

THE REGULATORY AND OPERATIONAL FRAMEWORK RELATING TO KIDNEY TRANSPLANTATION IN ALGERIA



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Abstract: End-Stage Renal Disease (ESRD) is a global public health problem. Our objective is to describe the current status of kidney transplantation in Algeria and to highlight prospects while respecting regulatory and operational aspects.

The analysis focused primarily on Law No. 18-11 of July 2, 2018, concerning health, the obstacles that hinder this high-level activity, and the two development opportunities: living donor kidney transplantation and deceased donor kidney transplantation.

Key Words: Kidney transplantation; Regulatory and operational aspects; Living donors; Deceased donors; Algeria.

الإطار التنظيمي والتشغيلي المتعلق بزراعة الكلى في الجزائر

ملخص: يُمثل الفشل الكلوي في مرحلته النهائية مشكلة صحية عامة عالمية. هدفنا هو وصف الوضع الراهن لزراعة الكلى في الجزائر، وإلقاء الضوء على آفاقها المستقبلية مع مراعاة الجوانب التنظيمية والتشغيلية.

ركز التحليل بشكل أساسي على القانون رقم 18-11 الصادر في 2 يوليو 2018، والمتعلق بالصحة، والعقبات التي تعيق هذا النشاط رفيع المستوى، وفرصتي التطوير: زراعة الكلى من متبرع حي وزراعة الكلى من متبرع متوفى.

الكلمات المفتاحية: زراعة الكلى، الجوانب التنظيمية والتشغيلية، المتبرعون الأحياء، المتبرعون المتوفون، الجزائر.



Le Cadre Réglementaire et Opérationnel Relatif à la Transplantation Rénale en Algérie

Résumé: L'Insuffisance Rénale Terminale (IRT) est un problème de santé publique mondial. Notre objectif est de décrire l'état actuel de la transplantation rénale des patients en Algérie, et de montrer les perspectives futures tout en respectant les aspects réglementaires et opérationnels.

L'analyse a principalement porté sur la loi n° 18-11 correspondant au 2 juillet 2018 relative à la santé et les obstacles qui freinent cette activité de haut niveau, et sur les deux opportunités de développement : la transplantation rénale à partir d'un donneur vivant et la transplantation rénale à partir d'un donneur décédé.

Mots Clés: Transplantation rénale; Aspects réglementaires et opérationnels; Donneurs vivants; Donneurs décédés; Algérie.



Introduction:

The kidney is a noble organ that acts as a filter, cleansing the body of waste. A person can live with only one kidney; unfortunately, over time, kidney disease gradually destroys both kidneys. End-Stage Renal Disease (ESRD) is the final stage of the disease, and without active renal replacement therapy, the patient will die.

In Algeria, the prevalence of Total Chronic Renal Disease (TCRD) is increasing. The main causes include diabetes, hypertension, and heredity, among others. Uncontrolled self-medication is also common. Many people have taken medication without consulting a doctor, developing drug resistance and kidney poisoning. The number of chronic kidney failure patients in 2020 is estimated at around 25,000 among 43 million inhabitants, of whom 1,500 are eligible for a transplant (this is a surgical operation that consists of replacing a failing vital organ with a healthy organ). A minimum annual need of 35 kidney transplants per million inhabitants (pmh), for a ratio of transplants carried out which has stagnated between 6.5 and 7 pmh (around 270 kidney transplants/year), for around 5 years¹. Kidney transplantation offers them a better quality of life than dialysis (dialysis consists of purifying the blood of its waste through a filtering membrane, which replaces the function of the kidney) and costs less to society². Nevertheless, kidney transplantation is an activity of great fragility that requires a great capacity for adaptation and perseverance. It relies on the involvement of all those involved in this activity and the acceptance of the entire population.

To ensure the viability of patients requiring kidney transplantation, strong commitments from public authorities are essential. The kidney transplant and transplantation activity in Algeria is part of the legal framework of Law 18-11 of July 2, 2018³, relating to health. Hence, the main question is: **What are the contributions of the 2018 Health Law for kidney transplantation?**

To answer this question, a descriptive study was conducted. We defined the foundations of the national kidney transplant policy (The first topic) while highlighting the limitations and prospects for the development of this high-level activity (The second topic).

¹- Rekhif Yassin et al., "Organ donation in Algeria: Limits and perspectives". Pan African Medical Journal, Volume 39, Article 232, 2021, DOI: 10.11604/pamj.2021.39.232.30716.

²- Marissal J.P., Saily J.C., "Elements of economic problems in the field of extra-renal purification", Santé Publique 2002, Volume 14, No. 2, PP.107-119, DOI: 10.3917/spub.022.0107.

³- Law No. 18-11, corresponding to July 2, 2018, relating to health, JORA No. 46.



THE FIRST TOPIC:

ALGERIAN KIDNEY RETRIEVAL AND TRANSPLANTATION POLICY

Kidney retrieval can only be performed with the donor's consent, and the recipient can only receive the transplant in a highly sophisticated and organized medical environment that complies with ethical rules of health safety, free access, and fairness for the recipient. This kidney retrieval and transplantation process is regulated by Law No. 18-11 of July 2, 2018, on health and overseen by an agency under the supervision of the Ministry of Health.

First requirement: The legal aspects of kidney transplantation

In Algeria, organ transplantation is governed by Law No. 18-11 of July 2, 2018, on health, and various regulatory texts. The application of this law is necessary to maintain the benchmarks of best practices essential for kidney retrieval and transplantation.

First section: Law No. 18-11, corresponding to July 2, 2018, relating to health

Total Chronic Kidney Disease (TCKD) is on the rise. Predisposing factors for this condition include⁴:

- Gender: according to epidemiological data, men are affected 2 to 3 times more often than women.
- Age: over 60 years of age.
- Obesity: a Body Mass Index (BMI) greater than 30 kg/m. BMI = Weight in kg/Height in m. According to the WHO, a normal BMI should be between 18.5 and 24.9.
- Exposure to nephrotoxic substances.
- A family history of kidney disease.
- Preexisting conditions: hypertension, diabetes, recurrent urinary stones and infections, autoimmune diseases, and systemic infections.

The number of patients treated with dialysis is estimated at 23,798 in 2019⁵ but the most appropriate treatment is kidney transplantation. Living organ donation

⁴- Lesourd Alice, "Therapeutic education of the kidney transplant patient", Thesis for obtaining the state diploma of Doctor of Pharmacy, University of Aix-Marseille, September 8, 2023.



primarily concerns the kidney because it is the only whole organ that can be donated while still alive, since a person can live with only one kidney. However, it is only performed if it represents the only way to keep the patient alive. The recipient's consent must be given in the presence of the head physician of the department to which they are admitted and two (02) witnesses.

There are two main types of transplants: transplantation from a deceased donor (in a state of brain death) and transplantation from a living donor, most often one of the parents. This activity is governed by three main enshrined ethical principles: presumed consent, free donation, and anonymity between the donor and the recipient⁶.

In Algeria, the important elements introduced by Law No. 18-11 are:

- The definition of rules for Living Donors (LD) and Brain-dead Donors (BD);
- The expansion of the donor's family circle;
- The choice of presumed consent;
- Hospital coordination of donation and retrieval.

Organ retrieval is performed from living individuals after consent; however, the conditions for transplantation are strictly regulated by law:

- Only responsible adults may be retrievals.
- It is prohibited to perform retrievals from individuals suffering from illnesses that could affect the health of the donor or recipient.

Today, the family circle authorized for donation extends to third-degree relatives, and this circle has also been extended to include donations between spouses. Thus, Article 360 specifies that the donor must be a father, mother, brother, sister, son, daughter, grandmother, grandfather, uncle, aunt, cousin, first cousin, nephew, niece, spouse, spouse of the father, or spouse of the mother of the recipient. Regardless of the relationship between the donor and the recipient⁷. Any form of psychological or financial pressure is prohibited by law.

⁵- Amarni Mohamed Sadeg Amine et al., "Pharmacoeconomic evaluation of kidney transplantation at the Oran University Hospital: Cost analysis and implications", *Nephrology & Therapeutics*, Volume 20, No. 2, 2024, PP. 85-94, DOI: 10.1684/ndt.2024.72.

⁶- Law No. 2004-800, corresponding to August 6, 2004, relating to bioethics, Official Journal 2004 of August 7, 2004 and Law No. 2011-814, corresponding to July 7, 2011 relating to bioethics, Official Journal 2011 of July 8, 2011.

⁷- Art. 360, Law No. 18-11, corresponding to July 2, 2018, relating to health, JORA No. 46 of July 29, 2018.



Considered a high-level activity, kidney removal and transplantation can only be performed in authorized establishments⁸. Beni Messous University Hospital, Mustapha University Hospital, Hussein Dey University Hospital, Bab El Oued University Hospital, Dr Maouche EHS (Algiers), Tizi-Ouzou University Hospital, Blida University Hospital, Oran University Hospital, Oran EHU, Sidi Bel Abbès University Hospital, Tlemcen University Hospital, Annaba University Hospital, Daksi EHS (Constantine), and Sétif University Hospital. The organizational aspects of kidney transplantation have become strategic axes of the National Transplant Agency (ANG). It oversees developing, controlling, and evaluating this activity.

Second section: The National Transplant Agency

The National Transplant Agency is a public administrative institution with legal personality and financial autonomy. The agency's internal organization is established by joint decree of the supervisory minister, the minister of finance, and the authority responsible for the civil service.

The National Transplant Agency is responsible for organ transplantation for⁹:

- Registering patients awaiting organ transplantation and transplants on a national list established for this purpose, based on the collection of hospital data;
- Managing national registers, consent, and refusal of organ donation, established by current legislation and regulations;
- Managing and maintaining organ donor and recipient files for traceability purposes;
- Develop and propose rules of good practice for organ procurement, storage, processing, transportation, and use, and monitor strict compliance with them. These rules are established by order of the Minister of Health, after consulting the National Council for Ethics in Health Sciences.
- Provide advice to the competent administrative authority on hospitals authorized to perform organ procurement and transplantation, as well as on all structures and organizations involved in the field of transplantation;

⁸- Order No. 48 of March 25, 2015, establishing the list of authorized centers for the collection and transplantation of tissues, cells, and organs.

⁹- Executive Decree No. 12-167, corresponding to April 5, 2012, establishing the creation, organization, and operation of the national transplant agency.



- Monitor compliance of the operations of hospitals authorized to perform organ procurement and transplantation with established standards;
- Promote organ donation and procurement among healthcare professionals and the general public;
- Promote and encourage scientific research and training in organ transplantation.

Since 2009, the Biomedicine Agency has been working alongside Algeria to prepare for the creation of the National Transplant Agency. The partnership between the Biomedicine Agency and the Ministry of Health and Social Affairs began with the preparation of the France-Maghreb Conference held in Algiers in January 2010. This partnership is important because it enables exchanges between healthcare professionals in Algeria and France and thus the development of organ procurement and transplantation activities in Algeria¹⁰.

At the institutional level, this cooperation is reflected in support for deceased donor procurement, primarily through hospital coordination audits. It also includes the establishment of a legal and ethical framework for the National Transplant Agency. The partnership agreement between the Biomedicine Agency and the National Transplant Agency, signed on April 10, 2016, is a concrete expression of the cooperative relationships between healthcare organizations in Algeria and France.

This partnership is managed by two committees: one for monitoring and one for steering, which meet twice a year. In 2018, healthcare professionals had the opportunity to work or complete internships in France, which helped establish a cultural and medical connection between France and Algeria. This connection is reinforced by participation in the France-Maghreb transplantation congress, which allows for the exchange of experiences, results, and projects between the various participating countries.

Second requirement: Overview of kidney harvesting and transplantation activities in Algeria

The only cure option for patients with ESRD remains kidney transplantation. However, in Algeria, this curative solution remains insufficient, despite legal and operational advances in the field. The number of potential recipients on the waiting list remains very high.

¹⁰- National Transplant Agency (ANG), "Covid-19, Donation and Transplantation: How to maintain and sustain donation and transplantation during and after a crisis? ", 9th France-Maghreb, Conference on transplantation, May 20-21, 2022, Paris.



This overview relates to annual kidney transplant activity in Algeria to understand the situation and define the objectives of the action. Then, since I worked at the Nedir Mohamed University Hospital in Tizi-Ouzou for 20 years, I wanted to study the activity of kidney transplantation within this healthcare establishment.

The medico-economic assessment is conducted in parallel, as it constitutes a decision-making tool for resource allocation in healthcare facilities.

First section: Kidney transplant activity report in Algeria

The first kidney transplant was performed on June 14, 1986, at the Mustapha University Hospital using a Living Related Donor (LRD). The second kidney transplant was performed at the end of 1987, using a LRD, at the Daksi specialized hospital in Constantine. In 2003, the Blida University Hospital had its first transplant experience, and in 2005, the Oran University Hospital had its first transplant. From 2007 to 2022, the number of kidney transplants performed was 2,803.

Table 1: Annual kidney transplant activity in Algeria from 2007 to 2022¹¹

Year	Number of transplant
2007	116
2008	112
2009	77
2010	116
2011	140
2012	122
2013	126
2014	166
2015	255
2016	244
2017	251
2018	268

¹¹- Bentabak Kamel, "State of the situation of organ, tissue, and cell donation and transplantation in Algeria", 6th France-Maghreb Conference on Transplantation, Fez, January 9-10, 2015, and National Transplant Agency (ANG), "Covid-19, Donation and Transplantation: How to maintain and sustain donation and transplantation during and after a crisis?", 9th France-Maghreb, Conference on transplantation, May 20-21, 2022, Paris.



2019	280
2020	91
2021	223
2022	216

We observed an increase in activity between 2012 and 2019, rising from 122 to 280 transplants, with several transplants per million inhabitants of 6.5, followed by a significant decrease in 2020, with 91 transplants caused by Covid -19. Faced with the persistent threat of Covid -19, dialysis and transplant recipients find themselves in a particularly worrying situation. Moreover, the repercussions of the health crisis and drug shortages continue to affect hospital performance.

The ninth France-Maghreb transplantation conference, held on May 20 and 21, 2022, provided an opportunity to share country experiences and demonstrate how to maintain and sustain donation and transplantation during times of crisis.

In the province of Tizi-Ouzou, the first kidney transplant was performed on December 13, 2006, at the Nedir Mohamed University Hospital in Tizi-Ouzou, using a living donor from the same sibling group. This transplant was performed by an Algerian-Canadian medical team specializing in organ transplantation. A second transplant was performed during the same year. From 2015 to 2024, 121 transplants were performed.

Table 2: Annual kidney transplant activity at Tizi-Ouzou University Hospital from 2020 to 2024¹²

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Number of transplant	19	15	17	20	19	04	12	05	04	06

Despite legal, medical, and technological advances in the field, kidney transplantation activity in Algeria remains insufficient. This is due to the growing shortage of organ donors and an aging population.

Several countries are seeking to develop and increase access to kidney transplantation because this activity offers the most favorable cost-effectiveness ratio compared to dialysis.

¹²- Tizi-Ouzou University Hospital, Nephrology, dialysis, and renal transplantation department.



Second section: The cost of kidney transplantation

Kidney transplantation is associated with longer-term survival and lower cardiovascular risk. According to the 2017, REIN Network report, the average life expectancy of a transplant patient aged 30 to 34 is 31 years, while that of a dialysis patient of the same age is 17 years. The benefits of kidney transplantation compared to dialysis treatment are also evident both for the patient (lower morbidity, better quality of life, greater opportunity to work) and for society, since the cost of the transplant is lower than that of dialysis, regardless of the technique used¹³. In addition to significantly improving patients' lives, the transplant could, in the long term, divide the cost of dialysis treatment by a factor of five¹⁴.

Despite these advantages, hemodialysis is the most widely used dialysis technique in France. The number of transplants from a living donor remains well below the targets set by the 2017-2021 transplant plan (1,000 kidney transplants per year). In 2007, the French National Health Insurance estimated the average annual cost of hemodialysis at €88,608, which represented 77% of the total cost of treating ESRD¹⁵. As of December 31, 2017, 87,275 patients were being treated for ESRD, or 1,294 per million inhabitants, of which 55% were treated with dialysis and 45% with kidney transplants. This prevalence is 1.7 times higher among men than among women. In 2018, of the 19,625 patients on the waiting list for a kidney transplant, only 3,567 received a transplant, or approximately 18% of patients¹⁶.

Each year, the number of patients treated for ESRD increases steadily and steadily by approximately 4%¹⁷. The cost of their care to health insurance exceeded €4 billion¹⁸. During 2021, 2,837 dialysis patients received a kidney transplant, 1,101

¹³- Enjalbert-Auneau Line, "Evaluation of the evolution of patients', experience before and after kidney transplantation: study of measurement invariance", Doctoral thesis, University of Nantes, Doctoral School No. 605 Biology and Health, Specialty: Epidemiology, Risk Analysis, Clinical Research, November 13, 2020.

¹⁴- ANG, "Transplantation in the Maghreb: What are the prospects?", 5th France – Maghreb conference on organ, tissue and cell transplantation, March 23-24, 2012, Nice, France.

¹⁵- High Authority of Health (HAS), "Medico-economic evaluation of strategies for managing end-stage chronic renal failure in France", Technical report, Saint-Denis La Plaine, 2014.

¹⁶- Idem

¹⁷- Nephrology Epidemiology and Information Network (REIN), 2017, Annual Report.

¹⁸- Court of Auditors, "End-stage chronic renal failure: promoting more efficient care", in Annual report on social security financing laws, La documentation française, September 2015.



transplants failed (requiring a return to dialysis or a new transplant), and 10,005 dialysis or transplant patients died¹⁹.

In Algeria, to develop kidney transplantation, social security organizations have fully covered this activity. While the kidney transplant development policy comes at a cost, increasing the number of transplants would generate savings compared to dialysis. For 2005, the cost of a kidney transplant was estimated at 2,000,000 Algerian Dinars (DA) for the first year. Medical monitoring is essential and is performed annually after the transplant; its cost ranges from 32,760 DA to 626,760.72 DA per year, depending on the treatment protocol²⁰.

The medico-economic assessment of kidney transplantation at the Oran University Hospital shows that the average billed amount for kidney transplant preparation is 485,438.31 DA. The kidney transplant operation lasts between 3 and 5 hours, and the average hospitalization cost is 375,484.70 DA²¹. The average cost for the first year of the transplant is higher than the cost for other years, at 1,305,197.40 DA. This increase is caused by the excessive use of medications that minimize toxicity and reduce the risk of rejection and by the frequency of imaging and laboratory tests²².

The pharmaco-economic assessment of kidney transplantation at the Tlemcen University Hospital shows that the pharmaceutical cost for the first year of the transplant ranges from 1,315,503.77 DA to 3,560,752.47 DA. This increase is linked to complications occurring after surgical intervention and their management. At the Nedir Mohamed University Hospital, the cost of a kidney transplant is estimated at 1,730,121.65 DA.

The primary objective of a healthcare facility is neither commercial nor industrial. Cost calculation is, therefore, specific and very complex. Without efficient human resources management, inventory accounting, and especially without the circulation of all medical and administrative information, analytical calculations remain approximate.

¹⁹ - Nephrology Epidemiology and Information Network (REIN), 2021, Annual Report.

²⁰ - Chaouche H., "The microeconomic level and institutional constraints, thoracic, cardiovascular, and renal transplant surgery department, Mustapha University Hospital, Algiers Center", Communication at the Maghreb-France conference on national strategies for the management of chronic kidney failure, 2005, Rabat.

²¹ - Amarni Mohamed Sadeg Amine et al., Op-Cit.

²² - Kara L., Habbi S., Bensaber D., Benmansour M., "Pharmacoeconomic of kidney transplantation at the Tlemcen University Hospital", *Nephrology & Therapeutics*, Volume 14, No. 5, 2018, P. 398, DOI: 10.1016/j.nephro.2018.07.335.



Given the organ shortage our society is experiencing and the very long waiting times, the development of kidney transplantation from living and deceased donors appears to be a very attractive solution for many patients.

THE SECOND TOPIC: PROSPECTS FOR THE DEVELOPMENT OF KIDNEY TRASPLANTATION IN ALGERIA

The expansion of indications for kidney transplantation is significantly increasing demand. Countries that practice kidney transplantation from brain-dead and cardiac-arrest donors, as well as from living donors, have a significant number of kidney transplants. Living donor transplantation and deceased donor transplantation must be complementary; however, sociological and cultural dimensions must be taken into consideration. For this reason, there is reluctance, both among medical professionals (nephrologists) and within the government.

First requirement: Living donor kidney transplantation

Living donor kidney transplantation is a process that is difficult to develop with family and friends. Patients are afraid of putting their family at risk. However, due to the growing demand from people with end-stage renal failure, this practice must be developed.

A living person can donate an organ for the direct therapeutic benefit of a recipient without any psychological pressure. Paired donation and altruistic donation are possible. Both processes are based on the principle of anonymity.

First section: Paired donation with living donors

For compatibility reasons, a person cannot always donate a kidney to a loved one. Each donor in the two pairs agrees to donate a kidney to an anonymous recipient to allow their loved one access to a transplant. Each recipient also agrees to receive a kidney from an anonymous donor. Donor 1 wants to donate a kidney to recipient 1, but they are incompatible. Donor 2 wants to donate a kidney to recipient 2, but they are incompatible. If donor 1 is compatible with recipient 2, and donor 2 is compatible with recipient 1, paired donation (x) can be performed by performing two simultaneous surgeries while respecting the anonymity of both recipient and donor.

This process increases the number of potential donors, given the large number of patients waiting for a kidney transplant. In France, the new bioethics law enacted on August 2, 2021, increased the number of donor-recipient pairs authorized for kidney paired donation. It increased from two pairs to six pairs, thus improving access to



transplants from living donors. In 2024, and for the first time, three donor-recipient pairs were operated on simultaneously. This highly complicated process was overseen by the Biomedicine Agency.

In Algeria, article 360 of law No. 18-11 of July 2, 2018, on health, stipulates that kidney retrieval and transplantation must be performed within a family context. Paired donation offers patients a greater chance of finding a living donor. The advantages of this technique are numerous:

- The principle of anonymity allows the recipient better psychological preparation for the surgical procedure.
- The time between kidney harvesting and transplantation is shorter.
- Complications after surgery are rare.
- A transplant from a living donor lasts longer than a transplant from a deceased donor.
- There is a lower risk of rejection of the transplanted kidney.

Second section: Altruistic donation with living donors

Altruistic kidney donation occurs when a person donates one of their kidneys to an unknown patient. The factors that motivate this offer can be diverse: religion, the death of a loved one due to an organ shortage, or a psychological problem. Unlike shared donation, which can be influenced by feelings of affection, guilt, or debt, the risk taken by the donor for the benefit of a stranger in altruistic donation automatically leads to in-depth psychological care for the donor to detect any potential problems and identify the true reasons behind this act.

In this context, the government and medical personnel must conduct information campaigns to raise public awareness of the benefits of living donation, to allay concerns, and to encourage altruistic action. While living donations offer clinical benefits for the recipient, certain aspects must be considered²³:

- The physical risk is low, but it is taken in favor of improving the health of a third party;

²³- High Authority of Health (HAS), "Medico-economic evaluation of strategies for managing end-stage chronic renal failure in France", Economic Evaluation and Public Health Service (SEESP), Technical report, Section: Analysis of the possibilities for developing kidney transplantation in France, June 2012.



- The possibility of using a living donor should not obscure the importance of increasing the frequency of deceased donations;
- The importance of protecting donor autonomy: the provision of comprehensive, objective, and early information to patients and their families is systematic.

Second requirement: Kidney transplantation using deceased donors

Kidney transplant waiting lists are constantly growing. Considered in a complementary manner, the procurement of kidneys from living donors and deceased donors (brain dead or deceased after cardiac arrest) increases the rate of kidney transplants and reduces waiting lists. Indeed, this high-level activity is developed in countries that use both procurement processes²⁴.

First section: The Maastricht international classification

The Maastricht international classification is a solution to the organ transplant crisis. It allows organs to be harvested from people who are dead cardiorespiratory, thus compensating for the declining number of people who are brain dead²⁵. This classification differentiates four groups of patients²⁶:

- Category I: people who suffer cardiac arrest outside of any medical care setting. Under these conditions, organ harvesting can only be considered if resuscitation procedures have been performed for less than 30 minutes.
- Category II: people who experience cardiac arrest with effective cardiac massage and mechanical ventilation, but without recovery of circulatory activity.
- Category III: people for whom a decision is made to limit or discontinue treatment due to the poor prognosis of the conditions that led to intensive care.
- Category IV: individuals who have died of brain death and who experience irreversible cardiac arrest while receiving intensive care.

The protocol governing the identification and collection of deceased donors is technically complex and includes important medical-technical recommendations. In

²⁴- Art. 164, Law 85-05 of 16/02/1985, supplemented and amended in 1990.

²⁵- Kootstra G., "First international workshop on non-heart-beating donors, Transplantation Proceedings", Volume 27, No. 5, 1995, P. 2891.

²⁶- ABM, "Protocol: Organ harvesting Maastricht III", DGMS/DPGOT, Version n° 6-May, 2016.



France, the collection of organs from deceased donors in Maastricht Category III is governed by a program coordinated by the Biomedicine Agency²⁷.

This practice has grown significantly since January 1, 2017, and all deceased individuals diagnosed with brain death are considered donors by default. If a person objects to donation during their lifetime, they must register on the national refusal register or provide their loved ones with an oral or written statement. Relatives may testify to the refusal, but they must sign an official document certifying the deceased's refusal²⁸.

Tunisia is the first Maghreb country to practice donation from deceased donors. Today, 25% of its transplant activity is carried out from deceased donors²⁹. In Algeria, given the sociocultural conditions and certain organizational constraints, kidney transplantation activities from deceased kidneys are not developed. The first kidney transplant from a deceased donor was carried out on December 1, 2002, at the University Hospital of Constantine. The rules for allocating organs from deceased donors must be defined and regularly evaluated by the principle of fairness³⁰.

According to the principle of presumed consent of deceased people set out in the July 2018 Health Act, refusal of organ donation can be expressed in three ways:

- Voluntary registration in the national register of refusals;
- A written statement during the deceased's lifetime;
- A detailed attestation of the deceased's intentions by their loved ones.

This principle is characterized by the fact that the absence of a refusal is considered consent to organ donation. The medical team responsible for the donation must systematically consult the register of refusals to determine the deceased's position. In the absence of registration in this register, the adult members of the deceased's family are consulted in the following order of priority: father, mother, spouse, children, brothers or sisters, or the legal representative³¹.

²⁷- Antoine Corinne, Maroudy Daniel, "New modalities for organ donation in France", *Revue soins*, Volume 61, No. 808, September 2016, PP. 26-31.

²⁸- ABM, Medical and Scientific Report for the year 2017 available at: https://www.agencebiomedecine.fr/IMG/pdf/abm-rapport_d_activite_2017-complet.pdf. (consulted on 23/08/2024).

²⁹- ANG, "Transplantation in the Maghreb: What are the prospects? ", 5th France – Maghreb conference on organ, tissue and cell transplantation, March 23-24, 2012, Nice, France.

³⁰- Art. 365, Law No. 18-11, corresponding to July 2, 2018, relating to health, JORA No. 46 of July 29, 2018.

³¹- Art. 362, Law No. 18-11, corresponding to July 2, 2018, relating to health, JORA No. 46 of July 29, 2018.



The implementation of the Maastricht III procedure is a formidable unifying project for kidney transplantation. Promoting kidney donation from a brain-dead person must focus primarily on the need for donation to save human lives. Furthermore, the State must assure the public that kidney removal from brain-dead individuals is religiously and legally permissible³².

Second section: Importance of perfusion machines for deceased donor kidneys

During transport, a significant number of kidneys are damaged. To optimize and increase supply, the use of preservation measures other than standard cold preservation (ice storage) is necessary to protect the organ. The use of perfusion machines keeps the kidney in excellent condition. It has now been demonstrated that irrigation of the kidney by a perfusion machine improves the recovery of function and one-year survival of deceased donor grafts, compared to simple cold preservation³³. The perfusion machine was introduced in France in 2012. In 2022 and 2023, 85 renal and hepatic perfusion machines were acquired, funded for €1.4 million³⁴.

Perfusion is a technique for the prolonged administration of preservation solutions through the renal artery at a controllable flow rate. The current financial and logistical challenges associated with the acquisition of perfusion machines, as well as their transportation and maintenance, prevent Algeria from acquiring and operating them. While it is certainly a very expensive process, it allows for an increase in the number of functioning kidneys and, through a domino effect, an increase in the number of kidney transplants.

In 2023, the Biomedicine Agency marked a significant milestone in the implementation of the 2022-2026 plan for organ and tissue procurement and transplantation. With 5,634 organ transplants performed, an increase of 2.5% compared to 2022, including 577 transplants from living donors (+8.3%). Thus, 3,132 potential brain-dead donors were identified, compared to 2,984 the previous year

³²- Order No. 34 of November 19, 2002, establishing the scientific criteria enabling the medical and legal determination of death with a view to the removal of organs and tissues.

³³- San Miguel L., Roberfroid D., Stordeur S., Swartenbroekx N., "Deceased Donor Kidney Perfusion Machine – A Rapid Assessment – Synthesis. Health Technology Assessment (HTA) ", Brussels: Federal Centre of Expertise for Healthcare (KCE). 2014. KCE Reports 217Bs. D/2014/10.273/07.

³⁴- ABM, Organ procurement and transplant activity report in 2023 and opinion barometer 2024, Press kit published on 02/13/24.



(+4.9%). Of these, 1,512 were able to be harvested for the benefit of patients awaiting transplants³⁵.

In order to reduce the waiting list of kidney transplant applicants, it is essential to halt the progression of kidney disease. This involves preserving autonomous kidney function for as long as possible. Some kidney protection measures include physical activity, stopping or reducing doses of drugs that are toxic to the kidney, preventing high blood pressure, preventing diabetes, and diet.

Conclusion:

End-Stage Chronic Kidney Disease poses a major public health problem. In Algeria, despite the enactment of a new health law in 2018 encouraging kidney transplantation, it remains an underdeveloped activity. The development of kidney procurement and transplantation necessarily involves promoting kidney donation from living and deceased donors. Furthermore, this activity must be provided with all the financial, human, and material resources necessary for its success.

It is therefore necessary to continue the initiatives already undertaken by the State and to consider our recommendations, in particular:

- The development of transplant information software.
- Ongoing training for specialized personnel for procurement and transplantation.
- Strengthening the role of anesthesiologists and intensive care physicians in hospital coordination of procurement.
- Periodic evaluation of the activity report for each organ transplant center.
- The creation of a kidney transplant monitoring and evaluation committee at the Ministry of Health and Social Welfare.
- The widespread implementation of living donor kidney transplants and the so-called "Maastricht III" procedure in authorized healthcare facilities.
- The dissemination of perfusion machines and staff training in their use.
- The development of pediatric kidney transplantation.
- The involvement of university hospital directors and medical committees.

A new law must be applied to contribute to improving kidney transplant activity and, therefore, saving the lives of many patients (including our families).

³⁵ - <https://rapport-annuel.agence-biomedecine.fr/> (consulted on 12/11/2024).



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