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Research Article

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Nursing Diagnoses of Adult Patients Undergoing Therapeutic Hypothermia After Cardiac Arrest

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Abstract

Objectives: This study aimed to identify the nursing diagnoses of adult patients undergoing therapeutic hypothermia (TH) following cardiac arrest.

Methods: A prospective descriptive study design was used. Data were collected from the intensive care units of four hospitals in Istanbul, Türkiye, between July 2020 and December 2021. The study sample consisted of 50 adult patients who returned to spontaneous rhythm after cardiac arrest and subsequently underwent TH. Data were collected using a researcher-developed "Therapeutic Hypothermia Follow-up Form."

Results: The mean age of the patients was 59.18 ± 15.64 years, and 82% (n=41) were male. The most common causes of cardiac arrest were respiratory arrest (30%; n=15) and myocardial infarction (30%; n=15). The most frequently identified nursing diagnoses included impaired swallowing, hypothermia, impaired verbal communication, ineffective airway clearance, impaired gas exchange, decreased cardiac output, and impaired skin integrity. Notably, pressure injuries were observed in 80% of the patients.

Conclusion: The findings suggest the need for the development of patient follow-up charts and nursing care algorithms specific to TH practices. The use of such tools may enable the early identification and prevention of potential nursing problems in this patient population.

Keywords Cardiac arrest · cardiopulmonary resuscitation · critical care · post-cardiac arrest care · therapeutic hypothermia

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INTRODUCTION

The primary reason for mortality and morbidity today is cardiovascular disease. Cardiac arrest occurs in approximately 375,000 individuals annually in Europe and over 500,000 individuals in the United States (1,2). Following cardiopulmonary resuscitation (CPR), patients may experience coma, severe cognitive impairment, and long-term disability, which in turn impose significant psychological and financial burdens on both families and society (3,4). Although survival rates after cardiac arrest range from 5% to 35%, the mortality rate associated with post-anoxic encephalopathy remains alarmingly high, between 65% and 95% (5,6).

One of the most significant complications in patients following CPR is the deterioration of the neurological status. Therapeutic hypothermia (TH) protocols have been developed to improve neurological outcomes in this patient population (1). TH is a treatment modality designed to reduce and mitigate neurological injury after cardiac arrest (7). It has been reported that TH prevents brain injury by slowing cerebral metabolism (8). Notably, a one-hour delay in initiating TH after CPR has been shown to increase mortality by 20%, emphasising the importance of early intervention (9). TH involves maintaining body temperature between 32°C and 36°C for at least 24 hours to prevent neurological damage following CPR (10). The European Resuscitation Council (ERC) and the American Heart Association (AHA) recommend TH as a treatment strategy for patients experiencing out-of-hospital cardiac arrest (1,8). The 2020 AHA Guidelines emphasise that, when TH is indicated after CPR, multidisciplinary and systematic care can positively influence both survival rates and neurological recovery (11,12). Similarly, the 2021 guidelines of the ERC and the European Society of Intensive Care Medicine (ESICM) state that TH is beneficial for patients with shockable rhythms, as well as for those with non-shockable rhythms, and recommend its administration following successful resuscitation (10). Complications can develop at any stage of TH. To prevent these complications and improve patient survival, continuous and careful monitoring is essential throughout the TH process (13). Nurses play a critical role in managing the complications that may arise in patients undergoing TH (13,14). In addition to implementing the cooling protocols, nurses are responsible for closely monitoring hemodynamic parameters, managing mechanical ventilation, assessing body temperature, evaluating sedation levels, and ensuring continuous neurological monitoring during TH care (15–17).

There is limited research addressing nursing care practices in the context of TH, with existing studies primarily focusing on general nursing approaches. To date, no study has comprehensively examined the specific components of nursing care provided to patients undergoing TH. This study aimed to identify the nursing care needs of adult patients receiving TH after cardiac arrest. For this purpose, the Nursing Model Based on Life Activities developed by Roper, Logan, and Tierney was adopted as a framework for assessing and organising patient care. This model encompasses key aspects of daily living, including maintaining a safe environment, communication, respiration, nutrition, elimination, personal hygiene and dressing, temperature regulation, mobility, work and leisure, sexuality, sleep, and end-of-life care considerations (17,18). This study represents an important and original contribution to the literature by offering a structured approach to nursing care planning and protocol development for adult patients undergoing TH, while also evaluating related clinical outcomes.

METHODS

Study Design

This prospective descriptive study was conducted in the intensive care units (ICUs) of four hospitals in Istanbul, Türkiye, between July 2020 and December 2021

Research Question

What are the most frequently identified nursing diagnoses in the patients undergoing TH?

Population and Sampling

The study population consisted of adult patients who underwent TH following cardiac arrest. TH was administered using a surface cooling method involving pads circulating cold fluid. A simple random sampling method was employed for sample selection.

Patients aged 18 years and older who achieved a return of spontaneous circulation after cardiac arrest and responded within ≤60 minutes of CPR were eligible for inclusion. The exclusion criteria included patients who died during the TH process, pregnant patients, those with terminal cancer, and patients who discontinued TH before completing 48 hours.

Data were collected from the ICUs of four hospitals in Istanbul, Türkiye, between July 2020 and December 2021. A total of 57 patients were initially enrolled in the study. However, 6 patients who died during TH and 1 patient who discontinued treatment before 48 hours were excluded. Consequently, the study was completed with 50 patients.

Data Collection Tools

Data were collected using the TH Assessment Form. The data collection process began at the initiation (0th hour) of TH

and continued until the 48th hour of treatment. All data were collected by a single researcher, a clinical education nurse with expertise in intensive care nursing. In this study, a single TH device was used across the four participating hospitals. The device was transferred between hospitals according to patient availability, and the researcher collected data on-site at the hospital where the device was in use.

Nursing Assessment Form for Therapeutic Hypothermia: The TH Patient Assessment Form was developed based on the literature (2,9,10) and informed by the Nursing Model Based on Life Activities by Roper, Logan, and Tierney (18,19). NANDA-International was used to establish the nursing diagnoses and relevant factors included in the form (20). The assessment form, which includes nursing diagnoses, was created according to this model. To evaluate the effectiveness and clarity of the form, feedback was obtained from 14 experts, including one intensive care physician, three intensive care nurses, and ten nursing academics. Based on their input, the form was finalised.

During the TH process (0th to 48th hour), the patients were assessed using this form, with current or potential nursing diagnoses marked accordingly.

Ethical Statement

Ethical approval for the study was obtained from the ethics committee (2020-13/9). Because the patients involved in the study were unconscious, written and verbal consent was obtained from their legal guardians. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Data Analysis

SPSS 26 statistical software was used in the data analysis. Descriptive statistics were used to assess the data and the minimum, maximum, mean, standard deviation, frequency, and percentage measurements were used.

RESULTS

The average age of the patients was 59.1 (±15.64) and 82% (n=41) of them were male. Of the patients, 92% (n=46) had chronic diseases. The most common chronic diseases were heart failure (27.88%; n=29) and hypertension (25.96%; n=27). The most frequently observed reasons of cardiac arrest were respiratory arrest (30%; n=15) and myocardial infarction (30%; n=15). While 62% (n=31) of the cardiac arrests occurred outside the hospital, the mean CPR period was 19.54 min. (±14.79) (Table 1).

Activity on maintaining safe environment activity; "Risk for bleeding" nursing diagnosis in 72% (n=36) of the patients and "Risk for infection" nursing diagnosis in 64% (n=32) of the patients were detected.

In the communication activity; "Impaired verbal communication" nursing diagnosis was detected in the patients (Table 2).

In the respiratory activity; "Ineffective airway clearance" in 98% (n=49) of the patients and "Impaired gas exchange" in 94% (n=47) of the patients were observed; whereas, "Risk for aspiration" was determined in all the patients.

In nutrition activity; "Impaired swallowing" nursing diagnosis was detected in all the patients and "Risk for unstable blood glucose level; hypoglycaemia" in 96% (n=48) and "Risk for deficient fluid volume" in 74% (n=37) of the patients were detected.

Table 1. Characteristics of patients undergoing therapeutic hypothermia (n=50)

Socio-demographic Characteristics	Min-Max (Med.)	Mean (±sd)
Age (years)	23-89 (62)	59.18 (±15.64)
Gender	**n**	**%**
Male	41	82
Female	9	18
Chronic Disease *		
No	4	8
Yes	46	92
Heart Failure	29	27.88
Hypertension	27	25.96
Diabetes	20	19.23
Asthma/Chronic obstructive pulmonary disease	11	10.58
Cancer	7	6.73
Kidney diseases	6	5.77
Cerebrovascular disease	4	3.85
Reason for Cardiac Arrest *		
Respiratory arrest	15	30
Myocardial infarction	15	30
Heart failure	12	24
Hypoxia	3	6
Unknown	3	6
Electrolyte imbalance	2	4
Location of the Arrest		
Out of Hospital	31	62
In Hospital	19	38
	Min-Max (Med.)	**Mean (±sd)**
Duration of resuscitation/min	2-60 (15) dk	19.54 (±14.79) dk

* multiple-choice question

Table 2. Nursing diagnoses for patients' activity areas (n=50)

Nursing diagnoses for the activity areas	n	%
Maintaining a safe environment		
Risk of bleeding	36	72
Risk of infection	32	64
Risk of physical trauma	24	48
Acute pain	8	16
Communication		
Impaired verbal communication	50	100
Respiration		
Risk of aspiration	50	100
Ineffective airway clearance	49	98
Impaired gas exchange	47	94
Nutrition		
Impaired swallowing	50	100
Risk of unstable blood glucose level; hypoglycaemia	48	96
Risk of deficient fluid volume	37	74
Excess fluid volume	28	56
Risk of unstable blood glucose level; hyperglycaemia	16	32
Deficient fluid volume	8	16
Risk of electrolyte imbalance	4	8
Excretory		
Risk of constipation	36	72
Risk of dysfunctional gastrointestinal motility	31	62
Dysfunctional gastrointestinal motility	17	34
Constipation	11	22
Diarrhoea	2	4
Motion		
Decreased cardiac output	45	90
Ineffective peripheral tissue perfusion	42	84
Motion		
Risk of ineffective gastrointestinal perfusion	41	82
Risk of pressure injury	10	20
Risk of ineffective peripheral tissue perfusion	8	16
Risk of decreased cardiac output	5	10
Risk of ineffective renal perfusion	5	10
Maintaining the Body Temperature		
Hypothermia	50	100
Hyperthermia	1	2
Personal hygiene and clothing		
Risk of impaired oral mucous membrane integrity	42	84
Impaired skin integrity	40	80
Risk of impaired skin integrity	10	20
Impaired oral mucous membrane integrity	8	16

In excretory activity; "Dysfunctional gastrointestinal motility" nursing diagnosis was detected in 34% (n=17) of the patients.

In the movement activity; "Decreased cardiac output" nursing diagnosis in 90% (n=45) of the patients, "Ineffective peripheral tissue perfusion" nursing diagnosis in 84% (n=42), and "Risk for ineffective gastrointestinal perfusion" nursing diagnosis in 82% (n=41) were determined.

Regarding maintaining the body temperature; "Hypothermia" nursing diagnosis was determined in the patients. In hygiene and clothing; "Impaired skin integrity" nursing diagnosis was found in 80% (n=40) (Table 2).

In Table 3, the Braden score of the patients was 8.84 (±1.03) on average. Pressure injury occurred in 80% (n=40) of the patients, 67.83% (n=78) were device related. The most important devices causing pressure injuries were the hypothermia device pad with a rate of 58.97% (n=46) and anti-embolic socks with a rate of 15.38% (n=15.35).

In Table 4, the pressure injury sites of the patients were coccyx in 21.7% (n=25), scapula in 19.1% (n=22), and abdomen in 11.3% (n=13), respectively. Of the pressure injuries, 90.4% were classified as stage 1.

In Table 4, the pressure injury sites of the patients were coccyx in 21.7% (n=25), scapula in 19.1% (n=22), and abdomen in

Table 3. Characteristics for patients' pressure injury (n=50)

	Min-Max (Med.)	Mean (±sd)
Braden Score	7-11 (9)	8.84 (±1.03)
Characteristics of Pressure Injury	**n**	**%**
Pressure Injury		
Yes	40	80
No	10	20
Device/Instrument-Related Pressure Injury		
Related	78	67.83
Not related	37	32.17
Total pressure ınjury	115	100
Related Devices		
Hypothermia Device pad	46	58.97
Anti-embolic socks	12	15.38
Infusion Sets	5	6.41
Blood pressure sleeve	4	5.13
Intubation Tube Holder	3	3.85
Central Catheter	2	2.56
Fixing Tape	2	2.56
Intubation Tube	1	1.28

Table 4. The patients' distribution of pressure injury according to regions and stage

Pressure Injury According to Regions	1st Region	2nd Region	3rd Region	4th Region	5th Region	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Sacrum	12 (30)	9 (24.3)	4 (16.7)	0 (0)	0 (0)	25 (21.7)
Scapula	6 (15)	9 (24.3)	5 (20.8)	2 (18.2)	0 (0)	22 (19.1)
Abdomen	6 (15.0)	5 (13.5)	2 (8.3)	0 (0)	0 (0)	13 (11.3)
Front knee	2 (5)	4 (10.8)	2 (8.3)	2 (18.2)	0 (0)	10 (8.7)
Back of the knee	1 (2)	1 (2.7)	4 (16.7)	2 (18.2)	1 (33.3)	9 (7.8)
Trochanteric	0 (0)	3 (8.1)	2 (8.3)	2 (18.2)	0 (0)	7 (6.1)
Clavicle	5 (12.5)	0 (0)	1 (4.2)	0 (0)	0 (0)	6 (11.3)
Elbow	0 (0)	2 (5.4)	2 (8.3)	1 (9.1)	1(33.3)	6 (5.2)
Ear	2 (5)	2 (5.4)	0 (0)	0 (0)	0 (0)	4 (3.5)
Heel	0 (0)	1 (2.7)	0 (0)	1 (9.1)	1 (33.3)	3 (2.6)
Iliac Spurs	2 (5.05)	0 (0)	0 (0)	1 (9.1)	0 (0)	3 (2.6)
Head	1 (2.5)	1 (2.7)	0 (0)	0 (0)	0 (0)	2 (1.7)
Neck	2 (5)	0 (0)	0 (0)	0 (0)	0 (0)	2 (1.7)
Chin	1 (2.5)	0 (0)	1 (42)	0 (0)	0(0)	2 (5.2)
Nose	0 (0)	0 (0)	1 (4.2)	0 (0)	0 (0)	1 (0.9)
Stage						
Stage 1	37 (92.5)	35(96.4)	18 (75)	11 (100)	3 (100)	104 (90.4)
Stage 2	3 (7.5)	2 (5.4)	6 (25)	0 (0)	0 (0)	11 (9.6)
Total	40 (100)	37 (100)	24 (100)	11 (100)	3 (100)	115 (100)

11.3% (n=13), respectively. Of the pressure injuries, 90.4% were classified as stage 1.

DISCUSSION

In the study conducted with adult patients undergoing TH after cardiac arrest, it was determined that most patients were male, and their mean age was 59.1 years. Andersen et al. (2019) reported that 58% of the patients with cardiac arrest were male, with a mean age of 66 years (21). In a similar study, it was noted that the age of the patients ranged from 48 to 54 years, and the majority were male (22, 23). These patient characteristics are consistent with the existing literature.

Conditions such as coronary artery disease, hypertension, diabetes, hyperlipidaemia, and genetics are recognised as significant risk factors for the development of cardiac arrest (24). The presence of multiple comorbidities further increases the mortality risk (25). Cha et al. (2019) indicated that diabetes and hypertension were the most common conditions observed in patients undergoing TH after CPR (26). In this study, the most common chronic diseases were heart failure, hypertension, and diabetes. These conditions disrupt vascular integrity and increase the risk of cardiac arrest in patients.

It is commonly stated that the primary cause of cardiac arrest is cardiac-related, with respiratory failure being a secondary cause (21, 22). In this study, it was found that 30% of the patients experienced cardiac arrest due to respiratory failure, while 30% experienced it due to myocardial infarction.

In this section, the care needs of the patients undergoing TH were discussed in relation to the Nursing Model Based on the Life Activities of Roper, Logan, and Tierney.

Activity on Maintaining Safe Environment: The most frequently observed complications in patients undergoing TH were pneumonia, infection, hypotension, haemorrhage, electrolyte imbalances, arrhythmia, and instability in glucose levels (27-29). A meta-analysis indicated that TH itself is a risk factor for both pneumonia and sepsis in patients undergoing TH after CPR (28). One study reported that ventilator-associated pneumonia occurred in 31% of patients undergoing TH after cardiac arrest (30). In the present study, the "Risk for bleeding" nursing diagnosis was identified in 72% of the patients, and the "Risk for infection" nursing diagnosis was found in 64% of the patients. These diagnoses were established by considering the risks related to potential complications during TH.

Sedatives used in the ICU are effective in calming patients and reducing agitation; however, they do not relieve pain, highlighting the need for thorough pain assessment (31, 32). Sedation in ICU patients can inhibit effective pain assessment

(33). In the current study, the "Acute pain" nursing diagnosis was identified in some TH patients. The level of sedation in these patients was found to influence the accuracy and effectiveness of the pain assessment.

Communication Activity: The "Impaired verbal communication" nursing diagnosis was identified in the patients during the TH in this study. This diagnosis was primarily attributed to the intubation and sedation of the patients.

Respiration Activity: The "Risk for aspiration" nursing diagnosis was observed in all the patients, while "Ineffective airway clearance" and "Impaired gas exchange" were noted in most patients. Hyperoxemia during TH intensifies neurological damage and increases mortality (34). Therefore, it is recommended to maintain oxygen saturation levels between 94% and 98% to mitigate these risks (35).

Nutrition activity: The "Impaired swallowing" nursing diagnosis was identified in all patients, while the "Risk for deficient fluid volume" and "Excess fluid volume" nursing diagnoses were observed in more than half of the patients. Zeiner et al. (2004) noted that renal function in patients undergoing (TH) after CPR was reduced compared with that in normothermic patients; however, this condition was fully reversible (36).

During TH, hyperglycaemia can increase mortality, while close metabolic control can reduce this risk (37). Consequently, the "Risk for unstable blood glucose level; hypoglycaemia" and "Risk for unstable blood glucose level; hyperglycaemia" nursing diagnoses were identified in the patients.

Excretory activity; Parenteral nutrition should be considered for critically ill patients who are unable to receive enteral feeding for more than 48 hours in the ICU (38). Casaer et al. (2011) observed that patients who began enteral nutrition early experienced fewer ICU-related infections, shorter hospital stays, and a reduced incidence of complications (39).

Constipation is more prevalent in patients with unsuccessful enteral nutrition (40). Based on this information, the nursing diagnoses of "Dysfunctional gastrointestinal motility," "Risk for dysfunctional gastrointestinal motility," "Constipation," and "Risk for constipation" were identified in the patients.

Movement activity: In this study, the nursing diagnosis of "Decreased cardiac output" was identified in most patients. Bradycardia is commonly observed during TH (35). It has been noted that patients undergoing TH often require vasopressors, and low blood pressure levels are associated with increased mortality. It is recommended to ensure adequate organ perfusion by supporting the need for vasopressor therapy (41).

The study faced limitations due to the patients' unconscious and immobile state, the necessity of performing critical procedures, the insertion of multiple medical devices, and the patients' sensitive and variable hemodynamic status. As a result, the Braden Risk Score of the patients was found to be under 12, indicating a high risk of pressure injuries. In critically ill patients, the most common site for pressure injury formation is the sacral region (42,43). Barakat et al. (2017) reported that 68% of pressure injuries associated with device-related occurred in the ICU (43). In a case report involving TH, it was noted that the removal of the hydrogel cooling pads led to skin peeling, which disrupted the skin integrity (44). In the current study, pressure injuries were observed in nearly all patients, primarily in the coccyx and scapular regions. More than half of these pressure injuries were device-related, with the most common culprits being the hypothermia device pads and anti-embolic socks. Based on these findings, the nursing diagnoses of "Ineffective peripheral tissue perfusion" and "Risk of pressure injury" were assigned to the patients.

Maintaining body temperature: Shivering was identified as a potential risk factor in the temperature management process during TH (45,46). Badjatia et al. (46) observed shivering in 39% of patients undergoing TH. During the rewarming phase of TH, metabolism accelerates, oxygen consumption increases, and hypotension can develop due to vasodilation, making patient monitoring crucial at this stage (35). In this study, "hypothermia" was identified as a nursing diagnosis in all patients.

Personal hygiene and clothing: As all patients in the study were intubated, the nursing diagnosis "Risk for impaired oral mucous membrane integrity" was identified in most patients. Needleman et al. (2012) highlighted that oral hygiene deteriorates in patients receiving mechanical ventilation, and emphasised the importance of nursing interventions in the planning and practice of oral care (47).

Strengths and Limitations

This study has several notable strengths. The TH assessment form was developed using a theoretical model, allowing for a comprehensive, holistic evaluation of the patients. Interdisciplinary expert opinions were incorporated during the development of the form, enhancing its credibility and validity. The patients were assessed over a 48-h period, and all nursing problems were systematically recorded, providing a detailed account of the nursing care required during TH.

However, there are also several limitations. First, the sample size was limited to 50 adult patients from four hospitals in Istanbul, which may restrict the generalizability of the findings to other healthcare settings or populations. Additionally, the study relied on a single follow-up form for data collection, which may not have captured all dimensions of nursing care comprehensively. The potential variations in nursing interventions and institutional protocols across different hospitals could have influenced the outcomes, introducing variability in the care provided and potentially affecting the results. Moreover, while the 48-h follow-up provides valuable insight into the acute phase of TH, further studies with longer follow-up periods could yield more comprehensive data on the long-term care needs and outcomes for these patients.

Conclusion

The most frequently identified nursing diagnoses in this study were impaired swallowing, hypothermia, impaired verbal communication, ineffective airway clearance, impaired gas exchange, decreased cardiac output, and impaired skin integrity. The most prevalent risk diagnoses included risk for aspiration, risk for unstable blood glucose levels, risk for ineffective gastrointestinal perfusion, and risk for impaired oral mucous membrane integrity.

According to the results of the study, it is recommended that assessment charts and care algorithms be developed specifically for patients undergoing TH. Preventive nursing interventions should be strategically planned by identifying potential problems early in the care process. Additionally, training programs focusing on the monitoring and management of TH-related complications should be designed for nurses to enhance their clinical competency. The results of this study are significant, as it represents the first investigation into the development of a nursing care protocol for patients undergoing TH.

Future studies should consider including diverse patient groups (e.g., head trauma patients, paediatric patients) undergoing TH, comparing different cooling methods, and conducting cohort studies to better understand the long-term care needs of patients following the TH process.

Ethics Committee Approval: This study was approved by the ethics committee of Acıbadem University (2020-13/9).
Informed Consent: Because the patients involved in the study were unconscious, written and verbal consent was obtained from their legal guardians.
Peer Review: Externally peer-reviewed.
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REFERENCES

1 Study Group HACA. Mild therapeutic hypothermia to improve the neurological outcome after cardiac arrest. New England Journal of Medicine. 2002;346(8):549-56.
2 Walker AC, Johnson NJJEMC. Targeted temperature management and postcardiac arrest care. Emergency Medicine Clinics.2019;37(3):381-93.
3 Rossetti AO, Oddo M, Logroscino G, Kaplan PW. Prediction after cardiac arrest and hypothermia: a prospective study. Annals of neurology. 2010;67(3):301-7.
4 Sandroni C, D'Arrigo S, Nolan JP. Prediction after cardiac arrest. Critical Care. 2018;22(1):1-9.
5 Bernard SA, Grey TW, Buist MD, et al. Treatment of comatose survivors of outof-hospital cardiac arrest with induced hypothermia. New England Journal of Medicine. 2002;346(8):557-63.
6 Polderman KH. Induced hypothermia and fever control for the prevention and treatment of neurological injuries. Lancet. 2008;371(9628):1955-69.
7 Seder DB, Jarrah S. Therapeutic hypothermia for cardiac arrest: A practical approach. Current neurology and neuroscience reports. Critical Care Neurology.2008;8(6):508.
8 Varon J, Acosta P. Therapeutic hypothermia. Chest. 2008;133(5):1267-74.
9 Leong SHB, Chan E, Ho BCH, et al. Therapeutic temperature management (TTM): post-resuscitation care for adult cardiac arrest, with recommendations from the National TTM Workgroup. Singapore Medical Journal. 2017;58(7):408.
10 Nolan JP, Sandroni C, Böttiger BW, et al. European resuscitation council and European society of intensive care medicine guidelines 2021: post-resuscitation care. Resuscitation. 2021;161:220-69.
11 Merchant RM, Topjian AA, Panchal AR, et al. Executive summary: 2020 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. Circulation. 2020;142(16):S337-S57.
12 Berg KM, Cheng A, Panchal AR, et al. Systems of care: 2020 American Heart association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. Circulation. 2020;142(16):S580-S604.
13 Soleimanpour H, Rahmani F, Golzari SE, Safari S. Main complications of mildly induced hypothermia after cardiac arrest: a review article. Journal of Cardiovascular and Thoracic Research. 2014;6(1):1-8.
14 Israelsson J, Lilja G, Bremer A, Stevenson-Ågren J, Årestedt K. Post cardiac arrest care and follow-up in Sweden–a national web-survey. BMC Nursing. 2016;15(1):1-8.
15 Gaieski DF, Band RA, Abella BS, et al. Early goal-directed hemodynamic optimisation combined with therapeutic hypothermia in comatose survivors of out-of-hospital cardiac arrest. Resuscitation. 2009;80:418-24.
16 Peberdy MA, Callaway CW, Neumar RW, et al. Post–cardiac arrest care: 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. Circulation. 2010;122:S768-S86.

17 Erb JL, Hravnak M, Rittenberg JC. Therapeutic Hypothermia After Cardiac Arrest. American Journal of Nursing. 2012;112(7):38-44.

18 Roper N. The Roper-Logan-Tierney. Blueprint for use of nursing models: education, research, practice, and administration. NLN Press, New York, Pub no:14-2696, 1996 (14):289.

19 Holland K, Jenkins J. Applying the Roper-Logan-Tierney Model in Practice-EBook: Elsevier Health Sciences; 2019.

20 Carpenito LJ. Nursing Diagnoses: Definitions and Classification (Accessed

21 January 2022, at https://dl.uswr.ac.ir/bitstream/Hannan/138720/1/9781608311101.pdf.)

22 Andersen LW, Holmberg MJ, Berg KM, Donnino MW, Granfeldt A. In-hospital cardiac arrest: a review. Jama. 2019;321(12):1200-10.

23 Mecklenburg A, Stamm J, Angriman F et al. Impact of therapeutic hypothermia on bleeding events in adult patients treated with extracorporeal life support peri-cardiac arrest. Journal of Critical Care. 2021;62:12-8.

24 Manzano F, Navarro MJ, Roldán D et al. Pressure ulcer incidence and risk factors in ventilated intensive care patients. Journal Critical Care. 2010;25(3):469-76.

25 Mozaffarianli D, Benjamin EJ, Go AS, et al. Heart disease and stroke statistics—2015 update: a report from the American Heart Association. Circulation. 2015;131(4):e29-e322.

26 Virani SS, Alonso A, Benjamin EJ, et al. Heart disease and stroke statistics—2020 update: a report from the American Heart Association. Circulation. 2020;141:e139-e596.

27 Cha J-J, Wi J. Vitamin D deficiency and neurological outcome after sudden cardiac arrest. Shock. 2019;52(6):146-52.

28 Wolfrum S, Radke PW, Pischon T, Willich SN, Schunkert H, Kurowski V. Mild therapeutic hypothermia after cardiac arrest—a nationwide survey on the implementation of the ILCOR guidelines in German intensive care units. Resuscitation. 2007;72(2):207-13.

29 Geurts M, Macleod MR, Kollmar R, Kremer PH, van der Worp HB. Therapeutic hypothermia and the risk of infection: a systematic review and meta-analysis. Critical Care Medicine. 2014;42(2):231-42.

30 Lantry J, Dezman Z, Hirshon JM. Pathophysiology, management and complications of hypothermia. British Journal of Hospital Medicine. 2012;73(1):31-7.

31 François B, Cariou A, Clere-Jehl R et al. Prevention of early ventilatorassociated pneumonia after cardiac arrest. New England Journal of Medicine. 2019;381(19):1831-42.

32 Alderson S, Mckechnie S. Unrecognised, undertreated, pain in ICU—Causes, effects, and how to do better. Open Journal of Nursing.2013;3(1):1-6.

33 Devlin JW, Skrobik Y, Gélinas C et al. Clinical practice guidelines for the prevention and management of pain, agitation/sedation, delirium, immobility, and sleep disruption in adult patients in the ICU. Critical Care Medicine. 2018;46(9):e825-e73.

34 Kizza IB, Muliira JK. Nurses' pain assessment practices with critically ill adult patients. International Nursing Review. 2015;62(4):573-82.

35 Roberts BW, Kilgannon JH, Hunter BR, et al. Association between early hyperoxia exposure after resuscitation from cardiac arrest and neurological disability: prospective multicenter protocol-directed cohort study. Circulation. 2018;137(20):2114-24.

36 Chia YW, Edıc SLL, Loh JK, Leong BS-H, Ong MEH. Beyond return of spontaneous circulation: update on post-cardiac arrest management in the intensive care unit. Singapore Medical Journal. 2021;62(8):444-51.

37 Zeiner A, Sunder-Plassmann G, Sterz F et al. The effect of mild therapeutic hypothermia on renal function after cardiopulmonary resuscitation in men. Resuscitation. 2004;60(3):253-61.

38 Skrifvars M, Pettilä V, Rosenberg P, Castren M. A multiple logistic regression analysis of in-hospital factors related to survival at six months in patients resuscitated from out-of-hospital ventricular fibrillation. Resuscitation. 2003;59(3):319-28.

39 Singer P, Blaser AR, Berger MM, et al. ESPEN guideline on clinical nutrition in the intensive care unit. Clin Nutr. 2019;38(1):48-79.

40 Casaer MP, Mesotten D, Hermans G et al. Early versus late parenteral nutrition in critically ill adults. New England Journal of Medicine. 2011;365(6):506-17.

41 Mostafa SM, Bhandari S, Ritchie G, Gratton N, Wenstone R. Constipation and its implications in the critically ill patient. British Journal of Anaesthesia. 2003;91(6):815-9.

42 Bro-Jeppesen J, Annborn M, Hassager C et al. Hemodynamics and vasopressor support during targeted temperature management at 33 °C versus 36 °C after out-of-hospital cardiac arrest: a post hoc study of the target temperature management trial. Critical Care Medicine. 2015;43(2):318-27.

43 Lima-Serrano M, González-Méndez M, Martín-Castaño C, Alonso-Araujo I, Lima-Rodríguez J. Predictive validity and reliability of the Braden scale for risk assessment of pressure ulcers in an intensive care unit. Medicina Intensiva (English Edition). 2018;42(2):82-91.

44 Barakat-Johnson M, Barnett C, Wand T, White K. Medical device-related pressure injuries: An exploratory descriptive study in an acute tertiary hospital in Australia. Journal of Tissue Viability. 2017;26(4):246-53.

45 Varon J, Acosta P, Wintz R, Mendoza N. Unusual side effect from hydrogel pads during therapeutic hypothermia. Resuscitation. 2008;78(3):248-9.

46 Mahmood MA, Zweifler RM. Progress in shivering control. Journal of the Neurological Sciences. 2007;261(1-2):47-54.

47 Badjatia N, Kowalski RG, Schmidt JM, et al. Predictors and clinical implications of shivering during therapeutic normothermia. Neurocritical Care. 2007;6(3):186-91.

48 Needleman I, Hyun-Ryu J, Brealey D et al. The impact of hospitalisation on dental plaque accumulation: an observational study. Journal of Clinical Periodontology. 2012;39(11):1011-6.