

NURSING CARE AFTER SKIN AUTOTRANSPLANTATION AS A TREATMENT METHOD OF SECOND- AND THIRD-DEGREE THERMAL BURNS – A CASE STUDY BASED ON THE NANDA AND ICNP® CLASSIFICATIONS

Katarzyna Wojnar-Gruszka^{1A,C,D,E,F}, Weronika Jasica^{2A,B,C}, Joanna Kojs^{3D,E}, Marcelina Potocka^{1E,F},
Lucyna Płaszewska-Żywko^{1E,F}

¹Department of Clinical Nursing, Institute of Nursing and Midwifery, Faculty of Health Sciences, Jagiellonian University Medical College, Krakow, Poland

²Student of the second degree studies in the field of Nursing, Faculty of Health Sciences, Jagiellonian University Medical College, Krakow, Poland

³Department of Neurology and Stroke Ward, Specialist Hospital G. Narutowicz in Krakow, Poland

Authors' contribution:

A. Study design/planning • B. Data collection/entry • C. Data analysis/statistics • D. Data interpretation • E. Preparation of manuscript • F. Literature analysis/search • G. Funds collection

Address for correspondence:

Dr. Katarzyna Wojnar-Gruszka
Department of Clinical Nursing
Institute of Nursing and Midwifery
Faculty of Health Sciences
Jagiellonian University Medical College,
25 M. Kopernika St., 31-501 Krakow
e-mail: k.wojnar-gruszka@uj.edu.pl

SUBMITTED: 20.11.2022

ACCEPTED: 18.12.2022

DOI: <https://doi.org/10.5114/ppiel.2022.125552>

ABSTRACT

Introduction: Burns are the fourth most common cause of injury throughout the world. Thermal burns account for 86% of these. The basis of burn disease treatment is fluid resuscitation, pain management, antithrombotic treatment, and in severe cases, surgical intervention and skin transplantation.

The aim of the study was to present selected nursing diagnoses of a patient with burn disease after partial skin autotransplantation as a thermal burn treatment method while using the NANDA and ICNP® classifications.

Material and methods: The study applied the case study method of a 35-year-old woman with second-/third-degree thermal burns covering 40% of the body surface. Research techniques were used: observation, documentation analysis, and interview, using the American ABA burn depth assessment scale and the NRS pain scale research tools.

Results: The main nursing diagnoses were severe pain on the injured tissue and in autografted areas, decreased myocardial oxygen demand due to the catabolic state of the body, the risk of oligovolemic shock, and the risk of graft site infection and infections on other burn wounds. The patient experienced increased anxiety and difficulties with accepting her health situation.

Conclusions: The depth and extent of the trauma required skin autotransplantation in the patient. Treating the burn consisted, inter alia, of correcting fluid and electrolyte disorders, pain management, antithrombotic treatment, β -blocker administration, and transfusing blood products. Comprehensive care, requiring extended monitoring, epidemiological regime, and risk assessment of complications, was important in the nursing process. Both diagnosis classifications – NANDA and ICNP® – proved useful in the patient's care, complementing each other.

Key words: thermal burns, burn disease, nursing care, NANDA, ICNP®.

INTRODUCTION

In Poland, burns affect approx. 400,000 people per year and are the fourth most common cause of injuries throughout the world [1]. According to data from the World Health Organization (WHO), they cause approx. 6.6 million injuries and 300,000 deaths each year, requiring a multidisciplinary approach and cooperation [2]. The most common is a thermal burn that “occurs through intensive heat contact to the body, which destroys and/or damages human skin” [3].

The degree of tissue damage depends on the temperature and duration of contact with the causative agent [4-6], and it requires hospitalization in accordance with the accepted criteria (Table 1) [7, 8].

Burn disease is diagnosed in the case of serious local and systemic disorders caused by burns covering more than 15-20% of the body surface in adults [9]. The course of the burn disease can be divided into 3 clinical periods (Table 2).

The basic treatment for the burn shock is fluid resuscitation supported by the supply of large doses of vitamin C [10], high-protein nutrition, early excision of

Table 1. American Burn Association (ABA) Burn Unit Referral Criteria

Burn depth (°)	Total body surface area – TBSA (%)*
I°	In superficial burns, there is no or minimal dermal injury, usually heals in 3 weeks without any sequelae
II°, III°	> 10% TBSA in patients under 10 or over 50 years of age, > 20% in other age groups, involve the face, hands, feet, genitalia, perineum, and major joints
III°	> 5% TBSA in any age group
Other	Electrical burns, including lightning injury Chemical burns Inhalation injury Burn injury in patients with pre-existing medical disorders that could complicate management, prolong recovery, or affect mortality (e.g. significant chemical exposure) Any patients with burns and concomitant trauma (e.g. fractures, blast injury) where burn injury poses the greatest risk of morbidity or mortality

TBSA – total body surface area

* In adults the “rule of nines” is used as a rough indicator of % TBSA.

Authors’ elaboration based on [7, 8].

dead tissue (up to 72 hours after the burn), the use of appropriate specialist dressings, and targeted antibiotic therapy [7]. Prolonged catabolism (period II) requires protein/albumin supplementation and the use of non-selective β -blockers [11].

The non-surgical local treatment of a burn wound includes antibiotics, agents containing silver, and lubrication of the skin. Treatment should take place under aseptic conditions [1, 12].

Surgical treatment is recommended for second- and third-degree burns based on the early excision of necrotic tissues (necrectomy) and surgical closure of the burn wound by covering with skin grafts. In the case of deep burns of partial or full skin thickness, the standard for wound coverage is to use split-thickness skin grafts (STSG) [2]. It is recommended that the 2 + 2 rule is followed, meaning surgery lasting no more than 2 hours with the transfusion limited to 2 blood units [13]. Autotransplantation up to 7-10 days after the burn accelerates the wound healing process (vs. 21 days or longer for spontaneous healing), significantly reducing the risk of infection and scarring, reducing pain, and enabling faster mobilization of the patient [2]. Other methods are the use of artificial skin, artificial epidermis, and allogeneic or xenograft [12, 14].

The treatment of burn wounds can be supplemented with hyperbaric therapy (HBOT). However, while HBOT is used to treat a wide variety of conditions as either a standard treatment plan or as an auxiliary therapy, the use of HBOT as an adjuvant in the treatment of thermal burns remains controver-

Table 2. Clinical course of burn disease

Clinical stage	Symptoms
I Shock (1-2 days)	Hypovolaemia and hypoperfusion, pulmonary oedema, organ ischaemia
II Catabolic stage (a few days – a few weeks)	Anaemia, reduced albumin levels, tachycardia, subfebrile states, muscle catabolism, impaired protein synthesis in the liver
III Anabolic stage (more than 4 weeks)	Further reduction in albumin levels, worsening of anaemia, progression of cachexia, organ complications

Authors’ elaboration based on [1].

sial due to limited and conflicting evidence [15]. Pain control and treatment (continuous analgesia) are indispensable and critical when treating patients with severe burns. Burn pain is defined as burning, stinging, and scalding; it is resistant to treatment and has a major impact on the patient’s psyche [1].

According to the current recommendations, the early introduction of enteral nutrition reduces the body’s hypermetabolic response [16]. In severe burns, proton pump inhibitors are used to prevent the formation of so-called Curling ulcers in the fundus or duodenum associated with increased secretion of hydrochloric acid in reaction to burns and ischaemia of the gastrointestinal mucosa as a result of hypovolaemia [17].

The hypermetabolic state in a severely burned patient leads, among others, to rapid loss of muscle mass and requires bed rest. The treatment requires obligatory antithrombotic prophylaxis. Immobilization of the patient is the cause of peripheral polyneuropathy; therefore, after stabilizing the haemodynamic state, it is necessary to start rehabilitation [11].

Burn disease alters the patient’s self-perception and quality of life, and is often associated with depression, post-traumatic stress disorder (PTSD), and anxiety disorders [6, 12, 18].

The study aimed to present selected nursing diagnoses in a patient after skin autotransplantation as a method of thermal burn treatment using the NANDA and ICNP® classifications.

MATERIAL AND METHODS

A case study was used in this research. The research techniques used were observation, analysis of medical records (observation cards, fever cards, and medical orders), an interview, and the measurement of vital and anthropometric parameters. The research tools used were the proprietary observation and interview questionnaire, the American Burn Association (ABA) burn severity rating scale, and the NRS (numeric rating scale) pain scale. The patient’s consent was obtained for the examination and publication of the photos. Based on the collected data, nursing

diagnoses were formulated according to NANDA and ICNP® guidelines, nursing interventions were planned and implemented, and outcomes were evaluated.

Organization of the study

The study was conducted in December 2021 during 3 selected days of hospitalization, meaning 14, 15, and 19 days after the injury (from the first to the fifth day after skin autotransplantation) in the plastic, reconstructive, and burn surgery department in a hospital in Małopolska.

Characteristics of the examined patient

A 35-year-old female patient suffered second-/third-degree thermal burns around the face, hands, torso, back, and lower limbs while adding fuel to a bio-fireplace. In the assessment of burn severity according to the ABA (Table 2), the burns were classified as major, covering approximately 40% of the body surface area. The patient was transferred to a plastic, reconstructive, and burn surgery ward.

The department included fluid treatment (Sterofundin 500 ml, 10% glucose 500 ml) with high doses of vitamin C (2 × 1 g), analgesic treatment (1% lidocaine 40 mg/h *i.v.* in continuous infusion; morphine 20 mg/20 ml *i.v.* in continuous infusion; Dexdor 200/50 ml *i.v.* continuous infusion; paracetamol PCA *ad hoc* 1 g) through a central vascular access inserted into the left internal jugular vein and anticoagulant treatment (Clexane 1 × 60 mg s.c.). The patient was conscious, auto- and allopsychically oriented and in good verbal contact. In the ward, the patient was kept in protective isolation and was constantly monitored. Saturation ranged from 98% to 100%, the number of breaths was in the range of 14-15/min, blood pressure (BP) ranged from 120/60 mmHg to 130/85 mmHg, heart rate was regular, pulse with good tense ranging from 80 to 100 ud/min, tempera-

ture ranged from 36.5°C to 36.6°C, and body mass index (BMI) was 30.49 kg/m².

The patient received wholesome meals with an increased amount of protein, supported by a high-energy formula for special medical purposes (Nutridrink Protein 2 × 1 bottle) and an immunomodulating ingredient (Arginilan 1 × 1 *p.o.*). A proton pump inhibitor (IPP, 1 × 40 mg *i.v.*) was used in the prevention of Curling ulcers. The patient was subjected to passive oxygen therapy through a nasal cannula (5 l/min), and venous blood gas measurements were taken daily. The patient had a bladder Foley catheter in place, and the fluid balance was monitored.

The examined patient denied the presence of comorbidities and did not take any medications regularly. To prevent wound infection and to prepare for transplantation, the patient underwent the procedure of changing the dressings on burn wounds every day under aseptic conditions and general anaesthesia. The burned surfaces were cleaned of dead tissue, washed with an antiseptic (sterile 1% NaCl), and protected with special sterile dressings (Cuticerin). Lanolin, boric acid ointment, and betadine were also used on the fingers of the right hand. On the third day of hospitalization, a tangential necrectomy was performed on the area of third-degree burns (mainly the right shoulder), and on the tenth day, a tangential necrosis excision was done to the right arm and right



Figure 1. Burn wounds of the patient's trunk on the fifth day after surgery (19 days after burn injury)



Figure 2. Burn wound of the patient's right arm covered with an intermediate thickness skin graft (19 days after burn injury)

torso. Wounds were covered with specialist Aquacel Ag dressings and reinforced with an elastic bandage. During the procedure, one unit of concentrated red blood cells (RBC) was transfused without complications. On day 12 after the injury, the patient was diagnosed with anaemia (RBC $3.01 \times 10^6/\text{ql}$, Hb 7.9 g/dl, Hct 19%); therefore, 2 units of concentrated red blood cells were transfused, and no complications were observed. On the 14th day of hospitalization, the right-side wounds were covered with a skin graft of intermediate thickness (Fig. 1), and on the 19th day this was also done on the right arm area (Fig. 2). All grafts were collected using a dermatome from the healthy tissue area of the thigh and left shank.

THE PATIENT NURSING PROCESS USING THE NANDA AND ICNP® CLASSIFICATIONS

In the nursing process, the NANDA classification was used, the interventions were developed according to the Nursing Interventions Classification (NIC), and the results of care were rated according to the Nursing Outcomes Classification (NOC) [19]. The mapping of diagnoses and interventions using the 2017 version of the ICNP® dictionary was also used [20]. For the purposes of this publication, the terms derived from the following axes were used: subject (F – focus), location (L), interventions (IC), and means (M).

Nursing diagnosis 1.

NANDA: Severe burning pain in the chest, abdomen, and extremities related to tissue trauma caused by thermal burn and pain at the site of skin transplant [21].

ICNP®: Pain [10013950 + 8] + abdomen [10000023] + right [10017234] + left [10011267] + arm [10002504] + leg [10011298] + burn [10003763] + thermal injury [10019637] + transplantation [10020053].

Intervention

NANDA

- Assessment of pain (duration, nature, pain aggravating and alleviating factors), intensity based on the NRS pain scale.
- Patient education on the causes of pain.
- Assisting in adopting a pain-relieving position.
- The use of amenities: anti-bedsore mattress, pillows, rollers.
- Providing the patient with conditions for rest.
- Combined and gently performed skin care treatments.
- Pharmacotherapy according to a doctor's orders (1% lidocaine 40 mg/h *i.v.* in the pump, Morphine 20 mg/20 ml *i.v.* in the pump, Dexdor 200/50 ml *i.v.* in

the pump [the first day of observation], paracetamol PCA *ad hoc* 1 g [the third day of observation]).

- Observing the patient in terms of her increased need for painkillers.
 - Participating in patient rehabilitation according to the plan agreed upon with the doctor and physiotherapist.
 - Motivating the patient to use relaxation methods, such as listening to her favourite music and conscious breathing.
- ICNP®
- Monitoring pain [10038929].
 - Assessing pain [10026119].
 - Assessing knowledge about pain [10039104].
 - Assessing control of pain [10002710].
 - Assessing knowledge of pain management [10039041].
 - Identifying attitude toward pain [10009654].
 - Teaching about pain [10039115].
 - Managing pain [10011660].
 - Assessing psychological response to pain [10038964].
 - Managing exercise regime [10023890].
 - Collaborating on pain management plan [10039831].
 - Administering pain medication [10023084].
 - Monitoring response to treatment [10032109].
 - Distraction [10039232].
 - Assessing medication side effect [10039087].
 - Teaching about medication side effects [10044614].
 - Teaching about managing pain [10019489].
 - Teaching breathing technique [10039213].
 - Teaching relaxation technique [10038699].
 - Collaborating with physician [10023565].

Nursing outcomes

NANDA: Pain intensity decreased from 6 to 4 on the NRS scale in the right hand. Pain remained at level 3 for the rest of the body.

ICNP®: Reduced pain [10027917].

Nursing diagnosis 2.

NANDA: Risk of decreased cardiac output related to hypovolaemia and anaemia associated with burn disease [22].

ICNP®: Impaired cardiovascular system [10022949], metabolism [10012005].

Interventions

NANDA

- Monitoring heart rate, blood pressure, respiratory rate.
- Monitoring oxygen saturation and pulse with a pulse oximeter.
- Monitoring body temperature 2 /day or as indicated.

- Performing a 12-lead ECG in case of the patient's worsening well-being.
- Blood sampling for venous blood gas analysis, biochemistry to determine electrolytes (K⁺, Na⁺, Cl⁻, Ca⁺⁺, Mg⁺⁺), glucose, and protein/albumin levels.
- Pharmacotherapy as prescribed by a doctor [Metoprolol 1 × 50 mg *p.o.*, 10% glucose 500 ml + 10 mmol Glycophos *i.v.* (on the first day of observation), MgSO₄ 1 × 2 g *i.v.* (regarding the first, second, and third days of observation), Exacyl 1 g (regarding the second day of observation).
ICNP[®]
- Monitoring vital signs [10032113].
- Monitoring cardiac status [10034285].
- Assessing cardiac status [10036738].
- Monitoring blood pressure [10032052].
- Monitoring respiratory status [10012196].
- Assessing respiratory status [10036786].
- Blood glucose monitoring [10032034].
- Monitoring body temperature [10012165].
- Managing symptom [10031965].
- Promoting self-management of symptom [10038469].
- Diagnostic testing [10031140].
- Monitoring laboratory result [10032099].
- Administering medication and solution [10001804].
- Monitoring response to treatment [10032109].
- Collaborating with physician [10023565].
- Measurement of the central venous pressure (CVP) 1-2×/day.
- Insertion of a Foley catheter into the bladder.
- Hourly and daily diuresis control.
- Keeping fluid balance.
- Venous blood sampling for blood gas testing.
- Venous blood sampling for biochemical testing (Na⁺, Cl⁻, K⁺, Ca⁺⁺, Mg⁺⁺).
- Collecting urine for general examination (osmolality).
- Assessment of the state of consciousness using the Glasgow scale.
- Observing the patient for signs of shock, i.e. weakness, dizziness, lower pulse rate, decreased diuresis, and pale skin.
- Assessment of oedema (lower and upper limbs, abdominal circumference).
- Supplementing fluid deficiency and electrolytes intravenously on doctor's orders [10% glucose 500 ml + 10 mmol Glycophos *i.v.* (the first day of observation), Sterofundin 500 ml (the first and second days of observation), MgSO₄ 1 2 g *i.v.* (the first, second, third days of observation)].
- Pharmacotherapy according to doctor's orders to reduce the inflammatory response (Biseptol 2 × 960 mg *i.v.*, Ampicillin 4 × 2 g *i.v.*).
ICNP[®]
- Monitoring vital signs [10032113].
- Symptom control [10025812].
- Monitoring fluid balance [10040852].
- Diagnostic testing [10031140].
- Monitoring laboratory result [10032099].
- Assessing urine [10050164].
- Assessing risk for dehydration [10040932].
- Monitoring blood pressure [10032052].
- Monitoring cardiac status [10034285].
- Monitoring respiratory status [10012196].
- Monitoring blood glucose [10032034].
- Monitoring body temperature [10012165].
- Monitoring fluid output [10035319].
- Administering medication and solution [10001804].
- Electrolyte therapy [10039324].
- Fluid therapy [10039330] + intravenous therapy [10010808].
- Monitoring response to treatment [10032109].

Nursing outcomes

NANDA: The patient's vital signs were as follows: saturation 98-99%, breathing 14-15/min, BP 120/60 mmHg, heart rate equal to the pulse, regular, with good tense, 80-100 bpm. Body temperature 36.6°C. Laboratory test results on the first day of care were as follows: Ht 19-26.3%, Hb 7.8-8.5 g/dl, Na⁺ 134-138 mmol/l, K⁺ 3.9-4.8 mmol/l, Ca⁺⁺ 1.17-1.2 mmol/l, Cl⁻ 103-107 mmol/l, Mg⁺⁺ 0.79 mmol/l, glucose 5.5-6.4 mmol/l.

ICNP[®]: Effective cardiovascular status [10033692].

Nursing diagnosis 3.

NANDA: Fluid volume deficit related to the damage of microcirculation vessels manifested by hyponatraemia and weight loss [23].

ICNP[®]: Impaired fluid volume [10042008], hypovolaemia [10042020], electrolyte imbalance [10033541], hyponatraemia [10031500], dehydration [10041882], hypovolaemic shock [10009599].

Interventions

NANDA

- Continuous monitoring and assessment of vital signs (BP, pulse, oxygen saturation, respiratory rate).
- Body weight measurement 1×/day.

Nursing outcomes

NANDA: Fluid balance was negative and amounted to -1550 ml on day 1, -1120 ml on day 2, and -2160 ml on day 3. The patient's body weight decreased by 4 kg during the evaluated days. CVP result +7 cm H₂O on day 1, +3 cm H₂O on day 2, and +2 cm H₂O on day 3. Laboratory test results on the first day of care: Na⁺ 134-138 mmol/l, K⁺ 3.9-4.8 mmol/l, Ca⁺⁺ 1.17-1.2 mmol/l, Cl⁻ 103-107 mmol/l, Mg⁺⁺ 0.79 mmol/l, glucose 5.5-6.4 mmol/l, phosphorus 1.26 mmol/l, creatinine 36 qmol/l, eGFR 189.11 ml/min/1.73 m², urea 4.73 mmol/l,

total protein 49 g/l, albumin 24 g/l. There was no sign of shock, and the patient was weak and tired.

ICNP®: Impaired fluid volume [10042008], hyponatraemia [10031500], hypomagnesia [1003149], weakness [10024897].

Nursing diagnosis 4.

NANDA: The risk of skin integrity impairment (e.g. infection, haematoma, necrosis) related to the burn and partial skin autograft [24].

ICNP®: Impaired skin integrity [10001290 + 3] + risk of infection [10015133] + haematoma [10008931] + necrosis [10012482], transplantation [10020053] + skin [10018239].

Interventions

NANDA

- Educating the patient about the increased risk of infection and prevention methods.
- Monitoring the patient's general condition, vital signs (temperature, breathing, heart rate, BP), and complaints reported by the patient on symptoms of infection.
- Compliance with the rules of asepsis and antisepsis when performing medical procedures.
- Educating the patient on the symptoms of infection (e.g. low-grade fever/fever, weakness, pain).
- Assisting the patient in keeping her skin clean.
- Change of underwear and bed linen.
- Administration of pharmacotherapy as prescribed by the doctor (Biseptol 2 × 960 mg *i.v.*, ampicillin 4 × 2 g *i.v.*).

ICNP®

- Prevention infection [10036916].
- Assessing susceptibility to infection [10002821].
- Assessing signs and symptoms of infection [10044182].
- Monitoring signs and symptoms of infection [10012203].
- Environmental safety management [10042507].
- Use aseptic technique [10041784].
- Teaching about health seeking behaviour [10032956].
- Promoting health-seeking behaviour [10032465].
- Teaching about wound care [10034961].
- Teaching about self-care [10045014].
- Skin assessment [10041126].
- Evaluating risk for infection after operation [10034048].
- Evaluating signs and symptoms of infection after operation [10034069].
- Assessing skin integrity [10033922].
- Assessing wound [10030799].
- Assessing susceptibility to infection [10002821].
- Assisting the surgeon during operation [10002866].
- Dressing patient [10031164].

- Wound care [10033347 + 2] + ointment [10013670] + wound dressing [10021227]
- Surgical wound care [10032863].

Nursing outcomes

NANDA: No general symptoms of infection. The patient did not report any symptoms of infection. Laboratory test results were as follows: CRP 122.25 mg/l, leukocytes $6.78 \times 10^3/\text{ql}$ [of 13.12]. Vital signs were as follows: temperature 36.6°C, heart rate 80-100 bpm, respiration 14-15/min, BP 120/60 mmHg.

ICNP®: No infection [10028945].

Nursing diagnosis 5.

NANDA: Low mood related to immobilization and anxiety related to a deficit of knowledge about burn wound management and skin transplantation, changed appearance, and impairment in further functioning at home and in the social environment manifested as insomnia [25].

ICNP®: Depressed mood [10022402 + 3] + impaired mobility [10001219], + lack of knowledge [1000083] + body image [10003405]. Anxiety [10000477]. Impaired psychological status [10038411].

Interventions

NANDA

- Establishing a support plan for the patient with a psychologist.
- Explaining the purpose of the actions undertaken in the care and therapy plan.
- Motivating the patient to undertake self-care and physical activity according to the established care plan.
- Informing the patient about the undertaken nursing activities.
- Encouraging telephone contact with relatives.
- Providing silence and conditions for rest.
- A therapeutic conversation with the patient based on communication techniques (active listening, empathy, respect, exploration).
- Pharmacotherapy as prescribed by a doctor [pregabalin 2 × 75 mg orally, Seronil 1 × 20 mg orally, hydroxyzine 2 × 25 mg orally (all for the first, second, and third days of observation), Dexdor 200/50 ml *i.v.* pump (on the first day of observation)].

ICNP®

- Assessing depressed mood [10026055].
- Assessing attitude toward disease [10024192].
- Assessing coping [10002723].
- Providing emotional support [10027051].
- Motivating [10012242].
- Talking [10019436].
- Teaching about diversionary therapy [10043536].
- Care planning [10035915].

- Promoting self-esteem [10024455].
- Assessing psychological status [10030734].
- Promoting positive psychological status [10032505].
- Supporting psychological status [10019161].

Nursing outcomes

NANDA: The patient did not want to contact a psychologist. Initially, the sleep continuity problems persisted, but after a while the anxiety decreased and the quality and quantity of sleep improved.

ICNP®: Decreased depressive mood [10027901]. Effective response to therapy [10036423], able to adjust [10021828].

DISCUSSION

Burns are a serious threat to a patient's health and life. In severe cases, shock may occur as a result of hypovolaemia and organ hypoperfusion [2, 26, 27]. In the presented patient, in the first phase of the disease, the main emphasis was placed on preventing the development of burn disease. In line with the accepted scientific evidence, steps were taken to prevent respiratory disorders, minimize fluid loss, and eliminate pain. Passive oxygen therapy was used in the prophylaxis of respiratory disorders [2].

Normal peripheral perfusion was maintained in the patient by using fluid resuscitation supported by providing large doses of vitamin C, which, as research has shown, reduces vascular permeability and the need for fluids [11, 28]. The research results show that burn pain is very strong, is resistant to treatment,

and can accompany the patient for many months after the injury. Pain treatment is indispensable and a critical component of therapy, and the early period is particularly painful [12, 18]. The examined patient required a continuous infusion of opioid drugs, but the pain was not eliminated and decreased by one point in a subjective assessment by the patient.

Large burned areas of the body over time resemble a state of severe malnutrition and require high-energy and high-protein nutrition supported by supplying immunomodulating ingredients (e.g. arginine, glutamine). Doing so improves the functioning of the immune system, reducing the number of infections and shortening the hospitalization time [29]. The patient was treated with a high-protein diet supported by preparations for special medical purposes and arginine.

After the patient was relieved from the shock phase, measures were continued to prevent the development of generalized infection associated with impaired skin integrity, immune disorders, and the use of invasive treatments. The patient was treated with antibiotics, and skin autotransplantation was performed twice. The autograft method significantly reduces the risk of infection, reducing pain and enabling the patient to become mobile sooner [2]. In the studied patient, the grafts healed (Figs. 3-5), and no infection of the post-transplant sites or other burn sites was found.

The period of catabolism in the patient manifested by a borderline heart rate (100 bpm) required the use of non-selective β -blockers, which reduce the myocardial oxygen demand and protect against cardiomyopathy. Such a procedure is the basic treatment for long-term metabolic consequences of severe burns indicated by some authors [11]. During this period, the patient's anaemia required the transfusion of 2 units of concentrated red blood cells without early and late transfusion complications. To counteract the



Figure 3. Burn wounds of the patient's chest and abdomen – condition at 45 days after skin grafting (59 days after burn injury)



Figure 4. Burn wounds of the patient's abdomen and thighs – condition at 45 days after skin grafting (59 days after burn injury)

development of Curling ulcers, intravenous prophylaxis with proton pump inhibitors were administered. In the treatment of patients with severe burns, immobilization is used [13], while applying therapeutic management of antithrombotic therapy, which was also used in the examined patient.

Pain, lack of knowledge, external injuries, and the necessity to return to fulfilling social roles were the reasons for a low mood in the examined patient, accompanied by anxiety and insomnia. A psychologist's care and the use of a neuroleptic were recommended. The examined patient denied the need for psychological consultation. Research indicates that a burn is a highly traumatizing situation that may lead to anxiety, depression, and post-traumatic stress disorder [12, 18]. The occurring problems result mainly from physical changes (deformations), limiting and sometimes preventing a person from fulfilling roles, and causing depression due to someone not acceptance their appearance. An important role here is played by early psychological intervention aimed at providing psychological support, psychoeducation, and training in coping with everyday life [30].

The patient showed a stable mood on the 37th day of hospitalization and was discharged home in good general condition, with the burn wounds healed and visible scars, knowing how to deal with burned skin after transplantation, and being ready to undertake self-care with the recommendation of using Tardyferon-Fol orally 1 × 1, Metocard 50 mg orally 1 × 1, and Seronil 10 mg 1 × 1 for 7 days then every 2 days, and Fenistil in drops.

Medical treatment in the case of thermal burns is long-lasting and multidisciplinary; therefore, the goal in nursing care should be to assess the patient's ability to self-care, to motivate him/her to undertake it, and to provide the patient with emotional and informational support.

In this case report 2 approaches were used in nursing care to formulate nursing diagnoses and plan interventions – the NANDA and ICNP classifications. The 2 classifications complemented each other – NANDA described in detail the process of arriving at a diagnosis and the analysis of the causes of the problems, while ICNP® allowed for a synthesised presentation of the patient's problems and offered brief, practical guidelines for nursing interventions.

CONCLUSIONS

Severe burns resulted mainly in the occurrence of burn wound pain in the examined patient despite the use of opioid therapy, and she was also at risk of developing other disorders of a clinical and psychological nature. Therefore, the patient required comprehensive treatment and nursing care. Surgery on dead tissues, skin transplantation, and its proper care



Figure 5. Burn wounds of the patient's back and right flank – condition at 45 days after skin grafting (59 days after burn injury)

allowed for complete healing of burned places, with no complications and tolerance of the grafts.

The use of the NANDA and ICNP® classifications of nursing diagnoses and interventions allowed us to analyse the patient's problems in detail and to plan nursing interventions according to evidence-based practice principles. The shown case report helps demonstrate the usefulness of both complementary classifications of nursing diagnoses.

Disclosure

The authors declare no conflict of interest.

References

1. Ścisło L, Walewska E, Kopyś, et al. Analiza procesu leczenia pacjentów dorosłych z oparzeniem III stopnia obejmującym 10–19% powierzchni ciała. *Leczenie Ran* 2018; 15: 111-119.
2. Walker NJ, King KC. Acute and chronic thermal burn evaluation and management. *StatPearls*. <https://www.ncbi.nlm.nih.gov/books/NBK430730/> (access: Jul 1, 2022).
3. European Practice Guidelines for Burn Care. European Burns Association. <https://www.euroburn.org/wp-content/uploads/EBA-Guidelines-Version-4-2017.pdf> (access: Jul 1, 2022).
4. Hlutkin AV, Kovalchuk VI, Lutik VA. Epidemiology thermal burns of the skin in children: Department of Pediatric Surgery, Grodno State Medical University, Belarus. *Chirurgia Plastyczna i Oparzenia* 2017; 5: 33-45.
5. Chrapusta A, Jędrys J, Budzyńska A, et al. Analiza zgonów pacjentów oparzonych a trudność w interpretacji danych epidemiologicznych. *Leczenie Ran* 2014; 11: 79-83.

6. Koyro KI, Bingleoel AS, Bucher F, et al. Burn guidelines – an international comparison. *Eur Burn J* 2021; 2: 125-139.
7. Chemical Hazards Emergency Medical Management. U.S. Department of Health and Human Services. American Burn Association Burn Unit Referral Criteria <https://chemm.hhs.gov/burns.htm#transfer> (access: Oct 10, 2022).
8. American Burn Association. Advanced Burn Life Support (ABLS) <http://ameriburn.org/wp-content/uploads/2017/05/burncenterreferralcriteria.pdf> (access: Oct 10, 2022).
9. Brongel L, Budzyński P. Oparzenia. In: Kózka M, Rumian B, Maślanka M (ed.). *Pielęgniarstwo ratunkowe*. PZWL, Warszawa 2013; 270-278.
10. Soltany A, Al Aissami M. A scoping review of the role of ascorbic acid in modifying fluid requirements in the resuscitation phase in burn patients. *Ann of Med and Surg* 2022; 75: 103460.
11. Jędryś J, Chrapusta A. Ciężkie oparzenie – najczęstsze problemy kliniczne. *Medycyna Praktyczna* 2015. <https://nagle.mp.pl/chirurgia/115497,ciezkie-oparzenie-najczestsze-problemy-kliniczne#1> (access: Oct 10, 2022).
12. Jeschke MG, Van Baar ME, Choudhry MA, et al. Burn injury. *Nat Rev Dis Primers* 2020; 6: 11.
13. Noszczyk W. *Chirurgia repetytorium*. 2nd ed. PZWL, Warszawa 2019; 623-625.
14. Braza ME, Fahrenkopf MP. Split-thickness skin grafts. *StatPearls*. <https://www.ncbi.nlm.nih.gov/books/NBK551561/> (access: Sep 15, 2022).
15. Alyafi T, Al-Marzouki AH, Al Hassani A. Therapeutic outcome of burn patients treated with hyperbaric oxygen. *Cureus* 2021; 13: e18671.
16. Koźlik M, Kazanowski M, Krajewski A. Terapia żywieniowa dorosłych pacjentów w chorobie oparzeniowej. *Chirurgia Plastyczna i Oparzenia/Plastic Surgery & Burns* 2014; 2: 15-8.
17. Siddiqui AH, Farooq U, Siddiqui F. Curling ulcer. *StatPearls*. <https://www.ncbi.nlm.nih.gov/books/NBK482347> (access: May 1, 2022).
18. Snell JA, Loh NH, Mahambrey T, et al. Clinical review: the critical care management of the burn patient. *Crit Care* 2013; 17: 241.
19. Ackley BJ, Ladwig GB (Eds.). *Podręcznik diagnoz pielęgniarstkich*. Wyd. I pol. Zarzycka D, Ślusarska B. Media House, Warszawa 2019.
20. International Classification for Nursing Practice. ICNP® – polski. <https://www.icn.ch/sites/default/files/inline-files/ICNP%202017%20Polskie.pdf> (access: Oct 1, 2022).
21. Dempsey SJ. Ból ostry. In: Ackley BJ, Ladwig GB (Eds.). *Podręcznik diagnoz pielęgniarstkich*. Wyd. I pol. Zarzycka D, Ślusarska B. Media House, Warszawa 2019, 162-169.
22. Płaszewska-Żywko L. Zmniejszona pojemność minutowa serca. In: Płaszewska-Żywko L, Kózka M. *Diagnozy i interwencje w praktyce pielęgniarstkiej*. PZWL, Warszawa 2021; 87-94.
23. Ackley BJ. Zmniejszenie objętości płynów. In: Ackley BJ, Ladwig GB (Eds.). *Podręcznik diagnoz pielęgniarstkich*. Wyd. I pol. Zarzycka D, Ślusarska B. Media House, Warszawa 2019, 398-402.
24. Baranoski S. Przerwanie ciągłości skóry. In: Ackley BJ, Ladwig GB (Eds.). *Podręcznik diagnoz pielęgniarstkich*. Wyd. I pol. Zarzycka D, Ślusarska B. Media House, Warszawa 2019; 577-579.
25. McCaffrey R. Niepokój. In: Ackley BJ, Ladwig GB (Eds.). *Podręcznik diagnoz pielęgniarstkich*. Wyd. I pol. Zarzycka D, Ślusarska B. Media House, Warszawa 2019.
26. Schaefer TJ, Tannan SC. Thermal burns. *StatPearls*. <https://www.ncbi.nlm.nih.gov/books/NBK430773/> (access: May 30, 2022).
27. Piszczek J, Korzeniowski T. Resuscytacja płynowa we wstrząsie oparzeniowym z punktu widzenia procedur pielęgniarstkich. *Chirurgia Plastyczna i Oparzenia/Plastic Surgery & Burns* 2018; 5: 175-184.
28. Tanaka H, Matsuda T, Miyagantani Y, et al. Reduction of resuscitation fluid volumes in severely burned patients using ascorbic acid administration. *Arch Surg* 2000; 135: 326-331.
29. Tan HB, Danilla S, Murray A, et al. Immunonutrition as an adjuvant therapy for burns (Review). *Cochrane Database of Systematic Reviews* 2014; 12: CD007174.
30. Lodha P, Shah B, Karia S, et al. Post-traumatic stress disorder (PTSD) following burn injuries: a comprehensive clinical review. *Ann Burns Fire Disasters* 2020; 33: 276-287.