

NURSE’S KNOWLEDGE ABOUT IMPLANTABLE PACEMAKER CARE FOR ADULT PATIENTS WITH HEART FAILURE

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Abstract

Background: Pacemaker may be a supportive therapeutic modality won't to control long-term cardiac rhythm problems to save patients' lives from complications as sudden death. Nurse plays an important role for caring cardiac pacemaker patients.

Objective: To evaluate the Nurse’s Knowledge about Implantable Pacemaker Care for Adult Patients with Heart Failure

Method: A Descriptive study was performed on 40 nurses, who were working at Institute of cardiology, and caring the patients with implantable pacemaker in the intensive care unit at Bahawal

Victoria Hospital, Bahawalpur. A self-administered questionnaire and an observational checklist. The researcher integrated nurse’s Knowledge focused on analysis data collected during caring

patients with permanent pacemaker implantation. This phase had effects on nurses' knowledge based on patient adherence with pacemaker care practice and performing activity of daily living.

Results: The results showed statistically significant improvements in the knowledge of nurses ($p < 0.001$) and also, across all aspects of patient's adherence care practice and performing activity daily living after implementation ($P = 0.000^*$). This showed that 87.5% of nurses passed with high level of knowledge in nursing care for adult patients with pacemakers, while 12.5% had moderate level of knowledge. In addition, the undergraduate nurses have significantly higher level of knowledge than diploma nurses with a P-value of 0.001.

Conclusion: Nurses caring patients with implantable pacemaker have excellent knowledge, that patients showed better adherence with pacemaker care activities and increase independency for performing activity daily living. Moreover, it's a significant association has been found between education level with their knowledge scores.

INTRODUCTION

The normal, healthy heart contracts by an electrical impulse then passes to the muscles of the lower chambers of the heart via "wires", telling them to contract and cause a heartbeat. This system assists the heart to contract at an effective rhythm. A slow heart rate can be caused by any problem with this system. An artificial pacemaker may be needed to help the heart to pump in right way and make sure that the blood and oxygen are pumped to all parts of the body (Khanna 2026).

Cardiac pacemaker may be used to treat chronic and life-threatening dysrhythmias and are used to support heart rate when bradycardia occurs it can be used to regular heart rate. Advances in pacemaker technology have resulted in units programmable for single- and double chambered control. If the heart rate is less than 60 beats (30-40 beats) per minute and the heart fails to meet the tissue oxygen requirements will be inserted into the atrial or atrioventricular sinus node to compensate for tissue hypoxia and irregular heart rhythm, and patients with this system will be able to continue their life (Paton, Žera et al. 2025).

One of the most serious cardiovascular issues is cardiac rhythm disorder. Cardiac rhythm slowing can be treated with temporary or permanent pacemakers, which replace slow or irregular beats with regular beats. Bradycardia can cause decreased tissue perfusion, congestive heart failure, and dyspnea. When an arrhythmia is severe, it may necessitate immediate treatment to restore normal rhythm (Thabet 2019).

According to the World Health Organization (WHO), cardiovascular disease caused an estimated 17.9 million deaths worldwide in 2016 (Rakhshan, Hassani et al. 2020). In Malaysia, statistical data from 2012 revealed that 295.8% of deaths per 100,000 populations were caused by cardiovascular disease. It is also estimated that sudden cardiac death causes approximately 450,000 deaths worldwide (Benjamin, Muntner et al. 2019).

The latest evidence has revealed that globally, cardiovascular disease (CVD) is the leading cause of death, and around 80% to 86% of these deaths occur in low- and middle-income countries. Most South Asian countries, including Pakistan, Sri Lanka, Bangladesh, India, and Nepal, comprise more than a quarter of low and middle income Countries (LMICs) and are identified to have a higher risk of coronary heart diseases (CHD) as compared to other part of the globe. CVDs are the main cardiac problem among people in Punjab, Pakistan, which affected 17.5% of the studied population (Zubair, Nawaz et al. 2018).

Cardiac stimulation is now a common treatment for symptomatic bradycardia or high-grade atrioventricular block. Pacemaker implantation increases now days: due to technological advancements of these devices, as well as the growing number of clinical indications. Every year, 1.25 million permanent pacemakers are implanted worldwide (Raatikainen, Arnar et al. 2018).

The problem of heart rhythm can currently be treated with the use of a permanent pacemaker (PPM), which assists the heart when the rate of heart rhythm falls below 60 beats per minute. It functions as an artificial sino-atrial node, draining the heart's electrical system and increasing the heart rate to 60 beats per minute (van Eif, Devalla et al. 2018).

Pacemakers, both single-chamber and dual-chamber, are used in rhythm changes accompanied by cardiac slowing. If the heart rate is less than 60 beats (30-40 beats) per minute and the heart does not meet the requirements of tissue oxygen, a pacemaker will be implanted inside the atrial or atrioventricular sinus node to compensate for tissue hypoxia and abnormal heart rhythm, and patients with this device will be able to live (Thabet, Helmy et al. 2019).

Nurses should play a role in the care of patients with implantable peace maker by keeping pacemaker knowledge up to date through continuous training and education to ensure comprehensive care (Hassan Ali Awad, El Shahat Ahmed El Gammal et al. 2022). Pacemaker management knowledge is critical, and it is a key factor in ensuring that patients are fully informed and understand the pacemaker (Pavliček 2022). Nurses are said to play an important role in providing information to patients and family members prior to surgery, liaising with the multidisciplinary team (Joseph, Gopichandran et al. 2020).

Rationale of the study: As the pacemaker will be part of the patient's life expectancy, it is critical to assess patient and caregiver knowledge in order to prevent early complications and dysfunction and to provide immediate treatment. Due to normal extra cardiac stimulation, the pacemaker has also been reported to induce musculoskeletal attention of the diaphragm, pectoral, or intercostal muscles. Pacemaker implantation has also been shown to reduce the occurrence of falls, fall-related fractures, and fall-related injuries in patients with sinus node dysfunction.

These ongoing updates and challenges among pacemaker patients highlight the need for nurses to refresh their knowledge. Currently, limited research has been conducted on nurses' knowledge of pacemaker management in the local context. It is critical to identify basic information related to nurse knowledge in order to provide ongoing awareness of updated pacemaker information. As a result, this study was carried out to assess nurses' knowledge of the management of patients with pacemaker implantation (Ali Mahmoud, Shetaya et al. 2025).

LITERATURE REVIEW

This literature review was conducted using a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) chart style. First, articles were found by searching terms such as knowledge, nurses, and pacemakers. The articles were then filtered based on methodology and all descriptive cross-sectional studies were chosen. These articles were further filtered based on publication duration, with those published between 2020 and 2025 being selected.

A pacemaker is a piece of technology that uses electrical impulses to stimulate the heart muscle. The heart receives an electrical signal from pacemakers, which causes it to depolarize and contract at a set rate. When the patient's own intrinsic system is unable to keep pace, the pacemaker (or pacer) does so. A pulse generator produces the pacer's stimulus, which is then transmitted through electrodes or leads inserted into the epicardium or endocardium. In order to provide good nursing care for pacemaker patients, it is necessary to monitor for common problems, avoid dislodgment, and instruct the patient on how to use and maintain their device.

A cross-sectional study was carried out to evaluate nurses' roles in the care of patients with permanent pacemakers. With 80.0% of the nurses studied had an unsatisfactory level of total knowledge regarding the care of patients with permanent pacemakers. It is demonstrated that 86.7% of the nurses studied had incorrect answers regarding the main parts of a pacemaker. In addition, 78.3% of the nurses polled provided incorrect information about pacemaker placement under local anesthesia, while 88.3% provided correct information about pacemaker complications. Furthermore, this study found a highly statistically significant relationship between nurses' knowledge and level of education ($p=0.0001$) and their jobs ($p=0.0001$). Four-fifths (80%) of bachelor's graduates and more than two-thirds (68.8%) of supervisor nurses had adequate knowledge (Ahmed, Taha et al. 2021).

Another cross-sectional study was carried out in Korea. A total of 100 subjects were included in this study. Similarly, 97.0% were female, with an average age of 30. With 63.0%, the most common age was 16 years old. University graduates had the highest level of education (83.0%). The results show that nurses' pacemaker knowledge level was confirmed as having an average of 18.9 points (79.6%)

out of 23 points. General characteristics of the subject. Pacemaker knowledge differed significantly according to work department ($F=3.32$, $p=.014$) and total work experience ($F=2.85$, $p=.042$) (Han and Kang 2018).

A descriptive design was also used to evaluate nurses' knowledge and practices regarding temporary pacemaker patient care. 77.5 percent of nurses had inadequate knowledge about caring for patients with temporary pacemakers. Shows that low nurse practice scores ensure that nurses follow professionalism when caring for patients with temporary pacemakers. This indicates that 92.5 percent of nurses had unsatisfactory practices when caring for patients with temporary pacemakers. This graph shows that there is a positive correlation between total nurse knowledge and total practice score when caring for patients with temporary pacemakers (Thabet, Helmy et al. 2019).

A cross-sectional study was conducted through purposive sampling among all nurses working at the critical care unit. Result show that almost half of the respondents have a moderate score ($n=13$, 48.6%), while a total of 13 respondents achieved a high score (18.6), and 23 respondents (32.9%) has a low score, particularly in information on the device. Further data and level of knowledge in detail. Based on the data analysis using a Pearson correlation test, there was a significant association between age and knowledge: $r = 0.301$, $p = 0.011$; level of education and knowledge: $r=0.265$, $p=0.027$; and length of service: $r=0.289$, $p=0.015$, while gender, marital status and specialization course have no association with the level of knowledge regarding pacemaker among nurses (Ismail, Ibrahim et al. 2020).

A descriptive exploratory design for evaluating critical devices. The study compares total mean knowledge and practice scores about implantable cardiac devices among the participants based on their background variables. It was discovered that there is a highly significant statistical difference between the means of the studied subjects' knowledge and practice scores based on their educational level ($f=7.243$; $p=0.002^*$; $f=12.27$; $p=0.000$). When compared to participants with technical and diploma degrees, those with baccalaureate degrees have higher means in both knowledge and practice (Ali, Youssef et al. 2018).

However, there is no significant statistical difference between the means of knowledge and practice scores of participants based on their gender or working areas ($t=-0.878$; $p=0.023$), but there is a significant statistical difference between mean knowledge scores and working areas ($t=-0.878$; $p=0.023$). It was discovered that there was no correlation between age and total mean knowledge and practices scores among the studied sample, but that there was a statistically significant correlation between years of experience and total mean practices scores among the studied sample ($r=-0.328$; $p=0.039$) (Ali, Youssef et al. 2018).

The research was carried out from November 2014 to June 2015. The study uses a convenience (non-probability) sample of (100) nurses from Al-Nassirrhya Heart Center to investigate the relationship between nurses' knowledge of pacemaker implantation for adult patients with cardiac rhythm disorders and demographic characteristics. According to the study's findings, the majority (49%) of the age group was (23-27) years old, and the majority of the study sample (60%) was male. Most of them (52%) were single and (40%) were secondary school nurses, and their livings (93%) were urban, more of the study sample was working in coronary care unit (21%) and (11%) of them had training course all of them inside of Iraq, and most of the study sample had once course training and (80%) of them were employed from (1-5) years with (1-3) years of experience in cardiac unit (68%), mean of score (Mohammed 2019).

Literature Gap: The number of hospitalizations for patients with Heart Failure (HF) in coronary care is increasing every day. These patients require special attention in order to avoid complications. Second, there is a scarcity of literature on this topic in Pakistan. As a result, this study is conducted to assess nurses' knowledge of nursing care for adult patients with implantable pacemakers.

OBJECTIVES

- To Assess Nurse's Knowledge about Implantable Pacemaker Care for Adult Patients with Heart Failure while working at Bahawal Victoria Hospital

- To identify knowledge gap about Implantable Pacemaker Care for Adult Patients with Heart Failure while working at Bahawal Victoria Hospital

OPERATIONAL DEFINITIONS

Nursing Care: Monitoring and prevention of common complications, prevention of dislodgement, and education of the patient on proper pacemaker use and maintenance nursing care is evaluated using study questionnaire sub-questions.

Patient with Implantable Pacemaker: Patients with implanted cardiac devices constitute a growing segment of contemporary health practice. Should be selected on the base of inclusion and exclusion criteria and will be operationalized through graphical display on the form of frequency and percentage.

Nurses Knowledge: Basics of pacemakers, instructions for patients, post-implant care, complications, and patient discharge: Examine using 15 questions, with a point value of one for each correct response and zero for each incorrect response. There are two categories, satisfactory and unsatisfactory, for a total score of 15.

- Satisfactory Knowledge: 9-15 mean $\geq 60\%$
- Unsatisfactory Knowledge: < 9 mean $< 60\%$

RESEARCH QUESTIONS

- What is the level Nurse's Knowledge about Implantable Pacemaker Care for Adult Patients with Heart Failure while working at Bahawal Victoria Hospital
- What is the gap regarding Nurse's Knowledge about Implantable Pacemaker Care for Adult Patients with Heart Failure while working at Bahawal Victoria Hospital

MATERIAL AND METHOD

Study design: Descriptive Cross-sectional study

Study setting: The nurses working in Cardiology Department at Bahawal Victoria Hospital.

Study duration: This study was completed in 4 months after acceptance from Ethical Review Committee.

Sampling technique: Purposive random sampling

Sample Selection: The study populations were the nurses working on the clinical side at at Bahawal Victoria Hospital, Bahawalpur

Inclusion:

1. All staff nurses of Cardiology Department
2. Nurses having age 22-45 years
3. Both gender (Male and Female)

Exclusion:

1. Nurses working in administration side
2. Allied Healthcare Professionals
3. Doctors

Study tool: A modified form of questionnaire was used in this study consist of two parts: demographic and. The questionnaire contains five questions in demographic part and fifteen questions in knowledge Assessment part. Each 15 questions are point with responses of (Yes) and (No). This questions basically regarding the indication, complications, post-implant care, and patient discharge of adult Patients with implantable Pacemaker.

DATA COLLECTION

All study participants was selected based on inclusion and exclusion criteria. The questionnaire was distributed to each available nurse to fill it within 30 minutes under the researcher guidance. Explanation to the participants about study and the questionnaire. The researchers utilized a modified questionnaire with two parts, which are described below. First, data on socio-demographic characteristics of nurses, such as age, gender, education level, years of experience, and source nurses' knowledge of nursing care of adult patients with pacemakers, were collected. Second, questions to assess participant knowledge of pacemaker; such as definition, signs and symptoms, complications, management, and nursing care

DATA ANALYSIS

Data was analyzed using statistical package for social science (SPSS) version 21 and MS Excel.

Descriptive statistics: were analyzed by frequency distribution table and percentage (%). While displayed in the form of graphs and charts

Inferential statistics: First of all the data normality was analyzed by using Kolmogorov Smirnov test. The data distributed normally so chi-square test was applied with statistical significance of $p < 0.05$ for categorical variable.

RESULT

This study was carried out over 40 nurses working in the BVH, Cardiology Department; the main purpose of the study was to assess the knowledge level and find the knowledge among a nurse regarding nursing care of adult patients with an implantable pacemaker. This chapter finding was analyzed by using frequency table and chi square test because most variables were descriptive and categorical.

This results stated that knowledge of nurses regarding nursing care of adult patient with pacemaker, unsatisfactory knowledge (<9) 13 (32.5%) and satisfactory knowledge (9-15) 27. (67.5%). The mean (X) is 9.51 and standard deviation (SD) is 1.78. It means that most of the study participants full between satisfactory knowledge score 9-15as shown in Table No: 1

Table No 1: Knowledge of Nurses Regarding Nursing Care of Adult Patients with Implantable Pacemaker

Knowledge Level	Frequency(n)	Percent (%)	X	S.D
Unsatisfactory knowledge (<9)	13	32.5	9.51	1.78
Satisfactory Knowledge (9-15)	27	67.5		

Analyzed by frequency table (X) mean (S.D) standard deviation

Table No 2: Knowledge Gap among Nurses Regarding Nursing Care of Adult Patients with Implantable Pacemaker

Variables	Unsatisfactory Knowledge (<9)	Satisfactory Knowledge (9-15)	Total	P-value
Educational level	Diploma	35	10	0.001
	BSN	49	14	
	Post RN	56	16	

Analyzed by chi-square test with a CI:95, d:5 and P<0.05

This result show that knowledge gap among nurses regarding nursing care of adult patients with pacemaker, As per educational level satisfactory knowledge of BSN is 49 out of 40, POST RN

satisfactory knowledge is 40 out of 56 and satisfactory knowledge of diploma holders is 24 out of 35. These results show that according to educational level, the satisfactory knowledge of BSN and POST RN is more than diploma holders with a P value is equal to 0.001. Its means that there are significant gap between the education level and knowledge level of the study participants with $p < 0.05$ as shown in the table 2.

DISCUSSION

Nurses should play a role in the care of patients with implantable peace maker by keeping pacemaker knowledge up to date through continuous training and education to ensure comprehensive care. Pacemaker management knowledge is critical, and it is a key factor in ensuring that patients are fully informed and understand the pacemaker. Nurses are said to play an important role in providing information to patients and family members prior to surgery, liaising with the multidisciplinary team. This study reported that most of the study participants were in a young age 21-30 (77.3%) female, they were single (57.3%), having job experience 1-3 year (65.4%) , most were diploma Holder (50.8%) and those nurses who received any training workshop before regarding nursing care of adult of adult patients with pacemaker were reported 1.1%. However a study conducted by Muizz Ismail, Ibrahim et al. (2020) the findings revealed that 60% were female , having age range between 20-34 years was 54.3%, having job experiences between 11-20 years 36.6%; while on the base of educational level 68.6% were diploma holder. More ever study of Thabet, Helmy et al. (2019) showed Nurses age between 18 to 21 years were reported 47.5%, nurse had work experience one to three years were 15%. While on the base of education this study supported our results that about 55% hold diploma. In relation to their previous training about care for patient with temporary pacemaker reveals that all nurses were not receiving any previous training.

Furthermore a study conducted by Henedy and El-Sayad (2019) and as per their results the majority age group was 23-27 years old 49% and most of the study sample was male 60%. Maximum were single 52% and more of them were working in coronary care unit 21%. Their job experience was 1-

5 year while their experience in cardiac unit was 1-3 years 68% which is similar to our results. (11%) of them were have training course all of them inside of Iraq and most of the study sample have once course training.

Also a study conducted by Ahmed, Taha et al. (2021) it showed most of the participants age were less than 30 and two third of nurses were married females. According to experiences of the nurses experience between 1-10 had 20% in coronary care unit (CCU). The current finding reported that nearly three quarters of studied nurses hadn't previously attended any training courses regarding of the care of patients with permanent pacemaker

This study identify that knowledge of 66.5% nurses regarding nursing care of adult patient with pacemaker was satisfactory knowledge with a score between 9 and 15. While 33.5% knowledge with a score less than 9. This result was supported by a study conducted by Han and Kang (2018) showed that nurses good knowledge level was reported 79.6% regarding pacemaker.

However a study conducted by Thabet, Helmy et al. (2019) result reported that 77.5% of nurses had inadequate knowledge about caring for patients with temporary pacemakers. Furthermore the findings of Ismail, Ibrahim et al. (2020) 48.6 % nurses having a moderate level of knowledge regarding patients care with pacemaker. Similarly the findings of Ahmed, Taha et al. (2021) to evaluate nurses' roles in the care of patients with permanent pacemakers. Result showed that 80.0% of the nurses studied had an unsatisfactory level of total knowledge regarding the care of patients with permanent pacemakers. It is demonstrated that 86.7% of the nurses studied had incorrect answers regarding the main parts of a pacemaker. In addition, 78.3% of the nurses polled provided incorrect information about pacemaker placement under local anesthesia, while 88.3% provided correct information about pacemaker complications.

This basically indicated that in our study most of the participants were score satisfactory as we compare our study finding to other studies. The reason for this was that knowledge gap among nurses regarding nursing care of adult patients with pacemaker, As per educational level satisfactory knowledge of BSN was 90%, POST RN satisfactory knowledge 64% and satisfactory knowledge of

diploma holders was 57%. There was significant gap between the education level and knowledge level of the study participants with $p < 0.05$. According to this study educational level is directly correlated with the knowledge level of the study participants that why BSN and POST RN score more than diploma holders.

This findings were supported by Ismail, Ibrahim et al. (2020) that level of education had a significant correlation with knowledge level of participants with P is equal to 0.027. Additionally the study of (Ali, Youssef et al. 2018) stated that there was a highly significant statistical difference between the means of the studied subjects' knowledge and practice scores based on their educational level with a p less than 0.05. Furthermore, study of Ahmed, Taha et al. (2021) found a highly statistically significant relationship between nurses' knowledge and level of education ($p=0.0001$) Four-fifths (80%) of bachelor's graduates and more than two-thirds (68.8%) of supervisor nurses had adequate knowledge. From the current study findings, the researchers recommended some strategies to improve nurses' knowledge of management of patients with pacemaker. To begin, ongoing nursing education regarding pacemakers is required. Second, inter-professional learning activities could be conducted to engage with the understanding of pacemaker management in the various fields, namely cardiovascular technologists, pharmacists, nutritionists, and therapists. Third, nurses should be evaluated on a regular basis regarding the care of pacemaker patients. It may lead to the improvement of skills and the updating of knowledge on a regular basis.

CONCLUSION

There was a statistically significant relationship between nurses' knowledge score and level of education, because BSN and POST RN knowledge is greater than diploma holders, with a P value equal to 0.001. Further this study suggested that continuous education is required to improve the level of knowledge, skills, and competencies in the care of patients with implantable pacemakers.

LIMITATIONS OF THE STUDY

- There was no gender base diversity.
- This study was limited due to descriptive study design.
- This study just finds out the knowledge gap on the base of education.
- This finding cannot be generalized due to the use purposive sampling technique and single setup.

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