age of 75 (RISKESDAS, 2018). Results of the researcher's survey in 2020 in 3 nursing homes in West-Sumatra-Province Indonesia, the prevalence of stroke is quite significant, at the Sabai-Nan-Aluih nursing home 91 per mile, at the Kasih-

Sayang Ibu nursing home is 85 per mile, and at the Jasa, Ibu nursing home is 160 per mile. It is important to prevent stroke in the elderly (Goldstein, 2011); (Dupre, 2014). The most effective stroke prevention strategy currently proposed is for all high-risk populations and individuals.

The top priorities for effective primary stroke prevention are 1) a comprehensive approach for people with all levels of CVD risk, 2) a focus on behavioral and lifestyle risk factors, 3) incentivizing healthcare professionals and patients implement to mobile technology (Electronic Health Information Technology) for use by health professionals and laypeople, and 5) implementing culturally appropriate education from an early age (Feigin,

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2016). The Indonesian government's program to prevent stroke in the community is by (a) discovery and control of stroke risk factors, (b) early detection of stroke, and (c) early treatment of stroke sufferers. This program is implemented in a service called the Pre-Stroke-Service. Pre-Stroke-Services are carried out at (a) Puskesmas-Pandu-PTM, (b) Health-clinic, and (c) Posbindu-PTM, and the service implementing staff are a) general practitioners, b) nurses, c) health-cadres (Kemenkes RI, 2013). There is a gap between the elderly in nursing homes and stroke prevention services provided by the government. Elderly nursing homes cannot access stroke prevention services outside nursing homes, because there is no Posbindu-PTM around the nursing home, and the Puskesmas-Pandu-PTM is not active around the nursing home. Until 2019, only 73.66% of puskesmas of 10.134 puskesmas in Indonesia implemented integrated non-communicable disease services through the Puskesmas-Pandu-PTM program. The percentage of villages that carry out Posbindu-PTM activities is only 43 of 92% of villages from all villages in Indonesia. In 2018 in West-Sumatra-Province, the Puskesmas-Pandu-PTM was 90.23% but only 65.70% of villages had Posbindu-PTM or only 700 Posbindu-PTM spread over 19 districts/cities (Pusdatin Ministry of Health, 2018) (Anung, 2019).

The weakness of the stroke-prevention-service provided by the government (Posbindu-PTM) is that the service is general (designated for healthy people, high-risk communities, and people with PTM aged 15 years and over) not specifically for the elderly (Kemenkes RI, 2019). Most (60.60%) elderly are less willing to use Posbindu and a small part (30.30%) are negative attitudes towards Posbindu (Misbah, 2015). The services are practical, easy to reach (nearby), and fast using communication and information technology (Digital Health or Mobile Health), also being the ideal service criteria for the elderly today (Nichols et al., 2017). The existence of the COVID-19 pandemic has caused the Indonesian Government to issue a regulation prohibiting the elderly from leaving nursing homes to prevent transmission of the coronavirus in the elderly group. Elderly who has chronic diseases (such as hypertension, diabetes, or other chronic diseases) are advised to carry out independent health monitoring in the institution using simple medical devices, such as digital sphygmomanometers, digital thermometers, and simple blood checks (Kemenkes RI, 10 20).

WHO suggests facilitating the capacity of practitioners who care for the elderly to use digital technology. The goal is to effectively deliver health care benefits, achieve higher health standards, and access services to promote and protect their health and well-being. Another goal is for non-communicable-disease management, hypertension control program and improving the quality of health services in the era of the industrial revolution 4.0 and the COVID-19 pandemic (WHO, 2020); (Opoku et al); 2017), (Nichols et al., 2017); (Sunjaya, 2019). Based on the problems above, the researcher has developed a new stroke-prevention service at three nursing homes in West Sumatra Province, Indonesia, named The stroke-Prevention-Service ERDANELA model. This service is developed through elderly-caregivers empowerment to become service-implementing cadres.

Empowerment is carried out in the form of training in a workshop that is held for 3 days with a total time of 1000 minutes in each nursing home. In this training, the elderly caregiver will be taught how to examine 4 stroke risk factors (hypertension, diabetes mellitus, hypercholesterolemia, and obesity) to identify stroke risk levels for the elderly (high risk or low risk) using the application of an android smartphone (use digital technology). Caregivers are also taught how to provide education to high-risk elderly about risk factor management, follow up on the risk factors found, do stroke early detection, or refer high-risk elderly to the nearest Puskesmas. This study aimed to investigate the effect of empowerment on the knowledge, attitude, skill, and behavior of elderly caregivers about stroke-prevention services in a nursing home.

Method

Research design

This is a quasi-experimental study with pre-test and post-test group design. The samples are all elderly caregivers a nursing homes some in West Sumatra Province, Indonesia: the Sabai-Nan-Aluih nursing home, the Kasih Sayang Ibu nursing home, and the Jasa Ibu nursing home in 2021. The sample size was total sampling. Of 58 elderly's caregivers who were working in 3 nursing-home, using exclusion criteria: a. Caregivers who can't read and write, b. The caregiver does not have an Android Smartphone, c. Caregivers who are medical personnel, d. For caregivers who are not willing to attend training, the researcher got the number of samples (caregivers) who participated in this empowerment of 52 caregivers.

Tools

The questionnaire design comprises demographic characteristics knowledge, attitudes, skills, and behavior variable. The knowledge variable

consisted of 16 questions, scoring 2 for 'true' and 1 for 'false', with ranged from 16 to 32. The attitude variable consisted of 6 questions ranging from 6 to 12 in the form of a two-point Gutman scale. The skill variable consisted of 5 questions also in the two-point Gutman scale, with a range from 5 to 10, and the behavior variable comprised 5 questions, scoring 2 for 'yes' and 1 for 'no', with a range from 5 to 10.

A structured questionnaire to assess the knowledge, attitudes, skills, and behaviors of caregivers about the stroke-prevention-services (ERDANELA model), was developed and adapted using a literature review from similar studies and from the "Guidelines for the Empowerment of Elderly Caregivers" (Kemenkes, 2018) issued by the Indonesian Ministry of Health, which already have high validity and reliability. The design, content relevance, suitability, readability, and structure of the questionnaire were evaluated and approved by six professors from the University's Department of Public Health, Psychology, Nutrition, and Social Affairs. The questionnaire was piloted on caregivers who did not participate in the training. From the results of the trial, the questionnaire was ambiguous and difficult to understand, then modified.

During the research, we appointed students from the Faculty of Public Health and the Faculty of Medicine as field supervisors to monitor the investigation process and carry out quality control. The validity of the data collected was then checked. Chronbach's alpha from the questionnaire is 0.91 which means that internal consistency is acceptable. Trained interviewers and checking the validity of the data collected guarantee that this research is of high quality (Tavakol et al., 2011). We gave materials of training that were consistent with the scientific references of study and were made in the form of module by title Guide Empowerment Of Elderly Caregiver in Nursing-home For Stroke-Prevention-Services ERDANELA Model.

Interventions

This empowerment is called the Empowerment ERDANELA model which was developed based on the model analogy of the empowerment of the Posbindu PTM cadre (Kemenkes, 2019). The empowerment was carried out in the form of training in workshops which are held for 3 days with a total time of 1000 minutes in each nursing home

1) The objectives of the training were:
1. Caregivers able to understand their role as service-implementing cadres in the stroke-prevention-services ERDNELA-Model in nursing homes, namely being able to

determine high-risk-elderly using application on the android smartphone.
2. Provide the ability and skills in monitoring stroke risk factors to caregivers, such as checking blood pressure, blood glucose, cholesterol, and obesity.
3. Provide skills in counseling about stroke, risk factors, impact, stroke control, initial/pre-hospital management of acute stroke elderly, and early detection of the stroke to caregivers

2) Training Participants

The training participants were elderly caregivers and staff in 3 nursing homes in West Sumatra Province: PSTW Sabai Nan Aluih with 24 caregivers, PSTW Kasih Sayang Ibu with 24 caregivers, and PSTW Jasa Ibu with 10 caregivers. The total is 58 caregivers. The exclusion criteria of participants were: 1) Caregiver who can't read and write, 2) Caregiver does not have an android Smartphone (HP), 3) Caregivers who are medical personnel, 4) Caregivers who are not willing to attend training. Based on the exclusion criteria, the number of participants in this study was 52 caregivers.

Data analysis

We used descriptive analysis to show the distribution of frequency and percentage of study variables, and the researcher used SPSS-23 software and changed the parametric statistical analysis of the Paired-T-Test to non-parametric statistical analysis using the Wilcoxon test because, in the normality test, the pre-test scores were not normally distributed.

Result and Discussion

Characteristics of elderly caregivers

Characteristics of 52 elderly caregivers in three nursing homes in West Sumatra Province, Indonesia were shown in Table 1. The majority of caregivers were 40-49 years old (34.60%), male (51.90%), had middle school education (48.10%), had monthly income bigger than the RMW (75.00%), have worked in nursing-home more than 5 years (67.30%), and have never attended training while working at the nursing-home (73.10%).

Table 1. Characteristics of Elderly-caregivers

Characteristics		f	%
1) Age:			
	<40 years old	15	28.80
	40-49 years old	18	34.60
	50-59 years old	14	26.90
	>60 years old	5	9.70

2) Gender:		
Male	27	51.90
Female	25	48.10
3) Education:		
Primary school	5	9.60
Middle school	25	48.10
High school or higher	22	42.30
4) Income/month:		
Smaller than RMW (<Rp. 2.484.041)	13	25.00
Bigger than RMW (>Rp. 2.484.041)	39	75.00
5) Length of work in the nursing home:		
Less than 5 years	17	32.70
More than 5 years	35	67.30
6) Have attended training while working in nursing homes:		
Never	38	73.10
Ever been	14	26.90
Total	52	100.0

The result of each question about the knowledge, attitudes, skills, and behavior of elderly caregivers are summarized in Table 2. A majority of respondents have bad knowledge, attitudes, skills, and behavior on stroke-prevention services in nursing homes before empowerment, about almost all questions. But after empowerment, the knowledge, attitudes, skills, and behavior of the caregiver for all questions increased.

Table 2. The result of each question about the knowledge, attitudes, skills, and behavior of the elderly caregivers

Question or Statement of Knowledge	Correct Response (%)		Score difference
	Pre-test	Post-test	
A stroke occurs due to a blockage or rupture of a blood vessel in the brain	23 (44.20)	27 (51.90)	4
The Stroke-Prevention-Application ERDANELA-Model on an android smartphone is used to determine whether the elderly are at high risk of stroke or not	11 (21.2)	33 (63.50)	22
Stroke risk factors are factors that cause a stroke. The most common risk factor for stroke is hypertension (high blood pressure).	4 (7.70)	24 (46.20)	20
90% of strokes are preventable. Ways to prevent stroke include: controlling risk factors, healthy behavior or lifestyle, being able to detect early symptoms of stroke, and getting access to good, appropriate, and affordable health services when an attack occurs.	3 (5.80)	19 (36.50)	16
The activities in the ERDANELA model of stroke prevention services are: a) Determining the elderly at high risk or not using an android smartphone. b) Checks of blood pressure, blood sugar, cholesterol, and height, weight, & IMT. IEC activities and elucidation, physical activity, or sports together c) Referral activities to Puskesmas if needed	7 (13.50)	39 (75.00)	32
If the elderly's blood pressure is 140/90 mmHg, it means that the elderly suffer from hypertension	2 (3.80)	37 (71.20)	35
If the elderly cholesterol is 200 mg/dL, it is said that the elderly have high cholesterol	7 (13.50)	38 (73.10)	31
If the blood sugar level in the elderly is 199 mg/dl, it is said that the elderly suffer from high sugar or diabetes	3 (5.80)	30 (57.70)	27
Regular checks of blood pressure, blood sugar, cholesterol, and obesity, can prevent stroke	3 (5.80)	26 (50.00)	23
Patients who have just had a stroke are immediately taken by ambulance to the hospital and should have received treatment 6 hours	7 (13.50)	33 (63.50)	26
Reducing salt consumption is education for the elderly with high cholesterol	4 (7.70)	23 (44.20)	19
The elderly who are thin must have low cholesterol levels and are less likely to have a stroke.	5 (9.60)	17 (32.70)	12
In the stroke-prevention-service ERDANELA-Model, blood pressure checks for the elderly who are at high risk are carried out every month	9 (17.30)	39 (75.00)	30
In the stroke-prevention-service ERDANELA-Model, elderly blood sugar checks are carried out once every 3 months	7 (13.50)	38 (73.10)	31

In the stroke-prevention-service, ERDANELA-Model, checks of cholesterol of high-risk-elderly are carried out once every 3 months	13 (25.00)	39 (75.00)	26
Examination of height and weight of the elderly with high risk is carried out once every 3 months	9 (17.30)	31 (59.60)	22
In my opinion, stroke attacks in the elderly can be prevented	1.51±2.21	1.75±2.19	0.24
In my opinion, the examination of the risk factors/causes of stroke in the elderly is not important and unnecessary	1.64±2.34	1.66±2.34	0.02
In my opinion, the elderly who have risk factors for hypertension need to have their blood pressure checked regularly	1.74±2.47	1.96±2.43	0.22
In my opinion, my cellphone needs to have an application to prevent stroke	1.66±2.61	2.11±2.54	0.45
In my opinion, the elderly who have many risk factors (high risk) need to be referred to the puskesmas	1.70±2.74	2.08±2.69	0.38
In my opinion, the knowledge that I got from this training should be practiced continuously with the elderly, otherwise, this very useful knowledge will be forgotten/lost.	1.68±2.88	1.92±2.85	0.24
I can measure the blood pressure of the elderly with a digital sphygmomanometer because I have received training	21 (40.40)	52 (100)	31
To prevent stroke in the elderly, I can check blood pressure, cholesterol, blood sugar, and obesity in the elderly in nursing homes	16 (30.80)	40 (76.90)	24
I can provide counseling about preventing stroke to the elderly2	17 (32.70)	38 (73.10)	21
I can do a FAST examination for early detection of stroke	18 (34.60)	31 (59.60)	13
I can use my cellphone to determine whether the elderly are at high risk of stroke or not	19 (36.50)	52 (100)	33
With the application on my cellphone, I can help the elderly who have a stroke quickly	16 (30.80)	26 (50.00)	10
I can determine high the risk elderly or not	11 (21.20)	18 (34.60)	7
I can check blood sugar and cholesterol with the GCU meter	10 (19.20)	23 (44.20)	13
I can determine whether the elderly are obese or not	4 (7.70)	16 (30.80)	12
I can provide education to control the risk factors that exist in the elderly	11 (21.20)	24 (46.20)	13

The mean value of four variables are knowledge, attitudes, skills, and behavior before and after empowerment:

Table 3. The mean of knowledge, attitudes, skills, and behavior scores of Elderly Caregivers

Variables	Before Intervention (Pre-test) Mean±Std. Deviation	After Intervention (Post-test) Mean±Std. Deviation
Knowledge	18.23±1.89	25.48±3.38
Attitude	7.65±1.22	10.15±1.09
Skills	6.75±1.37	9.10±0.96
Behavior	6.00±0.91	7.06±1.43

From table 3 above, it can be seen that there are differences in the mean scores of knowledge, attitudes, skills, and behavior before empowerment (pre-test) and after empowerment (post-test) (there was an increase in the mean score). This means that empowering the ERDANELA Model impacts increasing the knowledge, attitudes, skills, and behavior of elderly caregivers. To find out whether there is or not an impact of empowerment on elderly caregivers, a Paired-T-Test is carried out. The terms of the Paired-T-test are the differences between the two groups of data which are normally distributed and homogeneous.

Normality test results:

Table 4. Normality test prerequisites paired T-Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-test	.236	52	.000	.862	52	.000
Post-test	.078	52	.200*	.982	52	.628

Based on the Kolmogorov-Smirnov test, it is known that:

1. Pre-test data are not normally distributed (sig=0.200>0.05).
2. Post-test data were normally distributed (sig=0.00<0.05)

Because in the normality test the pre-test scores were not normally distributed, then to test the hypothesis

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above, the researcher changed the parametric statistical analysis of the Paired-T-Test to a non-parametric statistical analysis using the Wilcoxon test.

Table 5. Wilcoxon test

		N	Mean Rank	Sum of Ranks
Post-test	Negative Ranks	0a	.00	.00
Pre-test	Positive Ranks	52b	26.50	1378.00
	Ties	0c		
	Total	52		

From the Wilcoxon Test table above, it can be seen that:

1. Negative Rank is 0, all for N value, mean rank, and sum rank. It means there is no difference (negative) between the scores of the pre-test & post-test or no decrease knowledge, attitudes, skills, and behavior as seen from the decreased scores of the pre-test & post-test.

2. Positive Rank is the difference (positive) between scores of pre-test & post-test. Here there are 52 positive data (N) meaning that there is an increase in knowledge, attitudes, skills, and behavior for 52 elderly caregivers as seen from the increase in scores of pre-test & post-test. Mean rank or average increase is 26.5, while the sum of ranks or number of positive ranks is 1378.

3. The value of Ties is 0. Ties are the same value of the pre-test & post-test, here, it means there is no equal value between the pre-test & post-test.

The Wilcoxon Signed Ranks Test was then carried out.

Table 6. Wilcoxon signed ranks test

	Post-test - Pre-test
Z	-6.281b
Asymp. Sig. (2-tailed)	.000

From the Wilcoxon Signed Ranks Test table above, Asymp.Sig. (2-tailed) is 0.000 <0.05, it means that Ha is accepted or there is a difference in the empowerment results for the pre-test & post-test. It means there is an impact of training (empowerment) on increasing the knowledge, attitudes, skills, and behavior of elderly caregivers in nursing homes regarding the ERDANELA Model Stroke Prevention Service. Furthermore, the N-Gain Test or Normalized Gain Test is used to determine the effectiveness of the empowerment of the ERDANELA Model given to elderly caregivers in nursing homes. N-Gain test results for 52 elderly caregivers: the mean value of the N-Gain score is 0.5±0.2, and the full score is 0.9, meaning that the effectiveness of empowerment is moderate. Frequency distribution of Caregiver Empowerment Effectiveness.

Table 7. Frequency distribution of empowerment effectiveness

Effectiveness	Frequency	Percent
Low effectiveness	2	3.80
Moderate effectiveness	46	88.50
High effectiveness	4	7.70
Total	52	100.0

From table 7 above, the majority of the empowerment effectiveness is moderate at 88.50% of caregivers, while the empowerment effectiveness is high at 7.70% of caregivers and low empowerment effectiveness at 3.80% of caregivers.

This research proves that the empowerment ERDANELA model improved the quality of elderly caregivers to give stroke-prevention services in nursing homes. It seems that caregivers were poorly aware of stroke-prevention-service in nursing homes before. Knowledge, attitudes, skills, and behaviors of caregivers about stroke prevention services, were lacking. Most caregivers have never received training while working at nursing homes. This condition is similar to research in China which states that the quality (knowledge, attitudes, and skills) of elderly caregivers in Long Term Care (LTC) institutions (nursing-home) in Cina is at a low level. Almost all caregivers do not have adequate knowledge and training in elderly care (Zeng, 2019).

The empowerment ERDANELA model fits with the WHO framework of Integrated People-Centred Health Services and the new understanding of health-related empowerment by addressing the creation of an enabling and empowering environment for formal and informal caregivers (Kayser, 2019). Elderly caregivers in their duties must be competent to take preventive actions and carry out risk management (Entry Level 1). The two competency units above cover the domains of knowledge, attitudes, and behavior about the basics of long-term care for the elderly (Gakuen, 2016). Many studies have shown that caregivers with high quality are related to an increase in the service they offer to the elderly population in nursing homes (Song et al., 2014), (Engström et al., 2011); (Bostik et al., 2006). Behavior change theory believes that if someone has sufficient knowledge and a positive attitude, they can produce good skills (Davis et al., 2015)

The increase in knowledge, attitudes, skills, and behaviors of caregivers was a positive effect of the empowerment ERDANELA model (training). One of the skills given to elderly caregivers in the ERDANELA model training is the technique of identifying the level of stroke risk in the elderly using an application on an android smartphone. This skill fits with the priorities for effective primary stroke prevention is the

implementation of mobile technology (Electronic Health Information Technology) for use by health professionals and laypeople and a comprehensive approach to people with all levels of CVD risk (Feigin ., 2016). WHO recommends facilitating the capacity of practitioners who perform LTC in the elderly (elderly caregivers) to use digital technology to provide health care benefits effectively. The use and improvement of digital health solutions can revolutionize the way people around the world achieve higher health standards, and access services to promote and protect their health and well-being (WHO, 2020). (Opoku et al., 2017); (Nichols et al, 2017); (Sunjaya, 2019). Another skill gained from the empowerment ERDANELA model is that caregivers can check risk factors (blood pressure, blood sugar, cholesterol, and obesity) using a digital GCU meter. This skill fit with the one of priorities for effective primary stroke prevention is focused on behavioral and lifestyle risk factors. (Feigin .,2016).

Conclusion

Empowerment has succeeded in increasing the knowledge, attitudes, skills, and behaviors of elderly caregivers to become service-implementing cadres of the Stroke prevention service (ERDANELA model) in nursing homes in West Sumatra Province, Indonesia. It seems that caregivers can 1) identify the level of stroke risk in the elderly using the android application. 2) Measure the blood pressure of the elderly using a digital sphygmomanometer. 3) Measure weight, height, and BMI to know about obesity in the elderly. 4) Checking the elderly's blood sugar and cholesterol using the GCU-meter Digital. 5) Early detection of stroke using the fast method. 6) Provide education on risk factor management to the elderly.

Acknowledgments

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