MEDICAL TREATMENT GUIDELINES

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Note: These guidelines are intended for use by staff in the Department of Medicine, EDH. Please email wilsondpk@gmail.com with comments and suggestions.
Section 1  APPROACH TO THE BREATHLESS PATIENT

Causes of breathlessness:

1. Pulmonary oedema
2. Status asthmaticus
3. Pneumonia, including atypical and Pneumocystis pneumonia
4. Infective exacerbation of COPD / bronchiectasis
5. Systemic inflammatory response syndrome (usually caused by sepsis)
6. Aspiration
7. Tension pneumothorax or massive pleural effusion
8. Pulmonary embolus
9. Pericardial tamponade
10. Anaemia
11. Acidosis - DKA / Renal failure / Lactic acidosis (d4T / ddI)
12. Hyper-ventilation (conversional disorder)

Causes of dyspnoea with a raised jugular venous pressure:

- Cardiogenic pulmonary oedema
- Cor pulmonale with infective exacerbation
- Pulmonary embolus
- Pericardial tamponade
- Renal failure with fluid overload (pulmonary oedema and / or metabolic acidosis)

Have a low threshold for cardiac ultrasound to rule out pericardial effusion (aspiration is easy and effective)

Initial management:

- Measure oxygen saturations in room air
- Oxygen by face mask - rapidly escalate to re-breather (FiO2 ~70%)
- Heart rate / respiratory rate / temperature / blood pressure
- Listen to chest
- Crackles / wheeze / decreased breath sounds / bronchial breathing
- If wheezing or silent chest - give nebulised beta 2 agonist and IV corticosteroids
- IV access – use external jugular if necessary - take blood culture
- Ceftriaxone or co-amoxiclav IV stat

Initial diagnostic work-up:

- Chest radiograph
  - Pulmonary oedema
  - Pneumothorax
  - Pneumonia
  - Pleural effusion

Arterial blood gases and acid / base

- Document the inspired O2 and guesstimate the A-a gradient (%FiO2 – PO2)
- Type 1 or Type 2 failure?
- Metabolic or respiratory acidosis?
- Respiratory alkalosis?

What does pulmonary oedema look like?

- Upper lobe blood diversion – increased vascular prominence
- Interstitial markings – Kerley lines (A / B / C) - example in Dr Wilson’s office
- Pleural effusion R > L
- Peri-hilar air-space opacification

Causes of pulmonary oedema:

The Big 3:

- Myocardial ischaemia – do ECG + Troponin
- Hypertensive emergency
- Valve disaster (infective endocarditis / aortic regurgitation or stenosis / mitral regurgitation or stenosis / thrombosed prosthesis)

Primary heart muscle disease (commonest)

- Thiamine deficiency
• Tachycardia induced
  Burnt out heart
• Any of above + infection / fluid overload

Immediate management of pulmonary oedema:
• Furosemide 40-80 mg IV - titrated to urine output
• Morphine 1 mg / mL - give 2 mL IV every 10 minutes
• Glyceryl trinitrate 0.5 mg sublingually - repeated
• Urinary catheter to measure urine output
• Treat the cause

Immediate treatment of status asthmaticus:
• Continuous nebulisation with fenoterol or salbutamol
• IV hydrocortisone 200 mg every 6 hours or methylprednisolone 125 mg daily - switch to prednisone 40 mg daily when improving
• Add nebulised ipratropium every 6 hours
• IV MgSO4 2g 6 hourly if no response within 2 hours
• If no response within 4 hours - move patient to ICU - start aminophyline or salbutamol infusion
• Adrenalin 0.3 mL SC if desperate

When stable and mobilizing - switch to
• Inhaled salbutamol MDI - show how to use a spacer (can be made from a 500 mL or 1 L cooldrink bottle)
• Inhaled budesonide / formotorol if subjective benefit
• Try to organize a peak flow meter for the patient to use at home

All that wheezes is not asthma!
• COPD with infective exacerbation
• COPD with PE
• Cardiac asthma (pulmonary oedema on CXR)
• Foreign body / node compression / carcinoma

When to think of pneumonia?
• Fever / sweats
• Pleuritic pain
• Coughing (purulent sputum or blood)
• Air space opacification on CXR usually with crepitations or bronchial breathing on physical exam

When to think of PCP or other atypical pneumonias?
• Diffuse air-space opacification (classically ‘ground glass’) / reticulo-nodular infiltration
• Lower zone blood vessels ‘blurred away’
• Air bronchograms
• Increasing pulmonary density going down the vertebrae on the lateral X-ray

What is sepsis?
Response to specific inflammatory cytokines – invasive infection or trauma
• RR >20 or PCO2 <3.5
• Heart rate >90
• Temperature >38 or <35°C
• White cell count > 11 or <4 or left shift (band forms)
Severe sepsis
• Hypotension MAP <65 mmHg / confusional state / hyperlactaemia

Management of sepsis - see the section on Severe Sepsis

When to think of pulmonary embolism?
• High index of suspicion in the clinical setting of pregnancy, post-operative, DVT, malignancy, TB
• Tachypnoeic
• Hypoxaemic
• No obvious explanation on clinical exam and ‘normal’ CXR
• ECG - usually just shows tachycardia
• Take blood for D-dimer
• Start low molecular weight heparin (exoxaparin) 1mg/kg q12
Useful blood tests in a breathless patient:

- Blood gases (document the inspired oxygen concentration)
- Blood culture
- Urea and creatinine, ketones, lactate
- D-dimers
- Troponin
- Brain natriuretic peptide (not available yet)

When to think of mechanical ventilation:

- $\text{PO}_2 < 8.0 \text{ kPa} \text{ in re-breather oxygen mask}$
- Respiratory acidosis with $\text{pH} < 7.2$
- Patient becoming fatigued
- Decreased level of consciousness with impaired pharyngeal reflexes

Note that not all patients will be ICU candidates - if in doubt refer to intensivist or consultant for evaluation

Management of COPD / bronchiectasis:

Inpatient with acute infective exacerbation:

- Sputum bacterial culture and sensitivities
- Intravenous antibiotic - initially coamoxiclav or ceftriaxone with oral erythromycin - modify when culture results available
- Prednisone 40 mg orally daily
- Nebulizer with ipratropium and salbutamol or fenoterol every 2-6 hours
- Oxygen therapy nasal prong, 28%, or 40% or re-breather mask if oxygen saturations are low - do a blood gas after 1 hour to exclude carbon dioxide retention and respiratory acidosis
- Add intravenous or oral aminophyline / theophyline if the patient is tiring - monitor and correct potassium levels to prevent arrhythmias

Outpatient management:

- Vaccinate with annual influenza vaccine, and pneumococcal vaccine every 5 years
- Immediate initiation of treatment for bacterial LRTI at home - give a pack of amoxicillin 500 mg tds + coamoxiclav 625 mg tds + prednisone 40 mg daily for 5 days to keep in a safe place at home - advise to take if increasing shortness of breath with worsening cough, yellow sputum, pain when coughing - especially after a viral URTI
- Inhaled salbutamol MDI - show how to use a spacer (can be made from a 500 mL or 1 L cool drink bottle)
- Inhaled budesonide / formotorol if subjective benefit (should use objective improvement with FEV1/FVC if available)
- Oral theophyline if subjective benefit
- Physiotherapy for postural drainage - especially for bronchiectasis

Section 2  RESPIRATORY EMERGENCY

Considerations:

HIV-associated
- Severe community acquired pneumonia
- *Pneumocystis* pneumonia
- Tuberculosis
- Severe sepsis
- Lactic acidosis

Other
- Status asthmaticus
- Infective exacerbation of chronic obstructive pulmonary disease
- Pulmonary oedema
- Pulmonary embolus
- Pneumothorax

History
- Duration of symptoms
- Shortness of breath
- Productive cough and colour of sputum
- Pleuritic chest pain
- Fever and chills
- Weight loss and drenching night sweats
• Use of antiretrovirals (ARVs)

Clinical examination
• Respiratory rate, heart rate, blood pressure, peripheral perfusion, oxygen saturation in room air
• Use of accessory muscles, cyanosis, mental state
• Chest auscultation for breath sounds, wheezes or crepitations

Special investigations
• Chest radiograph
• Arterial blood gases in room air

Section 3 MANAGEMENT OF SEVERE HAEMOPTYSIS

Use the following emergency interventions:
− Set up a large bore intravenous cannula (green or grey) and resuscitate until the MAP is above 70 mmHg
− Give a stat dose of ceftriaxone or co-amoxiclav with gentamycin IV
− Give face mask oxygen and monitor the oxygen saturations
− Give morphine 3 mg IV (dilute 15 mg in 10 ml saline), repeated until the patient is calm and in less respiratory distress
− Arrange an urgent bedside CXR
− Prescribe anti-TB treatment after obtaining a specimen of coughed out blood/sputum for TB culture
− Prescribe regular antibiotic IV, diazepam and morphine or codeine (as a cough suppressant)
− Check on the patient frequently overnight
− If major bleeding persists arrange a transfer to Greys for embolization.

Causes of severe haemoptysis include:
− Tuberculosis
− Bronchiectasis or lung abscess
− Lung carcinoma
− Pulmonary oedema (especially with mitral stenosis)
− Pulmonary embolism
− Autoimmune diseases (Wegener’s granulomatosis, Goodpasture’s disease)

Section 4 SEVERE COMMUNITY-ACQUIRED PNEUMONIA

See Algorithm: Approach to the management of infiltrates on chest radiograph in patients diagnosed with LRTI

Severe pneumonia defined as any underlying co-morbidity (e.g. advanced HIV, diabetes), or multilobar disease, or confusion, or raised urea, or hypotension, or hypothermia

• Symptoms for few days
• Purulent sputum
• Pleuritic chest pain
• Localised crackles, bronchial breathing
• Areas of dense opacification on chest radiograph

Treatment:
• Intravenous amoxycillin-clavulanate 1.2 g 8 hourly, OR cefuroxime 1.5 g 8 hourly OR ceftriaxone 2.0 g daily WITH intravenous gentamycin 5-6 mg/kg daily AND oral erythromycin 1.0 g 6 hourly
• If not improving or critically ill (hypoxic, confused, hypotensive) consider treating for Pneumocystis pneumonia and tuberculosis
• Oxygen by face mask
• Intravenous fluids

Section 5 PNEUMOCYSTIS PNEUMONIA

• Severe shortness of breath
• Non-productive cough
• Diffuse (bilateral) interstitial opacification or “ground-glass” (alveolar) opacification on chest radiograph

Treatment:
• Cotrimoxazole 480 mg tablets - <60 kg 4 tablets three times daily; >60 kg 4 tablets four times daily.
• Add prednisone if oxygen saturations are <90% in room air - not on TB treatment 40 mg twice daily; on TB treatment 60 mg twice daily.
• Oxygen by facemask

Section 6  SEVERE SEPSIS

Defined as SIRS due to an infective cause:
• Pyrexia (≥38.5 °C) or hypothermia (<35 °C)
• Tachycardia (>90 bpm) and tachypnoea (RR >20 or P CO₂ <3.5)
• White cell count >11 or <4 or > 10% band forms (left shift)
• Usually signs of focal sepsis (e.g. pneumonia, urinary tract infection, cellulitis, meningitis, empyema, peritonitis, cholangitis, endocarditis, line sepsis, prosthesis infection)

With features of severity:
− Altered mental status
− Decreased perfusion (skin mottled, increased lactate, decreased urine output)
− Endothelial activation (hypotension, DIC, ARDS / acute lung injury)

NB. Sepsis with hypotension (MAP < 60 or <80 mmHg in known hypertensive) is called septic shock (due to vasodilation and decreased cardiac output) and needs urgent resuscitation to improve prognosis

Diagnosis and Treatment
• Admit to intensive care unit if possible or refer to regional level facility
• Check arterial blood gases, full blood count, differential, urea, creatinine, electrolytes, glucose
• Take blood culture, start intravenous ceftriaxone 2.0 g daily with gentamycin 5-6 mg/kg loading dose (continue if renal function and urine output normal)
• Insert urinary catheter and central venous line
• Give intravenous crystalloid until central venous pressure 12 – 15 cm water, then start adrenaline infusion (8 amps in 200 ml at 5 – 50 ml/hr) to maintain mean arterial pressure > 60 - 80 mmHg; add dobutamine (500 mg in 200 ml saline at 5 - 50 ml / hr) if need; and consider phenylephrine infusion (10 mg in 200 ml saline) if necessary under specialist supervision
• Add hydrocortisone 50 - 100 mg 8 hourly if MAP not responding to inotropes
• Consider continuous positive airway pressure (CPAP) or mechanical ventilation
• Transfuse with packed cells if the Hct is <0.3; measure the O₂ saturations of venous blood from the central line - adjust oxygen therapy / ventilation and MAP until % saturation is >70%
• Discuss case with a senior colleague

[Acknowledgement: John Patrick Reilly MD]

Section 7  INTUBATION OF MEDICAL PATIENTS

All medical staff should use the methods below in order to provide a uniform standard of care. Inexperienced staff should request assistance from a senior colleague or the intensivist on call.

The following equipment should be available:
1. Mask with reservoir bag attached to oxygen flowing at 10 L/min
2. Ambu-bag
3. Oral airway – appropriate size
4. Laryngoscope with blades of various sizes, new bulb and batteries
5. Endotracheal tube – appropriate size with cuff checked and tip lubricated
6. Introducer
7. Suction – with hard and soft catheters
8. Pulse oximeter
9. Cardiac monitor

The following drugs should be available:
1. Midazolam 15 mg
2. Etomidate 10 mg, thiopentone 500 mg, or propofol 200 mg
3. Suxamethonium 100 mg
4. Remicaine topical spray
5. 1% lignocaine

The patient should be prepared:
1. Counselling and reassurance
2. Breathing 100% oxygen through facemask with reservoir
3. Head supported on pillow
4. Stable and free-flowing intravenous access

All medications should be given into a free-flowing line, and close as possible to the intravenous cannula

Administration of short-acting intravenous anaesthetic drug - rapid sequence tracheal intubation in a patient with respiratory failure:
1. Premedicate midazolam 5 mg IVI (to reduce incidence of abnormal movements induced by etomidate)
2. Apply cricoid pressure
3. Give etomidate 10 mg intravenously over 5-10 seconds followed by suxamethonium* 100 mg
4. Perform orotracheal intubation as soon as patient becomes unresponsive
5. Reinsert oral airway to protect tube
6. Secure tube
7. If attempt fails re-insert oral airway, Ambu-bag patient with tightly fitting mask and request assistance

*Note: Suxamethonium should NOT be given if the serum potassium is abnormal - rather call the intensivist and give pancuronium with Ambubag support until the patient is fully paralysed

Section 8  LACTIC ACIDOSIS

- Patient taking ARVs especially women with BMI >28 and taking stavudine
- Shortness of breath, vomiting, abdominal pain, diarrhoea, weight loss
- Metabolic acidosis on arterial blood gases

Diagnosis and Treatment
- Check plasma electrolytes (including chloride), ALT, CK, amylase, lactate level (arterial or uncuffed venous blood into a grey-topped tube kept on ice)
- Stop ALL current ARVs
- If not vomiting and regimem included an NNRTI prescribe Aluvia 3 tablets 12 hourly (if on efavirenz) or Aluvia 2 tablets 12 hourly (if on nevirapine) for 7 - 10 days (to cover the NNRTI ‘tail’)
- If vomiting stop oral intake, and pass nasogastric tube for gaseous abdominal distension
- Give intravenous fluids
- Admit to ICU if possible
- If pH <7.1 give intravenous infusion of 4.2% sodium bicarbonate 200 ml hourly until pH >7.1
- Give intravenous vitamin B3 (riboflavin) 50 mg daily and vitamin B1 (thiamine) 100 mg daily
- Treat empirically for sepsis with a third generation cephalosporin e.g. ceftriaxone 2.0 g daily

Section 9  ADMISSION TO THE INTENSIVE CARE UNIT

Edendale runs a closed ICU for adult patients with 6 ventilated beds and 3 high care beds. This is not sufficient to be able to offer ICU care to all critically ill patients, and access to ICU is strictly controlled using the following principles
[acknowledgement Dr Von Rahden and Dr Farina]:

SEVERE ACUTE PHYSIOLOGICAL DERANGEMENT resulting from illness, injury or surgical procedure;
1.1.1.1. Having a high probability of mortality or significant morbidity if not treated.
1.1.1.2. Having a reasonable likelihood of being reversible if the ICU treatment modalities actually available at that time in the relevant institution are applied.
1.1.2.1. Patients with a severity of organ dysfunction or organ failure that is unlikely to be reversible using the available modalities of care should not routinely be admitted to ICU.

REASONABLE POTENTIAL FOR RETURN TO INDEPENDENT FUNCTIONAL EXISTENCE for a reasonable period of time if the acute physiological derangement is reversed
1.1.2.1. Patients with significant co-morbidities or chronic disease states that would preclude return to an independent functional state even if the severe acute physiological derangement is resolved should not routinely be considered for admission to GHIUC.
1.2. Patients being considered for major surgical procedures who are deemed to be at high risk of severe post-operative physiological derangement should be assessed for suitability for post-operative admission to ICU following the same principles outlined in 1.1.

1.3. Patients with significant medical conditions who are deemed to be at high risk for deterioration into a state of severe physiological derangement should be assessed for suitability for admission to ICU following the same principles outlined in 1.1.

1.4. Admission of a patient to ICU should NOT be considered if Intensive Care for that patient is, or is likely to be:

1.4.1. **Unnecessary:** the patient’s disease process is of too low a severity to require Intensive Care; the patient could be expected to recover adequately with the modalities of care that are available in the general wards.

1.4.2. **Unsuccessful:** the patient’s disease process is so severe or so advanced that the chances of recovery to a functional state, even with the application of optimal Intensive Care, are unacceptably poor.

1.4.3. **Unsafe:** risks of treatment outweigh the expected benefit

1.4.3.1. Intensive Care is associated with risk to the patient: as examples, the patient may be exposed to potential complications of invasive vascular access devices necessary for active physiological monitoring, or may be exposed to antibiotic-resistant bacteria which are more prevalent in the ICU environment than in the general wards

1.4.4. **Unkind:** an unacceptable quality of life for the patient results from admission

1.4.4.1. Adequate Intensive Care may cause significant unavoidable discomfort for patients during its application;

1.4.4.2. The application of Intensive Care may prevent death, but has the potential to allow the patient to survive in a chronic state of severe debilitation with low quality of life.

1.4.5. **Unwise:** resources are diverted away from patients who are more likely to derive significant benefit.

1.4.5.1. The current extremely limited capacity of local ICUs should be kept in mind.

Common reasons for referral of medical patients to ICU include:

- Respiratory distress that may require mechanical ventilation (i.e. RR >30 breaths per minute, oxygen saturation <92% in a rebreather mask)
- Acute coronary syndrome
- DKA or HONK
- Arrhythmias
- Acute renal failure requiring fluid management or peritoneal dialysis
- Reduced level of consciousness due to sepsis, overdose or encephalitis

The referral should following these steps

- Patients being referred to ICU should be discussed with the Registrar on call for ICU
- The ICU Registrar will assess the patient and make written notes
- The referral will be documented in the ICU referral log book
- If the patient is not accepted into ICU the case should be discussed with the ICU consultant and/or the medical consultant

Note that

- The patient remains the responsibility of the referring doctor until the patient arrives in ICU
- It is essential to commence emergency care while waiting for the ICU assessment
- It is courteous to offer to insert the central venous line or dialysis catheter if ICU is very busy and the resuscitation room is not busy

### MANAGEMENT OF HYPERKALAEMIA

1. Kexelate be prescribed for hyperkalaemia of >6.0 mmol/L documented on a blood sample taken less than 12-24 hours before the prescription.

2. Onset of action is usually after 3-4 hours.

3. An emergent ECG should be checked as soon as the diagnosis is made.

4. Calcium chloride or calcium gluconate 10 mL IV over 3 minutes, should be prescribed if ECG changes are present (e.g. peaked T waves, wide QRS, bradycardia, 1\textsuperscript{st} degree block)

5. If the potassium level is >7 mmol/L 10% dextrose 50 mL with 6-10 units insulin, furosemide 40 mg IV, and salbutamol nebuliser should be prescribed.

6. ACE inhibitors, ARBs and spironolactone should be discontinued.

7. Acidosis should be corrected and potassium levels rechecked prior before Kexelate is prescribed for hyperkalaemia associated with acidosis.

8. Follow up potassium levels should be taken 12 hourly until the potassium is <6.5 mmol/L, daily until the potassium is <6.0 and at least three times weekly while the patient is on Kexelate\textsuperscript{®} as an inpatient

9. Treatment with Kexelate is usually discontinued after 48 hours.

Dose: 15 – 30 g 6 hourly by mouth or 30 – 50 g 6 hourly rectally as retention enema (less effective)

### MANAGEMENT OF HYPOKALAEMIA

Potassium can replaced either orally or intravenously.
I. Emergent management of hypokalaemia

Notes:
1. Potassium supplementation is indicated if the serum potassium is less than 3.6 mmol/L.
2. Serum potassium should be supplemented with:
   - EITHER with 20 - 40 mmol intravenous potassium chloride (10 - 20 mL of 15% solution) diluted in 1000 mL normal saline infused over 2 hours
   - OR 20 - 40 mL oral potassium chloride 10% solution (13 mmol / 10 mL)
3. The intravenous route is indicated if the patient has very low serum potassium or is unable to take medication orally.
4. If the patient is fluid restricted the oral route is preferred.
5. Concentrated potassium chloride solution can be infused over two hours via a central venous line using a syringe driver in the intensive care setting.
6. Serum potassium should be re-checked every 6 to 24 hours while supplementation is in progress, determined by the rate of replacement.
7. The maximum total daily dose is 3 mmol / kg / d (approximately 400 mmol/d)

II. Long-term potassium supplementation

1. Potassium supplementation is indicated for patients taking potassium losing diuretics (e.g. furosemide).
2. Two - four tablets of oral Slow-K daily is effective.
3. Potassium supplementation should not be routinely prescribed if the patient is also taking a potassium-sparing agent (e.g. angiotensin converting enzyme inhibitors, angiotensin receptor blockers or spironolactone).
4. Serum potassium should be checked periodically for patients taking long-term potassium supplementation.

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Section 11 MANAGEMENT OF ABNORMAL GLUCOSE LEVELS

Always check the glucose reading in patients who:
- Give a history of being diabetic
- Give a history of fatigue, polyuria, polydipsia, blurred vision
- Are confused or comatose
- Are sweating or tremulous
- Are dehydrated
- Are septic (fever, tachycardia, tachypnoea, hypotension)
- Have ketones in the urine
- Are being admitted to the wards
- Are critically ill, including myocardial infarction and stroke

I. Emergent evaluation and management of hyperglycaemia

Indications for immediate admission:
- Ketonuria and venous or arterial blood pH <7.3 (if pH <7.2 the patient should be admitted to ICU)
- Decreased level of consciousness or seizures
- Postural hypotension, or dehydration (assessed on blood pressure, heart rate, JVP, urea to creatinine ratio, skin turgor)
- Vomiting

Why is the patient hyperglycaemic?
- Medications ran out
- Medication doses too low (should the patient be on insulin?)
- Infection such as pneumonia, urinary tract infection, cellulitis, diabetic foot, cholecystitis, diverticulitis
- Myocardial infarction (do an ECG!)
- Stroke

Initial treatment in the Resuscitation Room for patients who cannot be sent home:
- Set up a free-flowing intravenous line and run in 1000 mL of normal saline over 30 minutes (unless the patient is clinically fluid overloaded)
- Give insulin 10 u IV stat
- Take an urgent urea, creatinine, electrolytes, blood gases, full blood count and white cell differential
- Consider blood, urine or sputum cultures
- Do CXR and ECG
- If the patient is clinically septic give the first dose of an appropriate intravenous antibiotic immediately (usually either amoxycillin-clavulanate or cefuroxime or ceftriaxone)
Discuss further management with a senior doctor:
- Decide on the fluid regimen (usually about 6 L in the first 24 hours)
- Decide on the insulin regimen (usually a sliding scale or infusion - see policy)
- Decide on other treatment such as antibiotics, treatment for hypertension, heart failure
- Decide on admission

If you are unsure if the patient should be admitted:
- Treat with 3 L of intravenous fluids and two or three boluses of 5-10 units of intravenous insulin over about 6 hours
- Reassess using the guidelines below to decide if the patient can go home

When can the hyperglycaemic patient be sent home?
- Able to walk and is able to eat and drink
- Is not dehydrated
- Has not had a myocardial infarction or stroke
- Medications have been prescribed and doses adjusted if necessary

II. Assessment and management of hypoglycaemia

Suspect hypoglycaemia in any patient who:
- Is not mentating clearly (decreased level of consciousness, confusional state)
- Is having seizures
- Is clinically septic (fever, tachycardia, tachypnoea, hypotension)
- Is sweating and agitated
- Gives a history of being diabetic

Treatment:
- Set up an intravenous line and give 50 mL 50% dextrose over 5 minutes, followed by a dextrose infusion
- If you cannot find a vein immediately - give glucagon 1 mg deep IM, pass an NG tube and give 50 mL 50% dextrose down the tube
- Ask a senior doctor to set up an external jugular line or central venous line

Find out why the patient is hypoglycaemic:
- Taking diabetic medications and not eating due to an intercurrent illness
- Taking diabetic medications and has gone into renal failure
- Use of herbal medications
- Sepsis
- Malaria
- Alcohol binge (give 100 mg thiamine IV stat to prevent Wernicke's encephalopathy)
- Liver failure (look for jaundice, foetor, flap, prolonged INR)
- Adrenal failure (Addisonian crisis)

Discuss the further management plan with your senior colleague

Section 12 MANAGEMENT OF ABNORMAL BLOOD PRESSURE

I. Hypertension

Hypertension can be considered as:
- Non-urgent - patient is asymptomatic
- Hypertensive urgency - SBP ≥200 mmHg
- Hypertensive emergency - encephalopathy, left ventricular failure, ischaemic chest pain, oliguria / acute renal failure, aortic dissection

Indication for immediate admission:
- Hypertensive emergency

Note: Hypertensive urgency that is not complicated by heart failure or stroke should be admitted only if beds are readily available.

Management of hypertensive emergency:
1. Has the patient taken medications within the past 12 hours? - if not give stat dose of HCTZ 25 mg, enalapril 5-10 mg and amlodipine 5-10 mg either orally or by NG tube
2. Give captopril 12.5 mg or glyceryl trinitrate sublingually, repeat as needed
3. If in left ventricular failure / pulmonary oedema give furosemide 40-80 mg IV and start a Tridil infusion 50 mg in 200 mL Plasmalyte B at 20 - 60 mL / hr
4. If not in left ventricular failure or asthmatic give labetalol 200 mg in 200 mL at 60 - 120 mL per hour
5. Admit to ICU or HCU

Management of hypertensive urgency:
1. Has the patient taken medications within the past 12 hours? - if not give stat dose of enalapril 5-10 mg, amlodipine 5-10 mg, HCTZ 25 mg with or without atenolol 100 mg either orally or by NG tube
2. If patient does not need admission - discontinue the patient with a prescription of at least 3 antihypertensive drugs (if defaulted treatment) or on higher doses of / more antihypertensive drugs (if taking therapy) - use ACEI + CCB + diuretic + beta blocker + hydralazine or methyl-dopa
3. Counsel on the importance of adherence to therapy
4. Make an appointment for review at MOPD or Special Clinic

Management of non-urgent hypertension:
1. Has the patient taken medications within the past 12 hours? - if not give stat dose of enalapril 5-10 mg, amlodipine 5-10 mg, HCTZ 25 mg with or without atenolol 100 mg either orally or by NG tube
2. Discharge the patient with a prescription of at least 3 antihypertensive drugs (if defaulted treatment) or on higher doses of / more antihypertensive drugs (if taking therapy) - use diuretic + ACEI + CCB + beta blocker + hydralazine or methyl-dopa

II. Hypotension

Hypotension is defined as mean arterial pressure (MAP) <65 mmHg or as renal / cerebral underperfusion.

The commonest causes of hypotension in the Resuscitation and Admission Rooms are:
- Dehydration (gastroenteritis or uncontrolled diabetes)
- Septic shock

Other important causes:
- Myocardial infarction
- Tachycardia or bradycardia (arrhythmias)
- Pulmonary embolism
- Pericardial tamponade
- End-stage cardiac failure
- Tension pneumothorax
- Massive gastrointestinal bleed
- Medication overdose

Immediate management:
- If JVP is low - give 500 mL normal saline stat followed by 1000 mL normal saline over 30 minutes repeated twice
- If JVP is raised consider starting inotropes (dobutamine, dopamine or adrenalin)
- Consider admission to ICU (not if patient has severe irreversible disease such as congestive cardiac failure, cor pulmonale, or AIDS not on ARVs)

Section 13 APPROACH TO INABILITY TO WALK OR FREQUENT FALLS

[A.K.A. ‘gone off leg’ or ‘loss of power and strength’]

Patients frequently present with a history of being unable to walk, or (especially in the elderly) having frequent falls. The approach is to take a careful history of the onset of the problem (hours, days, weeks, months) and to do a focused physical examination. These are the causes you need to think of:

I. Problem with the legs:
- Weakness
  - Hemiplegia* (stroke) / Paraplegia (cord problem - ask about bladder and bowel function, and look for sensory level) / Proximal* (myopathy) / Distal (peripheral neuropathy)
- Pain
  - Arthritis (pain on passive movement: inflamed joint or osteoarthritis - remember to examine the hips) / Hip fracture (in the elderly) / Peripheral neuropathy
- Problems with gait
  - Ataxia (usually cerebellar - look for nystagmus) / Parkinson’s disease (look for cogwheel rigidity and tremor) / Loss of proprioception (examine joint position sense in the big toe) / Any of the above

NB: Always ask the patient to try and walk for you so you can examine the gait
II. Systemic cause

- General debilitation (a.k.a. frailty, wasting or emaciation [See approach to weight loss])
  Often due to HIV infection, tuberculosis, diabetes or cancer

- Infection
  Acute bacterial infection (e.g. pneumonia, meningitis, pyelonephritis) / tuberculosis / severe viral infection (influenza, HIV seroconversion)

- Postural hypotension (ask about visual ‘grey out’ when standing up and check BP lying and standing)
  Postural hypotension / myocardial infarction / septic shock / congestive cardiac failure / severe regurgitation (aortic or mitral regurgitation - infection or rupture) / aortic stenosis / heart block / episodes of tachyarrhythmia (ask about palpitations)

- Decreased cardiac output (ask about dyspnoea and ‘grey outs’ - always do an ECG)
  Pulmonary embolism / myocardial infarction / septic shock / congestive cardiac failure / severe regurgitation (aortic or mitral regurgitation - infection or rupture) / aortic stenosis / heart block / episodes of tachyarrhythmia (ask about palpitations)

- Anaemia
  Large gastrointestinal bleed / anaemia of chronic disorders (usually with bone marrow infiltration e.g. tuberculosis) / iron deficiency, B12 or folate deficiency / haemolysis* (check bilirubin, LDH, reticulocyte count, smear for red cell fragments)

- Biochemical abnormalities*
  Hypokalaemia / hyperglycaemia / hypoglycaemia / lactic acidosis (on ARVs)

- Central nervous system
  Large gastrointestinal bleed / anaemia of chronic disorders (usually with bone marrow infiltration e.g. tuberculosis) / iron deficiency, B12 or folate deficiency / haemolysis* (check bilirubin, LDH, reticulocyte count, smear for red cell fragments)

  - Delirium
    See the approach to delirium

  - Psychiatric conditions
    Depression / conversional disorder

- Vertigo (ask about sensation of room rotating, look for nystagmus)
  Inner ear / brain stem TIA

Common or life-threatening causes are underlined

*Rare causes:
  Leg weakness: Hemiplegia (Brown-Sequard) / Proximal (diabetic amyatropy)
  Electrolyte abnormalities: also think of hypophosphataemia, hypomagnesaemia, hypercalcaemia
  Haemolysis: Thrombotic thrombocytopaenia purpura, disseminated intravascular coagulopathy

Basic investigations for systemic causes for inability to walk

- Heart rate / blood pressure / respiratory rate / temperature
- Oxygen saturations
- Finger prick glucose
- Urine dipstick
- Chest x-ray
- ECG (if chest pain; or heart rate <60 or >110)
- FBC and white cell differential
- Urea, creatinine, electrolytes, ALT, GGT, bilirubin
- Arterial or venous blood gas and lactate
Patients with psychosis tend to have auditory hallucinations and to remain orientated, although they can also have superimposed delirium (for example from substance abuse used to ‘self-medicate’). Agitation and disturbed behaviour can be very troublesome. Delirium needs to be excluded and the psychotic symptoms then need to be treated with the lowest possible dose of neuroleptic, in order to prevent side effects.

Depression is very common, and the diagnosis is often missed. Tearfulness, diminished interaction with family and nursing staff, lethargy and appetite changes are clues to the diagnosis. It is important to ask directly for suicidal ideation: ‘Are you feeling so sad that you keep thinking you do not want to carry on living?’ Treatment with tricyclic antidepressants or serotonin inhibitors is effective, but initial doses need to be low to prevent side effects.

### Sedation of aggressive and agitated patients

See the flow chart at the end of this document for the management of aggressive and agitated patients.

1. **Offer sedation to patient:** If accepted document this in notes. Consider offering oral sedation if appropriate.
2. **If sedation is refused, sedate patient after gathering sufficient information to complete one MHCA 04 form, two MHCA 05 forms and one MHCA 07 form.** Ensure these forms are completed as soon as possible.
3. **If parenteral sedation needs to be given and patient is unable to cooperate:**
   - Call 6 assistants:
     - **CALL SECURITY MAIN GATE:** EXTENSION 4092
     - Five security guards – one for each limb and one for head/shoulders
     - One doctor/nurse to assist with administering sedation
   - **Give the following medications:**
     - a. Lorazepam 4 – 12 mg IVI / IMI
     - b. Haloperidol 10 – 30 mg IVI / IMI and/or clothiapine 80 - 160 mg IVI / IMI
4. **Ensure that the Resuscitation Trolley is close at hand, and place the patient in the recovery position to prevent aspiration.** Respiratory depression from the combination of neuroleptic drugs and benzodiazepines is very rare.
5. **Repeat the doses** of haloperidol and lorazepam at 15 – 30 minute intervals until the patient is fully sedated.
6. **Ensure that the patient is fully sedated so that the functioning of the ward is not disrupted.** Remember that agitated patients may rapidly metabolize medications due to enzyme induction from recreational drugs, and will have high levels of sympathetic nervous system activation. In order to counteract these effects much higher doses of sedating medications are needed.
7. **Ensure that patient is fully sedated so that restraints are unnecessary (it’s OK to use boxing gloves to prevent the patient pulling out the drip).**
8. **If the patient was violent at the time of presentation prescribe Clopixol Acuphase 50 – 200 mg IMI stat, which has an effect for up to 72 hours.**
9. **Prescribe maintenance sedation with lorazepam (5 – 15 mg) and haloperidol (2- 8 mg) to be given 3 – 6 hourly in order to ensure that the patient is sufficiently sedated so that the functioning of the ward is not disrupted.**
10. **Vital signs should be monitored 2 – 6 hourly depending on the patient’s level of sedation, and should be prescribed on the Department of Medicine Communication Chart.**
11. **Sedation should not be stopped until the ward doctor has reassessed the patient.**
12. **Hydration and nutritional status should be regularly assessed and fluids and feeds provided accordingly.** Prescribe thiamine 100 mg daily IV or PO

Patients should be triaged and managed in Medical Admissions or the Resuscitation Room by the most senior doctor present.

Patients can be admitted under four different circumstances:
1. **Voluntary:** the patient agrees to admission for assessment and sedation
2. **Assisted:** the patient does not agree to admission but a family member is able agree to admission. Forms **MHCA 04** (signed by any family member) and two **MHCA 05** (signed by the admitting doctor and another healthcare worker who need not be a doctor) and **MHCA 07** must be completed at the time of admission.
3. **Involuntary:** the patient does not agree to admission and is sedated for the safety of him/herself and the community. Forms **MHCA 01, MHCA 04** (signed by any healthcare professional) and two **MHCA 05** (signed by the admitting doctor and another healthcare worker who need not be a doctor) and **MHCA 07** must be completed at the time of admission. **Add MHCA 22** if the patient is brought in by the police - do not let the police leave until this form is signed!
   - The ward doctor must complete form **MHCA 06** after 72 hours and **MHCA 03** at the time of discharge.
4. **Emergency:** the patient requires immediate specialised psychiatric care and is transferred to Town Hill Hospital after discussion with the psychiatrist on call. Complete forms **MHCA 01, 04, 05** (signed by two healthcare workers), **07, 06** and **11**.

**Note that:**

The purpose of the 72-hour observation period is to rule out a medical cause for altered mental status (General Medical Cause). A medical cause for change in mental status can be ruled out using the observations listed in Step 3 in the Flow Chart. A 72-hour observation period may not be necessary if the patient has previously received a psychiatric diagnosis, and is presenting with a relapse of symptoms [MHCA Chapter 5, Sec. 34, Point (4) (a)].
A patient can be transferred directly to either Fort Napier Hospital or Town Hill Hospital if the following conditions are met:

1/ The patient presents with disordered behaviour, and history is obtained from a credible source (e.g. family member, neighbour) that this patient's behaviour has been similarly disordered in the past, and has received treatment from Fort Napier or Town Hill Hospital, and has relapsed (with or without non-adherence to therapy).

2/ An expedited medical work-up is negative (Clinical: vital signs stable; cardiorespiratory and abdominal exam normal; no meningism or focal neurological signs; no significant injuries. Laboratory: FBC, white cell diff; urea, electrolytes, ALT, INR; CXR and CSF [if indicated: see Lumbar Puncture Policy] are normal).

3/ An adequate description of the patient's behavioural disturbance (both from collateral history and direct observation) has been documented prior to sedation.

4/ The patient has been discussed with and accepted by the registrar or medical officer on call at the psychiatric hospital.

Summary of the Mental Health Care Act Forms (Act No. 17 of 2002) [Acknowledgement: Dr Liz Thomson]

STEP 1 Friends/family to complete Application for Admission on Form 04, and the police on Form 22. MUST BE SIGNED BY COMMISSIONER OF OATHS.

STEP 2 Person to be assessed by two (2) Mental Health Care Practitioners (MHCP) and examination and findings to be recorded on Form 05.

STEP 3 MHCP must submit Forms 04 and 05 to Head of Health Establishment (HHE).

STEP 4 HHE to decide on whether or not to provide further care and to give notice of consent to such care on Form 07.

STEP 5 Person can now be admitted/treated for 72-hours without his/her consent.

STEP 6 Person to be assessed every 24 hours for 72-hours.

STEP 7 Two MHCP re-assess person after 72-hours have elapsed and examination and findings recorded on Form 06.

STEP 8 MHCP submit Form 06 to HHE.

STEP 9 HHE decides whether person needs to be further treated as an outpatient (09), inpatient (08), or to be discharged (03) and gives notice to Review Board of same on forms depicted in parenthesis above.

STEP 10 If further treatment is required as an inpatient person must be transferred to a Psychiatric Hospital. HHE to complete Form 11.

Section 15 SERIOUS HEADACHE

Considerations:

HIV-associated
- Meningitis (bacterial, tuberculous and cryptococcal)
- Raised intracranial pressure (due to space-occupying lesion or meningitis)

Other
- Migraine
- Sub-arachnoid haemorrhage

Severe headache associated with fever or vomiting suggests meningitis - consider lumber puncture (See ‘Lumber Puncture Policy’). Tension headache and migraine can also be associated with vomiting, and infections such as malaria and influenza can also cause headache. Meningism (neck stiffness) is the essential clinical clue to the diagnosis of meningitis.

A CT scan of the brain should be performed before lumber puncture if the patient has:
- Papilloedema (if you need to dilate the pupils document this in the notes!)
- Focal neurological signs
- A decreased level of consciousness <13/15

Do not do the lumber puncture if the scan suggests raised intracranial pressure. Treat the patient with ceftriaxone 2 g daily and seek expert advice.

Section 16 INDICATIONS FOR LUMBER PUNCTURE AND MANAGEMENT OF CSF ABNORMALITIES

I. Identification of patients requiring lumbar puncture

Patients require lumber puncture if two or more of the following features are present:
1. Headache
2. Fever
3. Neck stiffness
4. Altered mental status (delirium or confusional state)

**OR:** Persisting headache in HIV-infected patients with CD4 count <100 to rule out cryptococcal meningitis, after clinically excluding chronic sinusitis.

### II. Contraindications to lumbar puncture

Lumbar puncture should not be performed if:
1. The patient is comatose and does not respond to voice or sternal rub (i.e. GCS <3/4; <5/6; <4/5)
2. Focal weakness is present (limbs or cranial nerves)
3. Papilloedema is identified by an experienced clinician

### III. Management of patients who cannot have lumbar puncture

If lumbar puncture is needed but is contraindicated the following steps should be taken:
- Prescribe ceftriaxone 2.0g IVI stat and dexamethasone 8 mg IVI stat, followed by ceftriaxone 2.0 g IV 12 hourly with dexamethasone 8 mg 8 hourly with IV fluids
- Arrange CT scan within 24 hours – lumbar puncture can be performed if there is no midline shift, no mass lesions and the basal cisterns (3rd and 4th ventricles) are patent

### IV. Lumbar puncture technique

1. Give morphine 10 - 15 mg IMI 30 minutes before procedure if patient is anxious or restless - add haloperidol 5 mg IMI for delirium
2. Position the patient in the left lateral position, with the spine fully flexed.
3. Locate the L4-5 or L5-S1 interspace, and mark the position over the interspinous ligament by gently indenting the skin with a pen-tip.
4. Sterile gloves should now be worn.
5. Clean the area with 10% povidone-iodine solution or 0.5% chlorhexidine solution in 70% alcohol, and infiltrate the skin with 1-2% lignocaine (using an insulin syringe).
6. Insert the lumbar-puncture needle through the interspinous ligament into the subarachnoid space (identified by a 'flash-back' of CSF into the needle hub).
7. Immediately measure the CSF opening pressure using a disposable manometer, held vertically with the '0 cm' mark level with the needle.
8. Collect the CSF into three sterile white-topped tubes tubes (labelled 1. 2. 3.):
   - 3 ml is sufficient for suspected bacterial meningitis;
   - 5 ml is required for the diagnosis of cryptococcal meningitis
   - 10 ml is required for the tuberculosis meningitis;
   - An additional 1 ml of CSF should be put into a grey-topped sodium fluoride tube, for glucose analysis.
9. Request chemistry, cell count, glucose, bacterial culture, cryptococcal agglutination test, India Ink stain , TB culture if TBM is suspected
10. Document capillary or plasma glucose immediately after procedure (for calculation of glucose ratio)

### V. Interpretation of CSF results

**Notes:**

CSF protein is frequently elevated to >2x normal in the setting of HIV infection associated with plasma hypergammaglobulinaemia

*Correction of WBC for RBCs
  \[ \text{Expected WBCs} = \frac{\text{WBC in blood} \times \text{RBC in CSF}}{\text{RBC in blood}} \]

*CSF protein will increase for 1mg (.01g) / 1000 RBC

### V. Management of common causes of meningitis

1. Patients cannot be discharged from MOPD or the wards until the CSF analysis has been discussed with a senior clinician.
2. If a diagnosis is not made with certainty on the first lumbar puncture the doctor has an absolute responsibility to repeat the lumbar puncture within 24-48 hours determined by the clinical state of the patient.

**Bacterial meningitis:**
- Ceftriaxone 2.0 g 12 hourly 7-14 days, with dexamethasone 8 mg 8 hourly IVI (first dose given before antibiotic) 4 days

**Cryptococcal meningitis:**

Treatment Guidelines and Policies, Department of Medicine, Edendale Hospital, Updated July 2010.
- Patient unable to walk: Amphotericin 0.7 mg/kg daily administered in 5% dextrose (see Amphotericin dilution policy) with normal saline 1000 ml 12 hourly with 20 mg KCl in each bag to maintain hydration (check urea, potassium and magnesium three times weekly) for 2 weeks or until patient ambulant
- After discontinuation of intravenous amphotericin: Fluconazole 400 mg daily for 8 weeks then 200 mg daily until CD4 >200 for 6 months
- Serial lumber puncture taking off 10-15 ml of fluid or reducing opening pressure to <20 cmH2O relieves symptoms and improves prognosis

**Tuberculous meningitis:**
- Rifafour/Rimstar according to weight with dexamethasone 8 mg tds for 7 days, then 6 mg tds for 7 days, then 4 mg tds for 7 days, then 2 mg tds for 7 days, then 2 mg bd for 28 days, decreasing by 1 mg per week. If oral dexamethasone is not available prednisone or dexamethasone can be substituted, at a starting dose of prednisone 80 mg bid or betamethasone 10 mg bid.

The following Table is a guide to the interpretation of CSF results:

<table>
<thead>
<tr>
<th></th>
<th>Cell count</th>
<th>Predominant cell type</th>
<th>Protein g/L</th>
<th>Glucose</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial</td>
<td>WBC 1000-5000</td>
<td>Neutrophils</td>
<td>1.0-2.5</td>
<td>Normal to raised</td>
<td>Gram stain positive, Herpes simplex PCR positive</td>
</tr>
<tr>
<td>Viral</td>
<td>WBC 50-1000</td>
<td>Lymphocytes</td>
<td>0.5 -2.0</td>
<td>Normal or slightly low</td>
<td></td>
</tr>
<tr>
<td>Cryptococcal</td>
<td>0-100</td>
<td>Lymphocytes</td>
<td>Normal to raised</td>
<td>Normal or low</td>
<td>India Ink, CLAT and culture positive</td>
</tr>
<tr>
<td>Tuberculous</td>
<td>&gt;25</td>
<td>Lymphocytes</td>
<td>1.0-10</td>
<td>Ratio &lt;0.5 or absolute &lt;1.9</td>
<td>Culture + &lt;40% of cases</td>
</tr>
<tr>
<td>Para-meningeal</td>
<td>WBC 50-200</td>
<td>Lymphocytes neutrophils</td>
<td>Normal</td>
<td>Normal</td>
<td>E.g. brain abscess</td>
</tr>
<tr>
<td>SAH*</td>
<td>RBC &gt;500</td>
<td>N/A</td>
<td>0.6 -1.5</td>
<td>Normal</td>
<td>Distinguish from traumatic</td>
</tr>
<tr>
<td>Normal</td>
<td>&lt;5</td>
<td>All lymphocytes</td>
<td>&lt;0.4</td>
<td>Ratio ≥0.5</td>
<td>Clear fluid</td>
</tr>
<tr>
<td>Normal HIV</td>
<td>&lt;10</td>
<td>All lymphocytes</td>
<td>&lt;1.0</td>
<td>Ratio ≥0.5</td>
<td>Clear fluid</td>
</tr>
</tbody>
</table>

**Section 17 BOOKING AND PREPARING PATIENTS FOR CT SCAN**

1/ Booking:
- The CT scan form should be completed in triplicate, and if contrast is to be given the informed consent form should be signed either by the patient or by the consultant.
- The urea / creatinine result should be documented on the form. Note that abnormal renal function increases the risk of contrast-induced nephropathy.
- Diabetic patients on metformin should switch to insulin sliding scale due to the risk of metformin-associated hyperlactaemia secondary to contrast-induced renal failure.
- Urgent scan requests should be discussed in person with the Radiologist.
- Routine inpatient requests should be left on the day of the request on the booking book in the CT scan suite: the radiographer will inform the ward 24-48 hours prior to the date of the scan.
2/ Preparations for the scan:

- Delirious patients should be sedated with midazolam 5-10 mg IVI and haloperidol 5 – 10 mg IVI when the porter arrives to transport the patient down to the CT scan suite. The doctor should be available.
- If contrast is to be given the intravenous catheter should be checked before the patient leaves the ward.
- Unconscious patients should have a nasogastric tube on drainage to prevent aspiration of stomach contents.
- Patients with a GCS of <7/15 should be considered for tracheal intubation if the scan is requested as an emergency procedure.

3/ Emergency scans:

Indications for emergency head scans for Internal Medicine are limited to:

- Presentations compatible with conditions requiring urgent neurosurgical intervention (e.g. suspected subarachnoid haemorrhage, cerebellar haematoma) and are surgical candidate (young, GCS 8-15/15, and no chronic severe co-morbidities). Patients with GCS 3-4/15 should be resuscitated (correct shock, hypoglycaemia and hypoxia) and re-evaluated before requesting a scan.
- Lumber puncture indicated but patient at risk of coning – see exert from Lumber Puncture Policy below.

Lumber puncture should not be performed if:
- The patient is comatose and does not respond to voice or sternal rub (i.e. GCS <3/4; <5/6; <4/5).
- Focal weakness is present (limbs or cranial nerves).
- Papilloedema is identified by an experienced clinician.

Management of patients who cannot have lumbar puncture:

a. Prescribe ceftriaxone 2,0g IVI stat, followed by ceftriaxone 2,0 g IV daily with IV fluids.

b. Arrange CT scan within 24 hours – lumber puncture can be performed if there is no midline shift, no mass lesions, no cerebral oedema and the basal cisterns (3rd and 4th ventricles) are patent.

Arranging urgent CT scans:

Urgent scan should be discussed personally with the radiologist. It is not acceptable to drop off the forms without prior verbal approval by the radiologist.

4/ Collection of scan results

The intern, registrar or PMO who requested the scan is responsible for collecting the result:
- Routine scan results should be collected within one working day.
- Emergency scan results should be discussed with the radiologist and collected within one hour.
- If neurosurgical intervention needs to be considered the scans should be faxed to IALH and discussed with the Neurosurgery Registrar on call.

Failure to collect scan results promptly jeopardises patient care and harms the Department’s reputation.

Section 18 DIAGNOSIS AND MANAGEMENT OF STATUS EPILEPTICUS

Status epilepticus is defined as:

EITHER: A series of seizures without full recovery of conscious between each seizure
OR: A seizure lasting for more than 30 minutes

Status epilepticus should be treated as a medical emergency using the procedure given below.

Note that:

1. The physical safety of the patient should be ensured by putting up sides on the trolley or bed.
2. Oxygen saturations should be checked and oxygen given by facemask.
3. Capillary blood (finger prick) glucose should be checked immediately.
4. Intravenous access should be obtained immediately with a 16 or 18 gauge intravenous cannula.
5. All intravenous anticonvulsant drugs should be given while normal saline is running in freely at the recommended rate.
6. Intravenous anticonvulsant drugs can be drawn up and prepared by a member of the nursing staff.
7. Intravenous anticonvulsant drugs should only be given by a doctor.
8. Intravenous phenytoin should not be diluted and should be given over 20 minutes EITHER by slow IV pushes [50 mg/minute] OR by intravenous infusion using a syringe driver.
9. Syringe drives can be loaned from 2R ICU / HCU

Refer to the algorithm at the end of this guideline.

Section 19 MANAGEMENT OF UNCONSCIOUS PATIENTS ('STROKE CARE PACK')

[Acknowledgement - Dr Linda De Villiers]

Patients with a decreased level of consciousness are unable to self-care and require detailed medical and nursing care. The general principles of care include:

Diagnosis of the underlying cause:
• Includes large strokes, intracranial bleeds, meningitis, toxoplasmosis, drug overdose and metabolic abnormalities (e.g. diabetic hyperosmolar coma, uraemia), hypertensive encephalopathy
• See the following policies - Management of altered mental status; Lumber puncture; CT scan

Treatment of underlying cause:
• Intracranial bleeds and hydrocephalus should be discussed with the neurosurgeons at IALH after the CT scans have been faxed
• Intracranial infections should be treated appropriately
• Metabolic abnormalities should be corrected
• Ensure that a nasogastric tube has been inserted so that medications can be given

Treatment of hypertension in stroke patients (infarct or bleed):
• If diastolic BP >120 mmHg begin antihypertensive treatment within 2 hours of admission. Lower the blood pressure to 140 diastolic in an infarct and 120 diastolic in a bleed using intravenous antihypertensive (e.g. glyceryl trinitrate), then by no more than 20 mmHg every 24 hours.
• If diastolic BP <120 mmHg start antihypertensive treatment after 24 hours
• Hydrochlorothiazide and enalapril are appropriate initial choices - add amlodipine if necessary
• If hypertension has been previously diagnosed, prescribe usual medications

Fluids and feeding:
• Stroke patients have impaired pharyngeal reflexes. However if patients are awake they can have the water swallow test on admission (see below) If patients are drowsy or swallow impaired start nasogastric feeds immediately (1500 mL feed and 1000 mL tap water daily). Only insert an intravenous line if IV drugs are needed.
• The patient should be catheterized and urine output measured to assist with fluid management
• Prescribe intravenous infusion of dextrose saline 80 - 120 mL / hr
• After 48 hours check for bowel sounds - if present start nasogastric feeding at 40 - 60 mL / hour, and reduce intravenous Infusion to 40 - 60 mL / hour
• When patient regains consciousness test swallowing reflex by syringe 10 mL of normal saline over the tongue onto the back of the pharynx using a soft intravenous cannula - if the patient swallows without choking it is safe to commence soft feeds

Prevention of complications:
• Nurse the patient 30° head-up to prevent aspiration
• Measure blood-pressure, heart rate, temperature, glucose and oxygen saturations every 6 hours
• Give oxygen by face mask to keep saturations above 90%
• Prescribe patients' usual diabetic medication and try to keep glucose in the 4 - 10 mmol/L range using short-acting insulin sliding scale
• Prevent DVT with pressure stockings (preferable if available) or subcutaneous heparin 5000 u subcut q12h
• Prescribe pressure care positioning
• Ask physiotherapists to prevent contractures

Response to fever:
• Look for pneumonia by counting respiratory rate RR>25 +/-, auscultating lungs, and arranging mobile unit chest radiograph - consider treating for aspiration pneumonia with ampicillin IV and metronidazole NG immediately
• Look for urinary tract infection by doing urine dipsticks for blood, protein, leucocytes, nitrates, and send for culture
• Check for drip-site sepsis
• Look for bed-sores
• Think of sinusitis and look for purulent nasal discharge
• Look for abdominal tenderness - think of pyelonephritis, cholecystitis, diverticulitis
• Consider lumber puncture
Many medical patients experience severe pain. Please take note of the following points:

- Lignocaine should be injected appropriately before arterial puncture, lumber puncture, central line insertion, intercostal drain insertion, or percutaneous biopsy
- Premedication with morphine should be given before elective procedures
- Appropriate initial analgesia for meningitis is morphine injections and ibuprofen with paracetamol - all given regularly
- Pleuritic or pericardial pain responds to ibuprofen or diclofenac with paracetamol/codeine
- Analgesia for an intercostals drain should include morphine for the first 48 hours
- Chronic pain should be treated according to WHO guidelines with paracetamol, ibuprofen, codeine or morphine (refer to the front pages of the SAMF)
- Oral morphine can be given as a solution (10 mg in 5 mL), or as 10 mg or 30 mg morphine sulphate tablets. Titrate up the morphine dose until pain is controlled. Note that morphine prescribed appropriately for pain is not addictive.
- Use adjuvant agents as appropriate (e.g. amitriptyline or gabapentin for neuropathy)
- Diclofenac and naproxen are available for patients not responding to ibuprofen, but requires a specialist signature.
- Junior staff should stop attempting a procedure if more than 3 passes have been unsuccessful - switching from a black hub needle to a pink/yellow hub (i.e. thicker needle) can be helpful

### Section 21  INITIAL PHARMACOLOGIC MANAGEMENT OF ST ELEVATION MYOCARDIAL INFARCTION (STEMI)

[Acknowledgement: Dr Kumar]

**Rationale:** To provide initial guidance regarding pharmacologic management of STEMI in the first 24 hours following symptom development. Treatment of post-STEMI cardiogenic shock, ventricular arrhythmias, and mechanical complications is not discussed here and should be guided by ACLS algorithms and institutional protocol.

**Diagnosis of STEMI:** Use clinical presentation + EKG findings. Cardiac biomarkers are *not* needed for diagnosis. Concerning EKG findings include:
1. ST segment elevation of 1mm or greater in 2 or more contiguous leads that are not believed to represent pericarditis or aneurysm
2. New left bundle branch block in the appropriate clinical setting

**Intervention Goals:**
1. Relief of ischemic pain
2. Hemodynamic assessment and correction of abnormalities
3. Initiation of reperfusion therapy
4. Anti-thrombotic therapy to prevent rethrombosis or sub-total stenosis

**Relief of Ischemic Pain:**
1. **Oxygen:** Supplemental oxygen to keep oxygen saturation > 90%
2. **Morphine:** Initial IV bolus of 2 to 4 mg. Rebolus 2 to 8 mg every 5 to 15 minutes as needed to relieve pain
3. **Nitrates:**
   - Treatment protocol
     i. Isordil 5mg SL every 5 mins up to 3 times
     ii. IV nitroglycerin if continued chest pain:
        1. Initiate at 5-10 micrograms/min
        2. BP Goal: 10% reduction in SBP in normotensive pts, 30% reduction in SBP in hypertensive pts.
   - **Contraindications** include SBP<90 mmHg, suspected RV infarction, hypertrophic cardiomyopathy, severe aortic stenosis, and recent intake of a phosphodiesterase inhibitor
4. **Beta Blockers:**
   - Treatment protocol
     i. Early oral atenolol or propranolol with goal HR ~60.
     ii. Avoid IV labetolol
   - **Contraindications** include active bronchospasm, severe bradycardia, high degree heart block, cardiogenic shock, and recent cocaine use

**Hemodynamic assessment and correction of abnormalities:** Treatment of post-STEMI cardiogenic shock, ventricular arrhythmias, and mechanical complications is not discussed here and should be guided by ACLS algorithms and institutional protocol.

**Initiation of Reperfusion Therapy with Streptokinase**
1. Considerations before thrombolysis
a. Greatest mortality benefit for patients presenting w/n 1 hr of symptom development, and benefit rapidly declines with time.
   b. Can expect mortality benefit of lysis up to 12 hrs after symptom development
   c. Can consider administration of lytic up to 24 hrs after symptom development in setting of continued chest pain and persistent ST elevations on ECG

2. Treatment protocol
   a. Dilute two 750,000 unit vials of streptokinase with 5 mL of D5W each
   b. Combine and add to 150 mL D5W
   c. Infuse over 60 mins
   d. Slow infusion if SBP declines by 25 mm Hg or more
   e. Monitor for signs of anaphylaxis or allergic reaction and terminate if concerning signs develop

3. **Absolute contraindications** include previous ICH, known structural cerebral vascular lesion, known malignant intracranial neoplasm, ischemic stroke within three months, suspected aortic dissection, active bleeding or bleeding diathesis, and significant closed-head or facial trauma w/in 3 months.

4. **Relative contraindications** include systolic blood pressure >180 mmHg and active peptic ulcer disease

**Anti-thrombotic therapy to prevent rethrombosis or sub-total stenosis**

1. **Aspirin**
   a. Treatment protocol
      i. Administer on presentation prior to ECG if moderate to high risk of acute coronary syndrome
      ii. Oral loading dose of 162mg to 325mg chewed
   b. **Contraindications** include hypersensitivity to aspirin, active bleeding, and severe uncontrolled hypertension

2. **Clopidogrel**
   a. Use as alternative to aspirin in patients with aspirin hypersensitivity
   b. Use in addition to aspirin in all patients with STEMI who do not have a contraindication
   c. Treatment protocol:
      i. 300mg loading dose + 75mg daily thereafter.
      ii. In patients >75 years old at high risk of ICH, consider withholding loading dose and starting at 75mg daily
   d. **Contraindications** include active bleeding and severe uncontrolled hypertension

3. **Low Molecular Weight Heparin (Enoxaparin)**
   a. Agent is strongly preferred to unfractionated heparin
   b. Use in all patients with STEMI who do not have a contraindication
   c. Treatment protocol
      i. Enoxaparin 30mg IV x 1 within 15 mins of thrombolysis
      ii. Enoxaparin 1mg/kg SC q12hrs
      iii. Adjust dose in patients >75 of age or with CrCl<30ml/min.
   d. **Contraindications** include active bleeding, acute renal failure, and history of heparin induced thrombocytopenia

**Adjunctive Therapy**

1. **Early ACE Inhibitor**
   a. Key target groups include those with an anterior MI, clinical evidence of heart failure, and known LV ejection fraction < 40%.
   b. Treatment protocol
      i. Initiate as early as possible following symptom onset
      ii. For captopril, start at 6.25mg q8hrs with titration to max 50mg q8hrs
      iii. For enalapril, start at 2.5mg daily with titration to max 20mg q12hrs
      iv. In needed, wean down IV nitroglycerin and diuretics in favor of ACE inhibition
   c. **Contraindications** include allergy to ACE inhibitors, renal failure, and SBP<90mm Hg
   d. Consider angiotensin receptor blocker (ARB) in setting of minor intolerance to ACE inhibitor. If using valsartan, start at 40mg q12hrs with titration to max 160mg q12hrs

2. **Early High Dose Statin**
   a. Initiate high dose treatment as early as possible during hospitalization
   b. Atorvastatin strongly preferred to Simvastatin
   c. Treatment protocol: Atorvastatin 80mg daily

---

**Section 22 INITIATION OF WARFARIN IN PATIENTS WITH ATRIAL FIBRILLATION**

<table>
<thead>
<tr>
<th>Score</th>
<th>Cardiac failure</th>
<th>Hypertension</th>
<th>Age &gt;75 yrs</th>
<th>Diabetes</th>
<th>Stroke / TIA</th>
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<td>1</td>
<td>1</td>
<td>1</td>
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<td>2</td>
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</tbody>
</table>

Score ≥2 - start warfarin

**NB.** All patients with valve lesions and atrial fibrillation should be considered for warfarin.

Treatment Guidelines and Policies, Department of Medicine, Edendale Hospital, Updated July 2010.
Social circumstances need to be investigated - if transport for regular INR checks is a major logistic barrier the risk of warfarin may outweigh the benefit.

Section 23 WARFARIN / INR GUIDELINES

Initiating Warfarin Therapy:

Treating current thrombosis:
- Start low molecular weight heparin (adjusted to dose) and warfarin at the same time
- Usual warfarin starting dose is 5 mg daily
- Consider using a higher dose if the patient is taking rifampicin (e.g. 7.5 mg or 10 mg daily)
- Repeat INR every 1 - 2 days

Initiating prophylaxis (e.g. for atrial fibrillation):
- There is no need to use heparin
- Start at 2.5 - 5 mg daily
- Repeat INR every 3 - 7 days
- Aim for INR of 2.0 - 3.0 within 4 weeks

Approximately five days are required for the antithrombotic effect of warfarin to take effect.

Follow-up of prolonged INR:

INR 4.5 - 6.0 - repeat in 1 week (outpatient)
INR > 6.1 - repeat daily

Dosage adjustments - see the algorithm at the end of this document.

Section 24 APPROACH TO SEVERE THROMBOCYTOPAENIA

Thrombocytopenia is common and evaluation can be approached in a structured manner:

Common causes:
- HIV infection
- Other viral illnesses
- Alcohol and other drugs
- DIC

Structured approach

Marrow failure (no megakaryocytes on the peripheral smear):
- HIV and other viruses
- Alcohol and other drugs
- Infiltration by infections and malignancies (TB, cryptococcus, lymphoma, leukaemia, myeloma, solid cancers [breast, bronchus, prostate])

Bone marrow biopsy is usually indicted to diagnose marrow infiltration

Increased consumption (megakaryocytes on the peripheral smear):
- Autoimmune (idiopathic) thrombocytopenia (ITP) - [INR and PTT normal; patient usually not anaemic unless bleeding or associated chronic disease]
- Disseminated intravascular coagulopathy (DIC) - [INR and PTT prolonged, with anaemia and red cell fragments on smear, raised LDH / bilirubin]
- Thrombotic thrombocytopenic purpura (TTP) - [INR and PTT normal, with anaemia and red cell fragments on smear, raised LDH / bilirubin] - associated fever, confusional state or focal signs, renal failure and non-blanching purpura.

Sequestration:
- Hypersplenism
Section 25  ANAEMIA AND PANCYTOPAENIA

Anaemia Considerations

HIV-associated
- Anaemia of chronic disorders (ACD)
- Malnutrition and vitamin deficiencies
- Bone marrow infiltration/aplasia (opportunistic infections and malignancies)
- Bone marrow toxicity (e.g. zidovudine, stavudine, co-trimoxazole)
- Haemolysis (G6PD deficiency and dapsone, thrombotic thrombocytopenic purpura [TTP], disseminated intravascular coagulopathy [DIC], autoimmune)
- Advanced HIV infection

Other
- Iron deficiency anaemia (e.g. gastrointestinal bleeding, post-partum)
- Malaria

Diagnosis and treatment
- Ask about diet, blood loss, drug history and constitutional symptoms (weight loss, drenching sweats, fevers and chills)
- Examine for purpuric rash, pallour, jaundice, hepatosplenomegaly and lymphadenopathy
- Obtain a chest radiograph if cough or constitutional symptoms present and check sputum smears for AFBs
- Request full blood count with differential, smear and reticulocyte count
- Check the MCV (raised implies folate/B12 deficiency or zidovudine/stavudine effect, lowered implies iron deficiency or ACD, normal suggests ACD or mixed nutritional deficiency)
- Check the platelet count and for red cell fragments (think about TTP and DIC)
- Check the reticulocyte count (low implies marrow aplasia or infiltration, raised suggests haemolysis or acute blood loss)
- ALWAYS CHECK IRON STUDIES AND B12 / FOLATE LEVELS BEFORE PRESCRIBING BLOOD TRANSFUSION OR HAEMATINICS
- Consider treating for smear positive or smear negative tuberculosis
- If patient is acutely ill and tuberculosis does not seem likely, refer for bone marrow biopsy and sepsis screen
- If patient is not acutely ill treat with iron sulphate, vitamin C, folate and (intramuscular) vitamin B12
- Repeat blood count in one month and review clinical status (as above)
- If bone marrow suppression is thought to be due to zidovudine or stavudine get expert advice

Pancytopaenia Consideration:

Apparent pancytopaenia is common in patients with advance HIV infection due to ACD (low haemoglobin), HIV-induced thrombocytopenia (low platelet count), and HIV-induced low CD4 count with or without neutropaenia (low white cell count). These abnormalities will usually correct with antiretroviral therapy, and bone marrow biopsy and iron/B12/folate levels are usually not helpful and are a waste of scarce resources.

Only referral for investigation if:
- The patient is bleeding or has a haemoglobin of <5g/dL AND is a candidate for antiretroviral therapy OR
- The haemoglobin if falling by >1 g/dL per week OR
- There is a petichial rash or bleeding OR
- There is bone pain

Section 26  USE OF BLOOD PRODUCTS BY MEDICAL PATIENTS

The intention of this policy is to rationalise the use of costly blood products by medical patients

Packed cell transfusion
- Actively bleeding patients (haemoptysis, haematemesis and bleeding per rectum) are to be transfused to haemoglobin of >8 g/L
- Patients with symptomatic anaemia and haemoglobin of <6 g/dL, and who are not actively bleeding, are to be transfused 2 units AFTER blood tests have been taken for iron studies, folate, B12, reticulocyte count
- Patients with advanced HIV disease who are terminally ill (confirmed by a senior doctor) should receive palliative care but should not be transfused

Blood specimens for cross-match should be:
- Sent to Main Theatre during the day
Sent to the 4th Floor Control Room after hours

Note that a Blood Bank is being installed at Edendale.

Transfusion of freeze dried plasma (FDP)

- Use of this product is restricted to patients with an INR of >4.0 who are actively bleeding - Hemosolvex is a less expensive alternative for warfarin toxicity
- Vitamin K should only be given in accordance with the anticoagulation policy (see sections 23 and 45)

Platelet transfusion

- One random donor pooled platelets (megaunit) platelet pack should be given to actively bleeding patients with a platelet count of <10 x10^{12} /L

### Section 27  APPROACH TO WEIGHT LOSS

Many patients admitted to the medical wards have been loosing weight to the point of emaciation. Most of these patients will have AIDS and/or TB, but it is important to have a structured approach to weight loss in order not to miss other diagnoses.

Decreased food intake:
- Poverty
- Psychiatric conditions: depression, anxiety, anorexia nervosa
- Oral pain (have a look in the mouth)
- Odynophagia / dysphagia: oesophageal thrush, oesophageal reflux, oesophageal cancers or CMV
- Mesenteric angina

Gastric problems:
- Peptic ulcer disease
- Gastric carcinoma or lymphoma

Digestive problems:
- Chronic pancreatitis (do an abdominal x-ray looking for calcification)

Malabsorption / small bowel disease (usually associated with diarrhoea):
- HIV enteropathy and intestinal parasites (cryptosporidium, microsporidium, isospora, giardiasis)
- Inflammatory bowel disease
- Tropical sprue / Coeliac disease / Whipples disease

Chronic infections:
- HIV and TB
- Bronchiectasis / lung abscess
- Brucellosis / typhoid
- Hepatitis B or C

Cancers
- Any invasive disease

Endocrine disorders
- Thyrotoxicosis
- Type 1 diabetes mellitus
- Addison's disease

Chronic system disease
- Chronic obstructive lung disease
- Congestive cardiac failure (cardiac cachexia)
- Chronic liver disease
- Chronic renal failure

Protein loosing states:
- Nephrotic syndrome / protein loosing enteropathy / severe burns or Steven’s Johnson syndrome

Acute illness (e.g. pneumonia) - often causes weight loss, but this is usually regained within 8 weeks
Section 28  
ABDOMINAL PAIN (ON ARVs)

Considerations:

- Lactic acidosis
- Pancreatitis
- Hepatitis

Diagnosis and Treatment

- As for lactic acidosis (see above)
- Also check bilirubin and INR if there is a tender hepatomegaly (see jaundice below)
- If diagnosis is pancreatitis treat with intravenous fluids, intramuscular pethidine, nasogastric drainage and regular clinical review

See ‘Diagnosis and Management of Hyperlactaemia in Resource-Limited Settings Policy’

Section 29  
JAUNDICE

Considerations:

HIV-related

- Drug induced hepatitis (nevirapine or antituberculous therapy)
- Unconjugated hyperbilirubinaemia due to protease inhibitors
- HIV cholangiopathy

Other

- Alcohol
- Viral hepatitis
- Obstructive jaundice with dilated intrahepatic ducts (often due lymphadenopathy in the porta hepatitis)

Diagnosis and treatment

- Stop all hepatotoxic drugs (if patient on nevirapine stop the NRTIs 2 days later)
- Ask about alcohol use
- Examine for hepatosplenomegaly, flapping tremour and hepatic foetor
- Check hepatitis A and B virus serology, bilirubin, ALT, INR, glucose, urea, creatinine, electrolytes
- Give intravenous 10% dextrose if patient unable to take orally
- Check biochemistry and INR daily until improving
- If level of consciousness deteriorates or if hepatitis is due to antituberculous medication* get expert advice
- If hepatitis due to nevirapine*, restart antiretroviral therapy with 2 NRTIs and efavirenz when ALT normal

[*Note nevirapine induced hepatitis occurs during the first 8 weeks of treatment. Hepatitis due to antituberculous therapy can occur at any time during treatment]*

Section 30  
ODYNOPHAGIA

Considerations:

HIV-related

- Oesophageal thrush
- Oesophageal apthous ulceration
- Herpes simplex or cytomegaloviral oesophageal ulceration
- Oesophageal Kaposi’s sarcoma

Other

- Reflux oesphagitis
- Oesophageal stricture or malignancy

Diagnosis and treatment

- Examine the mouth and pharynx
- Consider fluconazole 200 mg daily for 2 weeks, especially if there is oral or pharyngeal thrush
- If no response, request barium swallow or endoscopy (preferable)
- Single deep ulcer (biopsy shows chronic inflammation only) usually due apthous ulceration
• Treat with prednisone 30 mg daily for 2 weeks
• Multiple superficial ulcers usually due Herpes simplex or cytomegalovirus
• Try to obtain histological diagnosis
• Consider intravenous aciclovir or ganciclovir (difficult to access in the State sector)
• Multiple superficially filling defects usually due to thrush (best diagnosed with endoscopy)
• Consider fluconazole resistance and treat with intravenous amphotericin B

Section 31   DIARRHOEA / DEHYDRATION

Considerations:

HIV-associated

• Advanced HIV infection with coccidian parasite infestation
• Due to ARVs (e.g. didanosine and lopinavir/ritonavir)
• Lactic acidosis (unusual)
• Cytomegaloviral colitis (rare)

Other

• Food poisoning (e.g. toga virus)
• Dysentery
• Cholera
• Amoebiasis
• Malabsorption and inflammatory bowel disease (rare)

Diagnosis and Treatment

Acute onset

• Measure blood pressure lying and standing (if patient not too ill): postural drop of >10 mmHg absolute indication for intravenous fluids
• Exclude peritonism
• Check urea, creatinine, electrolytes, blood gases, lactate (if on ARVs)
• Check stool for blood, mucous and white cells: if present give ceftriaxone 2,0 g IV daily and metronidazole 400 mg 8 hourly
• Replace fluid and electrolyte losses
• Treat nausea with metocolpmamide and give loperamide two tablets 6 hourly

Chronic HIV-associated diarrhoea

• Measure blood pressure lying and standing (if patient not too ill): postural drop of >10 mmHg absolute indication for intravenous fluids
• Exclude peritonism
• Check urea, creatinine, electrolytes, blood gases, lactate (if on ARVs)
• Replace fluid and electrolyte losses
• Treat nausea and give loperamide or codeine or morphine oral solution 6 hourly to control diarrhoea
• Treat empirically for Giardiasis and Isospoiasis with metronidazole 400 mg tds for 5 days and cotrimoxazole 480 mg tablets 4 tablets 12 hourly for 2-4 weeks followed by 2 tablets daily

If not on ARVs:
Refer to ARV program if final diagnosis is HIV wasting syndrome

If on ARVs:
Exclude lactic acidosis (see above)
Consider switching ARVs if diarrhoea clearly related to drugs (get expert advice)

Section 32   APPROACH TO VOMITING

Vomiting is a very common symptom and can be due to life-threatening conditions.

I. Gastrointestinal causes

− Viral gastroenteritis / food poisoning / HIV-associated enteropathy (ask about watery diarrhoea and cramping)
− Peptic ulcer disease / gastritis / reflux oesophagitis (ask about epigastric pain)
Small bowel obstruction (look for gaseous abdominal detention)

II. Large organ causes

- Myocardial infarction (chest pain, check ECG and cardiac panel [creatine kinase / myoglobin / troponin])
- Acute pancreatitis (abdominal pain, check amylase or lipase)
- Acute hepatitis (check ALT)
- Cholecystitis (Murphy’s sign)
- Pyelonephritis / renal colic (dipstick)
- Pregnancy (urine pregnancy test)

III. Central nervous system causes

- Meningitis (headache and fever)
- Raised intracranial pressure (headache and decreased level of consciousness)
- Labyrinthitis / brain stem TIA (ask about vertigo)

IV. Systemic causes

- Sepsis (any site)
- Malaria (travel history, fever, low platelet count)
- Drug side-effects (e.g. co-amoxiclav, TB medications, digoxin)

Section 33 RENAL FAILURE

[Acknowledgement Dr Neil Collenge]

Urea and creatinine are routinely measured during inpatient and outpatient evaluation of medical patients and are frequently abnormal. Diagnosis and management needs to be timely and rational. Don't hesitate to get expert advice.

Urine dipstick analysis is essential. Check the urea, creatinine, potassium and bicarbonate regularly (daily if needed) until the situation has stabilised.

A patient identified with abnormal renal functions for the first time could have:

- Acute renal failure
- Chronic renal failure
- Acute on chronic renal failure

Patients with chronic renal failure often have an acute deterioration in renal function after a relatively minor acute insult, such as a urinary tract infection. (An analogy is patients with underlying dementia being more vulnerable to delirium)

Many medical patients have underlying renal impairment due to common chronic medical conditions such as:

- HIV infection
- Diabetes mellitus
- Hypertension

Other less common causes of renal failure include:

- Reflux nephropathy
- Chronic glomerulonephritis or interstitial nephritis - infections (hepatitis B, C, syphilis) or autoimmune, or idiopathic

Common causes of acute renal failure include:

- Under-perfusion due to dehydration, hypotension from any cause ['pre-renal’ with urea elevation disproportional to the creatinine elevation]
- Sepsis (septic shock, DIC and microvasculopathy, AIN due to specific organisms [mycoplasma, Legionella])
- Fluid overload including CCF, cor pulmonale, and chronic liver disease with ascites
- Hypertensive emergency
- Medications including, NSAIDS, ACEI, antibiotics, TB treatment, amphotericin
- Urinary obstruction (prostatism, spinal shock, cervical cancer)

90% of diagnoses can be made on history including recent infections, rashes, joint pains/swelling, medications/ingestions, drugs and alcohol, family history. Consider rhabdomyolysis due to drugs and herbal medications (haeme positive dipstick but no blood on microscopy) - check the CK. Genitourinary TB should be considered especially in HIV+ patients - check for sterile pyuria and AFBs in the urine - and send a specimen for TB culture. In all nephrotic patients, especially those with HIV, who develop rapidly rising creatinine (often with flank pain), renal vein thrombosis should be considered before dismissing them as having HIVAN.

Initial treatment of acute renal failure:
Make the patient euvoletic and bring the blood pressure into an acceptable range
- Check the urine dipstick, send a specimen for culture - spin the urine and look for casts yourself
- Treat sepsis (e.g. pneumonia, diabetic foot)
- Stop nephrotoxic drugs
- Check for a clinically distended bladder - put in a Foley’s catheter and monitor urine output
- Arrange a renal ultrasound scan to check renal size and exclude hydronephrosis

Approach to deteriorating renal function in the ward:
- Optimise fluid status, blood pressure, glucose control, and treatment of infection
- Check again for nephrotoxic drugs - send urine for eosinophil staining for drug-induced AIN
- Make sure you’ve read the ultrasound scan result!
- Has the patient had a renal insult likely to cause ATN? (sepsis, hypotension, NSAIDS, aminoglycosides, hyperbilirubinaemia) - this can take weeks to recover
- If there is blood, protein and casts in the urine and ATN is unlikely consider rapidly progressive glomerular nephritis (RPGN) - take blood cultures and do an echo (IE), send away an ANCA and ANF, ask about haemoptysis (Goodpastures) - get an expert opinion on the need for methylprednisolone and renal biopsy

Dialysis is indicated for:
- Uraemic encephalopathy
- Severe metabolic acidosis
- Hyperkalaemia with ECG changes
- Pulmonary oedema
- Neuropathy
- Acute intoxication

Note that some patients may not be eligible for dialysis after expert evaluation

Section 33 PRESCRIBING FLUIDS, FEEDS AND MEDICATIONS

- Many medical patients are very ill and unable to eat or take oral medications. Therefore you will need to make use of:
  - **Intravenous fluids and medications**: ensure that the patient has a running intravenous line and that the fluids have been ordered on the communication chart. It is preferable (and cost effective) to prescribe once daily or twice daily intravenous medication (e.g. ceftriaxone 2.0g IV daily, furosemide 80mg IV 12 hourly).
  - **Nasogastric feeds and medications**: especially important for comatose patients (e.g. stroke or TB meningitis). Remember that TB therapy cannot be given IV and therefore must be given by NG tube if the patient cannot swallow. Nasogastric feeds should be prescribed.
  - **Subcutaneous fluids (hypodermoclysis)**: this technique is especially appropriate for frail patients (e.g. advanced HIV or geriatric) who are dehydrated but not shocked. An IV cannula is inserted under the skin parallel to the anterior abdominal wall and connected to an IV line. Up to 4 liters can be given daily: the fluid is rapidly absorbed into the lymphatic system and enters the circulation. Morphine and haloperidol can be added to the fluid for patients receiving palliative care. Other medications can be given IM or by NG tube.

Section 34 PALLIATIVE CARE PACK

Many patients admitted to the wards will be diagnosed with a terminal illness where medical care cannot be expected to improve the patient’s functional status (e.g. very advanced AIDS, stroke, cor pulmonale, biventricular failure, chronic renal failure, end stage liver disease)

Take the following steps:
- Examine the patient for features of pain (facial expression, restlessness, moaning) - if present prescribe morphine intramuscularly or orally (note that nursing shortages prohibit the use of PRN opiates) and increase the dose until the patient looks comfortable
- Consider adding haloperidol or diazepam / lorazepam if the patient looks fearful or anxious
- Treat specific symptoms (e.g. diarrhoea, oral pain, rash, bed sores)
- Discuss the prognosis with the patient’s family and tell then about Home Based Care
- Discuss initiating / continuing medical interventions with your consultant (e.g. ARVs, antibiotics)
The HIV epidemic has greatly increased the incidence of tuberculosis (TB) and complicated TB diagnosis: smear-negative pulmonary TB and extrapulmonary TB account for >80% of total case load at Edendale. The aim of this policy is to standardize the diagnosis and management of TB for the Department of Medicine.

TB Systems at Edendale:

Procedures for sputum AFB request differ slightly depending on whether the patient is in the wards or an outpatient. The sputa requested can be for culture (sent to IALH in Durban, taking up to 2 months for a result) or a smear (processed in our lab, turn around time of days varies).

Sputum samples are entered in a suspect register and patients with a positive result who are not on treatment and who do not return for results should be traced and requested to return.

*Please do NOT complete forms and send sputa except via the procedure outlined below. If the sample is not entered in a suspect register, there is no backup for those who do not return for positive results.*

Other samples (e.g. Pleural fluid, pus etc) are sent by the doctor directly, who must make arrangements for follow up.

**Outpatient:**

- Write request in outpatient file (smear or culture) and send patient to TB Office
- Out of hours, give labelled sample bottles and request patient to cough night before and that morning and bring to TB Office

**Inpatient:**

- Complete TB warrior request form and leave outside iTEACH (5B2).
- Complete black dot sections of TB request form and leave in patients notes.
- Label 2 sample bottles and leave with patient.
- TB warriors will collect samples, deliver and document results in notes.

**Notifying TB:**

Outpatient: write diagnosis in outpatient file and send to TB Office. Meds and transfer will be arranged there.

Inpatients: request nurse (senior sister) to arrange for the patient to be taken to the TB Office.

In all cases, please specify the nature of TB in the outpatient notes.

ENSURE INPATIENTS ARE AWARE OF DIAGNOSIS AND HAVE A TRANSFER LETTER BEFORE LEAVING HOSPITAL!
(System may change during 2010 to an inpatient referral service to the TB Team for further management)

**A. Diagnosis of TB**

1. Patients who require admission and who are coughing productively should have 2 or more sputum specimens sent for AFB smears within 24 hours of admission.
2. Sputum induction using hypertonic saline and ultrasonic nebulization should be performed ideally within 24 hours of admission for all TB suspects with a non-productive cough [See Policy: Sputum collection and ultrasonic sputum induction]. To arrange nebulization call TB Office 4680 or 4663, or Coordinator Speed-dial 6299
3. Ambulant patients who do not require admission and who have been coughing for >2 weeks should be referred to their nearest Primary Health clinic for sputum smears for AFB, according to national guidelines.

**The ‘Cough Warriors’ [Inpatients]**

The ‘Cough Warriors’ are clinical auxiliaries who assist with delivery of TB specimens for AFB to the laboratory and return the results to the patients file. This service is done at the TB Office for outpatients.

**TB Cultures**

The results for all specimens sent for sputum culture are filed in the TB Office between the main entrance and the Staff Health clinic. Inpatient culture results are kept by the TB Warriors.

**Note:** All TB suspects should be offered testing for HIV infection using the VCT service.

**I. Sputum smear-positive pulmonary TB (PTB)**

**Note:** Mark AFB microscopy ONLY on the sputum form

Sputum AFB results should be available in the ward within 48 hours of the sample being sent.
Patients with at least one positive smear should be notified with smear-positive TB (note ‘scanty positive’ result is accepted as positive).

II. Sputum smear-negative PTB

See Annexures 1 and 2 for the WHO algorithms.

Patients can be diagnosed with smear-negative PTB if ALL of the following criteria are met:

1. Cough >2 weeks
2. Two or more sputa smear-negative OR non-productive cough
3. Pulmonary infiltrate compatible with TB present on current CXR (including micronodular OR nodular infiltrates)
4. No clinical response to oral antibiotics after 2 weeks OR intravenous antibiotics after 3 days
5. Pneumocystis pneumonia excluded clinically
6. Decision by a clinician at the level of Senior Medical Officer or above to commit the patient to a full course of antituberculous therapy

Patients meeting all criteria should be notified with smear-negative PTB. A culture should be requested.

Requesting TB culture and sensitivities

TB culture should be requested if:

1. A patient is being re-treated for TB
2. If the patient is diagnosed with smear-negative TB, pleural TB, extrapulmonary TB
3. A patient is sputum smear-positive after 7-11 weeks of TB therapy (failure to convert)
4. A patient is referred for failure to thrive (‘non-responder’) after 2-8 weeks of TB therapy (see definition below)
5. A patient is an MDRTB suspect (see definition below)

Sputum culture has the highest yield - ask for an induced specimen from the TB team for patients with non-productive cough - please arrange with TB Team before sending the patient. Pleural aspirate, ascites aspirate, cold abscess aspirate can be inoculated into a myco-F-lytic culture bottle.

Patients with altered mental status who cannot cough can have TB cultures sent from nasopharyngeal aspirates, urine, or blood (inoculated into a myco-F-lytic culture bottle). Gastric lavage fluid should be neutralized with sodium bicarbonate before being sent for culture (use the pH indicator on urine dipsticks as a guide).

Note: Mark AFB microscopy, culture and sensitivity and indication for request (e.g. re-treatment case, failure to thrive on TB treatment)

III. Pleural TB

Diagnose pleural TB if:

1. A pleural aspirate returns fluid
2. Fluid clinically has a high protein content (straw colour, OR protein clot forms on standing).
3. Empyema excluded on clinical examination of aspirated fluid (i.e. fluid not cloudy or purulent and pH >5 on dipstick)

If pleural malignancy suspected (age >45 years, blood-stained effusion):

1. Assess smoking history, and other features of malignancy (e.g. breast mass; hard, enlarged lymph nodes; hoarseness; chest pain)
2. Send fluid for cytology (half fluid, half alcohol solution [kept in schedule 6 cupboard])

Note: in equivocal cases send fluid total protein and LDH, serum total protein and LDH, and bacterial culture; pleural biopsy can be subsequently performed.

IV Extrapulmonary TB (EPTB)

EPTB should be diagnosed in patients with constitutional symptoms (fever, weight loss, night sweats, fatigue) by a specialist, CMO, PMO or registrar based on:

1. Mediastinal or intra-abdominal lymphadenopathy
2. Peripheral lymphadenopathy – asymmetric lymphadenopathy with caseating granuloma or giant cells seen on cytology or histology
3. Pericardial effusion >10mm in diameter
4. Ascitic exudates (serum albumin to fluid albumin gradient <11) – send specimen for cytology in alcohol if malignancy suspected

Note:
1. TB arthritis is diagnosed on arthoscopic synovial biopsy; TB spine should be diagnosed on MRI. These cases are managed by the Department of Orthopaedic Surgery
2. TB peritonitis is diagnosed on imaging, with or without laparoscopy. These cases are managed by the Department of General Surgery – contact Dr Islam, Department of Surgery (speed dial 6257).
V TB meningitis (TBM)

TBM should be diagnosed by a specialist, CMO, PMO or registrar based on CSF analysis showing:
1. Duration of symptoms >5 days
2. Pleiocytosis (usually with lymphocytic predominance)
3. Elevated protein and low glucose (gradient <0.5 calculated using blood glucose or finger prick glucose OR glucose <1.9)

B. Management of TB

TB should be treated according to national guidelines with fixed dosed combination therapy according to weight. Streptomycin should be added for patients receiving retreatment for smear positive TB (this recommendation may be replaced by use of rapid test for MDRTB e.g. line probe assay). Doses are calculated according to weight - see below. [Reference: South African Medicines Formulary 7th Edition 2005 page 290-291]

WHO recommends that seriously ill TB suspects should be admitted, have a blood culture taken and be started on an intravenous broad spectrum antibiotics during the workup for TB.

TB pericarditis and miliary TB: Prednisone should be added: 80 mg daily for 7 days, then 60 mg daily for 7 days, then 40 mg daily for 7 days, then 20 mg daily for 7 days, then 10 mg daily 7 days, then 5 mg daily for 7 days

TBM: Dexamethazone intravenously should be added (0.4 mg per kilogram per day for week 1, 0.3 mg per kilogram per day for week 2, 0.2 mg per kilogram per day for week 3, and 0.1 mg per kilogram per day for week 4) and then oral treatment for four weeks, starting at a total of 4 mg per day and decreasing by 1 mg each week. Usual therapy would be 8 mg tds for 7 days, then 6 mg tds for 7 days, then 4 mg tds for 7 days, then 2 mg tds for 7 days, then 2 mg bd for 28 days, decreasing by 1 mg per week.

If oral dexamethazone is not available prednisone or betamethazone can be substituted, at a starting dose of prednisone 80 mg bid or betamethazone 10 mg bid.

Note: Iron supplementation should not be given to patients with TB unless iron deficiency has been diagnosed using iron studies

Record keeping

The details of all TB suspects should be entered in the TB suspect register at the TB Office, and the final diagnosis documented.

Referral to the TB clinic

Patients referred to the TB clinic should have:
1. Discharge summary (if inpatient)
2. TB referral form* (pink)
3. Seven days of TB medication* from the pharmacy
4. Counselling* from the TB team on how to access TB therapy from the Primary Health Care Clinics
5. A Zulu TB information pamphlet giving details of the District TB control system

*Done by the TB Office

First-line antituberculous drugs

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Mode of action</th>
<th>Potency</th>
<th>Recommended dose for (mg/kg of body weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoniazid (H)</td>
<td>bactericidal</td>
<td>high</td>
<td>5</td>
</tr>
<tr>
<td>Rifampicin (R)</td>
<td>bactericidal</td>
<td>high</td>
<td>10</td>
</tr>
<tr>
<td>Pyrazinamide  (Z)</td>
<td>bactericidal</td>
<td>low</td>
<td>25</td>
</tr>
<tr>
<td>Streptomycin  (S)</td>
<td>bactericidal</td>
<td>low</td>
<td>15</td>
</tr>
<tr>
<td>Ethambutol</td>
<td>bacteriostatic</td>
<td>low</td>
<td>15</td>
</tr>
</tbody>
</table>

Rifafour e-275 (each tablet contains):

Rifampicin 150 mg
Isoniazid 75 mg
Pyrazinamide 400 mg
Ethambutol 275 mg
Example of recommended treatment dosages,

<table>
<thead>
<tr>
<th>Weight Range</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-37 kg</td>
<td>2 tablets</td>
</tr>
<tr>
<td>38-54 kg</td>
<td>3 tablets</td>
</tr>
<tr>
<td>55 - 70 kg</td>
<td>4 tablets</td>
</tr>
<tr>
<td>71 kg and over</td>
<td>5 tablets</td>
</tr>
</tbody>
</table>

RIFINAH-150: Patients weighing less than 50 kg: 3 tablets (450 mg rifampicin and 300 mg isoniazid).
RIFINAH-300: Patients weighing 50 kg or greater: 2 tablets (600 mg rifampicin and 300 mg isoniazid).

All TB medications given 5 times per week EXCEPT in the medical wards when they are given 7 days a week.

**Duration of treatment at the clinic**

**New case regimen:**
- Months 1+2: H / R / Z / E
- Months 3-6: H/R

**Re-treatment regimen:**
- Months 1+ 2: H / R / Z / E / S* (40 doses of S IM)
- Month 3: H / R / Z / E
- Months 4-8: H / R / E

*Note: Do not use streptomycin if a good clinical specimen has been sent for DST*

**Reasons for structure of re-treatment regimen**
- Aim is to achieve relapse-free cure
- Prolonged therapy needed due to presence of dormant / latent organisms (persisters)
- Combination therapy to prevent development of drug resistance
- Single drug resistant mutations may be present at initiation of therapy due to high number of organisms present
- Three bactericidal drugs given in intensive phase will rapidly reduce number of organisms and reduce the risk of resistance developing
- Inclusion of Z allows duration of treatment to be shortened
- E included for duration of treatment to cover for H resistance

**Common side-effects of TB treatment**

Severe
- Jaundice due to drug-induced hepatitis – Z most likely cause – stop all drugs and refer for re-introduction under specialist supervision (see below) – E and S not hepatotoxic
- Skin rash – can be caused by all drugs – stop all drugs and refer for re-introduction under specialist supervision
- Hearing loss, vertigo, renal impairment due to Streptomycin
- Visual loss – due to prolonged use of E – stop E - assessment of colour vision and ophthalmologist review
- Sensory peripheral neuropathy – common – caused by H – can be prevented / treated by pyridoxine – HIV neuropathy identical presentation

Minor (treat through)
- Nausea, vomiting
- Itch
- Athralgia

**Other medications**
- Pyridoxine 25 – 50 mg daily (to prevent INH neurotoxicity - especially for wasted patients and alcoholics)
- Co-trimoxazole 480 mg 1-2 tabs daily (for PLWH to prevent opportunistic infections, shown to improve survival in RCT)

**Operational:**
- Notification and registration with TB clinic, cough hygiene
- Directly observed therapy if possible for entire duration of treatment
- Completion of Green Card to record adherence to therapy
- Application for disability grant for duration of therapy (if needed)
- Nutritional assessment

**Monitoring (occurs at the TB Clinic)**

**New smear-positive case:**
- Repeat sputum smears at the end of month 2 and month 5 - if positive at month 5 register as treatment failure send sputum for culture and DST - review in 6 weeks
Re-treatment smear-positive case:
- Follow-up initial smear and culture status
- Review culture and DST results at 6 weeks – refer if drug resistance present
- Repeat two sputum smears sent at the end of month 3 and month 7
- If smear positive at 3 months - repeat culture
- If smear positive at 7 month register as treatment failure and refer
- Weigh regularly, adjust drug doses

Smear-negative cases:
- Smear-negative PTB and pleural TB: Duration as for smear-positive PTB (new case and retreatment) - clinical reassessment at weeks 2 and 4, with clinical and culture review at week 8. Repeat cultures if necessary. Final clinical review at months 3 and 4. At clinical review assess symptoms and level of functioning.*
- EPTB excluding TBM and TB lymphadenitis: as for smear-positive TB
- TBM and TB lymphadenitis: New case as for smear + PTB, with continuation phase extended by 3 months for total of 9 months Rx (with option of extending to 12 months). Re-treatment case as for smear-negative PTB with continuation phase extended for 4 months to give total of 12 months Rx. Clinical review as for smear negative PTB, with visual acuity checks at months 3, 6, 9, (12 for re-treatments).

*Focal symptoms (including cough), fever, fatigue, weight loss, should have resolved after 8 weeks of treatment. Weight gain implies successful treatment. Level of functioning is determined clinically - successful treatment implies that the patient should be able to return to normal way of life. Untreated HIV infection or post-TB lung disease can make response to treatment more difficult to assess.

HIV-positive patients:
- Repeat CD4 count six monthly after initial count
- Initiate antiretroviral training if CD4 <200 or AIDS-defining diagnosis develops

Follow-up of TB cases at MOPD

The following patients should be seen at MOPD at 4 weeks and 8 weeks if not responding well to treatment.
1. TBM: to review neurological status and assess need for ventriculoperitoneal shunt.
2. Pericardial TB: to assess for features of pericardial tamponade or constriction.
3. Pleural TB: to exclude empyema or malignancy

TB clinic nurses should refer patients in for review if there is failure to thrive after 8 weeks of TB treatment based on:
1. Weight loss
2. Fatigue
3. Persisting focal symptoms (e.g. cough, lymph node enlargement, pleural effusion)

Note: Patients with smear-negative TB should not be referred back to MOPD for chest X-ray at treatment completion UNLESS there are symptoms suggestive of persisting TB (see above).

All HIV positive TB patients should be referred to start antiretroviral therapy within 2 weeks of starting TB therapy.

C. Multidrug Resistant TB (MDRTB)

MDRTB is becoming increasingly common in KwaZulu-Natal. The severity of this problem and its public health implications should not be underestimated.

Definitions of TB drug resistance

Mono-resistance: Resistance to one of the first line TB drugs
Poly-resistance: Resistance to two or more first line TB drugs
Multi-drug resistance: Resistance to isoniazid and rifampicin
XDRTB: Resistance to most or all first line and second line TB drugs including isoniazid and rifampicin

Note: Patients with mono-resistance or poly-resistance other than multi-drug resistance or XDRTB are frequently cured by standard four-drug therapy. Patients with multi-drug resistance or XDRTB are never cured by standard four drug therapy.

Definitions of MDRTB suspect

1. Any patient who is sputum smear positive after 2 months of TB therapy AND culture/sensitivity tests have been sent
2. Any patient who is failing to thrive after 2 months of TB therapy and has signs of a deteriorating focal disease process compatible with tuberculosis AND culture/sensitivity tests have been sent
3. Any TB suspect who has been in contact with a patient known to have MDRTB AND culture/sensitivity tests have been sent
Management of MDRTB suspects:

Admission:

MDRTB cases or suspects should preferably be managed at home. Rationale: fewer people will come into contact with the patient at home than in a crowded hospital ward.

Please ensure that outpatients have a good sputum specimen sent for culture and DST - label the form very clearly 'MDRTB suspect' or 'MDRTB case'.

MDRTB cases or suspects can only be admitted if:

- There is an intercurrent illness (e.g. pneumonia) that needs inpatient treatment

Advanced TB alone is not an indication for admission (infection control risks outweigh benefit to patient).

MDRTB suspects who need admission should be admitted to the isolation cubicle after a Consultant has assessed the case. The Consultant should sign the transfer on the front of the case sheet.

Note: It is compulsory that all Healthcare Workers who enter the MDRTB isolation cubicles wear a closely fitted N95 mask.

Only two designated family members can visit the patient in the cubicle wearing compulsory N95 masks (each patient is assigned two N95 masks for visitors)

All suspected MDRTB cases on admission should be taught cough hygiene, taught how to wear a surgical mask and presented to a consultant within 24 hours of admission. If the diagnosis of MDR TB suspect is confirmed by the consultant the patient should remain in the isolation ward or cubicle.

Day 1: Enter the patient's name onto the TB suspect register. The patient is started on intravenous coamoxyclav 1,2 g IV 8 hourly with erythromycin 500 mg 6 hourly and TWO sputum specimens are sent for AFB smear. A THIRD specimen is sent for TB culture and DST. All forms must include the patient's national ID number and contact details.

Day 3: The patient's case and sputum smear results is reviewed with an infectious diseases consultant.

Day 5 - 7: The patient's case is reviewed again with in infectious diseases consultant, response to antibiotic therapy is assessed, and a decision whether or not to start empiric MDRTB therapy is made (usually it is NOT started). Safe arrival of the specimen at IALH TB lab must be confirmed by the registrar. ARV therapy is initiated if needed.

Further: If empiric MDRTB therapy is started the patient is kept in the isolation cubicle until the DST becomes available. If empiric MDRTB therapy is not started the patient can be discharged home and asked to return for DST results within 4 to 6 weeks or immediately if deterioration occurs. Family members must receive education and counselling by the TB Coordinator, Infection Control or an appropriately trained person under their supervision:

- Infection risks in the home, details of MDRTB treatment, duration and side-effects
- The patient sleeps alone in room with open window;
- Family members who HIV-infected, diabetic, very young or very old should move out of the house
- The patient follows cough hygiene (coughs into cupped hands that are frequently washed, or a tissue which is thrown away) and wears a surgical mask when in other rooms of the house.

Definition of MDRTB

1. Any patient with a TB culture resistant to both isoniazid and rifampicin

Management of MDRTB

1. All MDRTB suspects should have full traceable (including two active cellphone numbers) contact details in MDRTB suspect register entered by the TB Coordinator (or a designated supervised staff member)
2. All MDRTB suspects or MDRTB cases should be discussed with the doctor on call at King George Hospital, or a medical specialist or infectious diseases specialist.
3. MDRTB suspects or cases should be nursed in the side cubicles of 5B1 and 5F
4. All staff in contact with MDRTB suspects or cases should use fitted N95 masks that can be obtained from the Unit Manager
5. The minimum amount of time an N95 mask can be used for is 7 days of continuous use, the maximum amount of time an N95 mask can be used for is 14 days
6. Less ill patients can be managed as outpatients while waiting for sensitivity results
7. If the decision is made to treat for MDRTB at least three to four effective drugs should be prescribed in consultation with an MDRTB specialist
8. Patients being treated for MDRTB should be transferred to the Doris Goodwin TB Hospital, Richmond Chest or King George V Hospital for ongoing therapy.
Management of poly-resistance other than MDRTB

Treatment of poly-resistance other than MDRTB should be individualized after discussion with a specialist.

Note: A single drug should never be added to a failing regimen

Section 36 MANAGEMENT OF TB DRUG-INDUCED HEPATITIS

TB therapy should be stopped if the ALT is >5x normal. If the bilirubin is raised or the ALT is 3-5x normal LFTs should be repeated weekly. If the ALT is <3x normal the patient can be managed at the TB clinic with instructions to have an LFT check if the eyes turn yellow, or the urine darkens, or if nausea or right upper quadrant pain develops. Ideally all cases should be admitted, but ambulant patients who live close to the hospital can be managed as outpatients.

Drug re-challenge is usually managed in the following manner:

- Patients who are frail, or have extensive TB, or who are in the initial phase of treatment should receive E 800 - 1200 mg per day and streptomycin 750 - 1000 mg per day (ciprofloxacin can also be added if the patient is not at risk of undiagnosed MDRTB [i.e. persisting positive sputum smears or re-treatment case])
- H, R and Z should be stopped, as should co-trimoxazole and ARVs (at the discretion of the consultant)
- ALT, GGT and bilirubin should be checked twice weekly until the ALT is <2x normal
- R 450-600 mg daily can be started (day 0) and the ALT checked on day 1 and day 4
- If the day 4 ALT is <2x normal H 300 mg per day can then be started (day 5), with vitamin B6 50 mg per day, and the ALT, GGT and bilirubin checked on day 6 and day 10
- The patient can then be discharged on H, R and E with instructions to the clinic for the patient to complete 9 months of treatment

Other options include:

- Challenging the patient with Z 1.5 - 2.0 g per day - the advantage is that if the challenge is successful the patient need only take treatment for 6 months - the disadvantage is that Z could be the most hepatotoxic drug
- Stopping the R after successful re-challenge before starting H
- Starting at a low dose of R then H and titrating up to full dose

Section 38 GUIDELINES FOR REFERRAL TO RICHMOND TB HOSPITAL

1.1 All patients to have a diagnosis of tuberculosis (confirmed or clinical).
1.2 Only patients requiring tuberculosis (TB) treatment will be admitted to Richmond Hospital. The hospital does not admit MDR and XDR TB patients.
1.3 All patients to be referred with the following documentation:
   - TB referral form GW 20/14 (pink form)
   - Patient treatment card GW 20/15 (Green card), if on TB treatment
   - Referral letter giving patients history and management
   - Patients registered on ART programme should bring copies of all documents and results from the ART clinic at which they are enrolled.
   - Copies of all results (AFBs, laboratory, scans, HIV etc.)
   - Children under 5 years to bring road to health card
   - CXR
1.4 Referring clinician to contact a clinician at Richmond Hospital telephonically and give details of patients to be referred.
1. Red: Immediate priority (resuscitation cases)
2. Orange: very urgent priority (potentially life/limb threatening pathology) to be seen within 10 minutes
3. Yellow: urgent priority (significant pathology) to be seen within 60 minutes
4. Green: delayed priority (minor injuries/illness) to be seen within 240 minutes (4 hours)
5. Blue: dead

The orange category reduces the number of patients in the potentially large yellow category while limiting the red category to resuscitation cases.

A two-tiered approach to triaging is utilized, using both a physiological scoring system and a series of discriminators.

Patients with a MEWS Score of 5 or more should be seen immediately in the Resuscitation Room.

Patients with a score of 4 or less should be seen in MOPD

Notes:
<table>
<thead>
<tr>
<th>Colour</th>
<th>Red</th>
<th>Orange</th>
<th>Yellow</th>
<th>Green</th>
<th>Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target time to treat</td>
<td>Immediate</td>
<td>Less than 10 min</td>
<td>Less than 60 min</td>
<td>Less than 240 min</td>
<td>Dead</td>
</tr>
<tr>
<td>Mechanism of injury</td>
<td>High energy transfer</td>
<td>Shortness of breath - acute</td>
<td>Coughing blood</td>
<td>Chest pain</td>
<td>Haemorrhage - uncontrolled</td>
</tr>
<tr>
<td>Presentaion</td>
<td>Seizure - current</td>
<td>Seizure - postictal</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Focal neurology - acute</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Level of consciousness reduced</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Psychosis/ aggression</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Threatened limb</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Dislocation - other joint</td>
<td>Dislocation - finger or toe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fracture - compound</td>
<td>Fracture - closed</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Burn - face/ inhalation</td>
<td>Burn - other</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Burn over 20%</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Burn - electrical</td>
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<tr>
<td></td>
<td>Burn - circumferential</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Burn - chemical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Poisoning/ overdose</td>
<td></td>
<td></td>
<td>Abdominal pain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hypoglycaemia - glucose less than 3</td>
<td>Diabetic - glucose over 17 (no ketonuria)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vomiting - fresh blood</td>
<td>Vomiting - persistent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pregnancy and abdominal trauma or pain</td>
<td>Pregnancy and trauma</td>
<td></td>
<td>Pregnancy and PV bleed</td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>Severe</td>
<td>Moderate</td>
<td>Mid</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Senior health care professional's discretion

Figure 2. Adult discriminator list

Notes:
**Section 40**

**Approach to the management of infiltrates on chest radiograph in patients diagnosed with LRTI**

**Chest Radiograph**

- **Diffuse infiltrate**
  - Suspect *Pneumocystis* pneumonia
  - Consider tuberculosis
  - Blood culture
  - Sputum for AFB*
  - If available: Sputum for microscopy and culture*
  - Staining for *Pneumocystis*
  - Treat for *Pneumocystis* pneumonia

- **Focal consolidation**
  - Suspect bacterial pneumonia
  - Treating for bacterial pneumonia
  - Response within 3 days

**Yes**
- Review AFB results
- Follow-up until fully recovered

**No**
- Review AFB results
- Aspirate any pleural fluid
- Send sputum for TB culture*
- Send sputum for bacterial culture*
- Consider combined therapy for *Pneumocystis* and widened antibiotic cover, including a macrolide or tetracycline
- If no response after 5 days (inpatient) or 2 weeks (outpatient) consider diagnosing pulmonary TB

---

*Induce sputum if necessary; bronchoscopy can also be considered

Treatment for PCP is with cotrimoxazole 480 mg tablets - <60 kg 4 tablets three times daily; >60 kg 4 tablets four times daily. Add prednisone if oxygen saturations are <90% in room air - not on TB treatment 40 mg twice daily; on TB treatment 60 mg twice daily.

Note: severely ill HIV infected patients with extensive pulmonary infiltrates should be treated both for PCP and CAP and for PTB in consultation with a senior doctor.
Figure 1
Algorithm for the diagnosis of smear-negative TB in ambulatory HIV-positive patient

Ambulatory patient with cough 2–3 weeks and no danger signs

AFB HIV test

HIV+ or status unknown

AFB-positive

Treat for TB CPT
HIV assessment

TB likely

Treat for PCP
HIV assessment

Response

No or partial response

Reassess for TB

AFB-negative

CXR Sputum AFB and culture Clinical assessment

TB unlikely

Treat for bacterial infection
HIV assessment

Response

---

a The danger signs include any one of: respiratory rate > 30/minute, fever > 30 °C, pulse rate > 120/min and unable to walk unaided.

b For countries with adult HIV prevalence rate ≤ 1% or prevalence rate of HIV among tuberculosis patients > 5%.

c In the absence of HIV testing, classifying HIV status unknown as HIV-positive depends on clinical assessment or national and/or local policy.

d AFB-positive is defined as at least one positive and AFB-negative as two or more negative smears.

e CPT = Cotrimoxazole preventive therapy.

f HIV assessment includes HIV clinical staging, determination of CD4 count if available and referral for HIV care.

g The investigations within the box should be done at the same time whenever possible in order to decrease the number of visits and speed up the diagnosis.

h Antibiotics (except fluoroquinolones) to cover both typical and atypical bacteria should be considered.

i PCP, Pneumocystis carinii pneumonia, also known as Pneumocystis jiroveci pneumonia.

j Advise to return for reassessment if symptoms recur.
FIGURE 2
Algorithm for the diagnosis of tuberculosis in seriously ill HIV-positive patient

Seriously ill patient with cough 2–3 weeks and danger signa

Referral to higher level facility

Parenteral antibiotic treatment for bacterial infection b, c
Sputum AFB and culture d
HIV test d
CXR e

No tuberculosis

Treat tuberculosis

Immediate referral not possible

Parenteral antibiotics for bacterial infection b, c
Consider treatment for PCP e
Sputum AFB and culture e
HIV test e

HIV+ or unknown f

AFB-positive g

AFB-negative g

Improvement after 3–5 days

Reassess for tuberculosis h

No improvement after 3–5 days

Start TB treatment
Complete antibiotics
Refer for HIV and tuberculosis care

Reassess for other HIV-related disease

TB unlikely

---

a The danger signs include any one of: respiratory rate > 30/min, fever > 39 °C, pulse rate > 120/min and unable to walk unaided.

b The investigations within the box should be done at the same time wherever possible in order to decrease the number of visits and speed up the diagnosis.

c For countries with adult HIV prevalence rate ≤ 1% or prevalence rate of HIV among tuberculosis patients ≤ 5%.

d Antibiotics (except fluoroquinolones) to cover both typical and atypical bacteria should be considered.

e PCP: Pneumocystis carinii pneumonia, also known as Pneumocystis jiroveci pneumonia.

f In the absence of HIV testing, classfy HIV status unknown into HIV-positive depends on clinical assessment or national and/or local policy.

g AFB-positive is defined as at least one positive and AFB-negative as two or more negative smears.

h Reassessment for tuberculosis includes AFB examination and clinical assessment.
SECTION 43  ALGORITHM FOR THE MANAGEMENT OF AGGRESSIVE OR AGITATED PATIENTS

Step 1: Patient with disordered mentation:
1. Aggressive
2. Destructive
3. Running away from home
4. Disruptive and irrational
5. Hallucinating
6. Agitated

Step 2:
Obtain history of disordered thinking and behaviour from patient’s escorts
Observe the patient’s appearance and behaviour and document unusual features

Assess for features suggesting delirium:
Disorientation and incoherent speech; fluctuating level of attention or consciousness; history of recent alcohol abuse, or drug abuse; history of recent seizures or head trauma
RR >20, HR >90, Temp >38°C or <35°C, O₂ saturation <94% in room air
WCC <3.5 or >12, Ur >8, glucose >12 or <3, abnormal Na, K, or Ca
Abnormal cardiorespiratory or abdominal examination
Abnormal urine dipstick
Meningism or abnormal CSF analysis
Focal CNS signs
Asterixis

Step 3:
Sedate if patient’s behaviour is dangerous or disruptive
Offer sedation to the patient - if this is accepted document this in the notes
If sedation is refused, or if patient does not have sufficient insight to give consent, sedate patient after gathering sufficient information to complete the following forms - one MHCA 04, two MHCA 05 (signed by two healthcare workers), and one MHCA 07.

Note that sedation may need to be given before the physical examination and work-up for delirium is complete

Step 4:

Delirious:
1. Diagnose underlying condition
2. Start appropriate treatment for both the medical condition and the behavioural disturbance

Not delirious:
1. Admit with a working psychiatric diagnosis (e.g. brief psychotic episode, schizoaffective disorder, mania)
2. Ensure that appropriate medication is prescribed
**Section 44 PROTOCOL FOR THE TREATMENT OF STATUS EPILEPTICUS**

[Acknowledgement: Dr Anand Moodley]

**Establish Cardio-Respiratory adequacy**
- Get History & Examine briefly
- Insert IV line (N/Saline)
- Bloods (FBC, U & E, Glucose, Anticonvulsants)
- Dextrose 50 % - 50 ml IV pm
- Thiamine – 100 mg IV

**Lorazepam (0,1 mg/kg at 2 mg/min)**  
**or**  
**Diazepam (0,2 mg/kg IV at 5 mg/min)**

**Phenytoin loading dose (15 mg/kg at < 50 mg/min) GIVEN BY SYRINGE DRIVER OR SLOW IV PUSH OVER 20 MINUTES OR Sodium Valproate**

**Do convulsions stop?**
- **Yes**
  - **30 – 60 minutes**
  - **1. Phenytoin maintenance dose**
  - **2. Continue pt’s usual maintenance Therapy**
  - **Can give 1 more bolus of Diazepam**

**No**

**Diazepam 10 mg IV**
- **(over 15 – 30 seconds)**

**Do convulsions stop?**
- **Yes**
  - **Alert ICU/Neurologist**
  - **T/F ICU**
  - **Intubate and Ventilate**

**No**

**Midazolam (0,2 mg/kg IV loading dose Titrate dose (0,1 – 0,4 mg/kg/hr) to stop seizures**
- **+ Maintenance Therapy of usual medication &**
- **Phenytoin maintenance dose**

**Thiopentone (10mg/kg IV stat, then 50 – 100 mg over 15 min Maintenance: 5 – 20 mg/kg/hr**
- **X 4 hrs, then 1 – 2 mg/kg/hr with EEG monitoring**
- **OR**
- **Propofol (12 mg/kg IV, followed by 2 – 10 mg/kg/hr)**

**Do convulsions stop?**
- **Yes**
  - **Maintain on Midazolam for 24 hrs then withdraw.**
  - **Consider intermittent Clonazepam 1 – 2 mg 8 hr by IV maintenance, thereafter with usual maintenance therapy**

**No**
## MANAGEMENT OF PROLONGED INR

### Bleeding?

<table>
<thead>
<tr>
<th>INR &lt;10</th>
<th>INR &gt;10</th>
</tr>
</thead>
<tbody>
<tr>
<td>If rapid reversal is NOT required:</td>
<td></td>
</tr>
<tr>
<td>INR 4.0 - 6.0</td>
<td></td>
</tr>
<tr>
<td>Withhold 1 dose</td>
<td></td>
</tr>
<tr>
<td>If rapid reversal is required or INR &gt;6.0:</td>
<td></td>
</tr>
<tr>
<td>Withhold 1 dose</td>
<td></td>
</tr>
<tr>
<td>Consider Vit K 0.5 - 2 mg SC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-serious</th>
</tr>
</thead>
<tbody>
<tr>
<td>Look for and treat underlying cause (e.g. PUD, DUB)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potentially life-threatening</th>
</tr>
</thead>
<tbody>
<tr>
<td>If rapid reversal is NOT required:</td>
</tr>
<tr>
<td>Withhold doses</td>
</tr>
</tbody>
</table>

### Dose and duration of Haemosolvex is based on the patient’s body mass, type of hemorrhage, location of bleed, type of surgery and the clinical picture. One to two vials of Haemosolvex is sufficient in most cases; by each patient should be evaluated on an ongoing basis.

*Note: do not give high dose (>2 mg) Vitamin K to patients who are at high risk of thrombotic complications e.g. prosthetic heart valve replacement, recent life-threatening thromboembolic disease (e.g. PE, stroke), recurrent thrombotic disease. High doses of Vitamin K causes warfarin resistance.
### WARFARIN DOSAGE ADJUSTMENT ALGORITHMS:

#### For target INR of 2.0 to 3.0, no bleeding:

<table>
<thead>
<tr>
<th>INR</th>
<th>≤ 1.5</th>
<th>1.5 to 1.9</th>
<th>2.0 to 3.0</th>
<th>3.1 to 3.9</th>
<th>4.0 to 5.9</th>
<th>≥ 6.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment</td>
<td>Increase dose 10 to 20%; consider extra dose</td>
<td>Increase dose 5 to 10%†</td>
<td>No change</td>
<td>Decrease dose 5 to 10%†</td>
<td>Hold for 0 to 1 day then decrease dose 10%</td>
<td>See above</td>
</tr>
<tr>
<td>Next INR</td>
<td>4 to 8 days</td>
<td>7 to 14 days</td>
<td>No. of consecutive in-range INRs x 1 wk (max: 4 wks)‡</td>
<td>7 to 14 days</td>
<td>4 to 8 days</td>
<td>See above</td>
</tr>
</tbody>
</table>

†-If INR is 1.8 to 1.9 or 3.1 to 3.2, consider no change with repeat INR in seven to 14 days.
‡-For example, if a patient has had three consecutive in-range INR values, recheck in 4 weeks.
§-If INR is 2.3 to 2.4 or 3.6 to 3.7, consider no change with repeat INR in seven to 14 days.

#### For target INR of 2.5 to 3.5, no bleeding:

<table>
<thead>
<tr>
<th>INR</th>
<th>≤ 1.5</th>
<th>1.5 to 2.4</th>
<th>2.5 to 3.5</th>
<th>3.6 to 4.5</th>
<th>4.5 to 6.0</th>
<th>&gt; 6.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment</td>
<td>Increase dose 10 to 20%; consider extra dose</td>
<td>Increase dose 5 to 10%§</td>
<td>No change</td>
<td>Decrease dose 5 to 10%; consider holding one dose§</td>
<td>Hold for 1 to 2 days then decrease dose 5 to 15%</td>
<td>See above</td>
</tr>
<tr>
<td>Next INR</td>
<td>4 to 8 days</td>
<td>7 to 14 days</td>
<td>No. of consecutive in-range INRs x 1 wk (max: 4 wks)‡</td>
<td>7 to 14 days</td>
<td>2 to 8 days</td>
<td>See above</td>
</tr>
</tbody>
</table>

### Follow-up Algorithm:

<table>
<thead>
<tr>
<th># Consecutive In-range INRs</th>
<th>Repeat INR in</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 - 10 days</td>
</tr>
<tr>
<td>2</td>
<td>2 Weeks</td>
</tr>
<tr>
<td>3</td>
<td>3 weeks</td>
</tr>
<tr>
<td>4</td>
<td>4 - 8 weeks</td>
</tr>
</tbody>
</table>

Note: If INR 2.0 - 2.1 or 2.9 - 3.0, consider repeat INR in 2 - 3 weeks regardless of # of consecutive in-range INRs.
For pts w/ many consecutive therapeutic INRs, the F/U algorithm may be accelerated for a single out-of-range INR.

* If INR 1.8 - 1.9, consider no change but repeat INR in 7 - 14 days.
** If INR 3.1 - 3.2, consider no change but repeat INR in 7 - 14 days.

Remember:
1. Always consider trend in INRs when making warfarin management decisions.
2. Consider repeating INR same day or next day if observed value markedly different than expected value. (Potential for lab errors exist)
### Section 47  ANTIRETROVIRAL DOSING IN RENAL FAILURE:

[Acknowledgement: UCSF Centre for HIV Education http://www.aidsetc.org/aidsetc?page=et-03-00-02]

<table>
<thead>
<tr>
<th>Antiretroviral</th>
<th>GFR (ml/min)</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenofovir</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;50</td>
<td>300 mg daily</td>
<td></td>
</tr>
<tr>
<td>30 to 49</td>
<td>300 mg alternate days</td>
<td></td>
</tr>
<tr>
<td>10 to 29</td>
<td>300 mg twice weekly</td>
<td></td>
</tr>
<tr>
<td>Dialysis</td>
<td>300 mg weekly</td>
<td></td>
</tr>
<tr>
<td>Lamivudine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;50</td>
<td>150 mg twice daily or 300 mg daily</td>
<td></td>
</tr>
<tr>
<td>30 to 49</td>
<td>150 mg daily</td>
<td></td>
</tr>
<tr>
<td>15 to 29</td>
<td>150 mg stat then 100 mg daily</td>
<td></td>
</tr>
<tr>
<td>5 to 14</td>
<td>150 mg stat then 50 mg daily</td>
<td></td>
</tr>
<tr>
<td>&lt;5</td>
<td>50 mg stat then 25 mg daily</td>
<td></td>
</tr>
<tr>
<td>Stavudine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;50</td>
<td>30 mg twice daily</td>
<td></td>
</tr>
<tr>
<td>26 to 49</td>
<td>15 mg twice daily</td>
<td></td>
</tr>
<tr>
<td>10 to 25</td>
<td>15 mg daily</td>
<td></td>
</tr>
<tr>
<td>Dialysis</td>
<td>15 mg daily</td>
<td></td>
</tr>
<tr>
<td>Zidovudine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;15</td>
<td>300 mg twice daily</td>
<td></td>
</tr>
<tr>
<td>&lt;15</td>
<td>100 mg three times daily</td>
<td></td>
</tr>
<tr>
<td>Dialysis</td>
<td>100 mg three times daily</td>
<td></td>
</tr>
<tr>
<td>Abacavir</td>
<td>No adjustments needed</td>
<td>300 mg twice daily</td>
</tr>
<tr>
<td>Tenofovir / emtricitabine combination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;50</td>
<td>One tablet daily (300 mg / 200 mg)</td>
<td></td>
</tr>
<tr>
<td>30 to 49</td>
<td>One tablet alternate days</td>
<td></td>
</tr>
<tr>
<td>&lt;30</td>
<td>Switch off combination</td>
<td></td>
</tr>
<tr>
<td>Efavirenz</td>
<td>No adjustment needed</td>
<td>600 mg at night</td>
</tr>
<tr>
<td>Nevirapine</td>
<td>No adjustment needed</td>
<td>200 mg twice daily (extra dose after H/D)</td>
</tr>
<tr>
<td>Lopinavir / ritonavir</td>
<td>No adjustment needed</td>
<td>Two tablets twice daily (400 mg / 100 mg)</td>
</tr>
<tr>
<td>Atazanavir with ritonavir</td>
<td>No adjustment needed</td>
<td>300 mg with 100 mg daily</td>
</tr>
<tr>
<td></td>
<td>Cannot use in H/D</td>
<td></td>
</tr>
</tbody>
</table>