

**Case Report**

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**Case Study: Application Of Slow Deep Breathing Intervention In Post-CABG Coronary Artery Disease Patients With Acute Pain Nursing Problems**Almay Rayhan Arrafi<sup>1</sup>, Ristina Mirwanti<sup>2</sup>, Aan Nur'aeni<sup>2</sup><sup>1</sup>Faculty of Nursing, Universitas Padjadjaran, Indonesia<sup>2</sup>Departement Emergency and Critical Care, Faculty of Nursing, Universitas Padjadjaran, Indonesia**ARTICLE INFO****Article history:**

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**ABSTRACT**

Coronary Artery Disease (CAD) is a cardiovascular disease. Coronary Artery Bypass Graft (CABG) is a revascularization therapy in CHD which causes side effects in the form of pain which can worsen the patient's health if left untreated. The use of pharmacological therapy requires additional therapy such as non-pharmacological therapy to support the success of the pharmacological therapy that has been given. Slow Deep Breathing has the potential to be an intervention that nurses can perform to efficiently manage pain. The purpose of writing this article is to report on the implementation of Slow Deep Breathing (SDB) interventions in patients with CHD after the Coronary Artery Bypass Grafting procedure with acute pain nursing problems. There was a 66-year-old patient with a history of CAD who had performed the second day of the CABG procedure and experienced chest pain after CABG surgery accompanied by tightness. Slow Deep Breathing given for 15 minutes every time the patient feels pain can potentially be an additional pain management intervention for patients with post-CABG chest pain.

## Introduction

Coronary Heart Disease (CHD) or Coronary Artery Disease (CAD) is a very dangerous heart disease. The World Health Organization (WHO) states that CHD is the cause of death with a rapidly increasing number of 6.7 million cases (WHO, 2019). Based on data from the 2019 Basic Health Research results, shows a prevalence of 1.5%

Indonesian people suffer from coronary heart disease. Meanwhile, according to the 2018 Sample Registration Survey, it showed that 12.9% of deaths that occurred in Indonesia were due to CHD (Ministry of Health RI, 2019).

CHD is a cardiovascular disease that refers to pathological changes in the walls of the coronary arteries which result in decreased blood flow to the heart organs. An imbalance in meeting oxygen demand due to decreased blood flow can cause weakness or death of heart cells (Fikriana, 2018).

CHD is caused by cholesterol, a waxy substance that builds up in the lining of the coronary arteries to form plaque. This buildup can partially or completely block blood flow in the large arteries of the heart. Over time, if this is left unchecked, atherosclerosis will occur (National Heart, Lung, and Blood Institute, 2022). The cause of atherosclerosis is an unhealthy lifestyle such as smoking and drinking excessive amounts of alcohol. In addition, a person is at high risk of experiencing atherosclerosis if they have several conditions such as high cholesterol levels, hypertension, or diabetes (NHS.UK, 2020).

The main symptoms of CHD are chest pain, shortness of breath, feeling whole-body aches, feeling like you are about to faint, and nausea (NHS.UK, 2020). CHD symptoms may differ for each individual. However, individuals who experience CHD don't have specific symptoms so they don't know that they have CHD (National Heart, Lung, and Blood Institute, 2022)

In individuals who have risk factors for CHD, a diagnostic examination must be carried out to support the medical diagnosis. Some of the diagnostic tests that must be carried out are a

treadmill test, radionuclide scan, CT scan, MRI scan, and coronary angiography (NHS.UK, 2020). Meanwhile, according to the Centers for Disease Control and Prevention (2021), diagnostic examinations for CHD can be carried out by examining the EKG, ECG, exercise stress test, chest X-Ray, cardiac catheterization, and coronary artery calcium scan.

CHD if left unchecked will cause complications such as arrhythmias, acute coronary syndrome, congestive heart failure, mitral regurgitation, ventricular wall rupture, pericarditis, aneurysm formation, and mural thrombus (Shahjehan & Bhutta, 2022). Therefore, there is a need for proper handling of CHD.

Several treatment measures can be taken to treat CHD, ranging from lifestyle changes, pharmacology, to surgical procedures. Surgical procedures are performed if treatment through a healthy lifestyle and pharmacology is no longer feasible. Two types of surgical procedures can be performed, namely Percutaneous Coronary Intervention (PCI) and Coronary Artery Bypass Grafting (CABG) (Cleveland Clinic, 2022).

Percutaneous Coronary Intervention (PCI) or coronary angioplasty is a minimally invasive procedure, this procedure uses a small balloon to reopen blocked arteries and help blood flow to flow better, after which a stent will be placed to keep the artery open. While CABG is a surgical procedure that aims to create a new pathway for blood to flow. This pathway is known as returning blood flow to the heart. This procedure is performed on patients who already have severe coronary artery blockage (Cleveland Clinic, 2022). CABG is performed by transplanting the patient's arteries originating from the legs, arms, or chest that are placed on the heart to replace blocked and narrowed coronary arteries (Pahlawi & Setivani, 2021).

After the CABG procedure, the patient undergoes rehabilitation in the intensive care unit. Nurse practitioners need to pay attention to post-CABG care starting from monitoring potential complications during recovery, handling appropriately when complications arise, monitoring and optimizing the treatment given,

and monitoring the return of body activities and functions safely (Waard, Fagan, Minnaar, & Horne, 2021). According to Waar (2021), post-CABG patients will have symptoms that will appear and need attention to be treated immediately such as chest pain, shortness of breath, and disturbances due to decreased cardiac output.

Post-CABG pain can be caused by several factors, namely musculoskeletal problems, myocardial ischemia (graft stenosis/occlusion, pericarditis (Dressler's syndrome), pulmonary embolism, aortic dissection, sternal or non-union wound infections, pneumonia, and stomach ulcers (Wayne & Wayne, 2014). Additional tests are needed to find out the causes of the chest pain elicited. A thorough physical examination can be performed, such as checking vital signs to detect the presence or absence of tachycardia, high blood pressure, heart murmurs, epigastric tenderness, and the presence or absence of additional breath sounds.

According to Gimpel (2019), several possible characteristics of chest pain arises, chest pain that arises suddenly or gets worse, may be caused by ischemic heart disease or aortic dissection, pain localized to the surgical scar, and accompanied by erythema or discharge at the site, fever, or malaise, suspected sternal wound infection, persistent postoperative pain with normal findings on assessment and investigation may be associated with a musculoskeletal cause or chronic postoperative pain.

Pain is an unpleasant experience both sensory and emotional due to tissue damage (Schung et.al, 2015; Morgan, 2013). Pain can cause neurohormonal and physiological responses that disturb the body where pain stimulates the release of catecholamines and the activity of the sympathetic nervous system which causes hypertension, tachycardia, tachypnea, and increased cardiac oxygen use. If this condition is not treated, it can cause left ventricular dysfunction, myocardial ischemia, breathing pattern disturbances, and lung complications that worsen the patient's health condition (Hardin & Kaplow, 2020). So there needs to be a lot of

focus on providing adequate pain management and preventing unwanted outcomes.

Pain management in post-CABG patients mainly uses pharmacological therapy such as analgesics and opioids. The use of pharmacological therapy as pain management needs to consider the side effects of the drugs given. So that it requires non-pharmacological therapy to be given to support the success of pharmacological therapy that has been given to patients after CABG surgery (Leutually, et al., 2022). Non-pharmacological therapies that can be applied to post-CABG patients include Atrial Pacing, Anterior Fat Pad (AFP) (Haghjoo, 2012), Slow Deep Breathing, Ice Pack (Gorji et.al, 2014), Music Therapy, Massage, Ice Therapy, and Warm Therapy (Leutually, et al., 2022). Slow Deep Breathing is a technique that can potentially be used by nurses to efficiently manage pain. This technique is a technique that can effectively reduce pain levels with techniques that are simple, non-invasive, cheap, easy, and minimal risk (Jarrah, et al., 2022)

The purpose of writing this article is to report on the implementation of the Slow Deep Breathing intervention in patients with CHD after the CABG procedure with acute pain nursing problems..

## Method

This study used a research design in the form of a case study method to explain the implementation of the Slow Deep Breathing intervention in patients with CHD after the CABG procedure with acute pain nursing problems. Case studies were conducted on patients who had agreed to participate in the study. Data was collected through interviews, observation, and documentation. In addition to the Autonomy aspect, Researchers apply ethical aspects such as providing benefits through Slow Deep Breathing therapy (Beneficence), Avoiding harm to patients (Non-Maleficence), Using patient data and information confidentially

(Confidentiality), as well as other aspects such as Justice, Veracity, and Fidelity.

Slow Deep Breathing is given to the patient for 15 minutes at each complaint of moderate pain. This intervention was carried out for 3 days by the patient in the ward. The patient's response to the intervention was evaluated during the second and third days using the Visual Analogue Scale (VAS) and measuring the client's blood pressure, pulse, and respiration.

## Results

A 66-year-old female patient with a history of controlled hypertension with CHD and had PCI performed. The client comes to the hospital with complaints of pain and tightness in the chest area. In angiographic examination found severe stenosis in the distal LM, LAD in ostial to proximal, LCX in ostial to proximal, RCA in the mid area, and CAD LM 3 VD. Then the patient was decided to do Coronary Artery, Bypass Graft.

After the surgery, the client was recovered in the ward and experienced complaints of pain accompanied by shortness of breath. The pain is felt to come and go suddenly and found ST elevation on V2 in the patient's ECG examination. The patient has removed the chest tube and ventilator, but the patient still has a nasogastric tube, nasal cannula, a and volley catheter installed on the second day (1 day after surgery). Clients receive several pharmacological therapies including.

Drug	Dose
Paracetamol	1 gr/6 hours
Cefotaxime	1 gr/8 hours
Morphine	15 mcg/ KgBB /hour
Dobutamine	7.5 mcg/ KgBB /hour
Aspilet	80 mg/ day
Amiodarone	720 mg/24 hours
Omeprazole	40 mg/12 hours

Table 1Therapy Pharmacology administered to the patient

The nursing problem raised from complaints of pain submitted by patients is acute pain. The emerging nursing diagnosis is acute pain associated with postoperative tissue continuity (CABG) characterized by patients complaining of intermittent pain in the chest area with a VAS pain scale of 6 (0-10), pain accompanied by shortness of breath, the patient looks grimacing and there is muscle tension. , blood pressure 125/68 mmHg, pulse rate 106 x/minute, and respiratory rate 23 x/minute. There is a challenge in cases found where complaints of pain are accompanied by shortness of breath which continues with hypoxia with a SpO2 of 90%.

The purpose of nursing care is that after nursing actions for 3x24 hours, the pain level has decreased with the following criteria: decreased pain complaints, decreased pain scale, no grimacing, decreased muscle tension, improved blood pressure, and improved pulse frequency.

Interventions carried out to treat acute pain are pain management by observing the location, duration, frequency, and scale of pain, non-verbal pain responses, non-pharmacological therapy in the form of Slow Deep Breathing, facilitating rest and sleep, facilitating comfortable positions, and collaborating with doctors to administering analgesics (morphine and paracetamol) and other drugs (dobutamine, aspirin, and amiodarone).

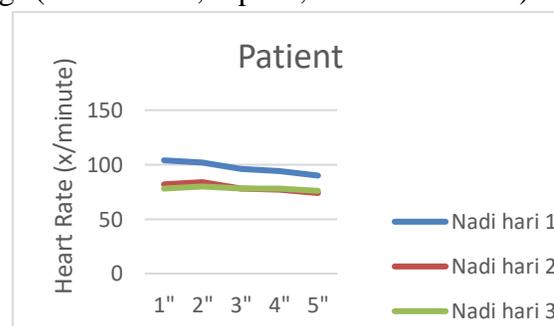


Diagram 1 Patient Hearth Rate Monitoring

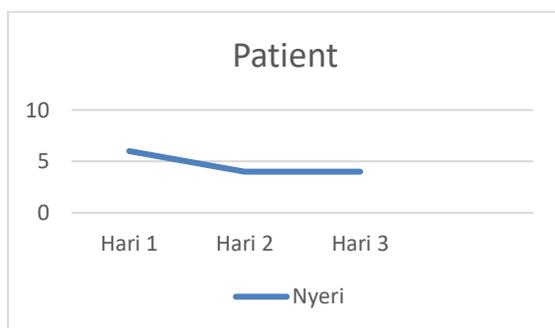


Diagram 2 Patient Pain Scale Monitoring

On the first day, the VAS score shown before the Slow Deep Breathing intervention was 6 (0-10) and obtained a blood pressure value of 125/68 mmHg, pulse 106 x/minute, and breathing 23 x/minute with complaints of pain and shortness of breath. Then education is given about Slow Deep Breathing therapy as pain management to overcome the level of pain felt by the patient. Then after doing Slow Deep Breathing the patient said he felt more relaxed and calm. On the second day, after the intervention was given, a VAS score of 4 (0-10) was obtained with a blood pressure of 120/82 mmHg, pulse 99x/minute and respiration 22 x/minute. On the third day, an evaluation was carried out to obtain a VAS score of 4 (0-10) with a blood pressure of 119/78 mmHg, pulse 96 x/minute, and respiration 19 x/minute. The patient said that the Slow Deep Breathing intervention apart from helping to reduce pain also helped the client's body and mind to calm down and relax.

## Discussion

This case study uses Slow Deep Breathing as a pain management intervention for Post CABG CHD patients. After 3 days of implementing the Slow Deep Breathing intervention, it was found that the patient experienced a decrease in pain levels. This condition is indicated by a decrease in the pain scale from 6 (0-10) to 4 (0-10) with

blood pressure 119/78 mmHg, pulse rate 96 x/minute, and respiratory rate 19 x/minute.

According to Gimpel (2019), several possible characteristics of chest pain arises, chest pain that arises suddenly or gets worse, may be caused by ischemic heart disease or aortic dissection, pain localized to the surgical scar, and accompanied by erythema or discharge at the site, fever, or malaise, suspected sternal wound infection, persistent postoperative pain with normal findings on assessment and investigation may be associated with a musculoskeletal cause or chronic postoperative pain.

Post-CABG chest pain can be caused by ischemia where which can occur in 19% of post-CABG cases. This condition is caused by a stenosis or blockage in an artery that is transplanted or not (Waard et.al, 2021). The use of antiplatelets such as acetylsalicylic acid or clopidogrel or ticagrelor can prevent blockages in these arteries and is recommended by the Canadian Cardiovascular Society guidelines (Tanguay, Bell, & Ackman, 2018).

Post-operative pain is one of the most common complaints of patients undergoing CABG in the hospital. The existence of a surgical procedure for CABG causes damage to the layers of skin and tissue which causes a painful sensation. Most postoperative patients experience moderate to severe pain (Darawad, Al-Hussami, Saleh, Al-Sutari, & Mustafa, 2015).

Pain is an unpleasant experience both sensory and emotional due to tissue damage (Schung et.al, 2015; Morgan, 2013). Watt Weston (2001) reported that 69% of patients had complaints of moderate to severe pain. In addition, Parry et al. (2010) said that pain sensitivity increased from moderate to severe due to coughing and breathing (43%), general activities (33%), mood (30%), and walking (27%). In general, wounds associated with surgical incisions cause moderate to severe pain

that can be repaired from time to time but can interfere with the patient's daily activities such as coughing, breathing, or other general activities.

The Slow Deep Breathing technique is a technique that is often used and is considered effective in reducing pain. Based on research conducted by Gorji (2014) investigating the impact of the application of ice packs and breathing exercises with acetaminophen on pain levels for post-cardiac surgery patients, the results of this study indicate that both methods can significantly reduce pain levels ( $p < 0.001$ ).

Slow Deep Breathing is a relaxation exercise that has long been used to reduce blood pressure, increase alveoli ventilation, reduce anxiety levels, and reduce pain levels in patients (Tarwanto, 2012). Based on research conducted by Mokadem (2017) found results where post-CABG patients who were given deep breathing therapy statistically significantly reduced pain levels in patients ( $p < 0.001$ ). In addition to overcoming pain, breathing exercises are considered capable of overcoming hypoxia after CABG (Fahmi, 2022). Deep breathing techniques can relax skeletal muscles increasing prostaglandins which affect blood vessel vasodilation to increase blood flow to improve spasms and ischemia, besides that a stimulant increase in sympathetic nerves causes a decrease in the hormones cortisol and adrenaline to reduce stress, feel calm, and increase blood levels. oxygen in the blood (Smeltzer, 2016).

Breathing is important and affects the whole body, breathing properly can oxygenate the body, trigger energy production, increase focus and concentration, eliminate toxins, and increase feelings of calm and relaxation which can reduce pain (Hebert, 2012) (Eldin, Mohamed, & Ragab, 2015)

In the study, Slow Deep Breathing was carried out for 5-15 minutes for each intervention. This technique can be done by

doing slow deep breaths 10 times which are repeated 3 times, then each set is given rarely 30-60 seconds so that the patient is not too tired.

However, according to the American Lung Association guidelines in Jarrah's research (2022), this technique is added by inhaling through the nose with the hand held on the stomach then holding the breath for 3 seconds and ending expiration with pursed-lip breathing for 2-3 seconds. However, in a study conducted by Boaviagem (2017), Deep Breathing was carried out with 5 seconds of inspiration followed by 5 seconds of expiration using pursed-lip breathing with a 1-2 second pause between inspiration and expiration.

Many deep breathing techniques can be applied and no assessment determines which technique is the most effective, but several things can become technical principles in doing Slow Deep Breathing starting from maximum inspiration, holding your breath between inspiration and expiration, and expiration. with positive pressure in a relaxed and appropriate manner (Westerdahl, 2015). Maximal inspiration can maximize the distribution of air ventilation throughout the lung fields, holding breath between inspiration and expiration is done to reduce airway collapse and overcome atelectasis, while exhalation with positive pressure is relaxed to maximize the respiratory cycle and prevent lung fatigue. (Westerdahl, 2015).

The Slow Deep Breathing technique can be instructed independently which can provide comfort easily even though the technique carried out with the guidance of a nurse is more effective than self-directed.

## Conclusion

Intervening Slow Deep Breathing for 15 minutes every time the patient feels pain can be a potential intervention for additional pain management in post-CABG surgical patients

with acute pain problems. Further research is needed to support the application of Slow Deep Breathing as an effective pain management technique.

## Referensi

- American Lung Association. (2018, Januari 20). *Breathing Exercise*. Retrieved from American Lung Association: <https://www.lung.org/lung-health%20diseases/wellness/breathing-exercises>
- Boaviagem, A., Melo, E. J., & Lubambo, L. (2017). The effectiveness of breathing patterns to control maternal anxiety during the first period of labor: a randomized controlled clinical trial. *Complement Therapy Clinical Practice*, 26: 30-35.
- Centers for Disease Control and Prevention. (2021, Juli 19). *Heart Disease*. Retrieved from Centers for Disease Control and Prevention: [cdc.gov/heartdisease/coronary\\_ad.htm#:~:text=Narrowed%20arteries%20can%20cause%20chest,the%20rest%20of%20your%20body.&text=Over%20time%2C%20CAD%20can%20weaken,blood%20the%20way%20it%20should](https://www.cdc.gov/heartdisease/coronary_ad.htm#:~:text=Narrowed%20arteries%20can%20cause%20chest,the%20rest%20of%20your%20body.&text=Over%20time%2C%20CAD%20can%20weaken,blood%20the%20way%20it%20should)
- Cleveland Clinic. (2022, Agustus 19). *Coronary Artery Disease*. Retrieved from my.cleveland: <https://my.clevelandclinic.org/health/diseases/16898-coronary-artery-disease>
- Darawad , M., Al-Hussami, M., Saleh, A., Al-Sutari, M., & Mustafa , W. (2015). Predictors of ICU patients' pain management satisfaction: a descriptive cross-sectional survey. *Australian Critical Care*, 28(3): 129e33. <https://soi.org/10.1016/j.aucc.2014.07.003>.
- Eldin, S., Mohamed, H., & Ragab, I. (2015). Effect of relaxation breathing technique among patients with moderate burn of their pain and anxiety at wound care. *World J Nursing Science*, 1(3):110e23. <https://doi.org/10.5829/idosi.wins.2015.110.123>.
- Fahmi, I., Nurachmah, E., Dianingtyas, H. E., Kamal, M., & ganefianty, A. (2022). Application of Breathing Exercises Using Ida Jean Orlando's Dynamic Nurse-Patient Relationship Model in Overcoming Postoperative Hypoxia (POH) after Coronary Artery Bypass Grafting: A Case-Series. *Nurse Media Journal Of Nursing*, 12(2):249-257, DOI: <https://doi.org/10.14710/nmjn.v12i2.45394>.
- Gimpel, D., Kahn, Z., Fisher, R., & McCormack, D. (2019). Primary care management of chest pain after coronary artery bypass surgery. *the bmj*, 1-6.
- Gorji, H., Nesami, B., Ayyasi, M., Ghafari, R., & Yazadani, J. (2014). Comparison of ice pack application and relaxation therapy in pain reduction during chest tube removal following cardiac surgery. *Nursing American Journal Medical Science*, 6(1):19e23. <https://doi.org/10.4103/1947-2714.125857>.
- Haghjoo, M. (2012). Pharmacological and Nonpharmacological Prevention of Atrial Fibrillation after Coronary Artery Bypass Surgery. *The Journal of Teheran University Heart Center*, 7 (1) : 2-9.
- Hardin, S., & Kaplow, R. (2020). *Cardiac surgery essentials for critical care nursing, third edition*. Burlington: Jones & Bartlett Learning.
- Hebert, S. (2012, December 04). *The importance of proper breathing in managing chronic pain*. Retrieved from Michifan State University Extension: [https://www.canr.msu.edu/news/the\\_importance\\_of\\_proper\\_breathing\\_in\\_managing\\_chronic\\_pain](https://www.canr.msu.edu/news/the_importance_of_proper_breathing_in_managing_chronic_pain)
- Jarrah, M., Hweidi, I., Al-Dolar, S., Alhawattmeh, H., Al-Obeisat, S., Hweidi, L., . . . Alkouri, O. (2022). The effect of slow deep breathing relaxation exercise on pain levels during and post chest tube removal after coronary artery bypass graft surgery. *International Journal of Nursing Sciences*, 155-161.
- Kemkes. (2021, September 28). *penyakit jantung koroner didominasi masyarakat kota*. Retrieved from sehatnegeriku: <https://sehatnegeriku.kemkes.go.id/baca/umum/20210927/5638626/penyakit-jantung-koroner-didominasi-masyarakat-kota/>
- Leutualy, V., Madiuw, D., Tasijawa, F. A., Sumah, D. F., Manuhutu, F., & Maelissa, S. (2022). Non-pharmacology Interventions on Pain in Critically Ill Patient: A Scoping Review. *Open Access*

- Macedonian Journal of Medical Science*, 10(F): 182-189. *journal*, 193(19): E689-E694, doi: 10.1503/cmaj.191108.
- National Heart, Lung, and Blood Institute. (2022, Maret 24). *coronary heart disease*. Retrieved from National Heart, Lung, and Blood Institute: <https://www.nhlbi.nih.gov/health/coronary-heart-disease>
- NHS.UK. (2020, Maret 10). *Coronary Heart Disease*. Retrieved from NHS: <https://www.nhs.uk/conditions/coronary-heart-disease/>
- NHS.UK. (2021, November 23). *Coronary Artery Bypass Graft*. Retrieved from NHS: <https://www.nhs.uk/conditions/coronary-artery-bypass-graft-cabg/#:~:text=A%20coronary%20artery%20bypass%20graft,oxygen%20supply%20to%20the%20heart>
- Parry, M., Watt-Watson, J., Hodnett, E., Tranmer, J., Dennis, C.-L., & Brooks, D. (2010). Pain Experiences of Men and Women After Coronary Artery Bypass Graft Surgery. *The Journal of Cardiovascular Nursing*, 25(3), E9–E15. doi:10.1097/jcn.0b013e3181cd66be
- Schung, SA., Palmer, GM., Scott, DA., (2015). *Acute pain management: scientific evidence*. 4th ed. Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine, 2015. 1-5 p.
- Shahjehan, R. D., & Bhutta, B. (2022). *Coronary Artery Disease*. StatPearls Publishing LLC.
- Smeltzer, Suzanne C. & Bare, Brenda G. (2016). Brunner & Suddarth's textbook of medical surgical nursing 8th ed. (Agung Waluyo et. al., Penerjemah). Philadelphia: Lippincott
- Tanguay, J. F., Bell, A. D., & Ackman, M. L. (2018). Canadian Cardiovascular Society guidelines for the use of antiplatelet. *Canadian Journal Cardiology*, 29:1334-45.
- Watt-Watson, J., Stevens, B., Garfinkel, P., Streiner, D., Gallop, R. (2001). Relationship between nurses' pain knowledge and pain management outcomes for their postoperative cardiac patients. *J Adv Nurs*. 2001;36(4):535Y545.
- Wayne, S., & Wayne, V. (2014, September). *Atypical chest pain after coronary artery bypass graft*. Retrieved from Australian Family Physician: <https://www.racgp.org.au/afp/2014/september/atypical-chest-pain-after-coronary-artery-bypass-g>
- Westerdahl, E. (2015). Optimal technique for deep breathing exercise after cardiac surgery. *Minerva Anestesiologica*, Vol 81 . No.6 (678-683).
- WHO. (2022, Desember 20). *cardiovascular-disease*. Retrieved from health-topics: <https://www.who.int/health-topics/cardiovascular-diseases/>
- Waard, d. d., Fagan, a., Minnaar, c., & Horne, d. (2021). management of patient after coronary bypass grafting surgery: a guide for primary care practitioners. *canadian medical association*