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Mexican Journal of Medical Research ICSa

Biannual Publication, Vol. 11, No. 21 (2023) 55-63

ISSN: 2007-5235

Overview of Organ Donation

Perspectiva Global de la Donación de órganos

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Abstract:

Organ and tissue donation is defined as the transfer of human cells, tissues and organs from a donor to a recipient; it is the only therapeutic option that helps to improve the quality of life and to avoid the death of people with organ failure. However, this process is hampered due to the discrepancy between organ supply and demand worldwide, which increases clinical deterioration and mortality rates on the waiting list of patients with chronic or acute multi-organ failure. The aim of this article is to provide relevant information about the process of organ and tissue donation, stand out the importance of understanding the process, providing information to the general population, with emphasis on essential groups for its dissemination, mainly health professionals who have the ability to positively influence society's perception of this issue by providing health education during primary care, This is the first contact and an important link in the attention of the potential donor, considering medical units as the closest source of information due to recurrent access, and not least children and young people, as it has been shown that this action increases the acceptance rate, turning this section of the population into agents of social change, generating with this manuscript, a positive impact on the perception and understanding of the subject for society, seeking to increase the availability of donors.

Keywords:

Donation, Organ, Tissue, Process, Brain Death, Circulatory Death, Donor, Receptor

Resumen:

La donación de órganos y tejidos se define como la transferencia de células, tejidos y órganos humanos de un donante a un receptor, es la única opción terapéutica que ayuda a mejorar la calidad de vida y evitar la muerte de personas con falla orgánica, sin embargo, este proceso se ve obstaculizado debido a la discrepancia que existe entre la oferta y la demanda de órganos a nivel mundial, lo cual incrementa el deterioro clínico y las tasas de mortalidad en la lista de espera de pacientes con falla multiorgánica crónica o aguda. El objetivo del presente artículo es enunciar información relevante acerca del proceso de donación de órganos y tejidos, resaltando la importancia de comprender dicho proceso, brindando información a la población en general, con énfasis en grupos esenciales para la difusión de la misma, principalmente los profesionales de la salud quienes tienen la capacidad de influir positivamente en la sociedad respecto a la percepción de este tema, al impartir educación en salud durante la atención primaria, fungiendo como el primer contacto y un eslabón importante en la atención del donante potencial, considerando a las unidades médicas como la fuente de información más cercana debido al acceso que se tiene de manera recurrente, y no menos importante a niños y jóvenes, pues se ha demostrado que con esta acción se logra un incremento en la tasa de aceptación, convirtiendo a esta sección de la población en agentes de cambio social, generando con este manuscrito, un impacto positivo en la percepción y comprensión del tema para la sociedad, buscando aumentar la disponibilidad de donantes.

Palabras Clave:

Donación, Órgano, Tejido, Proceso, Muerte Encefálica, Muerte Circulatoria, Donador, Receptor

INTRODUCTION

Transplantation has become the definitive treatment for end-stage organ or tissue failure, helping to improve quality of life and prevent death in these patients. Each post-mortem donor can save the lives of at least six people.[1-12] However, there is a discrepancy between organ supply and demand, which is the main obstacle to meeting transplantation needs, leading to a negative impact on clinical deterioration and mortality rates in the waiting list of patients with multiorgan failure.[1, 5, 12-29]

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Received: 11/10/2022, Accepted: 07/11/2022, Published: 05/01/2023

DOI: https://doi.org/10.29057/mjmr.v11i21.10007

Globally, in 2020, the Global Observatory on Donation and Transplantation (GODT) reported 129,681 organs transplanted, however, they mention a decrease of 17.6% compared to 2019.[30] In July 2022 in Mexico there were 2,576 patients on the transplant waiting list, of which 75% were waiting for a kidney transplant, 23% were waiting for a cornea transplant, 1% for a liver transplant, and the remaining percentage were waiting for other tissues or organs. According to the National Transplant Centre (CENATRA), of the total number of patients on the waiting list, approximately 16% receive a transplant, of which 50% are corneal transplants, 44% are kidney transplants, 4% are liver transplants, while 0.6% and 0.02% are heart and pancreatic transplants, respectively.[31]

It is necessary to disseminate donation and transplantation programmes in order to reduce the gap between organ supply and demand in our country, which has become a public health problem, which is why various strategies have been implemented to increase the culture of organ donation. The communications sector, companies and NGOs contribute to raising awareness of the positive effect of organ donation through the continuous dissemination of information, encouraging social responsibility and altruism, but building trust is slow and delicate, as it can be lost when the media portrays the issue in a negative light, falling victim to sensationalism.[32]

EPIDEMIOLOGY

The Global Donation and Transplantation Observatory reported 129,681 organ transplants internationally in 2020, registering a decrease of 17.6% compared to 2019, when a total of 157,301 organs were transplanted. Of the total reported in 2020, 31% were kidney transplants, of which 68.3% were acquired from deceased donors and 31.7% were contributed by living donors. Of the international total, 20% were liver transplants, of which 79% were procured from deceased donors and 21% from living donors for a total of 36,100 actual deceased organ donors.[30]

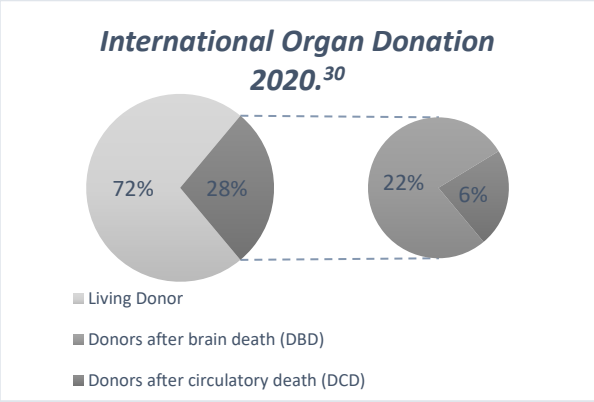

Figure 1. International organ donation 2020. These 2020 data are based on Global Observatory on Donation and Transplantation (GODT) data produced by the WHO-ONT collaboration.[30]

Of the total worldwide donations reported in 2020 (Figure 1), 28% were from deceased donors, reporting 36,100 actual deceased organ donors. Of this percentage, 77.4% of donations were obtained from donors following brain death, with a rate of 4.5 per million population, and the remaining 22.6% were from donors following circulatory death, with a rate of 1.3 per million population. [30]

For the year 2022, the National Transplant Registry Information System (SIRNT) in Mexico reports 19, 918 people on the waiting list, registering 4,208 transplants performed for that same year, 50.57% corresponding to corneal transplants, followed by 44.58%, 4.03% for kidney and liver transplants respectively, as well as the remaining 0.8% corresponding to heart and pancreatic transplants.[31]

ORGAN DONATION

The transfer of human cells, tissues and organs from a donor to a recipient for the purpose of restoring the body's functions, positively impacting the quality of life of patients with acute or chronic terminal organ failure, is known as donation.[33]
There are special ethically justified cases for artificially maintaining a deceased person on life support, including brain-dead pregnant women with viable products, and patients with brain death or circulatory arrest in whom organ donation is considered, in which cases resources are appropriately employed.[34,35]

The donor is the person from whom an organ or tissue is recovered during life or post-mortem, with the purpose of transplanting it to a recipient who must not present diseases that could jeopardise the success of the transplant. Donors who decide on their own body, and secondary donors who authorise the disposal of organs from a third person, including spouses, cohabitants, ascendant relatives, descendants and collateral relatives up to the second degree, legal representatives or health authorities, are recognised as original disposers. Donations are mainly obtained from brain-dead, circulatory arrest or living donors.[27,33,36,37]

Throughout time, modifications have been made to the norms that regulate this process of organ donation for transplant purposes, being the Official Mexican Emergency Norm NOM-EM- 003-SSA-1994, for the disposition of human organs and tissues for therapeutic purposes, except blood and its components, a substitute to the Technical Norm number 323 For the disposition of human organs and tissues for therapeutic purposes, which was published in 1988 in the Official Gazette of the Federation. However, the emergency standard was revoked when the Federal Law of Metrology and Standardization was enacted in 1992, in which article 48 refers to the maximum validity of 6 months that the emergency official standards would have; it is worth mentioning that this law was abrogated by the Law of Quality Infrastructure in 2020. Since there is no Official Mexican Standard published on the subject, the Official Mexican Emergency Standard NOM-EM- 003-SSA-1994 For the disposition of human organs and tissues for therapeutic purposes, except blood and its components is a reference without normative force.[36,38-40]

In order to carry out a donation, there must be an express consent of the donor who will decide whether it is carried out during life or after death, free of moral or physical coercion. Loss of life occurs when encephalic death or cardiorespiratory arrest occurs.[36,41] Therefore, the donor can be declared deceased according to two established medical criteria: after brain death, which is diagnosed by neurological criteria, or in asystole or circulatory arrest, after cardiac death.[42,43]

Brain death

Brain death is defined as the complete and irreversible loss of brain and brainstem function, characterised by the absence of electrical activity in the brain, the disruption of central regulatory mechanisms.[44-46]
A person with cessation of all brain activity is dead, although cardiopulmonary function may be artificially maintained for some time.[42]
Diagnosis is made by neurological examinations, radiological tests that confirm cessation of cerebral flow, electrophysiological tests, evoked potentials and apnoea tests that demonstrate irreversible failure of the cerebral cortex, brainstem and reticular action system.[44,47,48] For a correct diagnosis, acute intoxication by drugs that depress the central nervous system must be ruled out.[22]

An exhaustive assessment should be made of the state of arreactive coma, of which it is necessary to know its aetiology and that it is irreversible, with clinical evidence of absence of motor responses to painful stimuli, score of 3 on the Glasgow coma scale.[49-51] The absence of three or more brainstem reflexes will clinically show mydriatic, areflexic pupils to light stimuli, caloric stimulation tests should be used in which the patient should not present oculocephalic movements, when irrigating the tympanum with cold water, tonic deviation towards the cold stimulus should not be generated. The corneal reflex should be abolished in response to tactile stimuli. The cough reflex is assessed by stimulating the patient with bronchial suction.[52]

There are determining factors in the evolution of patients to encephalic death, which should be observed within 24 hours, for example, a Glasgow scale score of less than 6 before starting sedation of the patient, aetiologies that generate a volume greater than 60-65 ml of intracranial haematoma that show signs of herniation on CT, patients with hydrocephalus, systolic blood pressure greater than 150 mmHg, history of excessive ethylism.[51,53]

Most patients with severe brain injuries progress within 72 hours. The most common aetiology is endocranial hypertension due to cerebral haemorrhage, traumatic brain injury and subarachnoid haemorrhage.[47,48] Between 40-50% of severe traumatic brain injury (TBI) and 30-35% of haemorrhagic vascular events are considered serious intracranial injuries, which commonly progress to brain death.[54]
From these donors, a multi-organ donation (heart, liver, kidneys, lungs, pancreas, intestine and limbs) can be obtained.[36,54]

Circulatory death

Circulatory death occurs in people who have died in cardiorespiratory arrest, which is expected following a process of withdrawal of life-sustaining treatment.[34,47,55] This type of donation includes patients whose effective treatment options are null and void and whose disease progression will not culminate in brain death, for example, patients with brain damage, neurodegenerative, respiratory or cardiac diseases in the terminal phase, in whom, in conjunction with health professionals, the family and the patient's own wishes, the removal of life support is carried out in order to avoid prolonging the dying process with probably degrading interventions.[27,28,47,56]

Organ donation due to circulatory death is limited by warm ischaemia, which can affect organs to the point of non-viability. Warm ischaemia is the time between circulatory arrest and the onset of organ preservation.[57]

In 1995, in Maastricht, the term Nonheart-Beating Donor (NHBD) was first adopted to describe an organ donor after cardiorespiratory arrest, thus creating the Maastricht classification, which characterises different donation situations after circulatory death, considering organ viability, with the aim of distinguishing ischaemic organ injury, modalities for graft preservation and survival, as well as technical, ethical and medical aspects. Subsequently, the termination for death due to cardiac arrest was modified and is now known as Donation after Circulatory Death.[28,58,60]

According to the Maastricht classification, donation after circulatory death is divided into uncontrolled asystole, which includes type I and II patients, and controlled asystole, which includes type III and IV patients.[28,58,60]
Type I patients are characterised by unexpected cardiac arrest and no resuscitation, for example, victims of out-of-hospital accidents who do not receive cardiopulmonary resuscitation due to neck fractures or acts of suicide, these patients could become donors if the time of warm ischaemia is less than 45 minutes. Successful donation in this category is not very high, due to the uncertainty of the warm ischaemia time. Category II includes patients in whom cardiopulmonary resuscitation is used without success.[28,58,60]

Controlled asystole types III and IV are patients awaiting cardiac arrest following withdrawal of life support and brain-dead patients whose cardiac arrest occurs unexpectedly, during donor management, but prior to planned organ recovery, respectively.
It is considered a "controlled" category because the ischaemia time is too short to consider organ recovery, excluding cases of euthanasia.[28,58-60]

To determine circulatory death, the permanent absence of breathing and circulation and the presence of electrical and mechanical asystole causing inability to generate a heartbeat or circulation spontaneously must be ascertained.[28]

The diagnosis is based on circulatory and respiratory criteria, in which the absence of circulation and spontaneous breathing for a period of no less than 5 minutes is corroborated. This requires the use of an electrocardiogram to identify asystole on a continuous tracing, invasive blood pressure monitoring and echocardiography to verify the absence of aortic flow.[57]
Circulatory death donation has been an alternative due to the decrease in the incidence and mortality of pathologies that culminate in encephalic death.[27,28] Tissues such as corneas, bone, skin and heart valves can be obtained mainly from these donors.[36,54]

Previously it was believed that only hearts could be obtained from donors due to encephalic death, due to the ischaemic lesion that occurs after the withdrawal of life support measures; however, in 2020, a case was reported of a heart transplant following circulatory death using regional normothermic abdominal perfusion, which supports the viability of multi-organ donation due to circulatory death.[61]

DONATION AND TRANSPLANTATION PROCESS

Organ donation and transplantation is made at hospitals that comply with the requirements and conditions established by each country's rules and regulations.[4,36,37]

The scarcity of personnel is an obstacle to the integration of donation coordination teams. One of the organisms in charge of this function in Mexico is the Coordination of Organ and Tissue Donation for Transplantation Purposes (CODOyT), which is made up of health personnel in charge of this process within a framework of institutional regulations. It carries out continuous evaluations to identify and correct the limitations of these processes, promoting and disseminating them at different levels, both to health care personnel and to the general population, mainly children and young people, as it has been shown that this action increases the rate of acceptance, turning this age group into agents of social change. [32,62,63]

To implement the organ donation process effectively, it is necessary to obtain the commitment of hospital directors who will be responsible for prioritising these programmes with the correct regulation of legal requirements such as the health licences granted by the Federal Commission to Prevent Health Risks (COFEPRIS), choosing qualified personnel to form the transplant commission and appointing a Hospital Donation Coordinator (HDC), who should be distinguished by his or her autonomy and availability of time, emphasising values such as altruism and social responsibility.[32]

Detection of the potential donor

One of the main challenges is the identification of patients who will die within 2 hours after withdrawal of life support measures, trust, support and acceptance of the issue in society, and the lack of detection is one of the main causes that contribute to the loss of available donors.[27,54]

The detection of potential donors is one of the main functions of the HDC, who must make daily visits to the main critical areas of hospitals such as Intensive Care Units (ICU), Emergency and Operating Rooms, without justification for acts of commerce. Deaths that take place in authorised hospitals can be considered as candidates, as long as there are no medical or legal contraindications or a desire not to donate. Once the patient has been identified, the certification of encephalic or circulatory death begins, followed by an evaluation of the potential donor.
If the donor is a pregnant woman who has been certified dead, priority will be given to the life of the product of gestation, before beginning the donation process.[36,37,54]

Evaluation of the potential donor

The viability of the organs and tissues will be determined, ruling out health risks, questioning the patient's medical history, delving into essential points such as drug addiction, risk behaviour for HIV/AIDS, neoplastic, autoimmune and chronic degenerative diseases, mainly knowing the duration, treatment and lesions to target organs. Subsequently, a thorough physical examination will be carried out, inquiring about infection risks, anthropometry and lesions, followed by laboratory and laboratory tests. Infectiological and neoplastic evaluations will assess the danger of disease transmission to the recipient, known as health risk, conditioning the viability of the organ or leading to prophylactic measures in the recipient to lessen this risk.[29,37,54]
There are absolute contraindications for donation, such as the donor is a carrier of positive serology for human immunodeficiency virus (HIV), human T-lymphotropic virus (HTLV), types I and II, that the cause of death is an untreated active systemic infection, diseases caused by prions, disseminated hydatidosis, idiopathic haematological diseases, collagenosis, vasculitis, haematological neoplasms, diseases with metastatic capacity, neoplasms of the central nervous system; however, donors who are carriers of HIV, hepatitis B or C virus can be accepted, provided that the recipient is a carrier of these same viruses. There is no age limit for donation, however, chronic organ damage becomes a contraindication for donation, mainly in organs such as liver and kidney.[29,59,64]

Each organ proposed for donation must be evaluated individually. For cardiac donations, the age of the donor, history of cardiac arrest, time of these events and use of vasoactive drugs in them must be taken into account. For the acceptance of lungs, the main factor involved is anatomical integrity that allows for proper oxygenation capacity, together with the absence of airway infections. As far as pancreatic donation is concerned, the donor must not have a history of alcoholism or diabetes; in this particular case, an age of less than 45 years is recommended.[29,59,64]

Donor management

Actions must be implemented to promote the maintenance of perfusion of organs and tissues, to preserve their viability and functioning, with correct ventilatory support to avoid lung damage, keeping the eyes occluded to reduce epithelial lesions, correcting pathophysiological alterations, as well as prevention and treatment for health risk.[2,57]

The most important pathophysiological alterations include catecholamine storm, hypotension, vasoplegia, diabetes insipidus, arrhythmias, hydroelectrolyte and acid-base imbalance, release of inflammatory mediators and hypothermia. Antidiuretic hormone deficiency in 65-90% of patients resulting from damage to the neurohypophysis causes polyuria, hypovolaemia, hypernatremia and hypokalaemia. Damage to the primary thermoregulatory centre leads to hypothermia, causing vasoplegia with consequent loss of body heat, affecting the myocardium and making it more prone to arrhythmias.[44,45]

Interview and consent for donation

Through an interview, carried out by members of the coordination, who are trained to handle critical situations such as grief and emotional crises, the family will be informed of the possibility of donation, detailing the process and clarifying doubts, as well as providing accompaniment in the face of the loss.[36,37,54]
Under no circumstances should organs and tissues be disposed of against the donor's wishes; only single organs that are considered indispensable for life can be donated once the donor's death has been declared.[36,37,54]

Distribution of organs and tissues from deceased donors

If a positive response is obtained, the consent for the disposition of organs and tissues from cadavers for transplant purposes will be signed by the disposers, and the CHD will inform the Internal Coordination Committee for Donation, the National Transplant Registry, the Ministry of Health (SSA) and the Organ and Tissue Bank, the bodies in charge of organ donation and transplantation. Priority will be given to paediatric recipients in case the donor is under or equal to 18 years of age.[36,37,54]

The National Transplant Registry is the organism in charge of coordinating the National Transplant Programme, acting as the national reference centre for the disposition of organs and tissues collected for transplants, coordinating their distribution within the national territory, as well as establishing and supervising the procedures to be performed, with an updated register of donors and transplants done in the country, issuing donors with an identification card, as well as promoting activities related to updating, research, dissemination and social communication about this process.[36]

Organs and tissues to be used for therapeutic purposes are classified into organs that require vascular anastomosis and organs and tissues that do not require vascular anastomosis (Table 1). [36,54]

Table 1. Classification according to vascular anastomosis of organs and tissues used for therapeutic purposes.[36,54]

Organs and tissues employed for therapeutic purposes.[36,54]		
Require vascular anastomosis	No vascular anastomosis required	
Kidney	Eyes	Corneas
		Sclerotic
Pancreas	Skin	
Liver	Bone	
Heart	Cartilage	
Lung	Bone marrow	
Small intestine	Nervous tissue	
	Endocrine structures	Pancreas
		Parathyroid
		Suprarenals
		Thyroid

Those that require vascular anastomosis and that can be obtained from postmortem donors include kidney, pancreas, liver, heart, lung and small intestine; living donors can donate only a kidney, a lung or liver lobe, the distal segment of the pancreas and a segment no larger than 50 cm of small intestine. Organs and tissues that do not require vascular anastomosis can be obtained from deceased donors, including embryos and foetuses, who can donate corneas and sclera within 6 hours after irreversible cardiac arrest or under hypothermic conditions for up to 12 hours; skin in segments no larger than 100 square centimetres, not exceeding 15% of the body surface, within 12 hours after cardiac arrest; bone and cartilage within 12 hours after cardiac arrest; nervous tissue within 3 hours after cardiac arrest, as well as endocrine structures such as pancreas, parathyroid, adrenal, thyroid. [36,54]

Living donors can donate organs and tissues that do not require vascular anastomosis, such as bone marrow, mainly obtained from the sternum and iliac crests, not exceeding 15 millilitres per kilogram of donor weight, no more than two parathyroid glands and only one adrenal gland.[36,54]

Living donation

Due to the scarcity of deceased donors, living donation programmes were developed, with the same legal implication, requesting the age of majority, full use of their mental faculties, informing them of the risks, benefits and repercussions, giving their free and conscious consent and detecting health risks, guaranteeing their long-term health status; these donors can donate a complete kidney, or segments of liver, lung or pancreas, blood cell precursors, bone tissue, amniotic membrane and skin. A psychological evaluation of the donor must also be carried out to rule out behaviour related to onerous actions or coercion.[27,36,37] In these cases, it has been shown that graft survival is better than in post-mortem donors because they are donors in perfect health and are not subject to pathophysiological changes during death.[65] If there is no relationship between the donor and the recipient, a favourable resolution must be obtained from the Internal Transplant Committee, which will include a clinical summary of the case, with the corresponding medical and psychological evaluation of both the recipient and the donor, demonstrating the absence of lucre and illicit situations.[37]

Donations in medico-legal cases

If the death is subject to judicial investigation, authorisation must be obtained from the Public Prosecutor's Office, as long as criminal proceedings are not hindered. The CDH is the person in charge of notification by means of a form for donation in medico-legal cases, after evaluation by the forensic doctor, who will determine which organs and tissues do not interfere with the investigation, in order to proceed with the donation process. When the disposer is a person with no known identity or no family members located, who has been certified dead, the Public Prosecutor's Office must be notified and will rule in favour or against the removal of the organs and tissues related to the investigation.[36,37,54]

The multidisciplinary health team must guarantee a dignified death for the donor, without the absence of pain, generating an environment of calm and serenity, implementing a palliative care plan with the aim of dignifying and providing wellbeing to the patient and his or her relatives, taking into account physical, psychological, spiritual, and religious aspects.[28]

Handover of the corpse and acknowledgement of the family

The process of dignifying the corpse consists of preserving the external appearance of the donor so that it is not possible to corroborate with the naked eye the organ procurement, ending with the delivery of the body, providing support and guidance to the relatives in terms of contracting a funeral service, and finally thanking them for the decision to donate. A letter of recognition will be given by the CHD in which the organs donated should not be specified, and highlighting the act of altruism through CENATRA, which will be in charge of carrying out a symbolic recognition of merit every year. This ceremony will preferably

take place during the month of September, the commemorative date for organ donation in Mexico.[37,54]

EDUCATION ON ORGAN AND TISSUE DONATION

In order to increase donation rates and reduce the number of patients on the waiting list, proposals were created in 2012. One of the main strategies proposed was the dissemination of information through the media, identifying CENATRA as the organisation in charge of the donation process. Linking Medical Social Service Interns (MPSS) to the CODOyT programme, obtaining mutual benefit by offering better academic opportunities with the training of knowledgeable and experienced personnel, providing more trained personnel to perform related activities in hospital care units.[32]

In order to generate a positive impact on the population, achieving an understanding of this process, it is necessary to enrich education with targeted interventions that raise awareness among the population, as well as encouraging health students and future doctors by providing them with the necessary tools during their training to increase dissemination. In this way, the aim is to include in the academic programme of the Undergraduate Degree in Medical Surgery the creation of a manual in which the processes of organ donation, procurement and transplantation are explained in detail within the General Health Law. Generate an agreement between CENATRA, the SSA and the Secretary of Public Education (SEP) to encourage the inclusion of educational programmes on organ donation in order to establish a culture of donation from an early age.[32,37,66]

During the literature review, there were found several international and national studies carried out on students, mainly in the health area, in which the factors associated with donation were revealed. It is important to mention that these studies show that health professionals have the capacity to positively influence society's perception of this issue by providing health education during primary care, acting as the first contact and an important link in the potential donor's care, considering medical units as the closest source of information due to the recurrent access they have.[1-3, 5-20, 22-24, 26, 32,41-43,50,67-93.]

Predisposing factors for refusal include the integrity of the cadaver, lack of information, fear of receiving insufficient medical care when identifying themselves as official donors, religious beliefs, organ trafficking, procedural complications and their repercussions on the health of donors, dissatisfaction, denial and lack of knowledge on the part of the donor's family. Altruism has a positive influence, as well as reciprocity, social responsibility, no need for organs after death, scientific purposes, willingness to donate blood. The main sources of information were media, social networks, academic courses, specialised documents, health personnel, family/friends, public campaigns.[1-3, 5-20, 22-24, 26, 32,41-43,50,67-93.]

CONCLUSION

The concern to disseminate and generate a positive change in organ and tissue donation has led to the creation of proposals highlighting the need to strengthen organ and tissue donation programmes, as well as to identify and modify the factors that lead to refusal in the population. The dissemination of information by the media is one of the main strategies, together with teaching to generate a positive attitude at different educational levels, with emphasis on training areas in the health sector. These actions can bring about an encouraging change in the general population, as it has been shown that there is a need for well-targeted interventions to raise awareness and generate a better understanding of the issue to help health students and future doctors to increase outreach.

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