ROYAL INFIRMARY OF EDINBURGH

SIMULTANEOUS PANCREAS / KIDNEY TRANSPLANTATION PROTOCOL

Revised August 2018

INPATIENT MANAGEMENT

1 Offer of Organs

Organ allocation will be carried out according to the NPAS (appendix I)
Following the offer of a pancreas and kidney for transplantation, the recipient renal / pancreas transplant co-ordinator will contact the on-call consultant transplant surgeon to discuss the donor and recipient details. Prior to accepting the organs further discussion with the recipient's consultant renal physician may be required before the decision is made to accept the organs.

NHS BT duty office is then informed of the decision to accept or decline the pancreas and /or kidney.

The recipient transplant coordinator will inform all members of the transplanting team including:

- High dependency transplant unit / ward 206 transplant
- Anaesthetist
- Theatre staff
- Renal registrar / renal transplant SHO
- Renal Consultant
- Tissue typing

The patient will be contacted by the transplant co-ordinator and asked to come to the transplant Unit (Ward 206) as soon as possible. The patient will be asked to fast and omit insulin. If they require glucose then this should be taken in the form of drinks only. The transplant co-ordinator will arrange transport of the patient from home to Transplant Unit if required.

All prospective recipients should be admitted as soon as possible, after the offer has been accepted, particularly if the donor is a DCD donor. This will allow time for dialysis and cross-match.

2 Pre-operative recipient work-up

The completed assessment form with the MDT decision should be filed in the notes and available at the time of admission with a copy of all assessment investigations.

Blood is taken for:

- FBC* (urgent)
- U&Es (urgent)* Creatinine*
- Ca, ALB and PO4, LFTs
- Clotting screen (urgent)*
- Lymphocytotoxic cross-match* - 10mls clotted
- Tissue type (10mls EDTA)
- Virology – CMV Hep B, Hep C, & HIV (with consent)
- Glucose*
- BM test on the ward
- Amylase
- Cross-match 4units (Hep E –ve) RCC (**2 separate group and save samples need to be sent)**

*Results are required prior to proceeding with transplant. It will be the responsibility of the SHO clerking the patient to ensure that the laboratories are informed of the urgency, and that the results are faxed/phoned to the transplant unit.

It is the responsibility of the transplant co-ordinator to liaise with the tissue-typing laboratory to arrange the cross-match. Unless the patient is on the virtual cross-match list the results of the cross-match must be reported to the on-call renal transplant co-ordinator who will discuss results with the consultant transplant surgeon prior to start of the transplant. The crossmatch results must be put in the patients notes prior to the patient going to theatre. **The donor name should be removed prior to results being placed in recipient notes.**

Once serum potassium is obtained, if >5.5 discuss with the SpR for management

(Appendix 2)

Full history and examination of the patient.
Important points to be noted:

- duration of type I DM
- complications of DM
- duration of renal failure
- mode of renal replacement therapy (if applicable), time of last dialysis target weight, fluid allowance
- urine output (volume)
- infections – any recent e.g. UTI
- other relevant past medical history
- current medications
- recent glycaemic control
- ECF volume status
- Cardiovascular examination to include BP, peripheral pulses
- Abdominal examination
- Urinalysis and urine C&S
- PD fluid for microscopy and cell count if applicable
- CXR
- ECG
- Correction of any ECF volume depletion
- CMV status
- IV 0.9% NaCl should be initiated if there is clinical indication. This may be particularly the case for patients who have recently had haemodialysis.

Fasting – all patients should be fasted from 6 hours prior to the anticipated theatre time unless otherwise stated by surgeons or anaesthetists.

Document Donor details:

- Blood group
- HLA mismatching
- CMV status
- Cause of death
- Cross-clamp time
- **Donor confidentiality must be maintained at all times**

3 Consent

Obtaining consent is the responsibility of the operating surgeon. The patient will sign the pancreas transplant consent form (Appendix 1) in the assessment clinic. At the time of transplant this should be signed again by the patient in addition to the NHS Lothian consent form. Consent will also be confirmed on an annual basis at the assessment review clinic. **At the time of transplant the transplanting surgeon must check donor blood group is compatible with two copies of the recipient blood group prior to the start of the transplant.** The surgeon must sign the blood group check form to document that the blood groups of the donor and recipient have been checked.

4 Medications

Routine medications should all be charted and be taken except as stated:

- **Anti-hypertensive agents** should be taken except ACE inhibitors or AT2 receptor antagonists, which should be omitted. Remember Diltiazem will interact with Tacrolimus raising levels of latter.

- Omit NSAID, diuretics

- **Glycaemic control:**

Once patients fasting they should go on to a sliding scale as shown below (taken from Lothian Adult Medical Emergencies Handbook). All patients need a background fluid infusion; we would suggest 20mls/hour of 10% dextrose for anuric patients (unless BM>14).

BM	Insulin Infusion (units actrapid/hour=ml/hr)
>16	6
13-15.9	4
10-12.9	3
7.0-9.9	2
5.0-6.9	1
4.0-4.9	0.5
<4	0 (call Dr, sliding scale may need revision)

Blood glucose should be checked by the nurse every hour

- **DVT prophylaxis:**

  Heparin 5000 units s/c at induction.
  5000 units bd s/c thereafter until discharge

- **Antibiotic and anti-fungal prophylaxis:**

  Induction prophylaxis:
  Fluconazole 400mg IV
  Piperacillin-tazobactam 4.5 g IV

  Mild penicillin sensitivity: Ceftazidime 1g IV and Metronidazole 500mg IV
  Severe penicillin allergy: Vancomycin 500mg with Ciprofloxacin 400mg iv and Metronidazole 500mg IV

  Piperacillin-tazobactam 4.5 g IV once daily (in event of mild penicillin sensitivity either ceftazidime 1g daily in 250mls 0.9% NaCl over one hour with metronidazole OR severe penicillin allergy vancomycin 500mg/d with ciprofloxacin 400mg iv/ 500mg orally once daily with metronidazole 500mg iv/ 400mg orally daily). This should be continued for **3 days** and then stopped.

  Fluconazole (100mg bd) This will be continued until the results of the donor organ fluid culture is known. Initial results of culture should be released 48 hours post-transplant. If positive continue 7 days.

- **Pneumocystis prophylaxis:**

  Co-trimoxazole 480mg daily starts post-op when patient can swallow for 3 months post – transplant. Where patients have known or suspected sensitivity to Co-trimoxazole, a desensitisation regime may be used (see page 33 renal transplant protocol). Dapsone is an alternative but less beneficial. If both cotrimoxazole and dapsone are not tolerated atovaquone may be used instead.

- **Ranitidine 150mg bd**. or Lansoprazole 30mg once daily.

- **Anti – viral prophylaxis:**

  Valganciclovir see below: -

All transplant recipients except CMV –ve recipients of CMV –ve donors should receive Valganciclovir for 6 months. If patient is CMV+/- and is given further doses ATG or Campath (Alemtuzumab) after this 6 month period they should have a further period of Valganciclovir prophylaxis.

Place in therapy

Therapy will be continued in primary care for up to a total of 6 months treatment for which a shared-care protocol will be provided.

For those not on prophylaxis surveillance - CMV PCR should be checked weekly until 8 weeks post transplant, then at 10, 12, 24, 26 weeks post transplant.

The initial Valganciclovir dose is dependent on renal function as shown in the table below:

Cockcroft Gault Creatinine clearance (ml/min)	Prophylactic dose
>60	900mg od
40 to 59	450mg od
25 to 39	450mg every 2 days
10 to 24	450mg twice weekly
<10	100mg (solution) three times per week after HD

- **Prophylaxis against corticosteroid induced bone loss**:

  Patients should have oral Calcium 500 or calcichew I-II tabs nocte with alfacalcidol 0.25mcg once daily or calcitriol 0.25mcg, unless eGFR >60 – where Adcal D3 2 tabs/ daily can be given

  If patients have known osteopenia/osteoporosis, previous long-term steroid therapy or one or more previous transplants they should be considered for pamidronate 30mg IV following transplantation and a second 30 mg IV at 6 weeks. An alternative acceptable regime would be Didronel PMO (3 monthly cycles – includes calcium supplementation) or weekly Alendronate 70mg in women.

Immunosuppression:

All pancreas transplant patients are treated as intermediate risk patients.
This group includes simultaneous kidney/pancreas transplants, patients who had a previous transplant, sensitised patients, FACS positive crossmatch, any DR-mismatch, non-favourable match, black race. The only difference here is the target trough level of tacrolimus is higher. Given the higher risk of delayed graft function in the DCD donors, the level of immunosuppression will be adjusted as required, on an individual patient basis.

Pre-op (at admission)	MMF	1g
	Tacrolimus	0.05mg/kg
Peri-op	Simulect	20mg
	Methylprednisolone	500mg in theatre; 500mg at 24hrs post-op
Post-op	Prednisolone	20mg daily (reducing to 5mg at 3 months)
	MMF	1g bd at 08:00 and 20:00 hrs
	Tacrolimus (Adoport)	0.05mg/kg bd at 10:00 and 22:00
Day 4	Simulect	20mg

Tacrolimus target trough level 8-12 in first 3 months
target trough level 5 – 10 after 3

Rhesus –Ve females with childbearing potential who receive an organ from a Rh +ve donor require anti-D immunoglobulin (500 iu) at induction (or within 72 hours of operation).

All the above should be charted on the patients drug chart at the time of admission together with any known drug sensitivities.

5 Cross-match result

1. Virtual Cross match
If patient eligible for a virtual cross-match, tissue typing will inform the transplant coordinator who will ensure there is a copy of the virtual cross-match in the patients/s notes. If a full cross-match is required this will take about 4 hours and the result will be communicated to the coordinator who will document this in the notes.

2. If the Cross-match is positive or the patient is unsuitable:

- The patient will be advised accordingly.
- An immediate discharge letter will be given to the patient.
- A discharge letter will be sent to the referring unit and GP and arrangements for the patients follow-up will be made.
- Patients' notes from Local Centre will be returned
- Local physician will be contracted to inform of patient condition and arrange appropriate management.

2. If the cross-match is negative and the patient is suitable:

- The patient will be advised and surgeon, anaesthetist, and theatre will be informed by the transplant co-ordinator.

6 Post-operative recipient care

6.1 Immediate post-operative period:

First 24 hours – (ICU ward 118 protocol)

On arrival from theatre/ theatre recovery the patient will be admitted in the routine fashion.

The major early management issues are:

1. Potential for bleeding.
2. Fluid balance – these patients in generally require larger volumes of fluid than kidney transplantation alone.
3. Blood Glucose control – pancreatic function will dramatically reduce previous insulin requirements. Check for hypoglycaemia

4. Electrolyte disturbance.

DO NOT USE STANDARD WARD 118 MAINTENCE FLUID OR INSULIN REGIMES FOR THIS PATIENT GROUP.

ICU Admission Bloods:
FBC, Coag screen, U&E, LFTs, Formal glucose, AMYLASE, ABG, Drain Amylase

1 hourly Blood glucose check blood sample taken via arterial line
CXR – central line position
NG position – in-situ for 24 hours, remove following discussion with transplant surgeon. In patients identified as high nutritional risk an NJ feeding tube will be placed in theatre.

8 hours post transplant
Repeat FBC, U&E, Formal Glucose Serum and Drain AMYLASE
Repeat coagulation screen if clinically indicated

PRESCRIBE

All routine medications except ACE inhibitors, AT2 receptor inhibitors NSAIDS, s/c insulin, oral phosphate binders, erythropoietin

DVT prophylaxis	heparin 5000 units sc bd
GI prophylaxis	Ranitidine 50mg tds
IV Fluid	Initially crystalloid at urine output + 60mls/hr 200mls bolus if clinical signs of hypovolaemia NEEDS REGULAR CLINICAL REVIEW
Blood Glucose	Insulin if BM > 12 for 2 hours **call on-call surgeon to review patient** and start sliding scale (50 units Actrapid in 50mls N Saline):

BM 8 – 10	1 unit per hour
BM 10.1 – 12	2 units per hour
BM > 12	3 units per hour

Analgesia	Epidural and/or PCA as charted Regular Paracetamol 1g qds Avoid NSAIDS
Immunosuppression	Methylprednisolone 500mg - 24 hours after clamps released Prednisolone 20mg mane thereafter Ongoing immunosuppression in consultation with the transplant team.
Antimicrobials	Fluconazole 100mg bd until donor duodenal swab culture known. Co-trimoxazole 480mg daily Tazocin 4.5g once daily
Nutrition	High nutritional risk patinets will have NJ placed in theatre to have feed commenced at 12 hours post-op following discussion with transplant surgeon (as per SPK Nutritional protocol – appendix III).

6.1 Day 2 post transplant

Discussion with the duty team if further imaging is required.

- BM should continue 2 hourly

Blood glucose control**:** If BM>12 – **call surgeon to review patient as may a be a sign pancreas graft compromise.** Start sliding scale.

- Repeat U&Es, Glucose, FBC, LFT, Serum and drain Amylase daily
- In event of hyperkalaemia – see treatment protocol (**Appendix II**)

- **IV fluid replacement:**

  Crystalloid at urine output + 60 mls/hour.
  Aim for CVP 5-11 cm H2O. If CVP low then give colloid (4.5% HAS 200 ml aliquots) or crystalloid**. However it should be noted that SPK patients are likely to require more IV fluid than patients who have undergone kidney transplant alone.**

- Analgesia –. Some patients will have an epidural . If no epidural or epidural is discontinued use PCA. Avoid NSAIDS. If pain increase consider cause e.g. bleed, graft thrombosis, contact on-call transplant surgeon. Discuss pain management with pain team as necessary.
- NG tube for 24 hours usually.
- Urinary catheter should normally be removed on day 5. If catheter obstruction suspected, gentle catheter irrigation should be performed after surgical consultation and preferably by the surgeon.

- Nutrition:

Patients will remain fasted until the surgeons allow oral intake. Patients are classed as low or high nutritional risk during their assessment. High nutritional risk patients will have an NJ inserted in theatre and should have NJ feeding and low risk patinets will receive oral supplements as per the SPK NUTRITION PROTOCOL (Appendix III).

NOTE: If the patients condition changes and there is any cause for concern – do not hesitate to contact on-call transplant surgeon – at any time of day

7 Potential problems (Days 0-5) –

Note: Contact on-call surgeon if concerned at any time

- bleeding
- urinary leak
- renal vein thrombosis
- renal arterial occlusion
- pancreatic vascular thrombosis
- allograft pancreatitis
- urinary catheter occlusion

- **Post-op anuria**

  - Exclude catheter occlusion and hypovolaemia and treat as delayed graft function (see below)

- **Hypotension/low CVP unresponsive to IV fluids**

  - Suspect bleeding.
  - Exclude narcosis, cardiac event or ECF volume depletion
  - Arrange urgent abdominal USS.
  - ECG
  - Check FBC and X-Match
  - Inform on call transplant surgical registrar/consultant
  - Review need for epidural anaesthesia

- **Pain**

  - Suspect bleeding, graft infarction secondary to arterial or venous occlusion, urinary catheter occlusion, allograft pancreatitis
  - Urgent amylase
  - Inform surgeons
  - Arrange urgent abdominal USS and Doppler of vessels (if required)

- **Delayed graft function**

  - Renal +/- pancreatic ultrasound – Doppler on first post-op day. Additional imaging for pancreas may be required.
  - Renal biopsy may also be required on day 5-7 to exclude rejection and at weekly intervals thereafter until function is established.

- **Renal allograft dysfunction**

  - A rise in Creatinine, a change in slope of plotted log Creatinine or a decrease in urine output may result for a number of reasons. ECF depletion,

Tacrolimus toxicity or infection should be excluded. Acute rejection should always be suspected.
- An USS, Doppler +/- renal biopsy should be arranged.

- **Pancreatic allograft dysfunction**

  - Isolated pancreatic rejection in the absence of renal allograft acute rejection is relatively uncommon (-10% of cases). Problems with vascular supply should be first considered.
  - An abdominal USS and Doppler of pancreas should be arranged. If the pancreas is not visualised well consider CT-angiogram or MRA in discussion with consultant surgeon.
  - Request serum and drain amylase.
  - Pancreatic biopsy should be considered as there can be a discrepancy between the renal and pancreas biopsy

8 Routine management of post-operative transplant patients

Routine Investigations:

- **Blood Sugars** should be measured twice daily after the first 24 hours for the first weeks

- **Daily:**
  - U&E, Creatinine (plotted on log graph)
  - LFT
  - Amylase Serum and drain fluid
  - Glucose (fasting)
  - Calcium, Albumin and Phosphate
  - FBC – if WBC above normal level check CRP daily
  - Clotting Screen
  - Drain fluid amylase

- **Monday / Wednesday /Friday**
  - Tacrolimus level *(trough)

*For the first month the desired trough Tacrolimus level will be 10-15. In cases of delayed primary renal allograft function this may be reduced.

- **Weekly (Mon)**
- MSU or CSU
- PCR for CMV (9mls EDTA) for patients not on Valganciclovir prophylaxis.

Management of hyperglycaemia

Some patients may require some additional insulin if there is combined effects of pancreatic allograft dysfunction and steroids and Tacrolimus. Management should be discussed with the diabetic physicians. **If hyperglycaemia develops suddenly please discuss with surgeon as it may indicate a problem with the pancreas graft.**

Management of hypertension

If BP control is not adequate on the patients routine medication (excluding ACEi or AT2A) then additional therapy should be introduced. Dihydropyridine Calcium channel blockers would be a suitable first line choice.

Prevention / Management of infection

Prompt diagnosis and treatment with appropriate anti-microbial therapy is required. Cultures of blood and urine in event of a pyrexia are mandatory. Chest physiotherapy in the post-operative period is required. Remember interaction of Erythromycin, Clarithromycin with Tacrolimus. (These drugs should be avoided if possible).

Medications

The patients will start on the self-medication protocol when appropriate.

Wound Care

Wound clips should be removed following discussion with consultant transplant surgeon and no earlier than 2 weeks after transplantation.

Drains

Drain fluid should be measured every 24 hours and sample of fluid sent for drain amylase.

Pancreas drains to be removed / shortened as per instruction from consultant transplant surgeon.

Discharge / Follow-up (details in Out-patient protocol)

All patients should have a Glucose Tolerance Test between 7-10 days post-operatively.

When patients are considered fit for discharge:

The referring unit will be informed by immediate discharge letter and telephone call. If patients are transferred to the local hospital prior to discharge home the centre must be contacted before and on day of discharge. A copy of the patient transfer details sheet (appendix IV) with a computer printout of the biochemistry, haematology, Tacrolimus results and discharge letter should accompany patient on transfer and/or faxed to receiving unit. The GP should copied into this correspondence.

The discharge letter can be generated on vital data and must include details of:

- Mismatch
- Operation (including confirmation of appendicectomy or otherwise)
- Immediate graft function or otherwise
- Details of rejection episodes and required treatment
- Any complications and discharge requirements
- Creatinine and blood glucose/insulin requirements
- Drug prescription
- Follow-up plan including timing for stent removal (4-6 weeks post-operatively)

9 Transfer to Local Unit

If patients are transferred to the local hospital prior to discharge home the centre must be contacted before and on day of discharge. A copy of the patient transfer details sheet (appendix IV) with a computer printout of the biochemistry, haematology, Tacrolimus results and discharge letter should accompany patient on transfer and/or faxed to receiving unit. A copy should be filed in the patient's transplant case notes. **Follow up plan for SPK patients post transplant at RIE**

For **all** SPK patients to be offered follow up at 3 and 12 months and yearly thereafter at RIE .

If patients have follow up at their own centre there will be provision for dial – in updates up to 3 months .

For Inverness/Dundee/Aberdeen – through the existing kidney monthly meetings

For Glasgow/NI – To arrange dial up either through weekly MDT / Virtual clinics/ Outreach

Referring Centre	Follow up Clinics	3 month Review	Annual Review
Lothian	RIE	RIE	RIE
Fife	RIE> 3 months	RIE	RIE
Tayside	Dundee	RIE	RIE
Greater Glasgow	Glasgow	RIE	RIE
Northern Ireland	NI	RIE	RIE
Grampian	Aberdeen	RIE	RIE
Borders	RIE> 3 months	RIE	RIE
Lanarkshire	RIE> 3months	RIE	RIE
Dumfries and Galloway	RIE/Dumfries	RIE	RIE
Highland	Inverness	RIE	RIE
Ayrshire and Arran	Aberdeen	RIE	RIE
Shetland	Inverness	RIE	RIE
Forth valley	Glasgow	RIE	RIE

Please note any patient with complications resulting from SPK transplant will have follow- up at RIE.

All patients offered 3 month Follow up at RIE: Three month clinics to be surgically led, annual review transplant co-ordinator with medical/surgical support if required.

Current follow-up clinics held on a Monday am in OPD 1, existing templates for surgical/medical and transplant co-ordinator .

For Referring centres that are doing follow-up:

At all appointments to take standard bloods : FBC,CRP, U & E's , LFT's Amylase, random glucose and MSU. Then follow the RIE plan for one month and three month follow-up appointments below.

Frequency

Follow-up will **be at least weekly until 12 weeks post-transplant**. This will be either at RIE or referring unit , but could also be a combination of both .

All patients should be offered a **3 month Surgical Follow up** appointment at RIE.

From 12 **weeks to 6 months** outpatient visit intervals will be gradually increased to monthly visits.

Beyond 12 months follow-up will be normally at the local referring centre. If there is no local transplant unit, then follow-up should be carried out at either the nearest appropriate renal unit or at the Transplant clinic on a Monday, Wednesday or Friday at the RIE. **Patients should be seen every 3-4 months**.

NOTE: To ensure satisfactory shared care, prompt communication between units will be necessary.

Monitoring

Patients should monitor their BMs frequently for the first 3 months and record them in a diary. Recommend BM check – pre-breakfast and pre-evening meal. Patients should also monitor weight daily and adjust fluid intake accordingly.

At each out-patient review the following will be done.

- BP
- Weight
- Urinalysis
- Bloods taken for U&E, Glucose (random), Amylase, HBA1c, LFT, CAP, Tacrolimus trough level* FBC
- MSSU
- Urine Albumin/Creatinine ratio
- PCR for CMV when indicated. The threshold for CMV PCR should be lower after the 6 months, given the increased risk of CMV disease following completion of the prophylaxis period.
- Lipids every 6 months

- PTH every 6 months if evidence of renal allograft dysfunction or previous hyperparathyroidism.
- **HBA1c 3,6 and 12 months thereafter**
- Post transplant cytotoxic antibody levels checked at the time of any post-transplant biopsy as well as every month for first 6 months then annually thereafter.
- Retinal examination - yearly
- Neuropathy assessment 3, 6, and 12 months thereafter

Patients should be advised to have annual check for diabetic complications at their diabetic unit

Patients will be asked to omit their morning Tacrolimus dose until after bloods have been taken

Targets

- **Blood Pressure** 130/80
- **Blood Glucose** <6 mmol/l
- **Lipids** LDL cholesterol >3.0 dietary advice and statin.
  or total cholesterol > 5.0 dietary advice and statin.

Immunosuppression (appendix VIII)

Tacrolimus trough level	0 –1 month	10-15
	2 - 8 months	8-12
	> 8 months	5-10

Prednisolone dose	0 – 4 weeks	20mg/day
	4 – 8 weeks	15mg/day
	8 –12 weeks	10mg/day
	>12 weeks	5mg/day (if BW<70kg)

Any treated rejection will reset the clock to the above reduction schedule.

- **Prophylaxis against infection**

Co-trimoxazole discontinued at 3 months
CMV prophylaxis discontinued at 6 months

Three month follow-up clinics

Three month follow up to be medically led with the provision for potential of 20 appointments yearly.

Organisation: Appointment to be booked on discharge from the RIE

Location : Current proposal to utilise medical follow-up clinics Monday/Wed/Friday am in OPD1 . These are already templated .

Structure:

- Medications review
- BP / weight
- Wound check
- Neuropathy assessment
- Stent removal check
- Fluid balance
- Compliance review
- Pancreas function – patient BM check before am food and before pm food 2-3 times /week – Blood tests – amylase HbA1c, c-peptide, **GTT**

Graft status:
Functioning :HbA1c < 6% [42 mmol/mol] on NO anti-diabetic medication

Partial function: HbA1c > 6% [42mmol/mol]
OR
Requiring medication to maintain hbA1c < 6%
C-peptide +ve [or C-peptide > pre-transplant C-peptide]

Graft failure: C-peptide < 50 pmol/l
OR
C-peptide lower than pre-tx C-peptide
C-peptide tests should be accompanied by a glucose value and should ideally be stimulated. The gold standard would be a dynamic test either with an OGTT (75gms glucose) or mixed meal test (220mls of fortisips).

It is acceptable to perform a glucose and c-peptide 10-130 mins after ingestion of a large glass (>150ml) of lucozade.

Note: c-peptide levels are difficult to interpret in patients with renal failure

Monitor HbA1c
· 3 monthly in the first year
· At least yearly after that
IF
· HbA1c > 6.0% [42 mmol/mol]
· OR rises > 0.5% [5mmol/mol] in a year
· Consider investigation
· Review in joint clinic - surgeon + diabetologist
Suggested investigation plan should include

Metabolic	**Immunology**	**Vascular**
HbA1c	DSA	Imaging (CT)

- CGM - review of capillary glucose data – specifically 1 hour post meal and fasting readings.	Diabetes antibodies [GAD / IA-2]	Angiography Dopplers
Stimulated C-peptide - Mixed meal test / OGTT - C-peptide 10-30 mins after 150ml lucozade	Protocol Biopsy	

- Kidney function – blood tests- U & E , urinalysis and MSU , fluid balance
- Tacrolimus levels
- Viral screening:polyoma virus, cmv pcr

Patients undergoing solid organ or islet transplantation will undergo testing for the HBV, HCV, HIV and HEV when they have reached a time-point of **3 months post transplantation**. Testing of living donor and deceased donor transplant recipients will be undertaken.

Consent for testing will be according to local policy regarding BBV testing.

Testing will be arranged by the clinical team undertaking the follow up at that time and sent to the local clinical laboratory.

The following tests will be undertaken:

Pathogen	Test
Hepatitis B virus (HBV)	HBcAb and HBsAg
Human Immunodeficiency virus (HIV)	HIV Ag/Ab combo
Hepatitis C virus (HCV)	HCV Ag and HCV Ab
Hepatitis E virus (HEV)	HEV RNA PCR[1]

Samples sent for recipient virological testing will be stored for a period of 2 years in keeping with current NHS Lothian practice for virological testing. The policy of sample storage allows for testing of pre-transplant samples should concern arise over potential donor transmitted infection. It should be noted that samples sent for virological testing of organ donors are stored for an indefinite period.

A test result suggesting transmission of a BBV will require the clinician looking after the patient to

- Initiate further investigation of the recipient to confirm acquisition of a BBV. This will require specialist advice from a consultant virologist with experience of transplantation.
- Initiate appropriate management of the BBV in the transplant recipient. Specialist advice should be sought.
- Notify the Transplant Unit Clinical Director

[1]It is noted that final SaBTO recommendations are awaited.

- Notify NHSBT of possible BBV transmission by telephone call[2] and through the online reporting system[3]
- If blood products have been used either during or after transplantation then the blood transfusion services must be notified with submission to Serious Adverse BloodReactions and Events (SABRE)[4]

In the event of a transmission of a BBV, the Clinical Director of Transplant Surgery will

- Ensure that a DATIX submission has been made
- Inform the Associate Medical Director

[2]01179757580

[3]https://safe.nhsbt.nhs.uk/IncidentSubmission/Pages/IncidentSubmissionForm.aspx

[4]https://aic.mhra.gov.uk/mda/sabresystem.nsf/Login?Open

Appendix I Consent form

Name: DoB: CHI: (affix patient sticker)	Transplant Unit logo

At time of inclusion on National Transplant List	**Tick**	**Initial**
I have read and understood the patient information booklet explaining simultaneous kidney pancreas transplantation, including pre-assessment, the operation and post-operative care.	☐	
The following operative risks have been discussed and I understand:		
- Graft survival rates Pancreas (85 in 100 people at 1 year), Kidney (94 in 100 people at 1 year)	☐	
- Non functioning kidney or pancreas transplant *(The kidney or pancreas never works)*	☐	
- Delayed Graft Function (up to 40 in one hundred deceased donor transplants) *(There is a delay in the start of the kidney working)*	☐	
- Infection/leak with re-operation (up to 15 in 100 people)	☐	
- Bleeding requiring re-operation (up to 15 in 100 people)	☐	
- Pancreatitis	☐	
- Urine leak (2 in 100 people)	☐	
- Thrombosis *(blood clot in the vessels, causing the kidney or the pancreas not to work)*	☐	
- Episode of rejection after transplant, requiring treatment (in up to 20 out of 100 people)	☐	
- Cardiac complications	☐	
- Blood clots in the legs (DVT) or lungs (PE) (1 in 100 people)	☐	
- Mortality (less than 5 in 100 people)	☐	
The following aspects and risks of simultaneous kidney pancreas transplantation have been discussed and I understand:		
- Appendectomy at the time of transplant	☐	
- Donor specific risks were discussed, including transmissible infection (such as cytomegalovirus), or malignancy (known/unknown)	☐	
- Immunosuppressive treatment was discussed, including its associated risks (such as drug side effects, infection, diabetes and cancer, including skin cancer)	☐	
- The process of long-term follow-up post-transplantation and the consequences of not following medical advice on graft survival was discussed	☐	
- I have an understanding of current graft survival and mortality rates, as contained in the patient information booklet	☐	

I confirm that I have understood and consent to the procedure. I will have the opportunity to ask questions and re-affirm my consent at time of review and prior to the operation itself. Date: / /

Patient	Clinician
Signature……....	Signature……....
Name:	Name:

1

Appendix II

Management of Hyperkaleamia

Patients on haemodialysis

a. dialysis is due irrespective of treatment
b. based on the results of admission U&Es.

In practice, unscheduled haemodialysis is unlikely to be required except for hyperkalaemia.

Management of serum potassium

The objective is to ensure that the serum [K_+] is $\leq$ 5 mmol/l.
It is the responsibility of the renal SHO to obtain the potassium result and act upon it.

a. If serum [K} $\leq$ 5 and surgery is likely to be more than six hours later: -

Standard maintenance:
- 10%dextrose 500ml (+16U Actrapid) at 40 ml/hr
- nebulised salbutamol 5mg six hourly

b. If serum [K_+} >5 treatment is required.

Initial treatment;
maintenance regime **plus**
insulin/dextrose given as 5 units Actrapid in 50ml 50% dextrose over 15 minutes (check with consultant anaesthetist).
Potassium and BM should be checked after 60 minutes (onset of action is 45 – 60 mins, peak effect 60 – 90 mins).
Patients who fail to respond may require dialysis.

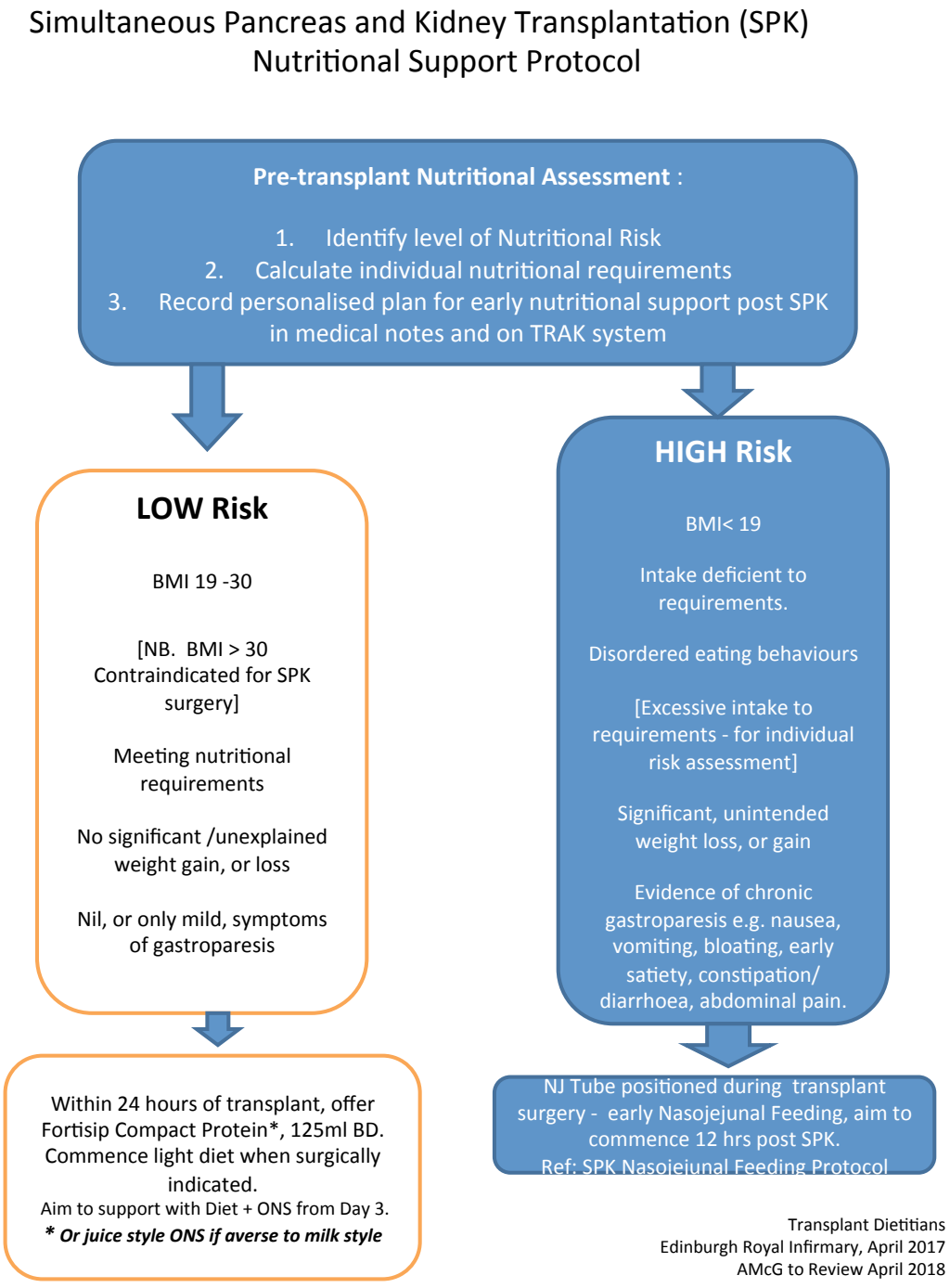
c. If serum [K] > 6.5 the patient may require haemodialysis.

The registrar or consultant must be informed.
Immediate measures are continuous ECG monitoring and 10ml calcium gluconate slow IV, repeated once if required.

Notes:

1. Post-dialysis potassium must be checked from a peripheral venous sample taken at least 5 minutes after the end of dialysis.
2. The maintenance regime is only designed to prevent a rise in serum [K_+] and is not appropriate when the serum[K_+] requires reduction.
3. There is no place for calcium resonium or sodium bicarbonate in the control of pre-transplant potassium.

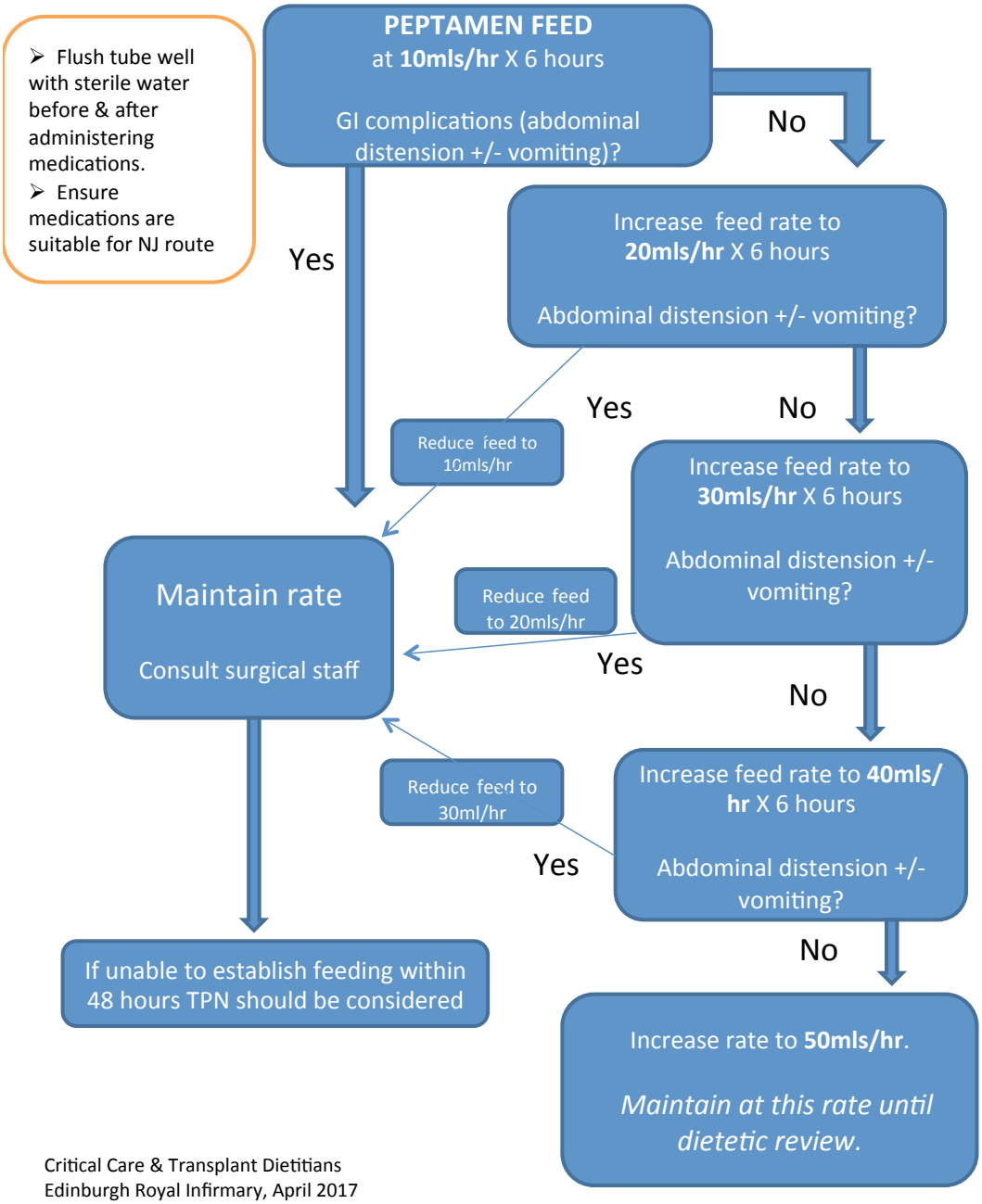
Appendix III Nutrition protocol



Simultaneous Pancreas and Kidney Transplantation (SPK)
Nasojejunal Enteral Feeding Protocol

Early Nutritional Support: Commence feeding as surgically advised, ideally 12 hrs post SPK.

- Flush tube well with sterile water before & after administering medications.
- Ensure medications are suitable for NJ route



Critical Care & Transplant Dietitians
Edinburgh Royal Infirmary, April 2017
JM/AMcG to Review April 2018

References/Acknowledgements

Finlay S, et al., The role of nutritional assessment and early enteral nutrition for combined pancreas and kidney transplant candidates, Clinical Nutrition ESPEN (2016), http://dx.doi.org/10.1016/j.clmesp.2016.12.002

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Appendix IV Discharge proforma

Transplant patients transferred from ERI

On transfer from Edinburgh post transplant :

- have a core data set recorded.
- be seen by the ward consultant.
- be seen by the pharmacist and have their drugs explained and documented in their 'green book'.
- have outpatient review organised.
- have enough drugs to last until they see their GP, bearing in mind that some drugs such as Myfortic may not be readily available in the community.

core data

- Recipient Primary disease.
- Previous transplant history, (transplant lifespan and cause of graft loss where applicable).
- Recipient urological problems.
- Operative complications.
- Post op surgical details.(op note should be attached)
- Date commenced RRT or pre-emptive.
- Donor kidney type; lud/lrd/dbd/dcd.
- Donor age, sex, cause of death.
- Cold ischaemic time.
- HLA Mismatch. Immunological risk; hi/med/low. Need for DSA monitoring.
- Virology; donor and recipient CMV and EBV status
- Delayed graft function and duration of dialysis (if applicable).
- Biopsy results. Biopsies should be requested for local review.
- Any ACR and treatment given
- Induction therapy given.
- Maintenance therapy.
- CNI dose, (current and historical).
- Full chemistry post transplant.
- CNI trough level history post transplant and target range.

Most of this information should be available from the transfer letter. Missing information should be obtained from the ERI transplant registrar by phone.

File this sheet in the patient's admission note and use it as a checklist.

Royal Infirmary of Edinburgh

Renal Transplant unit

Patient name: **CHI:**	
Consultant Surgeon **Consultant Nephrologist**	
Date of transplant	
Type of transplant	
Donor Details Sex Age Cause of death Other relevant details	
Cold ischaemic time	
HLA MM Pre-formed DSA Monitoring required If Y, is table attached?	
CMV status	
EBV status	
Induction therapy	
Maintenance therapy CNI chart attached? CNI target trough	
Surgical complications	
Other Issues	
Operation notes attached?	
If Y, details	
DGF?	

If Y, duration of dialysis	
Implantation biopsy?	
Graft biopsy? Number	
Findings	
Acute rejection?	
If Y, details	
Treatment	
Serious infection?	
STENT removal	
Treatment and duration	

Attached reports

Operation notes

Pathology reports

Radiology reports

CNI dosing chart

Biochemistry

Haematology

Microbiology

H&I post op DSA screen

BK screening form