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RENAL TRANSPLANTATION: EPIDEMIOLOGY AND HOSPITAL PUBLIC SPENDING

TRANSPLANTE RENAL: EPIDEMIOLOGIA E GASTOS PÚBLICOS HOSPITALARES

TRASPLANTE RENAL: EPIDEMIOLOGÍA Y GASTOS PÚBLICOS HOSPITALARIOS

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ABSTRACT

Objective: to describe the epidemiology of renal transplantation in Brazil and the hospital public spending for the Unified Health System between 2013 and 2017. **Method:** this is a quantitative, ecological and descriptive study conducted with data from the Hospital Information System. The following variables were selected: Brazilian regions; authorization for hospital admission and hospital costs. **Results:** there were 19,823 kidney transplants in Brazil. 79.94% occurred with deceased donors and 53.01% occurred in the southeast region. Transplantation generated a financial impact exceeding R\$ 588.3 million. Moreover, 84.55% were deceased donors and the southeast region caused greater burden (52.48%). **Conclusion:** there is need for empowering teams of organ capitation for direct and efficient approaches to sensitize families to the donation process. Education in the initial grades appears as an important tool for the process of critical and early reflection on the process of donation that may change the future scenario of organ donations in the country. **Descriptors:** Epidemiology; Public Health; Nephrology; Organ Transplantation; Chronic Renal Failure; Information Systems.

RESUMO

Objetivo: descrever a epidemiologia do transplante renal no Brasil e os gastos públicos hospitalares para o Sistema Único de Saúde entre 2013 e 2017. **Método:** trata-se de estudo quantitativo, ecológico e descritivo realizado com dados do Sistema de Informações Hospitalares. Selecionou-se as variáveis: regiões brasileiras; autorização de internação hospitalar e os custos hospitalares. **Resultados:** registrou-se 19.823 transplantes renais no Brasil. Verificou-se que 79,94% foi por meio de doadores falecidos e 53,01% ocorreu na região sudeste. Salienta-se que o transplante gerou impacto financeiro superior a R\$ 588,3 milhões de reais. Destaca-se, ainda, que 84,55% foram por doadores falecidos e o sudeste causou maior ônus (52,48%). **Conclusão:** reforça-se a necessidade de capacitação das equipes de captação de órgãos para abordagens diretas e eficientes no intuito de sensibilizar as famílias para o processo de doação. Adverte-se ainda, que a educação nas séries iniciais revela-se como uma importante ferramenta para o processo de reflexão crítica e precoce acerca do processo de doação que poderá no futuro, mudar o cenário de doações de órgãos no país. **Descritores:** Epidemiologia; Saúde Pública; Nefrologia; Transplante De Órgãos; Insuficiência Renal Crônica; Sistemas de Informação.

RESUMEN

Objetivo: describir la epidemiología del trasplante renal en Brasil y el gasto público hospitalario para el Sistema Único de Salud entre 2013 y 2017. **Método:** se trata de un estudio cuantitativo, ecológico y descriptivo con los datos del Sistema de Informaciones Hospitalarias. Fueron seleccionadas las siguientes variables: regiones de Brasil; autorización para el ingreso en el hospital y los costos hospitalarios. **Resultados:** se registraron 19,823 trasplantes renales en Brasil. Se encontró que 79.94% fue por medio de donantes fallecidos y 53.01% ocurrieron en la región sureste. Cabe destacar que el trasplante ha generado un impacto económico superior a los R\$ 588.3 millones. Además, 84.55% fueron donantes fallecidos y sureste causó mayor carga (52.48%). **Conclusión:** se refuerza la necesidad de potenciar el papel de los equipos de captura de órganos para enfoques directos y eficientes a fin de sensibilizar a las familias en el proceso de donación. También se advierte que la educación en los primeros años se revela como una herramienta importante para el proceso de reflexión crítica y los primeros pasos en el proceso de donación que pueda, en el futuro, cambiar el panorama de la donación de órganos en el país. **Descritores:** Epidemiología; Salud pública; Nefrología; Trasplante de órganos; Insuficiencia Renal Crónica; Sistemas de Información.

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INTRODUCTION

Estimates show an increasing behavior of the prevalence and incidence of chronic noncommunicable diseases (CNCD) due to the Brazilian population aging and the adoption of risk health behaviors.¹ Among the CNCD of greater epidemiological importance, Systemic Arterial Hypertension (SAH) and Diabetes Mellitus (DM) stand out.² They are diseases considered high risk factors for the development of Chronic Kidney Disease (CKD).²⁻⁵ According to a census survey conducted in 2016 in Brazil, SAH and DM were responsible, respectively, for 34% and 30% of renal involvement of the population.⁶

CKD is defined as the slow, progressive and irreversible loss of all renal functions (endocrine, tubular and glomerular).⁷ Chronic Renal Failure (CRF) or end-stage CKD occurs reaching the last stage, evidenced by the Glomerular Filtration Rate $< 15\text{ml/min/1.73m}^2$,⁸ emerging the need for referral of the patient to some renal replacement therapy for the maintenance of organic balance compatible with the life.⁹⁻¹⁰ Hemodialysis (HD), the various modalities of Peritoneal Dialysis (PD) and Renal Transplantation (RT) stand out among the available renal therapies,⁹ with the latter as less costly, among others.¹¹

Transplantation is defined as a set of high-complexity procedures in which there is transfer of cells, organs or tissues physiologically stable from a donor to a receiver.¹²⁻³ It requires specific inputs and human resources, extreme technical competence and continuing education for all staff involved in the process.¹² RT represents the most effective therapy for the socioeconomic recovery, reduction of comorbidities and increased life expectancy and quality of life (QOL) of patients.¹⁴⁻¹⁶ Moreover, RT can be performed with a Living Donor (LD) or Deceased Donor (DD).¹⁷

The donation of organs is little discussed in Brazil among the population and there is still lack of knowledge among health professionals. Furthermore, the theme permeates through several segments that shape the individual behavior, such as ethical, moral, cultural, economic, and religious aspects, which require a reflective discussion.¹⁸ Besides, there are other main factors associated with the discontinuous donation, such as lack of identification of a potential donor and scarcity of notification to capitation centers.¹⁹

Therefore, the development of this study is justified by benefits of RT for patients with CKD. The results may serve as a reflection

mainly for health professionals regarding the precise identification of a potential donor and an efficient approach with families for the approval of the transplant. Moreover, between 50 and 70% of relatives authorize the procedure when appropriately approached.¹⁹

Thus, such actions become capable of increasing the rates of donations from DD and, consequently, the homogenization in relation to supply and demand, which will increase the patients' adherence to the best therapeutic option of CKD.

OBJECTIVE

- To describe the epidemiology of renal transplantation in Brazil and the hospital public spending for the Unified Health System between 2013 and 2017.

METHOD

This is a quantitative, ecological and descriptive study conducted with secondary data from the Hospital Information System (HIS), which is a resource managed by the Ministry of Health, in partnership with the State and Municipal Health Bureaus. The (public or private) hospital units belonging to the Unified Health System (UHS) perform the admission of the patient, generate information about each hospitalization and send them to the municipal managers, who, in turn, pass on to the state managers and, finally, to the Executive Bureau of the Ministry of Health.²⁰

The study scenario selected was the Federative Republic of Brazil, consisting of approximately 207.7 million inhabitants and five regions: North, Northeast, Southeast, South and Midwest. The country has 5,570 municipalities and a territorial area of 8.5 million m^2 ,²¹ constituting the largest country in South and Latin America. The following variables were selected: Brazilian regions; Hospital Admission Authorization (HAA) approved for living and deceased donors and the values of hospital services for transplants reported from January 2013 to December 2017.

Data collection, tabulation and analysis occurred in July 2018 through the electronic platform, adopting simple descriptive statistics (absolute and relative frequencies) for all statistical analyses. Since this study collected data through a system of information in the public domain, it did not need consideration by the Research Ethics Committee, according to Resolution 466/2012 of the National Health Council.

RESULTS

There were, from 2013 to 2017, 19,823 RT, as shown in Table 1. Furthermore, 15,823 (79.94%) occurred from DD and the

southeastern region showed the largest numbers of RT by DD with 7,894 (39.88%) and LD, with 2,599 (13.13%), which corresponds to 53.01% of the total of performed transplants.

Table 1. Number of renal transplantations in Brazil between 2013 and 2017. Jequié (BA), Brazil, 2018

Regions	2013		2014		2015		2016		2017		Total		%	
	DD	LD	DD	LD	DD	LD	DD	LD	DD	LD	DD	LD	DD	LD
North	11	-	53	28	57	21	90	29	67	22	278	100	1.40	0.51
Northeast	70	14	687	124	750	104	683	84	727	65	2,917	391	14.74	1.98
Southeast	157	35	1,999	698	1,991	619	1,854	649	1,893	598	7,894	2,599	39.88	13.13
South	145	20	922	243	971	183	1,063	167	1,105	149	4,206	762	21.25	3.85
Midwest	26	3	111	32	92	24	148	27	151	32	528	118	2.67	0.60
Total	409	72	3,772	1,125	3,861	951	3,838	956	3,943	866	15,823	3,970	79.94	20.06

DD: Deceased Donor
LD: Living Donor
Numeric data equal to 0 not resulting from rounding.
Source: Ministry of Health - UHS Hospital Information System (HIS/UHS)

In relation to the values of hospital services expressed in Table 2, RT generated a financial impact of R\$ 588,359,306. Of these, R\$ 497,468,971 (84.55%) were from DD. The southeast region was responsible for

generating greater burden to the health system, with R\$ 247,351,989 (42.04%) for DD and R\$ 61,443,293 (10.44%) for LD, corresponding to 52.48% of all costs caused by transplantation.

Table 2. Values of hospital services in Brazilian currency for performing kidney transplants in Brazil according to the regions between 2013 and 2017. Jequié (BA), Brazil, 2018

Variables	2013	2014	2015	2016	2017	Total (R\$)	%
Deceased Donor							
Region							
North	229,799	1,160,668	1,333,916	1,988,869	1,512,946	6,226,197	1.06
Northeast	2,317,009	20,342,405	21,285,075	21,242,615	23,463,613	88,650,718	15.07
Southeast	4,671,248	62,987,987	61,588,391	58,192,773	59,911,590	247,351,989	42.04
South	4,858,189	30,418,499	33,045,911	35,809,939	36,953,491	141,086,030	23.98
Midwest	705,642	3,162,275	2,453,863	3,962,554	3,869,704	14,154,038	2.41
Total	12,781,887	118,071,834	119,707,155	121,196,750	125,711,344	497,468,971	84.55
Living Donor							
Region							
North	-	526,734	427,125	488,646	396,693	1,839,198	0.31
Northeast	295,313	2,274,993	2,108,133	1,552,634	1,197,071	7,428,144	1.26
Southeast	790,465	16,354,438	14,252,353	15,564,795	14,481,241	61,443,293	10.44
South	460,104	5,655,006	4,392,904	3,784,219	3,566,112	17,858,344	3.04
Midwest	59,179	637,372	423,508	535,442	665,857	2,321,357	0.39
Total	1,605,060	25,448,543	21,604,024	21,925,735	20,306,974	90,890,335	15.45

Source: Ministry of Health - UHS Hospital Information System (HIS/UHS)
Numeric data equal to 0 not resulting from rounding.

DISCUSSION

Brazil occupies a prominent global position in the field of nephrology, being one of the largest populations of outpatient dialysis programs and annually responsible for the largest numerical indicators of RT. Moreover, the country has the UHS, one of the greatest public health systems in the world, which offers free universal, comprehensive and equitable access of the population to health services.²²

Brazil showed greater realization of RT by DD in all regions, totaling 15,823 (79.94%), as shown in Table 1. For this type of transplantation, the donor has to be in irreversible coma, without cerebral activity and with respiratory and cardiac functions within the normal parameters. Two medical professionals are responsible for diagnosing

the death cause factor, and they cannot be part of the the transplant or withdrawal team.²³

Only 3,970 (20.06%) were LD in the country, as shown in Table 1. The transplantation performed in this modality has advantages, such as more satisfactory results, reduced queue time, increased longevity, in addition to providing a significant improvement in the QOL of users and relatives.²⁴ Despite these benefits, the transplant process with LD demonstrates a higher degree of complexity due to ethical aspects involved and the specific evaluations of recipients and donors. Such process give rise to psychological impacts on the family system resulting from dilemmas generated by the removal of an organ from a healthy member and/or the feeling of responsibility in

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ensuring the maintenance of the recipient's life.²⁵

Scientific evidence shows that kidney donation in life is a safe procedure characterized by a minimal presence of risks. However, in the long term, there are no studies showing the absence of complications in the LD. The transplantation of any organ should be a spontaneous action and the organ trade in Brazil is an illegal practice under penalty of fine and imprisonment from three to eight years.²⁶

The southeast region stood out with the greatest number of RT by DD with 7,894 (39.88%) and LD with 2,599 (13.13%). A study²⁷ corroborates these data, showing that the south and southeast Brazilian regions concentrate greater realization of transplants, provide less waiting time for the dependents and have the highest rates of attendance in the country.

The state of São Paulo stands out in terms of population and economy in the southeast region. This state has a good performance of efficiency in RT²⁸ due to sufficient rates of transplant team per capita that transcend national rates.²⁹ Furthermore, the Southeast region, specifically the state of São Paulo, presents high Human Development Index (HDI) and stands out in economic, social and health issues and by the presence of 10 Organizations of Demand for Organs/Corneas (OPO/OPC), which promote the effective guarantee of RT, if compared to other regions and/or states.^{28,29}

The financial impacts of RT are significant to UHS and, once more, the southeastern region stands out in the spending with DD, 247,351,989 (42.04%) and LD, 61,443,293 (10.44%), as shown in Table 2. These results corroborate a study²⁸ in which the authors show great variability of RT processes due to differences in management of financial resources invested in this sector. The authors, similarly to this study, conclude that, in general, south and southeast regions have higher efficiency in capitation and transplantation of organs if compared to other Brazilian regions, evidenced by the increased queues because of the imbalance between supply and demand.

The initial costs with all RT procedures are elevated due to the expressive percentage of surgical values. Nevertheless, the financial impacts after the surgery are significantly lower if compared to the burden generated by other dialysis procedures. An important example is the dialysis, whose annual expenses have ascending behavior, since the CKD is progressive and irreversible, which

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collaborates in the development of cardiovascular consequences, one of the main death cause factors in dialysis patients.³⁰

Regardless socioeconomic factors, the financial impact generated by RT is significantly lower from the second year after transplantation.²⁹ For comparative purposes, the estimates for average annual expenses for the user in HD is 10 times higher than the treatment with RT, including immunosuppressive therapy,¹⁷ which, in turn, is less costly than medicines used in HD and PD.²⁹

RT generates expectations for users who look forward to a life closer to normality. Nonetheless, despite decreased restrictions, mortality and direct and indirect financial costs,²⁹ RT is not a definitive cure, because the recipient requires continuous ambulatory care and adherence to immunosuppressive therapy to avoid transplant rejection.¹⁷

CONCLUSION

Most RT in Brazil were held from DD throughout the study period and the amount of donations is not yet able to balance supply and demand. In addition, there is need for empowering teams of organ capitation for direct and efficient approaches to sensitize families to the donation process. Education in the initial grades appears as an important tool for the process of critical and early reflection on the process of donation that may change the future scenario of organ donations in the country.

The financial impact generated in the first years after renal transplantation is significant for the Brazilian public health system, but, currently, it is the least costly intervention in the perspective of the user's entire lifecycle. The information contained in this study may contain underreporting due to the source of data collection. Nevertheless, the data from DATASUS assist in the development and implementation of actions aimed at health promotion, protection and rehabilitation, in addition to controlling and preventing diseases and injuries.

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