

# The nurse's performance in the heart and lung capture process in transplantation center

**RESUMO** | Objetivo: Descrever as atividades implementadas pelo enfermeiro no processo de captação de coração e pulmão em um centro transplantador brasileiro e sua implicação no aumento do número de transplantes realizados. Métodos: Estudo descritivo e observacional, com foco no organograma instituído sobre as atividades do enfermeiro para avaliação e o aceite do doador. Resultados: Com a formação da unidade, exclusivamente dedicada ao processo captação/transplante, houve entre os meses de agosto de 2013 e dezembro de 2021, um aumento de 138,18% na realização de transplantes cardíacos adultos, 76,54% nos transplantes pediátricos e/ou cardiopatias congênitas e 63,22% nos procedimentos de pulmão, quando comparado ao mesmo período dos anos anteriores. Conclusão: O estudo descreve pela primeira vez a importância da atuação do enfermeiro na implementação de um programa de transplantes de sucesso e como suas ações contribuíram para o aumento do número de procedimentos realizados e podem servir de modelo para outros centros.

**Descritores:** Enfermeiros; Transplante cardíaco; Transplante de pulmão; Doador de órgãos.

**ABSTRACT** | Objective: To describe the activities performed by nurses in the heart and lung harvesting process in a Brazilian transplant center and their implication in the increase in the number of transplants performed. Methods: Descriptive and observational study, focusing on the organizational chart established on the activities of nurses for the evaluation and acceptance of the donor. Results: With the formation of the unit, exclusively dedicated to the capture/transplantation process, between August 2013 and December 2021, there was an increase of 138.18% in adult heart transplants, 76.54% in pediatric transplants and/or congenital heart disease and 63.22% in lung procedures, when compared to the same period in previous years. Conclusion: The study describes for the first time the importance of nurses' performance in the implementation of a successful transplant program and how their actions contributed to the increase in the number of procedures performed and can serve as a model for other centers.

**Keywords:** Nurses; Heart transplantation; Lung transplantation; Organ donors.

**RESUMEN** | Objetivo: Describir las actividades realizadas por enfermeros en el proceso de extracción de corazón y pulmón en un centro de trasplante brasileño y su implicación en el aumento de trasplantes realizados. Métodos: Estudio descriptivo y observacional, con foco en el organograma establecido sobre las actividades de los enfermeros para la evaluación y aceptación del donante. Resultados: Con la formación de la unidad, dedicada exclusivamente al proceso de captación/trasplante, entre agosto de 2013 y diciembre de 2021, hubo un aumento del 138,18% en trasplantes cardíacos adultos, 76,54% en trasplantes pediátricos y/o cardiopatías congénitas y 63,22% % en procedimientos pulmonares, en comparación con años anteriores. Conclusión: El estudio describe por primera vez la importancia de la actuación de los enfermeros en la implementación de un programa de trasplante exitoso y cómo sus acciones contribuyeron para el aumento del número de procedimientos realizados y pueden servir de modelo para otros centros.

**Palabras claves:** Enfermeros; Trasplante de corazón; Trasplante de pulmón; Donador de órganos.

## Juliana Maria Anhaia de Sousa

Nurse at the Heart Institute, Hospital das Clínicas, University of São Paulo School of Medicine, São Paulo (SP). Specialist in Intensive Care Nursing from the Bandeirante University of São Paulo, São Paulo, SP. Heart Institute, Hospital das Clínicas, Faculty of Medicine, University of São Paulo  
ORCID: 0000-0002-6149-6711

## Ana Maria Peixoto Cardoso Duque

Nurse at the Heart Institute, Hospital das Clínicas, University of São Paulo School of Medicine, São Paulo (SP). Specialist in Nursing in Organ and Tissue Donation/Acquisition by Hospital Israelita Albert Einstein, São Paulo, SP  
ORCID: 0000-0002-1619-3850

## Luciana AkutsuOhe

Nurse at the Heart Institute, Hospital das Clínicas, University of São Paulo School of Medicine, São Paulo (SP). Specialist in Cardiology Nursing by InCor-HCFMUSP. Sao Paulo-SP.  
ORCID: 0000-0003-0773-6064

## Marcia Regina Bueno Freire Barbosa

Nurse at the Heart Institute, Hospital das Clínicas, University of São Paulo School of Medicine, São Paulo (SP). Specialist in Cardiology Nursing at InCor-HCFMUSP, São Paulo, SP.  
ORCID: 0000-0002-3716-5963

## Audrey Rose da Silveira Amâncio de Paulo

Nurse at the Heart Institute, Hospital das Clínicas, University of São Paulo School of Medicine, São Paulo (SP). Specialist in Intensive Care Nursing from the University Center of Faculdades Metropolitanas Unidas, São Paulo, SP.  
ORCID: 0000-0002-2658-3238

## Jaqueline Aparecida Leite de Melo

Nurse at the Heart Institute, Hospital das Clínicas, University of São Paulo School of Medicine, São Paulo (SP). Specialist in Cardiology Nursing at InCor-HCFMUSP, São Paulo, SP.  
ORCID: 0000-0002-6906-995X

Received on: 09/03/2022  
Approved on: 10/10/2022

## INTRODUCTION

Organ transplantation is a surgical procedure that consists of replacing a diseased organ or tissue with another in better condition, coming from a living or cadaveric donor, with the intention of curing or improving the recipient's quality of life.<sup>1</sup>

Since 1968, when the first heart transplant in Latin America was performed by Dr. Euryclides de Jesus Zerbini, the improvement of surgical techniques, the evolution of organ preservation solutions, as well as drugs that help to suppress rejection have been important factors in the success of transplants.<sup>2,3</sup> This transplant took place just under a year after the world's first heart transplant performed by Dr. Christian Barnard in South Africa.<sup>2,3</sup>

However, organ and tissue transplantation, especially cardiothoracic ones, requires a large structure, which makes the implementation of a transplant center very expensive, as it involves, in addition to an appropriate structure for high-complexity care, a specialized multidisciplinary team, logistics for evaluation, care for the donor and capture of the organ itself.<sup>1,4,5</sup>

In Brazil alone, between the years 2009-2019, 3162 heart transplants were performed. With 35 teams working in twelve states, the number of procedures is increasing each year. Data from the Brazilian Association of Organ Transplantation (ABTO - Associação Brasileira de Transplante de Órgãos) reveal that in 2019 there was a 6% growth in procedures compared to the previous year and 380 transplants of this type were performed, equaling the historic record reached in 2017.<sup>6</sup>

In our country, the first reports of lung transplants occurred in Porto Alegre (1989) and in São Paulo (1990), the latter performed at the São Paulo Hospital of the Federal University of São Paulo. Between 2009-2019, 888 procedures were performed

by lung transplant teams accredited by the Ministry of Health.<sup>6,7</sup> According to the ABTO, in 2013, for the first time, the country had 7 transplant teams in 5 states and 80 lung transplants were performed. However, it was in 2018 that lung transplantation reached its best rates, with 121 procedures. In 2019, the 7 teams were maintained, distributed in 4 states, responsible for 104 procedures, a decrease of 11.6% compared to the previous year. It is worth mentioning that, in general, lung transplantation had an increase in its procedures of 51.9%, in the 2009-2019 interval.<sup>4,6,7</sup>

Although the number of transplants performed continues to grow, the number of donors in adequate conditions is still insufficient to meet the demand on the waiting list for a solid organ. This list is unique in the national territory, which guarantees the suitability and equity of access to this type of treatment.<sup>6,7</sup>

According to resolution SS-114, of September 29, 2014, which provides for the organizational and operational structure of the State Transplant System of São Paulo, the General Coordination of the State Transplant System (CGSET - Coordenação Geral do Sistema Estadual de Transplantes) coordinates the State Transplant System (SET - Sistema Estadual de Transplantes) and, consequently, the Transplant Center (CTx - Central de Transplantes).<sup>8</sup>

CTx is responsible for the coordination, distribution and logistics activities of organs and tissues throughout the donation/transplantation process in the state of São Paulo. The Organ Procurement Organization (OPO) is responsible for evaluating, confirming the diagnosis of BD, approaching the family, maintaining the donor, monitoring the collection and delivery of the body to the family.<sup>8</sup>

In this way, nurses definitely conquered their space, working together with the multidisciplinary team and developing a technical and information multiplier role, together with the family of donors and also recipients. Your participation and active contribution are of real importance for

the success of the whole donation-transplantation process.<sup>9,10</sup>

The role of nurses in the capture and transplantation of organs and tissues is regulated by Resolution COFEN-292/2004. Its functions include planning, executing, coordinating, supervising and evaluating the nursing procedures provided to the deceased or living donor. Regarding care for the recipient, it is the responsibility of the nurse to apply the Nursing Care Systematization (NCS) in all phases of pre- and post-transplant care, at both a hospital and an outpatient basis.<sup>9,10,11</sup>

However, despite all the advances in the organ procurement process, there are factors that still make it difficult to achieve greater success in organ donation, such as the lack of notification of BD, the high percentage of refusals by family members and failures in the maintenance of organ donors.<sup>6,12,13,14</sup>

Assuming that ME causes an inflammatory syndrome that can quickly lead to deleterious changes in the organs of potential donors, some transplant groups have shown that, by improving care and expanding selection criteria (non-ideal or marginal donors), it is possible to safely and significantly increase the use of donated organs, graft quality and recipient survival. Theoretical-practical knowledge about BD and its signs and the training of nurses involved in this process is fundamental and corroborates the achievement of these objectives.<sup>12,13,14,15,16</sup>

In view of this situation, and through a pioneering initiative at the national level, a unit was formed in early 2013 with specialized professionals from various areas of health, dedicated to the process of heart and lung harvesting/transplantation - Nucleus of Transplants of InCor-FMUSP. The multidisciplinary action was permeated by the construction of a common care project among the professionals of the team, directed to the production of results that focus on increasing the number of procedures, the well-being of the patient and the reduction of hospital costs.<sup>1,4,15,16</sup>

Therefore, this work aims to describe

the actions implemented by the group of nurses in heart and lung capture at InCor-HCFMUSP and demonstrate the importance of their role in increasing the number of transplants performed by the institution.

**METHOD**

This is a descriptive, observational and retrospective study carried out in a high-complexity public university hospital, a reference in Cardiology, Pulmonology and cardiac and thoracic surgeries. It is linked to the Faculty of Medicine of the University of São Paulo, located in the city of São Paulo – SP, and has financial support from a non-profit private entity.

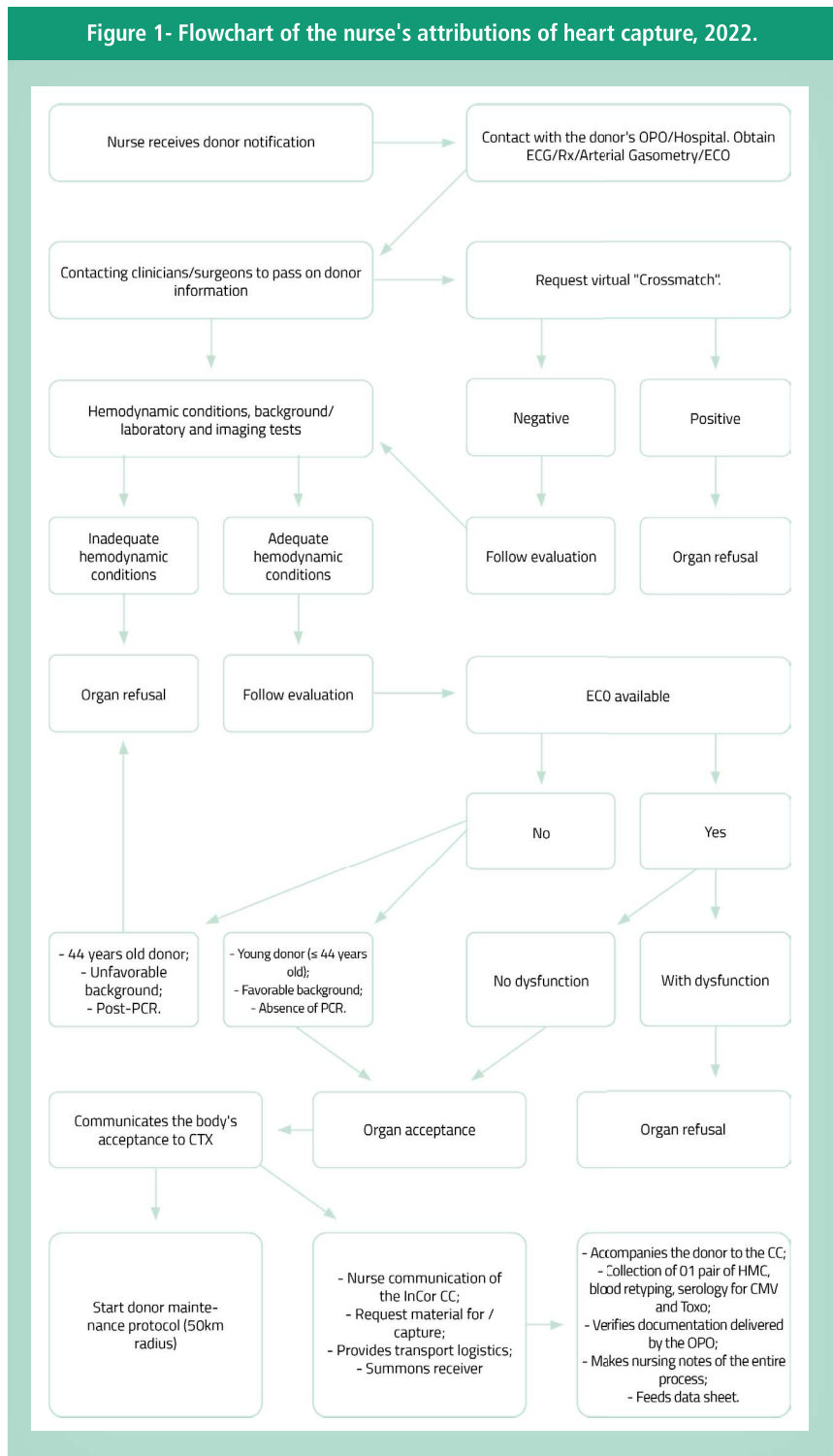
Based on the practical work within the InCor-HCFMUSP Transplant Center, the activities of the nurse in uptake were described and presented through a flowchart for acceptance or not of the heart and lung donor (Figure 1/Figure 2).

The heart and lung acceptance rate between August 2013 to December 2021 was also evaluated and compared with the same period in previous years (August 2004 to December 2012).

At the beginning of 2013, the Transplant Center was composed of heart surgeons, thoracic surgeons, cardiologists and pulmonologists. Six months after its creation, a group of nurses who work 24 hours a day and 7 days a week was incorporated into the nucleus, with defined attributions, always aiming to optimize the care of heart and lung donors. An assistant nurse was also added, totally dedicated to outpatient and hospital care for pre and post-transplant patients.

The capture nurse receives a call from CTx-SP and then the case is notified through the form Annex IV – Information on the Multiple Organ Donor and also the result of the HLA typing; contacts the responsible organizations and the donor's home hospital in order to obtain more detailed information and imaging tests (electrocardiogram, chest X-ray, echocardiogram, etc.). It requests the institution's immuno-

Figure 1- Flowchart of the nurse's attributions of heart capture, 2022.



Source: Prepared by the authors (2022).

logy laboratory to carry out a virtual crossmatch to compare the antibody panel of

the potential recipient with the HLA of the donor.

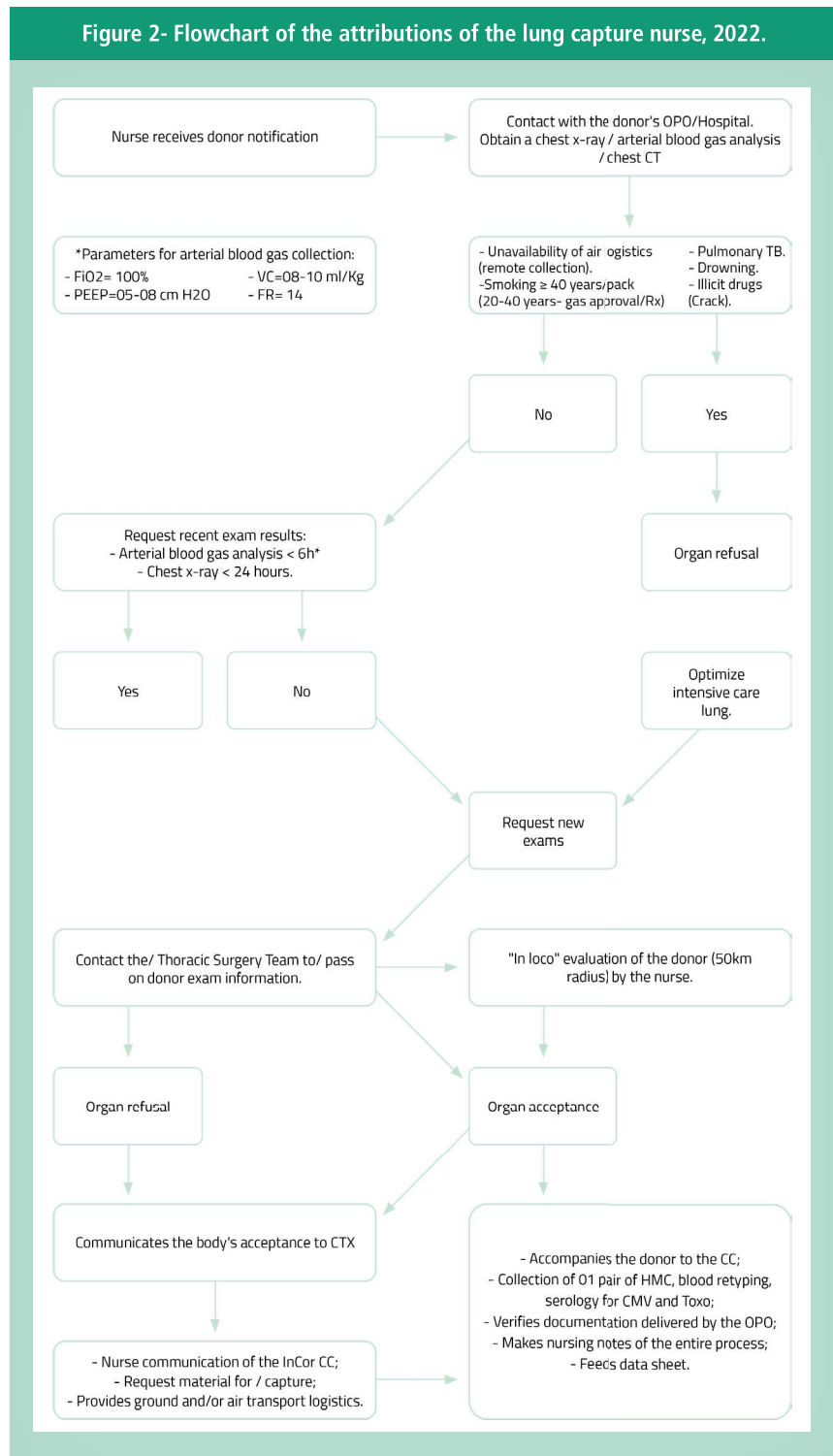
At this moment, the nurse contacts the physician on duty at InCor-HCFMUSP, informs them about the donor's clinical data and sends them the exam images. It is up to the medical team to define the interest in the case and decide on the "in loco" evaluation and measures to maintain the donor. If the team is interested, CTx-SP and the Organ Procurement Organization (OPO) are notified and the nurse travels to the hospital of origin (50km radius). In the case of donors in locations with a distance greater than 50 km, the evaluation is made only with the data provided by telephone contact and sending images.

In front of the donor, the nurse performs the workup with an emphasis on the cardiopulmonary system, provides laboratory and imaging tests if they have not been performed so far, and carefully evaluates the medical record, provides guidance to the local team and suggests strategies, aiming to improve the donor's condition as much as possible. The medical team is updated and decides whether to accept or refuse the organ. If he refuses, the professional informs CTx-SP about the reason and the name of the person in charge.

Based on the "Guidelines for the maintenance of multiple organs in the potential deceased adult donor", carried out by a joint initiative of the Brazilian Association of Intensive Medicine (AMIB) and the Brazilian Association of Organ Transplantation (ABTO), it is suggested to the team responsible for the donor care strategies that aim to reduce the deleterious effects arising from the BD process.<sup>12,13,14</sup>

Taking into account that the time between the offer of the organ by CTx and the explant is about 6-8 hours, we have little time to evaluate and implement any type of joint action, however, the work is directed to the adjustment of hemodynamic parameters closer to the ideal donor.

In case of acceptance of the organ, the nurse at the capture must notify the CTx and confirm the name of the recipient and the donor, notify the nursing supervision and the nurse at the InCor surgical



Source: Prepared by the authors (2022).

center about the capture and request the material for the procedure. They are also

responsible for actions that make the logistics of land and air transport of the sur-



gical team viable.

The recipient awaiting the transplant on an outpatient basis is summoned by the nurse at the capture, via telephone contact. The professional should check your clinical conditions (fever, signs/symptoms of infection, medications in use, especially anticoagulants) and advise you on fasting, suspension of anticoagulant and rapid transfer to the InCor hospitalization sector (must arrive at the hospital within a maximum of 2 hours).

The maintenance of the donor continues under the supervision of the InCor medical team until the time of organ extraction, the nurse accompanies the transport to the surgical center, collects a pair of blood cultures, material for blood typing confirmation and, if necessary, serology tests (Cytomegalovirus – IgG and IgM and Toxoplasmosis – IgG and IgM), check the donor documentation delivered by the OPO (notification form, donation term signed by first-degree relatives: father, mother, grandparents, siblings or spouses, BD diagnostic test report, blood typing and serology results). The nurse also records the time for clamping the aorta artery and forwards it to the CTx, making nursing notes of the entire process.

Participating in the entire process, the nurse at capture is responsible for feeding the database for donor and transplant information, submitting monthly reports to the teams and statistical data from the groups to the executive director of the institution, in addition to producing scientific articles.

## RESULTS

### Impact on the number of transplants performed

The period used for comparison was the months of August/2004 to December/2012. At that time, the surgical teams worked independently, where the cardiac surgeons and thoracic surgeons received the data from the donor by telephone, without the possibility of a refined evaluation and a careful maintenance more di-

rected to the heart and/or lung, defining there for the acceptance or not of the organ for transplantation. Given this difficulty for the team to make a quick decision, the notifications received by the CTx were not stored and, during this period, only 401 procedures were performed.



Data from the Brazilian Association of Organ Transplantation (ABTO - Associação Brasileira de Transplante de Órgãos) reveal that in 2019 there was a 6% growth in procedures compared to the previous year and 380 transplants of this type were performed, equaling the historic record reached in 2017.



Between August 2013 and December 2021, the Transplant Center performed 789 transplants, 393 of which were adult heart, 143 pediatric heart and/or congenital heart disease, and 253 lung transplants.

Data from the Nucleus of Transplants show that, in the last octennium studied,

the number of adult heart transplants had an increase of 138.18% in relation to the same period of previous years. As for infant heart transplantation, the increase was 76.54% at the same time.

In the case of lung transplantation, it is noted that the procedures have been growing significantly in recent years, with an increase of 63.22% in the period studied. However, in 2020 there was a percentage decrease of 37.83% compared to the previous year, possibly because the lung is the organ most susceptible to the events that follow BD, in addition to possible infections, inflammatory changes and cardiovascular dysfunction.<sup>12,13,14</sup> These factors were associated with the COVID-19 pandemic, which affected the world population in 2020. The pandemic situation had a considerable impact on solid organ transplants, with lung transplantation being the one that suffered the most from the negative consequences of the pandemic.<sup>17,18</sup>

Lung transplantation teams in the state of São Paulo have been studying possibilities to intercede even earlier in maintaining the donor with lung protection measures, soon after family consent.

The formation of the multidisciplinary team - Heart Team - associated with the direct role of the nurse in the evaluation and care of the donor "in loco" and the performance of the echocardiogram at the bedside were crucial points for the increase in the number of heart transplants.

## CONCLUSION

The investment in specialized centers and the formation of a unit with a highly qualified multidisciplinary team dedicated exclusively to heart and lung transplantation proved to be a strategy of excellence.

Nurses are a vital member of this team and their role in the transplant scenario has evolved a lot in the last 30 years. Their role is crucial in the implementation of a successful program and the organization of a group of nurses specifically responsible for the process of maintenance and

capture of heart and lungs is a pioneering initiative in our country.

This study describes, for the first time, the activities of nurses as participants of the InCor-FMUSP Transplant Center, created in 2013, and how its performance

contributed substantially to the effective increase in the number of heart and lung transplants in the last octennium studied when compared to the previous period.

It is worth mentioning that the nursing actions presented favor the improvement

of the scenario of cardiothoracic transplants in the country, and can be used as a model in other national and international transplant centers. 🐦

## References

1. Bacal F, Marcondes-Braga FG, Rohde LEP, Xavier Júnior JL, de Souza Brito F, Moura LZ, et al. III Diretriz Brasileira de Transplante Cardíaco. *Arq Bras Cardiol*. 2018; 111(2):230-289.
2. Fiorelli AI, Coelho GHB, Oliveira Junior JL, Oliveira AS. Insuficiência cardíaca e transplante cardíaco. *Rev Med (São Paulo)*. 2008. abr-jun; 87 (2): 105-120.
3. Bocchi EA, Marcondes-Braga FG, Ayub-Ferreira SM, Rohde LE, Oliveira WA, Almeida DR, et al. II Diretriz Brasileira de Insuficiência Cardíaca Crônica. *Arq Bras Cardiol*. 2009; 93 (1 supl.1): 1-71.
4. Marcondes-Braga FG, Bonatto MG, Andrade CR, Bacal F. Implementation of Heart Transplantation Program to Advanced Heart Failure Patients in Brazil. *Curr Heart Fail Rep* (2019). 16:7-11. doi: [10.1007/s11897-019-0418-z](https://doi.org/10.1007/s11897-019-0418-z)
5. Azeka E, Jatene MB, Jatene IB, Horowitz ESK, Branco KC, Souza Neto JD, et al. I Diretriz Brasileira de Insuficiência Cardíaca e Transplante Cardíaco no Feto, na Criança e em Adultos com Cardiopatia Congênita. *Arq Bras Cardiol* 2014; 103(6Supl.2):1-126
6. Associação Brasileira de Transplantes de Órgãos (Brasil). Registro Brasileiro de Transplantes. 2019; Ano XXV(14).
7. Jatene FB, Pêgo-Fernandes PM, Medeiros IL. Transplante pulmonar. *Rev Med São Paulo*. 2009; 88(3): 111-22.
8. Brasil. Ministério da Saúde. Portaria 2600 de 21 de outubro de 2009. Aprova regulamento técnico do Sistema Nacional de Transplantes. [Acesso em 2020 julho 24]. Disponível em: <http://sbn.org.br/app/uploads/portaria2600.pdf>
9. Mendes KDS, Roza BA, Barbosa SFF, Schirmer J, Galvão CM. Transplante de órgãos e tecidos: Responsabilidade do enfermeiro. *Texto Contexto Enferm., Florianópolis*. 2012; Out-Dez; 21(4): 945-53. <https://dx.doi.org/10.1590/S0104-07072012000400027>.
10. Coleman B, Blumenthal N, Currey J, Dobbels F, Velleca A, Grady KL et al. Adult cardiothoracic transplant nursing: An ISHLT consensus document on the current adult nursing practice in heart and lung transplantation. *J Heart Lung Transplantation* 2015; 34:139-148.
11. Conselho Federal de Enfermagem (Brasil). Resolução COFEN-292/2004. [Access in 30/07/2021]. Available from: [http://www.cofen.gov.br/resolucao-cofen-2922004\\_4328.html](http://www.cofen.gov.br/resolucao-cofen-2922004_4328.html)
12. Westphal GA, Caldeira Filho M, Vieira KD, Zaclikevis VR, Bartz, MCM, Wanzueta R et al. Guidelines for potential multiple organ donors (adult). Part I. Overview and hemodynamic support. *Rev Bras Ter Intensiva*. 2011; 23(3):255-268. DOI: <http://dx.doi.org/10.1590/S0103-507X2011000300003>
13. Westphal GA, Caldeira Filho M, Vieira KD, Zaclikevis VR, Bartz, MCM, Wanzueta R et al., Guidelines for potential multiple organ donors (adult). Part II. Mechanical ventilation, endocrine and metabolic management, hematological and infectious aspects. *Rev Bras Ter Intensiva*. 2011; 23(4):269-282. DOI: <http://dx.doi.org/10.1590/S0103-507X2011000300004>
14. Westphal GA, Caldeira Filho M, Vieira KD, Zaclikevis VR, Bartz, MCM, Wanzueta R et al., Guidelines for potential multiple organ donors (adult). Part III: organ-specific recommendations. *Rev Bras Ter Intensiva*. 2011; 23(4):410-425. DOI: <http://dx.doi.org/10.1590/S0103-507X2011000400005>
15. Peduzzi M, Oliveira MAC. Trabalho da equipe multiprofissional. In: Martins MA, Carrilho FJ, Alves VAF, Cerri GC, editores. *Clínica médica v.1: atuação da clínica médica, sinais e sintomas da natureza sistêmica, medicina preventiva, saúde da mulher, envelhecimento e geriatria, medicina laboratorial na prática médica*. Barueri: Manole; 2009. p171-8.
16. Sindeaux ACA, Nascimento AMV, Campos JRE, Campos JBR, Barros AB, Luz DCRP. Cuidados de enfermagem dispensados ao potencial doador de órgãos em morte encefálica: uma revisão integrativa. *Revista Nursing*, 2021; 24(272): 5134-5140. DOI: <https://doi.org/10.36489/nursing.2021v24i272p5128-5147>
17. Danziger-Isakov L, Blumberg E, Manuel O, Sester M. Impact of COVID-19 in solid organ transplant recipients. *Am J Transplant*. 2021; 21(3):925-37. DOI: <https://doi.org/10.1111/ajt.16449>
18. Ribeiro Junior MAF, Costa CTK, Néder PR, Aveiro IA, Elias YGB, Augusto SS. Impacto do COVID-19 no número de transplantes no Brasil durante a pandemia. Situação atual. *Rev Col Bras Cir*. 2021; 48:e20213042. DOI: <https://doi.org/10.1590/0100-6991e-20213042>