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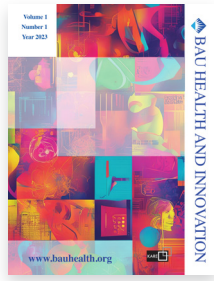

Case Report

Nursing Care of Pacemaker Associated Infections Using the Activities of Life Model: A Case Report

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Abstract

Cardiac pacemakers are devices used in the treatment of patients with bradyarrhythmia, providing electrical stimulation and transmitting impulses to the heart. In addition to prolonging patients' life expectancy, they play an effective role in alleviating symptoms caused by bradycardia. Despite technological advancements and anti-infection interventions, these implanted devices may still lead to infections due to their foreign body nature. To prevent infection, aseptic principles should be followed, dressings should be performed under appropriate conditions, and patients should be monitored for signs of infection while receiving information about nursing care practices. In the nursing profession, the use of models and theories is essential for collecting and generating scientific knowledge, as well as improving practices by enhancing their quality. This case report presents the nursing care process of a patient with a pacemaker-associated infection using the *Nursing Model Based on Life Activities*, a model that facilitates problem identification and resolution through a holistic evaluation of the individual.

Keywords: Life Activities Model, nursing care, pocket infection, sick sinus syndrome.

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Sick sinus syndrome is a conduction disorder caused by dysfunction of the sinus node, leading to arrhythmias. Electrocardiographic findings include sinus bradycardia, sinus pause, sinoatrial outflow block, tachycardia syndrome, atrial bradyarrhythmias, and atrial tachyarrhythmias.[1] Pacemaker devices are widely used in patients with arrhythmias and play a crucial role in reducing mortality and morbidity. Despite advances in cardiac device design, infection control, and antibiotic prophylaxis during device placement, these devices can still lead to foreign body infections. Infection may present with redness, increased temperature, discharge, and fever at the intervention site.[2]

The incidence of pacemaker-related infections in individuals with pacemakers is reported to be 0.5–5.7%, with an occurrence rate of 1.8–10 per 1,000 device-years. Currently, approximately 10% of all infective cases are associated with pacemaker devices, with a reported rate of 7% in our country.[3] A review of the literature shows that infections related to pacemaker devices occur less frequently after initial implantation and more commonly after elective replacement. The higher incidence of acute infection following the second procedure is believed to be due to the development of fibrous tissue around the pacemaker pocket, which impairs circulation.[4]

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The care of this case was presented within the framework of the Nursing Model Based on Life Activities. The North American Nursing Diagnosis Association (NANDA) nursing diagnoses and Nursing Interventions Classification (NIC) nursing interventions were used in the case presentation. The life model designed by Nancy Roper serves as the foundation of the nursing process and is frequently applied in nursing education and practice due to its applicability to both patients and healthy individuals. This model views the individual holistically, identifies and addresses existing problems, and contributes to the development of the nursing process.[5,6] In this case, six nursing diagnoses were determined in accordance with the 12 activities of daily living in the Roper-Logan-Tierney Nursing Model.

Case Report

A 46-year-old woman with a history of hypertension, paroxysmal atrial fibrillation, and fibromyalgia was diagnosed with sick sinus syndrome 10 years ago following intermittent episodes of palpitations, weakness, and presyncope. She subsequently underwent dual-chamber (DDD-R) pacemaker implantation. One month ago, she underwent pacemaker replacement. Following the procedure, she presented with complaints of pain at the wound site, arm pain, and increased temperature at the wound site. With a C-reactive protein (CRP) level of 114 mg/L, she was admitted to the intensive care unit with a preliminary diagnosis of pacemaker pocket infection.

Medical Process

The patient's body temperature ranged between 36.1°C and 37.3°C. Due to elevated C-reactive protein (CRP) levels, the infectious disease team evaluated the patient and recommended obtaining a blood culture and initiating intravenous ampicillin-sulbactam at a dosage of 1.5 g four times daily. Superficial ultrasonography was performed to assess for the presence of an abscess. A pacemaker lead was observed 4.5 cm beneath the skin; however, no abscess was detected in the pacemaker area. On external examination of the pacemaker site, tenderness, increased temperature, and redness were noted, but there were no signs of discharge or bleeding.

Methicillin-resistant coagulase-negative staphylococci were identified in the blood culture. The antibiotic regimen was adjusted to vancomycin hydrochloride (1 g twice daily) and cefazolin sodium (2 g three times daily) (Fig. 1).

A repeat blood culture on the 12th day of follow-up showed no bacterial growth. Consequently, treatment

Figure 1. Appearance of the pacemaker incision area with redness on day 2 of hospitalization.

Figure 2. Appearance of the pacemaker incision area with redness on day 2 of hospitalization.

with trimethoprim-sulfamethoxazole (one tablet twice daily) was initiated. By the 15th day of follow-up, the redness, temperature increase, and pain at the wound site had regressed, with no increase in discharge, body temperature, or other signs of infection. Additionally, CRP levels had decreased, and a decision was made to continue monitoring without replacing the pacemaker device. At discharge, the patient's CRP level was 38 mg/L. She was discharged with instructions to continue oral antibiotic

Table 1. Grouping of nursing diagnoses according to daily living activities

	Nursing diagnosis	Alan Classroom Code	Objective	NIC initiatives[7,8]	Expected outcome
Ensuring and Sustaining a Safe Environment	Ensuring and Sustaining a Safe Environment	Safety/protection Infection 00004	Minimizing the uptake and transmission of infectious agents	*Hands are washed before and after any intervention. *Aseptic techniques are applied during catheter changes. *Ensure that appropriate aseptic conditions are provided when dressing the surgical incision site, peripheral and central catheters.	Prevention of infection due to hospitalization, peripheral catheters and pacemakers.
Nutrition	Dietary changes: decreased appetite and eating less than the body needs	Nutrition Absorption 00002	Nutrition management, nutrition counseling, nutrition monitoring	*The importance of adequate and balanced nutrition is explained to the patient. *The patient's daily calorie requirement is determined. *Information is given about feeding frequently and little to reduce the feeling of tension in the stomach. *Oral hygiene (tooth brushing, mouth rinsing) is provided before eating.	Making a nutrition plan for the patient's needs and solving the problem related to nutrition.
Excretion	Constipation associated with inadequate physical activity and change in eating habits	Elimination and Change Gastrointestinal Function 00011	Elimination of constipation	*An appropriate nutrition program is created for the patient and fluid intake is provided. *If he/she feels the need for defecation, it is explained that he/she should not delay. *The importance of exercise is explained, and if it is mandatory to stay in bed, support is given to exercise in bed.	Prevention of constipation by ensuring normal bowel emptying.
Movement	Fatigue due to pain, insufficient sleep/ rest and malnutrition	Activity/Rest Energy Balance 00093	Ensuring that the patient maintains a balanced physical, cognitive, emotional and social activities	*The patient's level of fatigue is determined using a scale. *The patient is allowed to express his/her views on his/her lifestyle, roles and relationships affected by fatigue. *Information is given about effective coping skills and the negative effects of stress on energy level.	Elimination of patient fatigue.

Table 1. Cont.

	Nursing diagnosis	Alan Classroom Code	Objective	NIC initiatives[7,8]	Expected outcome
	Acute pain due to presence of infection	Comfort Physical Comfort 00132	Providing pain management and pain relief	*The patient's pain will be evaluated and recorded using the appropriate scale. *Analgesic treatment will be applied according to the physician's request. *The patient will be recommended to do practices that will divert his/her attention (listening to music, counting numbers by himself/herself, breathing rhythmically)	Optimal reduction in the patient's pain and the ability to provide pain management.
Sleep	Disturbance in sleep pattern due to pain at the site of invasive intervention and being in the hospital environment	Activity/Rest Sleep/Rest 00198	Energy management, sleep enhancement and environmental management	*Noise and sounds in the environment will be reduced. *The patient's medical treatments and care practices will be planned according to sleep patterns. *The intake of caffeinated beverages in the afternoons will be restricted, and the patient will be informed that it may cause sleep disturbance.	Identify factors that prevent sleep, state that sleep duration is adequate, report no trouble falling asleep and no sleep interruptions, state that they wake up rested and no signs of fatigue are observed.

therapy and to return to the hospital if she experienced redness, discharge, increased body temperature, or a deterioration in general condition at the lesion site (Fig. 2).

Data on the Patient's Life Activities

1. **Establishing and maintaining a safe environment:** The patient is at risk of infection due to the presence of an intravenous catheter and recent pacemaker replacement.
2. **Communication:** The patient has no issues that would hinder communication with healthcare team members or family.
3. **Respiration:** The patient did not report any respiratory difficulties.
4. **Nutrition:** The patient stated that she typically eats two meals a day at home. During hospitalization, she reported a loss of appetite and difficulty eating hospital food due to its taste.
5. **Excretion:** The patient experienced constipation during hospitalization, likely due to reduced food intake.
6. **Personal hygiene and dressing:** The patient expressed feeling unclean because she was unable to bathe in the hospital environment, though she reported changing clothes frequently during hospitalization.
7. **Body temperature control:** The patient's body temperature remained within normal limits throughout the follow-up period.
8. **Movement:** The patient reported fatigue due to prolonged bed rest. She stated that pain at the pacemaker site and in her arm restricted her ability to move actively.
9. **Work and recreation:** The patient stated that she spends most of her time at home and engages in domestic activities.
10. **Expressing sexuality:** The patient did not report any concerns related to sexuality.
11. **Sleep:** The patient experienced difficulty falling asleep due to arm pain and the unfamiliar hospital environment.
12. **Death:** The patient stated that she did not experience a fear of death (Table 1).

Discussion

With the increasing use of pacemaker devices, the incidence of complications has also risen. Common complications include bleeding, infection, pneumothorax, and, in severe cases, death. It is believed that infection rates have increased in parallel with the growing use of these devices.[9,10] This case report analyzes a patient diagnosed with sick sinus syndrome who underwent pacemaker implantation and later developed an infection following a replacement procedure.

Today, the life model is widely used in nursing education and practice, particularly in the data collection process, due to its ease of application. A review of the literature indicates that studies have been conducted both nationally[11,12] and internationally[13] within the scope of the Life Activities Model.

In this case, the patient's self-care needs were identified as infection, constipation, fatigue, pain, nutritional imbalance, and sleep disturbances. Accordingly, nursing diagnoses included risk of infection, nutrition less than body requirements, constipation, fatigue, acute pain, and disturbance in sleep patterns. Nursing care was planned with appropriate interventions. The case was analyzed in line with the life activities model, demonstrating that this model can be effectively used in diagnosing and managing pacemaker-related infections.

The infection associated with the pacemaker may have resulted from improper dressing techniques at the intervention site, inadequate patient education regarding post-implantation care, or a lack of understanding of the provided instructions. During hospitalization, dressings should be performed using aseptic techniques, and the pacemaker incision site should be closely monitored for signs of infection.

The nurse should educate the patient on aseptic principles, proper dressing materials, and dressing techniques. The patient should be informed that mild itching or burning at the incision site is normal, but cologne, powder, or lotion should never be applied. If sutures are present, they will be removed within 7–10 days. Additionally, the nurse should emphasize the importance of avoiding excessive strain on the arm near the procedure site and advise the patient to seek medical attention if they experience pain, redness, discharge, bleeding, swelling, fever above 38°C, or if the pacemaker becomes visible under the skin.

To ensure the effectiveness of patient education, the nurse should assess the patient's understanding of the instructions. If comprehension is inadequate, family members should be included in the training to facilitate proper care and management.

Disclosures

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

Authorship Contributions: Concept – G.U.; Design – G.U.; Supervision – H.Y.; Resource – G.U., H.Y.; Materials – G.U.; Data Collection and/or Processing – G.U., H.Y.; Analysis and/or Interpretation – G.U., H.Y.; Literature Search – G.U.; Writing – G.U., H.Y.;Critical Reviews – H.Y.

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