LHSC Kidney Transplant Clinical Handbook

Revised 2025 01 21

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Abbreviations and Definitions

Allocation Points – used to determine priority on the waitlist.

Anonymous Donor – Living donors who may donate a kidney anonymously to the National Kidney Paired Donation (KPD) program or to the Ontario deceased kidney wait list.

BMI – Body Mass Index

BP – Blood Pressure

BPMH – Best Possible Medication History

CCO – Cancer Care Ontario

PRA – the percentage of Canadian deceased organ donors expected to have one or more of the candidates unacceptable antigens. PRA scores are calculated automatically when HLA labs enter a candidate's serum antibody results. (unacceptable antigens at A, B, C, DRB1, DQA1, DQB1, DPA1, DPB1 and DRB345)

CTR – Canadian Transplant Registry – a secure computer database managed by Canadian Blood Services. (Password protected)

LHSC – London Health Sciences Centre – includes University Hospital, Victoria Hospital, Children's Hospital, the London Regional Cancer Centre, Lawson Health Research Institute (LHRI) and CStar.

MOTS/MOTP – Multi-Organ Transplant Service, Multi-Organ Transplant Program

MOTU – Multi-Organ Transplant Unit – 12 bed unit opened in 1987 – pre- and post-transplant patients are treated there – transplant specialty unit

MRN – Medical Record Number – LHSC's patient identifier (8 digits) Also referred to as a PIN (Personal Identification Number)

DCC – Death Determination by Cardiac Criteria (previously DCD – Donation after Cardiac Death)

DM – Diabetes Mellitus

DNC – Death Determination by Neurological Criteria (previously NDD – Neurological Determination of Death)

Enbloc - two kidneys from the same usually pediatric donor, along with the vena cava and aorta, are transplanted into a single recipient.

ESRD – End-stage renal disease

HLA – Human Leukocyte Antigen

HSP – Highly Sensitized patient Program

IPOS – Interprovincial Organ Sharing – Canadian Blood Services initiative to increase interprovincial kidney sharing by expanding on the existing Highly Sensitized Patient (HSP) Program.

KDPI – Kidney Donor Profile Index

OATS – Organ Allocation and Transplant System – Database managed by Trillium Gift of Life Network overseen by Ontario Health (Ministry of Health)

OOP – Out of province (but within Canada)

OPO – Organ Procurement Organization

PCKD – Polycystic Kidney Disease

PRA – Panel Reactive Antibody

PVD – Peripheral Vascular Disease

RC – Recipient Coordinator

SCC - Special Case Committee – A committee that reviews and responds to requests for listing patients and/or assigning exceptions for unique cases that fall outside of the established criteria as defined in the Allocation Algorithm.

SIPAT – Stanford Integrated Psycho-social Assessment for Transplant

SPPB – Short Performance Physical Battery - objective measurement instrument of balance, lower extremity strength, and functional capacity in older adults (>65 years of age).

SOP – Standard Operating Procedure is a set of detailed step-by-step instructions that describe how to carry out any given process.

TDS – Transplant Donor Specialist

TGLN - Trillium Gift of Life Network - Ontario Health (Trillium Gift of Life Network) is responsible for delivering and coordinating organ and tissue donation and transplantation services across the province, as well as for planning, promoting and supporting all health care and allied professionals, advocates and the Ontario public in fulfilling their shared and integrated responsibilities in saving the lives of Ontarians waiting for a life-saving transplant.

WTC – Willing to cross – ABO B candidates willing to cross the A2 barrier and accept ABO A donors as identified by the transplant program.

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Introduction

Kidney transplantation is a successful treatment for patients with end stage kidney disease. Patients assessed for kidney transplantation undergo a comprehensive evaluation to assess their suitability for kidney transplantation. The purpose of the assessment is to ensure that a kidney transplant is necessary, that the patient can endure the surgery and the follow-up care and that the patient will benefit from a kidney transplant.

It is understood that donor organs are in limited supply, that the number of patients with chronic kidney disease is increasing and that the transplant surgery is rigorous. Therefore, all patients are carefully reviewed by the multidisciplinary team. Patients are educated about the waiting period, procedure, recovery, long-term care and potential complications. Alternate treatment options, including ongoing medical management, surgical procedures and palliative care are reviewed.

Indications

The Trillium Gift of Life Network (TGLN), in collaboration with the Ontario kidney programs, has established patient referral and listing guidelines which are available on the TGLN website.

- Ontario's Referral Guidelines for Adult Kidney Transplantation
- Ontario's Listing Guidelines for Adult Kidney Transplantation
- Ontario's Referral and Listing Criteria for Paediatric Kidney Transplantation

The online version of these guidelines should be considered the source of truth.

General Criteria

Assessment for kidney transplantation may be considered for all patients with end-stage renal disease or chronic kidney disease, provided no absolute contraindications exist. (See below: Exclusion Criteria) Eligibility should be determined on medical and surgical grounds and should not be based on social status, gender, race or personal or public appeal.

In general, pre-emptive kidney transplantation is the preferred form of renal replacement therapy and should be encouraged where appropriate. Generally specific groups of patients should be considered for transplant assessment:

- Patients receiving dialysis should be referred as soon as their medical condition indicates;
- For patients who meet the conditions below but are not yet on dialysis:
    - Refer any patient who is expected to require dialysis within the next year.
    - Refer patients with potential living donors if they meet any of these criteria:
        - eGFR <15 mL/min per 1.73m^2
        - ≥ 25% chance of requiring renal replacement therapy within 2 years, as assessed with a valid equation, see www.kidneyfailurerisk.com
        - Expected dialysis will be required within the next 2 years.

Paediatric: Patients should be considered for evaluation once renal replacement therapy is expected to be required within 12 months.

Exclusion Criteria

The exclusion criteria include but are not limited to:

- Co-Morbidities: Patients with any co-morbidity that will decrease the likelihood of a 5-year survival outcome post-transplant to below 50% or those patients whose peri-operative risk is deemed to be unacceptably high by the evaluation team. These include but are not limited to active malignancy or infection.
- Consent: Patients who do not want a transplant
- Post-Transplant Care: Patients with inadequate or unsafe post-transplant care plans;
- Psychosocial Considerations: Patients with acute or untreated psychotic illnesses or patients that display social support/compliance issues that prohibit adherence to therapy (e.g. attendance for dialysis, compliance with medications). Kidney transplantation should be delayed until patients have demonstrated compliance to therapy for at least six (6) months.

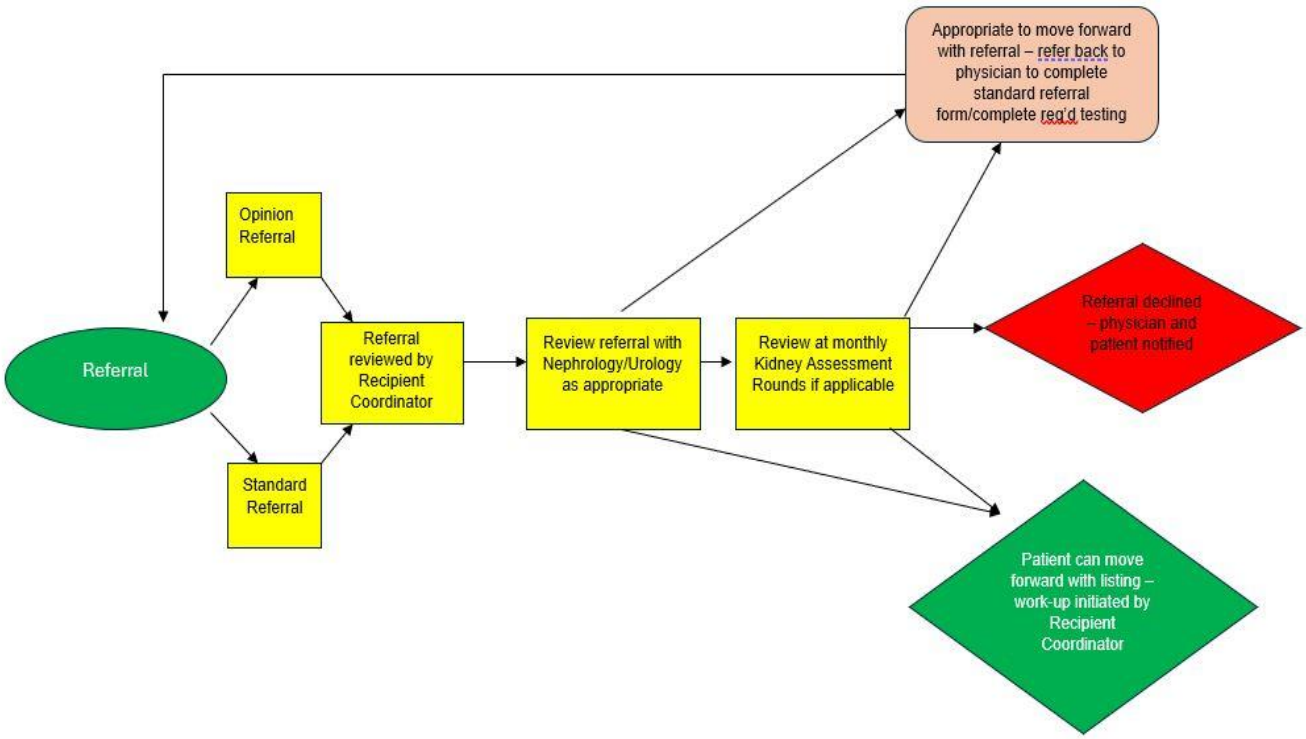
Specifics and details are available in the TGLN guidelines.

Referral Process

Potential recipients are referred from across the designated region to the Kidney Transplant Program and assessed according to the guidelines set out by the Kidney Working Group of TGLN.

The Program processes both opinion referrals and standard referrals.

Process Map – Referral to Listing



Opinion Referral

If the patient or referring team have concerns regarding suitability for kidney transplantation (e.g. some cancers, psychosocial issues, weight concerns, and/or other medical considerations that may preclude kidney transplant assessment), an opinion referral can be made before a full transplant workup is initiated.

1) An Opinion Referral Form should be completed by the referring physician/centre.

2) The Administrative Partner (AP) will enter the patient into the LHSC Transplant Database (FileMaker).

3) Opinion referral is given to the Transplant Recipient Coordinator (RC) for review.

4) The RC will review the referral with the Transplant Nephrologist and/or the Transplant Surgeon as determined by the medical consideration listed on the Opinion Referral Form.

5) If an appointment is required, the RC gives the opinion referral to the AP to schedule an appropriate appointment e.g. a surgical consult or a Frailty Assessment

6) For complex cases, the RC will add the case to the next Kidney Transplant Multidisciplinary Rounds, seeking consensus from the Kidney Transplant Team.

7) After review of the case either by a nephrologist, surgeon or at Kidney Transplant Multidisciplinary Rounds:

    a) If a patient is deemed suitable for transplant consideration, the RC will request the referring physician/centre to complete the Kidney Transplant Referral Form.

    b) If a patient is declined for transplant consideration:
        i) The RC will provide a letter to the referring physician/centre with the decision and if appropriate provide any suggested actions/follow-up recommendations.
        ii) If there is a pre-transplant coordinator involved in the case, the RC will update them.
        iii) The RC will close the opinion referral in Filemaker and document the outcome.
        iv) For cases discussed at Kidney Transplant Multidisciplinary Rounds, the Transplant Nephrologist will document a case conference note in Cerner and copy the referring nephrologist. (If there is no current LHSC MRN associated with the patient, the AP will enter the patient into the LHSC system and create an MRN).

Standard Referral:

1) A standard kidney transplant referral form is to be completed for patients.

2) Referral forms should be faxed (519-663-3858) or emailed (kidneytransplantreferral@lhsc.on.ca). For emailed referrals, the sender will receive an automatic response with time expectations.

3) Referrals are printed and placed in a folder given to the appropriate RC.

4) Referrals are reviewed within 2-4 weeks of receipt, using the Kidney Recipient Assessment Worksheet and the Kidney Transplant Process Checklist. The Transplant Recipient Coordinator (RC) will review the patient's history to ensure that adequate information has been provided and rule out absolute contraindications to transplant.

5) After reviewing the referral package, the RC may identify further required information and confer with the referring centre to complete these investigations and/or consultations. The RC will then send an email to the referring centre requesting any outstanding investigations and/or consultations.

6) If the information in the referral indicates that the patient may not be appropriate to proceed with evaluation, the RC will discuss it with the transplant team. If required, the referral will be brought to Kidney Transplant Multidisciplinary Rounds. All concerns will be addressed with the referring team/physician.

7) If the referral is acceptable to proceed with evaluation it is processed as below:

☐	Register candidate in LHSC's healthcare management system (Cerner/One Chart), if not already done, generating an LHSC medical record number (MRN)
☐	Enter data into Trillium Gift of Life provincial database (OATS)
☐	Enter data into LHSC Transplant Database (Filemaker)
☐	Patient is sent acknowledgement of receipt of referral marked either complete or incomplete
☐	Kidney Recipient Assessment Worksheet is initialed when data entry complete
☐	Return worksheet to RC

8) The RC will review data entry to ensure accuracy and completion.

9) The RC will determine priority of the evaluation following the established Kidney Transplant. Assessment Priority Guidelines:

Priority for Assessment	Time Frame from Complete Referral Received
1. Multi-organ transplant candidates (liver or heart)	Within 6 weeks (Any urgent case will be seen within 48 hours – discussion to occur between the transplant hepatologist and the transplant nephrologist)
2. Patients with a living donor	Within 3 months (Any urgent case will be seen within 48 hours – discussion to occur between the referring nephrologist and the transplant nephrologist)
3. Paediatric patients	
4. Patients who previously donated a kidney	
5. Medically urgent cases (high risk of losing dialysis access)	
6. Other patients on dialysis	Within 5 months

7. Pre-emptive A, B, AB patients with no living donor option	Within 5 months
8. Pre-emptive O patients with no living donor potential and PRA ≥50	Within 5 months

10) The referral is placed in the queue in the Waiting Assessment Inbox according to their priority and/or date the referral was received.

11) There is a monthly review of folders in the Waiting Assessment Inbox by the RCs with the AP.

12) The AP will:

☐	Create Transplant Chart (with Kidney Transplant Process Checklist)
☐	Schedule appointments for candidates with the transplant assessment team • Surgery (complete referral) • Anaesthesia (include all cardiac and pulmonary related notes/tests • Social Work (scanned copy of drug coverage, and SW notes not accessible through OneChart (Cerner)
☐	Communicate with the patient to notify them of their appointments, copying RC with information. (Some communication may require an interpreter. AP will organize and notify RC)
☐	Provider reminder call/s or email notifications/s to candidates no later than one (1) week prior to their scheduled appointments.

Assessment Process

A comprehensive multi-disciplinary assessment is conducted by the Kidney Transplant Team including laboratory investigations, imaging studies and consultations.

Laboratory

All initial mandatory bloodwork should be complete prior to the appointment with the Transplant Nephrologist to ensure that the results are available during consults.

Test	Who
ABO cross & type	All
ALT, ALP	All
Bilirubin	All
Albumin	All
CBC	All
PTT, INR	All
Creatinine	All
Electrolytes (Na, K, Cl, HCO_3)	All
Ca, PO_4	All
Total protein	All
HbA1C	All
HDL, LDL (fasting), cholesterol, triglycerides	All

Urea	All
Prostate specific antigen (PSA)	Males >50, or >40 with family history
CMV antibody (IgG)	All
EBV antibody (IgM)	All
Hepatitis B core antibody (HBcAb)	All
Hepatitis B surface antibody (HBsAb)	All
Hepatitis B surface antigen (HBsAg)	All
Hepatitis B DNA	HBV pos
Hepatitis C antibody (HCV Ab)	All
Hepatitis C RNA	HCV pos
HIV Ag Ab	All
HTLV	All
2-step Tuberculosis (TB-PPD, (TST))	All
QFT-Plus, IGRA	*For specific patients only
Varicella (VZV IgG)	All
Syphilis	All
Measles	All
Mumps	All
Rubella	All

Testing and Imaging

All initial mandatory tests should be done within 1 year prior to the appointment with the Transplant Nephrologist to ensure that the results are available during the consultation.

Test	Who
Height, weight, BMI	All
Abdominal/Pelvis CT scan (non-contrast)	All diabetics, patients with PVD, patients with previous transplants, PCKD, BMI >35
Abdominal ultrasound[1]	All
Chest X-ray	All
Electrocardiogram (ECG)	All
Echocardiogram	All
Myocardial perfusion study (MIBI) or Exercise Stress Test[2]	TGLN guideline
Cardiac catheterization	For specific patients as determined by Cardiac Risk
Colonoscopy vs FIT test	>50 years old with above average risk (as per CCO Guidelines) or if clinically indicated. If patient is considered at an increased risk (1 or more first degree relatives – parent, sibling, child diagnosed with the disease) then a colonoscopy is indicated starting at age 50 or 10 years earlier than the age the relative was diagnosed, whichever comes first. Refer to CCO Screening Guidelines and/or gastrointestinal physician's suggestions.

	The FIT test is performed every 2 years starting at age 50 for patients with no family history of colorectal disease and no clinical indications. If at some point a colonoscopy is performed on the low risk patient and is considered normal or low risk, then the FIT test is performed every 5 years. Refer to CCO Screening Guidelines
Mammogram	Female (or transfeminine if have used feminizing hormones for at least 5 years in a row) > 40 (as per CCO Guidelines) or if clinically indicated
PAP smear	Anyone with a cervix who is or ever has been sexually active starting at 25 (as per CCO Guidelines)
CT chest	For specific patients as determined by significant smoking history

[1]Do not perform if Abdominal/Pelvis CT scan performed with contrast dye
[2]If Cardiac Angiogram performed within the last 2 years

Consults

Patients next in queue are assigned to the AP to schedule the following appointments:

a) Nephrologist
b) Surgeon
c) Social Worker
d) Recipient Coordinator
e) Anaesthesiologist
f) Physiotherapy if warranted (Short Performance Physical Battery (SPPB) score <6)
g) Other medical consults if indicated by patient history (e.g. cardiology, hepatology)

Consult	Comments

Recipient Coordinator	All patients
	• General health history
	• Patient understanding of reason for appointment/assessment
	• Education of transplant process
	  ○ Assessment process
	  ○ Types of donors (living, deceased-DNC, DCC, ExD, IRD, HCV)
	• Short Performance Physical Battery
	• Dry runs
	• Education as per the Kidney, Kidney Pancreas Transplant Initial Patient Education Clinical Record

Social Work	All patients • Psychosocial assessment • SIPAT score (Stanford Integrated Psychosocial Assessment for Transplant) • Ensures understanding of procedure • Medication coverage • Support with transportation plan

	• Plan for follow up by Social Work if required • A note is dictated in the patient's Hospital Chart (EMR)
Surgery	All patients • Review of patient history, laboratory and diagnostic investigations • Physical examination • Discussion of risks and benefits of transplantation • Discussion of other treatment options • Identifies additional or outstanding tests for completion of assessment • Living donor discussion • Identify barriers to transplant • Identify potential surgical complications • The surgeon will document their findings in the patient's EMR.
Nephrologist	All patients • Height, weight, BPMH • Travel history • Complete vaccination history • Review results, patient assessment • Physical assessment • Identify medical complications • Identify barriers to transplant • A note is dictated in the patients Hospital Chart (EMR)
Anaesthesiologist (Pre-Admit Clinic)	All patients • Review of perioperative risk – identify barriers to transplant • A note is dictated in the patient's Hospital Chart (EMR)
Physiotherapy	• As indicated by SPPB score <6
Infectious Diseases	As indicated by: • Any infectious disease concern (e.g. splenectomy) • Vaccination concerns Refer to SOP 10.01 Infectious Diseases: Recipient Screening, Vaccinations and Post-Transplant Follow-up

Clinics

Nephrology Transplant Clinic

4th floor Out- Patients
Dr. Khaled Lotfy, Tuesday 1300-1500
Dr. Lakshman Gunaratnam, Wednesday 0900-1200

a) Transplant clinic dates and times are communicated by Transplant Nephrologist's Administrative Partner (AP)
b) AP schedules appointment for patients
c) Transplant assessment bloodwork (CareSet: Orderable – LAB – Renal Transplant RECIPIENT Workup) entered prior to the initial nephrology transplant assessment consult (the Friday prior to the scheduled appointment). Orders should be entered by the RC.

d) RC brings the patient charts to Nephrology Transplant Clinic prior to check in. (as per LHSC process – in Cerner_
e) The RC brings the patient to the clinic room and assesses and documents height, weight, BP, and HR.
f) The Nephrologist assesses patient and documents as per standard of care.

Surgical Transplant Clinic

8th floor, Outpatients
Dr. Patrick Luke - Tuesdays and Thursdays 1330-1500, 1530-1700;
Dr. Alp Sener - Mondays 1330-1500, 1530-1700

a) There are allotted surgical clinic times for transplant assessment. The AP will schedule surgical assessments accordingly and provide the appropriate surgeon's AP with a copy of the consult prior to the appointment date.

Listing Process

Criteria for Placing Patients on the Active Wait List

a) Evaluated and approved by the Multidisciplinary Team (Nephrology, Urology, Anaesthesia, Social Work, RC)
b) Proof of Adequate Drug Coverage
c) On dialysis as listed below

Dialysis Requirement

Candidates must be undergoing regularly scheduled hemodialysis or peritoneal dialysis to be eligible for listing on the Ontario **deceased donor** kidney wait list, with the following exceptions:

- Pediatrics (<19 years old)
- Candidates with a GFR<15ml/min on two occasions (estimated or measured)

Candidates who do not meet these criteria may still be listed for **living donor** transplant.

Medical Status

Kidney candidates are listed with one of the following medical statuses:

Medical Status	Definition
High Priority (Medically Urgent)	Eligible for allocation Candidates listed with high priority must be approved by the Kidney & Pancreas Special Case Committee.
Normal Priority	Eligible for allocation
Temporarily On Hold	Candidates on hold are not eligible for allocation of donor kidneys but accrue wait time

Eligibility for the National Highly Sensitized Patient (HSP) Registry

LHSC Process:

1) The Transplant Lab updates Luminex testing and communicates via email to the RC when it is completed
2) When ready to active on the deceased donor waitlist, the RC will:
   a) Refer to the Kidney Transplant Listing Record for completion
   b) Activate the patient with the appropriate listing status in:
      i) Trillium Gift of Life Network (TGLN) database (Organ Allocation and Transplant System (OATS))
      ii) London Health Sciences Centre Transplant Database (Filemaker)
3) The AP will send an Activation letter to patient and their Referral Centre
4) The transplant chart is transferred to the Active cabinet in the Multi-Organ Transplant Unit

Wait List Management

1) The RC will review all patients on the wait list quarterly
2) The RC will review OATS active and active (on hold) with program active waitlist (FileMaker) to ensure accuracy monthly – both databases are password protected and available only to authorized team members.
3) The AP will send referring centres quarterly reports for review of all patient statuses
4) If the patient has the option of living donation, the patient may be placed on 'hold' on the list until the living donor is approved and the surgery booked. Preoperative visits will be arranged, and the recipient notified.
5) When a patient is listed for transplant an order is placed in the patient's LHSC health record for transplant. This enables an email alert to be generated when the patient is admitted to LHSC or an LHSC affiliate hospital. This email is sent to the RCs.

Minimum testing and imaging requirements while on the waiting list:

HLA Laboratory

Candidates on the wait list are required to have HLA drawn monthly. Active patients on the wait list also require a Panel Reactive Antibody (PRA) test done every 3 months as a minimum. A candidate must have a PRA result <180 days old (4 months plus 60-day grace period) to be allocated an organ.

If serum testing results are not reported by 120 days, TGLN will send an alert notifying the transplant program.

If serum is still not reported by 181 days, the candidate's registration is placed on hold and the transplant program is alerted.

Test	Who	Frequency
HLA	All	Monthly
PRA	All (Active)	Quarterly

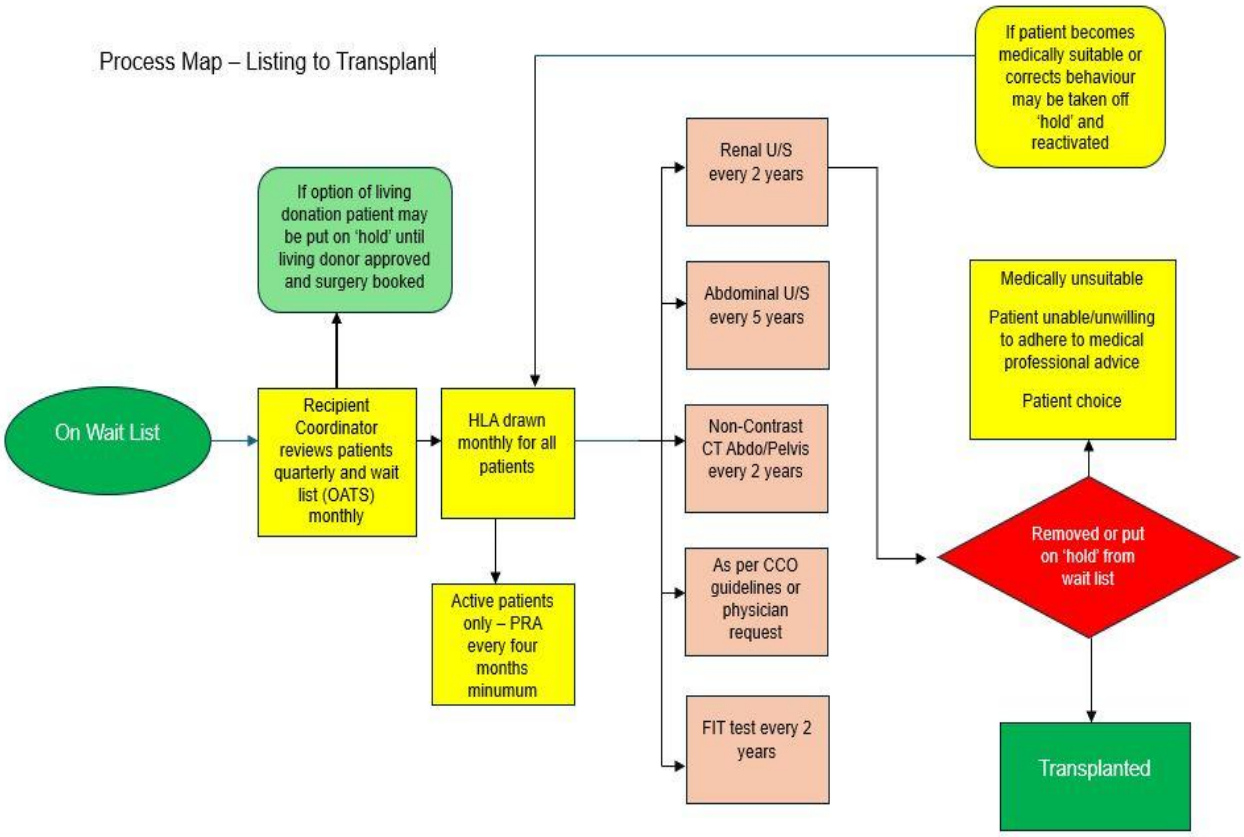
Testing and Imaging

Test	Frequency
Renal Ultrasound	Every 2 years
Abdominal Ultrasound	Every 5 years
CT Abdomen, Pelvis Non Contrast	Every 2 years (*for patients with DM, PVD, PCKD and/or previous transplant as per surgeon)*
Colonoscopy	Every 5 years if family member diagnosed with colorectal cancer before age 50 Every 10 years if family member diagnosed after age 60 – or at any point if clinically indicated. (See CCO Guidelines)
FIT Test	Every 2 years (if colonoscopy has been performed and is normal, then FIT test is every 10 years) if patient is of average risk. (See CCO Guidelines) Review gastrointestinal physician's recommendations.
CXR	Every 2 years
Electrocardiogram (ECG)	Every 2 years
Echocardiogram	Every 2 years
Cardiac catheterization	Every 2 years if clinically indicated
Mammogram	As per CCO guidelines
PAP Smear	As per CCO guidelines
PSA	Annual
Serology testing (HBV, HCV, HIV, HTLV, Syphilis)	Every 2 years
Anti A Titre (for Blood Group B patients)	Every 12 months

Removing Patients from the Active Transplant Wait List

Patients are removed from the transplant wait list under the following circumstances:

a) Medically unsuitable
b) Death
c) Patient's inability to adhere to healthcare professionals' direction
d) Patient desire
e) Transplanted



Allocation and Organ Offers

Allocation

Organs are allocated per TGLN's Wait list, organ offers and allocation policies. Refer to the policy available on the TGLN website.

Considerations for allocation include:

1) Blood Group

Donor Blood Group	Recipient Blood Group
O	O, A, B, AB
Non A1	A, B, AB (deceased donor) O, A, B, AB (living donor)
Non A1B	B
A1	A, AB
B	B. AB
AB	AB

[1] Non A1 kidneys may be allocated to non A recipients. Refer to Non-A1/NonA1B to B and O Recipients Transplant Guidelines

2) Hepatitis C NAT
   Hepatitis C NAT positive donor organs are matched to candidates who have been identified by their transplant program as eligible.
   Recipients of HCVNAT positive organs should be managed as per SOP 7.07.03, Utilizing Organs from Known Risk Donors – HCV NAT positive

3) Extended Criteria Donors (ECD) (KDPI>85%)
   ECD kidneys are matched to candidates who have been identified as potential recipients. At listing recipients may be offered the opportunity to expand their donor pool by accepting ECD donors. The Nephrology team will fully explain risks and benefits.

4) Double Kidneys
   All donor kidneys are offered as singles first. Kidneys are then offered as doubles once singles have been declined by all transplant programs.

5) Kidneys from donors less than 4 years of age
6) Kidneys from donors less than 4 years of age are only matched to adult candidates and transplanted enbloc.

Allocation - Local

One kidney is allocated to a matched candidate listed at the transplant program in the same region as the donor hospital. Adult kidney only candidates are the only group that have a local donor region.
Local Kidney Allocation Hospitals (for complete list see TGLN Allocation Policies)

Donor Hospital Name	**London Regional City**
Alexandra & Marine General Hospital	Goderich
Bluewater Health (2 sites)	Sarnia
Chatham Kent Alliance	Chatham
Grey Bruce Regional	Owen Sound
Health Sciences North	Sudbury
Leamington District	Leamington
Norfolk General	Simcoe
Plummer Memorial	Sault Ste Marie
St. Thomas Elgin	St. Thomas
Stratford General	Stratford
Strathroy Middlesex	Strathroy
London Health Sciences Centre (2 sites)	London
Children's Hosp. of Western Ontario	London
Windsor Regional (3 sites)	Windsor
Woodstock General	Woodstock

If there is only one kidney, or kidneys are to be used as doubles, the local kidney allocation takes priority over provincial/national allocation.

Provincial/National Allocation

The second kidney, if available, is allocated to a matched candidate on the Ontario wait list, regardless of region, or a matched candidate listed on the IPOS Kidney program list. (as identified by the CTR)

Exceptions:

- A discussion occurs if an IPOS Kidney allocation will lead to an organ loss;
- Kidneys from donors <4 yrs of age will be offered en bloc to Ontario candidates first, then IPOS Kidney;
- Once national IPOS export threshold for Ontario is met, TGLN will only export an IPOS kidney when the following criteria are met:
  - IPOS recipient PRA≥99.5%
    AND
  - No multi-organ, paediatric, kidney-pancreas, list exchange/previous living donor or PRA≥94.5% recipients appear on the Ontario kidney allocation.

Allocation of Non-Directed Living Donor (NDAD) and List Exchange Donor Kidneys

- If allocated through the KPD program, CBS generates the match run. If an NDAD donor who starts a KPD chain is an Ontario living donor, TGLN will allocate the unmatched kidney at the end of the chain to the deceased donor list within the hospital where the living donor is registered.

- NDADs and list exchange donors who do not wish to enroll in the KPD program or were not matched through KPD, may choose to donate to the Ontario deceased donor wait list and will be allocated to the donor hospital where the living donor is registered.

Note: Donors that put 'conditions' on their donation (e.g. where a donor excludes certain categories of recipient) are not permitted. They may become ineligible to be a donor.

Ranking and Allocation Points –Candidates are ranked according to ABO compatibility.

- A2 and A2B into identified ABO B candidates
- ABO identical
- ABO compatible

Within each ABO compatibility group listed above, further ranking is determined by allocation points. Allocation points are calculated using the following formula:

Allocation points = 0.1 point/30 days waiting + [(PRA/100) x 4]

Note: PRA refers to Class I and II cumulative PRA. Candidates listed without a dialysis start date accrue points for PRA but not waiting time.

If two or more candidates have the same allocation points, priority is given to the candidate with the higher PRA value, then wait time, then the earliest list date.

Organ Offering:

Kidneys are offered to LHSC Kidney Transplant Program per TGLN Wait list, organ offers and allocation policy. Organ offers are made to TGLN through the Transplant Donor Specialist (TDS) at LHSC. TDS Standard Operating Procedures will be followed.

Once a deceased donor kidney has been matched to a candidate on the LSHC deceased organ wait list, TGLN will communicate with the TDS (Transplant Donor Specialist) with the offer. (Refer to SOP 1.02.01, Recording of Donor Referrals and Offering Process) The offer should include but is not limited to:

- Donor information: ABO, type of donor (DCD/NDD), age, cause of death, medical and social history and risks, including infectious or surgical concerns, kidney function (See Donor Assessment form)

- Recipient information: name/s of recipient/s that the organ is being offered to
- Estimated time of retrieval of organ

The TDS will set up a Microsoft Teams meeting to present the offer to the Transplant team via a page to the on-call team members of 77777. The team includes, but is not limited to:

- Surgical consultant
- Surgical fellow/s
- Nephrology consultant
- Nephrology fellow/s

Considerations include:

Exceptional Distribution (ExD)

A Source Establishment (SE) may distribute cells, tissues or organs that have not been determined safe for transplant if all of the following conditions are met:

- A cell, tissue or organ that has been determined safe for transplant is not immediately available.
- The transplant physician or surgeon, based on their clinical judgement, authorizes the exceptional distribution, and
- The transplant establishment obtains the informed consent of the recipient.

Increased Risk Donor (IRD)

An ExD donor that has also been identified as having specific lifestyle behaviours that may be associated with an increased risk of transmission of infectious diseases to transplant recipients.

Recipients of ExD, including IRD organs should be managed as per:

- Exceptional Distribution Donor Recipient Management Guidelines
- SOP 7.07.02, Utilizing Organs from Increased Risk Donors
- 7.07.03, Utilizing Organs from Known Risk Donors – HCV NAT positive

At this time the team may require further information about the donor to decide. The TDS will communicate with TGLN regarding the requested information.

Once the team is satisfied that they have enough information, they will accept or decline the kidney for the intended recipient. If this is a local kidney offer (see above) there may be multiple recipients to choose from. If the team does NOT pick the first candidate on the list, TGLN must be supplied with a reason why candidates were skipped to transplant the chosen patient. The TDS will supply TGLN with rationale.

If this is a provincial or HSP offer, it will only be made to the single patient. Should LHSC decline the kidney for that patient, the kidney is offered elsewhere. (It may or may not be reoffered to LHSC).

Transplant – Deceased Donor

Call-in

Once an organ has been accepted for transplant the TDS will contact the RC and provide the following information:

- Name of the intended recipient
- Any relevant donor information, including but not limited to:
    - CMV/EBV status
    - ExD/IRD status
    - ABO
    - Type of donor (DNC/DCC/A-NRP)
    - Cause of death (if applicable)
    - Size (if applicable)
    - Timing of donor OR
    - Timing of recipient OR

The TDS will inform the RC if a backup recipient is required and any physician requests.

Notifications:

1) The RC calls the patient to review their health status, ensuring that there have been no recent hospitalizations, infections (including COVID-19), or other illnesses. The patient will be given NPO instructions if applicable.
2) ExD and IRD issues may be discussed here as well.
3) If the patient's health status is suitable to proceed the selected recipient is notified of admission plans for potential transplant. Patients are made aware that they may be discharged home from hospital without a transplant if the donor organ is not suitable or, if upon admission, the potential recipient's health is of concern. When the patient's health status is of concern the RC will review with the physician on call for direction.
4) If it is decided that the patient is not suitable for transplant the nephrologist will discuss with the TDS who will contact TGLN. The TDS will notify TGLN of an alternate recipient, if applicable. (Note: if this is the 'local' offer, there may be an alternate recipient eligible for the organ. If this is the 'non-local', provincial or HSP offer, and the kidney has not yet left the donor centre, the kidney is reallocated to the next person on the provincial waiting list. If the kidney is en route or at LHSC, the kidney will be reallocated to a candidate on the local waiting list.)
5) Arrangements are reviewed with the patient for transportation to the hospital. It is the patient's responsibility to arrange for transportation in the majority of cases. Patients who live a great distance from London may require transportation to be arranged via commercial or ORNGE (Ministry of Health) flights. ORNGE flights may be initiated if recipient lives more than 500 km from the hospital and/or commercial flights are not available in a timely manner. To ensure minimal cold time for the donated liver hospital admission is expected to be as expedient as possible.

Refer to Recipient Call-In Checklist – Adult OR Recipient Call-In - Paediatric

The RC notifies the following:

a) Multi-Organ Transplant Unit (MOTU)
b) Admitting
    i) Kidney only: "Renal Failure for Kidney Transplant"
    ii) Kidney Pancreas: "Type 1 Diabetes for Kidney Pancreas Transplant"
c) Blood Transfusion Lab
d) OR Admitting Desk or Charge Nurse – provide patient name and MRN.
e) Message is left for the most responsible RC if the on-call RC is different.

f) Message is left for the kidney transplant social worker.
g) Message is left at referring centre.
h) Email sent to all relevant members of the transplant team details important to the recipient call-in. (e.g. special requirements, ETA)

Note: The timing of cases can change often. The RC and the TDS are expected to work together to maintain communication with the Transplant team, the OR and the MOTU.

Back-up recipient

The primary recipient may not always be suitable to proceed with transplant. This may be for a variety of reasons including but not limited to:

- Positive prospective crossmatch
- Contraindications to transplant discovered on admission for transplant (e.g. infection, cancer, etc.)
- Donor anatomy

When switching to the back-up recipient:

1) The Nephrologist notifies:
   - Transplant Surgeon
   - RC
   - The primary recipient including reason why transplant has been cancelled
2) The RC notifies:
   - TDS
   - Operating Room
   - Floor or Unit where the back-up recipient was admitted
3) The TDS notifies:
   - TGLN of the change ASAP so that the original recipient can be removed from TGLN's TIP list
   - Update database/labeling as required

Living Donor Transplant

Living Donors are worked up as per the Living Kidney Donation Standard Operating Procedures.

Initial Steps

1) The RC will liaison with the living donor program to identify pairs that are ready for OR booking.
2) The Living Donor Program informs the donor of OR date and encourages donor to share with recipient.
3) The RC receives confirmation email from living donor office with confirmed pair.
4) The RC will provide the Living Donor Team with the following recipient information: ABO, CMV IgG, EBV IgG and type of dialysis.
5) The RC will connect with the recipient to confirm the surgery date and next steps in the process.

3 Week Pre-Op Review

a) Tests will be arranged by the PA

Test	Description
☐ Bloodwork (General)	Pre-admit group and screen, CBC, INR/PTT, electrolytes, creatinine, random glucose, calcium, phosphate, urate, albumin, ALT, ALP, bilirubin
☐ Bloodwork (Serology)	CMV IgG, EBV IgG, EBV early Ab/Nuclear Ab, HB screen, HCAb, HIV Ab, HTLV 1&2 Ab), WNV (May 1 – October 31)
☐ Urine	Culture and R&M
☐ Beta Hcg	For females under the age of 50
☐ Any testing req'd by Transplant Program, LHSC, TGLN or Public Health as indicated by current community health status	e.g. COVID (2 week pre-op rapid test, 24-72 hour pre-op PCR test)
☐ Chest Xray	
☐ ECG	
☐ Pre-admission clinic	Anaesthesia included if >1yr since last assessment
☐ Surgeon	Review and surgical consent
☐ Recipient Coordinator	Review, expectations, teaching if applicable
☐ Social Work	Review, expectations
☐ Pharmacy	Review and teaching

b) Communication package for RC – organized by PA and RC – includes:

☐ Itinerary sent to recipient (copy to RCs)	Communicated to recipient with preferred method (email, Canada Post)
☐ Pre-Admission Clinic Booking Form	Form is used to inform OR of living donor pair, surgeon, and any need for extra equipment such as laparoscopy, cystoscopy etc)
☐ Surgical assessment checklist	
☐ Consent form	
☐ Surgical memo	example

☐ Kidney Recipient: Patient Education and Preoperative Checklist	Example
☐ Rapid screen form - COVID	2 – week COVID screening
☐ Review of Recipient Chart	1 week prior to OR
☐ Day of OR – Recipient Checklist	Example
☐ Pre-Op Questionnaire	Example

c) Final crossmatch (CXM) organized by living donor program (SOP#2.02.05) and communicated with RC.
d) All assessment and communication is collated by the RC and reviewed with the Nephrologist
e) Living Donor surgery email sent the week prior to the OR (example) to notify LD and Transplant Teams
f) * AP to schedule COVID-19 PCR swab 24-72hrs before confirmed living donation date
    i. Schedule with 4 Outpatient Transplant Clinic Nurse
    ii. Enter COVID PCR swab online as Asymptomatic Screening in a planned state.
g) Transplant Nephrologist (consultant/fellow) to enter Transplant – Kidney Recipient, Pre-Op (Living Donor) and Post-Op (Multi-phase) care set in planned state.
h) The RC to confirm order entry the Monday before 1300 prior to the planned OR (deadline for Pre-Admission order entry)
i) The RC to review COVID PCR swab results 24 hours prior to planned surgery *

Morning of Donor and Transplant OR

On the morning of the planned ORs, both the donor and the recipient are reviewed by surgery. The recipient is also reviewed by Nephrology. The RC completes the Day of OR – Recipient checklist and communicates any issues with Nephrologist on service and surgeon. The donor cannot proceed to the OR until BOTH the donor and recipient are assessed and cleared for surgery. If concerns exist with either the donor or the recipient, the donation will be cancelled, and the OR notified. The RC will also notify the LD Team, MOTS, TDS and Social Work. (if applicable)

Kidney Paired Donation

In 2009, as a result of the long wait lists for kidney transplantation and lengthy wait times for recipients, the Canadian Blood Services (CBS) launched the Kidney Paired Donation Program (KPD), an innovative registry that is designed to facilitate kidney donations among live donors.

- KPD donor and recipient candidates will be entered into the CBS KPD Registry. CBS will communicate potential matched pairs to LHSC. Refer to SOP 2.09, Kidney Paired Donation.

- Once the recipient is matched, the recipient team will complete the side-by-side review of the donor and recipient and if suitable, will preliminarily accept the donor kidney. The RC will accept the kidney on the CBS Registry.

- The living donor program is provided with all the necessary donor information. The donor team will arrange for the crossmatch. Refer to SOP 2.10, Shipping and Receiving Kidneys.

- It is important to maintain anonymity throughout the KPD process, including notification of donation and transplant as well as surgery booking. Refer to SOP 2.10, Shipping and Receiving Kidneys.

- Scheduling of surgery will be as per SOP 2.07.01, Living Donor Surgery Booking. It will usually be an 'after-hours' booking.

- Once booked, the recipient preparation for surgery will follow the same process as all living donor transplants. (See above)

- If concerns are identified in either the donor or the recipient, the patient will be deferred for additional evaluation and/or the process will be terminated.

- Care of the recipient post-transplant will be as with all recipients.

Surgery and Post-Operative Management

Consent

Surgical Consent

The surgical consent requires that the surgical team (Surgeon/fellow) speak to the patient on admission or in the clinic and sign the surgical consent form.

The surgical procedure is discussed in, including but not limited to, likely site of engraftment, possible complications peculiar to the patient, including difficulties with atherosclerotic vessels and the potential need for additional procedures like removal of PD catheters. Also potential for bleeding and need for blood transfusion. We also enlighten them on the risk of delayed graft function and rejection as well as the general course of recovery. Discussion on the use of drains, urethral and TAP block catheters also takes place.

The patient and their family are offered an opportunity for questions at this time.

Exceptional Distribution (ExD)

If applicable, the patient must also sign the Exceptional Distribution Recipient Consent Form. The transplant team is responsible for informing patients about potential risks of the transplant surgery (see above) and any donor-specific concerns. This includes issues such as potential donor transmissible disease concerns (e.g. history of infection or cancer). This form must be signed by the consenting physician or delegate as well as by the recipient (or substitute decision-maker) and placed in the recipient's medical record. The patient will be informed of the reasons for exceptional distribution and the possible implications.

The recipient is also informed of the right to refuse an organ if they are unwilling to accept the risks inherent in the exceptional distribution and remain active on the waiting list. The LHSC completed Consent to Treatment and Exceptional Distribution Notification and Recipient Consent are placed in the patient's medical record.

The RC will fax a consult request to Transplant ID when the patient receives:

- an IRD organ
- an ExD organ due to unknowns related to IRD

ID will arrange for recipient follow-up as required.

If further follow-up/testing of the donor is required due to the exceptional distribution this will be done through the TDS and the Source Establishment. Completed results of the donor follow-up will be communicated to the on-call physician and ID.

Deceased and Living Donor Follow-up

Documentation and communication of positive donor culture reports, as well as previously outlined further follow-up testing of the donor, is essential to ensure quality care for transplant recipients.

- The TDS will follow SOP 1.03.01, Communication of Positive Cultures.
- The LDs will follow SOP 2.05.01, Positive Culture, Serology or Virology Reports and communicate any concerns with the living donor directly to the transplant team as below.
- The TDS (Deceased donors only) notifies the nephrologist on call (for kidney) or the surgeon on call (kidney-pancreas or pancreas) or delegate, directly (phone call or a email or text that has been answered) of all positive blood and urine cultures and respiratory cultures that are positive for fungus. An email with the attached report (as supplied to the TDS by the SE) will be sent to:
  i. Nephrologist on call
  ii. Surgeon on call
  iii. Surgical fellow
  iv. Recipient coordinator on call who will forward it to the appropriate outpatient clinic staff
  v. Infectious disease consultant.
- Recipient treatment will be directed by the Transplant Team.
- Patients will be monitored for adverse events as per SOP 7.04, Errors, Accidents and Adverse Reactions.

Periodically, the SE or another Transplant Establishment will reach out to inquire about the recipient (usually to review and compare with the recipient of the mate kidney). In order to maintain anonymity, it is important that these inquiries be processed through TGLN. The TDS should initiate the follow up via the TGLN PRC.

Admission

1) In PowerChart use the order set “TRANSPLANT - Kidney Recipient, Pre-Op (Deceased Donor)
2) NPO status: patients should be allowed to eat and drink up until 8 hours before OR time and clear fluids up until 2 hours before OR time to reduce chances of acute renal injury
3) Appropriate perioperative antibiotics and induction immunosuppression should be ordered to be sent to the OR

Review of the Renal Allograft

In the OR the kidney transplant surgical team/OR team reviews the documentation to ensure that the correct organ is being transplanted into the correct recipient. The TGLN Donor ID number on the organ packaging and cooler must correspond to the TGLN donor ID number on the allocation report provided to the transplant surgeon. If there are any concerns regarding the donor organ the TDS will be as soon as possible to review the information prior to the transplant commencing.

OR staff (OR nurse, fellow, TDS, surgeon) will affix the organ label (SOP 1.02.09, Organ Labeling) on a sheet in the lab section of the recipient’s medical chart allowing for the identification of the donor and tracking. The label also provides organ details including organ side, (L or R or both), ABO, EVB, CMV, HCV and HBcAB, flush and preservation solutions and time of cross clamp and flush.

If applicable, errors will be documented as per LHSC Policies along with MOTP Error and Accident Reporting Procedures. Other errors or concerns will be communicated to the Source Establishment by the TDS.

The Kidney transplant Surgical team also reviews the kidney pump parameters (for deceased donor kidneys arriving to the transplant OR on pump) and assesses the anatomy of the renal allograft. Key things we look for during the anatomy examination include:

- Presence of atherosclerosis in the carrels patch or renal artery
- Presence of accessory arteries and the possible need for back table reconstruction
- Presence of any other vascular or collecting system anomaly

Findings at this time, if severe enough, may preclude transplantation. Should this happen the RC is notified, along with Nephrology and the TDS (who will inform TGLN of the decision.) At this point TGLN will decide whether the organ is offered back to the provincial list. (Refer to SOP 1.02.20, Case Cancellations)

Transplant Surgery

The Anaesthetists administer general anaesthesia (GA) with a cuffed endotracheal tube and insert an arterial line and central line. Induction immunosuppression and antibiotics given.

Routine skin prepping and draping to expose the site of engraftment (decided before surgery by the health of Iliac vessels and laterality of donor's kidney).

Gibson incision is made, carried down to retroperitoneum and external iliac artery and vein identified and mobilised. The donor kidney is brought into the surgical field and anastomosis of the renal artery and vein done to the external iliac artery and vein in end-to-side fashion.

Haemostasis ensured.

Uretero-neo cystostomy done.

Wound closed over a drain and dressed.

Patients are managed in the Operating Room according to LHSC OR Policies and Procedures.

Cancelled Transplant

The transplant may be cancelled for a variety of reasons including but not limited to:

- the organ is unsuitable on inspection (either during the retrieval or in the transplant OR when examined by the Transplant surgeon)
- the donor is found to be unsuitable at retrieval (e.g. unexpected malignancy discovered during surgery)
- the donor arrested prior to organ recovery (DNC)
- the donor did not arrest within the accepted time period (DCC).

In these cases, the TDS will notify:

- TGLN
- Nephrologist
- Surgeon (if applicable)
- RC
- LHSC OR nurse
- Anaesthesia
- Transplant Fellow (if applicable)
- Transplant Lab
- If any transportation that may have been previously should be considered in cancellations

(Refer to SOP 1.02.20, Case Cancellations)

The RC notifies:

- MOTU/admitting floor
- Family/patient
- Blood Transfusion Lab

Post-Anaesthetic Care

a) Patients proceed to the Post-Anaesthetic Care Unit following their surgery.
b) Patients are managed post-operatively according to the LHSC PACU Procedures.

Post-Transplant Care

a) When ready, the recipient is transferred to the Multi-Organ Transplant Unit or, if their medical condition warrants, the Intensive Care Unit (ICU).
b) While in the ICU the patient is under the care of the ICU medical team. The Transplant Team is integral to the continued care of the recipient and is expected to assist in the management of the recipient, including but not limited to, immunosuppression monitoring, dialysis (if applicable) and surgical follow-up.
c) When admitted to the MOTP refer to Kidney Transplant Clinical Pathway
d) Patients are treated following the Immunosuppressive Regime for Kidney Transplant Recipients.

e) Documentation of care is on the clinical record, the MOTU flow sheet, the pain management record, the medication record etc. available through Hospital Forms Management. (MOTU PA will provide support in the supplying of these forms when required.)

Transplant Infections diseases (ID) are consulted on all kidney and kidney pancreas recipients with infectious concerns:

i. Increased risk donor
ii. Positive Serology donor (e.g. HBV or HCV)
iii. ExD donor with an increased risk of disease transmission.

Patients who receive a kidney positive for HBV or HCV are also referred to Hepatology. (Refer to SOP) (Refer to Kidney Transplant – HCV Donor: Post-transplant follow-up Protocol)

Patients follow a general care plan during their hospital stay as developed by the Kidney Transplant team on a case-by-case basis. Hospital stay post-transplant should follow the clinical pathway.

Patients receive the LHSC Handbook on their admission. This handbook addresses:

- Expectations post-surgery – pain control, would care, lines and tubes, routine testing, breathing and coughing, mobility, diet
- Daily Routines following transplant – pathway posted on patient room wall, so patient knows what to expect each day.

Refer to Kidney Clinical Pathway Patient Checklist

- Life after dialysis including care and removal of catheters
- Anti-rejection drugs along with medication tips
- Vaccinations
- Identification and prevention of infection, rejection, delayed graft function, cancer prevention, dental care, diabetes, hypertension, cataracts, glaucoma, bone disease
- Discharge and follow-up appointments and education checklists

Discharge Planning

- Discharge appointments will be given to see both the surgeon (on the 8th floor clinic) and transplant nephrologist (on the 4th floor clinic). These appointments will occur within a few days of your discharge.
- After leaving the hospital, out of town patients will need to stay in London for about 4 weeks.
- Patient is seen in hospital twice/week for 2-3 weeks and then once a week for 2-3 more weeks to help manage any medical and/or surgical issues and adjust medications as required.
- Surgical clinic visit 4 weeks post-transplant for booked cysto-stent removal.

Resources

National

- Health Canada Guidance Document for Cell, Tissue and Organ Establishments - Safety of Human Cells, Tissues and Organs for Transplantation
- Canadian Standards Association (CSA) – CAN/CSA-Z900. 1:22 Cells, tissues and organs for transplantation: General standards (password protected site)
- Canadian Standards Association (CS) – CAN/CSA-Z900.2.3-17 Perfusable organs for transplantation (password protected site)
- Canadian Blood Services (some areas password protected)
- Canadian Blood Services – Kidney Paired Donation (some areas password protected)

Provincial

- Multi-Organ Kidney Transplantation Referral and Listing Guidelines
- Referral and Listing Criteria for Adult Simultaneous Kidney and Pancreas Guidelines
- Referral Guidelines for Adult Kidney Transplantation
- Listing Guidelines for Adult Kidney Transplantation
- Referral and Listing Criteria for Paediatric Kidney Transplantation
- Kidney Transplant Referral Form
- Kidney Special Case Committee (SCC) Application Form
- PRELOD Forms
- TGLN Clinical Handbook Kidney Transplantation
- TGLN Clinical Handbook for Living Kidney Transplantation
- Kidney Donor Profile Index (KDPI) FAQ for Physicians (TGLN)

London Health Sciences Centre – General

- LHSC Multi Organ Transplant Program Intranet site
- LHSC Adverse Event Management Systems (AEMS)
- LHSC OneChart
- Pathology and Laboratory Management (PaLM)
- LHSC Perioperative Care
- LHSC Policy Manager
- Post-Anaesthetic Care Unit (PACU)
- LHSC Surgery Services
- Clinical Pathway – Kidney Transplant
- Crossmatch Guidelines for Kidney, Kidney-Pancreas, Pancreas and Simultaneous Liver-Kidney Transplants
- Script for talking to Recipients when Offering Organs from an HCV Positive Donor
- Immunosuppressive Regimen for Kidney Transplant Recipients
- Non-A1/Non-A1B to B and O Recipients Transplant Guidelines & Resources

Donor

- ALS Donors: Using Livers of Kidneys
- HCV Positive Donors – SOP for Utilizing Organs
- Increased Risk Donors – SOP for Utilizing Organs
- Script for Talking to Patients from an IRD donors
- Reporting and Investigation Positive Donor Cultures (SOP)

Forms

Assessment

- Opinion Referral (lhsc.on.ca)
- Standard Kidney Transplant Assessment form
- Kidney Recipient Assessment Worksheet
- Kidney Transplant Process Checklist
- Initial Recipient Assessment
- Transplant Care Plan: Acknowledgement of Transplant Patients Responsibilities
- Transplant Listing Record

Donation – Deceased

- Donor Assessment Form

Transplant

- Adult Recipient Call in Checklist
- Paediatric Recipient Call in Checklist
- Kidney Recipient – Kidney Education and Preoperative Checklist
- Kidney Recipient Assessment Prior to Living Donor Transplant
- Exceptional Distribution Consent Form