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## Evidence-based nursing care of patient with acute myocardial infarction: Case report

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### Abstract

To achieve high-quality nursing care and management of acute myocardial infarction patients must be in accordance with evidence-based nursing practice and nurses' willingness to modify nursing practice when new evidence emerges. The framework for the comprehensive care and management of a patient with acute myocardial infarction includes a comprehensive nursing assessment, diagnosis, planning, intervention, and assessment process. This case study aims to explain and illustrate how to care for patients with acute myocardial infarction based on the rationale and nursing practice evidence underlying the holistic approach. Nurses have been shown to have an essential role in the diagnosis, management, and treatment of acute coronary syndromes. This is because nurses provide care directly to patients and can identify problems early.

**Keywords:** comprehensive nursing assessment, high-quality nursing care, evidence-based nursing practice, acute myocardial infarction

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### Introduction

Acute coronary syndrome (ACS) is the premier cause of fatality globally. About 30 to 40% of all deaths occur in Iraq due to cardiovascular disease. Myocardial infarction (MI) is one of the most common coronary heart lesions, an invisible epidemic in the 21st century, with prevalence approaching three million people worldwide, with more than one million deaths in the United States annually (Shabbir et al., 2021) [1]. Thus, changes in health care delivery and increased awareness of the urgency of treating patients with the acute coronary syndrome has led to the provision of thrombolysis in the emergency room (ER) rather than the coronary care unit (CCU).

Nurses play a vital role in the management of patients with ACS. The care of patients with ACS involves extensive monitoring and regular analysis of data to obtain situational awareness of the patient's evolution and risk for complications. However, constant in the management of the patient with myocardial infarction is the commitment of the nursing to an evidence-based holistic approach. This article applies a case study method to explore the present evidence-based nursing practice (EBNP) that informs the assessment, clinical decision-making, and selection of nursing interventions in the first 12 hours of holistic care of a patient with myocardial infarction. A pseudonym is used to maintain the patient's anonymity (Kelly, 2004) [2].

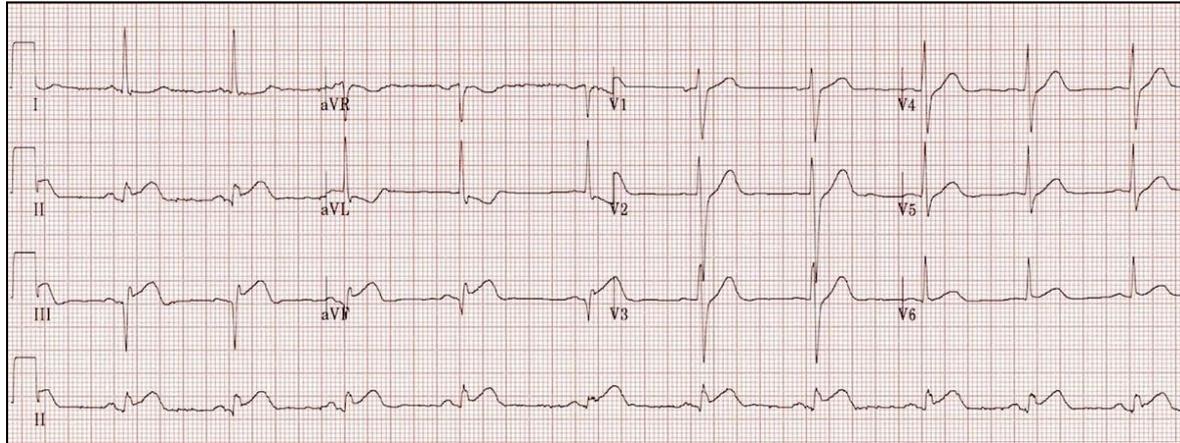
### Case Presentation

The patient was a man, 68 years old age smoker 20 cigarettes daily, with a history of hypertension and diabetic Mellitus, was admitted to the emergency department (ED) complaining of chest pain. He states that the pain began before 20 minutes earlier and consisted of acute pain lasting about one minute, followed by a dull pain that lasted around one minute. The pain was located over his left chest area, somewhat near his shoulder. The pain started when the patient was walking in his home. He did not sit and rest during the pain but continued to do housework. Following his presentation to the emergency department, he noticed pain as he got out of bed. Once again, it was a dull pain, preceded by a short interval of sharp pain.

An immediate electrocardiograph (ECG) (Figure 1), together with a brief, targeted history and physical examination, confirmed a diagnosis of an inferior myocardial infarction (MI). An additional, performed right-sided ECG that excluded concurrent right ventricular involvement. The ECG is highly specific for MI (95% to 97%) yet not sensitive (approximately 30%). Right-sided, posterior lead placement, and repeat ECG testing can increase electrocardiograph sensitivity. At the emergency department, the patient was given nitroglycerin, which he claims helped alleviate the pain somewhat. During these pain episodes, the patient has not experienced any shortness of breath, nausea, or diaphoresis. Electrocardiograph findings suggest ongoing coronary artery occlusion (in the absence of left ventricular hypertrophy and bundle branch block).

In past medical history, inactive medical problem patient has significant for hypertension and diabetes before five years age, in past surgical history patient has not done any surgical operation previously, but he was doing percutaneous coronary intervention before six months. The patient takes irregular medication and is not

committed to the doctor's instructions. He has a positive family history of chronic diseases, patient's mother died due to complications of heart failure, and the patient's father died due to cancer, unknown type.



**Fig 1:** ECG of patient indicating he has inferior myocardial infarction with ST-segment elevation in leads II, III, aVF, and Q-wave formation in III and aVF

### In the Emergency Department Immediate Nursing Management

Immediate nursing care and management in the emergency department was as follows:

- Reassured patient and his family
- Ascertained vital signs (blood pressure, pulse rate, and respiratory rate)
- Delivered oxygen therapy via nasal cannula at 2 litres/minute and commenced continuous monitoring of oxygen saturation Applied continuous cardiac monitoring and observed ECG changes. Administered in an effervescent dose of aspirin 300 mg,
- Placed in both arms intravenous (IV) accesses
- Reserved to complete blood count, blood specimens for biochemical profile, coagulation studies, and troponin I

Observing and monitoring the indications and contraindications to thrombolysis and following hospital's evidence-based guidelines for the treatment of myocardial infarction (Table 1), the patient was administered intravenous thrombolytic and adjunctive therapy with his consent within 20 minutes of arrival at the emergency department. This is referred to as the door-to-needle time, so the 20 minutes was duly checked.

**Table 1:** Guidelines of the hospital for the evidence-based treatment of acute coronary syndrome thrombosis

<p><b>Administered sublingual nitroglycerine at 5-minute intervals to a maximum of 3x2 puffs</b></p> <p>Clonidogrel 300mg orally</p> <p>Observed indications and contraindications to thrombolytic therapy</p> <p>Consent to administer thrombolytic therapy was obtained</p> <p>Subcutaneous low weight molecular heparin at 1mg/kg</p> <p>Intravenous metoprolol 5mg over 5 minutes, repeated x2 to 15mg total</p> <p>Administered morphine intravenous at 2.5mg</p>
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### Transfer Preparation

Jennifer Kornusky, (2021) <sup>[3]</sup> advised that patients with uncomplicated MI are best cared for in specialist CCU. Therefore, attention was directed towards preparing for the patient's safe transfer from the ER to CCU and placed specific emphasis on the provision and functionality of vital transfer equipment, such as (oxygen supply, cardiac monitor, defibrillator, pulse oximetry, emergency drugs). Before the patient's transfer from the emergency room, a precursory history and summary of treatments received was communicated to the coronary care staff by the chest pain nurse specialist, obtained comprehensive verbal and written report once the patient was safely transferred to his monitored coronary care bed (Smith et al., 2018) <sup>[8]</sup>. A comprehensive, holistic approach was carried out to assess the patient in the coronary care unit, which assessed his overall condition. Maintaining accurate clinical records was also essential for accurately assessing the patient's physical, psychological, and social well-being. Whenever necessary, the views and observations of family members were obtained concerning that assessment. Throughout his assessment, the patient was reassured, and interventions were explained, signifying that care was taken to maintain his dignity and privacy (Miao et al., 2020) <sup>[5]</sup>. History and physical examination are often inconsistent when evaluating acute myocardial infarction. The history should focus on the onset, quality, and associated symptoms. Recent studies have found that men with sweating and bilateral arm pain radiating are often associated with myocardial infarction (Mechanic et al., 2021) <sup>[4]</sup>.

### **Assessment of hemodynamic**

An assessment of vital signs, including blood pressure, heart rate, and a 12-lead electrocardiogram, was immediately performed. The left arm was used to assess blood pressure because of its proximity to the main aorta. The relative absence ‘coolness’ of patient’s distal limbs served as a quick and helpful guide to peripheral perfusion. ECG monitoring to assess dysrhythmias and ST-segment elevation has been implemented as an assessment tool because it is non-invasive, well tolerated by patients, and provides continuous information about the heart (Kelly, 2004) <sup>[2]</sup>. However, it must be remembered that the patient is always more important than the monitor. Electrocardiographs are an aid to, and not a substitute for, patient care (Kornusky, 2021) <sup>[3]</sup>. Therefore, it was imperative to observe the patient as well as the monitor. Furthermore, Amit S. Dhamoon, Rojeena Chapagain, and Niranjana Ojha et al. (2021) <sup>[6]</sup> advise that hemodynamic stability assessment should also consider the pathophysiology and compensatory changes to the underlying problem of the patient. Subsequently, a working comprehension of the pathophysiology of inferior myocardial infarction underpinned the patient’s hemodynamic assessment process.

### **Assessment of Respiratory**

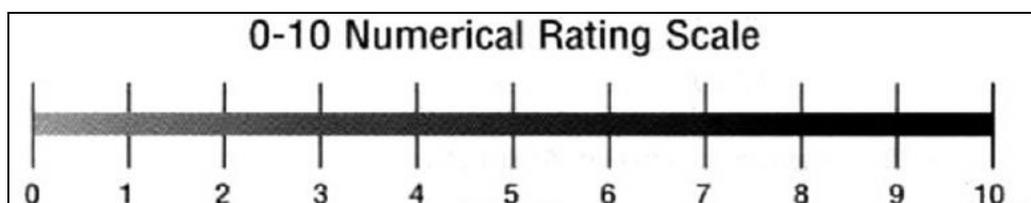
Initial assessment of the patient involved the nurse observing problems, such as visible cyanosis of the lips or being cold to the touch. Rate, rhythm, and regularity of breathing as well as chest expansion were all noted and documented (Docherty, 2002). Chest wall symmetric, skin condition, and assessed and documented no accessory muscle use, no tenderness to palpation and bilateral crackles throughout lung fields, no wheeze. Orna Avital and Jennifer Kornusky (2021) <sup>[3]</sup> demonstrated that hypoxemia in the first 24 hours after a myocardial infarction is a frequent and predictable occurrence that remains undetected unless a pulse oximeter is used. While pulse oximetry was used continuously to assess the patient’s oxygenation status, it was acknowledged that factors can interfere with pulse oximeter accuracy. However, pulse oximetry measurement is only one component of the complex of the oxygen metabolism system. Therefore, the respiratory assessment was also carried out for signs and symptoms of fatigue, weakness, exertional dyspnea, or dizziness, which may indicate tissue hypoxia (Kelly, 2004) <sup>[2]</sup>.

### **Pain assessment**

Priority pain assessment, a because continued pain is a symptom of ongoing myocardial infarction, which places the additional risk on non-infarcted myocardial tissue, commented that pain and pain assessment is vital to good medical and nursing care for judging a patient’s progress, treatment impact, and occasionally arriving at a proper diagnosis. The patient’s chest pain assessment implemented the P, Q, R, S, T approach (Table 2). Used the Manchester triage pain (Figure 2) assessment ruler to minimize bias, obtain reliable and valid data, and assess the severity of the patient’s pain accurately and consistently. The Manchester Triage Group (1997) cautioned that the environment and patient’s perceptions and beliefs can be barriers to effective pain assessment. Therefore, the Patient’s pain assessment also noted subjective manifestations such as grimacing, increased muscle tone, or restlessness.

**Table 2:** P, Q, R, S, T approach to the assessment of chest pain

<p><b>Precipitating and palliative factors:</b> asked patients to describe what brought on the pain and what measures have helped relieve the pain</p> <p><b>Quality:</b> asked patients to describe in their own words what the pain feels like</p> <p><b>Region and radiation:</b> asked patients to point to the location of the pain, and if the pain goes anywhere</p> <p><b>Severity:</b> asked patients to rate the pain on a scale of 1–10, with 10 being the worst pain ever experienced</p> <p><b>T: Time:</b> asked patients how long the pain lasts and any temporal associations</p>
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**Fig 2:** Pain scale of Manchester triage.

### **Anxiety assessment**

Assessed patient’s level of anxiety because increased anxiety levels lead to increased neuroendocrine activity, which can worsen ischemia of the heart muscle. Verbal anxiety, tense facial expression, and body movements indicate the patient’s anxiety (Mechanic et al., 2021) <sup>[4]</sup>. Alternatively, autonomic responses to anxiety (rapid pulse rate, elevated blood pressure, increased respiration, mydriasis, dry mouth, and peripheral vasoconstriction) are often the most reliable indicator of the degree of anxiety when verbal and behavioral responses do not match the circumstance.

### Objective Findings

Generally, the patient is alert, responsive, and has some difficulty breathing but is able to speak in full sentences and has no fever, no chills, or sweats. The patient's blood pressure was 135/75 mmHg (was 150/70 mmHg at presentation to ED), and oxygen saturation was 98% on 2 liters of oxygen/minute, temperature 37.2°C, and respiratory rate was 16 cycles per minute, and heart rate 96 beats/minute with normal sinus rhythm and resolution of ST-segment elevation. Not present of neck vein distension and peripheral oedema. On chest auscultation, there was no evidence of adventitious sounds. Patient-reported his central chest pain as four on the Manchester triage scale and described the pain as quite bad, 'Moderate'. The results of the biochemistry profile, coagulation studies, complete blood count, and chest x-ray were unremarkable. However, the specific test for detecting myocardial damage, troponin I, was positive at 4.6 mg/dL.

### Findings of Psychosocial

Although anxious, the patient, a widowed farmer with four teenage children, was judgment and insight intact, fully attentive, and oriented when presented to the coronary care unit (Glasgow Coma Scale 15/15). Intact memory for recent and remote events, no depression or agitation but anxiety. In social history, the patient lives an active life, patient's house of the environment is good if was from healthy, heating, cooling, and lighting. The patient enjoyed excellent health until his admission. The patient's socio-economic status is adequate to some extent. The patient has smoked about 20 cigarettes per day since 20 years ago.

### Differential Diagnosis of chest pain

**Myocardial infarction:** occurs when the blood supply to the heart muscle through the coronary arteries is interrupted, resulting in ischemia. Risk factors that lead to myocardial infarction are atherosclerosis, angina, previous myocardial infarction or stroke, advanced age, smoking, hyperlipidemia, diabetes, hypertension, obesity, etc. A patient who has had an acute myocardial infarction usually has substernal chest pain that may spread to the shoulder, jaw, or arm, as well as shortness of breathing, palpitations, and sweating. The electrocardiogram will show evidence of ST-elevation or depression, Q waves, or inverted T waves. Cardiac enzymes such as troponin and CK-MB will usually increase within 3-12 hours after the onset of chest pain if the patient has had a myocardial infarction. Performed a series of 3 measurements of cardiac enzymes are usually done in order to monitor elevations over time. All patients suspected of having an myocardial infarction should receive aspirin and nitroglycerin, as was done in this patient's case. The patient's age, diabetes, and hypertension put him at an increased risk for myocardial infarction. His presentation isn't typical for a myocardial infarction since his pain is not substernal; there are no palpitations, sweating, or radiation of the pain. His ECG and initial normal cardiac enzymes also make it less likely that the patient currently has a MI. However, it would be ideal to perform another ECG tomorrow morning and repeat cardiac enzymes in 6-8 hours to ensure an MI will not be missed.

**Angina pectoris /Unstable Angina:** angina is chest pain that results from reduced blood flow and myocardial ischemia. The patient usually feels pressure, heaviness, or tightness in the chest caused by exertion or emotional stress. Worsening angina, angina at rest, or angina that lasts more than 15 minutes are all typical signs of unstable angina. A patient with unstable angina does not have ST elevation or new Q waves on ECG and normal serum CK-MB and troponin. Based on this information, it appears very likely that SR may have unstable angina. His chest pain was not prompted by exertion (as with stable angina) but occurred with varying degrees of activity, from rest (sitting in bed) to mild exertion (walking around the house). Also, once SR was given nitroglycerin in the ED, he stated his pain had subsided somewhat. The only history factor that makes a diagnosis of unstable angina less likely is that his chest pain lasts 2-3 minutes. Usually, chest pain associated with unstable angina and lasts more than 20 minutes in duration. Once SR is stable and myocardial infarction has been ruled out, he should undergo nuclear stress testing to evaluate him for unstable angina.

### Musculoskeletal

Chest pain must be differentiated from potentially life-threatening causes of chest pain such as myocardial infarction, pulmonary embolism, or aortic dissection. Usually, with musculoskeletal pain, the chest pain can be recurring on physical examination with palpation or with various exercises of the arms and trunk. The patient may also have a history of strength training, yard work, or other exercises that strained the chest muscles. Patients with Musculoskeletal chest pain may benefit from NSAIDs, muscle relaxants, or possibly narcotic analgesics. If all possible cardiac causes of chest pain can be excluded in the case, it is likely that his pain can be attributed to the musculoskeletal system, the first attack of chest pain, which may have strained the chest muscles.

On physical examination, chest pain was caused by palpation and deep inspiration, supporting a diagnosis of musculoskeletal pain.

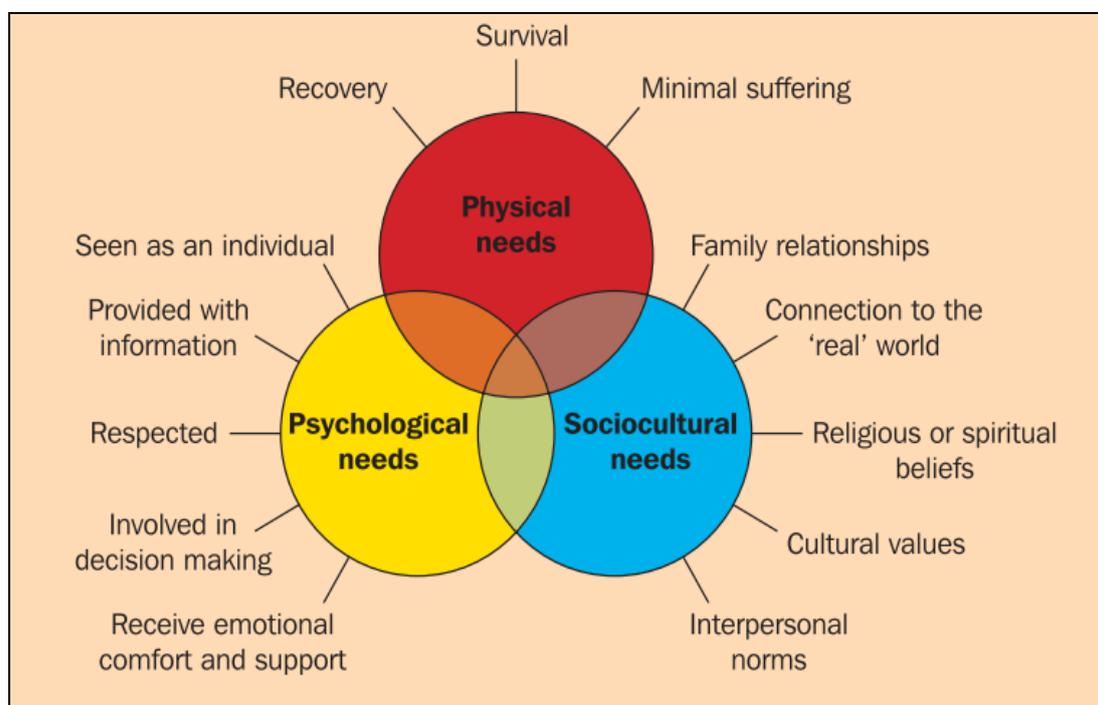
Depending on the clinical features, history, and diagnostic assessment, and data evaluation, it may include major nursing diagnoses. Ineffective heart tissue perfusion is associated with decreasing coronary blood flow. The risk of ineffective peripheral tissue perfusion is associated with decreased cardiac output from left ventricular dysfunction.

### Coordination of Care

A specialized team (interprofessional) manages acute myocardial infarction dedicated solely to cardiology. The team usually consists of a heart surgeon, interventional cardiologist, intensive care specialist, or cardiology nurse. The key to managing myocardial infarction is time until treatment. Thus, healthcare professionals, including nurses who work in the ED, should be aware of the symptoms of myocardial infarction and the importance of rapid triage. A cardiology consultation should be conducted immediately to ensure that the patient receives treatment within the recommended time frame. Because myocardial infarction can be associated with many serious complications, managing these patients in an intensive care unit setting is best. The pharmacist, nurse practitioner, and primary care providers should educate patients about taking nitroglycerin. The doctor should be called if there is no relief after three doses. The nurse must immediately communicate with the professional team in the triage process because the time for reperfusion is limited.

### Nursing Plan

The nursing goals for myocardial infarction were to relieve the patient's symptoms (chest pain, stabilize heart rhythm, etc...), limit the extent of myocardial damage, reduce cardiac workload, revascularize the coronary artery, preserve myocardial function, and manage and prevent cardiac tissue complications. The patient's nursing care plan included a human perspective (Figure 3), which took into account his physical needs related to his psychological, social, and cultural needs.



**Fig 3:** Critically ill human needs (adapted from Kelly, 2004) <sup>[2]</sup>.

### Interventions for pain relief

As discussed above, the patient's probability of having an acute cardiac or other life-threatening event is low. Having established that the patient three peripheral vascular lines were patent and intact, glyceryl trinitrate (GTN) 20 mg/20ml via syringe to dilate coronary arteries and reduce ischemic pain. Repeated narcotic drug therapy (a bolus of morphine 2-4 mg intravenously) is aimed at relieving pain and anxiety, as this may lower the arrhythmia threshold, increase the workload of the myocardium and provoke coronary spasm a stress test to identify any possible coronary causes of chest pain, such as unstable angina.

### Myocardial tissue perfusion interventions

Oxygen therapy was continued at 4 liters/minute via nasal cannula because it was essential to assist the myocardial tissue to continue pumping activity and to repair the damaged tissue around the site of the infarction. The upright position was preferred to promote better lung expansion, reduce venous return, lower preload, and reduce cardiac workload (Kelly, 2004) <sup>[2]</sup>. However, if the patient was offered a choice of position, it may have helped him retain a sense of control and prevented feelings of powerlessness. Oxygen therapy was humidified in order to avoid ciliary function damage and moisten the upper airway, thereby enhancing gas exchange. Bed rest was also pro- moted, as it effectively improves oxygenation, thereby promoting healing and relieving pain.

### Anxiety and stress relief interventions

Ongoing explanations, reassurance, and support were essential to alleviate the fear and anxiety of the patient and his family. Through the patient's behavioral, verbal, and involuntary responses, the nurse's therapeutic use of

touch contributed to reduced anxiety and illustrated touch as a powerful tool for maintaining patient privacy, coping mechanisms, and self-identity. However, it was also essential to establish and maintain professional boundaries by ensuring that the nurse-patient relationship does not become personal and avoiding over-sharing with the patient. In addition, measures to prevent the patient from experiencing stress included: Acknowledging his fears and anxieties, noise control, active listening, addressing and treating him respectfully, implementing care in a calm, supportive and confident manner, and spiritual care.

#### ***Intervention for hypertension control***

To control patient's blood pressure the nurse will continue patient's home medications of Furosemide 20Mg and Hyzaar 100/25Mg. Although his blood pressure was initially 150/70, it later stabilized to 110/65mmHg. The nurse will advise the patient to follow-up with his hypertension.

#### ***Intervention for Diabetes control***

The patient was recently diagnosed with borderline diabetes and tried to control it with diet and exercise. When presented in the emergency room, his blood sugar level was 360mg/dl. The nurse will place the patient on sliding scale insulin and continue to monitor blood glucose levels throughout his stay in the hospital. The nurse will also obtain a hemoglobin A<sub>1</sub>C to identify his sugars over the past three months. The nurse will encourage the patient to follow with his PCP about diabetes because diet and exercise appear to have failed, requiring medications to control diabetes.

#### ***Lifestyle Modifications***

Smoking cessation is the most cost-effective secondary procedure to prevent myocardial infarction occur. Smoking has a pro-clotting effect, strongly associated with atherosclerosis and myocardial infarction. A low-fat diet that focuses on whole-grain products, fruits, vegetables, and fish are considered cardioprotective. The target level for bodyweight is a body mass index of 20 to 25 kg/m<sup>2</sup> and a waist circumference of <94 cm for males and <80 cm for females.

#### ***Interventions for complications***

Dysrhythmias are experienced more frequently than any other myocardial infarction complication, with approximately 90 % occurring. The alertness of ventricular fibrillation was maintained with cardiac monitoring, representing life-threatening arrhythmias. Bed rest was strongly advocated reducing heart workload. To ensure patient's dignity and comfort and to facilitate monitoring of urinary output, permitted the use of a commode was allowed by the bedside. After the patient arrived at the coronary care unit, 10-15 second runs were observed from the accelerated ventricle rhythm and frequent and noted early ventricular contractions Mechanic et al. (2021) [4]. advise that this reperfusion arrhythmia are often self-limiting and may not require treatment. Nursing interventions also included being alert to any complications. It is clear that the patient did not develop complications or noticed significant deviations in his baseline subjective and objective observations.

#### **Patient education**

Patients should be taught any changes in diet and lifestyle that should be made.

**Diet:** low sodium, low cholesterol, avoid sugar/soda, avoid fried/processed foods.

**Exercise:** 30-45 minutes of moderate activity 5-7 days a week, unless otherwise instructed by a cardiologist. The patient's activity tolerance will determine this – how much he/she can do and still be able to breathe and be pain-free?

#### **Medication Instructions**

**Nitroglycerin:** take a single sublingual tab at the beginning of chest pain. If the pain does not subside after 5 minutes, call for help and take a second dose. You can take a 3rd dose 5 minutes after the second if the pain does not subside.

**Aspirin:** take 81 mg per day

Anticoagulant: can be prescribed to the patient if he/she has a stent placed. They should learn about the risks of bleeding.

#### **Evaluation**

After performing interventions within the time specified, as a result of evidence-based nursing interventions promptly, the nurse must verify that the patient's vital signs remained stable and resolved ST-segment elevation. In the first 12 hours of his hospitalization, the patient did not display any untoward effects of the thrombolytic therapy or MI complications, and chest pain and anxiety completely resolved. Stressed that patients admitted to hospital and survived MI are usually highly motivated to reduce the risk of further infarction. Therefore, referral forms have been prepared for a cardiac rehabilitation nurse, dietitian, and smoking cessation nurse. The patient and his family expressed satisfaction with their overall care.

**Evidence-Based Issues**

The earlier myocardial infarction is treated, the better the prognosis. Therefore, nurses should be careful about myocardial infarction symptoms and signs and reduce risk factors to improve outcomes.

**Conclusion**

The rapid expansion of treatment knowledge for patients with myocardial infarction has led to the awareness of the need to modify practice continually. In this case, the emergency department's reasonable and expeditious initiation of thrombolytic treatment provided an undeniable successful outcome. A safe and well-coordinated patient transfer to the appropriate coronary care unit setting ensured that further evidence-based nursing assessments and interventions could be provided. A humanistic assessment and an intervention strategy that includes the person's biopsychosocial and spiritual elements was the most appropriate approach to patient care in the CCU.

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