

Nurse Practitioner

Princess Alexandra Hospital

Health Management Protocol

For the management of adults with

Chronic Kidney Disease (CKD)
(not on dialysis)

*Nurse Practitioner – Chronic Kidney Disease
Princess Alexandra Hospital
Metro South Health Service District*

Approved 11 March 2009

Version 1.0

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Glossary of Terms

Acronym	Meaning
BMI	Body Mass Index
BP	Blood pressure
CKD	Chronic kidney disease
GP	General Practitioner
HMP / DTP	Health Management Protocol / Drug Therapy Protocol
NSAIDs	Non steroidal anti-inflammatory drugs
PBS	Pharmaceutical Benefits Scheme

Description of Health Service:

The CKD Clinic is a service of the Department of Nephrology at Princess Alexandra Hospital.

The CKD Clinic focuses on promoting the health and well being of the patient by managing kidney disease and related conditions. The goal of CKD patient care is to:

- Delay progression of CKD
- Prevent and treat the complications of CKD
- Prepare the patient for kidney replacement therapies (dialysis and/or transplant) or conservative management / palliative care

Patients are referred to the Clinic from nephrology outpatient clinics for multidisciplinary management of their CKD. There are some referrals for anaemia management in palliative patients.

In addition to ambulatory care, the clinic also provides telephone support, home visits and community outreach.

Clinical collaboration and support is provided by a designated Consultant Nephrologist. Routine support occurs weekly. Support for urgent / emergent situations is provided by phone / email when required.

Scope of Practice:

The nurse practitioner is responsible and accountable for making professional judgements about when the patient's condition is beyond their scope of practice and for initiating consultation with a medical officer or other member of the health care team.

This document applies to adults with a confirmed diagnosis of CKD (not on dialysis).

Beyond the scope of this document are:

- CKD stage 5 on dialysis
- Acute renal failure / acute glomerulopathies
- Children
- Pregnancy
- Kidney transplantation
- Inpatient care

Management of CKD patients includes:

- Preserving kidney function
- Blood pressure and fluid volume
- Cardiovascular risk factors
- Anaemia
- Mineral and bone disease
- Nutrition and metabolism
- Health prevention / immunisation
- Self management / support
- Transplant work-up
- Ensuring timely placement of dialysis access (peritoneal dialysis catheter or vascular access for haemodialysis)
(Mohlzahn & Butera, 2006)

Overview of Clinical Assessment by the Nurse Practitioner:

The nurse practitioner utilises advanced practice knowledge and skills to manage a caseload of patients, and to make a thorough health assessment of individual patients by:

- Obtaining a comprehensive health history
- Performing a physical assessment
- Initiating and evaluating diagnostic procedures and laboratory tests
- Accessing and reviewing results of other diagnostic studies
- Analysing information in order to formulate a differential diagnosis
- Assessing barriers to achieving treatment targets
- Developing and implementing a management plan to achieve evidence based treatment targets, addressing any barriers identified

- Educating, counselling and gaining agreement to the management plan with the patient and family
- Evaluating patient's adherence and response to the plan of care
- Documenting in the patient's record according to established guidelines
- Organising referrals, consultations and coordinating patient care
- Regularly meeting with the Nephrology Consultant where the clinical care of each patient is discussed and having access at all times to discuss urgent or difficult case findings

(ANNA, 2001; Russell, 2008)

Management Plan

- Patients are managed using individualised treatment plans. Treatment targets are established based on national guidelines and approved Department of Nephrology protocols. Targets may be adjusted depending on individual patient characteristics e.g. it may not be appropriate to pursue a blood pressure of < 125/75 in a patient with significant carotid artery disease or high falls risk.
- Where targets are adjusted or not being achieved, the rationale and / or barriers will be documented in the patient record.
- Medication doses being managed by the nurse practitioner (either prescribing or titrating) will be on the "start low – go slow" principle.
- Patients will be educated about any medications being prescribed and will be provided with approved Consumer Medicines Information and/or locally developed and endorsed Medication Information sheets.

Follow-up:

- The nurse practitioner utilises clinic or home visit consultations as well as telephone follow up to monitor patient's response to therapy, and/or make changes in therapy as well as assess suitability to continue with drug titration.
- Actions taken by the nurse practitioner are communicated to the GP, allied health professionals and nephrologist / other physicians who may follow up patient.
- Frequency of nurse practitioner follow up is determined by individual patient requirements and the treatment plan.

Clinical Practice Guidelines

Medication management by Nurse Practitioner in CKD

Hypertension

Target: < 130 / 80 or < 125 / 75 if proteinuria > 1g / 24 hours

Drug groups relevant to this section:

Antihypertensives

Diuretics

Drugs for electrolyte imbalance

The initial treatment plan is made in collaboration with the patient's treating doctor. The medication management plan is discussed and priorities determined, including maximum dose(s) to be used.

The patient will be monitored for side effects and adverse events. If these occur the patient will be referred back to the treating doctor for review.

History

Cause of CKD, stage and presence & degree of proteinuria

Presence of cardiovascular disease or cardiovascular risk factors

Assess for signs and symptoms of other end-organ damage

Assess for other significant co-morbidities

Identify barriers to self management

Physical examination

BP (sitting & standing), weight, temperature, pulse, respirations, dependent and peripheral oedema, jugular venous pressure, auscultation

Follow up and monitor

- Serum creatinine and potassium within one week if titrating angiotensin converting enzyme inhibitors or angiotensin 2 receptor blockers
- Response to antihypertensive therapy within one month
- For complications and side effects of pharmacologic therapy
- Adherence to treatment plan

References: ANNA, 2005; Salem, 2006; Heart Foundation 2008; KHA 2007.

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Mineral and bone disease of CKD

Targets: Serum corrected calcium, phosphate, parathyroid hormone and vitamin D within normal range; serum bicarbonate > 20 mmol/L

Drug groups relevant to this section:

Vitamin D

Phosphate binders

Other drugs for electrolyte imbalance

It is important to avoid hypercalcemia in these patients.

Serum phosphate should be corrected (if elevated) prior to commencing calcitriol.

History

Past medical history for hyperparathyroidism, cardiac and vascular disease, gastrointestinal disease

Assess for risk factors for osteoporosis (older age, post menopausal status, race, vitamin D deficiency, medications, prolonged immobilization)

History of injuries especially low impact fracture

Current medications and supplements

Adherence to diet, medications and treatment regimens

Financial or other constraints in meeting dietary and medication regimes

Physical examination

Features of elevated calcium x phosphate product, calciphylaxis

Muscle strength, gait and range of motion noting limitations in movement

Bone pain

Skin for local tissue injury or presence of macules, papules or pruritis

Eyes for visible irritation and local inflammation

Extremities for presence and quality of pulses and vascular insufficiency

Follow up and monitoring

- Serum calcium, phosphate in 4 – 8 weeks
- Parathyroid hormone; 25 & 1,25 hydroxy Vitamin D
- Serum bicarbonate
- For complications and side effects of pharmacologic therapy
- Adherence to treatment plan

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References: ANZSN & KHA, 2000; NKF, 2003.

Dyslipidaemia

Target: LDL Cholesterol < 2.5 mmol/L or < 2.0 mmol/L if diabetes or previous cardiovascular event

Drugs groups relevant to this section:

Lipid lowering agents

History

Assess for coronary heart disease risk-equivalent conditions (clinical coronary artery disease, peripheral arterial disease, abdominal aortic aneurysm, diabetes mellitus, proteinuria)

Assess for modifiable risk factors for cardiovascular disease (including smoking, alcohol use, physical activity and exercise)

Response to treatment plan (cardiovascular risk reduction, therapeutic lifestyle change, dietary and medication regimen)

Adherence to treatment plan

Physical examination

Weight and BMI, BP and heart rate, apical and peripheral pulses, fluid status

Patient education

Inform patient of warning signs of adverse reaction to statins. In collaboration with the patient (and / or carer) develop a safety plan - including having a pathology request form available in case complications occur.

Follow up and monitor

- Serum electrolytes & liver function tests, creatine kinase at next scheduled pathology tests OR EARLIER if symptomatic;
- Fasting lipids in three months to assess response to pharmacologic therapy
- For complications (*NB myalgia*) and side effects and interactions
- Adherence to treatment plan including therapeutic lifestyle change

References: NHF & CSANZ, 2005.

Haematinics and Anaemia

Targets: serum Ferritin 200 – 500ng/L; TSAT > 20%.

If on erythropoietin stimulating agent haemoglobin 110 – 120g/L

NB Normalisation of haemoglobin >130g/L in this group is associated with increased cardiovascular events and is to be avoided.

Drugs groups relevant to this section:

Haematinics

Oral iron replacement is the first choice of therapy. If not tolerated intravenous iron may be indicated.

Erythropoietin stimulating agents

Iron stores should be replete and hypertension must be corrected prior to initiation of an erythropoietin stimulating agent.

The rate of haemoglobin increase should not exceed 10g/L in any two week period.

History

Assess for signs or symptoms of anaemia

Assess for gastrointestinal signs or symptoms

Assess for comorbid conditions (angina, pulmonary disease, hyper- or hypotension, congestive heart failure or cerebrovascular disease)

Assess for potential causes of iron deficiency and / anaemia (blood loss, iron deficiency, vitamin B12 and folate deficiency, inflammation or infection, secondary hyperparathyroidism, malnutrition, aluminium ingestion)

Response to treatment plan

Adherence to treatment plan

Persistent or progressive iron deficiency is an absolute indication for referral and investigation of occult GIT blood loss.

Physical examination

Weight, BP and heart rate, respiratory rate, skin and mucous membranes

Patient education

The patient and / or carer should be taught how to self inject the erythropoietin medication and dispose of syringes appropriately.

They should be informed of side effects that should be reported eg headaches or dizziness

Follow up and monitor

Outpatient clinic review after four weeks of erythropoietin therapy with:

- Full blood count, serum electrolytes & liver function tests, iron studies
- Check blood pressure
- For response to pharmacologic therapy
- For complications and side effects of pharmacologic therapy
- For causes of hyporesponse to erythropoietin therapy

Continue to review monthly until patient stabilised

Patients receiving iron supplementation will be reviewed as above with the frequency as appropriate according to their stage of CKD and other health care needs

References: ANZSN & KHA, 2000.

Preparation for dialysis

Drugs groups relevant to this section:

Topical antiseptics

Stool softeners and laxatives

Vaccines

Assessment

Assess for signs or symptoms of uraemia and for any absolute indications for the initiation of dialysis

Assess access: arterio-venous fistula patent and maturing / Tenckhoff catheter healing and bowel activity

Review pathology results: full blood count, serum electrolytes & liver function tests, serology and skin swabs

Response to treatment plan

Adherence to treatment plan

Physical examination

Weight, BP and heart rate, respiratory rate, fluid volume, surgical sites (if present)

Follow up and monitor

- Full blood count, serum electrolytes & liver function tests, monthly / as indicated
- For response to pharmacologic therapy
- For complications and side effects of pharmacologic therapy

References: Queensland Health, 2008. NH&MRC, 2008.

Management of hyperkalemia in outpatients with chronic kidney disease

Target: Serum potassium above the normal reference range is commonly seen in patients with chronic kidney disease. In consultation with the patient's treating nephrologist and taking into account the clinical circumstance, it may be decided to tolerate a serum potassium of ≤ 6 mmol/L.

Treatment is dependent on the severity and rate of development of hyperkalemia, the presence or absence of clinical manifestations, and the presence or absence of other factors (such as hypocalcaemia and metabolic acidosis) which can potentiate the toxicity of potassium.

Drugs groups relevant to this section:

Drugs for electrolyte imbalances

Major causes of hyperkalaemia (in outpatient setting)

- Increased intake – dietary sources / potassium supplements
- Medication related: decreased excretion eg angiotensin converting enzyme inhibitors / angiotensin receptor blockers / potassium sparing diuretics / β -blockers / NSAIDs / digoxin
- Release of intracellular potassium eg due to catabolism / haemolysis
- Shift of potassium from cells to extracellular fluid eg insulin deficiency / acidosis
- Spurious due to hemolysis of the sample. This commonly occurs when the sample is not processed promptly.

Signs & symptoms of hyperkalaemia

- Skeletal muscle weakness
- Tingling of lips and fingers
- Restlessness
- Intestinal cramping
- Diarrhoea
- Sudden death

(Cardiac arrhythmias and electrocardiograph changes may be seen if patient is present for assessment.)

Assessment:

(NB this scenario commonly presents with the patient at home having had routine blood tests collected and the abnormal result is identified by the laboratory or the Nurse Practitioner viewing results online.)

- Review past pathology results – determine if this is an acute or chronic problem – a rapid rise presents greater risk than chronically elevated levels
- Review all recent pathology results for other absolute indications for initiating dialysis
- Identify when / where blood was collected
- There may be a comment on the laboratory report re: possibility of haemolysis
- Is the patient well or do they have any of the above signs and symptoms or an intercurrent illness?

If patient is unwell and the serum potassium is > 6.0 mmol/L:

Advise to present to the nearest Emergency Department for assessment and treatment without delay.

If patient is asymptomatic and the serum potassium is > 6.5 mmol/L:

Advise to present to the nearest Emergency Department for assessment and treatment without delay.

*****The patient should not drive to the hospital themselves due to risk of cardiac dysrhythmias *****

If the patient is asymptomatic and the serum potassium is \leq 6.5 mmol/L:

Determine if there have been any recent changes to diet or medications.

Repeat blood test at a hospital collection centre within 24 hours

If a dietary source is identified advise patient to cease high potassium food and refer to dietician for review within a week (may be done as a phone consultation)

If related to medication changes will need to review and discuss therapeutic options with treating doctor. Consider adding diuretics if the patient is not hypovolaemic.

Management

“Resonium A” (sodium polystyrene sulfonate) promotes potassium excretion. It may be given as an acute treatment or longer term depending on the circumstances.

Dose:

Resonium A powder 30g orally statim and then once per day until review

Longer term according to pathology (eg 15g two or three time per week)

Patient education:

Explain rationale for concerns and need to get blood rechecked even if feeling well

Relating to cause / source of hyperkalaemia

If started on Resonium A re: the likelihood of constipation and the need to take regular aperients while using it

Follow up:

Electrolytes and liver function tests, full blood count in one week

If on long term Resonium A, need to monitor regularly to avoid hypokalemia

Adjust dose according to results

References: Mohlzahn & Butera, 2006.

REFERRAL:

The nurse practitioner role includes assessment and management of clients using nursing/midwifery knowledge and skills and may include but is not limited to:

- Direct referral of clients to other health care professionals
- Prescribing medications
- Requesting diagnostic investigations.

Currently in Australia nurse practitioners do not have access to a Medicare provider number. Consequently until this situation changes a referral from a nurse practitioner may cause financial disadvantage for the patient. To ensure that patients are not financially disadvantaged arrangements for private referral are as follows:

- The Consultant Nephrologist will make any private referrals required for patients being managed by the nurse practitioner

The nurse practitioner should consider referral to a medical officer in the following situations

- Persistent signs and symptoms despite treatment
- Symptomatic or laboratory evidence of previously unidentified decreased or decreasing function of any vital organ or system
- Signs of recurrent or persistent infection
- Any atypical presentation of a common illness or unusual response to treatment
- All potentially life threatening situations
- When a patients condition deteriorates unexpectedly

INVESTIGATIONS

The nurse practitioner has full pathology test ordering privileges as a Requesting Officer in Pathology Queensland as per Pathology Queensland Analytical Service Policy 14475.

Other diagnostic investigations will include:

- Plain x ray
- Echocardiogram
- Sleep studies
- Vascular mapping
- Other non-radiology / non-invasive investigations

DRUG THERAPY PROTOCOL - FRAMEWORK

- Choice of pharmacological therapy must be guided by National Guidelines, approved unit protocols and the Australian Medicines Handbook, within the parameters of the Standard Drug List for Queensland Hospitals.
- The Consultant/General Practitioner is the lead clinician for the co ordination of the patient's care and thus any new medications, titration of medications and recommended discontinuation of medications must be communicated to them.
- The nurse practitioner must verify that the choice of drug is suitable for the patient after carefully considering the following individualised patient information, such as,
 - Age
 - Previous allergies,
 - Adverse drug reactions,
 - Co-morbidities such as renal and hepatic dysfunction
 - Concomitant medications for potential drug interactions
 - Pregnant and or lactating women

The Queensland Health Safe Medication Practice Unit has identified specific medications and patient groups where extra precautions are necessary. These groups are listed below and must be considered carefully when selecting drug treatment to avoid adverse medication events.

High Risk Medications

- Drugs with a narrow therapeutic range i.e. digoxin, lithium
- Drugs requiring specialised monitoring or interpretation i.e. therapeutic dose monitoring
- Anticoagulants
- Cytotoxics
- NSAIDS or COX-2 Inhibitors
- Opiate analgesics
- Aminoglycosides
- Anti-epileptics
- Insulin
- IV Electrolyte supplementation

- Weekly dosing regimens i.e. methotrexate

High Risk Patient Groups

- Renal impairment (Cervelli, 2007)
 - Cardiac disease
 - Liver disease
 - Transplantation
 - Mental Health problems
 - Cancer
 - Paediatrics
 - Elderly
 - Pregnant and Breastfeeding
-
- Currently in Australia nurse practitioners do not have access to the pharmaceutical benefits scheme. Consequently until this situation changes prescriptions from a nurse practitioner may cause financial disadvantage for the patient. To ensure that patients are not financially disadvantaged arrangements for dispensing of the nurse practitioner prescription are as follows:
 - The Consultant Nephrologist will write any PBS or Authority prescriptions required for patients being managed by the nurse practitioner
 - A copy of the approved HMP/DTP must be available in the pharmacy for identification and signatory purposes.

DRUG THERAPY PROTOCOL – PRESCRIBING

Drug groups to be prescribed by Nurse Practitioner

1. *Drugs for electrolyte imbalance*
2. *Vitamin D*
3. *Phosphate binders*
4. *Haematinics*
5. *Topical antiseptics*
6. *Stool softeners and laxatives*
7. *Vaccines*

1. *Drugs for electrolyte imbalance*

Generic Name	Form	Indications, dose schedule and duration of drug supply
Sodium bicarbonate	Capsule	AMH section 7.4 / MIMS section 7(a)
Sodium polystyrene sulfonate	Powder	AMH section 7.7.2 / MIMS section 20(a)

2. *Vitamin D*

Generic Name	Form	Indications, dose schedule and duration of drug supply
Cholecalciferol	Capsule	AMH section 10.3.2 / MIMS section 21(d)

3. *Phosphate binders*

Generic Name	Form	Indications, dose schedule and duration of drug supply
Aluminium hydroxide	Tablets	AMH section 7.7.1 / MIMS section 1(a)

4. *Haematinics*

Generic Name	Form	Indications, dose schedule and duration of drug supply
Ferrous sulfate	Tablet	AMH section 7.6 / MIMS section 21(i)
Ferrous sulfate with folic acid	Tablet	AMH section 7.6 / MIMS section 21(i)
Iron polymaltose	Injection	AMH section 7.6 / MIMS section 6(i) See also protocols on the PAH Nephrology Integrated Database re: <ul style="list-style-type: none"> • Iron scheduling guidelines for Peritoneal Dialysis Unit and predialysis patients • Intravenous iron infusion (renal)

5. *Topical antiseptics*

Generic Name	Form	Indications, dose schedule and duration of drug supply
Mupirocin	Ointment	AMH section 9.5 / MIMS section 13(b)

6. *Stool softeners and laxatives*

Generic Name	Form	Indications, dose schedule and duration of drug supply
Docusate	Tablet	AMH section 12.4.1 / MIMS section 1(c)
Docusate with sennosides	Tablet	AMH section 12.4.1 / MIMS section 1(c)
Sorbitol	Liquid	AMH section 12.4.3 / MIMS section 1(c)

7. Vaccines

Generic Name	Form	Indications, dose schedule and duration of drug supply
Hepatitis B Vaccine	Vial	AMH section 20.1 / MIMS section 10(a)

DRUG THERAPY PROTOCOL - TITRATION

Drug groups to be titrated by Nurse Practitioner

1. **Antihypertensives**
2. **Diuretics**
3. **Vitamin D**
4. **Phosphate binders**
5. **Lipid lowering agents**
6. **Erythropoietin stimulating agents**

1. Antihypertensives (refers to all drugs in class unless individually named)

Generic Name	Form	Indications, dose schedule and duration of drug supply
Angiotensin converting enzyme inhibitors	Tablets	AMH section 6.4.4 / MIMS section 2 (a)
Angiotensin 2 antagonists	Tablets	AMH section 6.4.5 / MIMS section 2 (a)
Beta blockers	Tablets	AMH section 6.4.3 / MIMS section 2 (b)
Calcium channel blockers	Tablets	AMH section 6.4.6 / MIMS section 2 (a)
Methyldopa	Tablets	AMH section 6.4.8 / MIMS section 2 (a)
Prazosin	Tablets	AMH section 6.4.10 / MIMS section 2 (a)
Hydralazine	Tablets	AMH section 6.4.7 / MIMS section 2 (a)

2. Diuretics

Generic Name	Form	Indications, dose schedule and duration of drug supply
Ethacrynic acid	Tablets	AMH section 6.1.1 / MIMS section 2 (c)
Furosemide	Tablets	AMH section 6.1.1 / MIMS section 2 (c)
Chlorthalidone	Tablets	AMH section 6.4.1 / MIMS section 2 (c)
Hydrochlorothiazide	Tablets	AMH section 6.4.1 / MIMS section 2 (c)
Indapamide	Tablets	AMH section 6.4.1 / MIMS section 2 (c)
Spirolactone	Tablets	AMH section 6.4.2 / MIMS section 2 (c)

3. Vitamin D

Generic Name	Form	Indications, dose schedule and duration of drug supply
Calcitriol	Capsules	AMH section 10.3.2 / MIMS section 6(g)

4. Phosphate binders

Generic Name	Form	Indications, dose schedule and duration of drug supply
Calcium carbonate	Tablets	AMH section 10.3.3 / MIMS section 21 (b)

5. Lipid lowering agents

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Generic Name	Form	Indications, dose schedule and duration of drug supply
Statins	Tablets	AMH section 6.6.1 / MIMS section 2 (f)

6. Erythropoietin stimulating agents

Generic Name	Form	Indications, dose schedule and duration of drug supply
Darbepoetin alfa	Injection	AMH section 7.5.1 / MIMS section 6 (i)
Epoetin alfa	Injection	AMH section 7.5.1 / MIMS section 6 (i)
Epoetin beta	Injection	AMH section 7.5.1 / MIMS section 6 (i)

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HMP/DTP Developed and checked by:		
Name	Signature	Date
<i>Nurse Practitioner</i>	Signed	7 Nov 2008
<i>Senior Pharmacist</i>	Signed	7 Nov 2008
<i>Senior Staff Specialist</i>	Signed	7 Nov 2008

Endorsed by: DDON/Chair, District Nurse Practitioner Steering Committee

Signed 09 December 2008

Endorsed by: District Manager

Signed 10 December 2008

FINAL APPROVAL: Chair, Queensland Nurse Practitioner Advisory Committee

Signed 11 March 2009

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