


## Profile of organ procurement for transplantation in a large state procurement center

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### ABSTRACT

**Introduction:** In Brazil, the scarcity of organs harvested for transplantation is a frustrating reality. There are several factors responsible for this situation. The present study aims to analyze the profile of organ harvesting at the Hospital de Pronto Socorro de Canoas (HPSC), Rio Grande do Sul State, Brazil. **Methods:** This was a retrospective cross-sectional study in a database. Data regarding organ procurement from donors admitted to the HPSC were evaluated, in addition to data from the State Organ Procurement Center, in the period between January 2016 and July 2023. The variables analyzed were gender, age, cause of death (traumatic or non-traumatic), organs harvested, time between the diagnosis of brain death and organ harvesting, and the need for vasoactive drugs and transfusions in the preoperative period of harvesting. **Results:** During the period analyzed, 158 organ harvests were performed for transplantation, 108 (68%) in male patients and 50 (32%) in female patients. The median age of the patients was 47 years (IQR: 26, 58); Traumatic causes of death accounted for 67% of the sample (n=106), while non-traumatic causes accounted for 33% of deaths (n=52), and stroke accounted for 23.4% (n=37) of total deaths. **Conclusion:** Regardless of the number of organs harvested, the kidneys are the most removed organs, followed by the liver and corneas. The numbers show that over the years, there have not been very expressive numbers of captures, which may be the result of a low awareness of the importance of organ donation.

**Keywords:** Organs, Transplantation, Death.

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## INTRODUCTION

In Brazil, the scarcity of organs harvested for transplantation is a frustrating reality. There are several factors responsible for this situation, but the following should be highlighted: the difficulty of the care team in detecting brain death (BD) and correctly following the diagnostic protocol, which ends up making donation unfeasible; the population's lack of information about the procurement and transplantation processes, which interferes with the consent of the potential donor's family, limiting the number of transplants; the structural problems of the Brazilian Unified Health System.<sup>1</sup>

BD is defined as the complete and irreversible cessation of brain functions, making it impossible to maintain life without the aid of artificial means.<sup>2</sup> In Brazil, the diagnosis of BD is defined by CFM Resolution No. 1480/97. Initially, it is necessary to make sure that the patient has identification and hospital registration. The cause of the unresponsive coma must be known and established, the patient must not be hypothermic (axillary temperature  $< 35^{\circ}\text{C}$ ), must not be receiving Central Nervous System suppressive drugs, and must not be hypotensive (systolic blood pressure must be greater than or equal to 90 mmHg). Once these items are completed, the patient must undergo two neurological examinations, which must be performed by two different physicians, who are not members of the organ removal and transplantation team, to assess the integrity of the brainstem. The minimum time interval between one exam and another is six hours. In addition to the two clinical tests, it is also important to note that a complementary test is required to show the absence of cerebral electrical activity or cerebral metabolic activity or cerebral blood perfusion.<sup>2</sup>

The minimum aspects indispensable for the maintenance of the potential donor are: a) Maintain MAP  $> 65\text{mmHg}$  or SBP  $> 90\text{mmHg}$ ; b) Initiate volume replacement with crystalloids if hypotension is present (20-30 ml/kg); c) Infuse vasoactive drugs (preferably noradrenaline) at the dose necessary to achieve BP target; d) Use vasopressin whenever vasopressors are indicated – continuous infusion at a dose of 0.5 to 2.4 U/h.<sup>3</sup> According to studies, early administration of vasopressin and noradrenaline optimizes hemodynamic support for BD patients.<sup>4</sup>

Regarding hematological support, it is necessary to: a) Transfuse red blood cells if Hb  $\leq 7$  g/dl for all patients; b) Transfuse red blood cells for patients with Hb between 7 and 10 g/dl, if hemodynamic instability with inadequate tissue perfusion; c) Transfuse platelets if active bleeding and thrombocytopenia; c) Transfuse fresh plasma if INR  $> 1.5$  and high risk of bleeding, pre-invasive procedure, or active bleeding; d) Transfuse cryoprecipitate if fibrinogen  $< 100$  mg/dl is associated with a high risk of bleeding, pre-invasive procedure, or active bleeding.<sup>3</sup>

The absolute contraindication to the use of organs from a potential donor occurs when the risk of transmission of a disease outweighs the possibility of benefit from potential organ recipients.<sup>5</sup> The main absolute contraindications are related to the transmission of some infectious and neoplastic conditions. In addition, there are risk factors that are considered absolute criteria for the exclusion of



tissue donors, due to the increased risk of disease transmission. Factors associated with behavior considered risky in the 12 months prior to donation (applicable to all tissues): use of injectable illicit drugs; engaging in sexual intercourse in exchange for money, with multiple partners, or by exposure to intercourse with partners known to be infected; and the practice of homosexual relations between men.<sup>5</sup>

Between 2016 and June 2023, 25,687 organ transplants were registered in Brazil, 1,741 of which were registered in Rio Grande do Sul.<sup>5</sup> The profile of donors at the state or national level is the same, with a predominance of males, in the age group of 50-64 years, with the most frequent cause of BD being stroke. (6) Even so, this is a small number when analyzing the demand needed to meet the waiting list. (6)

Thus, the present study aims to analyze the profile of organ harvesting at the Hospital de Pronto Socorro de Canoas (HPSC), Rio Grande do Sul State, Brazil.

## METHODS

This was a retrospective cross-sectional study in a database. Data regarding organ procurement from donors admitted to the Emergency Hospital of Canoas (RS) were evaluated, in addition to data from the State Organ Procurement Center, in the period between January 2016 and July 2023. The variables analyzed were gender, age, cause of death (traumatic or non-traumatic), organs harvested, time between the diagnosis of brain death and organ harvesting, and the need for vasoactive drugs and transfusions in the preoperative period of harvesting.

## RESULTS

During the period analyzed, 158 organ harvests for transplants were performed, 108 (68%) in male patients and 50 (32%) in female patients. The median age of the patients was 47 years (IQR: 26, 58); 10 patients (6.3%) were 11-17 years old; 47 (29.7%) were 18-34 years old, 30 (19%) were 35-49 years old, 48 (30.3%) were 50-64 years old, and 24 (14.7%) were older than 65 years old. Traumatic causes of death accounted for 67% of the sample (n=106), while non-traumatic causes accounted for 33% of deaths (n=52), and stroke accounted for 23.4% (n=37) of total deaths.

Following the chronological order (Figure 1), in 2016 there were 32 captures (20%), in 2017 there were 18 (11%), in 2018 there were 19 (12%), in 2019 there were 14 (9%), in 2020 there were 13 (8%), in 2021 there were 23 (14%), in 2022 there were 26 (16%) and in the first seven months of 2023 there were 13 captures (8%).

In the sample analyzed, 158 patients donated their organs for transplantation. In 21 patients (13%), only one organ was harvested, two organs were harvested in 68 patients (43%), three organs in 36 patients (23%), and four or more organs in 28 patients (18%). In 5 patients (3%) of the sample,

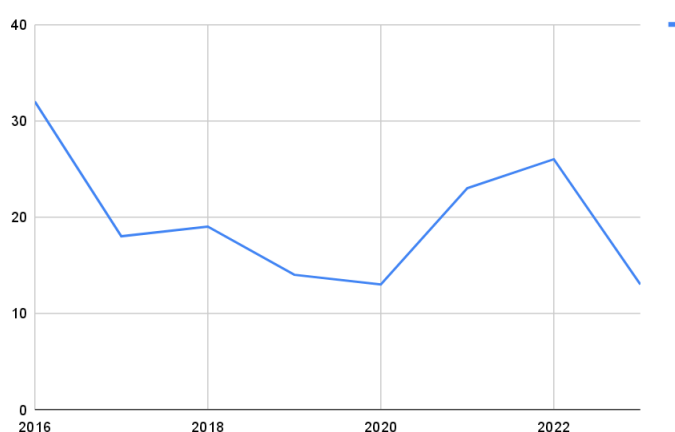
there were no data in the medical records on uptake; therefore, they were not accounted for in the analysis.

In cases where only one organ was harvested, 90% were kidneys and 10% liver. In the cases of harvesting two organs, 97% were kidneys, 85% liver, 9% corneas, 6% skin, 1% heart and 1% lungs. In the harvesting of three organs, 100% were kidneys, 67% liver, 58% corneas, 39% skin, 19% lungs, 14% heart and 3% pancreas. Finally, in the harvests of four or more organs, 100% were kidneys and liver, 82% corneas and skin, 25% lungs, 11% heart, 7% pancreas, and 3% intestine and spleen.

Regarding the preoperative prescription of vasoactive drugs (VAD) and blood components, some vasoactive drug option was administered to 101 patients (63%) of the sample. In 54 patients (34.2%), no vasoactive drug was used. Transfusion of blood components was performed in 23 patients (14.6%) of the sample, while 132 patients (83.5%) did not receive blood components. No information was found on transfusion of blood components and administration of VAD in 3 patients (1.8%).

Regarding the time between BD protocol closure and capture, a mean of 11.8 hours (h) was obtained, with a standard deviation of 4.1 h. The time between BD and capture that lasted 5 hours or less represented 7% of the sample (n=11), 14% (n=22) took between 6 and 8 hours, 38% (n=60) lasted 9 and 12 hours, and 39.1% (n=62) of the sample took more than 12 hours. A total of 3 patients (1.85%) were excluded from the calculation due to lack of information in the medical records.

Figure 1: Number of organ harvests per year



## DISCUSSION

The profile of the donors of the hospital in question is in line with the national and state profiles, being represented, for the most part, by men in the age group of 50-64 years. On the other hand, differently from the Brazilian profile, because the present study was conducted through the database of a trauma hospital, traumatic causes are the main mechanism of evolution to BD, even



though stroke represented a significant portion of deaths. The year with the highest number of funding was 2016, and a significant drop was subsequently noted in the following four years, having increased in 2021, where it is possible to perceive a trend towards gradual growth. It can be seen that a significant portion of the patients received preoperative VAD, however, it is taken into account the fact that the study was carried out in a trauma hospital, in which the patients usually have a similar profile, with hemodynamic instability, requiring VAD to stabilize the condition. Likewise, the use of blood components is widely used in cases of emergency due to trauma to maintain blood volume, and has been the treatment of a small portion of patients.

## CONCLUSION

Regardless of the number of organs harvested, the kidneys are the most removed organs, followed by the liver and corneas. The numbers show that over the years, there have not been very expressive numbers of captures, which may be the result of a low awareness of the importance of organ donation.



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