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How to Enhance Kidney Donation around the World: A Summary of Expert Opinions from the 5th International Congress of Chinese Nephrologists

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Keywords
Chronic kidney disease · Dialysis · Kidney donation · Kidney transplantation · Kidney replacement therapy

Abstract
Background: Kidney transplantation is the best modality of kidney replacement therapy for kidney failure, and yet global shortages of donor kidneys persist. ***Summary:*** The 5th International Congress of Chinese Nephrologists (ICCN), held in Hong Kong from December 13–15, 2024, hosted a "Kidney Donation Roundtable Workshop" to address this critical issue. The incidence of kidney transplantation varies across countries and regions, and detailed evaluation is essential to guide stakeholders in developing strategies to enhance kidney donation and improve patient outcomes worldwide. This paper summarizes expert opinions from the congress, focusing on strategies to enhance kidney donation globally. ***Key Messages:*** Improving public education, addressing ethical and cultural barriers, optimizing organ

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allocation systems, and leveraging policy incentives to promote both living and deceased donation are cornerstones in combating donor kidney shortages.

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Introduction

Chronic kidney disease (CKD) poses a significant global healthcare challenge and affects over 10% of the world's population (more than 800 million patients) while severely diminishing quality of life and increasing mortality risks [1]. The Global Burden of Disease (GBD) study identified diabetes and CKD as growing threats to global health [2]. The number of people receiving kidney replacement therapy (KRT) is expected to rise from 2.6 million in 2010 to 5.4 million by 2030 [3]. Kidney transplantation remains the optimal treatment for kidney failure. According to the 2024 United States Renal Data System (USRDS) Annual Data Report, kidney transplant incidence in 2022 varied widely, ranging from 79 per million population (pmp) in the USA, 72 pmp in Spain, and 67 pmp in Jalisco, Mexico, to less than 10 pmp in regions like Hong Kong (8 pmp), Malaysia (7 pmp), and Ethiopia (1 pmp in select metropolitan areas). Most European countries reported incidences of 30–50 pmp, while areas like Guatemala recorded as low as 0.1 pmp [4]. According to the Organ Procurement and Transplantation Network (OPTN), approximately 27,329 kidney transplants were performed in the USA in 2023, while 89,792 patients remained on the waiting list for a kidney transplant as of September 2024, highlighting a significant organ shortage [5, 6]. To address these issues, experts from countries and regions including Australia, Canada, China, Hong Kong, Malaysia, New Zealand, Singapore, Taipei, UK, and USA convened at the 5th ICCN on December 13, 2024, to evaluate strategies for improving kidney donation and patient outcomes worldwide. This review summarizes global kidney donation epidemiology and related policies.

Australia and New Zealand

The Australian Government Department of Health and Aged Care oversees organ donation in Australia, while the Organ and Tissue Authority (OTA) agency works to increase organ and tissue donation rate. Australians can register their intent to donate on the Australian Organ Donor Register, specifying which organs and tissues they wish to donate after death. Australia employs an "opt-in" consent system, requiring explicit consent for organ and tissue donation. Irrespective of whether a person has registered the intention to donate organs and tissue after death, family consent is required for donation to proceed [7]. In 2023, 37% of actual deceased donors were registered organ donors.

Organ donation in Australia has risen steadily over the past decade, yet the demand for transplants continues to outstrip the supply of donor organs. In 2023, there were 513 deceased organ donors, corresponding to 19.3 donors pmp, up from 16.9 pmp in 2013 [8, 9]. Of 194 intended donors in 2023 (consent and organ donation process has commenced but donation did not proceed), donation did not proceed primarily due to medical contraindications or timing issues for donation after circulatory determination of death [10]. As of January 2025, there were 1,426 people waiting for kidney-only transplants, 62 waiting for simultaneous pancreas-kidney transplants, 108 waiting for liver-only transplants and 190 waiting for heart and/or lung transplants [11]. In 2023, most deceased donors were male, aged 45–64, with donation after neurological determination of death accounting for 65% of donors [9]. Intracranial hemorrhage and cerebral hypoxia/ischemia was the dominant cause of death of actual donors, accounting for almost 70% of overall deaths [12]. In 2023, of the 502 kidney donors, 907 kidneys were retrieved and utilized for transplantation into 829 patients with kidney failure, of which 35% of kidneys were transplanted following the donation after circulatory determination of death donation pathway. The non-utilization rate (retrieved but not transplanted) for deceased donor kidneys in 2023 was approximately 7%, down from over 10% in 2019 [10] (Fig. 1).

A recent national review of the organ donation process in Australia led to the development of the National Strategy for Organ Donation, Retrieval and Transplantation report, of which three key priorities were identified to improve organ donation rate: improving governance structure of the donation, retrieval and transplantation system; improving organ donation and transplantation rate among Aboriginal and Torres Strait Islander Australians and Australians who live in rural and remote locations [13]. This 5-year plan aims to boost organ donation rates, optimize retrieval systems, and ensure a more equitable transplant allocation process in Australia.

Canada

Canada's universal healthcare system, established under the Canada Health Act of 1984, ensures access to care based on need rather than ability to pay, with roots

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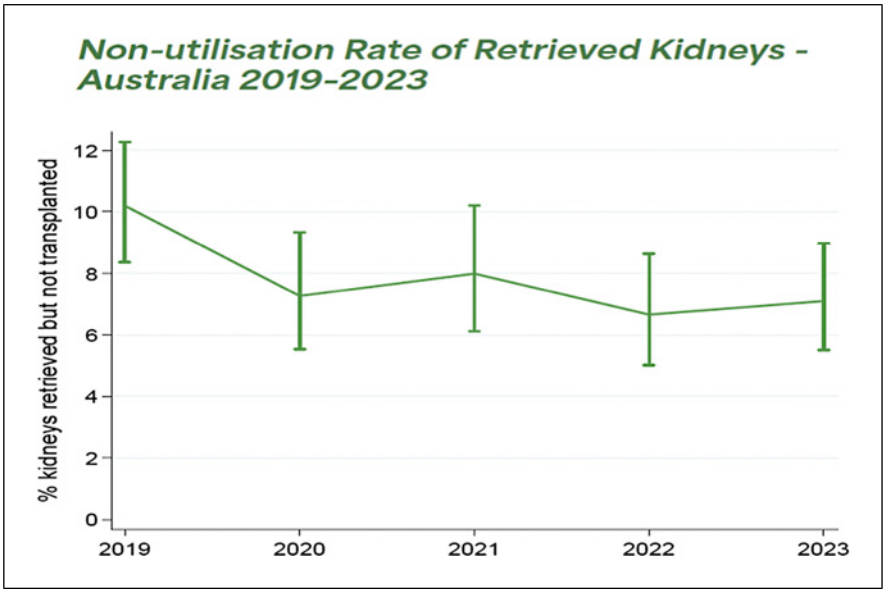


Fig. 1. The non-utilization rate (retrieved but not transplanted) for deceased donor kidneys in 2023 was approximately 7%, down from over 10% in 2019 (Source: The Australia and New Zealand Organ Donation Registry (ANZOD) 2024 report [10]).

in Saskatchewan's 1947 Medicare program. Administration and service delivery remain highly decentralized [14].

Canada hosts 18 adult transplant centers (18 kidneys, 8 livers, 7 hearts, 4 lungs, 6 pancreases, 4 islets, 2 intestines), 10 pediatric transplant centers and 10 provincial organ donation organizations [15]. The Ajmera Transplant Center at University Health Network in Toronto operates the second largest transplant program in North America. Several organizations and programs are crucial in promoting organ transplant: Canadian Blood Services, Organ Donation and Transplantation Collaborative, Canadian Donation and Transplantation Research Program and Canadian Society of Transplantation. Interprovincial Organ Sharing Registries, such as the Kidney Paired Donation program (since 2009), Highly Sensitized Patient Registry (since 2013), National Organ Waitlist (since 2012), and Heart Registry for high-status patients (since 2023) work together to enhance access. Of the 1,106 transplants completed as of May 22, 2024, 92 were from paired exchanges, 242 were from closed chains, 772 were from domino chains. More than 950 transplants were facilitated by the highly sensitized patient registry by March 2024 [16].

Between 2014 and 2023, KRT initiations grew by 0.5% annually, while solid organ transplants surged by 43%. In 2023, nearly 50,000 Canadians had kidney failure, with 29,906 on peritoneal dialysis or hemodialysis and 19,356 living with a functioning kidney transplant [15]. As of December 31, 2023, 3,427 patients awaited solid organ transplants, including 71% for kidneys, 14% for livers, 5% for lungs, 3% for hearts, 3% for pancreases, and 3% for multi-organ transplants [15]. In 2023, 3,369 solid organ transplants were performed, with deceased donors rising 15% (from 827 in 2022 to 951 in 2023) and living donors increasing 21% (from 490 in 2020 to 594 in 2023) [15]. Only 1–2% of hospital deaths are eligible for deceased donation, limiting opportunities.

Public education efforts, led by the Public Education and Awareness Committee (PEAC) and an expanded Community Forum, aim to boost transplant awareness, foster national collaboration, develop a public education strategy, and increase registered donors. Living Donation Week, an annual event by the Centre for Living Organ Donation, promotes transplantation awareness, and is supported by online educational resources and tools.

China

The primary organization overseeing kidney donation and organ transplantation in China is the China Organ Donation Administrative Center (CODAC), managed by the Red Cross Society of China. CODAC coordinates organ donation activities, promotes public awareness, and ensures adherence to national regulations [17]. The China Organ Transplant Response System (COTRS), established in 2011, was responsible for the allocation of donated organs in a transparent and automated manner. Additionally, Organ Procurement Organizations (OPOs) operate at regional levels to facilitate organ donation and procurement processes. The Kidney Transplantation Quality Control Center monitors the

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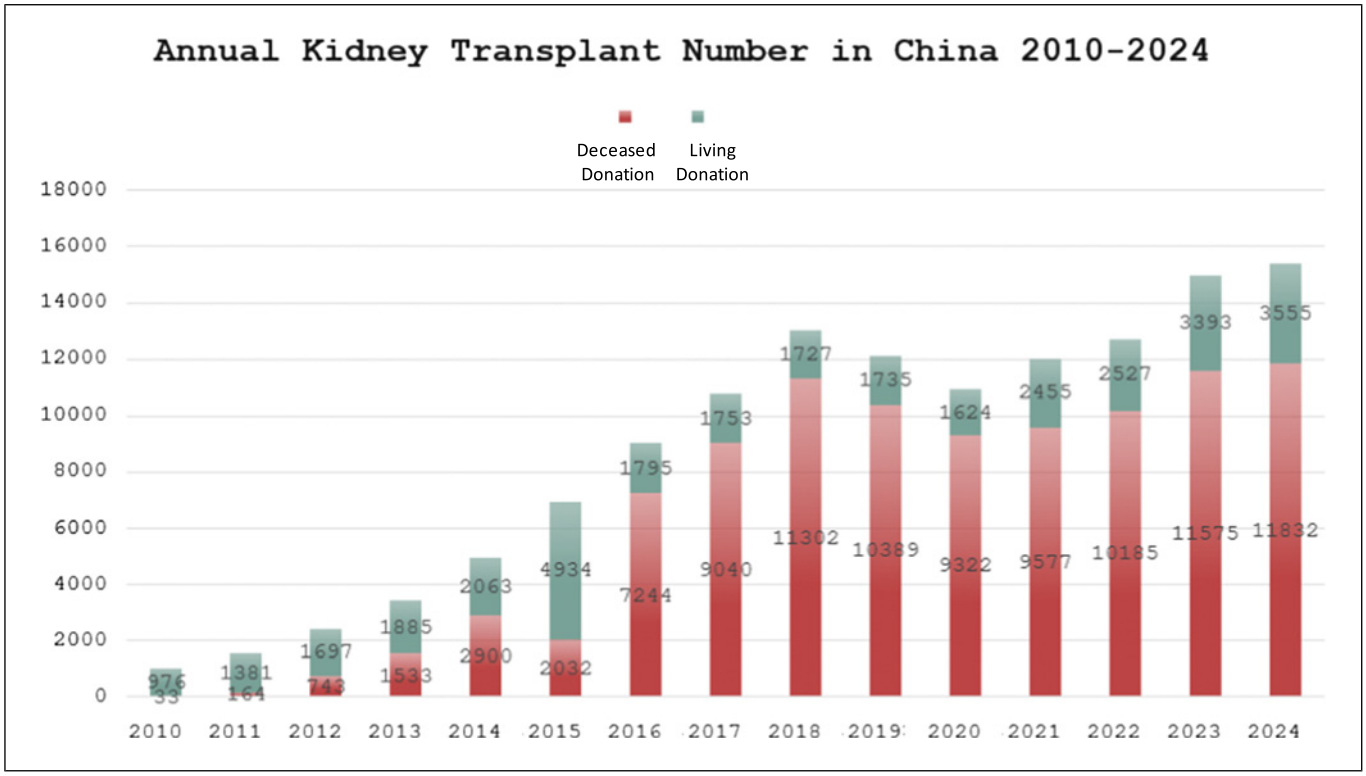


Fig. 2. Annual kidney transplant number in China 2010–2024 (Source: Chinese Scientific Registry of Kidney Transplantation 2025 [20]. https://www.csrkt.org.cn/).

quality and outcomes of kidney transplant programs across the country.

There are approximately 132.3 million CKD patients in China and 2.8 million of them were receiving KRT [18]. The total medical expenditure of inpatients with CKD was 23,780 million renminbi (RMB) in 2015 (3,430 million USD as of October 2018), accounting for 6.3% of the overall inpatient expenditure, despite CKD patients comprising only 4.8% of hospitalized patients. The median inpatient cost for CKD was 14,965 RMB (IQR: 8,302–28,282), higher than for diabetes (13,749 RMB [IQR: 7,666–24,955]) and non-CKD patients (11,219 RMB [IQR: 5,867–18,556]) [19].

The first kidney transplant in China was done in the Peking University First Hospital in 1960 and the first successful living donor kidney transplantation was done in the First Affiliated Hospital of the Sun Yat-Sen University in 1972. China has made significant strides in kidney donation through centralized systems like CODAC and COTRS, supported by an extensive network of transplant hospitals. The total number of solid organ transplants had been rising throughout recent decades, reaching 15,387 transplants in 2024. The number of deceased donors increased by 27% (from 9,322 in 2020 to 11,832 in 2024) while the number of living donations increased by 119% (from 1,624 in 2020 to 3,555 in 2024) [20] (Fig. 2). However, by the end of 2019, 47,382 patients (approximately 33.9 pmp) were still on the waiting list for kidney transplant in China [18], highlighting a persistent gap between supply and demand which is exacerbated by cultural barriers.

Hong Kong

Organ transplants in Hong Kong Special Administrative Region, China are subject to regulation under the Human Organ Transplant Ordinance and the organ procurement system is based on an opt-in approach. The traditional Chinese belief of preservation of body integrity after death made an opt-out approach difficult. A survey in Hong Kong showed clear objection (66%) to presumed consent for organ donation and only 28% agreed [21].

The dialysis population in Hong Kong tripled from 2,261 in 1996 to 7,014 in 2022. An additional 3,515

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patients had functioning kidney grafts in 2022 (3,058 deceased donor transplants and 457 living donor transplants), representing a prevalence of 472 pmp [22, 23]. Donation rates were low, at 4.7 pmp in 2022 and 3.2 pmp in 2023. The overall transplant rate in Hong Kong remained modest, with 59 kidney transplants (8 pmp) completed in 2024, including 41 from deceased donors and 18 from living donors. Nevertheless, 2,476 patients remained on the kidney transplant waiting list [23]. A high family refusal rate (48%) significantly contributed to potential donor losses, compounded by cultural beliefs, religious objections, and limited public awareness [24]. Transplant outcomes showed death-censored graft survival rates for living donor kidney transplant performed in Hong Kong during 2010 and 2019 of 97% at 1 year and 94% at 5 years, while deceased donor kidney transplant had rates of 97% at 1 year and 89% at 5 years [25].

The Paired Kidney Donation Pilot Programme, launched in 2018, facilitated Hong Kong's first paired kidney donation in 2021, enabling transplantation for incompatible donor-recipient pairs. Promotion efforts include booths at Smart Identity Card Replacement Centers and over 580 organizations have pledged to promote organ donation in the community by signing the Organ Donation Promotion Charter since its launch in 2016.

Malaysia

Malaysia is a country in Southeast Asia with a population of 34 million [26] and a GDP per capita of USD 11,691 in 2023 [27]. Total expenditure on health was 5% of GDP in 2021, of which 58% was from the public sector [28]. The prevalence of CKD is 15.5%, with stages 3–5 accounting for 6.8% [29].

The Human Tissues Act legislation was introduced in 1974 to enable organ retrieval from deceased donors for transplantation. This law formed the basis for the "opt-in" system of deceased organ donation, which remains in place today. The first living-related (sibling) donor kidney transplant was done in 1975, and the first deceased donor kidney transplant was performed in 1976 [30]. A National Policy on Cell, Tissue and Organ Transplantation was published in 2007 [31]. In the deceased donor transplant program, a national waiting list of patients is maintained by the Malaysian Society of Nephrology. The Malaysian Organ Sharing System (MOSS) was established in 1999 [32] and changed to the electronic online version, eMOSS, in 2006. Organ allocation was based entirely on dialysis vintage. A major revamp of the kidney allocation system was undertaken in 2019, using modified United Network for Organ Sharing (UNOS) criteria and incorporating the Estimated Post Transplant Survival (EPTS) score to optimize the utility of scarce kidneys and improve allograft and recipient outcomes. The factors included in the formula are the candidate's age in years, duration on dialysis in years, current diagnosis of diabetes, and whether the candidate has had a prior solid organ transplant. The new allocation system is referred to as Malaysian Kidney Allocation System (MyKAS) [33].

The number of patients with kidney failure treated with dialysis continues to rise annually, making Malaysia the country with the sixth highest rate of prevalent dialysis patients globally; however, it is ranked second lowest in the international comparison for kidney transplantation rate per 1,000 dialysis patients, as reported by the USRDS for 2021 [34]. In 2023, Malaysia had 53,210 prevalent dialysis patients and 2,101 kidney transplant patients. Transplants make up 3.8% of patients on KRT. The median age of prevalent dialysis patients in 2023 was 56.5 years [35]. The new transplant rate increased from 3 pmp in 2014 to 8 pmp in 2023. There are 7 accredited kidney transplant centers in Malaysia. In 2023, 81 deceased donor transplants and 168 living donor transplants were performed. Another 30 new transplant recipients received kidney graft in another country, notably 23 from Cambodia. Patient survival for renal transplants was 93% at 5 years, and graft survival was 91% at 5 years.

Health economic research to assess the cost and utility of kidney transplantation in Malaysia was conducted in 2009. The study, which used micro-costing methods, showed that the cost per quality-adjusted life year in adults was RM 30,224 (USD 8,826) for living-donor kidney transplants and RM 46,546 (USD 13,592) for deceased donor kidney transplants [36].

Studies have identified barriers to transplantation in Malaysia [37]. One component may be related to society with an extremely low donor pledge rate. Society must understand and value organ donation to initiate the process. To increase donation rate, government and non-governmental organizations have organized an organ donation awareness week annually since 2014. The Community Organ Donation Drive (CODE) Life, sponsored by National Kidney Foundation since 2018, is ongoing [38]. Monthly transplant awareness walks are sponsored by the Rotary Club [39] and Varsity Pledge for

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Urgent Life Saving Efforts (P.U.L.S.E), targeting university students and sponsored by the Ministry of Higher Education, was launched in 2024 [40]. In 2022, the Minister of Health allowed organ pledging via the mySejahtera application [41]. This app was used during the COVID-19 pandemic for vaccination, tracking, and tracing throughout the country.

There was a low donor detection rate in major hospitals. In 2019, Organ Procurement Units were established in 16 focus Ministry of Health hospitals with dedicated human resources [42]. Their terms of reference were to detect all potential brain-dead persons, ensure brain death test to be performed in all suspected brain-dead persons, counsel the family members of all suitable potential donors, refer all cases to transplant centers, coordinate the procurement of organs, audit the process and conduct training and promotional activities about organ donation. Their efforts have been partially successful, although delayed by COVID-19. In 2021, 14 deceased donor kidneys were procured, 44 in 2022, and 82 in 2023.

There are issues with human resources, and more nephrologists are being trained to care for transplant patients. There are currently 292 nephrologists in Malaysia [43]. The number of living-donor renal transplants may be increased by performing ABO-incompatible transplantation [44] and HLA incompatible transplants [45], reported since 2011 and 2016, respectively. Transplantation of HCV RNA-positive deceased donor kidneys into HCV-negative recipients has been successfully performed since 2021, using direct-acting antiviral agents for HCV posttransplantation. Previously discarded HBV-positive deceased donor kidneys have also been successfully transplanted since 2019 into HBV-negative recipients with antibodies to HBV who received antiviral prophylaxis post-transplant. Increasing the number of deceased donor transplants involves accepting marginal donors who are older (e.g., >70 years old) or those aged 60–69 years with risk factors like hypertension, diabetes mellitus, or cardiovascular disease. The quality of donated kidneys can be assessed using the Kidney Donor Profile Index (KDPI) score, which originated in the USA. Local data suggest that donated kidneys with a high KDPI score (>85%) have similar 5-year graft survival rates to those with lower scores.

Singapore

Organ transplantation in Singapore is governed by two major legislative acts: the Medical (Therapy, Education and Research) Act (MTERA) and the Human Organ Transplant Act (HOTA). Enacted in 1972, MTERA allows individuals over 18 years old to donate their organs and tissues for therapy, education, or research after death, operating on an opt-in system that requires explicit consent from the donor or their next of kin. In contrast, HOTA, enacted in 1987, works on an opt-out system, automatically permitting the removal of kidneys, heart, liver, and corneas from Singaporean citizens and permanent residents over 21 years old who have died, unless they have opted out. HOTA focuses primarily on transplantation, while MTERA has a broader scope that includes research, education, and therapy.

According to the Singapore Renal Registry Annual Report 2022 [46], the crude incidence rate of kidney transplants was 18.7 pmp in 2022. In 2022, a total of 72 kidney transplants were performed, including 50 living kidney donor transplants and 22 deceased donor transplants. The 10-year graft survival rate for living donor transplants was 82.8%, with a corresponding patient survival rate of 89.1%. In contrast, the 10-year graft survival rate for deceased donor transplants was 67.9%, with a patient survival rate of 80.7%.

Key milestones in kidney donation and transplantation in Singapore include the first deceased donor kidney transplant in 1970, the first pancreas-kidney transplant in 2012, the first paired-exchange kidney transplant in 2015, and the mainstreaming of kidney donation after circulatory death slated for 2024. In 2017, pancreas transplant services (simultaneous pancreas-kidney transplant being the most common) were expanded to include both type 1 and type 2 diabetic patients, aiming to improve their quality of life and reduce long-term complications.

The National Kidney Foundation Kidney Live Donor Support Fund, established in 2009, encourages living kidney donors by providing financial protection, reimbursement for pretransplant evaluation and screening costs, and compensation for income loss. Raising public awareness and educational initiatives have been crucial. Campaigns such as the Live On Campaign and the Live On Festival, along with the inclusion of organ donation topics in school textbooks, aim to enhance awareness about organ donation. These initiatives, including roadshows, exhibitions, websites, and social media, aim to encourage more individuals to opt in under MTERA and decrease opt-out rates under HOTA. In addition, ongoing strategies to maximize organ donation include continuous education and training for healthcare professionals, policy changes to expand the donor pool, the introduction of donor coordinators, intensive care unit audits to ensure potential donors are identified, and the implementation of the Organ Transplant Improvement Program across hospitals.

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Taipei

The Taipei authority promulgated "Human Organ Transplantation Act" in 1987, and the Department of Health passed complementary measures called the "Brain Death Assessment Policy" in 1987, establishing the first organ donation and transplantation legal regulation in Asia, ensuring ethical practices, and prohibiting organ trafficking. Donations after circulatory death were officially permitted following the establishment of Guidelines of Organ Donation after Cardiac Death by the Ministry of Health and Welfare in 2017. Living donor eligibility was restricted to within third-degree consanguinity and spouse since 1987 and was expanded to fifth-degree consanguinity and spouses in an amendment enacted in 2022. The Department of Health established the "Organ Registry and Sharing Center" in 2022 to organize organ transplantation; all organ donors and recipients should be registered electronically, and the organ allocation process is computerized. Taipei operates an opt-in system for deceased donation, requiring explicit consent, and family approval is often sought.

The first kidney transplantation was performed from a live donor in Taipei in 1968 [47]. Despite a high prevalence of kidney failure (approximately 3,500 pmp), the organ donation rate remained suboptimal (4.4 pmp) due to cultural beliefs favoring body integrity after death, while the kidney transplant rate was 14 pmp (deceased donors 7.5 pmp, living donors 6.5 pmp) in 2022 [48]. In 2023, there were 242 deceased donor kidney transplants and 200 living donor kidney transplants [48]. The Paired Kidney Exchange Program, legalized under the 2015 amendment to the Human Organ Transplant Act, allows incompatible donor-recipient pairs to exchange kidneys, increasing transplant opportunities.

UK

There has been a significant number of patients waiting for kidney donations despite well-established kidney donation programs in the UK. In 2023–2024, 6,250 people were waiting for kidney transplantation; 899 living donors and 2,298 deceased donor kidney transplants were performed [49]. The median waiting time for kidney-only transplant was 489 days for adults and 337 days for pediatric patients registered between 2017 and 2021.

Multiple approaches are being used to increase kidney donations. For living kidney donations, early discussions with patients and their families are a key step. In clinical centers, multidisciplinary teams, including specialist nurses, transplant coordinators, physicians, and surgeons, hold regular meetings with patients and their families to improve understanding and preparation for kidney transplantation. These meetings facilitate timely workup of patients for kidney transplantation and early identification of potential living donors for discussion and preparation.

Improved communication with the public and the patients' families is crucial in overcoming barriers to kidney donation. It is important to use language accessible to a wide range of people and avoid jargon. In the UK, this must consider the culture of multiethnic communities. Overcoming language barriers is important; multilingual materials (leaflets and videos) and the assistance of translators are essential. Multiple initiatives, supported by National Health Services and charities, aim to develop a deeper understanding of potential barriers in this area [50]. An online transplant TV channel for medical professionals, patients and carers has been set up by the Institute of Transplantation, Freeman Hospital, Newcastle upon Tyne [51]. Using these approaches, stories from organ donors and patients, along with scientific and medical information, are shared using language accessible to the public. Community representatives have a key role in improving interactions with patients and potential donors in ethnic groups. In particular, free Peer Support Services for patients with kidney disease and their families have been established by charities, such as National Kidney Foundation [52].

Since 2019, there have been legal changes to organ donation in the UK. An opt-out system for organ donation was introduced, presuming that upon a person's death, they consent to donate their organs unless they or their families indicate otherwise. Individuals can still register their decision to donate their organs and are encouraged to discuss their decision with their families. All adults who have not confirmed whether they want to be a donor are considered willing to donate their organs and tissue upon death unless they choose to opt out [53].

USA

The USA utilizes the opt-in system for organ donation, and does not allow family to override the decision. Notwithstanding the legal binding of the registration, most Organ Procurement Organisations (OPOs) are reluctant to proceed with donation against the wishes of grieving family members, even when the deceased had legally authorized donation.

In 2024, 27,759 kidney transplants were performed in the USA, representing a 200% increase since 1990 [54]. Despite this record, over 48,500 patients with

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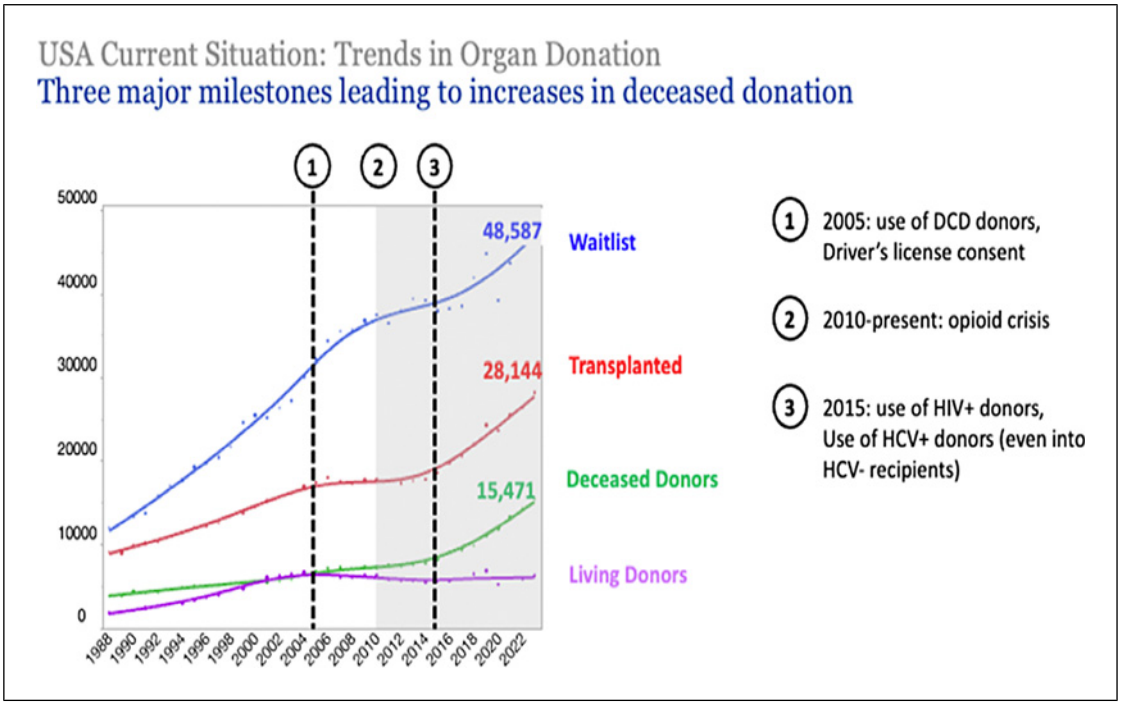


Fig. 3. Current trends in organ donation in the USA – three major milestones leading to increases in deceased donation.

kidney failure remain on the waitlist, with the number of patients awaiting transplantation continually outpacing the transplant rate. The number of deceased donors has risen substantially, with approximately 31,700 kidneys recovered in 2024 [54]. However, the living donation rate has remained stagnant over the past 2 decades (Fig. 3). Currently, 65% of the US adult population (170 million individuals) are registered organ donors [55].

Three major milestones in organ allocation contributed to a 300% increase in the deceased donation rate since 1990. First, in 2015, the "Organ Donation Breakthrough Collaborative" was implemented, requiring all OPOs to adopt standard protocols for donation after circulatory death recovery, and consent for donation was added to driver's licenses. Second, the opioid crisis, beginning in the 2010s and continuing to the present, led to a 24-fold increase in donors [56]. Third, the expansion of criteria for medically suitable organs now includes HIV-positive and HCV-positive donors.

Despite improved consent and donation rates and the growing need for kidney transplants, many recovered kidneys are discarded. Currently, 30% of kidneys recovered for transplant are not used (non-utilization rate) [57], equating to over 9,000 kidneys that, if transplanted, would have reduced the waitlist by nearly 20% [58]. Kidneys from donors with a high kidney donor profile index (KDPI) >85% are most frequently unused, with a non-utilization rate of 60% [59].

The primary reason for non-utilization is "no suitable recipient located," accounting for 60% of cases. In USA, "no suitable recipient located" is a particular code offered as an option on the reporting form. Essentially it means that the entire match list of candidates was exhausted. The donor could have been turned down by each center for a variety of differing reasons. This raises the question: How could the match list with thousands of candidates be exhausted without finding a suitable patient? Without understanding the specific reasons for non-utilization, developing predictive measures is challenging. We need to analyze the characteristics leading to non-utilization and compare donor and kidney characteristics to those of successfully transplanted kidneys to better understand graft outcomes of these "marginal" kidneys. While these organs may have shorter longevity, certain candidates – particularly older patients with significant comorbidities who tolerate dialysis poorly – could benefit from high KDPI kidneys.

Another potential contributor to the high non-utilization rate is that OPOs may be too aggressive

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Table 1. Summary of consent systems and overrule policy

Country/Region	Consent system	Family's role to overrule[a]
Australia	Opt-in	Formal
Canada	Opt-in	Formal
China	Opt-in	Formal
Hong Kong	Opt-in	Formal
Malaysia	Opt-in	Informal
Singapore	Opt-out	Not allowed
Taipei	Opt-in	Formal
UK	Opt-out	Formal
USA	Opt-in	Informal

[a]Informal overrule: no legal right to overrule, but clinicians do permit it under certain circumstances.

in pursuing organ donors who are not suitable for transplantation, wasting resources that could be better directed. Historically, OPOs faced less regulatory scrutiny than transplant centers. To address this, the Centers for Medicare & Medicaid Services (CMS) released a Final Rule in 2020 modifying OPO performance measures and minimum thresholds in their conditions for coverage. OPOs now face decertification if their donation or transplantation rates fall significantly below the median. This policy went into effect in 2022, with OPOs accountable during their 2026 recertification. Whether this improves organ recovery efficiency and transplant rates remains to be seen.

Strategies to improve utilization rates are included in the federal "Increasing Organ Transplant Access Model" (IOTA). This initiative aims to increase kidney transplants and address disparities among recipients by providing performance-based incentives. Incentives depend on whether transplant centers increase the transplant number, reduce inappropriate kidney discards, and maintain graft and patient survival outcomes. IOTA, a 6-year mandatory project, begins in July 2025. Half the centers in a donation service area will participate, with the other half as controls. Participating centers will receive an additional USD 15,000 per kidney transplant (upside risk payment) if they meet metrics but face a USD 2,000 penalty for failure (downside risk payment).

Other practice-related strategies to improve deceased donor organ transplantation include identifying and adopting best practices from high-performing OPOs among low-performing OPOs. Additionally, identifying transplant program best practices that encourage the successful use of a broader range of organs, especially from donors with high KDPI, is essential. Improving the assessment of suitable donors to reduce unnecessary procurements and suitable candidates for marginal organs to reduce non-utilization rates, along with creating computerized tools to aid OPOs and transplant clinicians in these assessments, could enhance efficiency. Developing innovative technologies to improve organ quality from marginal donors is another promising approach.

Despite record-breaking kidney transplant numbers in 2024, critical challenges persist, including a 30% non-utilization rate of recovered kidneys and a growing gap between waitlisted patients and available organs. National regulatory frameworks, initiatives, and local adoption of best practices by OPOs and transplant programs must be pursued concurrently to address these inefficiencies.

Role of the Family in Deceased Organ Procurement

Family members play a pivotal role in deceased organ donation, often participating in decisions about organ use, even when the deceased's preferences are explicitly documented [60]. Their refusal to consent often prevents the utilization of available organs [61]. Families can influence consent systems in three primary ways [62]: ascertaining and documenting the deceased's wishes, overriding the default consent policy if no preferences were stated, or, in some instances, disregarding the deceased clearly expressed intentions. Table 1 summarizes the consent systems and overrule policy in different countries and regions.

Global Challenges and Potential Solutions for Enhancing Organ Donation

The global organ donation landscape is hindered by several significant challenges that limit the availability of transplantable organs. A major issue is the organ shortage, where the demand for organs, particularly kidneys, far exceeds the global supply, compounded by family consent barriers where refusal, often supported by legal rights to override a deceased's wishes in many regions, leads to non-utilization. Variability in consent systems, with opt-in systems yielding lower donation rates, and cultural and ethical concerns, including religious

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Table 2. Global challenges and potential solutions for enhancing organ donation

Challenges	Description	Potential solutions
Organ shortage	Demand for organs, especially kidneys, far exceeds supply globally	Expand donor pools via opt-out systems (e.g., Singapore, UK), paired kidney exchanges, and use of marginal donors
Family consent barriers	Family refusal is a major cause of non-utilization, with legal rights to overrule deceased's wishes in most regions (except USA)	Enhance public education to address misconceptions and may involve cultural/religious leaders
Consent system variability	Opt-in systems yield lower donation rates	Adopt opt-out systems where culturally appropriate, standardize consent protocols, and improve transparency in organ allocation
Cultural and ethical concerns	Religious beliefs, fear of body mutilation, and mistrust in healthcare systems deter donation	Develop culturally sensitive education programs, engage religious authorities, and ensure ethical practices to build trust
Organ trafficking	Illegal trade exploits vulnerable populations, driven by organ shortages in high-income countries	Strengthen global regulations (e.g., declaration of Istanbul), increase legal donor pools, and monitor transplant tourism
System inefficiencies	Logistical delays, suboptimal matching, and lack of standardized brain death criteria reduce organ availability	Streamline logistics with technologies like ex vivo perfusion, standardize brain death definitions

beliefs, fear of body mutilation, and mistrust in healthcare systems, further deter donation. Additionally, organ trafficking exploits vulnerable populations in high-income countries due to shortages, while system inefficiencies, such as logistical delays, suboptimal matching, and inconsistent brain death criteria, reduce organ availability. To address these challenges, potential solutions include expanding donor pools through opt-out systems (e.g., Singapore, UK), paired kidney exchanges, and the use of marginal donors. Enhancing public education to dispel misconceptions and may involve cultural and religious leaders. Adopting opt-out systems where culturally appropriate with public support, standardizing consent protocols, and improving transparency in organ allocation can address consent variability. Culturally sensitive education programs, engagement with religious authorities, and ethical practices can build trust to mitigate cultural concerns. Strengthening global regulations (e.g., Declaration of Istanbul), increasing legal donor pools, and monitoring transplant tourism can combat organ trafficking, while streamlining logistics with technologies like ex vivo perfusion and standardizing brain death definitions can enhance system efficiency. Table 2 summarizes these global challenges and the potential solutions to enhance organ donation.

Conclusion

The 5th ICCN highlighted diverse strategies and challenges in enhancing kidney donation globally. Experts emphasized tailored approaches, including policy reforms to streamline organ allocation, increased investment in transplant infrastructure, and culturally sensitive education to boost public trust. Collaboration across borders, leveraging successful models, and addressing ethical concerns were deemed critical to closing the global gap in kidney donation and improving outcomes for patients with kidney failure.

Conflict of Interest Statement

P.K.T.L. was a member of the journal's Editorial Board at the time of submission. F.W.-K.T. has received industrial supports for his research work (including research project grants from AstraZeneca Limited, OncoOne, Rigel Pharmaceuticals, and Thornton and Ross Ltd) and consultancy agreements with OncoOne, Rigel Pharmaceuticals, Retrophin, Travere Therapeutics) which do not relate to this article. All the other authors have no conflicts of interest to declare in relation to this article.

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