

## Persahabatan Hospital's Experience on Establishing the First Lung Transplant Program in Indonesia

Susan Hendriarini Mety<sup>1</sup>, Muhammad Aris Furqon<sup>1</sup>, Hana Khairina Putri Faisal<sup>2</sup>, Mia Elhidsi<sup>2</sup>, Yenni Maryati<sup>3</sup>, Norman Hardi Utama<sup>4</sup>, Putri Dianita Ika Meilia<sup>5</sup>, Rini Susanti<sup>6</sup>, Selly Christina Anggoro<sup>7</sup>, Siti Chandra Widjanantie<sup>7</sup>, Agus Dwi Susanto<sup>2</sup>

<sup>1</sup>Cardiothoracic and Vascular Surgery Department, Persahabatan Hospital, Jakarta

<sup>2</sup>Pulmonology and Respiratory Medicine Department, Persahabatan Hospital, Jakarta

<sup>3</sup>Intensive Care Unit, Persahabatan Hospital, Jakarta

<sup>4</sup>Anesthesiology and Intensive Care Department, Persahabatan Hospital, Jakarta

<sup>5</sup>Forensic Medicine and Mortuary Unit, Persahabatan Hospital, Jakarta

<sup>6</sup>Dentistry Department, Persahabatan Hospital, Jakarta

<sup>7</sup>Physical Medicine and Rehabilitation Department, Persahabatan Hospital, Jakarta

### Abstract

**Background:** Lung transplant can improve life expectancy and quality of live. In severe lung diseases that no longer respond to medication, a lung transplant is the only treatment. Indonesia, which ranks first in the world for highest smoking rates and have been battling tuberculosis endemic, have potential lung transplant recipients. As the National Respiratory Center, Persahabatan Hospital has the responsibility to provide state-of-the-art respiratory service. Persahabatan Hospital has been establishing the first lung transplant program in Indonesia.

**Methods:** This paper presents a narrative review of Persahabatan Hospital in developing the country's first lung transplant program. This review described the journey, challenges, and progress of the program.

**Results:** The first lung transplant surgery has not yet taken place, despite the efforts. Securing a brain-dead donor remains challenging. However, we have achieved some milestones, such as developing a lung transplant candidate management system, assembling a dedicated team for managing brain death patients, and establishing a program to approach the next-of-kin of brain death patients. Integration and collaboration within this team will grow and represent a multidisciplinary approach that is vital for the program's long-term success.

**Conclusion:** The lung transplant program is complex. It is an expensive process, requiring cooperation among various specialists, and it is difficult to find suitable donors. There are also non-technical aspects such as sociological and legal considerations. The success of this first lung transplant program is crucial for developing alternative treatments for patients, gaining acceptance of the procedure, and enabling further expansion of the procedure across Indonesia.

**Keywords:** lung transplant, brain death donor, establishing, first, Indonesia

### Corresponding Author:

Susan Hendriarini Mety  
Cardiothoracic and Vascular Surgery  
Department, Persahabatan Hospital,  
Jakarta  
susanmety@yahoo.com

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Lung diseases represent a significant global health challenge, contributing to morbidity and mortality rates that are alarmingly high. Conditions such as chronic obstructive pulmonary disease (COPD), pulmonary fibrosis, and severe asthma can lead to respiratory failure, necessitating advanced therapeutic interventions.

Indonesia is home to a large population, with approximately 270 million people, and it faces a double burden of disease, particularly in the realm of respiratory health. Smoking is one of the leading causes of chronic respiratory diseases, contributing to a high incidence of chronic obstructive pulmonary disease (COPD), lung cancer, and other pulmonary conditions. According to the World Health Organization (WHO), Indonesia has one of the highest rates of smoking globally, with over 70% of men in the country being regular smokers. Furthermore, the country has been grappling with a persistent TB endemic, which exacerbates respiratory health issues. Given these factors, the establishment of a lung transplant program in Indonesia is not only timely but essential. It represents a critical step toward addressing the healthcare needs of a population with a high incidence of severe lung diseases.<sup>1</sup>

The prevalence of lung diseases in Indonesia is alarming. According to recent epidemiological studies, millions of Indonesians suffer from chronic respiratory conditions, with COPD and TB being the most prevalent. Recent epidemiological data show that COPD affects approximately 9.2 million Indonesians (3.7% prevalence) and that around 885,000 new TB cases were reported in 2024, underscoring the urgent need for advanced treatment options including lung transplantation. These statistics underscore the urgent need for effective treatment options, including lung transplantation, to improve patient outcomes.<sup>2,3</sup>

Current treatment options for severe lung diseases in Indonesia primarily include pharmacological therapies, pulmonary rehabilitation, and oxygen therapy.<sup>4</sup> However, these interventions often provide limited relief for patients with end-stage lung disease. For many individuals, the progression

of their condition leads to respiratory failure, rendering them ineligible for conventional treatments. Lung transplantation emerges as a viable alternative, offering the possibility of restoring lung function and improving quality of life for patients who have exhausted all other options. Lung transplantation has emerged as a critical treatment option for patients with end-stage lung disease, offering the potential for improved life expectancy, functional status, and overall quality of life. The procedure involves the surgical replacement of a diseased lung with a healthy lung from a deceased donor, and it is often the last resort for patients who have exhausted all other treatment options.

Persahabatan Hospital, a tertiary care facility, is uniquely positioned to address this gap. As the National Respiratory Center, Persahabatan Hospital plays a pivotal role in advancing respiratory health services in Indonesia. The hospital has taken the initiative to establish the country's first lung transplant program, aiming to provide state-of-the-art care for patients with severe lung diseases. This program is designed to address the urgent need for lung transplantation in Indonesia, offering hope to patients who may otherwise face a grim prognosis. The journey toward establishing this program involves navigating numerous challenges, including securing donor organs, developing a dedicated transplant team, and addressing sociocultural barriers to organ donation.<sup>4,5</sup>

## METHODS

This paper presents a narrative review of how Persahabatan Hospital is developing the country's first lung transplant program. This review described the journey, along with the challenges and progress of the program. The review focuses on the hospital's efforts to build the necessary infrastructure, the formation of multidisciplinary teams, and the challenges encountered during the process. The review draws from hospital records, interviews with key stakeholders, and the ongoing efforts of medical staff involved in the program.

## RESULTS AND DISCUSSION

### Development of the Lung Transplant Program at Persahabatan Hospital

The journey toward establishing a lung transplant program at Persahabatan Hospital began with comprehensive planning and assessment of the existing healthcare infrastructure. As Indonesia's National Respiratory Center, Persahabatan Hospital was officially designated by the Ministry of Health to pioneer advanced respiratory and thoracic services, including lung transplantation. This mandate reflects the hospital's pivotal role in developing national capacity for managing complex pulmonary diseases and advancing tertiary and quaternary care in Indonesia.<sup>5</sup>

Initial steps included conducting feasibility studies to evaluate the hospital's capacity to support a transplant program, including the availability of surgical facilities, intensive care units, and post-operative care resources. Stakeholder engagement was crucial during this phase, involving discussions with healthcare professionals, policymakers, and potential donor families to gauge support for the initiative. In 2023, the hospital formally entered the preparatory phase through the establishment of the Lung Transplant Clinic. This clinic serves as the central coordination unit for all pre-, peri-, and post-transplant activities, encompassing patient evaluation, donor–recipient matching, immunological assessment, and long-term follow-up. By 2024, the program advanced into the implementation stage, marked by the creation of digital systems and inter-institutional collaboration. Memoranda of Understanding (MoUs) were established with the Ministry of Health, the Indonesian National Police (POLRI), and several regional hospitals to support donor identification, organ logistics, and emergency referral coordination. These collaborations laid the foundation for a national lung transplant referral and procurement network, as articulated on the hospital's official transplant program website.<sup>4,5</sup>

Operationally, Persahabatan Hospital has established a structured brain death donor screening system to standardize early donor identification and

referral. This system outlines the critical pathway for Donation After Brain Death (DBD), integrating neurological assessment, brain imaging, and serial follow-up. Potential donors are stratified into surveillance categories based on neurological status, Glasgow Coma Scale (GCS) score, and chest radiographic findings. Patients meeting initial criteria, such as GCS < 8 with clean thoracic imaging and no seizure activity, are followed every 24–48 hours to confirm stability for formal brain dead testing. This standardized donor surveillance aligns Persahabatan's workflow with international organ procurement protocols while adapting to local hospital settings.

In a similar manner, Klesney-Tait et al. (2015) described that successful lung transplant programs are built upon four interdependent pillars: transplant volume, recipient outcomes, financial sustainability, and academic contribution. These indicators provide an objective framework for long-term excellence and accountability. Incorporating comparable quality metrics at Persahabatan Hospital will be essential to ensure program viability, regulatory compliance, and ongoing performance evaluation in line with international standards.<sup>5,6</sup>

Recognizing the complexity of lung transplantation, Persahabatan Hospital assembled a multidisciplinary transplant team comprising pulmonologists, thoracic surgeons, anesthesiologists, transplant coordinators, and social workers. This team is responsible for overseeing all aspects of the transplant process, from candidate evaluation to post-operative care. The formation of this dedicated team is essential for ensuring that patients receive comprehensive care throughout their transplant journey. This approach reflects global best practices, as highlighted by van der Mark et al. (2020), who emphasized that the foundation of successful lung transplant programs lies in a multidisciplinary structure encompassing medical, surgical, and rehabilitative expertise. Establishing such a team ensures readiness for the intricate perioperative and long-term demands of transplantation.

Developing standardized protocols for candidate management is a critical component of the lung transplant program. These protocols outline the criteria for patient selection, evaluation processes, and pre-operative assessments. Additionally, the protocols address the management of potential complications and the need for ongoing monitoring of transplant candidates. By establishing clear guidelines, the program aims to streamline the evaluation process and ensure that patients receive timely and appropriate care. According to van der Mark et al. (2020), pre-transplant readiness is a determinant of post-transplant survival. The structured assessment model implemented at Persahabatan Hospital aligns with these international recommendations, ensuring that patient selection and perioperative management meet global safety and quality benchmarks.<sup>7</sup> Complementing this effort, an integrated digital registry system for donor and recipient management was developed, as reported on the official Persahabatan Lung Transplant website. This registry represents the first structured database of its kind in Indonesia, designed to facilitate transparent data collection, donor–recipient matching, and longitudinal follow-up.<sup>5</sup>

In parallel, Persahabatan Hospital strengthened its infrastructure to meet the technical and safety requirements of lung transplantation. Operating theaters were upgraded to support advanced cardiothoracic procedures, and intensive care capacity was expanded with ECMO (Extracorporeal Membrane Oxygenation) systems and high-performance ventilators. The hospital's immunology and microbiology laboratories were also enhanced to support donor crossmatching, infection control, and immunosuppressive drug monitoring. Rehabilitation units were enhanced to facilitate respiratory recovery and post-transplant rehabilitation, ensuring a seamless continuum of care.<sup>4,5</sup>

To align with Indonesia's ethical and legal frameworks, the hospital also implemented ethical and regulatory groundwork, referring to Permenkes No. 38/2016 and Government Regulation No. 53/2021 on organ transplantation. Ethical

consultations and religious dialogues were conducted to ensure that organ donation and transplantation align with Islamic bioethical principles, a key consideration in Indonesia's sociocultural context. Furthermore, Persahabatan Hospital has conducted public education and awareness campaigns, as documented on its official website, to promote organ donation and foster community acceptance.<sup>4,5</sup>

Through these combined initiatives, Persahabatan Hospital has successfully laid the foundation for the nation's first lung transplant program. The establishment of a specialized clinic, multidisciplinary team, digital registry, and advanced infrastructure signifies Indonesia's readiness to perform its inaugural lung transplant and represents a major milestone in the country's pursuit of medical self-sufficiency and excellence in respiratory care.<sup>5</sup>

### **Legal and Ethical Framework for Organ Transplant**

Organ transplantation in Indonesia is carried out in accordance with strict national regulations that govern every stage of the process, from donor identification to post-transplant care. These regulations are clearly outlined in several key legal documents.<sup>8</sup>

Law No. 17 of 2023 on Health affirms the government's role in protecting the public's right to health and mandates proper regulation of organ transplantation. Government Regulation No. 53 of 2021 on Organ and Tissue Transplantation furthermore discuss the mechanism, ethical, donor selection, consent procedures, and other regulation for organ transplant. Minister of Health Regulation No. 38 of 2016 on the Implementation of Organ Transplantation, highlight the technical regulation for organizing and managing organ transplant program in healthcare institutions. Minister of Health Regulation No. 37 of 2014 on the Determination of Death and Utilization of Donor Organs, complements by regulating the ethical and legal parameter on brain death patients. To ensure that transplantation services maintain consistent quality and regulatory compliance, Minister of Health Regulation No. 14 of

2021 incorporates these medical activities into the national health sector's risk-based licensing framework. National coordination is further supported through the Decree of the Minister of Health No. HK.01.07/MENKES/139/2021, which created the National Transplantation Committee (Komite Transplantasi Nasional).<sup>8</sup>

By following these legal frameworks, healthcare institutions ensure that every transplantation procedure is conducted safely, ethically, and in accordance with established national standards. Strict compliance with these regulations also supports transparency and patient protection, allowing transplantation services in Indonesia to run effectively and responsibly.<sup>8</sup>

### **Selection Criteria for Lung Transplant Candidates**

The selection of lung transplant candidates at Persahabatan Hospital follows various regulation and standards. The 2021 International Society for Heart and Lung Transplantation (ISHLT) Consensus Document emphasizes that careful selection is fundamental to achieving favorable outcomes in lung transplantation. The procedure is reserved for patients with advanced, irreversible respiratory disease who have exhausted all medical and surgical treatment options and whose predicted two-year survival without transplantation is less than fifty percent. Common indications include chronic obstructive pulmonary disease (COPD), idiopathic pulmonary fibrosis (IPF), bronchiectasis, cystic fibrosis, and certain forms of pulmonary hypertension.<sup>9</sup>

Each potential candidate undergoes a comprehensive evaluation encompassing medical, functional, and psychosocial aspects. Generally, candidates are below 65 years of age, maintain an adequate nutritional status, and have preserved heart and kidney function. Psychosocial stability, adherence to medical management, and reliable family or community support are equally important. Physical resilience and functional strength are also evaluated, as these factors influence postoperative recovery and long-term survival. Absolute contraindications include active malignancy,

uncontrolled infection, significant failure of other vital organs, and active substance use, while relative contraindications such as obesity or chronic infection with resistant microorganisms are reviewed on a case-by-case basis.<sup>9</sup>

At Persahabatan Hospital, candidate evaluation is conducted by a multidisciplinary team within the Lung Transplant Clinic, consisting of pulmonologists, thoracic surgeons, anesthesiologists, psychologists, and rehabilitation specialists. Every patient is assessed through detailed physiological and psychological testing, including spirometry, echocardiography, imaging, nutritional analysis, and mental health evaluation. This coordinated approach ensures that patient selection remains evidence-based while reflecting Indonesia's healthcare context and cultural considerations.<sup>8</sup>

The donor evaluation process adheres to national regulations on organ donation and brain death determination as stipulated in Minister of Health Regulation No. 37 of 2014. Potential donors are identified among patients with severe neurological injury who exhibit irreversible loss of brain function. Clinical suspicion arises in those with a Glasgow Coma Scale of eight or less, absence of seizure activity, and stable cardiopulmonary function. Brain death confirmation requires a series of neurological assessments showing loss of all brainstem reflexes and absence of spontaneous breathing, supported by ancillary tests such as electroencephalography or cerebral angiography when indicated.<sup>8</sup>

Brain death determination is performed by at least two independent physicians, typically including an intensivist, neurologist, and anesthesiologist, to ensure diagnostic accuracy and ethical transparency. Following confirmation, the Donor Advocacy and Coordination Team assess organ suitability, focusing on lung quality through oxygenation parameters, radiographic findings, and infection screening for transmissible diseases such as HIV, hepatitis B, and hepatitis C. Only donors meeting these clinical and physiological standards are considered viable for transplantation.<sup>8,9</sup>

Informed consent from the donor's family constitutes a vital ethical component of the process. Comprehensive counseling is provided by trained transplant coordinators to facilitate understanding and voluntary decision-making, with the inclusion of religious or spiritual advisors when requested. This approach aligns with Islamic bioethical principles and Indonesia's cultural values.<sup>8</sup> Through the integration of ethical oversight and clinical evaluation, Persahabatan Hospital ensures that lung transplantation is performed in accordance with both national regulations and ISHLT standards, reinforcing its commitment to safety, transparency, and respect for human dignity.

### **Pulmonary Rehabilitation in Lung Transplant**

Pulmonary rehabilitation represents an essential part of the care of lung transplant patients, both as preparation before surgery and as a key part of recovery afterward. Structured rehabilitation programs have been shown to improve lung function, exercise capacity, and overall quality of life in patients before and after transplantation.<sup>10-12</sup> According to the American Thoracic Society and the European Respiratory Society, pulmonary rehabilitation is described as a comprehensive program that typically includes exercise training, education, and behavior modification designed to improve physical and psychological well-being. In the context of lung transplantation, this form of rehabilitation is even more important for preventing deconditioning, muscle weakness, and reduced endurance due to long-term illness and the negative effects of a major surgical intervention.

The rehabilitation before transplantation typically consists of aerobic and strength training sessions several times per week over four to twelve weeks. Such a method promotes exercise tolerance, diminishes the incidence of complications after surgery, and favors faster recovery.<sup>12</sup> Studies have demonstrated that a structured preoperative rehabilitation program can reduce the length of mechanical ventilation time for patients and hasten functional recovery post-surgery. After transplantation, rehabilitation commences when the

patient is considered stable, usually within the first two days. The early phase includes progressive mobility, breathing exercises, and airway clearance techniques to re-establish lung function and prevent muscle wasting.<sup>11</sup> Mei et al. (2024) reported that individualized early rehabilitation led to measurable improvements in lung function, oxygenation index, six-minute walk distance (6MWD), and quality of life. The program included gradual respiratory retraining, limb strengthening, and transition from assisted to independent ambulation, with active monitoring by a multidisciplinary team comprising pulmonologists, respiratory therapists, and rehabilitation specialists.<sup>11</sup>

Rehabilitation does not end at the time of hospital discharge. Home-based and online programs have become indispensable for sustaining this progress and keeping patients active throughout long-term recovery. These approaches make it easier for patients to continue exercising and to stay engaged in their rehabilitation program. Both pre- and post-transplant rehabilitation, as routine components of lung transplant care, enhance physical recovery, support independence, and increase long-term survival and quality of life.<sup>10-12</sup>

### **Challenges Faced in Establishing the Program**

One of the most significant challenges in establishing a lung transplant program is securing a sufficient supply of donor organs. In Indonesia, the concept of organ donation is still relatively new, and there is a lack of awareness regarding the importance of brain death as a criterion for organ donation. In Indonesia, like many other countries, brain-dead donors are the primary source of organ donations for lung transplantation. However, the incidence of brain death in the country is relatively low, and the procurement of organs from brain-dead patients is further complicated by cultural, legal, and logistical issues. Efforts to educate the public about the benefits of organ donation and the process of brain death are essential for increasing donor organ availability. Additionally, establishing relationships with hospitals and emergency services to identify potential brain-dead donors is crucial for the program's success.

Internationally, early-stage lung transplant programs have often faced similar logistical and sustainability barriers. Klesney-Tait et al. (2015) reported that nearly 40–44 % of newly established lung transplant centers in the United States failed within their first few years due to low transplant volumes, limited institutional commitment, or insufficient financial support. To prevent comparable outcomes, Persahabatan Hospital's phased implementation and strong institutional backing provide a necessary foundation for long-term stability.<sup>5</sup> Moreover, donor-recipient matching and transport efficiency remain key determinants of early program success; most established centers operate within a 4–5 hour donor catchment radius to preserve organ viability. Persahabatan's development of the Jejaring Rumah Sakit untuk Donor dan Resipien (Jarum-DR) network is therefore consistent with these proven international logistics models.<sup>5,6</sup>

Sociocultural factors play a significant role in organ donation rates in Indonesia. Many individuals and families hold misconceptions about organ donation, viewing it as taboo or contrary to cultural beliefs. Addressing these sociological barriers requires targeted community outreach and education initiatives to foster a culture of acceptance around organ donation. Similar experiences have been reported by Nguyen et al. (2020), who noted that public reluctance and religious concerns are key obstacles in developing countries' early transplant efforts. Strengthening donor education and awareness, as Persahabatan Hospital has initiated, remains essential to improving donor registration and family consent rates.<sup>13</sup> Engaging religious leaders and community influencers can also help dispel myths and promote the importance of organ donation as a life-saving measure. Moreover, as highlighted by van der Mark et al. (2020), public confidence in donor and recipient safety, as well as transparent allocation systems, is essential to build societal trust in transplantation programs.<sup>7</sup>

From a clinical perspective, Persahabatan Hospital has also faced challenges in building sufficient technical and human resource capacity. Lung transplantation requires a highly skilled

multidisciplinary team, including thoracic surgeons, pulmonologists, intensivists, and transplant coordinators, all of whom need specialized training. This difficulty parallels the early stages of programs in Vietnam and India, where limited prior experience demanded prolonged training and mentorship from established international centers<sup>13</sup>. To overcome this barrier, Persahabatan Hospital has engaged in continuous professional development and simulation-based training to maintain readiness.

Infrastructure readiness has also been a considerable challenge. Lung transplantation demands modern surgical facilities, intensive care units capable of advanced ventilatory support, and access to bridging technologies such as Extracorporeal Membrane Oxygenation (ECMO). Nguyen et al. (2020) identified the lack of ECMO availability as a major limiting factor for lung transplant programs in low-resource countries. Persahabatan Hospital's investment in ECMO and upgraded cardiothoracic operating rooms therefore represents a significant advancement toward meeting international standards.<sup>13</sup>

Late referral of patients with end-stage lung disease is another barrier shared across developing countries. Many patients are referred only after prolonged disease progression, resulting in high wait-list mortality. This pattern was also observed in Korea and Vietnam, where 40–50% of eligible patients died before a suitable donor became available. Early education for pulmonologists and regional hospitals on transplant indications and timely referral is therefore an ongoing priority for the program.<sup>13</sup> Van der Mark et al. (2020) further noted that pre-transplant optimization and infection prevention are pivotal, as infection is a leading cause of early post-transplant mortality. Indonesia's high tuberculosis burden adds complexity to infection control; thus, strengthening pre-transplant screening and antimicrobial stewardship will be critical components of Persahabatan's clinical protocol development.<sup>7</sup>

In addition to the clinical challenges, there are also significant legal, ethical, and sociological issues that must be navigated in the establishment of a lung transplant program. Van der Mark et al. (2020)

further underscored the importance of ethical transparency, equitable access, and long-term patient follow-up in transplant programs. Embedding these ethical principles within Indonesia's emerging legal framework is crucial to sustaining public trust and ensuring compliance with international standards of practice. In Indonesia, the legal framework for organ donation is still evolving, and there is limited public awareness of the importance of organ donation. To address these challenges, Persahabatan Hospital has been working with government agencies, legal experts, and advocacy groups to develop a clearer policy on organ donation and transplantation. Public education campaigns have also been initiated to raise awareness about the benefits of organ donation and to encourage people to register as organ donors.<sup>7</sup> This strategy is consistent with recommendations from Nguyen et al. (2020), who emphasized the need for strong governmental and institutional cooperation to formalize national organ-sharing systems.<sup>7</sup> Persahabatan Hospital's creation of the Jejaring Rumah Sakit untuk Donor dan Resipien (Jarum-DR) network parallels models such as the Korean Network for Organ Sharing (KONOS) and has been cited as essential for equitable donor distribution and efficient organ transport logistics.<sup>5</sup>

Community outreach and education efforts have been instrumental in raising awareness about lung transplantation and organ donation. Persahabatan Hospital has organized workshops, seminars, and public campaigns to educate the community about the importance of organ donation and the potential impact of lung transplantation on patients' lives. Engaging with local media and utilizing social media platforms have further amplified these efforts, fostering a greater understanding of the program's objectives and benefits. Nguyen et al. (2020) similarly reported that sustained public engagement and media advocacy were critical in improving donor rates and public trust during the early stages of lung transplant program development in Asia and Latin America.<sup>4,5</sup>

Nguyen et al. (2020) also state the early phase of lung transplant programs in developing

countries often encounters limited financial support and incomplete insurance coverage for high-cost procedures and lifelong immunosuppressive therapy.<sup>13</sup> Persahabatan Hospital continues to collaborate with the Ministry of Health and the National Health Insurance Agency (BPJS Kesehatan) to ensure long-term financial sustainability and patient access.<sup>4,5</sup>

### **Milestones Achieved**

While the hospital has not yet conducted its first lung transplant surgery, significant progress has been made in building the infrastructure and processes needed for the program's success. For example, the hospital has developed a lung transplant candidate management system, which includes a patient registry, a system for matching donors and recipients, and protocols for coordinating with other hospitals and transplant centers.

Despite the challenges faced, significant milestones have been achieved in the development of the lung transplant program at Persahabatan Hospital. One of the key accomplishments is the establishment of a comprehensive candidate management system. This system facilitates the evaluation and tracking of potential transplant candidates, ensuring that they receive timely assessments and appropriate care. The implementation of electronic health records has also streamlined communication among team members, enhancing collaboration and efficiency.<sup>5</sup> This aligns with global best practices noted by Nguyen et al. (2020), who reported that digital integration and multidisciplinary coordination are critical success factors in newly established transplant programs across Asia and Latin America.

Training and collaboration among specialists have been integral to the program's progress. The transplant team has engaged in continuous education and training initiatives to enhance their skills and knowledge in lung transplantation. Collaborations with international transplant centers have provided valuable insights and best practices, enabling the team to refine their protocols and improve patient outcomes. This commitment to

ongoing education is essential for maintaining high standards of care within the program. Nguyen et al. (2020) emphasized that sustained international collaboration is a defining feature of successful early-stage programs, noting that long-term mentorship and cross-institutional partnerships significantly improve surgical performance and postoperative outcomes.<sup>13</sup> Persahabatan Hospital's engagement with regional and international centers exemplifies this approach.<sup>5</sup>

In addition to the clinical challenges, there are also significant legal, ethical, and sociological issues that must be navigated in the establishment of a lung transplant program. In Indonesia, the legal framework for organ donation is still evolving, and there is limited public awareness of the importance of organ donation.

To address these challenges, Persahabatan Hospital has been working with government agencies, legal experts, and advocacy groups to develop a clearer policy on organ donation and transplantation. Public education campaigns have also been initiated to raise awareness about the benefits of organ donation and to encourage people to register as organ donors. These advocacy efforts have included the signing of several Memoranda of Understanding (MoUs) under the *Jejaring Rumah Sakit untuk Donor dan Resipien (Jarum-DR)* network with hospitals such as RSUD Jatisari Karawang and RS Paru Dr. H.A. Rotinsulu Bandung. As documented on the hospital's website, these agreements aim to create a coordinated inter-hospital network to facilitate organ identification, retrieval, and transport.<sup>4,5</sup> Nguyen et al. (2020) similarly highlighted that the establishment of nationwide donor–recipient networks is a hallmark of sustainable transplant systems, enabling more equitable organ distribution and reduced waitlist mortality.<sup>13</sup>

Community outreach and education efforts have been instrumental in raising awareness about lung transplantation and organ donation. Persahabatan Hospital has organized workshops, seminars, and public campaigns to educate the community about the importance of organ donation and the potential impact of lung transplantation on

patients' lives. Engaging with local media and utilizing social media platforms have further amplified these efforts, fostering a greater understanding of the program's objectives and benefits. A notable initiative included a joint workshop with the Indonesian National Police (POLRI) in March 2024, as highlighted on the hospital's official site, aimed at strengthening logistics, donor identification, and emergency coordination.<sup>5</sup> Such multi-sector collaboration reflects the strategic model recommended by Nguyen et al. (2020), in which law enforcement and public institutions play active roles in organ procurement systems.<sup>13</sup>

### Future Directions and Goals

As the lung transplant program continues to develop, plans for the first lung transplant surgery are underway. The transplant team is actively working to identify suitable candidates and secure donor organs. This milestone represents a significant achievement for the program and will serve as a testament to the dedication and hard work of the entire team. Successful execution of the first transplant will pave the way for future surgeries and establish a foundation for the program's growth.

To address the ongoing challenge of donor organ availability, the program is implementing several strategies. These include enhancing public awareness campaigns to promote organ donation, establishing partnerships with hospitals to facilitate the identification of potential donors, and advocating for policy changes to support organ donation initiatives. Additionally, the program aims to develop a registry of potential organ donors to streamline the matching process and improve access to donor organs.<sup>5</sup>

Looking ahead, there are plans to expand the lung transplant program to other regions in Indonesia. This expansion will involve collaborating with regional hospitals and healthcare providers to establish satellite transplant centers. By decentralizing the program, more patients will have access to lung transplantation services, ultimately improving health outcomes across the country. Training programs for healthcare professionals in these regions will also be

essential to ensure that they are equipped to manage transplant candidates effectively.<sup>5</sup>

The establishment of the lung transplant program at Persahabatan Hospital represents a significant advancement in respiratory healthcare in Indonesia. It addresses the urgent need for effective treatment options for patients with severe lung diseases and offers hope to individuals who may otherwise face a bleak prognosis. The program's development is a testament to the commitment of healthcare professionals and stakeholders to improve lung health in the country. To ensure the success of the lung transplant program, a collaborative effort among stakeholders in healthcare is essential. Policymakers, healthcare providers, and community leaders must work together to promote organ donation, enhance public awareness, and support the program's initiatives. By fostering a culture of acceptance around organ donation, we can increase donor organ availability and improve patient outcomes.

## CONCLUSION

The vision for the future of lung transplantation in Indonesia is one of hope and progress. As the program continues to evolve, it has the potential to transform the landscape of respiratory healthcare in the country. By overcoming challenges and achieving milestones, the lung transplant program at Persahabatan Hospital can serve as a model for other regions, ultimately expanding access to life-saving treatments for patients across Indonesia. The journey toward establishing a robust lung transplant program is ongoing, but the commitment to improving lung health and saving lives remains unwavering.

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