The Effectiveness of Catheterization Pre-Action Education on the Knowledge of Coronary Heart Patients in the ICVCU Room of Prof. Dr. H. Aloei Soboe Hospital, Gorontalo City

Rahmad Lanasir, Pipin Yunus, Haslinda Damansayah
Nursing Study Program, Faculty of Health Sciences, Universitas Muhammadiyah Gorontalo
Email Correspondence:

ABSTRACT
Coronary Heart Disease (CHD) is a disease of the heart and blood vessels caused by narrowing of the coronary arteries. Narrowing of blood vessels occurs due to the process of atherosclerosis due to the slow accumulation of cholesterol and connective tissue on the walls of blood vessels. The research method is a research strategy in identifying problems before the final planning of data collection, the research design used in this study is Quasy Experimental using the paired t-test. From the results of the analysis, patient knowledge was obtained before the pre-catheterization education was carried out at Prof. Dr. H. Aloei Saboe Hospital. From 30 respondents, 3 respondents (10%) were obtained, they had good knowledge and as many as 27 respondents (90%) had poor knowledge. From the results of the analysis, it was found that the patient's knowledge after pre-catheterization education was obtained from 30 respondents, 29 respondents (96.7%), had good knowledge and as many as 1 respondent (3.3%) had poor knowledge. From the results of the significance test using the paired t test on the comparison of the frequency of patient knowledge before and after the Pre-action of cardiac catheterization education at Prof. Dr. H. Aloei Saboe Hospital , there was a significant change with a value of p=.001 ($p<0.05$), then it can be concluded that there is an Effectiveness of Pre-Catheterization Education on the Knowledge of Coronary Heart Patients in the ICVCU Room of Prof. Dr.H. Aloei Soboe Kota Hospital Gorontalo.
Keywords: Education, Pre-Catheterization Procedures, Knowledge, Patients with Coronary Heart Disease

INTRODUCTION

CHD or Coronary Heart Discharge (CHD) is characterized by blockage of the blood vessels around the heart caused by atherosclerosis. According to Cardiac Catheterization is an invasive procedure that is often used as a diagnostic and treatment for coronary heart disease patients. Cardiac catheterization has several advantages over other diagnostic and treatment measures in the treatment of patients with heart disorders. According to. Cardiac catheterization is a non-surgical interventional procedure that uses a catheter to widen or open a narrowed coronary artery with a balloon or stent. When a patient suffers from Coronary Heart Disease (CHD), catheterization is performed to reduce plaque-related narrowing or blockage. (Lewis, 2021) Masriani, (2020) Agustri et al, (2022) (Catur et al, 2022)

According to an estimated 17.9 million people died from CVD in 2020, representing 32% of all global deaths and of those deaths 85% were caused by heart attacks and strokes. More than three-quarters of deaths from cardiovascular disease occurred in low- and middle-income countries, followed by 17 million premature deaths (under the age of 70) due to non-communicable diseases, about 38% were caused by CVD in 2020. Data from the 2023 Indonesian Health Survey (SKI) regarding the number of heart patients by age group states that the 25-34 year old age group dominates with a total of 140,206 people. This figure is slightly above the age group of 15-24 years which reached 139,891 people. WHO, (2021)

The death rate caused by Coronary Heart Disease (CHD) in Indonesia is quite high, reaching 1.25 million people with an Indonesian population of 250 million people (Ministry of Health, 2020). Gorontalo Province is above average, with a prevalence of 1.8%. Coronary Heart Disease has risk factors that cannot be modified, namely age and gender.

Coronary heart disease can be detected by performing non-invasive diagnostic tests or invasive examinations. An invasive examination that can be done is cardiac catheterization. Cardiac catheterization is an action recommended by cardiologists to determine the condition of vital organs (Masriani, 2020) (Pilot, 2022) . Performing cardiac caterization is an effort to reduce the risk of death from narrowing of blood vessels. Cardiac caterization is the most widely used hemodynamic intervention and diagnosis technique in the world (Sinaga et al, 2022)

Cardiac catheterization is a non-invasive or non-surgical procedure in which a thin catheter tube (about 1.7 mm in diameter) and length is inserted into a blood vessel, then directed towards the heart. One of the most common types of cardiac catheterization is the heart's coronary blood flow examination, otherwise known as

coronary angiography. Cardiac catheterization is performed by inserting a catheter into the aorta and left ventricle by puncturing the branchialis artery or femoral artery to check the anatomical state and function of the heart. (Pilot, 2022) (Nurdin, 2020)

Research conducted in Saudi Arabia suggests that the general public's knowledge regarding cardiac catheterization is still low, where about 69.5% do not know the difference between cardiac catheterization as a diagnostic or treatment procedure, 30.1% do not know who will perform the procedure, and most do not know the use of contrast agents in the procedure. Regarding vascular access for catheterization, 30.5% of respondents did not know which blood vessel to have access to insert a catheter tube, and some even answered that they had direct access to the heart and through the mouth. Albugami et al, (2020) (Albugami et al, 2020)

The results of previous studies found that patients' refusal to perform cardiac catheterization procedures was related to knowledge of the disease and knowledge of catheterization procedures. Patients will agree to undergo the procedure after they get an explanation regarding the procedure to be performed. Patients who are going to undergo cardiac catheterization need information about this invasive procedure so as not to have an impact on psychological tension (Malliarou et al, 2022) .

The results of the study found that providing information before the catheterization procedure helps to increase knowledge so that it can reduce the patient's anxiety level. The psychological stress experienced by patients when undergoing catheterization has an effect on the physiology of the body, increasing autonomic nerve activity so that it has an impact on the instability of blood pressure, heart rate, and breathing frequency. This tends to be one of the causes of delays and even cancellations of catheterization procedures (Block et al, 2022) .

Based on the results of the observation of the interview Knowledge of Coronary Heart Patients in the ICVCU Room is different about the language of catheterization, many patients do not understand cardiac catheterization from 12 patients who were interviewed from 5 patients, 3 of them understood and 2 others only knew about cardiac catheterization and 7 others did not understand cardiac catheterization. In the results of the interview, it was found that most of the patients did not understand about cardiac catheterization procedures, This corroborated that patients in the ICVCU room had not received education about cardiac catheterization procedures, from the results of the interview above, the researcher was interested in conducting research on the effectiveness of pre-catheterization education on the knowledge of coronary heart patients in the ICVCU room of Prof.Dr.H.Aloei Soboe Hospital, Gorontalo City.

RESEARCH METHODOLOGY

The research method is a research strategy in identifying problems before the final planning of data collection (Nursalam, 2020), the research design used in this study is *Quasy Experimental* using *the paired t-test*. By involving intervention groups. Aims to find out the influence that arises as a result of treatment. The special feature of this experiment is in the form of interventional treatment. The research has been carried out in the ICVCU Room of Prof.Dr.H.Aloei Saboe Hospital, Gorontalo City. In April 2025. The sampling technique used in this study uses *a non-probability sampling* technique with *the Total sampling* method. The number of samples in this study amounted to 30 people.

Data Analysis Techniques

After the data is tabulated, data processing is carried out using the SPSS computer statistical code and then presented in the form of a frequency distribution table accompanied by an explanation of each variable studied.

Univariate analysis

Univariate analysis is an analysis that consists of only one variable analyzed, there is no longer a difference between dependent and independent variables. Univariate analysis utilizes descriptive statistical methods to explain the characteristics of a single variable.

Bivariate analysis

This analysis aims to determine the differences before and after the effectiveness of pre-caterization education on the knowledge of coronary heart patients in the ICVCU room of Prof.Dr.H.Aloei Soboe Hospital, Gorontalo City. The statistical test used is the *Paired Samples T-test* with a 95% confidence rate. To see the meaning of statistical calculations, a meaning limit of 0.05 is used so that if the value of P is ≤ 0.05, then statistically there is a meaningful influence, if P is >0.05, then the results of the calculation have no meaningful

influence. Before the hypothesis test is carried out, a normality test is carried out first. Pretest and post-test data normality testing is carried out to find out whether the data is distributed normally or not. The calculation of the normality test uses *the Kolmogorov Smirnov test with the SPSS application. Decision-making policy if Asymp.Sig (2-tailed*).

Hypothesis Test

The Hypothesis Test consists of a non-parametric statistical test and a parametric test. Non-parametric statistical tests are used when the data is less than 30, not normally distributed and not linear, while parametric statistical tests are used when the data is normally distributed.

The Hypothesis Test in this study uses the Wilcoxon Signed Test. The Wilcoxon Signed Test is a statistical non-parametric hypothesis test used when comparing two related samples to see the difference between the paired samples. Analyze the paired observations of two data whether there is a difference or not.

RESULT

Characteristics of respondents

Table 1 Characteristics of respondents

Characteristic	Frequency	Percentage
Age:	N	
36-45 Years	5	16,7 %
46-55 Years	11	36,6 %
56-65 Years	14	46,7 %
Total	30	100%
Final Education:		
SD	11	36,6 %
JUNIOR	8	26,7 %
SMA	5	16,7 %
D3/S1	6	20 %
Total	30	100%
Gender:		
Man	19	63,3 %
Woman	11	36,7 %
Total	30	100%

Data Source 2025

Based on table 1, the researcher obtained from 30 respondents based on the age frequency distribution table, the most respondents aged 56-65 years were 14 respondents (47.7%), based on the distribution table of the frequency of education, the most respondents were educated in elementary school as many as 11 respondents (36.6%), Based on the gender frequency distribution table, the most respondents were male as many as 19 respondents (63.3%).

Univariate Analysis

Univariate analysis based on patient knowledge before pre-catheterization education was carried out in the ICVCU Room of Prof.Dr.H.Aloei Soboe Hospital, Gorontalo City.

Table 2 Analysis of the frequency distribution of the level of knowledge before

Previous level of knowledge	Frequency (n)	Present(%)
Good	3	10%
Less good	27	90%
Total	30	100%

Data Source 2025

Based on table 2 above, it shows that the patient's knowledge before the pre-catheterization education was obtained from 30 respondents, 3 respondents (10%), had good knowledge and as many as 27 respondents (90%) had poor knowledge.

Univariate analysis based on patient knowledge after pre-catheterization education was carried out in the ICVCU Room of Prof.Dr.H.Aloei Soboe Hospital, Gorontalo City.

Table 3. Analysis of the frequency distribution of knowledge levels after

Knowledge level after	Frequency (n)	Present(%)
Good	29	96,7%
Less good	1	3,3%
Total	30	100%

Data Source 2025

Based on table 3 above, it shows that the patient's knowledge after pre-catheterization education was obtained from 30 respondents, 29 respondents (96.7%), had good knowledge and as many as 1 respondent (3.3%) had poor knowledge.

Bivariate Analysis

Analysis of the effectiveness of providing pre-action cardiac catheterization education on patient knowledge in the ICVCU Room of Prof.Dr.H.Aloei Soboe Hospital, Gorontalo City.

Table 4. Analysis of the effectiveness of pre-action cardiac catheterization education

Variable	N	Mean	Std. deviation	P Value
Patient Knowledge Before	30	1,90	0,305	
				0,001
Patient Knowledge After	30	1,03	0,183	

Data Source 2025

The results of the analysis of table 4 can be concluded that the average frequency of patient knowledge before being given Pre-catheterization Education at Prof. Dr. H. Aloei Saboe Hospital obtained an average value of 1.90 with a standard deviation of 0.305. Meanwhile, the frequency of knowledge after Pre-catheterization education at Prof. Dr. H. Aloei Saboe Hospital obtained an average score of 1.03 with a standard deviation of 0.183. After a significance test was carried out using *a paired t test* on the comparison of the frequency of patient knowledge before and after the Pre-action of cardiac catheterization education at Prof. Dr. H. Aloei Saboe Hospital , a significant change was obtained with a value of p= 0.001 ($p<0.05$), then it can be concluded that there is an Effectiveness of Pre-Eterization Education on the Knowledge of Coronary Heart Patients in the ICVCU Room of Prof. Dr. H. Aloei Hospital Soboe Gorontalo City.

DISCUSSION

Univariate analysis of patient knowledge before being given Pre-Cardiac Catheterization Education at Prof. Dr. H. Aloei Saboe Hospital.

Based on the results of the frequency distribution analysis before the pre-cardiac catheterization education in the ICVCU room of Prof. Dr. H. Aloei Saboe Hospital. showing that out of 30 respondents, 3 respondents (10%) were found to have good knowledge and as many as 27 respondents (90%) had poor knowledge.

This shows that most patients do not have a sufficient understanding of the medical procedures to be undertaken. According to the theory from Nutbeam (2020), low health literacy is one of the main obstacles to understanding medical information, especially in patients with advanced age or low education. This is supported by the results of the researcher's observation that the majority of respondents are in the elderly age group in the range of 55-65 years and the majority of respondents have an elementary school (SD) education. This is in line with the research of Putri et al. (2021) which states that without special education, most patients do not understand medical procedures thoroughly.

Researchers assume that the low knowledge before education is caused by the lack of information received by patients, limited communication between health workers and patients, and the presence of demographic factors such as old age and low education level, which affect the ability to receive and understand medical information well.

Univariate analysis after being given Pre-catheterization education at Prof. Dr. H. Aloei Saboe Hospital

The results of the analysis after the pre-cardiac catheterization education were obtained as many as 29 respondents (96.7%) had good knowledge and as many as 1 respondent (3.3%) had poor knowledge. This shows that the respondents have increased from before the pre-cardiac catheterization education there were 27 respondents who still had poor knowledge and after the pre-cardiac catheterization education there were 29 respondents with good knowledge.

This is in line with the theory of Dewi & Sudaryanto, (2020) Knowledge has an influence on the formation of a behavior and knowledge can also be referred to as one of the languages that can affect attitudes and behaviors in a person's life to provide a response or assessment of an object, therefore the discussion of knowledge in preventing dengue fever cannot be separated from the stage of behavior formation.

In line with the research entitled Effectiveness of Pre-Catheterization Education on the Knowledge of CHD Patients Who Will Undergo Cardiac Catheterization Action, the results of statistical analysis using paired t-test ($p<0.001$). The results of the study showed that there was an influence of pre-catheterization education on the knowledge of patients who will undergo cardiac catheterization procedures. Muliantino et al., (2023)

However, in 29 (96.7%) respondents who were already knowledgeable, there was still 1 respondent who had poor knowledge. This shows that patients do not have an adequate understanding of cardiac catheterization procedures, their objectives, benefits, risks, and preparations. This condition can be caused by several factors that affect the process of receiving and understanding information by patients. In this case, one of the factors that can affect is age, it can be seen that 1 respondent who has poor knowledge is already 60 years old.

According to Notoatmodjo (2020), a person's knowledge is influenced by internal factors such as education level, age, cognitive ability, psychological condition, and also external factors such as the medium of conveying information and the time and atmosphere when education is carried out. In this context, it is likely that one respondent who has not understood education optimally could be due to advanced age related to decreased cognitive function, low education levels, anxiety ahead of medical procedures, or even hearing or concentration impairment when education is given. This is supported by a theory from WHO, (2023) which states that the success of health education is highly dependent on personalizing approaches, as well as adjustments to individual learning abilities.

The researcher assumes that there is a significant increase in knowledge in patients before and after being given pre-catheterization education at Prof. Dr. H. Aloei Saboe Hospital. This increase shows that the provision of pre-action education has an important role in improving patients' understanding of the medical procedures that will be undertaken, there are factors that hinder the receipt of information due to old age, cognitive barriers, hearing loss and low education.

Bivariate Analysis of the Effectiveness of Pre-Action Cardiac Catheterization Education on Patient Knowledge at Prof. Dr. H. Aloei Saboe Hospital

Based on the results of the research, the researcher obtained a comparison of the frequency of knowledge before being given Pre-Action Education of Keteterization in the ICVCU room of Prof. Dr. H. Aloei Saboe Hospital, an average score of 1.90 with a standard deviation of 0.305 respondents and after being given Pre-Action Education of Keteterization, an average score of 1.03 with a standard deviation of 0.183 was obtained.

This shows that there is an average decrease which indicates that the education provided before the catheterization procedure is very beneficial in improving patient knowledge. According to Nutbeam's theory (2020), health education that is provided clearly, easily understandable, and tailored to the needs

of patients will increase health literacy, namely the patient's ability to understand medical information. Meanwhile, according to the theory of Berkman et al. (2021), effective education will increase the patient's understanding of the medical measures to be carried out. This can be seen from the decrease in standard deviation, meaning that the patient's understanding becomes more even.

After a significance test was carried out using *a paired t test* on educational therapy Pre-cardiac catheterization procedure, a significant change was obtained with a value *of p*= 0.001 (*p=<0.005), then it can be concluded that there is an* Effectiveness of Providing Pre-Action Cardiac Catheterization Education on Patient Knowledge at Prof. Dr. H. Aloei Saboe Hospital.

This research is supported by a study entitled The Effectiveness of Pre-Catheterization Education on the Knowledge of CHD Patients Who Will Undergo Cardiac Catheterization Procedures The results of statistical analysis using paired t-test (p<0.001). The results of the study showed that there was an influence of pre-catheterization education on the knowledge of patients who will undergo cardiac catheterization procedures. Also supported by Muliantino et al., (2023) (Hidayati, 2023) research on the Effect of Education on Cardiac Pre-Catheterization Patients in the Emergency Installation of Sultan Agung Islamic Hospital, a quasi-experimental design with a type of one group pre-post test design the results of the statistical test obtained a p value of 0.000 (P<0.05) which showed that there was an Effect of Education on Cardiac Pre-Catheterization Patients in the Emergency Installation of Sultan Agung Islamic Hospital.

The results of the above study showed a significant increase in the level of knowledge of patients after being given pre-catheterization education of cardiac catheterization, where before education most patients (90%) had poor knowledge, and after education almost entirely (96.7%) showed an increase to the level of good knowledge. Providing education helps patients understand the objectives, procedures, benefits, and risks of the medical measures to be performed. This understanding is essential for patients to feel calmer, cooperative, and have control over their health-care decision-making. Education can strengthen the relationship between patients and healthcare workers through effective communication. Education can improve patients' perceptions of disease risks, strengthen their belief in the benefits of medical measures, and encourage them to take necessary preventive or treatment measures. Researchers assume that pre-catheterization education of cardiac catheterization has been shown to be effective in improving patient knowledge. This increase shows the importance of the role of health workers, especially nurses, in providing clear, systematic information, and in accordance with patients' understanding abilities. Education provided prior to medical procedures has been shown to prepare patients mentally and increase their participation in the treatment process. Health education needs to be an integral part of every stage of service, especially in the run-up to invasive measures, to ensure patient readiness and support the achievement of quality and patient-centered services.

This is in line with the theory of S. Ulfah, (2021). Education can improve patients' perception of disease risk, strengthen their belief in the benefits of medical measures, and encourage them to take necessary preventive or treatment measures. Education not only improves patients' knowledge, but can also influence their behavior and attitudes toward health, ultimately contributing to better treatment outcomes.

In line with the research Marshadi, (2022). entitled The Effectiveness of Providing Structured Education on the Anxiety Level of Pre-Cardiac Catheterization Patients at Eka Hospital using a quasi-experimental post-test research design analyzed using an Independent T test The results of the independent T test obtained a significance value of p = 0.000 (p < 0.05), so that there was an effect of structured education on pre-cardiac catheterization procedure patients.

CONCLUSION

From the results of the analysis, patient knowledge was obtained before the pre-catheterization education was carried out at Prof. Dr. H. Aloei Saboe Hospital. From 30 respondents, 3 respondents (10%) were obtained, they had good knowledge and as many as 27 respondents (90%) had poor knowledge. From the results of the analysis, it was found that the patient's knowledge after pre-catheterization education was obtained from 30 respondents, 29 respondents (96.7%), had good knowledge and as many as 1 respondent (3.3%) had poor knowledge. From the results of the significance test using *the paired t test* on the comparison of the frequency of patient knowledge before and after the Pre-action of cardiac catheterization education at Prof. Dr. H. Aloei Saboe Hospital , there was a significant change with a value of p=.001 (p<0.05), then it can be concluded that there is an Effectiveness of Pre-Catheterization Education on the Knowledge of Coronary Heart Patients in the ICVCU Room of Prof. Dr.H. Aloei Soboe Kota Hospital Gorontalo.

SUGGESTION

It is expected that the hospital, especially Prof. Dr. H. Aloei Saboe Hospital, will continue to improve and maintain a structured and standardized pre-action education program, especially for patients with coronary heart disease who will undergo catheterization. This education can be used as part of the permanent protocol (SOP) in the ICVCU room in order to increase the patient's readiness and understanding of the procedure to be undertaken.

It is expected that educational institutions, especially nursing study programs, will use the results of this research as teaching materials or references in learning related to patient education and the handling of coronary heart disease. This is important so that students have a more applicable and contextual understanding in providing education to patients in clinical practice.

It is hoped that the next researcher can develop this research by involving other variables, such as the method of delivering education or the level of anxiety before action. Follow-up research can also be done with different designs such as quasi experiments to strengthen the scientific evidence regarding the effectiveness of pre-catheterization education.

BIBLIOGRAPHY

Agustri et al. (2022). Heart at Eka Hospital Eka Hospital Tangerang School of Health Sciences Sint Carolus University of Indonesia.

Albugami et al. (2020). *The Perception Of Coronary Artery Disease And Cardiac Catheterization In Saudi Arabia: ―What The Public Knows.‖ Cureus*.

Anggreani et al. (2022). Cardiac catheterization procedure in the hospital. *Journal Of Nursing And Midwifery Sciences.*

Block et al. (2022). *Stress Management In Pre- And Postoperative Care Amongst Practitioners And Patients In Cardiac Catheterization Laboratory: A Study Protocol. Frontiers In Cardiovascular Medicine*. 9(6).

Catur et al. (2022). Cardiac Pre-Catheterization Patient at Panti Rapih Stikes Hospital Panti Rapih Yogyakarta, Jl. Tantular No 401 , Condongcatur , Depok ,Sleman, Stikes Panti Rapih Yogyakarta , Jl . Tantular No 401 , Condongcatur , Depok , Sleman , Stikes Panti Neat Yog. . 3(2), 114–125.

Hafliah, F., & Syafirati, A. (2023). The Effect of Providing Pre-Catheterization Cardiac Health Education on Improving Patient Knowledge. 15(1).

Harrison. (2020). Cardiac Pre-Catheterization Patients at Panti Rapih Stikes Panti Rapih Hospital Yogyakarta.

Hidayati, N. (2023). The Effect of Education on Anxiety Levels and Readiness of Pre-Catheterized Cardiac Patients in Emergency Installations.

Hudiyawati et al. (2022). The relationship between age and sex and quality of life in people with heart failure at Pku Muhamadiyah Hospital, Yogyakarta.

Ministry of Health of the Republic of Indonesia. (2022). Indonesia's health profile in 2022. Jakarta: Ministry of Health of the Republic of Indonesia.

Lestari, W., & Hidayat, A. (2020). The relationship between education level and the patient's understanding of medical procedures. Journal of Health Sciences, 18(1), 55–62.

Lewis. (2021). *Low Educational Attainment Is A Predictor Of Adverse Outcomes In Patients With Coronary Artery Disease. Journal Of The American Heart Association*, . 8(17).

Malliarou et al. (2022). *The Effect Of An Information Brochure On Patients Undergoing Cardiac Catheterization On Their Anxiety, Knowledge And Fear: A Randomized Controlled Study. Health Psychology Research*, 10(3).

Marshadi, I. (2022). The Effectiveness of Structured Education on the Anxiety Level of Pre-Cardiac Catheterization Patients at Eka Hospital. *Carolus Journal Of Nursing*, 5(1).

Masriani. (2020). The Effect of Cardiac Precatheterization Health Education on Patient Anxiety Levels at the Integrated Cardiac Service Installation of RSSA Malang. Scientific Journal of Health Media Husada, 9(1), 37–46.

Masturoh, & Anggita. (2020). Knowledge Level.

Muliantino, R. M., Mailani, F., & Dafris, W. (2023). The effectiveness of pre-catheterization education on the knowledge of PJK patients who will undergo cardiac catheterization procedures. *Real In Nursing Journal* (RNJ), 6(2).

Munawaroh et al. (2022). The Effectiveness of *the Family Support System* on the Knowledge Level of Pre-Catheterization Patients at Smc Telogorejo Hospital. Nursing. 2(12), 23–27.

Notoatmodjo, S. (2020). Health promotion and health behavior. Jakarta: Rineka Cipta. Daughter, A. D.,
Notoadmodjo in Hopefa. (2022). Factors Influencing Knowledge.
Notoadmodjo in Pudji Hastutik. (2020). The Concept of Knowledge.
Nurdin, L. (2020). The Level of Knowledge of Coronary Heart Disease Inpatients Towards Diseases and Side Effects of Drugs Consumed at the Integrated Heart Center of Wahidin Sudirohusodo Hospital, Thesis.
Nursalam. (2019). Nursing Science Research Methodology: A Practical Approach. In Nursing Science Research Methodology: A Practical Approach (4th ed.). Jakarta. In Nursing Science Research Methodology: A Practical Approach.
Driver. (2022). Getting to Know Catheterization and Angiography Examination. Ministry of Health of the Republic of Indonesia.
Primary. (2020). Operational Standards for Coronary Heart Disease Nurses Undergoing Preoperative Cardiac Catheterization.
Rahmawati, D., Astuti, W., & Sari, P. (2021). Differences in knowledge levels by gender in heart disease patients. Journal of Nursing Sciences, 9(1), 34–41. Sari, M.,
Sartika, & Pujiastuti. (2020). Hemodynamics in Post PCI (Percutaneous Coronary Inteirveintiion) Patients in the ICCU Room. Proceedings of the National Seminar.
Sinaga et al. (2022). The Effect of Health Education on the Level of Anxiety of Cardiac Catheterization at Omni Pulomas Hospital, East Jakarta. . *Journal Of Nursing And Midwifery Sciences*., 1(1), 1–7.
Starry. (2021). Hemodynamics in Post PCI (Peircutaneous Coronary Intervention) Patients.
Sukarini. (2022). Pre-Operative Education and Information Provision from Nurses to Patients.
Syara et al. (2023). Post-Percutaneous Coronary Heart Disease : *A Review Study Intervention School Of Nursing , Taipei Medical University* , Taipei City , Taiwan Roc. Coronary heart disease (pjk) by the accumulation of plaque in the walls of the arteries with pjk . 6(2).
Tao. (2020). Treatment of Patients Undergoing Cardiac Catheterization Procedures. *Idea Nursing Journal*, 3(3), 285–292.
Trisna, N. P. (2022). An overview of the reasons for couples of childbearing age in the use of IUD contraceptives in Tribuana Village, Abang District in 2022.
Warmansyah, J. (2020). Research and Data Processing Methods for Decision Making in Companies.
Who. (2021). *Cardiovascular Diseases*.
World Health Organization. (2023). Cardiovascular diseases (CVDs). https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds) Yusnita, A. (2020). Decline in cognitive function in the elderly and its impact on the learning process. Journal of Psychology, 15(2), 88–94.
Yuliana, N., & Ramadhani, R. (2021). The effect of education level on improving patient knowledge after health counseling. Indonesian Journal of Nursing, 24(2), 101–108.