

23. Medications prescribed for patients with kidney disease

A GUIDE FOR PATIENTS

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Medications prescribed for patients with kidney disease

The following information contains very brief outlines and broad principles relating to the use of medications in the treatment of kidney disease and kidney transplantation. No attempt has been made to provide detailed accounts of potential side effects sometimes attributed to the medications described. Those patients seeking more detailed information on individual medications should consult their doctor and/or pharmacist.

Broad principles of drug treatment in kidney disease

Once kidney function has deteriorated to any significant degree, further loss of function will continue. There is now ample evidence that the progression of kidney failure can be significantly slowed and in some cases, completely stabilised by appropriate medical treatment. Remembering to take the necessary medications is **very important** and requires a high level of commitment!

Most people with kidney failure regularly consult at least two doctors: their local doctor (GP) and a kidney specialist. Many people also see hospital doctors in renal outpatient clinics and in dialysis units. Therefore, it is difficult to keep track of the medications patients are taking. For this reason, **it is very important to always bring your medications with you each time you are seeing a doctor.**

All medications have two names, a **trade name** and a **generic name**. Pharmaceutical companies are obliged by law to state both names on the packaging. The trade name is usually more prominent and the generic name is usually in smaller lettering underneath. An example of this is the blood pressure-reducing medication Coversyl, the generic name of which is perindopril. Most doctors principally use generic names, but both trade names and generic names are used interchangeably, frequently leading to confusion among patients.

Without exception, all medications have the potential to cause side effects. The vast majority of medications rarely cause problems when used correctly. Always seek immediate medical advice should you suspect you are developing a reaction to a medication. Always tell your doctor of any allergies you may have suffered with medications in the past.

How each individual responds to individual treatments is impossible to predict. People with similar kidney complaints may have a complete response, a partial response or no response to a given treatment.

Many medications are broken down and excreted by the kidneys. Because of this, the dose of some medications needs to be changed when prescribed to people with kidney failure. Failure to adjust doses of medication in people with kidney failure can have very serious consequences.

Because of the risk of interactions between different medications you should never take any new medications without first consulting your doctor. For the same reason, you should never take 'alternative' medications or 'herbal' remedies without consulting your doctor. This is particularly important for kidney transplant recipients receiving immune-suppressive medications.

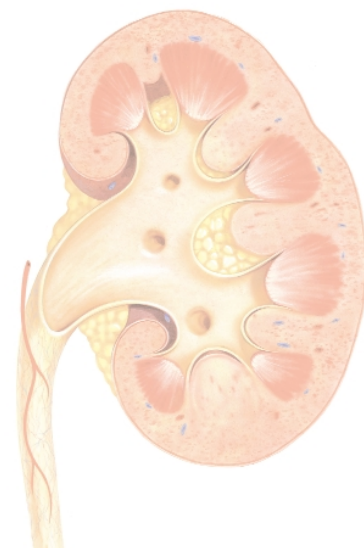
Never stop any medication without first consulting your doctor. Never exceed the prescribed dose. It is not true that 'a little more will do no harm, and might do more good'!

It has been estimated that up to 11% of kidney transplants fail as a result of acute rejection episodes due to recipients not taking their medication! Understandably, most kidney specialists are very reluctant to place people with end-stage renal failure on kidney transplant waiting lists if they have shown themselves to be unreliable in the taking of medications.

When contemplating a holiday it is wise to:

- > travel with medical insurance if available
- > travel with detailed information and medical details relating to your condition
- > carry extra supplies of necessary medications.

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Medications continued...

Medications frequently prescribed to people with kidney disease -

a. Blood pressure lowering medications

Controlling high blood pressure helps to slow the rate of decline of kidney function. There are many different types of medications available and adequate control of raised blood pressure frequently requires more than one medication.

Angiotensin-converting enzyme inhibitors (ACE inhibitors)

These drugs are particularly useful as they both control blood pressure and protect kidney function from further deterioration. They are also commonly used in the treatment of heart failure. **ACE inhibitors are well-tolerated medications.** Common examples include Coversyl (perindopril), Accupril (quinapril), Renitec (enalapril), Capoten (captopril), Odrik (trandolapril), Monopril (fosinopril), Zestril (lisinopril) and Tritace (ramipril). They can cause foetal abnormalities (birth defects) if taken by women during pregnancy.

Angiotensin II receptor antagonists (AIIARs)

These are a relatively new class with similar effects to ACE inhibitors, though less is known about them at this stage. They are at least as effective as ACE inhibitors. They are usually taken once per day. Common examples include Cozaar (losartan), Avapro (irbesartan), Atacand (candesartan) and Micardis (telmisartan).

Beta-adrenergic antagonists (β -blockers)

β -blockers have been available for many years and are of proven efficacy particularly in people with heart disease. They are usually taken once or twice per day. They must be used with caution in people with asthma or poor circulation. Oxprenolol is commonly used to control blood pressure in pregnancy. Common examples include Betaloc (metoprolol), Brevibloc (esmolol), Corbeton (oxprenolol), Dilatrend (carvedilol), Tenormin (atenolol) and Visken (pindolol).

Calcium channel antagonists (calcium channel blockers)

These medications are very effective in controlling blood pressure. They are also effective in improving the blood supply to the heart, hence their use in people with angina. They are usually taken once per day. They are well tolerated, but can cause swelling around the ankles in some people. Common examples include Adalat Oros (nifedipine), Plendil ER (felodipine) and Norvasc (amlodipine).

Alpha-adrenergic antagonists (alpha-blockers)

Alpha-blockers are occasionally added to other medications to lower blood pressure, particularly in men with difficulty emptying their bladder due to prostate problems. They are generally taken once to three times per day, depending on the preparation. They are well tolerated but can cause light-headedness in some patients at the start of treatment, particularly in people with diabetes mellitus. Common examples include Carduran (doxazosin) and Minipress (prazosin).

Minoxidil

This medication is only used when blood pressure is proving difficult to control. It is very effective at controlling blood pressure, but it can lead to an increase in body hair and/or fluid retention in some people. It is taken twice or three times per day. The only preparation available in Australia is Loniten (minoxidil).

Methyldopa

This medication is used particularly to control blood pressure during pregnancy. It is effective and has been used for many years to treat pregnant women with high blood pressure without harmful effects on the foetus. It is taken twice or three times per day. A common example is Aldomet (methyldopa).

Hydralazine

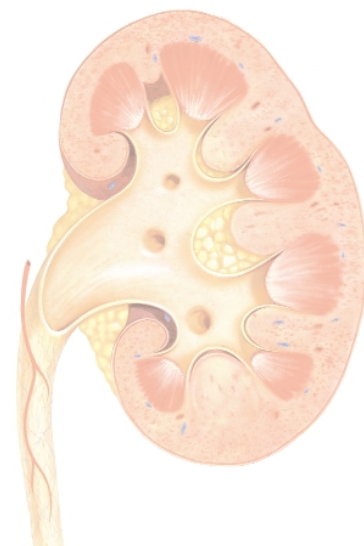
This medication is used only when blood pressure is proving difficult to control and to control blood pressure during pregnancy. It is effective at controlling blood pressure, but it can lead to fluid retention in some people. It is taken twice per day. A common example is Alphapress (hydralazine).

b. Medications used to reduce the amount of water in the body (diuretics)

Diuretics or 'water tablets' as they are better known, are used in many situations including the treatment of high blood pressure (see also section 11), heart failure, and the nephrotic syndrome (see also section 5). There are several different types of diuretics available, the most commonly used in kidney disease, being the loop diuretics.

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Some people with kidney failure, such as those with nephrotic syndrome, are at particularly high risk of developing high cholesterol levels. Similarly, kidney transplant recipients are also at increased risk. In such people, it is important to control the levels of cholesterol and fat in the blood and to start treatment if necessary.

Medications continued...

The main difficulty associated with these medications lies in the fact that taking too small a dose results in no response, whereas taking too high a dose can lead to dehydration. The best way to control this response is by weighing the person each morning and adjusting the dose accordingly (rapid weight loss is suggestive of too high a dose being used). Diuretics are generally taken once or twice per day. Common examples include Lasix (frusemide) and Burinex (bumetanide).

c. Medications used to reduce high cholesterol levels (hyperlipidaemia)

Some people with kidney failure, such as those with nephrotic syndrome (see section 4), are at particularly high risk of developing high cholesterol levels. Similarly, kidney transplant recipients are also at increased risk. In such people, it is important to control the levels of cholesterol and fat in the blood and to start treatment if necessary.

Treatment consists first of special dietary advice, exercise and failing this, the use of cholesterol-lowering medications. Though there are several different groups of medications to achieve this, by far the most commonly prescribed are a family of drugs called HMG Co-A reductase inhibitors (**statins**). Statins are well tolerated, but in a small number of people may cause muscle pain. They are generally taken at night. Common examples include Lescol (fluvastatin), Lipitor (atorvastatin), Pravachol (pravastatin) and Zocor (simvastatin).

d. Medications used to control potassium levels (hyperkalaemia)

People with kidney failure tend to suffer a build-up of potassium because they do not excrete it through their kidneys. This leads to potentially dangerous levels of potassium in the body. Control of these levels in kidney disease begins with a **low potassium diet**, avoiding foods rich in potassium such as fruit eg banana. Occasionally, special compounds called **potassium-binding resins** are used temporarily. These bind potassium in the stomach and intestine and prevent its absorption into the bloodstream. The potassium, bound to the resins, then passes through the intestine and is removed from the body in the bowel motions. Resins are very bitter in taste and are expensive. They are taken twice or three times per day until the potassium in the blood falls to acceptable levels. There are two potassium-binding resins commercially available in Australia: Calcium Resonium (calcium polystyrene sulphonate) and Resonium A (sodium polystyrene sulphonate).

e. Medications used to control phosphate levels (phosphate binders)

Treatment to control phosphate levels begins with a **low phosphate diet**. Special compounds called **phosphate binders** are also frequently prescribed to help prevent the build up of phosphate in the blood. These compounds bind phosphate released from food in the stomach and prevent its absorption into the bloodstream. Because of this, phosphate binders **must** be taken with food. The phosphate bound to the phosphate binders then passes through the intestine and is removed from the body in the bowel motions. There are numerous phosphate binders commercially available including Caltrate/Tricalac (calcium carbonate), Mylanta (multiple actives), Alu-Tab (aluminium hydroxide) and Gastrogel (multiple actives).

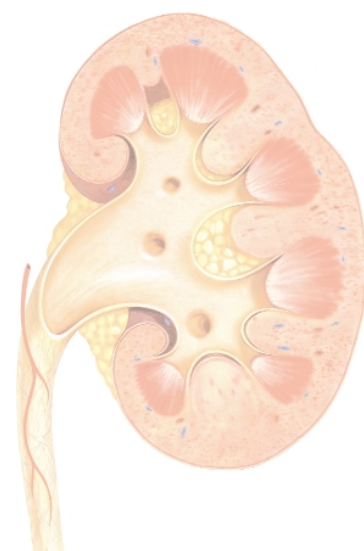
f. Medications used to suppress overactive parathyroid glands (vitamin D analogues)

People with kidney failure tend to have low levels of active vitamin D and high levels of phosphate in their blood, causing the level of calcium in the blood to fall. This is detected by the parathyroid glands in the neck and in an effort to raise the level of calcium in the blood, they become overactive. This is ultimately at the expense of the bones, from which the calcium is moved and if untreated, people with kidney failure develop calcium-poor and severely weakened bones. Prevention of this problem is achieved by starting a low phosphate diet, the use of phosphate binders and by taking vitamin D. These drugs are taken at night either once per day, once per week or three times per week. The only active form of vitamin D available in Australia is calcitriol, which is commercially available as Rocaltrol, Calcijex and Sitriol.

g. Medications used to reduce blood uric acid levels (hypouricaemics)

People with kidney damage caused by raised levels of uric acid or recurrent episodes of gout are treated with two main medications, allopurinol and colchicine. Allopurinol is usually taken once per day. It is generally well tolerated and is commercially available as Allohexal, Allorin, Capurate, Progout and Zyloprim. Colchicine is commonly used to treat attacks of gout rather than preventing attacks. It is very effective, but it may cause diarrhoea. It is available as Colgout.

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People with kidney failure, particularly those undergoing treatment with intermittent haemodialysis, are unable to maintain adequate iron stores in their body. Because of this, intravenous supplements are sometimes given, usually while the patient is connected to the haemodialysis machine.

Medications continued...

h. Medications used to increase the body's iron stores

People with kidney failure, particularly those undergoing treatment with intermittent haemodialysis (see also section 20), are unable to maintain adequate iron stores in their body. Because of this, intravenous supplements are sometimes given, usually while the patient is connected to the haemodialysis machine. The most common, most effective and safest form is Ferrum H (polymaltose complex).

i. Medications used to maintain a normal blood count

As mentioned in section 1, the kidneys produce a compound called erythropoietin. This stimulates the bone marrow to produce red blood cells and maintain a normal blood count. With reduced kidney function, the production of erythropoietin is reduced and anaemia occurs. This results in tiredness, weakness and nausea and has an adverse effect on the heart. Erythropoietin is now available in the form of an injection, which corrects the anaemia and helps the function of the heart. These injections are usually given directly under the skin (subcutaneously) one to six times per fortnight (usually three times per week) or intravenously if convenient.

j. Medications used to control the level of acid in the blood (acidosis)

As mentioned in section 18, when kidney failure occurs the production of bicarbonate may be reduced, resulting in a build-up of acid in the bloodstream. This is called **acidosis**. Treatment of this problem involves taking tablets rich in bicarbonate. These are taken two to three times per day and the most commonly used preparation is called Sodibic (sodium bicarbonate).

k. Vitamin supplements

With more severe kidney disease and in people undergoing intermittent haemodialysis in particular, essential vitamins may become deficient and supplements are frequently required. These are well tolerated and are taken once daily. Common examples are Multi B Forte (ascorbic acid and vitamin B group), vitamin C (ascorbic acid) and folic acid. Folic acid also counteracts elevated levels of homocysteine, inevitable in renal failure and a risk factor for cardiovascular disease.

I. Immunosuppressive medications

Immunosuppressive medications suppress the immune system and reduce the inflammation responsible for many diseases, in particular the so-called autoimmune diseases. These medications are employed in two circumstances:

- > some kidney conditions improve with the use of drugs that suppress the immune system.
- > following kidney transplantation to prevent rejection of the transplanted kidney.

Because immuno-suppressive agents depress the immune system, they predispose the body to infection. It is important to always seek medical advice should you suspect infection while taking these medications. The most common types of infection in these circumstances are 'sore throat', chest infections, skin infections or urinary tract infections. Unfortunately, these medications are the most effective and sometimes the only treatment available for many kidney diseases. Clearly, doctors do not start treatment with these medications unless it is deemed absolutely necessary and the doses are reduced as quickly as is safely possible. Usually, they are only prescribed after a precise diagnosis of the exact type of kidney disease has been reached with the aid of a kidney biopsy.

The two immuno-suppressive agents most commonly used in the treatment of kidney disease are corticosteroids (cortisone), such as intravenous methylprednisolone or oral prednisolone, and the alkylating agent Endoxan (cyclophosphamide).

Corticosteroids are very commonly used in a variety of medical conditions. Much experience has accumulated with their use as well as reviewing and preventing their potential side effects. These include loss of control of the adrenal glands, predisposition to infections, skin changes, changes in facial and body appearance, predisposition to diabetes mellitus, bone damage, muscle weakness and psychological problems, among others. Fortunately, most of these problems only affect a small percentage of people treated with corticosteroids and many of them are reversible after the dose is reduced or the medication is stopped.

The chemotherapy agent Endoxan (cyclophosphamide) is often used in the treatment of serious kidney diseases. It can be given either intravenously every three to six weeks or orally every day.

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Many medications can have adverse effects on the kidneys. People with known kidney disease need to be very careful in regard to the medications or herbal remedies they take in case their kidney function becomes further reduced.

Medications continued...

Besides leading to serious infection, cyclophosphamide may also cause infertility, malignancy (cancer), hair loss, bladder inflammation and lung damage. In males, sperm banking is available when desired. Careful administration and review of cyclophosphamide therapy can prevent or reduce its side effects.

m. Medications used in kidney transplantation

All the previously mentioned medications are frequently used in the setting of kidney transplantation, but there are a few medications used almost exclusively following transplantation. As well as immuno-suppressive medications, certain medications are also used to prevent infection immediately after the transplant, when the risk of infection is highest. These include Valtrex (valaciclovir), to prevent viral infections and Bactrim DS (double strength trimethoprim-sulphamethoxazole), 1 tablet twice daily Monday and Friday, to prevent Pneumocystis lung infections. Another medication called Cardizem CD (diltiazem) 180 mg once per day increases the blood supply to the kidney and helps increase the effect of Neoral (cyclosporin A).

The most commonly used immuno-suppressive medications used following successful kidney transplantation include prednisolone (cortisone), Neoral (cyclosporin A), Prograf (tacrolimus), Imuran (azathioprine), and Cellcept (mycophenolate mofetil).

n. Medications to be taken with care in kidney disease

Many medications can have adverse effects on the kidneys. People with known kidney disease need to be very careful in regard to the medications or herbal remedies they take in case their kidney function becomes further reduced. Fortunately, most problems associated with drugs and the kidneys are reversible with withdrawal of the medication, but prevention is **always** better than cure.

The main ways in which medications may impair kidney function include:

- > causing dehydration such as with diuretics ('water tablets').
- > reducing the blood supply to the kidneys, as with a group of painkillers called non-steroidal anti-inflammatory medications also called 'anti-inflammatories' or 'NSAIDs'. These are often prescribed for the treatment of painful joints, arthritis or 'rheumatism'. In people with normal kidney function they rarely cause problems, but in people whose kidney function is already reduced they are more likely to cause kidney failure and should be avoided or used with extreme caution. Some of these medications appear harmless because they are available 'over-the-counter' without a prescription. Examples include Brufen (ibuprofen), Nurofen (ibuprofen), Feldene (piroxicam), Naprosyn (naproxen), Voltaren (diclofenac), Surgam (tiaprofenic acid), Ponstan (mefenamic acid), Orudis (ketoprofen) and Indocid (indomethacin).
- > direct toxicity of the medications to the kidneys, as may be caused by a group of antibiotics called aminoglycosides, although these are only used in hospitals.
- > rarely, by causing allergic reactions (tubulo-interstitial nephritis).

Many of these drugs can be used if necessary, but the dose may need to be changed or the time between doses (**dosing interval**) lengthened. If they are used, a blood test should be taken soon after treatment is started, in order to assess kidney function. If any doubt exists, or before starting any new medication, it is important to check with your doctor and/or your pharmacist that it will not adversely affect your kidneys.

Many medications can be used if necessary, but the dose may need to be modified or the time between doses (dosing interval) lengthened. If they are used, a blood test should be taken soon after therapy is commenced, in order to monitor kidney function.

