



Guía clínica intervenciones de enfermería en procuración de órganos de personas adultas con muerte encefálica

Clinical guide nursing interventions in organ procurement for adult patients with encephalic death

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Abstract

Introducción: Las instituciones hospitalarias son las sedes donde se brinda el proceso de procuración, donación y trasplante de órganos, por lo cual deben garantizarse los pasos operativos con la participación coordinada del personal capacitado y comprometido. Los profesionales de salud y de enfermería de las Unidades de Cuidados Intensivos (UCI) o afines, que están directamente relacionados con los procedimientos de procuración de órganos, deberán realizar las intervenciones basadas en evidencia científica y cuidado humanizado.

Objetivo: Desarrollar una guía clínica de intervenciones de enfermería en procuración de órganos en las personas adultas con muerte encefálica (ME), mediante el uso de la taxonomía NANDA-NOC-NIC.

Métodos: La Guía Clínica de Intervenciones de Enfermería en Procuración de Órganos de personas adultas con ME, se basó en el Manual Metodológico para el Desarrollo de Guías de Práctica Clínica de Enfermería, del Sistema Nacional de Salud de México. Se ocupa de las principales complicaciones de ME e incorpora elementos del juicio clínico para comunicarse mediante la taxonomía NANDA-NOC-NIC.

Conclusiones: El proceso de donación-trasplante de órganos es una estrategia de subsistencia principalmente para enfermos crónicos. Las intervenciones de enfermería guían el mantenimiento de órganos de personas con ME de forma correcta y eficiente, a fin de generar un proceso óptimo de procuración-donación-trasplante de órganos.

Palabras clave: enfermería, sistema nervioso, muerte encefálica, procuración de tejidos y órganos.

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Resumen

Introduction: Hospital institutions are the sites where the process of organ procurement, donation, and transplantation takes place, so the operational steps must be guaranteed with the coordinated participation of trained and committed personnel. Health and nursing professionals in Intensive Care Units (ICU) or similar, who are directly related to organ procurement procedures, should perform interventions based on scientific evidence and humanized care.

Objective: To develop a clinical guide for nursing interventions in organ procurement in adults with encephalic death (ED), using the NANDA-NOC-NIC taxonomy.

Methods: The Clinical Guide for Nursing Interventions in Organ Procurement in Adult Persons with ED was based on the Methodological Manual for the Development of Nursing Clinical Practice Guidelines of the Mexican National Health System. It addresses the main complications of ED and incorporates elements of clinical judgment to communicate using the NANDA-NOC-NIC taxonomy.

Conclusions: The process of organ donation-transplantation is a subsistence strategy mainly for the chronically ill. Nursing interventions guide the maintenance of organs of people with ED correctly and efficiently, to generate an optimal organ procurement-donation-transplantation process.

Keywords: nursing, nervous system, encephalic death, tissue and organ procurement.

Introduction

From 1966 to 2015, the number of deceased organ donors in Mexico increased, of which 491 were due to encephalic death (ED) and 1,475 due to cardiorespiratory arrest (PCR). In 2019, the number of deceased donors increased to 2,495 (564 due to ED and 1,931 due to PCR), a 1.7-fold increase, bringing the deceased donor rate to 19.7 per million inhabitants. The increase in the incidence of chronic non-communicable diseases that lead to terminal organ failure concomitantly increases the need for transplants.¹ Regarding these facts, which were expressed in the

initiative to reform Articles 321, 322, and 324 of the Mexican General Health Law, related to donations and transplants, it was mentioned that the greatest difficulty lies in obtaining the necessary organs.² Legislatively, the procurement, donation, and transplantation of organs and tissues from a deceased person are consistent with the right of every person to the protection of health (Article 4 of the Political Constitution of the United Mexican States).

Hospital institutions are the sites where these procedures are performed and where the largest number of potential donors and recipients are located. In hospitals, the

operational steps must be guaranteed with the coordinated participation of trained and committed personnel.²

In this scenario, health and nursing professionals in Intensive Care Units (ICU) or similar are directly related to the processes and procedures of organ procurement, since they must perform interventions based on scientific evidence and humanized care so that they implement the necessary measures to avoid as much as possible potential damage to organs for transplantation.³⁻⁸ This implies maintaining the physiology and cellular homeostasis of the human organism to prevent electrolyte, endocrine, cardiovascular, and pulmonary alterations, as well as hematological and autonomic nervous system alterations^{9,10} that prevent organ donation and transplantation. For these purposes, it is necessary to have the infrastructure and structure of human resources in health to carry out organ procurement actions, in the humanized sense of facilitating the reception of organs by sick people for their survival and quality of life.¹¹⁻¹⁵

In Mexico, there is a dynamic organ transplantation activity in line with the resumption of transplantation programs under the context of the COVID-19 pandemic. In this sense, the variants of concern Alpha, Beta, Gamma, Delta and, above all, Omicron, predominant from the year 2021, are contemplated to incorporate precautionary measures for the processes of organ procurement, donation, and transplantation, under the responsibility of the hospital coordinators of donation and with the participation of the team of trained personnel for each stage.¹³ For these reasons, it is important to know the scientific

aspects, regulatory frameworks, processes, and preservation procedures of the organs most frequently procured or with the highest waiting rate that are requested from persons with ED, since they require quality maintenance and interventions specific to the pandemic context.^{2-8,13}

The insufficiency of published scientific material to guide nursing interventions in the correct organ procurement for adults with ED, and to provide theoretical, methodological, technical, and humanistic bases for an efficient organ donation and transplantation process under the best possible conditions, led us to propose the development of a clinical guide for nursing interventions in the procurement of the most frequent organs to be donated by adults with ED, such as kidneys, lungs, heart, corneas or pancreas. This guide is based on the NANDA-NOC-NIC taxonomy.

Methods

The present work consisted in the elaboration of the Clinical Guide for Nursing Interventions in Organ Procurement for adults with ED (GCIEPO), based on the methodology proposed in the Methodological Manual for the Development of Clinical Practice Guidelines for Nurses (MMDGPCE), of the Mexican National Health System.¹⁶

The rationale was based on a previous systematic review that was developed using descriptors of the PICO method focused on the main topic, the evaluation of the level of scientific evidence of the publications, according to the Oxford Center for Evidence-Based Medicine (OCEBM), and the AGREE II report checklist. This previous phase of systematic review has already been published.¹⁷

The GCIEPO addresses the major complications of organ procurement and uses the standardized nursing language of the North American Nursing Diagnosis Association (NANDA) for diagnoses, the Nursing Interventions Classification (NIC) for interventions, and the Nursing Outcomes Classification (NOC) for outcomes.

At the end of each care plan, a “*clinical judgment*” is presented to support the scientific basis of nursing care.

Results

Table 1 presents a checklist for the determination of ED, taken from the clinical guide for the diagnosis of encephalic death of the Ministry of Health.¹⁸ This makes it possible to focus nursing interventions for organ procurement based on the prevention of complications (Tables 2-8), since cardiac arrest, in the presence of ED, becomes noticeable 24 to 48 hours after confirmation of the diagnosis.

Table 1. Checklist for determination of encephalic death.

<p>Prerequisites (All must be evaluated)</p>	<ul style="list-style-type: none"> • Irreversible coma of known cause. • Neuroimaging studies to explain the coma. • Absence of CNS depressant drugs (if indicated, request toxicological examination); in case of administration of barbiturates, serum levels should be <10 ug/ml. • Absence of residual effect of muscle relaxants. • Absence of serious acid-base disorders, electrolyte abnormalities, or endocrine. • Normothermia or mild hypothermia (>36°C). • Systolic blood pressure ≥100 mmHg. • Absence of spontaneous breathing.
<p>Clinical evaluation (All must be evaluated)</p>	<ul style="list-style-type: none"> • Pupils unresponsive to light. • Absent corneal reflex. • Absence of oculocephalic reflexes (check for cervical spine integrity). • Absence of oculovestibular reflexes. • Absence of facial movements to painful stimuli of the supraorbital nerve and temporomandibular joint. • Absence of gag reflex. • Absence of cough reflex to tracheal suction. • Absence of motor response to painful stimuli in all four extremities (spinal integration reflexes are allowed).
<p>Apnea test (All must be evaluated)</p>	<ul style="list-style-type: none"> • Patient with hemodynamic stability. • Adjustment of ventilatory parameters to maintain normocapnia (PaCO₂ 35-45 mmHg) • Preoxygenation with FiO₂ 100% for 10 minutes or until reaching PaO₂ >200 mmHg. • Setting the PEEP (end-expiratory pressure) level to 5 cmH₂O. • Provide O₂ through tracheal suction catheter at carina level at 6 L/min or connect patient to T-piece with CPAP (continuous positive airway pressure) at 10 cmH₂O. • Disconnect the fan. • Verify absence of spontaneous breathing. • Obtain an arterial blood gas measurement after 8-10 minutes, reconnect the patient to the ventilator. • pCO₂ ≥60 mmHg or 20 mmHg increase from baseline. • Aborted apnea test.

Complementary studies (if the clinic does not provide enough information to confirm or issue the medical diagnosis of ED, one of the studies requested by the treating physician is required, based on the General Health Law).	<ul style="list-style-type: none"> • Conventional cerebral angiography. • Electroencephalogram. • Computed tomography angiography. • Transcranial Doppler ultrasound. • Magnetic resonance angiography. • Angiogramography. • Positron emission computed tomography. • Somatosensory evoked potentials.
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Source: Guidelines for Diagnosis of encephalic death and management of the potential organ donor.¹⁸

Clinical judgment

It is important to point out that transcranial Doppler is the gold standard method in the diagnosis of ED.¹⁹

Table 2. Clinical Guide Nursing Interventions in Organ Procurement for adults with ED (GCIEPO).

<i>Endocrine system</i>			
Complication: Hyperglycemia and hypothyroid states			
Applicable nursing diagnoses (NANDA)	Applicable Nursing Objectives (NOC)	Specific Nursing Interventions (NICs)	Specific Nursing Interventions (NICs)
00179 Risk of unstable blood glucose level	2111 Severity of hyperglycemia 2113 Severity of hypoglycemia 2300 Blood glucose level	2120 Management of hyperglycemia 2314 Administration of medication: intravenous 2380 Medication management 2280 Hormone replacement therapy	2395 Medication management 2380 Medication management
Complication: Diabetes insipidus			
Applicable nursing diagnoses (NANDA)	Applicable Nursing Objectives (NOC)	Specific Nursing Interventions (NICs)	Specific Nursing Interventions (NICs)
00025 Risk of fluid volume imbalance 00195 Risk of electrolyte imbalance	1937 Risk control: dehydration 0606 Electrolyte balance 0601 Water balance 0617 Severity of hyponatremia 0606 Electrolyte balance 0600 Electrolyte and acid-base balance 0619 Severity of metabolic acidosis 0620 Severity of metabolic alkalosis	0590 Urinary elimination management 2080 Liquid handling 4120 Liquid handling 4130 Liquid monitoring 4260 Shock prevention 4140 Liquid replenishment 4258 Shock management: volume 0590 Urinary elimination management	2395 Medication management 2380 Medication management

0607	Severity hypercalcemia	of	2000	Electrolyte management
0608	Severity hyperchloremia	of	2001	Electrolyte management: hypercalcemia
0609	Severity hyperkalemia	of	2002	Electrolyte management: hyperkalemia
0610	Severity hypermagneseemia	of	2003	Electrolyte management: hypermagneseemia
0611	Severity hypernatremia	of	2004	Electrolyte management: hypernatremia
0612	Severity hyperphosphatemia	of	2005	Electrolyte management: hyperphosphatemia
0613	Severity hypocalcemia	of	2006	Electrolyte management: hypocalcemia
0614	Severity hypochloremia	of	2007	Electrolyte management: hypokalemia
0615	Severity of hypokalemia		2008	Electrolyte management: hypomagneseemia
0616	Severity hypomagneseemia	of	2009	Electrolyte management: hyponatremia
0617	Severity hyponatremia	of	2010	Electrolyte management: hypophosphatemia
0618	Severity hypophosphatemia	of	2020	Electrolyte monitoring
			1910	Acid-base equilibrium management
			1911	Acid-base balance management: metabolic acidosis
			1912	Management of acid-base balance: metabolic alkalosis
			1913	Management of acid-base balance: respiratory acidosis
			1914	Acid-base balance management: respiratory alkalosis

Clinical judgment

Hyperglycemic states are due to peripheral insulin resistance, insufficient reduction of insulin secretion by the pancreas, and unsuppressed glycogenolysis, as well as increased regulatory mechanisms, which cannot regulate cellular homeostasis due to

hypothalamic-pituitary adrenocortical damage and catecholamine secretion. For these reasons, the daily work of nursing should focus on monitoring capillary glycemic figures to analyze the need for insulin infusion therapy, basal insulin therapy, or insulin schedule, to maintain the glycemic target around 140 and 160 mg/dl.

On the other hand, pituitary ischemic injury produces a decrease in plasma levels of pituitary hormones, especially vasopressin (ADH) levels, undetectable approximately six hours after issuing the medical diagnosis of ED, while the hormone triiodothyronine (T3) decreases by more than 50% in the first hour and is undetectable nine hours later. Consequently, hypothyroidism occurs, leading to myocardial exhaustion, a shift to anaerobic metabolism, and reduced cardiac function, so in these cases nursing practice should focus on hormone therapy substitution, administering a bolus of 20 µg of intravenous T4, followed by a continuous infusion at 10 µg/hour, or a bolus of 4.0 µg of intravenous T3, followed by a continuous infusion at 3 µg/hour. Likewise, external administration of vasopressin is also required, to avoid the presence of diabetes insipidus with high glycemia figures. As for the clinical condition of hypothyroidism, we do not yet have a nursing diagnosis that addresses it, so only the interventions that could be used for such a case are included.

Diabetes insipidus is due to a lack of antidiuretic hormone secretion, leading to polyuria or osmotic diuresis, causing fluid depletion which in turn leads to hypotension

and, in the worst clinical scenarios, hypovolemic shock, as well as electrolyte abnormalities such as hypernatremia, hyponatremia, and hypertonic dehydration, to name the most frequent. In these situations, nursing should focus on monitoring fluid control or diuresis, skin assessment through mucous membranes and skin folds, with the application of fluid therapy using hypotonic solutions, such as half molar saline solution, i.e. 0.45%. Likewise, the administration of vasoactive drugs through intravenous desmopressin or noradrenaline in a bolus of 1 to 4 µg, followed by a continuous intravenous infusion of 0.5 to 2 µg, or from the institutional protocol or the dose-response of the person, optimizing in the following goals of tissue perfusion, should be considered: ²⁰⁻²⁹

- Heart rate: 60-100 bpm
- Systolic blood pressure: ≥100 mmHg
- Mean arterial blood pressure: 70-90 mmHg
- Diuresis >1cc/kg/h (50-100 cc/h)
- Body temperature: >35°C.
- Arterial gasometry: partial pressure of oxygen (PaO₂) ≥100mmhg, partial pressure of carbon dioxide (pCO₂) 35-45 mmHg, pH 7.35-7.45.
- Central venous pressure: 8-10 mmHg

Table 3. Clinical Guide Nursing Interventions in Organ Procurement for Adults with ED (GCIEPO)

<i>Cardiac system</i>			
Complication: Arterial hypertension followed by hypotension due to volume loss and arrhythmias			
Applicable nursing diagnoses (NANDA)	Applicable Nursing Objectives (NOC)	Specific Nursing Interventions (NICs)	Generalized Nursing Interventions (NICs)
00240 Risk of decreased cardiac output	1928 Risk control: hypertension	2300 Medication administration 2314 Medication administration - intravenous	2395 Medication management 2380 Medication management
00029 Decreased cardiac output	1933 Risk control: hypotension		

00200 Risk of decreased cardiac tissue perfusion	2112 Severity of hypertension	2395 Medication management
00228 Risk of inefficient peripheral tissue perfusion	2114 Severity of hypotension	3480 Lower extremity monitoring
00204 Ineffective peripheral tissue perfusion	0400 Effectiveness of the cardiac pump	4030 Administration of blood products
00267 Risk of unstable blood pressure	0414 Cardiopulmonary status	4040 Cardiac care
	0401 Circulatory status	4020 Decrease in hemorrhage
	0422 Tissue perfusion	4090 Arrhythmia management
	0405 Tissue perfusion: cardiac	4162 Management of hypertension
	0416 Tissue perfusion: cellular	4170 Management of hypervolemia
	0404 Tissue perfusion: abdominal organs	4175 Management of hypotension
	0407 Tissue perfusion: peripheral	4180 Management of hypovolemia
	0408 Tissue perfusion: pulmonary	4120 Liquid handling
		4054 Management of central venous access device
		4092 Pacemaker management: temporary
		4050 Cardiac risk management
		4250 Management of shock
		4254 Management of shock: cardiac
		4258 Management of shock: volume
		4130 Liquid monitoring
		4210 Invasive hemodynamic monitoring
		4070 Circulatory precautions
		4010 Prevention of bleeding
		4260 Prevention of shock
		4150 Hemodynamic regulation
		4140 Liquid replenishment
		4200 Intravenous therapy
		6680 Monitoring of vital signs

Clinical judgment

In the first instance, the presence of ED releases catecholamines and, consequently, produces vasoconstriction, which leads to a state of arterial hypertension and cardiac arrhythmias, in the worst-case scenario. After this sympathetic

cascade or storm, there is a marked reduction of the same that generates an inotropic and chronotropic deficiency, in addition to peripheral vascular resistance, present due to dehydration secondary to diabetes insipidus (polyuria) that results in a state of hypotension, bradycardia, and hypovolemia. In these cases, the work of

critical care nurses should be focused on preserving cardiac volemia, which will give way to sufficient perfusion and oxygenation of the other organs to be donated

For this reason, in situations of hypotension or hypovolemia that do not subside with the administration of parenteral therapy, vasoactive drugs such as adrenaline, norepinephrine, or dobutamine are used employing dose-response, in such a way that the person with a medical diagnosis of ED is individualized. In the presence of bradyarrhythmias, aleudrine is administered pharmacologically or, if not corrected, a pacemaker is applied. In the presence of tachyarrhythmias, pharmacological administration of amiodarone is used under the corresponding medical prescription. The hemodynamic goals are as follows:²⁰⁻²⁹

- Left ventricular ejection fraction of at least

45% with the least amount of vasoactive drugs

- Heart rate: 60-100 bpm
- Systolic blood pressure: ≥ 100 mmHg
- Mean arterial blood pressure: 70-90 mmHg
- Diuresis > 1 cc/kg/h (50-100 cc/h)
- Body temperature: $> 35^{\circ}\text{C}$.
- Arterial gasometry: partial pressure of oxygen (PaO₂) ≥ 100 mmHg; partial pressure of carbon dioxide (PCO₂) 35-45 mmHg; pH 7.35 - 7.45.
- Central venous pressure: 8-10 mmHg

In addition, it is important to remember that in the pathophysiology of ED, there is a permanent increase in intracranial pressure, so the presence of arterial hypertension is evident. This may be followed by hypotension and hypovolemia, which is why it was integrated into the NOC and NIC and the clinical judgment.²⁰⁻²⁹

Table 4. Clinical Guide Nursing Interventions in Organ Procurement in Adults with ED (GCIEPO)

<i>Sistema térmico</i>		
Thermoregulatory system		
Applicable nursing diagnoses (NANDA)	Applicable Nursing Objectives (NOC)	Specific Nursing Interventions (NICs)
00220 Risk of thermal injury	0800 Thermoregulation	3840 Precautions in malignant hyperthermia
00007 Hyperthermia	1923 Risk control: hypothermia	3900 Temperature control
00253 Risk of hypothermia	1908 Risk detection	3740 Treatment of fever
00274 Risk for ineffective thermoregulation	00006 Hypothermia	3786 Treatment of hyperthermia
00008 Ineffective thermoregulation	0800 Thermoregulation	3800 Treatment of hypothermia
	1913 Severity of physical injury	6610 Risk identification
	1908 Risk detection	

Clinical judgment

In the loss of body thermal regulation, there are clinical episodes of both hypothermia and hyperthermia, so the nursing function must

maintain thermal goals between 35 and 37 °C, to preserve the organs to be donated. Otherwise, such thermal dysregulation leads to the presence of disseminated intravascular coagulation and arrhythmias.²⁰⁻²⁹

Table 5. Clinical Guide Nursing Interventions in Organ Procurement in Adults with ED (GCIEPO)

<i>Pulmonary system</i>		
Complication: Lung injury		
Applicable nursing diagnoses (NANDA)	Applicable Nursing Objectives (NOC)	Specific Nursing Interventions (NICs)
00031 Ineffective airway clearance	0415 Respiratory status	1710 Oral health maintenance
00274 Risk of ineffective thermoregulation	0402 Respiratory status: gas exchange	1910 Management of acid-base balance
00008 Ineffective thermoregulation	0410 Respiratory status: patency of airways	2300 Medication administration
	0403 Respiratory status: ventilation	2395 Medication management
	0416 Tissue perfusion: cellular	2380 Medication management
	0408 Tissue perfusion: pulmonary	1911 Acid-base balance management: metabolic acidosis
	1100 Oral health	1913 Acid-base balance management: respiratory acidosis
	1935 Risk control: aspiration	1912 Acid-base balance management: metabolic alkalosis
		1914 Acid-base balance management: respiratory alkalosis
		3160 Aspiration of secretions
		3390 Ventilation support
		4106 Embolism care: pulmonary
		3300 Management of mechanical ventilation: invasive
		3304 Management of mechanical ventilation: prevention of pneumonia
		3140 Airway management
		3180 Management of artificial airways
		3350 Respiratory monitoring
		3200 Precautions to prevent aspiration

Clinical judgment

Increased intracranial pressure following irreversible loss of encephalic function results in neurogenically induced lung injury as a result of proinflammatory cytokine release, as well as inadequate management of invasive mechanical ventilation, so ventilatory goals should be as follows: ²⁰⁻²⁹

- Partial oxygen pressure (PaO₂) should be maintained above 100 mmHg.
- Individualized inspired oxygen fraction (FiO₂) to preserve the oxygenation of the economy.
- Positive end-expiratory pressure (PEEP) from 6 and 8 cm H₂O to 15 cm H₂O.
- Tidal volume (TV) with targets of 6 to 8 ml/kg of predicted weight, mean of 7 ml/

- kg of predicted weight
- Oxygen saturation of 95% -Oxygen saturation of 95%
 - Plateau pressure <30 cm H₂O
 - Maximum pressure <35 cm H₂O

Likewise, it is important to point out that, before admission to the surgical area, the inspired oxygen fraction should be increased to 100%. In addition, ventilator-associated pneumonia should be prevented by

suctioning secretions, a semi-fowler position with approximately 30° of head elevation, and oral hygiene with chlorhexidine. Greater attention should also be paid when the tidal volume of the established goals is increased and, at the same time, the person is on increased volemia or fluid therapy, since this could lead to the presence of acute pulmonary edema and prevent transplantation. ²⁰⁻²⁹

Table 6. Clinical Guide Nursing Interventions in Organ Procurement for Adults with ED (GCIEPO)

<i>Hematological system</i>		
Complication: Disseminated intravenous coagulopathy and systemic inflammatory reaction		
Applicable nursing diagnoses (NANDA)	Applicable Nursing Objectives (NOC)	Specific Nursing Interventions (NICs)
00206 Risk of bleeding	0409 Blood coagulation	2300 Medication administration
00205 Risk of shock	0401 Circulatory status	2314 Medication administration - intravenous
00268 Risk of venous thromboembolism	0416 Tissue perfusion: cellular	2395 Medication management
	1932 Risk control: thrombi	3480 Lower extremity monitoring
	2114 Severity of hypotension	4030 Administration of blood products
	1933 Risk control: hypotension	4040 Cardiac care
	1908 Risk detection	4020 Decrease in hemorrhage
	0414 Cardiopulmonary status	4090 Arrhythmia management
	0401 Circulatory status	4175 Management of hypotension
	0413 Severity of blood loss	4180 Management of hypovolemia
	0419 Severity of hypovolemic shock	4120 Liquid handling
	0418 Severity of cardiogenic shock	4054 Management of central venous access device
	0420 Severity of neurogenic shock	4092 Pacemaker management: temporary
		4050 Cardiac risk management
		4250 Management of shock
	4254 Management of shock: cardiac	
	4258 Management of shock: volume	
	4130 Liquid monitoring	
	4210 Invasive hemodynamic monitoring	
	4070 Circulatory precautions	
	4010 Prevention of bleeding	
	4260 Prevention of shock	
	4150 Hemodynamic regulation	
	4140 Liquid replenishment	
	4200 Intravenous therapy	
	6680 Monitoring of vital signs	
	4106 Embolism care: pulmonary	
	4110 Precautions in embolism	
	4270 Management of thromboembolic therapy	

Clinical judgment

The systemic inflammatory response occurs due to the presence of ischemic encephalic injury and metabolic changes produced by the catecholamine storm, as well as an inadequately

restored cardiovascular state, while disseminated intravascular coagulopathy is preceded by the release of tissue thromboplastin from necrotic encephalic tissue. Similarly, nursing care is focused on the prevention of these situations.²⁰⁻²⁹

Table 7. Clinical Guide Nursing Interventions in Organ Procurement for Adults with ED (GCIEPO)

<i>Optical system</i>		
Complication: Corneal injury		
Applicable nursing diagnoses (NANDA)	Applicable Nursing Objectives (NOC)	Specific Nursing Interventions (NICs)
00245 Risk of corneal injury	1902 Risk control 1916 Risk control: visual impairment 1927 Risk management: dry eye 1924 Risk control: infectious process 1908 Risk detection 2110 Severity of dry eye	6540 Infection control 2395 Medication management 6610 Risk identification 6680 Vital signs monitoring 6550 Protection against infections 1360 Prevention of dry eyes 1650 Eye care 2310 Administration of medication: ophthalmic

Clinical judgment

The corneal lesion is due to low or no tear production, which leads to opacification of the corneal stroma with loss of optical transparency. For these reasons, a trained and standardized corneal procurement team is in charge of performing interventions so that the cornea does not present complications and is properly preserved. In addition, the post-

mortem corneal viability time must be taken into account, since procurement and processing, to be optimal, have a time window of 72 hours according to the European Directorate for the Quality of Medicines and HealthCare (EDQM). In the process of procurement and preparation for donation, the eye bank of the United States of America performs a serological blood test and an inspection of the corneas through imaging and analysis of the donor's medical history.^{30, 31}

Table 8. Clinical Guide Nursing Interventions in Organ Procurement for Adults with ED (GCIEPO)

<i>Family system</i>		
Complication: Alteration of the parental role of the person with a medical diagnosis of ED		
Applicable nursing diagnoses (NANDA)	Applicable Nursing Objectives (NOC)	Specific Nursing Interventions (NICs)
00074 Compromised family coping	2608 Family resilience	6260 Organ procurement
00073 Disabling family coping	1300 Acceptance: health status	

1307 Death with dignity
 1500 Parent-child bonding
 1814 Knowledge: therapeutic procedure
 1803 Knowledge: disease process
 2007 Comfortable death

Clinical judgment

According to the above clinical conditions, we can observe that the presence of ED triggers imbalances in the cellular homeostasis of the human being in a maximum period of 96 hours, of which only three people can be potential candidates for the process of organ donation-transplantation. Therefore, care should also focus on the emotional grief of the potential donor's family. That is, regardless of the family's decision in the face of the possibility of donation and the haste to start procuring the target organs, due to the limited time available, it is necessary to preserve the patient's rights as a patient and eventually the rights as a human being. Nursing interventions must attend to this parental role, since the person is a human being before being a donor and, in the face of death that makes it impossible to say goodbye to close ones, the emotional mourning process must take place.^{20, 29}

Conclusions

The process of organ donation-transplantation has become a subsistence strategy. This guide shows the nursing interventions so that the maintenance of organs of people with a medical diagnosis of ED is adequate, efficient, and correct, to generate an optimal process of organ donation-transplantation.

Finally, it is recommended that this guide should be reviewed and updated every one to

three years and that the situations of donors who die of cardiac arrest and the pediatric population should also be addressed. Likewise, health education strategies should be created concerning the culture of organ donation-transplantation, since nowadays this process is a relevant means of subsistence.

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