Global Perspective on Kidney Transplantation: Thailand

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Number of Kidney Transplantation and Waitlist in Thailand

Although the first case of kidney transplantation (KT) in Thailand was performed in 1975, the current transplant registry was only created in 2001 by the Thai Transplant Society. The Thai Transplant Registry receives clinical information from every KT center in Thailand annually. The number of KT in Thailand has gradually increased over the period, especially deceased donor (DD) KT\(^1\) (Table 1). In 2020, number of total KTs in Thailand was 712 or 10.68 KTs per million population. DDKT accounts for approximately 80% of all KTs. The Ministry of Public Health and Thai Red Cross Society have carried out deceased donor campaigns and established donor hospitals in every region, resulting in the significant increase in number of DDs in Thailand. Although organ transplants were suspended for a month (April 2020) from the outbreak of COVID-19 infection, number of DDKTs still increased from 557 in 2019 to 575 in 2020. However, the organ donation rate in Thailand is still relatively low (4.5 DD per million population in 2019).\(^2\) The number of LDKTs has also steadily decreased in the past six years. Last year, 137 LDKTs were performed in Thailand, a decrease from 172 in 2019. Nevertheless, there are currently more than 6,500 active KT recipients in the country.\(^1\)

Despite an increase in number of KTs in Thailand, number of patients on the waitlist is also growing. Unlike in the United States (U.S.) that pre-emptive KT is allowed in both DDKT and LDKT, the policy in Thailand currently did not allow preemptive DDKT due to shortage of DD kidney. In 2019, there were 6,417 end stage kidney disease (ESKD) patients waiting for DDKTs,\(^2\) and approximately 10% received a KT. Moreover, there are many ESKD patients, who are eligible for KTs, but not on waitlist. Based on Thai renal replacement therapy registry, the number of patients who received hemodialysis and peritoneal dialysis in 2019 was 114,262 and 30,869, respectively. Approximately 55% of these dialysis patients were younger than 65, and thus the ratio of patients on waitlist for a KT below the age of 65 was roughly 8%.\(^3\) Although the Thai public health supports KT for all Thai ESKD citizens, there are multiple barriers to evaluation and waitlisting for KT among Thai ESKD patients, such as traveling expense, a negative attitude towards KT, and/or lack of interest in KT due to the long waiting time.
Kidney Transplant Practice in Thailand

In Thailand, KTts are performed by a surgical team consisting of different specialists. We do not have transplant surgeons or transplant nephrologists, who devote all of their time specifically for KT care. Majority of physicians involved in KTts also have other assignments. For example, transplant nephrologists are also assigned to provide care for dialysis patients or general nephrology/kidney disease clinics. Transplant surgeons are also commonly assigned for other abdominal or urological operations in addition to KTts. In 2019, 70% of KTts were performed by a surgical team consisting of a urologist and a vascular, hepatobiliary, or experienced general surgeon. This setting is common in most academic/government and all private hospitals across Thailand. Vascular, hepatobiliary, or general surgeons construct vascular anastomosis, while urologists subsequently create ureteric anastomosis. Urologists and hepatobiliary surgeons performed KTts solely 27% and 3% of all transplants in 2019, respectively. During the immediate and in-hospital posttransplant period, collaborative care is provided by surgeons and nephrologists. The surgeon is primarily responsible for surgical complications, drain and catheter care, while the nephrologist is responsible for management of immunosuppression, renal replacement therapy (if necessary), electrolyte and acid-base disturbances, and associated medical conditions. However, long-term immunosuppression and medical care are provided by nephrologists in almost all KT centers.

Regarding induction therapy, 73.6% of patients received interleukin-2 receptor antagonists in 2019, while 11% were given anti-thymocyte globulin, respectively. The remaining 15% received only steroid without antibody induction. The prevalence of maintenance immunosuppression prescription for KT recipients at discharge from hospital was as follows: tacrolimus (94.6%), mycophenolate (94.3%), and prednisolone (81.6%). The median length of hospital stays for LDKTs and DDKTs in 2019 were 11 (IQR 8 - 16) and 17 (IQR 13 – 25) days, respectively. Delayed graft function (requirement of dialysis after KT) occurred in 3.1% of LDKTs and 36 % of DDKTs. The mean cold ischemic time (CIT) of DDKTs was 17.8 ± 4.5 hours. Mean age of our DDs in 2019 was 37 ± 14 years. The most common cause of brain death was head trauma (62.5%). The prevalence of underlying hypertension, diabetes mellitus and cerebrovascular disease as cause of brain death in DDs was 10.3, 3.4
and 33.3%, respectively. However, most DDs (90.4%) had hypotension, and 17.5% needed cardiopulmonary resuscitation prior to organ procurement.¹

Kidney Transplant Outcomes in Thailand

Transplant outcomes in Thailand are comparable to Japan and the United States.⁴,⁵ Our graft and patient survival rates have gradually improved over the past two decades. Graft and patient survival rates according to transplant year have been summarized in Figure 1. One, five, and ten-year graft survival rate of DDKTs in 2019 was 95.9%, 78.9%, and 58.5%, respectively. The allograft outcome after LDKTs is superior to DDKTs. The one, five, and ten-year graft survival rate of LDKTs in 2019 was 98.2%, 92.6%, and 77.1%, respectively. Around 40% of transplant loss were caused by death with a functioning graft. The main etiologies of early graft failure within five years were rejection (56%), followed by interstitial fibrosis and tubular atrophy (IFTA) (22%), and vascular or urologic complication (11%). Majority of late allograft failures were caused by IFTA (46.3%), rejection (33%), and recurrent glomerular diseases (9%).

Patient survival after transplantation in Thailand is extremely favorable. In 2019, one, five, and ten-year recipient survival rate after DDKTs was 97.2%, 89.5% and 86.2%, respectively, while the one, five, and ten-year survival rate after LDKTs was 99.4%, 96.7%, and 87.9%, respectively. The leading cause of death was infection (34.9%). Cardiovascular and malignancy were reported as the mortality cause in 14.7 and 4.8% of all cases, respectively. However, cause of death in approximately one-third of patients remains unknown. We recently developed our kidney donor profile index (KDPI) and estimated post-transplant survival (EPTS) models from our database between 2001 and 2014. We also analyzed US KDPI and EPTS in our population. The US KDPI of our DDs is relatively low, at median of 36% (22 – 59%), while median US EPTS in our recipients is 14% (7 – 27%).⁶ Thus, one of the most crucial explanations for promising graft and patient survival in Thailand is transplantation of a relatively better kidney quality to healthier candidates. However, a longer CIT, lack of machine perfusion, and inadequate donor care might hinder better outcomes.
Coverage for Kidney Transplantation in Thailand

Currently, Thailand has three government health coverage schemes; the Civil Servant Medical Beneficiary System (CSMBS) for civil servants and their immediate family members (10% of population), the Social Security Organization (SSO) for employees (20% of population) and the Universal Health Coverage Scheme (UCS) scheme for the remaining 70% of population, most of whom have a low income. After UCS launched its universal renal replacement therapy program in 2008, costs of KT surgery, post-operative care, treatment of rejections and long-term immunosuppression has become reimbursable for all Thai citizens. In 2019, KTs were performed under reimbursement from CSMBS, SSO, and UCS for 21%, 33%, and 28% of all cases, respectively. Seventeen percent of patients chose to have KTs performed at a private hospital at their convenience and paid for the cost of KT operation and immunosuppression themselves.

Areas of Improvement

There are several future challenges that remain areas of improvement in our system. First, with a notable increase in the number of DDs, the organ donation rate is still low at 4.5 per million, when compared to western countries. Most DDs come from upcountry, where most local hospitals have no designated donor care and harvesting team. Second, organ procurement is usually performed by a team that needs to travel from transplant center, which is mostly located in Bangkok, the capital city of Thailand. The transportation of procurement team and organ over long distances mostly requires commercial flights, which might not be available all the time. This results in the high prevalence of donor hypotension and relatively long CIT. Third, there is also no pre-transplant biopsy available in Thailand, which limits the use of extremely marginal donors. Fourth, the number of LDKTs progressively reduced over the last 5 years. Therefore, a campaign that targets the living donation might prove essential. Fifth, a single antigen bead HLA antibody test is not reimbursed for most patients. Instead, pre-formed HLA antibodies are identified by specific beads, thus leading to inaccurate identification of pre-formed donor-specific antibodies (DSAs) in highly sensitized patients. For allocation, we are currently in the process of implementing longevity matching to maximize utilization of DD kidneys and
discussions regarding application of calculated panel reactive antibody (cPRA). There is also a limitation in reimbursement of desensitization treatment for patients who had DSA or ABO-incompatible KT. Lastly, post-transplant surveillance for CMV, BK infection, DSA, and CMV prophylaxis with ganciclovir or valganciclovir is currently not included in the KT reimbursement packages in most patients (SSO and UCS). Nevertheless, there has been significant progress in KT in Thailand for the past decade, and we have confidence that successful collaboration among the Thai Red Cross Society, Thai Transplant Society, all transplant centers, and health coverage policymakers will lead to sustainable health and better quality of life for ESKD patients.

**Disclosures**

A. Lumpaopong reports the following: Scientific Advisor or Membership: Nephrology Society of Thailand; Thai Transplantation Society. The remaining authors have nothing to disclose.

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**Author Contributions**

N Larpparisuth: Conceptualization; Data curation; Formal analysis; Investigation; Project administration; Writing - original draft; Writing - review and editing

W Cheungpasitporn: Supervision; Writing - review and editing

A Lumpaopong: Supervision; Writing - review and editing
References


**Table 1**: Number of kidney transplantations in Thailand in the last 10 years.

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DDKT; deceased donor kidney transplantation, LDKT; living donor kidney transplantation, KT; kidney transplantation

**Figure 1**: Graft (Fig 1A) and patient survival rate (Fig 1B) of DDKTs and LDKTs according to each transplant year in Thailand.