



Original Article

Nurses Knowledge regarding Permanent Pacemaker Care for Adult Patients with Cardiac Rhythm Disorder

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ABSTRACT

Now a days, number of implantations increases day by day. It's crucial to evaluate the understanding of patients and their caretakers to prevent any issues or malfunctions and offer quick treatment. **Objective:** To assess nurses' knowledge regarding permanent pacemaker care for adult patients with cardiac rhythm disorder. **Methods:** Descriptive Cross-sectional study conducted in Punjab institute of cardiology. A total of 185 the nurses working on the clinical side were selected based on inclusion and exclusion criteria. The questionnaire was used to collect data analyzed using SPSS with statistical test chi-square with $p < 0.05$ for categorical variable. **Results:** According to this study, most of the participants (77.3%) were women aged 21 to 30 years, unmarried (57.3%), and had completed their diploma (50.8%). The study found that 66.5% of nurses were with satisfactory level of knowledge in nursing care for adult patients with pacemakers, while 33.5% had an unsatisfactory level of knowledge. The knowledge of nurses who held a BSN or a POST RN qualification was significantly higher than those who only held a diploma with a p-value of 0.001. **Conclusions:** Majority of the participants possessed satisfactory knowledge regarding the care of patients with permanent pacemakers. The study also revealed a significant association between the level of education of nurses and their knowledge scores. The study concludes that consistency in the provision of education is necessary for the enhancement of nurses' knowledge, expertise, and competencies in providing care to patients with permanent pacemakers.

INTRODUCTION

The effective and efficient functioning of the heart relies entirely on the precise timing of its beats. Without a strong and steady heartbeat, blood cannot flow to where it needs to go, and the heart's contractions will be weakened. Any interruption in the heart's electrical impulses or issues leads to heart block and arrhythmia. Thus, reciprocal are necessary to ensure the cardiac rhythm properly [1]. The heart's conducting system is a specialized network of electrical pathways [2]. Heart arrhythmias and bradycardia can be caused by irregularities in the normal cardiac conduction system [3]. The most serious one cardiovascular issue is cardiac rhythm disorder. Cardiac rhythm slowing can be treated with temporary or

permanent pacemakers, which replace sluggish or irregular beats with normal beats. Bradycardia can cause decreased tissue perfusion, dyspnea, and congestive heart failure. When an arrhythmia is severe, it may require immediate treatment to restore regular rhythm [4]. According to the World Health Organization (WHO), cardiovascular disease caused an estimated 17.9 million deaths worldwide in 2016 [5]. 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 [6]. Recent findings have shown that cardiovascular disease (CVD) is

the primary cause of death worldwide, with approximately 80% to 86% of fatalities occurring in low- and middle-income nations. Most of the South Asian countries, such as Pakistan, India, Bangladesh, Sri Lanka, and Nepal, which make up more than a quarter of low and middle-income countries, have a higher risk of coronary heart disease (CHD) compared to other regions. In Punjab, Pakistan, CVDs are the leading cardiac issue affecting 17.5% of the population studied [7]. Electric stimulation of the heart has become a popular method for treating bradycardia or high-grade atrioventricular block. The use of pacemakers has increased significantly in recent years due to technological advancements and the expanding range of medical conditions they can be used to treat. Approximately 1.25 million permanent pacemakers are implanted worldwide every year [8]. At present, heart rhythm irregularities can be addressed by using a permanent pacemaker (PPM), helps the heart when the heart rate decrease than 60 beats per minute. The PPM works as an artificial sino-atrial node that regulates the electrical activity of the heart and elevates the heart rate more than 60 beats per minute [9]. To treat heart rhythm disturbances that result in a slower heartbeat, pacemakers are employed, including single and dual-chamber types. If the rate of heart falls lower than 60 beats per minute (sometimes less than 30-40 beats per minute) and insufficient tissue oxygenation results, a pacemaker is implanted either in the atrial or atrioventricular sinus node to correct abnormal heart rhythm and address tissue hypoxia. Patients who undergo this procedure and receive a pacemaker can live a normal life [10]. Nurses have to play a vital role in the care of patients with PPM by keeping pacemaker knowledge up to date by the help of continuous education and training sessions to ensure comprehensive care [11]. Pacemaker management knowledge is complicated, critical, as well as it is a key factor in verifying that patients are fully informed about the pacemaker [12]. Nurses play an important role in the education of the patients and family members prior to surgery, liaising with the multidisciplinary team [13]. It is important to evaluate the knowledge of patients and caregivers regarding the pacemaker, as it becomes an essential part of the patient's life. This is necessary to avoid any potential complications and to provide timely treatment. Nurses play a central role in managing pacemaker patients and need to keep themselves updated on the latest information and challenges. However, a very limited research is done on the nurses' knowledge regarding management of the pacemaker in the local context. Therefore, this study was conducted to assess the basic knowledge of nurses in managing patients with pacemaker implantation, with the aim of providing ongoing education on updated pacemaker information.

METHODS

Study descriptive cross sectional study was conducted at the Punjab Institute of Cardiology over a four-month period from December 2022 to March 2023. A total of 185 female staff nurses between the ages of 22 to 45 years, were selected through simple random sampling from the clinical area of the institute. Nurses working in administration or non-critical areas, as well as those with less than one year of experience, were excluded from the study. The sample size was calculated through an open epi software by taken anticipated frequency of 77.5% based on a study conducted by Thabet *et al.*, confidential level of 95% and a margin of error of 5% [10]. The researchers used a modified questionnaire with two parts - demographic and knowledge assessment - which contained 15 questions related to pacemaker indications, complications, post-implant care, and patient discharge. The questionnaire was adapted from a previous study by Ali *et al.*, [14]. The assessment of knowledge involved 15 questions, where each correct response received a point value of one and each incorrect response received zero points. The knowledge level was categorized into two groups: satisfactory and unsatisfactory, based on a total score of 15. Satisfactory knowledge was defined as a score between 9 and 15, indicating a mean of over 60%. Unsatisfactory knowledge, on the other hand, was characterized by a score below 9, indicating a mean of less than 60%. Each available nurse was given 30 minutes to complete the questionnaire. Data analysis was performed using the statistical package for social science (SPSS) version 21.0, and the researchers used frequency distribution tables and percentages for analysis. The Kolmogorov-Smirnov test was used for the testing normality of data distribution, and the chi-square test was used to test for statistical significance with a p-value of less than 0.05 for categorical variables.

RESULTS

This study was carried out over a 185 nurses working in the PIC; the main purpose of the study was to assess the knowledge level and find the knowledge among a nurses regarding nursing care of adult patients with pacemaker. This chapter finding was analyzed by using frequency table and chi square test because most variables were descriptive and categorical. The study found that the 185 participating were female nurses (100%) and aged between 21-30 years (77.3%). There were no male nurses in the study because there were none working in the PIC setting. Regarding marital status, 57.3% of nurses were single and 42.7% were married. In terms of job experience, 65.4% of nurses had 1-3 years of experience, 25.4% had 4-6 years, and 9.2% had 7-9 years. Educational levels of nurses were

also assessed, with 50.8% holding a diploma, 21.6% a Post RN degree, and 27.6% a BSN degree. Only 1.1% of nurses had received any training workshop regarding the nursing care of patients with pacemaker. In terms of knowledge assessment, 33.5% of nurses were with unsatisfactory knowledge (scoring below 9 out of 15), while 66.5% had satisfactory knowledge (scoring 9-15 out of 15). This indicates that the majority of the participating nurses were young, female, with relatively less experience and had diploma-level education as shown in the Table 1.

Table 1: Demographic Data of the Nurses

Demographic Variables		Frequency (%)
What is your age?	21-30	143(77.3)
	31-40	35(18.9)
	41-50	7(3.8)
What is your gender?	Female	185(100)
What is your marital status?	Single	106(57.3)
	Married	79(42.7)
What is your job experience?	1-3 Year	121(65.4)
	4-6 Year	47(25.4)
	7-9 Year	17(9.2)
What is your educational level?	Diploma	94(50.8)
	Post RN	40(21.6)
	BSN	51(27.6)
Do you receive any training?	Yes	2(1.1)
	No	183(98.9)

Analyzed by frequency(n)and Percentage(%)

This results stated that knowledge of nurses regarding nursing care of adult patient with pacemaker, unsatisfactory knowledge (<9) 62 (33.5%) and satisfactory knowledge (9-15) 123 (66.5%). The mean (X) was 9.51 and standard deviation (SD) was 1.78. It means that most of the study participants full between satisfactory knowledge score 9-15 as shown in Table 2.

Table 2: Knowledge of Nurses Regarding Nursing Care of Adult Patients with Pacemaker

Knowledge Level	Frequency(%)	X ± SD
Unsatisfactory knowledge (<9)	62(33.5)	9.51±1.78
Satisfactory Knowledge (9-15)	123(66.5)	

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

Table3 shows that knowledge gap among nurses regarding nursing care of adult patients with pacemaker. As per educational level satisfactory knowledge of BSN is 36 out of 40, POST RN satisfactory knowledge is 33 out of 51 and satisfactory knowledge of diploma holders is 54 out of 94. 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 3.

Table 3: Knowledge Gap among Nurses Regarding Nursing Care of Adult Patients with Pacemaker

Variables		Unsatisfactory Knowledge (<9)	Satisfactory Knowledge (9-15)	Total	p-value
Educational level	Diploma	40	54	94	0.001
	BSN	4	36	40	
	Post RN	18	33	51	

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

DISCUSSION

To ensure comprehensive care for patients with pacemaker (PPM), it is necessary for nurses to continuously gain the latest knowledge on pacemaker management through training and education. Role of the nurses is very crucial in providing education to patients and their families, and liaising with the multidisciplinary team. Our study found that most of the nurses who participated were young, female, single, with 1-3 years of job experience, and diploma holders. Only a small percentage (1.1%) of the nurses had received training on nursing care for adult patients with pacemaker prior to our study. However a study conducted by Muizz Ismail *et al.*, the findings revealed that 60% were female, having age range between 20-34 years were 54.3%, having job experiences between 11-20 years were 36.6%; while on the basis of educational level, 68.6% were diploma holder [15]. Furthermore, a study conducted by Thabet *et al.*, yielded similar results. Additionally, this study supported our findings that approximately 55% of participants held a diploma. Regarding previous training related to patient care with temporary pacemakers, it was discovered that none of the nurses had received any form of training in this area [10]. Additionally a study conducted by Henedy and El Sayad showed that the majority age group were in middle age [16]. Furthermore, Ahmed *et al.*, conducted a study that revealed a majority of the participants were under the age of 30, and two-thirds of the nurses were married females. The present study's findings indicated that approximately three-quarters of the participant nurses had not received any prior training courses specifically related to the care of patients with permanent pacemakers (PPM) [17]. In our study, we found that 66.5% of nurses demonstrated satisfactory knowledge in nursing care for adult patients with pacemakers, scoring between 9 and 15. Conversely, 33.5% of nurses had knowledge scores below 9. These findings align with a study conducted by Han and Kang, which also reported a high knowledge level of 79.6% among nurses regarding pacemaker care [18]. However a study conducted by Henedy and El-sayad result reported that 77.5% of nurses had sufficient knowledge about caring for patients with temporary pacemakers [16]. Furthermore, according to the findings of Elgazzar, 48.6 % nurses having

a moderate level of knowledge regarding patients care with pacemaker [19]. Similarly another study finding showed that 80.0% of the participant nurses were with an unsatisfactory level of knowledge about the care of patients with permanent pacemakers [17]. 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. Our study findings were supported by Elgazzar, additionally the study of Angelidou 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 [19, 20]. Furthermore, another study found an extremely statistically significant relationship between nurses' knowledge and level of education ($p=0.0001$) [17].

CONCLUSIONS

The study found that the majority nurses were with satisfactory knowledge of nursing care for adult patients with pacemakers. Furthermore relationship between education level and patient care highlights the significance of advanced education in nursing. Improving nurses' knowledge in this domain can have significant implications for patient safety, as well as the overall quality of care provided. By addressing potential deficiencies in knowledge, healthcare institutions can strive towards standardized and evidence-based practices in permanent pacemaker care.

Authors Contribution

Conceptualization: UEA

Methodology: IN, LK

Formal analysis: AA

Writing-review and editing: UEA, SM, NR, AA, RF, SW

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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