Shared Care Guidance for Immunosuppressive Treatment following Paediatric kidney transplantation

Updated: March 2023

This guidance has been prepared and approved for use in North of Tyne, Gateshead and North Cumbria It gives details of the responsibilities of GPs and specialist services in shared care arrangements and is intended to provide sufficient information to enable GPs to prescribe this treatment within the shared care arrangement. Secondary care will provide the initial three months of treatment, as agreed in the commissioning contract.

Further copies are available from:

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Endorsed for use within the North of Tyne, Gateshead and North Cumbria Area Prescribing Committee Footprint	
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An electronic version of this document can also be viewed / downloaded from the North of Tyne, Gateshead & North Cumbria Area Prescribing Committee's Website http://www.northoftyneapc.nhs.uk

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North of Tyne, Gateshead and North Cumbria Area Prescribing Committee

Shared Care Guidelines for Immunosuppressive Treatment following kidney Transplantation in paediatrics

A. Introduction to kidney transplantation

Transplantation is the treatment of choice for many patients with End Stage Kidney Failure (ESKF), preferably performed pre-emptively to avoid the complications of dialysis. Each year there are approximately 120 paediatric kidney transplants in the UK, equally split between living related or from deceased donations.

Both patient and graft (transplanted organ) survival have improved substantially over the last 50 years, and continue to do so. Approaching 90% of cadaveric kidney transplants are functioning 1 year following transplantation, and 50% at 10 years. Corresponding figures for live-donor transplants are 95% and 65%. Patient survival 1 year after transplantation is 97%. Children with a transplant live longer than those on dialysis, have a better quality of life, have higher cognitive functioning and cost the NHS less.

The Paediatric Nephrology Department at the Great North Children's Hospital in Newcastle provides kidney transplantation to children and adolescents in the Northern region. It is one of 10 UK paediatric kidney transplant centres. At any time, we follow up approximately 40 transplant recipients.

Following transplantation, patients remain as in-patients until kidney function is stable, and they are established on their immunosuppressive regimen. They are then followed up closely with frequent reviews.

Transplant recipients have a named kidney nurse for coordination of care, access to 24 hour kidney nurse contact and open access for medical issues back to our unit. We also set up arrangements for open access to their local paediatric units in the event of being unwell. A consultant paediatric nephrologist is permanently on service to advise both GPs and our general paediatrian colleagues around the region.

Post-transplant follow up

After transplantation, patients are followed up in a specialist clinic until they are transitioned to adult nephrology care. There are several important objectives of follow up:

- Monitoring and preservation of kidney function
- Monitoring and modification of immunosuppression
- Prevention and management of complications of immunosuppression:
    - Malignancy (especially post-transplant lymphoproliferative disease)
    - Infection
    - Hypertension and cardiovascular disease
    - Diabetes
- Shared care with other specialists, for example those with liver or urology conditions
- Compliance with medication and follow up care
- Psychosocial issues are well supported with our dedicated team of specialist nurses, kidney psychologists, play therapists and social worker
- Dietetic support

There is a specialised nurse led transplant clinic for established transplants. Detailed annual reviews are conducted to monitor late effects and generalised well being, including cardiovascular risks, schooling and dental well being.

Frequency of follow up

Most patients remain in hospital for about two weeks following transplantation. For up to 1 month after discharge they are seen or have kidney function monitored 2 or 3 times per week in our clinic or in the kidney day unit. The frequency of subsequent visits depends on the stability of graft function, and the presence of any concurrent illnesses.

This is the follow up schedule for uncomplicated transplants. Follow up may be intensified as issues arise.

- 6 weeks: Daily to three times per week
- 6 –12 weeks: twice per week
- 12 –18 weeks: once per week
- 18 – 30 weeks: once per fortnight
- 30 – 45 weeks: once per three weeks
- 45 weeks – 18 months: once a month
- 18 months – 2 years: once every 6 weeks
- Year 3: once every 2 months
- After year 3: once every 3 months

What happens at a follow up appointment?

Most episodes of acute rejection occur in the first few months after transplantation, so the focus of early follow up appointments is on monitoring kidney function and ensuring adequate immunosuppression. As the risk of acute rejection decreases, immunosuppression intensity is reduced to minimise adverse effects, in particular the nephrotoxicity of the calcineurin inhibitors (CNIs) tacrolimus.

In paediatric transplant recipients, disease recurrence, transplant rejection, urine infections and non-compliance with immunosuppression are the most important cause of graft loss. Close attention is paid to modifiable risk factors.

At follow up clinics patients can expect:

- Measurement of weight and blood pressure
- To see a nephrologist or senior kidney nurse
- Review of medications
- Measurement of serum creatinine, electrolytes, LFT, FBC, and trough levels of tacrolimus
- To access psychosocial support that can impact on long term graft survival or quality of life

To minimise time off school or travel, after six weeks, the patient's named nurse may arrange for blood tests to be performed locally either at the local hospital or at the GP practice. The paediatric kidney team will retrieve and review these results in a timely manner.

Following the clinic visit or blood tests:

- Blood results will be reviewed by the team
- Any abnormal results requiring action, or treatment changes, will be communicated to the patient by telephone, letter, or at a new appointment
- Following significant issues or changes to medication, a letter will be sent to the patient's GP, local paediatrian and parents

Shared care of transplant recipients

Since all patients are followed in the transplant clinic until transfer to adult nephrology, the paediatric kidney team will monitor and adjust immunosuppressive treatment. We will initiate prophylaxis against opportunistic infection, and any treatments for the prevention of late effects such as cardiovascular diseases or kidney osteodystrophy. Our current protocols are listed below, and specific responsibilities enumerated in the guideline for each immunosuppressive drug.

Transplant recipients will continue to receive primary care from their own GP. Specific Primary Care responsibilities are listed in the guideline for each immunosuppressive drug.

Please note that:

- The paediatric kidney team can be contacted at any time for advice (see 'Contacts' page 21)
- There are many important drug interactions with immunosuppressive medications, listed in the guideline for each drug
- As part of the planned transition process for every adolescent patient, the paediatric kidney team will counsel all female transplant recipients about contraception
- **Abrupt withdrawal or changes to immunosuppressive treatment may lead to acute rejection and graft loss**

B. Immunosuppressive Protocol

Individualised protocol for every patient

Each patient has an individualised immunosuppression protocol drawn up before listing for transplant. The current standard protocol is **tacrolimus and mycophenolate mofetil (MMF)**. Individualised protocols may include **azathioprine** or **prednisolone**.

Drug dosing and monitoring

Initial doses and recommended monitoring for each drug are shown in the shared care guideline. The required dose of tacrolimus varies substantially from patient to patient, and is determined by measurement of whole blood drug levels performed immediately before a dose (that is, a 'trough' level). Most episodes of acute rejection occur in the first few months following transplantation, thus target drug levels are highest initially (Table 1). As the risk of acute rejection declines, target drug levels are reduced in order to minimize side effects (particularly nephrotoxicity) whilst maintaining adequate immunosuppression.

There are many important drug interactions with tacrolimus. The most important are listed in the shared care guideline for each drug, great care is needed when prescribing for these patients.

Please contact us before prescribing as we may need to arrange for additional monitoring of blood levels.

The target levels for tacrolimus, is shown below. Doses are adjusted in the transplant clinic.

	Tacrolimus
0-2 month	**8 - 12 ng/ml**
2-12 months	**5 - 8 ng/ml**
After 1 year	**3 - 5 ng/ml**

C. Prophylactic Treatment

1. Anti-microbial prophylaxis

Kidney transplant recipients are at increased risk of infection

Once the patient is discharged from hospital and the surgical wounds have healed, most of the excess risk is related to opportunistic infection with fungi (*Candida sp, Pneumocystis jirovecii*), viruses (CMV, VZV and other herpes viruses) and occasionally TB.

Immunosuppressive treatment does not seem to dramatically increase the risk of common bacterial infections, although when transplant patients develop such infections they are more likely to be severe. An important exception is the risk of urinary tract infection, particularly in those patients predisposed to UTI as a result of anatomical abnormalities of the urinary tract.

Pneumocystis jirovecii. All patients receive **co-trimoxazole** for 6 months following transplantation.

Cytomegalovirus. Patients without evidence of exposure or immunity to CMV, determined by lack of circulating anti-CMV IgG antibodies, are at risk of invasive CMV disease if they receive an organ from a CMV positive donor. These patients receive CMV prophylaxis with **valganciclovir** for 6 months following transplantation. Valganciclovir is also given to patients who receive augmented immunosuppressive treatment with anti-lymphocyte antibodies. The dose of valganciclovir is determined by the patients' kidney function.

Urinary Tract Infection. Cotrimoxazole provides some prophylaxis against UTI for the first 6 months following transplantation. Prolonged prophylaxis is required in patients who have vesico-ureteric reflux into their transplants or have other structural urinary abnormalities, usually with **cefalexin** or **trimethroprim** at night.

2. Immunisation

As part of the transplant work up, we would have ensured that all patients are up to date with their immunisations. Varicella status would have been checked and children immunised if found to be not to have mounted a prior response. **Children may still develop chickenpox or shingles on immunosuppression. We must be contacted at once to initiate treatment.**

Annual Influenza vaccination is recommended

Patients on immunosuppressive treatment should NOT receive any live vaccines.

Examples of live vaccines that cannot be given include:
BCG
Measles, mumps and rubella (MMR)
Oral poliomyelitis, live (Sabin)
Yellow Fever

The following inactivated/detoxified exotoxin vaccines can be given:
COVID
Diphtheria, Pertussis, Tetanus, Polio (inactivated)
Diphtheria, Pertussis, Tetanus, Polio (inactivated) Haemophilus influenzae type b (Hib)
Diphtheria, Tetanus, Polio (inactivated) (Booster)
Haemophilus influenzae type b (Hib)
Influenza
Meningitis C
Hepatitis A
Human pappilloma vaccines

3. Prophylaxis against cardiovascular disease

Cardiovascular disease is the commonest cause of death in adult kidney transplant recipients. The risk of cardiovascular death in adult dialysis patients is increased 20-fold when compared to the general population, and transplantation reduces this risk only by about one half. These increased risk justifies a prevention strategy.

Hypertension. Target blood pressure is **at or below 50th centile for height and age.** Antihypertensives are usually calcium channel blocker e.g. **amlodipine** or ACE inhibitor.

Cholesterol. There is no firm evidence to base treatment of hypercholesterolaemia in the paediatric kidney transplant recipient. Pragmatically we treat if **total cholesterol >6mmol/L** on repeated occasions despite dietary intervention. Our unit guideline suggest **atorvastatin** as it is not renally excreted unlike other statins. Statin drugs are lipophilic, and metabolised by the same enzymes as tacrolimus. The dose will be recommended and monitored by the transplant clinic.

4. Pregnancy

All female adolescent kidney transplant recipients will be counselled about **effective contraception** in the transplant clinic. We will refer patients to a gynaecology specialist to decide on the most appropriate contraceptive to balance drug interaction and thrombosis risk.

Successful pregnancy is possible after a kidney transplant. Young women wishing to become pregnant require very careful planning. There are important issues surrounding blood pressure, proteinuria, kidney function and medications that require careful assessment before contemplating pregnancy. Patients who plan to become pregnant or become pregnant inadvertently are transferred to the care of an adult nephrologist who is experienced in managing these patients.

Tacrolimus shared care guideline

Introduction

Tacrolimus is a calcineurin inhibitor. It is usually prescribed with other immunosuppression medication immunosuppression. There may be significant variation in bioavailability between brands. Therefore only the Adoport® (twice daily) is currently used in paediatric kidney transplant recipients. It is essential that these are prescribed using the brand name, this also avoids confusion between the twice daily and once daily preparations.

Liquid preparations: Dose changes are frequent after transplant and during acute diarrhoeal episodes. Changes of doses are usually communicated to the parents by phone after drug levels are available from the laboratory. To avoid harm, it is **essential that the concentration and formulation of liquid preparations never change**. Patients will be on 1mg/ml preparations to minimise errors. This must also be prepared by a specials manufacturer using an identical formulation to that supplied by the hospital. This formulation must be made with tacrolimus powder suspended in 50:50 Oraplus and Orasweet SF. The hospital purchases this product from Newcastle Specials. (Contact information at end of document)

Responsibilities of Nephrologist

- Assessment of the patient as fit enough to receive both an organ transplant and immunosuppressive treatment
- Provision of information regarding immunosuppression, especially the risks and side effects, before the patient is placed on the transplant list
- Prescription of an immunosuppressive regimen appropriate to the patient and the condition of the organ to be transplanted
- Indefinite follow-up of the patient and monitoring of immunosuppressive treatment until transfer to an adult nephrologist
- Consideration of prophylaxis against opportunistic infection
- Provide 24 hour telephone advice and access to paediatric care for any medical concerns
- Request participation in a shared care arrangement from the patient's GP when the patient's treatment has been stabilised and a shared care arrangement is clinically appropriate
- Communication regarding management plan with GP

Responsibilities of GP

- To contact the paediatric kidney team to confirm that they are happy to accept the shared care arrangement within 28 days of receiving the request
- Communication with the paediatric kidney team should the patient develop intercurrent illness Prescription of tacrolimus using the, correct, brand name.
- Administer annual influenza vaccination
- Avoid all live vaccines
-

Responsibilities of Patient and family

- Compliance with prescribed medications, dietary advice and regular clinic attendance
- No smoking
- Sun safety
- To contact the paediatric kidney team should they become unwell or be in contact with infectious diseases such as chickenpox

Tacrolimus

Indication	Immunosuppressive therapy to prevent rejection of solid organ allografts
Formulation and strengths available	Adoport® 0.5mg, 1mg & 5mg Liquid 1mg/ml
Cost	https://www.nhsbsa.nhs.uk/pharmacies-gp-practices-and-appliance-contractors/drug-tariff
Dose	Initiation in hospital. Maintenance dose determined by trough (pre-dose) measurement of whole blood tacrolimus level. Target level varies according to time since transplant and individual need.
Usual Dose Range	0.5mg bd up to 10mg bd
Likely duration of treatment	Indefinite, as long as treatment is considered appropriate by specialist
Contraindications	Known hypersensitivity to tacrolimus
Warnings	Breast feeding is contraindicated. May be used during planned pregnancy under specialist advice. **Avoid all live vaccines**
Side Effects (Full list in BNF for children)	Nephrotoxicity Metabolic: hypertension, hyperlipidaemia, hyperuricaemia & diabetes Cosmetic: alopecia Neurological: tremor, dysaesthesia, rarely peripheral neuropathy Increased susceptibility to infection Increased risk of malignancy Rarely hypertrophic cardiomyopathy (only reported in children)
Drug Interactions (Full list in BNF for children)	**Tacrolimus metabolism is inhibited (and toxicity enhanced) by:** Macrolide antibiotics (erythromycin, clarithromycin & azithromycin) Azole antifungal drugs (fluconazole, itraconazole, clotrimazole) Calcium antagonists (diltiazem, verapamil & lercanidipine – less so other dihydropyridine drugs) Grapefruit juice Statins **Tacrolimus metabolism is induced (and efficacy reduced) by:** Anticonvulsants (carbamazepine, phenytoin & phenobarbitone) Some antibiotics (rifampicin & rifabutin) St Johns Wort **Nephrotoxicity enhanced by all NSAIDs**
Monitoring	FBC, U&E, LFT, tacrolimus trough levels, glyscouria and BP in Transplant Clinic (see page 4)
Licensed indication	Adoport® capsules licensed for children for prevention of kidney transplant rejection. Tacrolimus 1mg/ml suspension is an unlicensed product obtained from a specials manufacturer.

Mycophenolate mofetil (MMF) shared care guideline

Introduction

MMF blocks both T and B lymphocyte proliferation by inhibiting purine nucleotide synthesis. Most cell types can synthesise purines using either a *de novo* or a scavenger pathway. In contrast, rapidly proliferating lymphocytes rely on the scavenger pathway. MMF inhibits the rate limiting enzyme of this pathway (inosine monophosphate dehydrogenase - IMPDH), and for this reason is a relatively specific immunosuppressive drug. Other bone marrow-derived cells are also susceptible to MMF, and anaemia, neutropaenia and thrombocytopaenia are common side effects.

MMF is a pro-drug, and rapidly metabolised to the active compound mycophenolic acid (MPA) in the liver. MPA is excreted in bile, and undergoes entero-hepatic recirculation. As a result, the concentration of MPA in the intestinal lumen is high. This accounts for diarrhoea, which is the other important side effect of MMF.

Responsibilities of Nephrologist

- Assessment of the patient as fit enough to receive both an organ transplant and immunosuppressive treatment
- Provision of information regarding immunosuppression, especially the risks and side effects, before the patient is placed on the transplant list
- Prescription of an immunosuppressive regimen appropriate to the patient and the condition of the organ to be transplanted
- Indefinite follow-up of the patient and monitoring of immunosuppressive treatment until transfer to an adult nephrologist
- Consideration of prophylaxis against opportunistic infection
- Provide 24 hour telephone advice and access to paediatric care for any medical concerns
- Request participation in a shared care arrangement from the patient's GP when the patient's treatment has been stabilised and a shared care arrangement is clinically appropriate
- Communication regarding management plan with GP

Responsibilities of GP

- To contact the paediatric kidney team to confirm that they are happy to accept the shared care arrangement within 28 days of receiving the request
- Communication with the paediatric kidney team should the patient develop intercurrent illness
- Prescription of mycophenolate mofetil
- Administer annual influenza vaccination
- Avoid all live vaccines

Responsibilities of Patient and family

- Compliance with prescribed medications, dietary advice and regular clinic attendance
- No smoking
- Sun safety
- To contact the paediatric kidney team should they become unwell or be in contact with infectious diseases such as chickenpox

Mycophenolate Mofetil (MMF)

Indication	Immunosuppressive therapy to prevent rejection of solid organ allografts
Formulation and strengths available	250mg capsules & 500mg tablets or oral suspension (1000mg / 5ml)
Cost	https://www.nhsbsa.nhs.uk/pharmacies-gp-practices-and-appliance-contractors/drug-tariff
Dose	Initiation in hospital. Dose may be reduced depending on side effects. Occasionally total daily dose is divided to 4x/day to manage abdominal side effects
Usual Dose Range	500 to 3000mg daily in divided doses
Likely duration of treatment	Indefinite, as long as treatment is considered appropriate by specialist
Contraindications	Known hypersensitivity to mycophenolic acid. Pregnancy and breast feeding
Warnings	Active gastro-intestinal disease. Side effects may be more common in children and the elderly **Avoid all live vaccines**
Side Effects (Full list in BNF for children)	Myelosuppression Gastro-intestinal toxicity, particularly diarrhoea Increased susceptibility to infection Increased risk of malignancy
Drug Interactions (Full list in BNF for children)	Antacids and colestyramine reduce MMF absorption Aciclovir & valganciclovir may increase risk of myelosuppression; plasma levels of aciclovir and valganciclovir increased by MMF
Monitoring	FBC, U&E, LFT and BP in Transplant Clinic Mycophenolic acid trough levels are not routinely measured.
Licensed indication	>2 years of age

Azathioprine shared care guideline

Introduction

Azathioprine has been used as a component of immunosuppressive therapy to prevent allograft rejection since the first successful kidney transplants in the 1960s. Like MMF it is an anti-proliferative agent that acts by interfering with purine nucleotides. Azathioprine is metabolised to 6-thioguanine, which blocks DNA synthesis. Unlike MMF, this effect is non-specific and any proliferating cell type will be affected (see list of side effects below).

Azathioprine is usually used as part of triple immunosuppression in conjunction with a CNI and steroids. MMF is often substituted for azathioprine to allow for CNI dose reduction or elimination.

Liquid preparations: To avoid harm, it is **essential that the concentration never change**. Patients will be on 10mg/ml preparations.

Responsibilities of Nephrologist

- Assessment of the patient as fit enough to receive both an organ transplant and immunosuppressive treatment
- Provision of information regarding immunosuppression, especially the risks and side effects, before the patient is placed on the transplant list
- Prescription of an immunosuppressive regimen appropriate to the patient and the condition of the organ to be transplanted
- Indefinite follow-up of the patient and monitoring of immunosuppressive treatment until transfer to an adult nephrologist
- Consideration of prophylaxis against opportunistic infection
- Provide 24 hour telephone advice and access to paediatric care for any medical concerns
- Request participation in a shared care arrangement from the patient's GP when the patient's treatment has been stabilised and a shared care arrangement is clinically appropriate
- Communication regarding management plan with GP

Responsibilities of GP

- To contact the paediatric kidney team to confirm that they are happy to accept the shared care arrangement within 28 days of receiving the request
- Communication with the paediatric kidney team should the patient develop intercurrent illness
- Prescription of azathioprine
- Administer annual influenza vaccination
- Avoid all live vaccines

Responsibilities of Patient and family

- Compliance with prescribed medications, dietary advice and regular clinic attendance
- No smoking
- Sun safety
- To contact the paediatric kidney team should they become unwell or be in contact with infectious diseases such as chickenpox

Azathioprine

Indication	Immunosuppressive therapy to prevent rejection of solid organ allografts
Formulations and strengths available	25mg & 50mg tablets. Liquid 50mg/5ml
Cost	https://www.nhsbsa.nhs.uk/pharmacies-gp-practices-and-appliance-contractors/drug-tariff
Dose	60mg/m^2 once daily
Usual Dose Range	25mg to 150mg, in single daily dose
Likely duration of treatment	Indefinite, as long as treatment is considered appropriate by specialist
Contraindications	Known hypersensitivity to azathioprine or 6-mercaptopurine
Warnings	Pregnancy and breast feeding. Azathioprine may be used during planned pregnancy under specialist advice. **Avoid all live vaccines**
Side Effects (Full list in BNF for children)	Myelosuppression Hepatitis Pneumonitis Increased susceptibility to infection Increased risk of malignancy
Drug Interactions (Full list in BNF for children)	**Dangerous interaction with allopurinol** Allopurinol inhibits azathioprine metabolism, leading to the accumulation of active metabolites and profound myelosuppression. In most transplant patients requiring allopurinol treatment, azathioprine should be replaced with MMF.
Monitoring	FBC, U&E, LFT and BP in Transplant Clinic
Licensed indication	Imuran tablets are licensed for children, in combination with corticosteroids and/or other immunosuppressive agents and procedures, to enhance the survival of kidney organ transplant. Azathioprine 10mg/ml is an unlicensed medicine purchased from a specials manufacturer.

Prednisolone prescribing information

Shared care agreement not necessary for prednisolone

Introduction

Corticosteroids, like azathioprine, have been used as a component of immunosuppressive therapy to prevent allograft rejection since the first successful kidney transplants in the 1960s. They act to inhibit the alloimmune response at multiple levels, but are relatively weak in comparison to the other immunosuppressive drugs in current use.

The side effects of long term corticosteroid use are well known (see below) and are the cause of considerable morbidity in transplant recipients. Modern immunosuppressive protocols aim to minimise corticosteroid exposure, and there is increasing evidence that steroids can be omitted completely from regimens including the potent drugs tacrolimus and MMF.

Responsibilities of Nephrologist

- Assessment of the patient as fit enough to receive both an organ transplant and immunosuppressive treatment
- Provision of information regarding immunosuppression, especially the risks and side effects, before the patient is placed on the transplant list
- Prescription of an immunosuppressive regimen appropriate to the patient and the condition of the organ to be transplanted
- Indefinite follow-up of the patient and monitoring of immunosuppressive treatment until transfer to an adult nephrologist
- Consideration of prophylaxis against opportunistic infection
- Provide 24 hour telephone advice and access to paediatric care for any medical concerns
- Communication regarding management plan with GP

Responsibilities of GP

- To contact the paediatric kidney team to confirm that they are happy to accept the shared care arrangement within 28 days of receiving the request
- Communication with the paediatric kidney team should the patient develop intercurrent illness
- Prescription of prednisolone
- Administer annual influenza vaccination
- Avoid all live vaccines

Responsibilities of Patient and family

- Compliance with prescribed medications, dietary advice and regular clinic attendance
- No smoking
- Sun safety
- To contact the paediatric kidney team should they become unwell or be in contact with infectious diseases such as chickenpox

Prednisolone

Indication	Immunosuppressive therapy to prevent rejection of solid organ allografts
Formulations and strengths available	1mg, 5mg & 25mg tablets (plain or enteric coated) 5mg dissolvable tablets
Cost	https://www.nhsbsa.nhs.uk/pharmacies-gp-practices-and-appliance-contractors/drug-tariff
Dose	Initial dose 5mg/m^2/dose bd
Usual Dose Range	3 to10mg alternative days
Likely duration of treatment	Indefinite, as long as treatment is considered appropriate by specialist
Contraindications	Known hypersensitivity to prednisolone
Warnings	Prolonged treatment with corticosteroids leads to adrenal suppression. Abrupt withdrawal of prednisolone in patients on long-term treatment can lead to a hypo-adrenal crisis, and precipitate an episode of acute rejection. **Avoid all live vaccines**
Side Effects (Full list in BNF for children)	Behavioural changes Long term growth Metabolic: hypertension, hyperlipidaemia, diabetes, weight gain Musculoskeletal: osteoporosis and avascular necrosis Increased risk of peptic ulceration Skin thinning and easy bruising Increased susceptibility to infection Increased risk of malignancy
Drug Interactions (Full list in BNF for children)	Prednisolone and other corticosteroids are metabolised by multiple pathways, principally in the liver. Although drugs that either induce or inhibit these pathways will influence steroid metabolism, the prednisolone dose is not usually adjusted.
Monitoring	FBC, U&E, LFT, glyscouria and BP in Transplant Clinic
Licensed indication	Sovereign soluble prednisolone tablets are licensed for use in children for immunosuppression in transplantation.

E. Contacts

1. Urgent advice and referrals

There is always an on-service **Consultant Paediatric Nephrologist** responsible for all acute referrals and in-patient nephrology, including transplant recipients. The on-call Consultant can be contacted via the Hospital **Switchboard (0191 233 6161)**.

There is always a **Paediatric kidney nurse specialist** on-call day or night, contactable via switchboard.

2. Contact numbers

Paediatric kidney nurse specialist on call	via switchboard
Consultant Paediatric Nephrologist on call	via switchboard
Departmental secretaries	0191 28 24917 / 25379
Paediatric Nephrology Fax number	0191 28 20077
Newcastle Specials	0191 282 0389

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Private and Confidential

Immunosuppressive Treatment following Paediatric kidney transplantation - Shared Care Request/Confirmation

- Specialist Prescriber to complete first section of form and send to patient's GP.
- GP to complete second section of form and return to specialist prescriber within 28 days
- A copy of the full shared care guideline can be viewed at www.northoftyneapc.nhs.uk

Specialist Prescriber	
Department	
Hospital	
Telephone	
Patient details (use hospital label if preferred)	
Name	
Address	
Postcode	
NHS or Hosp reg no	**Male / Female DoB**

Treatment Requested for Prescribing in Accordance with an Approved Shared Care Arrangement					
Drug Information					
Name/Formulation		**Dose**		**Frequency**	
Name/Formulation		**Dose**		**Frequency**	
Name/Formulation		**Dose**		**Frequency**	
Indication -Adult ADHD					
Other information (if appropriate)					
Signed (Specialist Prescriber)	**Name (Print)**		**Date**		

To be completed by GP	**Please tick one box**
I ACCEPT the proposed shared care arrangement for this patient	□
I ACCEPT the proposed shared care arrangement with the caveats below	□
I DO NOT ACCEPT the proposed shared care arrangement for this patient	□
My caveats/reason(s) for not accepting include:	
Signed **Name (print)**	**Date**