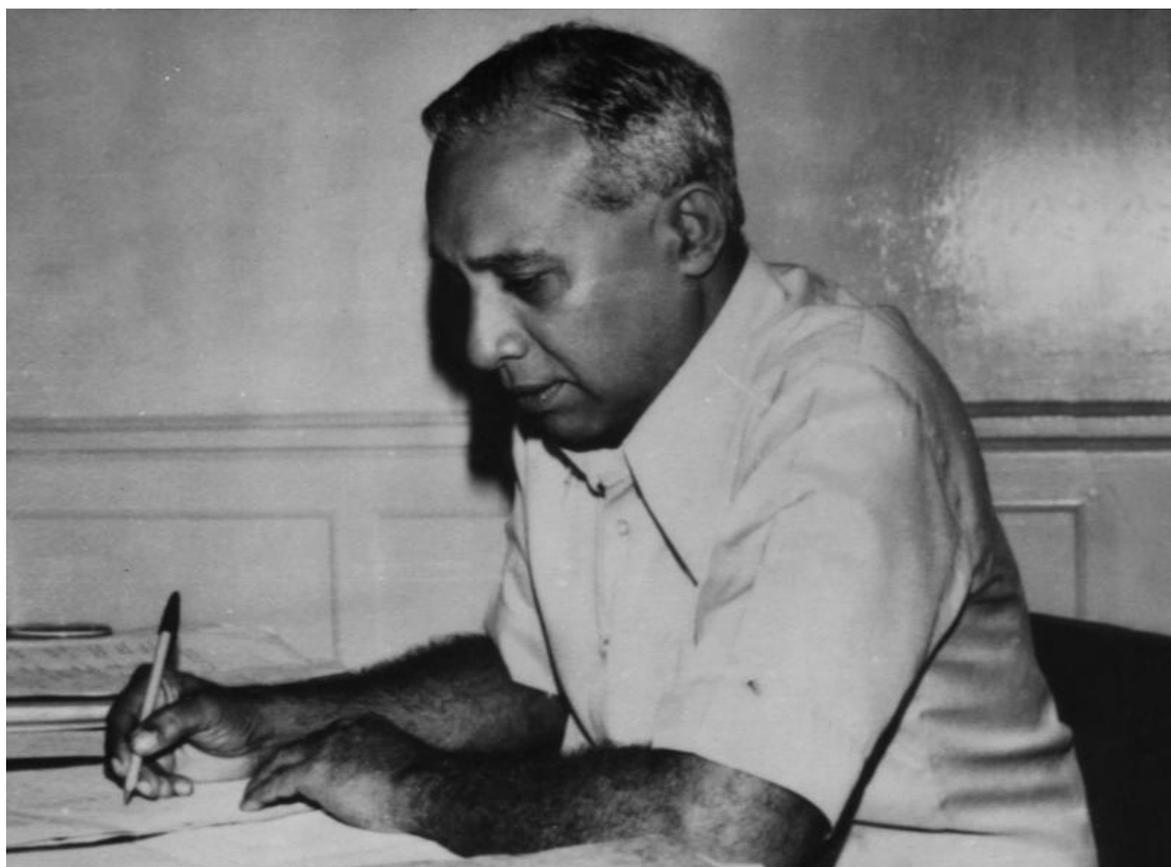




The Sri Lanka Prescriber

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The Sri Lanka Prescriber

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Cover picture

Bibile the visionary (Real reform never waits for rational justification)

The late Professor Senaka Bibile was a visionary. In 1971 he introduced major pharmaceutical reforms in Sri Lanka. He was criticised by a section of the Sri Lankan medical establishment supported by the multinational drug industry. However, the United Nations agencies took immediate notice. The Technology Division of the United Nations Conference on Trade and Development (UNCTAD) saw the importance of Bibile's reforms and commissioned him to write down his experiences. In June 1977 UNCTAD published "Case Studies in the Transfer of Technology: Pharmaceutical Policies in Sri Lanka". The original written in English by Professor Bibile was translated into Arabic, Chinese, French and Spanish and widely distributed to developing countries in Africa, Asia and Latin America and the Middle East. Professor Bibile was invited to join UNCTAD and set-up a pharmaceuticals unit in the Technology Division, UNCTAD, Geneva. He took up the position in July 1997.

Professor Bibile's reforms were also taken up by the World Health Organization (WHO). In May 1981 during the debate on pharmaceuticals at the World Health Assembly Sessions in Geneva, Dr Balu Sankaran, Director of the Drug Action Programme of WHO stated, among others, "The programme of work being implemented by the Drug Action Programme on Essential Drugs is modelled on the reforms introduced by the late Professor Bibile in Sri Lanka in 1971". Bibile's reforms in 1971 had taken a global dimension.

Professor Bibile died on 29th September 1977 in George Town, Guyana, South America where he was on an UNCTAD Mission to develop a Regional Pharmaceutical Policy for the Caribbean Community (CARICOM), a sub-regional group of 13 Member States.

UNCTAD, recognising the importance of the pharmaceutical programme of work initiated by Professor Bibile, invited me to join UNCTAD and continue his work. I was one of his students and had the privilege of working under him in the Pharmacology Department first in Colombo and then in Peradeniya from 1959 till 1977. Following my tenure in UNCTAD, I joined Health Action International Asia - Pacific in 1987 to continue Bibile's work at a regional level.

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(Cover picture of Senaka Bibile by courtesy of Mr. Upasena Jayaratne)

Living with epilepsy: advice to patients and carers

This is the last in a series of three articles on epilepsy, and will deal with some of the issues faced by patients and carers in living with epilepsy.

Safety first.

If you get any warning symptoms before the seizure, lie down on the ground, in a safe place, as quickly as possible. Avoid situations where your life may be in danger or there is a risk of injury, if you have a seizure.

Examples:

- working with moving machinery or heavy equipment
- working at heights, climbing trees or ladders
- travelling on the footboard in buses or trains
- bathing at unprotected wells, or bathing in rivers, streams, tanks or the sea without anybody accompanying you. Swimming under close supervision is generally allowed if your seizures are under control
- cooking at an open fire and using unprotected bottle lamps

You may like to discuss these with your doctor. The bottom line is, be sensible in what you do. After all, it is your life.

Epilepsy triggers.

There are some situations or conditions which can increase the likelihood of seizures in a patient with epilepsy. Concurrent illness with fever, certain drugs, and menstrual periods in women are some of them. Your doctor would advise you on what can be done to reduce the risk of seizures in such situations. For example, keeping body temperature down is important during fever, especially in children. For women who develop seizures mainly during menstruation, a short course of drugs to cover this period every month may be enough.

More importantly, there are some situations we may be able to control or avoid. These include irregular meal times and skipping meals, inadequate sleep and late nights, excess fatigue, and alcohol.

A flickering display screen from a TV can precipitate seizures in a minority of patients. There are a few 'tricks' to help such patients to minimise the risk. These include;

- Watch TV only in a room with good background lighting.

- Your eyes should be at or above the level of the screen.
- Stay at a distance from the screen, at least 10 feet.
- Use a remote control to change channels, without going near the screen.
- Avoid watching programmes with poor reception.
- Looking away or closing one eye when channels are being changed or when there is flickering on the screen.

It is not necessary to stop or limit watching TV for everybody with epilepsy.

Be a good patient. Seizure control depends on what YOU do.

- Regular treatment is the key to good seizure control. Take your tablets everyday as instructed.
- If you have forgotten to take a tablet on time, take it when you remember it. If you remember it when the next dose is due, just take the next dose. Do not double the dose.
- Regular follow up visits to your doctor are important, as he may be able to recognise patterns of poor seizure control or side-effects early.
- Do not stop medicine or change the dosage without your doctor's advice.
- Have your meals on time. Do not forget breakfast before leaving for school or work.
- Make sure that you get enough sleep regularly. Avoid undue fatigue.
- Missing meals and lack of sleep is a terrible combination for somebody with epilepsy. Add alcohol to that, and you have a recipe for disaster. This is commonly seen in the setting of weddings, funerals, *pirith* ceremonies, *thovil* ceremonies, musical shows, discos, and late night parties. Make sure that you excuse yourself, and sleep early. Your social responsibilities are important, but so is your health.

Other illnesses and other drugs.

Drugs used for other illnesses can interact with your epilepsy drugs and reduce their efficacy, and vice versa. Always carry a list of your epilepsy drugs with you, and tell your doctor about your medication when you go for treatment for another ailment. When taking treatment for epilepsy, remember to tell your doctor

about any other medication you may be taking, including Ayurvedic medicines.

Epilepsy drugs can interfere with the contraceptive pill. It may be necessary to change the pill, or use a different method of contraception. Talk to your doctor about this.

Keep a seizure diary.

Maintaining a record of your seizures is helpful in adjusting the treatment, and in identifying factors that may precipitate seizures. Note the occurrence and the time of seizures, whether you were awake or asleep, anything you feel might have precipitated it, and any other detail you might consider relevant. Always take it on your visit to the doctor.

How will my life change?

Physical activity and sports

Leisure activities are an essential part of normal life. Physical activity, regular exercise and participation in sports do not necessarily increase the risk of seizures. However, there are a few situations that require such as:

- Avoid contact sports where there is a risk of head injury eg. boxing, wrestling, karate, etc.
- Avoid swimming without close supervision.
- Avoid cycling on the road until seizures are well controlled.

Driving

Driving can be dangerous. Having a seizure while driving can lead to accidents, which can cause injury or death to you, your fellow passengers, and to others on the road. Driving is not recommended for at least one year after the last seizure. Driving a heavy goods vehicle or a passenger vehicle should be avoided altogether. In most countries these are enforced by law.

Alcohol

Alcohol excess can trigger seizures, especially when associated with missed meals, late nights and missing out on the tablets. Alcohol can also interact with your epilepsy drugs. It is best to avoid alcohol. If you cannot do this, drink only in moderation.

If somebody near you has a seizure

Remember these, and you might be able to save a life.

- Try to prevent injury. If the person is on the ground, remove any objects in the surrounding area which can cause injury. If you were able to hold him before the fall, lower him gently and cushion the fall. Do not try to keep him upright or seated. Move the

person away only if he is close to a fire, on the road, or in water.

- Do not try to restrain him or stop the violent jerking.
- Remove spectacles.
- Do not try to give him food or drink.
- Do not insert any objects (such as spoons) or your fingers in the mouth, in an attempt to prevent tongue biting.
- Do not try to place metal objects (such as iron rods) in his hand, in the belief that it will abort the seizure. It can cause injury.
- Give him space. Avoid people crowding around.
- Keep your cool. Try to keep a note of the duration of the seizure.
- Roll him onto his side, when he can be turned after the violent jerking stops. This will help clear any saliva, vomitus or food from the mouth, and keep the airway open.
- Do not panic. You do not need to rush everybody with a seizure to the hospital. He may have difficulty in breathing or even temporarily stop breathing, and may go 'blue' during the seizure. Breathing will gradually become regular once the seizure is over.
- Call for medical help or arrange transport to a hospital if the seizure lasts for more than five minutes, if repeated seizures occur in a short time, if there is severe injury or bleeding after the seizure, or if there is difficulty with breathing after the seizure.
- Try to stay with the patient. Talk to him and keep him calm once the seizure is over. He may be drowsy and confused after the seizure, but this is quite normal.

For the parents.....

If your child has epilepsy

- Do not blame him or yourself for his illness. It is common for parents to have feelings of guilt, but it is certainly not your fault, or his, that he has epilepsy.
- Give him all the love and emotional support, and the confidence to 'stand on his own feet'. Do not try to overprotect him.
- Let him have as normal a life as possible. Encourage schooling, sports and other activities, within limits of safety (see above).
- Keep his teachers and friends informed about his illness, and on what to do if he has a seizure.

Some children with epilepsy may have learning difficulties. A minority of children may have severe difficulties with learning and may need to attend special schools. There can also be problems with vision, hearing,

speech and walking. These are usually due to underlying brain abnormalities, and epilepsy is then just a part of a widespread problem.

What about pregnancy?

Epilepsy is certainly not a barrier to having children, but there are important facts to consider. Women with epilepsy have a slightly higher risk of having babies with some developmental abnormalities. Most of these are minor, but some can be serious. This risk increases with treatment, and the risk is higher in mothers taking more than one drug. Even then, such abnormalities are very rare, and more than 90% of women with epilepsy will have an uncomplicated pregnancy and a normal baby. Epilepsy is not a problem for breast feeding.

If it is possible to plan a pregnancy, it is best to conceive after the seizures have been controlled and the drugs stopped. This may be difficult in some patients who need to be on long term treatment, and it is sensible to discuss the potential risks with your doctor.

The drugs should NOT be stopped, or the dose reduced, if you become pregnant while on treatment. This can

result in recurrence of fits, which can harm both the mother and the baby.

Taking a vitamin called folic acid minimises the risk of developmental abnormalities, and all women of childbearing age and taking drugs for epilepsy should take this on a regular basis, even before pregnancy.

Tail piece

Live a full life.

Epilepsy is just another illness, and can be treated like any other illness. Regular treatment and a sensible life style will help in controlling seizures. Epilepsy should not be a barrier to leading a full life and realising your dreams.

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Prescribing in renal disease

Summary

The appropriate prescribing of many drugs depends on knowledge of the patient's total renal function, which is proportional to their body mass. The Cockcroft-Gault method of calculating creatinine clearance takes into account the patient's weight. The recently introduced estimated glomerular filtration rate, which is now routinely reported with biochemistry test results, is useful for screening for renal disease, but is unsuitable for calculating doses as it does not take into account the patient's size. Both are unreliable at extremes of weight. The list of medications that need dosage adjustment according to renal function is long, but includes commonly prescribed drugs such as antivirals, hypoglycaemic drugs (metformin, sulfonylureas, insulin), spironolactone and allopurinol.

Key words: creatinine clearance, drug therapy, glomerular filtration rate, kidney disease.

Introduction

The clearance of many drugs and their metabolites depends on adequate renal function. Renal clearance is especially important for some drugs where the gap between efficacy and toxicity is narrow. Doses of these drugs need careful adjustment if they are prescribed for patients with impaired renal function. Some drugs also have the potential to cause renal toxicity. This is particularly likely to occur in patients who already have some, degree of renal impairment, although other factors can increase the risk.

Estimating renal function

An accurate estimation of renal function, or glomerular filtration rate (GFR), requires sophisticated techniques that are unsuitable for routine or repeated use. In practice, the serum creatinine concentration is used for day-to-day assessment of renal function. It has limitations, but it remains a robust and practical parameter for most clinical situations.

Serum creatinine

The serum creatinine concentration has important limitations when used for estimating renal function.

1. There is an inverse relationship between serum creatinine and renal function. A doubling of serum creatinine represents a halving of GFR. A person's serum creatinine can rise from 60 to 120 micromol/L and so still be in the normal range (typically 50 to 120 micromol/L), yet the renal function has deteriorated dramatically.
2. Renal function declines steadily with age in adults, but this is not reflected in the serum creatinine, which remains steady or may only increase slightly with age (in the absence of overt renal disease, where it may rise more obviously). An 80-year-old will have approximately half of the renal function of a 20-year-old, despite both having the same serum creatinine concentration.
3. Renal function has an approximately linear relationship with lean body mass. In the presence of the same serum creatinine, a 120 kg person will have twice the renal function of a 60 kg person because they have bigger kidneys.
4. Women have a lower muscle mass than men of equivalent weight and age. A woman's serum creatinine represents approximately 0.85 of the renal function of a man with the same serum creatinine.

These limitations are particularly relevant and must be addressed when attempting to measure renal function for the purpose of calculating drug doses.

Creatinine clearance

The serum creatinine concentration represents a balance between its production in the body (from muscle) and its excretion by the kidneys. From this can be derived an estimation of the creatinine clearance by the kidneys, in millilitres per minute (mL/min) or millilitres per second (mL/sec). This is the notional volume of serum that is cleared of creatinine in those times. The creatinine clearance is the 'poor man's' equivalent of the formal measurements of GFR, but for most clinical purposes is an adequate measurement of renal function.

Direct determination of creatinine clearance requires simultaneous measurement of the concentration of creatinine in the serum and in a timed urine specimen (usually 24 hours).

Timed urine collections are labour-intensive and notoriously unreliable. As a result many equations for estimating creatinine clearance have been derived that only need measurement of serum creatinine. The most widely recognised of these is the Cockcroft-Gault formula, which relies on patient age, weight, gender and serum creatinine.

$$\text{creatinine clearance (mL/min)} = \frac{(140 - \text{age}) \square \text{lean body weight (kg)} (\square 0.85 \text{ for females})}{\text{serum creatinine (micromol/L)} \times 0.815}$$

The accuracy of this formula for estimating creatinine clearance is equivalent to that from a timed urine collection, so there is no good reason for using a 24-hour collection. Manufacturers' renal dosing recommendations for medications are based on Cockcroft-Gault estimates of renal function, so this formula is also recommended when estimating creatinine clearance for the purpose of calculating drug doses that vary according to renal function.

Clinicians should be aware of some important limitations of the Cockcroft-Gault estimation of renal function. It is:

- not validated in some populations
- unreliable in extremes of body size (that is, in severe malnutrition or obesity)
- imprecise and unreliable for rapidly changing renal function (for example intensive care, acute renal failure).

What is estimated GFR?

Australian pathology laboratories have started routinely including an estimated GFR (eGFR) in all biochemistry reports that include serum creatinine. The reporting of serum creatinine has also been standardised to be in micromol/L (so the actual number is 1000 times that when reported as mmol/L).

The formula used to calculate eGFR was derived as part of a large study of the effect of dietary protein restriction on the progression of renal failure. (This was the Modification of Diet in Renal Disease study, hence the MDRD formula¹). The advantage of this formula is that it does not require knowledge of the patient's height or weight as the eGFR is calculated using serum creatinine, age and gender.

It is crucial that clinicians realise that the eGFR is not estimating the patient's actual GFR, but is estimating an adjusted GFR – which assumes that the patient is of average body size. This explains how the number can be calculated without any knowledge of the patient's actual size. Average body size equates to a body surface area of 1.73 m², and so the eGFR is reported as mL/min/1.73 m². In practice, this means that while one person who is twice the size of another, of the same age, gender and serum creatinine, will have twice the actual GFR, the eGFR for both will be the same.

The eGFR is primarily intended to be a screening tool for renal disease in the community, in association with other signs of renal disease such as urinary abnormalities and hypertension. It has similar limitations

as the Cockcroft-Gault equation², including that it is not validated in Aboriginal and Torres Strait Islander people.

eGFR is not preferred for calculating drug doses

Drug dosing should be based on the patient's actual GFR and not an adjusted GFR. While recognising that the Cockcroft-Gault equation has limitations, it does at least take into account body size when estimating GFR, whereas the eGFR does not. Using the eGFR to calculate dosages would lead to overdosing of small patients and underdosing of large patients. Overdosing increases the risk of toxicity of drugs with a narrow therapeutic range, while underdosing reduces efficacy. The MDRD formula used to calculate eGFR can be manipulated to adjust for a patient's body surface area (if the patient's height and weight are known). A recently published observational analysis suggests wide variation between the formulas³. However, as yet it is unknown whether the MDRD formula is superior to Cockcroft-Gault for calculating drug doses.

Prescribing for dialysis patients

For the purpose of drug prescribing, patients on dialysis (haemodialysis or peritoneal dialysis) should be considered to have a creatinine clearance/GFR of less than 10 mL/min. Certain drugs are actively removed from the circulation during dialysis, and this needs to be considered when deciding on the timing of administration

as well as the dosage. Factors that may reduce the extent to which a drug is dialysed include large molecular size of the drug, high protein binding, large volume of distribution and high lipid solubility. In addition to these parameters, the type of dialyser membrane may also affect drug clearance, as will blood and dialysate flow rates. If a drug is known to be dialysed, patients having haemodialysis may be instructed to take the drug after the dialysis session.

Dose alteration in renal impairment

Once renal impairment has been detected and creatinine clearance estimated, the need for dose alteration of renally cleared drugs must be determined. Generally dose adjustment is needed when the creatinine clearance is below 60 mL/min. People who have been taking a drug for many years may need a dose adjustment as they age. Adjustments can be achieved by a reduction in dose, or an extension of the dosing interval, or both. Knowledge of appropriate dosage adjustment is important to ensure the drug is effective and that accumulation and further kidney damage is avoided. There are various references to consult in Australia including the *approved product information* and the *Australian Medicines Handbook*. International references include the *Renal Drug Handbook* and *Drug prescribing in renal failure*⁴. Table 1 lists some of the commonly prescribed drugs that require dose alteration in renal impairment.

Table 1. Commonly prescribed drugs that require dose adjustment in renal impairment

| Class | Examples |
|-------------------------------|--|
| Antibiotics/antifungals | aminoglycosides (eg. gentamicin), vancomycin, ceftazidime, cefepime, cephazolin, ciprofloxacin, fluconazole, piperacillin, carbapenems (eg. meropenem), sulfamethoxazole |
| Antivirals | famciclovir, aciclovir, valaciclovir, valganciclovir, ganciclovir |
| Anticoagulants | low molecular weight heparins (eg. enoxaparin) |
| Cardiac drugs | digoxin, sotalol, atenolol |
| Diuretics | If creatinine clearance is less than 30 mL/min: - avoid potassium-sparing diuretics due to risk of hyperkalaemia - thiazide diuretics have limited efficacy |
| Opioids | morphine, codeine, pethidine (due to risk of accumulation of active or toxic metabolites) |
| Psychotropics/anticonvulsants | amisulpride, gabapentin, lithium, levetiracetam, topiramate, vigabatrin |
| Hypoglycaemic drugs | metformin, glibenclamide, glimepiride, insulin |
| Drugs for gout | allopurinol, colchicine |
| Others | lamivudine, methotrexate, penicillamine |

Antiviral drugs

Renal clearance is the major route of elimination for many antivirals, including those used for treating herpes simplex, herpes zoster and cytomegalovirus infections (such as aciclovir, famciclovir, valganciclovir and ganciclovir). In patients with renal impairment, renal clearance of these drugs is reduced and the elimination half-life is significantly prolonged. As a result, normal doses will accumulate and may lead to neurological signs such as dizziness, confusion, hallucinations, somnolence and convulsions, as well as more rarely, tremor, ataxia, dysarthria, seizures and encephalopathy. These adverse effects are dose-related and reversible on stopping the drug. They are especially problematic in elderly patients or patients taking other neurotoxic medications. If essential, it may be possible to reintroduce the drug at a lower dose.

Hypoglycaemic drugs

Renal function needs to be considered when prescribing three of the major groups of hypoglycaemic drugs – biguanides (metformin), sulfonylureas and insulin.

Metformin

Metformin has been associated with rare but potentially fatal lactic acidosis. This is thought to result from accumulation of metformin when renal impairment reduces renal clearance. The risk of lactic acidosis is potentially enhanced in conditions where tissue hypoperfusion and hypoxaemia are a problem (for example in cardiac or respiratory failure, or following a myocardial infarction), with increasing age and with higher doses of metformin (generally above 2 g/day). The common adverse effect of nausea is also dose-related and more likely to occur in the presence of renal impairment.

No definitive guidelines exist on reducing the dose of metformin in renal impairment, and lactic acidosis has been reported with doses as low as 500 mg/day⁵. Ideally, metformin should be avoided in patients with a creatinine clearance of less than 30 mL/min and should be used with caution, at a reduced maximum daily dose of 1 g, in patients with a creatinine clearance of 30-60 mL/min. For those patients with a creatinine clearance of 60-90 mL/min, the recommended maximum daily dose is 2 g. Metformin should also be withheld temporarily in patients undergoing surgery, suffering from dehydration, trauma or serious infections, or undergoing procedures likely to affect renal function (for example, contrast studies).

Sulfonylureas

Long-acting sulfonylureas such as glibenclamide and glimepiride are associated with a higher risk of

hypoglycaemia in comparison to short-acting sulfonylureas. In patients with renal impairment and/or advanced age, the risk of hypoglycaemia is increased. These drugs are inherently long-acting as well as having metabolites that are excreted renally. Shorter-acting sulfonylureas such as gliclazide or glipizide are a safer choice in patients with renal impairment. They should be started at a low dose and increased gradually.

Insulin

Renal elimination accounts for up to half of the clearance of insulin, so as renal failure progresses, less insulin is excreted, so smaller doses are required. Patients with diabetes and renal impairment can also have unrecognised gastroparesis which may disconnect absorption of ingested food from the time of the insulin injection. This can lead to erratic glucose regulation that may be complicated by frequent episodes of hypoglycaemia.

Spironolactone

Since the publication of the Randomized Aldactone Evaluation Study⁶ in 1999, the use of spironolactone, in conjunction with an angiotensin-converting enzyme (ACE) inhibitor, has increased. In this trial, the addition of spironolactone significantly improved morbidity and mortality in patients with advanced heart failure. However, almost immediately following this publication came reports of an increase in hospital admissions (and subsequent deaths) related to hyperkalaemia⁷.

Hyperkalaemia is a particular problem for patients with renal impairment and its risk is heightened by advanced age, doses of spironolactone exceeding 25 mg/day, dehydration, diabetes mellitus, and simultaneous treatment with non-steroidal anti-inflammatory drugs, ACE inhibitors or angiotensin receptor antagonists. Prescribers are urged to frequently monitor serum potassium, creatinine and urea when starting spironolactone for heart failure, and to consider avoiding its use in patients with a creatinine clearance of less than 30 mL/min.

Allopurinol

Allopurinol is used in the management of gout to lower serum and urinary uric acid concentrations. As allopurinol, and its active principal metabolite oxypurinol, are mainly excreted in the urine, they accumulate in patients with poor renal function so the dose should be reduced. The manufacturers recommend starting treatment with a maximum dose of 100 mg/day and increasing it only if the serum or urinary urate is not satisfactorily controlled.

Hypersensitivity reactions to allopurinol are characterised by fever, chills, leucopenia, eosinophilia,

arthralgia, rash, pruritis, nausea and vomiting. The frequency of this reaction is thought to be increased in patients with renal impairment, and in those who are concomitantly taking allopurinol and a thiazide diuretic. Caution is advised when using this combination in renal impairment.

Conclusion

Adjusting the dose of renally cleared drugs is important when prescribing for patients with renal impairment. There are many drugs that require dose adjustment according to renal function. Estimation of creatinine clearance and hence renal function can be determined using the Cockcroft-Gault equation. The role of the MDRD equation (expressed as eGFR on biochemistry reporting) is currently as a screening tool for kidney disease.

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Oro-facial pain – dental surgeons' point of view

Pain is an unpleasant sensory and emotional experience associated with active or potential tissue damage, or described in terms of such damage (International Association for the Study of Pain, I.A.P.S). Oro-facial pain (O.F.P) is the presenting symptom of a broad range of diseases. OFP is diagnosed and treated with relative ease, but in some cases, the origin of the pain remains obscure. The majority of patients with O.F.P are suffering from some easily detectable pathology of teeth, their supporting tissues or associated structures. Patients often find difficulties in precise localisation of O.F.P and indicate a vague area of the face as the site of their complaint.

Whatever the nature of the pain and however unusual its presentation, the first step must be the elimination of the possible local causes such as exposed dentine, inflamed pulps, periapical lesions, pericoronal infection in relation to impacted wisdom teeth and so on, by clinical and radiological examinations. Vitality testing of teeth and diagnostic local anaesthetics may be useful aids in the diagnosis. However, when local causes of O.F.P are excluded by careful investigations there remain a number of conditions of less evident origin for consideration. Exposed dentine, pulpitis and periapical periodontitis are the common causes of a toothache. Food impaction between teeth is also a possible cause.

Exposed dentine could be due to dental caries, gingival recession following periodontal disease, attrition, abrasion and erosions in enamel, and traumatic injuries to the teeth. This is not a pain. It is sensitivity of teeth to hot, cold, and sweet food and drink. The sensitivity is poorly localised and the exposed areas will be sensitive to probing. The teeth are not tender to percussion. Usually **pulpitis** is a sequel of dental caries. In acute pulpitis the pain is severe and poorly localised, but restricted to a particular side. It is initiated by hot and cold stimuli and later on could be spontaneous, may increase in frequency and severity.

Apical periodontitis is a sequel of pulpitis or a periodontal infection or inflammation. In acute apical periodontitis the pain is localised. The patient can indicate the affected tooth, whereas in pulpitis patient holds his hand to the side of the face. The tooth is tender to touch and the patient will be reluctant to bring his teeth together.

The following conditions of the oro-facial region may be confused with a toothache:

- (a) Temporomandibular dysfunction syndrome
- (b) Maxillary sinusitis
- (c) Trigeminal neuralgia

- (d) Trigeminal neuropathy due to trauma, HIV/AIDS or tumour invasion
- (e) Salivary gland diseases such as sialadenitis and salivary stone
- (f) Soft tissue lesions such as ulcers eg: aphthous ulcers, herpes zoster
- (g) Atypical facial pain and atypical odontalgia
- (h) Vascular disorders such as migraine, migrainous neuralgia and giant cell arteritis.
- (i) Referred pain eg. from heart in angina, chest in lung cancer and cervical vertebral disease.

In temporomandibular dysfunction syndrome there is a dull pain in front of the temporomandibular joint with joint clicking or palpable crepitus in the joint and sometimes trismus. The pain radiates over the masseter, and temporalis to cervical and occipital regions. The lateral pterygoid muscle may be tender and the mandible deviates to the affected side on opening. The temporomandibular joint will not show any radiological changes. It is often difficult to distinguish dysfunction pain from pain due to pathological changes occurring in the joint tissue. It affects mainly young people.

In atypical facial pain, pain is continuous, particularly in the maxilla, in the absence of detectable organic cause. The pain is usually dull, with intermittent exacerbations. The pain has no obvious precipitating factors, although it may be attributed to dental treatment or dental diseases and is rarely completely relieved by analgesics. The diagnosis of depression manifesting with orofacial symptoms is difficult, as the patients have no typical depressive symptoms. Anyhow, organic causes for the pain must be excluded.

In atypical odontalgia there is severe throbbing pain associated with one or several teeth which are hypersensitive to any stimuli. Extraction of an involved tooth usually leads to transference of the symptoms to the adjacent tooth.

The possible causes of OFP are many and they cross the boundaries of medical and dental disciplines, and an interdisciplinary approach is often required to establish a diagnosis and for management.

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Self-assessment questions for non-medical readers

Answer 'true' or 'false' for each item in each question

1. Are the following popular beliefs about rabies true or false?
 - (a) Barking dogs do not bite.
 - (b) Dogs with rabies have hydrophobia (ie. fear of water).
 - (c) Dogs and cats that are quiet and feeding normally do not have rabies.
 - (d) Eating pork or bacon after a dog or cat bite can cause rabies.
 - (e) After a rabid dog or cat bite certain indigenous medicines can prevent rabies.

2. True or false regarding rabies?
 - (a) Dogs, cats, mongooses, monkeys, jackals, foxes, bats and cattle are all susceptible to the rabies virus.
 - (b) Little pups cannot have rabies.
 - (c) The incubation period for human rabies is from a few weeks to 2 years or more.
 - (d) If the biting animal is a dog or cat, observable in a secure cage or leash, and is healthy and alive for 14 days, it is not rabid.
 - (e) Rabies is caused by a virus that has a special affinity for the brain, spinal cord and salivary glands.

3. The following steps are appropriate after a dog or cat bite.
 - (a) Wash wound(s), including scratches, with soap and water for 3 - 5 minutes.
 - (b) Clean washed wound with betadine solution or 70% surgical spirit if available.
 - (c) Isolate the animal when possible on a secure leash or cage for observation, giving it food and water.
 - (d) Apply indigenous balm or herbal paste on the wound.
 - (e) Seek medical advice from a Western qualified doctor in general practice, private hospital or government hospital or MRI as soon as possible.

Answers to self-assessment questions

Question 1. All are false and dangerous beliefs. Barking dogs often bite, rabid dogs and cats do not fear water, and quiet animals may well be rabid. Eating pork, bacon, beef or other food items has no causal link with rabies; if the animal has rabies a bite can cause rabies whatever the victim eats or does not eat. Indigenous medicines cannot prevent rabies after a rabid animal bite.

Question 2. True (a), (c), (d) and (e). Pups can have rabies. In item (d) note well the words observable, "secure cage or leash", and "healthy and alive". Item (b) is false.

Question 3. True (a), (b), (c), and (e). Item (d) is false.

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