Nursing Care of a Patient Followed in the Intensive Care Unit in the Acute Period After Electrical Burn According to Gordon's Functional Health Patterns Model: A Case Study

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ABSTRACT

OBJECTIVES: The World Health Organization reported about 265 000 deaths per year from fires alone worldwide, with more deaths from electrical burns, scalds, and other causes of burns. Electrical burns are an important public health problem all over the world and in our country of Turkey. Nursing care for patients with electrical burn injuries and support for the patient's family throughout recovery involve complex and demanding expertise. In this study, we have presented the nursing care of a patient with electrical burn who was followed in the intensive care unit according to Gordon's Functional Health Patterns Model.

MATERIALS AND METHODS: A 44-year-old male patient was admitted to the burn unit after he contacted electrical wires while changing a sign on the highway. He had second-degree and third-degree burns on his arms, hands, and feet (28% of total body surface area). The goals during this phase were saving a life, maintaining and protecting the airways, restoring hemodynamic stability, promoting healing, and preventing complications. In the intensive care unit, we provided care, follow-up, and treatment according to Gordon's Functional Health Patterns Model and multidisciplinary patient care plans.

RESULTS: Nursing care was planned according to effective management of the individual, who had imbalanced nutrition of less than body requirements, deficient fluid volume, constipation risk, self-care deficits, a disturbed sleep pattern, acute pain, interrupted family processes, sexual dysfunction, and anxiety. Nursing diagnoses for interventions were applied, and evaluations were made.

CONCLUSIONS: Nurses can positively affect all phases of patient care. In the case described here, Gordon's Functional Health Patterns model formed the basis of nursing care, resulting in achievement of goals of the planned nursing care.

KEY WORDS: *Electrical burn, nursing model, case report*

INTRODUCTION

Burns are a serious public health problem both globally and nationally. According to the World Health Organization, over 265 000 people die worldwide every year from fires, with burns accounting for an estimated 180 000 deaths in low- and middle-income countries.[1,2] The physical examination is crucial in patients with electrical burns, since those burns can cause life-threatening conditions, particularly related to the cardiovascular system in the acute period.[3] Good fluid resuscitation is essential to prevent kidney failure in patients with burns.[4,5] Moreover, the heat generated by electrical energy passing through tissues causes damage to important structures, such as nerves, vessels, and muscles in the extremities, which may lead to compartment syndrome in those extremities. Compartment syndrome is an emergency that requires early diagnosis and instant fasciotomy. It is necessary to treat patients with severe electrical burns in burn centers where necrotized tissues can be debrided and wounds can be quickly closed.[5-7]

The care and treatment processes of patients with electrical burns are complex and challenging. In this context, nurses play a substantial role in the overall management of patients with burns; it is therefore essential for nurses to

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know the different protocols used for care of patients with burns. The nursing management of patients with burns includes psychological support and medical care for the patient and their families. The optimal care of patients with burns requires a multidisciplinary team approach.[5,6] In this study, we have described the nursing care for a patient with electrical burn who was followed in the intensive care unit (ICU) according to Gordon's Functional Health Patterns Model.

Gordon's Functional Health Patterns Model

In 1987, Marjory Gordon proposed a perspective called "Functional Health Patterns" in her studies on nursing diagnoses to collect and organize information with a strong nursing perspective.[8-10] Gordon defined the nursing process of Functional Health Patterns as the sequence of behaviors in a certain period. The model for Functional Health Patterns emphasizes critical thinking and clinical decision-making. It consists of 11 patterns related to human health and life: health perception-health management pattern, nutritional-metabolic pattern, elimination pattern, activity-exercise pattern, sleep-rest pattern, cognitive-perceptual pattern, self-perception/self-concept pattern, role-relationship pattern, sexuality-reproductive pattern, coping-stress tolerance pattern, and value-belief pattern.[10-12]

Health perception-health management pattern

This pattern involves how patients perceive and manage their health and well-being and whether they have any health problems. The first step to evaluation of a patient's health is to conduct interviews consisting of planned and focused conversations between the nurse and patient. These interviews are aimed at revealing the patient's perception of health, functional status, and knowledge of health, recovery, and other factors. These evaluation interviews make it possible to identify the patient's specific interests and perceptions about health, illness, health management practices, and health care. The interview is also a tool for gathering demographic data and information on social background and support systems. Data and information gathered from the evaluation interview provide a basis for clinical decisions and diagnoses.

Nutritional-metabolic pattern

This pattern involves the patient's pattern of food and fluid consumption relative to metabolic needs.

Elimination pattern

This pattern involves the patient's pattern of secretion through the bowel, bladder, and skin.

Activity-exercise pattern

This pattern involves the patient's pattern of activities, exercise, leisure, and recreation.

Sleep-rest pattern

This pattern involves the patient's pattern of sleep, rest, and relaxation. The nurse should evaluate the patient's sleep and rest in detail.

Cognitive-perceptual pattern

This pattern involves the patient's emotional perception and cognition. Identifying sensory, perceptual, and cognitive patterns requires an understanding of processes and structures related to vision, hearing, taste, smell, touch, pain perception, language, and thinking. This pattern includes an understanding of the relevant sensory organs, peripheral nervous system, and central nervous system.

Self-perception/self-concept pattern

This pattern involves the patient's pattern of self-perception, such as mood, control, competence, and body image.

Role-relationship pattern

This pattern involves role engagements and relationship patterns, revealing how the patient's perceptions affect their behavioral and emotional responses.

Sexuality-reproductive pattern

This pattern involves the patient's satisfaction and dissatisfaction with sexuality and reproduction.

Coping-stress tolerance pattern

This pattern involves the patient's effectiveness in coping and tolerating stress in general.

Value-belief pattern

This pattern involves the patient's values and beliefs, including spiritual and/or goals that guide choices or decisions.[10-13]

It is possible to apply the Functional Health Patterns model with an extensive scope since this model represents the functional characteristics of humans. A pattern should be evaluated by considering all other patterns, thus allowing a holistic approach when considering the patient.

MATERIALS AND METHODS

A 44-years-old male patient presented to our burn treatment center in April 2021 after contact with electrical wires while changing a sign on the highway. He did not have any systemic diseases. Our primary aim was to save the patient's life, maintain his airways, and provide hemodynamic stability and pain control. To prevent compartment syndrome, we performed fasciotomy immediately; we then evaluated laboratory findings and performed intravenous hydration, performed blood and blood product replacement, and started the patient on sodium bicarbonate infusion. To ensure optimal management of burn wounds, we met tissue oxygen requirements at the maximum level with nasal oxygen and inhalation treatments.

The patient also received special medical nutrition products containing protein, carbohydrates, fats, vitamins, and minerals. Table 1 shows results of vital sign, physical, and neurologic examinations of the patient at admission to the ICU.[14] Table 2 shows the patient's laboratory findings and medications.

Data were collected after verbal consent and written consent were obtained from the patient. The study was approved by the Non-Invasive Clinical Research Ethics Committee of the Baskent University Ankara Hospital.

RESULTS

Health perception-health management pattern

In the ICU, the patient stated that he accepted the treatment and that he thought he would be healthier after the treatment.

Nutritional-metabolic pattern

We observed that the patient ate less than his body's albumin requirement and that his appetite had decreased since hospitalization. We planned a supportive nutrition program for the patient in cooperation with a dietitian.

Elimination pattern

The patient, who had met his need for defecation every day in his daily life, stated that he had a feeling of insufficient elimination after his hospitalization due to limited mobility.

Activity-exercise pattern

The patient was fully dependent on others to perform daily life activities. He could only meet his self-care needs with help due to limited mobility.

Sleep-rest pattern

We observed that the patient could sleep 6 to 7 hours per night and that he slept 3 to 4 hours more during the day with administration of anesthesia during dressing changes. He had difficulty falling asleep due to treatments.

Cognitive-perceptual pattern

We observed that the patient's pain level was high due to the burn areas and surgical interventions. His pain score was 7 on the Numerical Pain Evaluation Scale. The score decreased over time.

Self-perception/self-concept pattern

During the stay in the ICU, the patient was calm; he smiled when we entered his room to meet his treatment and care needs. He said that he felt bad, but that he knew that this was temporary. He expressed that this would cause changes in his lifestyle, but he was happy to be alive.

Role-relationship pattern

The patient stated that, because he was away from his family during his stay in the hospital, he was upset for not being able to act as a father and husband, and he wondered if everyone was well and safe.

Sexuality-reproductive pattern

The patient stated that there was no problem in his sexual life previously and that he knew about contraception methods. He reported problems in parenthood due to his stay in the hospital.

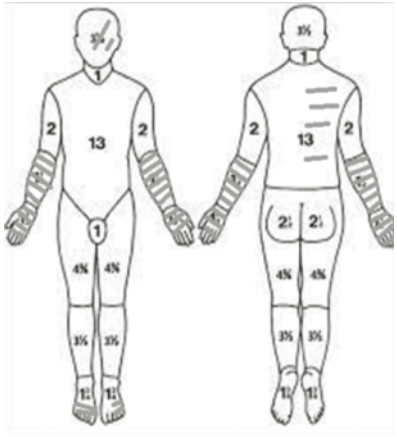
Coping-stress tolerance pattern

The patient was calm and open to communication in general. However, we observed that he had fears and concerns about staying in the hospital and being away from his family, which created anxiety in him.

Value-belief pattern

The patient stated that he used prayer as a coping method. We observed that he displayed a fatalistic attitude by expressing that everything comes from God and gets better in time. He expressed that he calmed down by praying

TABLE 1. Vital Findings and Physical and Neurological Evaluation of Patient

Blood pressure: 176/104 mm Hg		Glasgow coma score: 15
Heart rate: 66 beats/min		Eye opening response: spontaneously
Body temperature: 37.1 °C		Verbal response: oriented to time, person, and place
Respiration: 22 breaths/min		
Oxygen saturation: 96 (8 L/min O_2)		Motor response: obeys command

Lund and Browder burn diagram is presented.[13]

TABLE 2. Patient's Laboratory Findings and Medications

Test Name	Result (Normal Range)	Test Name	Result (Normal Range)
	Laboratory Findings		
Hemoglobin	16.4 g/dL (3.5-18 g/dL)	Creatine kinase	18629 U/L (30-200 U/L)
Hematocrit	48.7% (36%-50%)	Procalcitonin	1.3 ng/mL (<1.2 ng/mL)
Red blood cells	5.43× 10^6/μL (4.5- 5.8 × 10^6/μL)	BUN	13 mg/dL (6-26 mg/dL)
White blood cells	20.88 × 10^3/μL (4.5-11 × 10^3/μL)	Creatine	0.75 mg/dL (0.7-1.3 mg/dL)
Thrombocytes	200 × 10^3/μL (150-400 × 10^3/μL)	AST	991 U/L (5-34 U/L)
Calcium	7.7 mg/dL (8.5-10.2 mg/dL)	ALT	146 U/L (0-55 U/L)
Potassium	4.1 mmol/L (3.5-5.2 mmol/L)	Albumin	3.5 g/dL (3.4-4-8 g/dL)
Magnesium	1.83 mg/dL (1.6-2.6 mg/dL)	CRP	10.2 mg/dL (0-5 mg/dL)
Phosphorus	2.1 mg/dL (2.3-4.7 mg/dL)		
	Medications		
Pethidine	Synthetic opioid	To reduce pain	
Dexketoprofen	NSAID	To reduce pain	
Hydroxyzine	Antihistamine	To treat itchiness, anxiety, and nausea	
Acetylcysteine	N-acetylcysteine	To help prevent liver damage	
Metoprolol	Beta blocker	To treat angina and heart failure	
Propofol	Anesthetic agent	To slow the activity of nervous system	
Pantoprazole	Proton pump inhibitor	To decrease amount of acid produced in the stomach	
Enoxaparin sodium	Anticoagulant	To prevent deep vein thrombosis	
Vitamin C	Vitamin	To repair tissue and for enzymatic production of certain neurotransmitters	
Tazobactam	Antibiotic	To treat a wide variety of bacterial infections	
Metoclopramide	Antiemetic	To treat and prevent nausea and vomiting	
Sodium bicarbonate	Antacid	To normalize body pH	
Furosemide	Diuretic	To treat fluid build-up	
Mannitol	Osmotic diuretic	To elevate blood plasma osmolality	
Ringer	Isotonic solution of electrolytes	To balance pH	
Therapeutic nutrition product	Arginine, glutamine, and μ-hydroxy-μ-methylbutyric acid	To slow protein breakdown, facilitate synthesis of collagen, and promote function of numerous cells involved in immune responses	
Magnesium, calcium, phosphorus	Electrolytes	To balance electrolytes	

Abbreviations: ALT, alanine aminotransferase; AST, aspartate aminotransferase; BUN, blood urea nitrogen; CRP, C-reactive protein; NSAID, nonsteroidal anti-inflammatory drug

and that his family and his wife were valuable to him. We observed that the patient's wife supported him, and he was often calmed with his wife's support.

Nursing plan

Nursing care was planned to allow the therapeutic regimen to be implemented effectively; the patient required care for imbalanced nutrition, with less than body requirements, deficient fluid volume, constipation risk, self-care deficits, disturbed sleep patterns, acute pain, interrupted family processes, sexual dysfunction, and anxiety. Nursing diagnoses for interventions were applied, and evaluations were made (Table 3).[15]

DISCUSSION AND CONCLUSIONS

For patients admitted to the ICU after electrical burns, we suggest that it is necessary to evaluate them as a whole, that is, with consideration of physiological, psychological, and social factors and economic status. A holistic approach to nursing care creates positive effects in terms of patient outcomes. We recommend the use of Gordon's Functional Health Patterns Model in patients with burns.

TABLE 3. Evaluation of Patient According to Gordon's Functional Health Patterns Model[14]

	Nursing Diagnosis	Descriptive Features and Symptoms	Aim	Nursing Intervention	Evaluation
Health Perception-Health Management Pattern	Managing Therapeutic Regimen Effectively: Individual	Patient verbally expressed desire to manage his treatment and prevent negative consequences and verbally expressed that he aimed to reduce risk factors related to treatment and its results	Ability to identify changes in his condition, to prevent complications that may develop	- Inform patient about possible complications - Make evaluation together with patient about the stress he experienced- Provide information on healthy living activities	We observed that the patient, who was dependent on others to perform healthy lifestyle behaviors, actively participated in the care processes and paid attention to dietary therapy.
Nutritional-Metabolic Pattern	Imbalanced Nutrition: Less Than Body Requirements	Weakness, fatigue, decreased appetite, decreased serum albumin level (albumin: 2.25 g/dL)	To feed the patient in accordance with his daily metabolic requirements and activity level, to increase his appetite, and to prevent weight loss	- Plan diet high in protein and calories in cooperation with a dietitian, to ensure adequate and balanced nutrition - Support nutrition due to patient's decreased muscle tone - Ensure patient ate small and frequent meals - Provide information on importance of nutrition - Monitor hydration status - Apply oral care - Place patient in semi-Fowler position while eating	Patient could not feed himself without assistance and was help at every meal. We ensured that he ate small and frequent meals high in protein and calories. We provided total parenteral nutrition support and therapeutic nutrition products. Albumin transfusion allowed albumin level to increase from 2.25 to 3.5 g/dL. We provided oral care. We observed that his appetite increased.
Nutritional-Metabolic Pattern	Deficient Fluid Volume	Weakness, fatigue, decreased appetite, decreased electrolyte levels	To have stability of patient's vital signs skin/color and electrolyte levels; to have patient produce adequate urine volume, and to have his fluid and blood volume return to normal	- Monitor vital signs, especially BP and HR, urine output/color, and temperature - Assess skin turgor and oral mucous membranes for signs of dehydration- Administer fluids, blood, blood products, plasma expanders as ordered - Monitor serum electrolytes and urine osmolality (and report abnormal values)	Patient had improved CVP values and vital signs, showed normal intake-extraction levels, and had improved dehydration findings; laboratory results were observed to reach normal levels.
Elimination Pattern	Constipation Risk	Limited mobility, changed defecation routine	For the patient, to defecate with normal frequency and consistency, to continue routine bowel movements without feeling any discomfort	- Include fiber and fluid in diet - Plan activities according to patient's tolerance to increase intestinal peristalsis and motility- Regulate defecation time (especially after breakfast) - Administer laxative or stool softener medication according to doctor's order	The patient did not develop constipation.

TABLE 3. (Continued) Evaluation of Patient According to Gordon's Functional Health Patterns Model[14]

Activity-Exercise Pattern	Self-Care Deficit	Unable to dress, wash, feed, or go to the toilet on his own	To ensure that the patient participated in daily life activities at highest level by identifying factors that cause lack of self-care; to help patient perform self-care activities; to help him while eating, putting him in the right position; to provide oral care before/after meals; to assist with needs such as bathing and changing clothes; to support him in expressing his needs	- Assist patient with eating - Provide oral care before/after meals - Provide sponge baths; help him to change clothes - Recognize that, although his dependency to drink water decreased, dependency on assistance with other daily life activities could not change	Patient was unable to dress, wash, feed, or go to the toilet on his own.
Sleep-Rest Pattern	Disturbed Sleep Pattern	He expressed tiredness, frequent interruption of sleep, and difficulty in falling asleep	To ensure adequate sleep, relieve insomnia symptoms, and to provide adequate rest	- Create a relaxing, quiet, and calm environment - Reduce daytime sleeps - Plan treatment and care practices according to sleep hours - Apply medical treatment according to doctor's order	We made the patient listen to music and watch videos to sleep. We replanned the treatment processes. However, he stated that he still had difficulty falling asleep due to the pain during the dressings.
Cognitive-Perceptual Pattern	Acute Pain	The patient said that he had pain and he had restlessness, weakness, and changes in body and facial expression	For the patient, to express that he had less/no pain	- Evaluate location, severity, and degree of pain - Identify factors that increase or decrease severity of pain-Administer analgesics according to doctor's orders - Use non-pharmacological methods to reduce pain	The patient stated that his pain decreased after analgesic drug treatment. Tachycardia and tachypnea decreased. His pain score was 1-2.
Role-Relationship Pattern	Interrupted Family Processes	Prolonged treatment for burns, hospitalization, being away from home, emotional changes in family members	To ensure the continuation of his relationship with his wife and other family members	- Enable patient to maintain communication and spend sufficient time with his wife - Inform both patient and his family about treatment and process - Plan visiting hours with his wife and ensure that he had time with family members	We observed that the patient made plans with his family members, gave directions about organizations, and clearly stated his demands.
Sexuality-Reproductive Pattern	Sexual dysfunction	Hospitalization, having burn areas, limited physical movement	To ensure the continuity of the patient's sexual activity	- Assess patient's level of knowledge on contraception methods and provide additional information before discharge - Explain that everything would return to normal after treatment and follow-up processes - Inform that he can resume his sexual activities when ready and when doctor allows it	The patient stated that he was satisfied with this information.

TABLE 3. (Continued) Evaluation of Patient According to Gordon's Functional Health Patterns Model[14]

Coping-Stress Tolerance Pattern	Anxiety	Patient's expression of fear and anxiety	To reduce level of anxiety by giving him the information he needs and to ensure his adaptation to treatment	- Identify anxiety symptoms and signs (restlessness, tachypnea, tachycardia, etc.) - Allow patient to express himself- Explain his condition, its treatment, and why his stay in hospital is prolonged - Provide calm, supportive, and safe environment - Strengthen his communication by encouraging him to ask questions - Question his methods of coping with stress - Provide information about burns and postdischarge period	He stated that his anxiety level was reduced.

Abbreviations: BP, blood pressure; CVP, central venous pressure; HR, heart rate

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