Efficacy of an Intervention Protocol on Nurse's Knowledge, Practices regarding Permanent Pacemaker Patient's Care

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Abstract: **A pacemaker may be used as a supportive therapy technique to help patients with long-term heart rhythm disorders avoid complications such as sudden death. A nurse's role in the care of cardiac pacemaker patients is crucial. Aim of the study: To examine the effectiveness of an intervention protocol on nurse's knowledge and practice regarding permanent pacemaker patient`s care. A quasi-experimental research design was used in intensive care units and cardiac care unit for 50 nurses at Al-Salam and Port Fouad hospital in Port Said city, Egypt. Intervention protocol for nurses was achieved through the following data collection tools as before-designed questionnaire, observation checklists sheet and intervention protocol. The result showed that the interventions had a better effect on knowledge–and practice score regarding pacemaker care after implementation of the intervention protocol compared to before intervention with only statistical significant with practice. also, there was positive strongly correlation between the studied nurses level of education, experience and knowledge regarding pacemaker at after program with statistical significant difference regarding experience. Therefore, this intervention protocol can be implemented in health practice and research in order to improve patient care. Conclusions. The results of this study displayed that before the educational program was implemented, the majority of nurses had unsatisfied practice and minority inadequate knowledge in regards to artificial pacemakers, but after it was implemented, there was an improvement**

Keywords: **Knowledge, Practices, Permanent Pacemaker, Intervention Protocol, Patient's Care.**

I.   INTRODUCTION

Cardiac pacemakers are an operative treatment for, atrioventricular block, sick sinus syndrome, and other severe cardiac dysrhythmias. Around 3 million people in the world have a pacemaker, and roughly 600,000 pacemakers are placed each year [1], [2]. The number of patients getting pacemaker implantation is steadily increasing as the population ages and cardiovascular disease becomes more common [3] .

The first phase of treatment is pacemaker implantation, and after operative monitoring, follow-up, and health education are all key variables that influence patients' psychological function and quality of life [4], [5]. Implanting a device is a life-changing experience for the person, both physically and psychologically [2]. The patient may be affected and concerned not just by the diagnosis and implantation of the device, but also by its function. Important considerations about how to live with the device and what to do with it in the event of a severe or end-stage disease may also arise. Beliefs and knowledge of patients. Patients' coping reactions to their sickness and treatment are influenced by their beliefs and knowledge about their illness [6], [7]**.**

The need for clarification on the role of the implantable cardioverter defibrillator (ICD) in advanced stages of any illness is becoming more urgent as the before valence of ICD implantation rises and life expectancy rises, with many older persons living with comorbidities [8]. According to a recent research, one out of every four patients received fruitless and painful shocks from the gadget just before they died [9]. While, hospitalization nursing includes care and rehabilitation after patients leave the hospital to aid in patient self-management and to guarantee that information, therapy, and nursing services are not interrupted [10].

Patients with an implanted pacemaker (PM) should undergo periodic check-ups to verify the accurate functioning of the device and to get it reprogrammed for optimal therapy, when necessary, to before vent repeated hospitalizations and before the replacement time. The continuous adjustment of pacing parameters can be important benefits to the patient and improve the effectiveness of Treatment [11], [12]. Regular follow-ups are critical for early discovery of technical and clinical flaws that may arise during the PM's operation. However, it considerably increases the duty of the institutions that maintain these devices, as evidenced by the fact that the majority of them are located in the United States.

Regularly checking the implanted PMs is a common duty undertaken by cardiac electrophysiologists [13]. Furthermore, these patients frequently require emergency hospitalization and rehospitalization after long durations of hospitalization, resulting in a lower quality of life ([14]. So that , nurses should play an important role in the management of patients with permanent pacemaker by keeping up to date on pacemaker technology through ongoing training and education . The ability to maintain a pacemaker is critical, and it is a significant aspect in ensuring that patients are properly educated and com beforehand the device [15] . Nurses are said to play an important role in liaising with the multidisciplinary team and in delivering information to patients and their families prior to surgery [16].

These ongoing updates and issues among pacemaker patients highlight the necessity for nurses to keep their expertise up to date. There is currently no research on nurses' pacemaker management knowledge in the local setting. It is critical to determine basic facts connected to nurses' knowledge in order to provide continuing awareness of current pacemaker information. Pacemakers are frequently seen in medical surgical patients and necessitate particular treatment. By 2023, the number of pacemakers in the world is before rise to 1.43 million [17]. For numerous reasons, clinical nurses should be aware if a patient has a pacemaker. Some pacemakers are incompatible with certain imaging examinations, such as magnetic resonance imaging, putting the patient at danger. Pacemaker patients typically have substantial, symptomatic cardiovascular disease that need more frequent monitoring. The pacemaker could fail, putting the patient at risk and necessitating an immediate assessment by the nurse [18]. So, the main objective of the study is to examine the effectiveness of an intervention protocol on nurse's knowledge and practice.

Research hypothesis

The knowledge and practice of participants regarding Permanent Pacemaker are fulfilled by the intervention protocol, and they followed the correct practice regarding patients care.

II. MATERIAL AND METHODS

Research design

A quasi-experimental research (one group before -test after-test design) was implemented.

Study population and sampling

A convenience sample was used including all available nurses (50) working in the intensive care units, cardiac care unit at Al-Salam and Port Fouad hospital in Port Said city - Egypt. The study's sample consisted of nurses with at least one year of experience who provide direct nursing care to patients with an implantable cardiac device. Ages of 25 and more, and various educational levels were all criteria for inclusion. Subjects who refused to freely engage in the study met the exclusion criteria.

Data collection tools

Tool 1: Structured interview questionnaire

This was adopted by the researchers based on reviewing relevant scientific literature [19]–[21] . It was designed to assess nurses' knowledge and comprised two parts which cover the next data.

Part I includes socio-demographic data such as nurse age, training courses, educational qualification and duration of experience

Part II includes the nurses' Knowledge Assessment Questionnaire consists of General information about pacemaker implantation (11 items) true and false question, Information regarding health information that patient should know at discharge comprised 7 multiple choices. A total score for the questionnaire was 17 with each right answer was given one score and the wrong answer code was zero this to assess nurse's knowledge. While those who obtained score <60% were considered having inadequate nurse in knowledge and adequate score of ≥60percentage.

Tool 2: Observation Checklist tool for Nurses Caring for patients with temporary pacemaker to evaluate to evaluate nurses' practice when caring for patients receiving artificial pacemakers. This tool adapted from [22]**.** that used to assess nurse's performance. This tool comprises all steps (47) of all nursing care procedures for a patient with a temporary pacemaker.: as role of nurse before insertion of pacemaker 6 items, role of nurse when introducing temporary pacing/ before procedure nursing role 6 items, role of nurse throughout insertion of pacemaker 3 items , role of nurse when assisting with beginning of temporary trans venous pacing 15, role of nurse following insertion of pacemaker8 items , patient monitoring and care 9 items . Scoring system: To evaluate nurses' performance, each item has a three-point Likert scale, with 1 indicating done correctly, 0 indicating done incorrectly, and 0 indicating not done. A satisfactory performance level was defined as a score of 60%, whereas an unsatisfactory performance level was defined as a score of 60%. Reliability was measured by Cronbach's alpha coefficient (0.788) [22].

Data collection

This study was carried out subsequently receiving agreement from the hospital director and head of departments. Data were gathered using the aforementioned Structured interview questionnaire from August, 2019 to September, 2020. The purpose and process of the study were clarified to the research participants, and they were knowledgeable that no hazard was involved in contributing in the research and that their information would not be used for any purpose other than the current study. The questionnaires took about 15–20 minutes to complete, and the questionnaires were gathered directly after completion. The pretest questionnaire was conducted just before the first day of the intervention protocol; the posttest questionnaire was conducted in the manner as the pretest immediately after the end of the 4-week education program.

Intervention protocol were planned by the researchers based on the requirements of the studied nurses to improve their knowledge and practice and evaluate the effect of intervention protocol on nurses' knowledge and practices regarding artificial pacemakers-based on the related literature [23], [24]. These were written in the Arabic language based on four parts. The first part contains of knowledge related to artificial pacemakers (as definition, indications, types, benefits, Contraindications and complications). The second part included knowledge regarding Health information that patient should know at discharge with artificial pacemakers (as activity, follow-up care, wound site, shower, driving, ID card, medications, return to work, pain relief, home appliances and mobile phones

Statistical analysis

The raw data was coded and placed into the SPSS database (SPSS package version 20, Chicago, USA). Data analysis and interpretation were carried out. We utilized the following statistical measures: Different properties were described using descriptive statistics such as frequency, distribution, mean, and standard deviation. The significance of the findings of paired qualitative variables was tested using univariate analysis, including the Mc Nemar test. Pearson correlation coefficient was used to calculate the correlation. The results were significant at the 5% level of significance.

III. RESULTS

TABLE I: Demographic variables of the studied nurses. It was establishing that the nearly half (48%) of them were ages 30-<40years, with a mean age 31.6±5.7. As regards educational qualification of the nurse it was found that 94.0% of them were having diploma nursing. As concerns the nurses' years of experience, it was seen that (44%) were having experience work 5-<10 years. While, more than half of the studied sample (64.0 %) did not take before training courses.

TABLE II: shows that there was a marked enhancement in nurses' knowledge regarding pacemaker care after - implementation of the intervention protocol compared to before -intervention with, no significant in total knowledge score.

TABLE III: shows that there was a marked enhancement in nurses' practice regarding pacemaker care after implementation of the intervention protocol compared to before intervention with statistical significant in total practice score

TABLE IV: reveals that positive strongly correlation between the studied nurses level of education, experience and knowledge regarding pacemaker at after program with statistical significant difference regarding experience. Also, the table displays that the negative correlation between the studied nurses level of education, years of experience and knowledge regarding pacemaker at before intervention protocol with no statistical significant difference.

TABLE V: shows that the positive correlation between the practice of studied nurses and their educational level at after program with statistical significant difference. Also, the table shows that the negative correlation between the practice of studied nurses regarding their level of education and year of experience at the before intervention protocol with no statistical significant difference.

TABLE VI: determine the correlation between total knowledge score & total practice score before & after intervention protocol, we used the Spearman correlation coefficient. The results of this analysis revealed that negative correlation before and after the intervention protocol, although no significant.

TABLE I: Demographic variables of the respondents (N =50)

Variable	Studied nurses	
	No.	**%**
Age (years)		
20-<30	21	42.0
30-<40	24	48.0
40-<50	5	10.0
Min-Max	24.0-47.0	
Mean±SD	31.6±5.7	
Educational qualifications		
Diploma	47	94.0
Institute of nursing	3	6
Years of experience		
1-<5	21	42
5-<10	22	44
10 or more	7	14
Min-Max	1.0-22.0	
Mean±SD	5.4±3.8	
Training courses		
Yes	18	36.0%
No	32	64.0%

TABLE II: Total knowledge score of the studied nurses before and after intervention protocol .

Total Knowledge score	Studied nurses (n=50)				Mc Nemar test
	Before intervention protocol		**After intervention protocol**		
	No.	**%**	**No.**	**%**	
Adequate	4	8.0	0	0.0	0.240
inadequate	46	92.0	50	100	

Inadequate: score less than 60%,   Adequate Score Of 60% Or More   *significant at p≤0.05

TABLE III: Total practices score of the studied nurses before and after intervention protocol.

Total practice score	Studied nurses (n=50)				Significance
	Before intervention protocol		After intervention protocol		
	No.	%	No.	%	
Unsatisfactory	46	92	3	6.0	**P<0.0001***
Satisfactory	4	8	47	94.0	

Significance: P-vale for Mc Nemar test or Marginal Homogeneity test   *significant at P≤0.05

TABLE IV: Correlation between the nurse's knowledge regarding pacemaker and their educational level and experience at before and after program

sociodemographic	knowledge of studied nurses			
	before program		after program	
	R	P	R	P
Educational level	-.142	.329	.441[**]	.001
Experience year	-.197	.164	.057	.698

Table V: Correlation between the nurses practice regarding pacemaker and their qualification and experience at before and after intervention protocol.

sociodemographic	practice of studied nurses			
	before program		after program	
	R	P	R	P
Educational Level	-.145	.308	.776	.041
Experience Year	-.088	.541	.987	.002

TABLE VI: Correlation between total knowledge score & total practice score before & after intervention protocol(N=50)

Practice of nurses about pacemakers	Knowledge Score Of Studied Nurses			
	Before Intervention Protocol		After Intervention Protocol	
	r	P	R	P
Total practice score	-0.053	0.714	-0.184	0.197

r: Pearson correlation coefficient

IV. DISCUSSION

Pacemakers save lives, yet they often cause patients substantial psychological pain. Positive psychological variables are linked to better cardiac patient outcomes [25].Implantable Cardioverter Defibrillators (ICDs)patients, like many other cardiac populations, suffer from significant levels of anxiety, sadness, and low quality of life (QOL)[26], [27]. A pacemaker will be with the patient for a long period after it is implanted. In addition to the fact that a pacemaker is a crucial guarantee of a patient's heart health, the patient's quality of life must also be considered. According to one study, the type of pacemaker implanted had a significant impact on patients' quality of life after surgery [28].Nurses who are caring for patients who are having a cardiac device implanted should be familiar with the indications, functioning, contraindications, and consequences. Nurses should also be knowledgeable when it comes to before paring patients for the procedure and providing after-implantation care, which includes close observation, continuous monitoring, and

providing before -discharge education and instructions to assist patients and their families in dealing with any potential problems that may arise [19]. Patients as "integrated persons" began to get substantial medical and nursing attention with the creation of medical and nursing modes in the 1940s, based on the notion of "integrated person." Professionals increasingly learned that the patient's hospitalization is only a small part of the whole nursing process. As a result, continuous nursing care between the hospital and the family broadens the scope of nursing care [29]**.**

The results of the current study for before and after protocol intervention scores demonstrated that nurse's pacemaker knowledge and practice scores after intervention were better than before intervention. This current study concurs with the study showed in Egypt, wherein the authors revealed that patients' knowledge of pacemakers was unsatisfactory in both groups before the intervention protocol was implemented [30] . This study also in the line with [31] found that patients in the study group had a higher level of self-care knowledge, practice, and different degrees of Nursing Sensitive patient Outcomes after implementing self-care guidelines compared to the control group and before implementing self-care guidelines.

The before sent study that there was a marked enhancement in nurses' knowledge regarding pacemaker care after - implementation of the intervention protocol compared to before -intervention with, no significant in total knowledge score. This study agreement with, [32] said that there was a statistically significant improvement in the post test compared to the before test in terms of the knowledge of the study participants. Furthermore, according to [33], who assessed the knowledge of homecare management of permanent pacemaker implanted patients in Sctimst, Trivandrum, found that the study sample lacked knowledge of homecare management following permanent pacemaker implantation. While, other studies [21] found that, a large proportion of 52.6 percent of subjects had a knowledge score below 40% (poor level of knowledge), which improved after the after-test and only 18.5 percent remained in the poor category, while 26.9% reached a good level of knowledge and 2.1 percent was in the excellent category, despite the fact that no patient was in this category in the before test and only 2.1 percent had good level of knowledge in the before test . A purposive sample of all nurses working in a public hospital in Kelantan was used to perform a cross-sectional study and found that only 13.6 percent of respondents had good awareness of patient management with pacemaker implantation, while 48.6% had moderate understanding.

The before sent study show that there was a marked enhancement in nurses' practice regarding pacemaker care after-implementation of the intervention protocol compared to before -intervention with statistical significant in total practice score. This result in the same line with [34] There were statistically significant differences in study sample practices related to pacemaker incision care, pulse, avoiding tight clothing, and using medic bracelets between before and after program. while this study inconsistent with [35] found that The majority of the study individuals performed poorly, according to the conclusions of this study. Furthermore, more than half of the participants in the study perform after-implant care poorly, and more than two-thirds perform it incorrectly (67.5 percent)

The current study revealed that positive strongly correlation between the studied nurses level of education, experience and knowledge regarding pacemaker at after program with statistical significant difference regarding experience. Other studies [36] found that there was a significant difference between the educational level (p=0.027) and knowledge of nurses.

Regarding correlation between the nurses practice regarding pacemaker and their qualification and experience at before and after intervention program. Found that positive correlation between the practice of studied nurses and their educational level regarding the after program with statistical significant difference. Also, the table shows that the negative correlation between the practice of studied nurses regarding their level of education and year of experience at the before program with no statistical significant difference. [37]who investigated registered nurses' knowledge and practice regarding patient safety following cardiac catheterization in Punjab institute and found that there was a substantial association between knowledge and practice, as well as knowledge and qualification. This finding demonstrated that qualification has a big impact on a nurse's knowledge, and that nurses can enhance their knowledge through experience. This is also in line with the findings of [38], who examined Nurses' practice and Knowledge regarding patient's safety following Cardiac Catheterization and discovered a statistically significant relationship between nurses' practice and their years of experience.

There was negative correlation between total knowledge score & total practice score before & after intervention protocol, the difference was not statistically significant. This finding disagrees with [34] found that the overall knowledge score of

the examined sample and their total practices score had a positive highly statistically significant link. This could be explained by the fact that patients with a high level of knowledge do substantially better in terms of self-care. While, [39] found that most nurses were not confidence in their capacity to before pare patients for implant or living at home following implant. This finding was inconsistence with [31] reported that statistically significant positive correlation between patients' total self-care knowledge and total practice with their nursing sensitive patient outcomes in study and control groups.

V. CONCLUSION AND RECOMMENDATION

Based on the findings in the before sent study, the establishing intervention protocol was found to foster self-care practice and knowledge regarding artificial pacemaker. Therefore, this protocol can be implemented in nursing practice and research in order to improve their health and to lower the risk of the physical, social, and emotional influences regarding pacemaker. Moreover, future studies are needed about artificial pacemaker issues to develop evidence-based nursing management guidelines from different health centers in Egypt and other contexts.

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Conflicts of interest

There are no potential conflicts of interest declared by the author.

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