The Organization of Kidney Transplantation Services at Ramathibodi Hospital : Fourteen Years Experience on Waiting List, Kidney Donors and Kidney Transplantation

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Abstract

The Kidney Transplantation Program at Ramathibodi Hospital was established in 1985. By the end of 1998, there were 1,614 patients on the cumulative waiting list. The first kidney transplantation (KT) was started in 1986 by using kidney from living-related donor (LD) while cadaveric KT (CD-KT) was started in 1987. A total of 528 KT were done, 278 cases (52.7%) were CD-KT and 250 cases (47.3%) were LD-KT. Six patients had two kidney transplants. 278 kidneys were donated from 189 cadaveric donors. Fifty cadaveric donors (26.4%) were from Ramathibodi Hospital while the rest were from other hospitals and the Organ Donation Center, Thai Red Cross Society. For LD, 233 out of 250 (93.2%) were from living-related, more than 50 per cent of these donors were from siblings. 17 spousal donors have been accepted for KT at Ramathibodi Hospital since 1997. Concerning the recipient pools, 522 patients (32.3%) were transplanted, 123 patients (7.6%) died without KT, 111 patients (6.9%) underwent KT at other hospitals, and 78 patients (4.8%) changed to waiting lists at other hospitals. The rest were lost to follow-up. At present, only 265 patients are still actively waiting (send serum every month). The number of KT and living donors has gradually increased, whereas, the number of cadaveric donors has decreased. However, cooperation with the "Organ Donation Center" has improved the number of cadaveric donation in the last two years. Sufficient organ donations and an active working team will provide a good kidney transplant service for the patients.

Key word : Kidney Transplantation Services, Organization at Ramathibodi

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Kidney transplantation (KT) has been accepted worldwide as the most effective treatment for end-stage kidney disease for over 40 years. There are two sources of kidney donors; living donor (LD) and cadaveric donor (CD). Histocompatibility testing must be examined prior to KT. The success depends on allocating a proper kidney for an appropriate patient by an experienced surgeon and good post-operative care by the nephrologist. The Kidney Transplant Programme at Ramathibodi Hospital was established in 1985, using both LD-KT and CD-KT. Most LD are from living-related donors, whereas, spousal donors have been accepted for the past two years. The working team is composed of surgeons, urologists, nephrologists, anesthesiologists, neurologists, pathologists, radiologists, psychologists, medical technologists and nurses, who work together according to the protocol set up by the Renal Transplant Committee (RTC). Up to now, there have been four chairmen. The new RTC will be elected when there is a new Dean. Professor Phaitun Gojaseni was the first chairman of RTC (1988-1994), then Professor Suchati Indraprasit (1994-1997), Associate Professor Verasing Muangman (1997-1998), and Dr. Suthus Sriphojanart (1998-present).

MATERIALS AND METHOD

Materials :

Patients on waiting list : A total of 1614 patients were studied. All were patients with end-stage kidney disease from the Departments of Medicine and Pediatrics, Ramathibodi Hospital and patients who were referred from other dialysis centers. All were registered on the waiting list for KT at Ramathibodi Hospital from 1985 to 1998.

Kidney donors[1] **:** A total of 528 kidneys from 439 donors were used for kidney transplantation. 233, 17 and 189 donors were from living-related, spousal and cadaveric donors, respectively. For living-related KT, at least one HLA-haplotype sharing with negative lymphocyte crossmatch is accepted. Spousal KT was done only in couples with a marital status of at least three years. Alternatively, the married couples should have children together to gaurantee a true marriage. For cadaveric KT, the donors should have a fulfilled criteria of "brain death" adopted from the Thai General Medical Coucil. Anti-HIV antibody should be negative. ABO identical donor is used for CD-KT, whereas, an ABO compatible donor is used for LD-KT. A positive B cell crossmatch is not considered a contraindication for KT if DTT treatment showed the presence of IgM isotype and the recipients possess autoantibodies in the serum.

Method : Blood group and histocompatibility test were initiated and set up by Professor Pimol Chiewsilp. These included ABO grouping, HLA typing, T&B lymphocyte crossmatchings, panel reactive antibody (PRA) and autoantibody test. HLA-ABC typing (Oriental tray from One Lambda, USA), lymphocyte crossmatching and autoantibody test were performed by NIH-microlymphocytotoxicity test. HLA Class II typing (DR, DQ) was performed by microlymphocytotoxicity test (One Lambda, USA) or DNA typing (PCR-SSP, low resolution, kit from Dynal, Australia). The T and B lymphocyte crossmatchings and autoantibody testing were performed in duplicate in three different temperatures (4°C, 22°C and 37°C) with a long incubation period. The nature of antibody, IgG or IgM, was investigated by DTT treatment test. The IgM antibody will be detroyed by DTT, whereas, IgG activity is still present in two-fold diluted serum. 30 random T and 15 random B lymphocytes were used for PRA screening. PRA was retested after a three months interval. All sera with positive PRA were identified for HLA antibody specificity. The preimmunized HLA antibody specificity was notified in the kidney waiting list. In addition, HLA mismatched specificities from previous KT were also identified. This is aimed to avoid repeated HLA mismatch immunization. Other pretransplant evaluation included a test for infectous markers, complete blood count (CBC), general blood chemistries, and urinary examinations. Complete physical examination, chest X-ray and EKG were also routinely performed[1]. List of recipients was updated once a month. Anti-HIV, HBsAg, anti-HBs, anti-HBe, anti-HCV, CMV-Ab (IgM & IgG) were tested by ELISA technique.

RESULTS

Table 1 shows the number on the waiting list, number of donors received, and number of KT performed from 1985 to 1998. The cumulative number of patients waiting for KT at Ramathibodi Hospital for 14 years was 1,614 patients. The number of new patients registered for KT was not much in the first 3 years. The highest number of patients per year was in 1996 with 179 patients. Since 1998, patients were eligible to be registered at only one

Table 1. Number of patients, donors, and kidney transplantations at Ramathibodi Hospital (1985-1998).

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
No. of Patients/yr	5	16	27	70	120	131	114	161	172	164	170	179	175	110	1614
No. of Donors/yr	0	3	9	25	18	23	27	29	27	32	39	53	76	78	439
No. of CD	0	0	7	24	16	19	17	10	15	19	15	9	12	26	189
No. of LD	0	3	2	1	2	4	10	19	12	13	24	44	64	52	250
No. of Kidney Tp./yr	0	3	10	34	20	37	37	34	41	43	49	59	79	82	528
No. of CD-KT	0	0	7+1[a]	32+1[a]	18	33	26+1[a]	15	29	30	25	15	14+1[a]	30	274+4[a]
No. of LD-KT	0	3	2	1	2	4	10	18+1[b]	12	13	24	44	63+1[b]	52	248+2[b]

CD-KT = Cadaveric Donor - Kidney Transplantation

LD-KT = Living Donor - Kidney Transplantation

a = Retransplant with CD-KT

b = Retransplant with LD-KT

Table 2. Number of donors, sources and relationship between donor and recipient.

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
Living donors/yr	0	3	2	1	2	4	10	19	12	13	24	44	64	52	250
Father	0	0	0	0	0	0	1	1	1	0	2	2	2	1	10
Mother	0	0	0	0	0	0	1	0	1	2	3	6	7	2	22
Brother	0	2	2	1	0	2	4	6	4	3	6	9	14	9	62
Sister	0	1	0	0	1	1	4	7	4	6	11	11	13	10	
Son	0	0	0	0	1	0	0	4	1	0	0	8	7	6	27
Daughter	0	0	0	0	0	0	0	1	1	2	1	8	11	7	31
Nephew/Niece/Aunt	0	0	0	0	0	1	0	0	0	0	1	0	5	5	12
Husband	-	-	-	-	-	-	-	-	-	-	-	-	3	3	6
Wife	-	-	-	-	-	-	-	-	-	-	-	-	2	9	11
Cadaveric donors/yr	0	0	7	24	16	19	17	10	15	19	15	9	12		189
Ramathibodi Hospital	0	0	6	10	5	4	2	1	10	3	3	4	1	1	50
Others	0	0	1	14	11	15	15	9	5	16	12	5	11		139
Organ Donation Center	-	-	-	-	-	-	-	-	-	-	-	-	6	25	31
Other Hospitals	0	0	1	14	11	15	15	9	5	16	12	5	5	0	108

hospital, therefore, the number of patients entered in 1998 fell to 110 patients. The ages of patients on the waiting list ranged from 12-70 years (mean 46.4 years). More males were found than female patients (M:F = 1.8 : 1). There were 365, 504, 648 and 97 patients with A, B, O and AB blood groups, respectively.

In the first year of establishing the program, there was no kidney donor. The first KT was started in 1986 by using a kidney from a living-related donor. CD-KT was started in 1987. A total of 189 cadaveric and 250 living donors were used. 528 kidneys were obtained and transplanted into 522 recipients. 278 cases (52.7%) were CD-KT and 250 cases (47.3%) were LD-KT. Six CD-KT patients were retransplanted, four of them with CD-KT and two of them with LD-KT. The peak of CD-KT was found in the first-half period (i.e., 33 KT in 1988 and 1990) while peak of LD-KT was found in the second-half period (64 KT in 1997). The total KT was gradually increased from 3 to 82 KT per year.

Table 2 shows the sources of kidney donors. There were 250 living-donors, 233 (93.2%) were living-related while 17 (6.8%) were spousal donors. More than 50 per cent of living-related donors were from siblings (69 sisters and 62 brothers). Offspring donors (31 daughters and 27 sons) were more than parental donors (22 mothers and 10 fathers) and extended family (12 nephew/niece/aunt). Extended family was accepted only with one HLA haplotype sharing. Wives were more likely to donate kidneys than husbands (1.8 : 1). The ages of LD ranged from 15-69 years (mean 39.7 years). Male LD was less than female LD (M:F = 1 : 1.2).

47 A, 78 B, 116 O and 9 AB kidneys from living donation were transplanted into 49 A, 93 B, 93 O and 15 AB recipients, respectively. There were 28 pairs of LD-KT who received ABO compatible kidneys, i.e., 16 B-O, 6 A-O, 4 AB-A, 1 AB-B, 1 AB-O patient-donor pairs.

50 out of 189 (26.4%) cadaveric donors were from Ramathibodi Hospital (1-10 donors/year). The peak of CD from Ramathibodi Hospital was found in 1988 and 1993 and then fell to only one donor per year in 1997 and 1998. Most CDs (73.6%) were obtained from other hospitals (108 donors, 1-16 donors/year) and the Organ Donation Center, Thai Red Cross Society (since 1997, 6-25 donors/year). The peak of CD from other hospitals was found in 1998 from the Organ Donation Center. The ages of CD ranged from 1 day - 61 years (mean 35.2 years). The male : female ratio of CD was M:F = 3.5:1. 55 A, 102 B, 100 O and 21 AB cadaveric KT were performed from 39 A, 67 B, 68 O and 15 AB cadaveric donors, respectively.

Table 3 shows the current status of the waiting list for KT at Ramathibodi Hospital. During 14 years, 123 patients (7.6%) died without KT, 111 patients (6.9%) underwent KT at other hospitals, 78 patients (4.8%) changed to other waiting lists. At present, only 265 patients are still actively waiting (send current serum for crossmatching every month) while the rest were lost to follow-up. Of these, there are 17 patients waiting for a second transplantation. Thirteen patients had had a transplant at Ramathibodi Hospital and four patients had had a transplant at other hospitals. The ABO blood groups of the patients waiting for a kidney are 64 A, 74 B, 114 O and 13 AB.

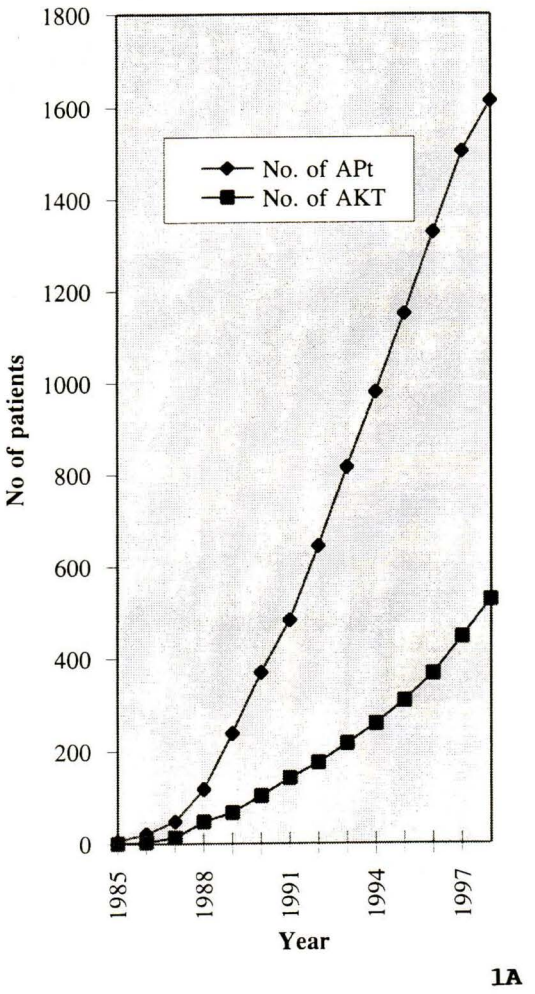


Fig. 1A. Awaiting patients (APt) and actual KT (AKT).

Table 3. Update kidney waiting list at Ramathibodi Hospital.

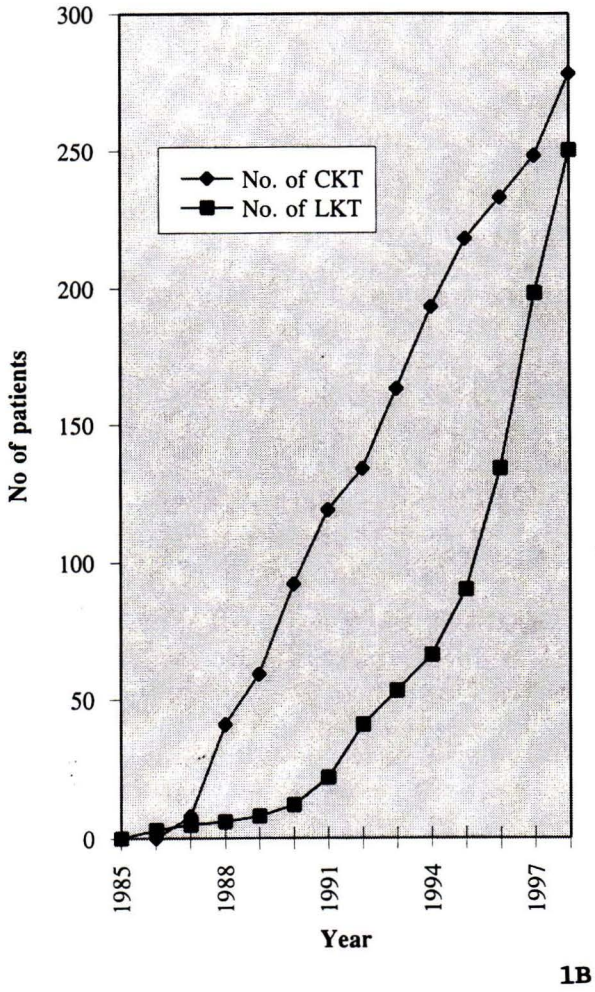
Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
Dead during waiting	1	7	5	3	0	2	2	11	19	26	20	17	10	1	123
KT at other hospitals	1	1	0	1	1	2	3	3	13	24	21	29	12	0	111
No more waiting *	0	1	2	4	6	2	3	2	5	13	16	13	11	0	78
Active waiting	0	0	0	4	3	6	4	8	5	17	30	42	72	74	265
First transplant	0	0	0	0	2	5	4	6	5	15	28	40	72	71	248
Retransplant	0	0	0	4[a]	1[a]	1[b]	0	2[a]	0	2[a]	1[a]+1[b]	1[a]+1[b]	0	2[a]+1[b]	13[a]+4[b]

a = Waiting for retransplant (1st KT at Ramathibodi Hospital)

b = Waiting for retransplant (1st KT at other hospital)

* = No more waiting included changing hospital

KT = Kidney Transplantation



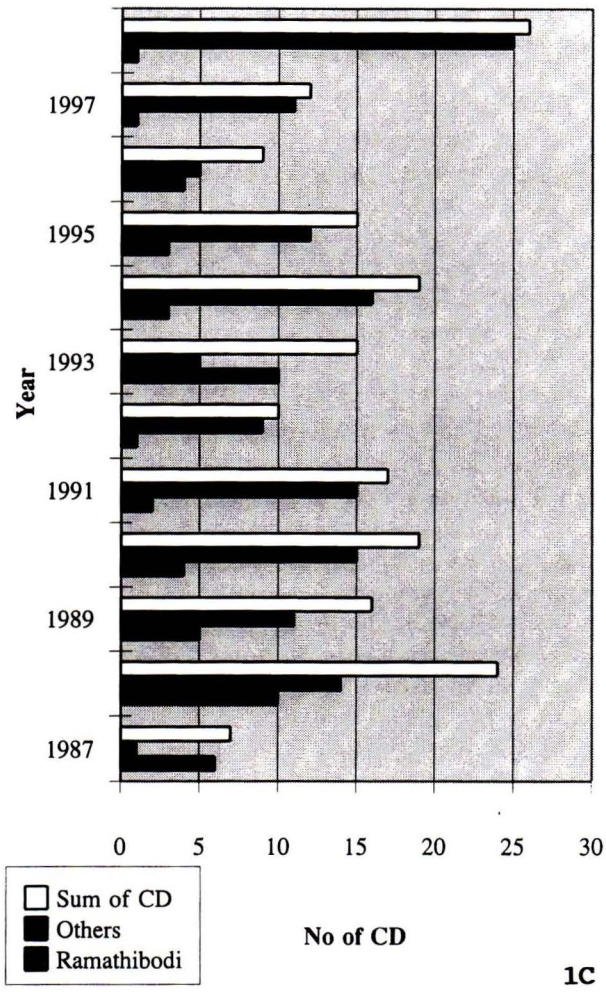


Fig. 1B. Cumulative CD-KT (CKT) and LD-KT (LKT).

Fig. 1C. Cadaveric donor (CD) in each year.

Fig. 1A shows the relationship between the increasing rate of patients registered for KT (awaiting patients, APt) and kidney transplantation service that can be provided for the patients (actual kidney transplantation, AKT). This shows that only 1/3 of the patients (32.3%) had already been transplanted at Ramathibodi Hospital within 14 years.

Fig. 1B shows the difference between the cumulative number of CD-KT and LD-KT at Ramathibodi Hospital. It was found that the cumulative number of CD-KT was greater than LD-KT in the first two-third period (1987-1991, 1993-1994) while the cumulative number of LD-KT was greater than CD-KT in the last one-third period (1996-1998). By the end of 1998, the cumulative number of LD-KT rose to 250 and was close to the cumulative number of CD-KT (278).

Fig. 1C shows the variation in number of cadaveric donors obtained from Ramathibodi Hospital and other places in each year. Total CD varied from 7-26 donors per year. Primary CD from Ramathibodi Hospital was less than CD from other hospitals (< 5 donors/year in 1990-1992 and 1994-1998), except in 1987 and 1993. Usually, the number of CD from other hospitals exceeded $\geq$ 5 donors/year except in 1987. The number of CD at

Ramathibodi Hospital is still not sufficient, especially in the last 5 years (1994-1998).

DISCUSSION

The procedure of kidney transplantation requires several steps of coordination including pre-operative, intra-operative, and post-operative managements. This is more complicated in cadaveric kidney transplantation. Good organization is essential for this continuing job. At Ramathibodi Hospital, Renal Transplant Committees (RTC) were organized from the staff involved in kidney transplantation. The RTC meets every 1-2 months, raises the problems encountered through the process and then shares ideas to solve those problems. Therefore, many difficulties are solved and everyone enjoys working together. At present, Ramathibodi Hospital is the hospital that has done the highest number of kidney transplantations in Thailand. The graft survival of LD-KT was 96 per cent and 95 per cent for 1 and 5 years, whereas, those of CD-KT was 85 per cent and 61 per cent, respectively[2,3]. The patient survival of LD-KT and CD-KT was superior than the graft survival; being 98 per cent at both 1 and 5 years for LD-KT and 90 per cent and 73 per cent for CD-KT, respectively[2,3]. This success did not occur only from individual effort but also from the support of the Faculty of Medicine.

Although there were fewer patients waiting for KT in the later year than in the past, the transplantation activity (both LD-KT and CD-KT) has been increasing. This reflects the continuous efforts of the Faculty's staff and also the support from the Organ Donation Center, Thai Red Cross Society. The incidence of ABO groups on the waiting list was similar to kidney donors for both living and cadaveric donations (O > B > A > AB). However, the transplantation rate of group B and AB patients was slightly higher than for group A and O patients. Therefore, the number of group A and O patients awaiting kidney transplantation at present is slightly higher. In the future, kidney organ sufficiency and the active working team will improve the kidney transplant service for the patients.

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14 ปีของการปลูกถ่ายไตที่โรงพยาบาลรามาธิบดี : ผู้ป่วยคอยไต ผู้บริจาคไต และการปลูกถ่ายไต

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โครงการปลูกถ่ายไตที่โรงพยาบาลรามาธิบดี ได้เริ่มก่อตั้งในปี พ.ศ. 2528 จำนวนผู้ป่วยที่ลงทะเบียนเพื่อปลูกถ่ายไตจนถึงปลายปี พ.ศ. 2541 มีทั้งสิ้น 1,614 ราย ได้ทำการผ่าตัดปลูกถ่ายไตครั้งแรกในปี พ.ศ. 2529 โดยใช้ไตจากญาติของผู้ป่วย (LD-KT) ส่วนการปลูกถ่ายไตโดยใช้ไตของผู้บริจาคที่เสียชีวิตเนื่องจากสมองตาย (CD-KT) นั้นได้เริ่มในปี พ.ศ. 2530 ได้ทำการปลูกถ่ายไต ทั้งสิ้น 528 ครั้งให้แก่ผู้ป่วย 522 ราย เป็น CD-KT 278 ราย (52.7%) และ LD-KT 250 ราย (47.3%) ผู้ป่วย 6 รายได้รับการปลูกถ่ายไตซ้ำ ไตที่รับบริจาคจำนวน 278 ไต ได้จากผู้ป่วยเสียชีวิต 189 ราย เป็นผู้ป่วยของโรงพยาบาลรามาธิบดี 50 ราย (26.4%) ที่เหลือได้จากโรงพยาบาลอื่นและศูนย์รับบริจาคอวัยวะ สภากาชาดไทย ส่วนไตของผู้บริจาคที่มีชีวิต 250 รายนั้น ได้จากญาติที่มีความสัมพันธ์ทางสายเลือด 233 ราย (93.2%) ส่วนใหญ่เป็นพี่น้องของผู้ป่วย (>50%) สามีหรือภรรยาของผู้ป่วย ทางโรงพยาบาลรามาธิบดีเพิ่งยอมรับเมื่อ 2 ปีที่แล้ว จากการรวบรวมสถิติในช่วง 14 ปีที่ผ่านมาพบว่า มีผู้ป่วยเสียชีวิต โดยยังไม่ได้รับการปลูกถ่ายไต 123 ราย (7.6%), ปลูกถ่ายไตที่โรงพยาบาลอื่น 111 ราย (6.9%) และไม่ประสงค์ปลูกถ่ายไตหรือย้ายไปคอยไตที่โรงพยาบาลอื่น 78 ราย (4.8%) ปัจจุบันมีผู้ป่วยที่ยังคงส่ง serum เป็นประจำทุกเดือนเพื่อคอยไต 265 ราย นอกนั้นได้ขาดการติดต่อและไม่สามารถติดต่อกลับได้ จำนวนการปลูกถ่ายไตและผู้บริจาคไตที่มีชีวิตได้เพิ่มสูงขึ้นตามลำดับ ขณะที่จำนวนผู้บริจาคไตที่เสียชีวิตกลับลดน้อยลง อย่างไรก็ตามการประสานงานกับศูนย์รับบริจาคอวัยวะสภากาชาดไทย สามารถแก้ไขให้ปัญหาการขาดแคลนผู้บริจาคไตลดน้อยลง การมีไตบริจาคจำนวนเพียงพอและคณะทำงานที่ขยันขันแข็ง จะช่วยเพิ่มประสิทธิภาพการบริการปลูกถ่ายไตให้แก่ผู้ป่วย

คำสำคัญ : โครงการการปลูกถ่ายไต, โรงพยาบาลรามาธิบดี

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