

STANDARD TREATMENT GUIDELINES

**FOR THE
MINISTRY OF HEALTH, NAURU
2014**

**Standard Treatment Guidelines
Ministry of Health**

First Edition, 2014

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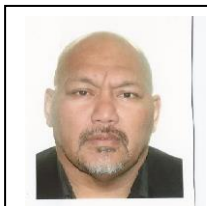
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FOREWORD



The Health Strategic Plan 2010-2015 stated the Ministry of Health's vision of '*A Healthy and Peaceful Nation that values and supports human rights and dignity through the provision of quality health care and services*'. The Ministry continues to support programmes and activities towards this vision and the provision

of quality medicine and supplies is part of this undertaking.

The Standard Treatment Guidelines (STGs) is a good example of policies instituted to ensure efficient use of medicinal supplies. The general purpose of the STGs is to guide the clinicians, pharmaceutical personnel and all other health professionals, to use the medicines rationally for the good of patients.

In line with the strategic vision of the Ministry, I am truly honoured to note the formulation of the first Standard Treatment Guidelines (STGs) for the Nauru Ministry of Health. Indeed, the formulation of the STGs is linked to the established Nauru Essential Medicines List (EML) which lists the essential medicines that satisfy the health care needs of the majority of the population. The Nauru Essential Medicines List was initially agreed to and drawn up in 2011 after a series of public consultation. The rationale for selecting a limited number of essential medicines is that it leads to better supply forecasting and management, reducing costs in the long run.

The careful selection and implementation of an identified list of essential medicines is a proven, effective intervention that enhances access to and rational use of pharmaceuticals, leading to improved quality of care. I note that the notion of an EML has become an established approach in the field of international public health and is supported by governments and health care providers around the world.

Along with EML and formularies, STGs help promote rational use of medicine as it was developed in close collaboration with end users through a consultative and consensus-building process. It also help simplify medicine supply, treatment decisions, trainings, and others.

I congratulate the Senior Pharmacist, Clinical Consultant and all staff involved in the formulation of the STGs. The path is now available for the health authorities and all health care providers at all levels, to commit themselves in ensuring that the medicines are available and that this new STGs now offers a guide to their usage.



Hon. Valdon Dowiyogo
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Reference is also made to the following document, produced by the MOH:

- Infection control manual for RON Hospital

We wish to acknowledge the continuous support of the Ministry of Health through the office of the Director Medical Services in the production of the first ever edition of the STGs for MOH Nauru which is one of the biggest milestones achieved in terms quality patient care in the Nauru Health Services.

Special thanks to Dr Lepani Waqatakirewa for his valuable contribution to this guidelines.

INTRODUCTION

The production of the Standard Treatment Guidelines (STGs) and Essential Medicines List (EML) for the MOH is one of the major strategies aimed at the achievement of the three principal objectives of the National Medicines Policy for Nauru, which are:

- 1. To provide medicines of acceptable quality to all the people of Nauru for the prevention, treatment and alleviation of illness, within the constraints of a limited budget.*
- 2. To ensure the constant availability (with no stock-outs) and acceptable quality of all medicines on the Nauru Essential Medicines List.*
- 3. To ensure procedures, practices and staff are in place to encourage and educate health practitioners and consumers about rational use of all medicines.*

The medicines in the EML are derived from the Guidelines which, logically, should be agreed prior to putting the EML together. The STGs and EML in this case have been developed together.

The production of the STGs was a collaborative effort by senior clinicians and pharmacist at Republic of Nauru Hospital. They are intended to be used by medical officers, dentists, health officers, nurses and pharmacy staff in Nauru.

These guidelines are based on those produced by Tonga and by Fiji. Both of these countries used the Australian evidence-based “Therapeutic Guidelines” series as a partial base for their recommendations and the version of these published in April 2013 has been used to underpin some of our recommendations. These three sources are gratefully acknowledged.

DISCLAIMER

These guidelines form an acceptable basis for management of patients, but there may be sound clinical reasons for different therapy in individual patients or in specific institutions. The complexity of clinical practice requires that, in all cases, users understand the individual clinical situation and exercise independent professional judgement when basing therapy on these guidelines. Particularly in complicated situations, these guidelines are not a substitute for seeking appropriate advice.

These guidelines do not include comprehensive information about medicines, some of which may be important: usually contraindications and precautions for the recommended medicines are not included. Responsible use requires that the prescriber is familiar with these matters.

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ABBREVIATIONS AND ACRONYMS

| | | |
|------------------|---|---|
| β | - | Beta |
| < | - | Less than |
| > | - | More than |
| \geq | - | More than or equal to |
| \uparrow | - | Increase |
| \downarrow | - | Decrease |
| ® | - | Trade name |
| A&E | - | Accidents and Emergencies |
| ABC | - | Airway, breathing and circulation |
| ABG | - | Arterial blood gas |
| ACEI | - | Angiotensin converting enzyme inhibitor |
| ACS | - | Acute Coronary Syndrome |
| AFB | - | Acid fast bacilli |
| ALS | - | Advanced life support |
| AMI | - | Acute myocardial infarction |
| Amp | - | Ampoule(s) |
| ARDS | - | Acute Respiratory Distress Syndrome |
| ARM | - | Artificial rupturing of membranes |
| ASOM | - | Acute suppurative otitis media |
| bd / bid | - | Twice a day |
| BMI | - | Body mass index |
| Ca ⁺⁺ | - | Calcium ions |
| CCF | - | Congestive cardiac failure |
| CD's | - | Communicable Diseases |
| CMV | - | Cytomegalovirus |
| COPD | - | Chronic obstructive airways disease |
| COPD | - | Chronic obstructive pulmonary disease |
| CPAP | - | Continuous positive airways pressure |
| CPR | - | Cardio-pulmonary resuscitation |
| Cl ⁻ | - | Chloride ions |
| CSF | - | Cerebro-spinal fluid |
| DOT | - | Directly observed treatment |
| dpm | - | Drops per minute |
| EBM | - | Expressed breast milk |
| EBV | - | Epstein-Barr virus |
| ECG | - | Electrocardiography |
| EML | - | Essential Medicines List |

| | | |
|------------------|---|--|
| ET | - | Endotracheal |
| FBC | - | Full blood count |
| FEV1 | - | Forced expiratory volume in one second |
| FNA | - | Fine needle aspiration |
| GA | - | General anaesthetic |
| GCS | - | Glasgow Coma Scale |
| GDM | - | Gestational diabetes mellitus |
| GTN | - | Glyceryl trinitrate |
| GTT | - | Glucose tolerance test |
| HAP | - | Hospital acquired pneumonia |
| HDU | - | High Dependency Unit |
| HIV | - | Human Immunodeficiency Virus |
| hr | - | Hour(s) |
| ICU | - | Intensive Care Unit |
| IHD | - | Ischaemic heart disease |
| IMI | - | Intra-muscular injection |
| IU | - | International Units |
| IUFD | - | Intrauterine foetal death |
| IV | - | Intravenous |
| J | - | Joules |
| K ⁺ | - | Potassium ions |
| L | - | Litre |
| LA | - | Local anaesthetic |
| LFT | - | Liver function test |
| LVED | - | Left ventricular end diastolic |
| LVF | - | Left ventricular failure |
| LVH | - | Left ventricular hypertrophy |
| max. | - | Maximum |
| Mg ⁺⁺ | - | Magnesium ions |
| min | - | Minute(s) |
| mL | - | Millilitre(s) |
| MO | - | Medical Officer |
| MOH | - | Ministry of Health |
| MVA | - | Motor vehicle accident |
| N/S | - | Normal saline solution |
| Na ⁺ | - | Sodium ions |
| NCD's | - | Non Communicable Diseases |
| NGT | - | Nasogastric tube |
| Obs & Gyn | - | Obstetrics and Gynaecology |

| | | |
|------------------|---|------------------------------------|
| ORS | - | Oral rehydrating solution |
| PA | - | Postero-anterior |
| PCR | - | Polymerase chain reaction |
| PEFR | - | Peak expiratory flow rate |
| PO ₄ | - | Phosphate |
| prn | - | When required or when necessary |
| q12h | - | Every 12 hours |
| q4h | - | Every 4 hours |
| q6h | - | Every 6 hours |
| q8h | - | Every 8 hours |
| qh | - | Every hour |
| qid | - | Four times a day |
| RON | - | Republic of Nauru |
| SAH | - | Sub-arachnoid haemorrhage |
| SaO ₂ | - | Saturation of oxygen |
| SC | - | Subcutaneous |
| SCC | - | Squamous cell carcinoma |
| SL | - | Sub-lingual |
| STEMI | - | ST elevation myocardial infarction |
| STG | - | Standard Treatment Guideline |
| STI | - | Sexually transmitted infection(s) |
| SVT | - | Supraventricular tachycardia |
| TB | - | Tuberculosis |
| tds / tid | - | Three times a day |
| TFT | - | Thyroid function test |
| TKVO | - | To keep vein open |
| TMJ | - | Temporo-mandibular joint |
| UEC | - | Urea electrolytes and creatinine |
| UTI | - | Urinary tract infection |
| VF | - | Ventricular fibrillation |
| VSD | - | Ventricular septal defect |
| VT | - | Ventricular tachycardia |
| WHO | - | World Health Organization |

1 ACCIDENT AND EMERGENCY (A&E)

1.1 THE AGGRESSIVE PATIENT

1.1.1 Approach to the Aggressive Patient

- Avoid physical confrontation
- Keep an escape route open
- Direct body or eye contact can be provocative to patients
- Remember personal space when dealing with psychotic patients
- Get immediate help from security or police

Management

With physical violence, safety for staff and other members of the public takes priority. A calm approach with talking and listening can resolve a violent act.

Employ physical restraint only if there is risk that other members of the public may get hurt. Use a minimum degree of force to control episode. Hold limbs near joints to prevent fracture. Grasp clothes, not body, if possible. Don't apply pressure to neck, throat, chest or abdomen. Use the hospital's security staff to assist in restraining violent patients and if necessary, call the police for assistance.

At the same time, talk to the patient and try to reassure you are trying to help.

Pharmacologic restraint should be a last resort. *IV diazepam* is probably safest. An alternative choice is *midazolam IMI*, at *0.1mg/kg up to 5-20mg*.

1.1.2 Aggressive and Confused Patients

- Think of possible causes
- Sedate patient if necessary
- Maintain Airways, Breathing and Circulation – ABC – and treat any reversible cause
- If a psychiatric cause is suspected call psychiatry staff

- If organic cause is suspected, admit to medical ward after proper sedation.

Possible causes

- Substance intoxication or withdrawal: e.g. alcohol, cocaine, benzodiazepines or marijuana
- Psychiatric disorders especially if there is a history of psychosis due to schizophrenia, or associated with dementia
- Organic delirium due to hypoglycaemia, electrolyte disturbance, hypoxia, sepsis, head injury, meningitis, liver / renal failure
- Intracerebral haemorrhage

Restraint

- Use relatives, security guards or if necessary police to hold the patient
- Sedation using IMI initially. The IV access may be safely obtained after initial control with IMI

Sedation

- *IMI midazolam 5-20mg*
OR
- *IMI chlorpromazine 100-200mg*
OR
- *IV diazepam 5-10mg*
PLUS
- *IV haloperidol 5-10mg*

Remember to document all medications used and the time of administration.

1.2 CARDIAC ARREST

1.2.1 First on the Scene

- Assess the patient
- Call for help and commence one person CPR
- Ask for the resuscitation trolley to be brought to the bed side
- Assemble oxygen equipment, using bag mask device with oxygen flow at 15 litres

- Bring defibrillator and attach monitoring leads to patient
- Pull out bed and remove unwanted furniture
- Two people CPR to commence as soon as help arrives
- Draw up emergency drugs such as:
 - *Adrenaline 1mg (10mL of 1:10,000 or 1mL of 1:1000)*
 - *Amiodarone 300mg diluted in 20mL of 5% dextrose*
 - *Atropine 1mg*

1.2.2 CPR Ratios

- 30 compressions to 2 breaths

1.2.3 Documentation

After team arrives, one member is delegated to document arrest procedure on the Emergency Documentation Sheet. A record should be kept of:

- Time resuscitation team and defibrillator arrived
- Shocks – times/joules delivered
- Drugs – times/doses administered
- Time resuscitation ceased
- Outcome
- Notification of family

1.2.4 Debriefing

- This should occur after every emergency situation
- Senior person to initiate debriefing for involved staff

1.2.5 Basic Life Support Algorithm

Based on the Australian and New Zealand Resuscitation Council's advice, 2012.

Basic life support is the technique of rescue breathing combined with chest compressions to temporarily maintain a circulation to preserve brain function until a specialised treatment is available (such as Advanced Life Support) (**Figure 1.1, Figure 1.2**).

CPR should be commenced when there is no sign of life – unresponsiveness, unconscious, not breathing and not moving. The compression to ventilation ratio should be 30:2 for infants, children and adults.

Figure 1.1 Basic life support flow-chart

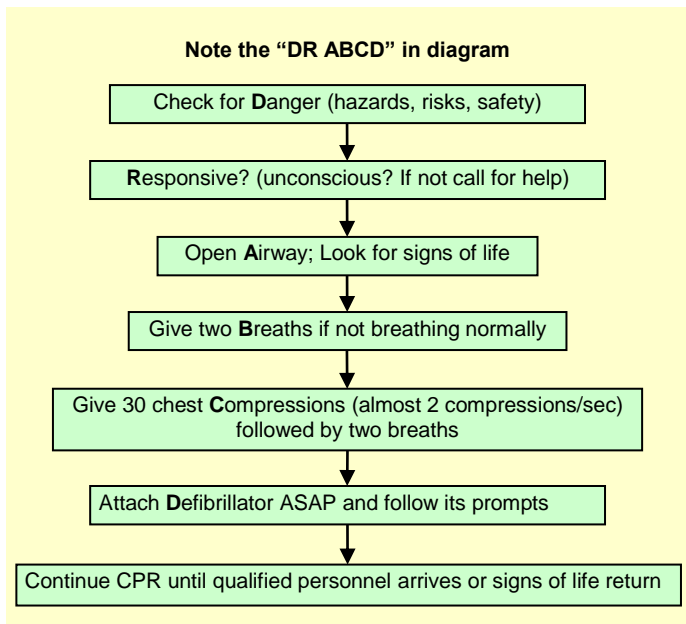
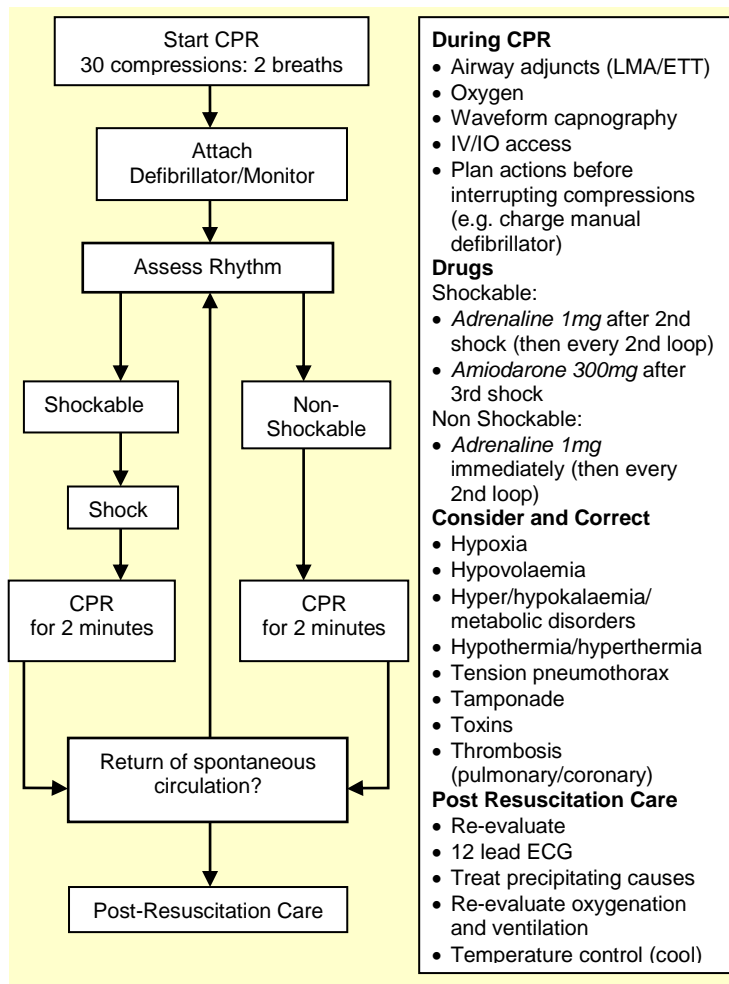


Figure 1.2 Cardio Pulmonary Resuscitation Guide

- For persistent VF, consider:
 - *Magnesium sulphate 0.1-0.2mmol/kg (8-16mmol of Mg⁺⁺ or 2-4g for adults) IV push over 10 minutes, for torsade de pointes*
 - *Lignocaine 1-1.5mg/kg IV push*
 - Different defibrillator
 - Change pad position.
- Paediatric doses of resuscitation drugs:
 - *Amiodarone: 10mg/kg IV or intraosseous*
 - *Lignocaine: 1mg/kg IV or intraosseous*
 - *Adrenaline: 10mcg/kg IV or intraosseous*
 - *Atropine: 20mcg/kg IV or intraosseous*
 - *Magnesium sulphate: 0.1-0.2mmol/kg IV or intraosseous*
 - *Sodium bicarbonate: 1mmol/kg IV slowly. This solution is incompatible with a lot of medicines and IV line must be flushed out before and after the administration of sodium bicarbonate.*

1.3 OTHER LIFE THREATENING EMERGENCIES

1.3.1 Acute Anaphylaxis

A sudden generalised acute hypersensitivity reaction to drugs (like penicillin, streptokinase, aspirin), stings (bee/wasp), foods (nuts, shellfish) or vaccines.

Clinical features

- A feeling of impending death may be experienced
- There may be swelling of tongue, lips, pharynx and epiglottis leading to upper airway obstruction
- The lower respiratory system shows features similar to acute asthma
- Skin shows urticaria, erythema, pruritis and angioedema
- CVS shows peripheral vasodilatation and ↑ vascular permeability leading to plasma leakage, ↓ intravascular volume, hypotension and shock
- Arrhythmias, ischaemic chest pain and ECG changes may also be present

Treatment

- Discontinue suspected agent if possible
 - Ensure ABC
 - Open airway by intubation or tracheotomy (crico-thyroidotomy) if needed
 - Give *100% oxygen (6L/min via face mask)*. If bronchospasm present, *nebulise with salbutamol (Ventolin®) 5mg and oxygen*
 - If IV access in adults, *titrate adrenaline in 50-100mcg aliquots (0.5-1mL of 1:10,000), give an aliquot per minute, max. 5mL*
 - If no immediate IV access, *give adults IMI adrenaline 0.5mL (1:1,000 solution or 0.5mg), every 5 minutes if no clinical improvements*
 - For children, *make 1:10,000 adrenaline solution and give 0.1mL/kg of this solution either IMI or SC*
 - *Dose of IMI adrenaline (adrenaline 1mg/mL (1:1000))*
 - Child under 6 years, 150mcg (0.15mL), repeat every 5 mins if necessary
 - Child 6-12 years, 300mcg (0.3mL), repeat every 5 mins if necessary
 - Child 12-18 years, 500mcg (0.5mL), repeat every 5 mins if necessary
 - If a child is small or pre-pubertal, 300mcg (0.3mL) should be given
 - **Fluids:** *Give IV fluid to correct hypotension. Either N saline or a colloids infusion will restore volume*
 - **Antihistamine:** *Give IMI promethazine (12.5-25mg or 0.1mg/kg in children; every 6 hours)*
- PLUS
- **Steroids:** *IV hydrocortisone 100-200mg every 6 hours or 1-2mg/kg for children.*
 - N.B. promethazine has a more sedative effect than chlorpheniramine. Chlorpheniramine is used as an adjunct to adrenaline (epinephrine) in the emergency treatment of anaphylaxis and angioedema

- *Dose of chlorpheniramine: By mouth (Child)*
 - 1 month – 2 yrs 1mg BD
 - 2-6 yrs 1mg every 4-6hrs,max 6mg daily
 - 6-12 yrs 2mg every 4-6hrs,max 12mg daily
 - 12-18 yrs 4mg every 4-6hrs,max 24mg daily
- Emergency treatment of anaphylaxis reactions, symptomatic relief of allergy by IM or IV injection (Child):
 - <6 months 250mcg/kg (max 2.5mg) repeated if required up to 4 times in 24 hours
 - 6 months-6 yrs 2.5mg, repeated if required up to 4 times in 24 hours
 - 6-12 yrs 5mg, repeated if required up to 4 times in 24 hours
 - 12-18 yrs 10mg, repeated if required up to 4 times in 24 hours
- Administration: for IV injection, give over 1 minute; if small dose required, dilute with sodium chloride 0.9%
- Admit
- Observe for 24 hours in case reaction relapses
- Report all anaphylaxis and label in clear red ink, on patient's chart, the cause of the anaphylaxis as a warning and for future reference.

1.3.2 Acute Pulmonary Oedema

This can be due to either cardiogenic or non-cardiogenic causes.

Cardiogenic pulmonary oedema

Due to left ventricular failure leading to ↑ LVED pressure, ↑ pulmonary capillary hydrostatic pressure, and collection of fluid in the extravascular pulmonary tissue, at a faster rate than the lymphatics can clear it.

Causes

AMI, IHD, arrhythmias, hypertension, valvular diseases, cardiomyopathy, drugs such as β-blockers, acute myocarditis, left atrial myxoma and pericardial diseases.

Signs and symptoms

Shortness of breath, maybe chest pain, tachypnoea, tachycardia and anxiety. If the pulmonary oedema is severe, may be central cyanosis with pink frothy sputum. On auscultation, fine inspiratory crepitations at lung bases plus wheezes. A 3rd and 4th heart sound may be heard too (difficult to hear in a noisy A&E).

Investigations

Cardiac monitor, SaO₂ with pulse oximeter, do ECG to check for ischaemia, request hospital notes, request CXR and send blood for FBC, UEC, RBS, and for CK and/or troponin if possible (troponin measurement will become available in Nauru in the near future).

Treatment

- ABC
- Sit patient up and support with pillows in a comfortable position
- Oxygen high flow through face mask
- IV access
- Give slow IV frusemide, 40mg stat
- Repeat IV frusemide if needed after 20 minutes by 20mg increments up to a max. of 120mg while in A&E
- IV morphine in 1-2mg aliquots, give slowly. (usually to a total of 5-10mg). Do not give in COPD, low BP, and in cases with depressed mental state. Give metoclopramide 10mg IV to counteract the emetic effect of morphine.
- If the systolic BP is >90mmHg, give SL glyceryl trinitrate (Anginine®)
- Treat or refer for treatment of underlying causes (e.g. arrhythmias, AMI, cardiogenic shock, prosthetic valve problem)
- If patient is hypotensive, give IV dopamine infusion
- If hypertensive, give nifedipine: chew and swallow nifedipine SR 20mg (also see Section 2.7.5).

Non-cardiogenic pulmonary oedema

This occurs without the increase in pulmonary venous pressure. The following mechanisms can cause it:

- ↑ capillary permeability (Commonest cause in non-cardiogenic pulmonary oedema; classical example is the ARDS)

- ↓ plasma oncotic pressure
- ↑ lymphatic pressure

Causes

- ARDS secondary to sepsis, trauma, pancreatitis
- Intracranial haemorrhage
- IV fluid overload
- Hypoalbuminaemia due to either liver or kidney failure
- Smoke inhalation
- Near drowning
- Lymphangitis carcinomatosa
- Drugs, poisons, chemical inhalations

Approach

- Distinguishing from cardiogenic pulmonary oedema is usually apparent from the **history**
- Attach cardiac monitor, do ECG, check for O₂ saturation with pulse oximeter, blood for UEC, glucose, FBC, blood gas if possible, sit patient up, give *high flow oxygen*, *IV frusemide 40-100mg slowly*, admit for further managements.

1.3.3 Asthma

See also Section 18.5.

This is a pulmonary disease characterised by reversible airway obstruction, airway inflammation, and increased airway responsiveness to a variety of stimuli.

Severity is categorised into mild, moderate or severe (**Table 1.1**).

Table 1.1 Asthma Severity Scale

| Severity of asthma | PR | RR | Costal Recession (infants) | PEFR* | SaO ₂ |
|--------------------|---------|------------|----------------------------|---------|------------------|
| Mild | <100 | 12-20 (N) | None | 200-300 | > 95% |
| Moderate | 100-120 | 20-40 | Moderate | 100-200 | 85-95% |
| Severe | >120 | >40 or <10 | Extensive | <100 | <85% |

(N) = normal

* Peak Expiratory Flow Rate (PEFR) meters are available in Nauru and should routinely be used to monitor older children and adults with asthma

Mild asthma

- Measure and record PEFR
 - *Nebulise with salbutamol solution – 1mL of 5mg/mL solution added to 1mL of sterile water*
- PLUS
- *Ipratropium bromide 1mL (250mcg/mL). Children below 10 years, use dose according to age.*
- Review after 15-30 minutes. Take and record post-nebulise PEFR
- *Repeat nebulised salbutamol if PEFR <250*
- Reinforce need for compliance with maintenance treatment
- Arrange follow-up clinic. Discharge home

Moderate / severe asthma

- ABC
- *Oxygen 10L/min via face mask to maintain oxygen saturation at or above 92%*
 - *Nebulise: Salbutamol solution 1mL (5mg/mL) added*
- PLUS
- *Ipratropium bromide 1mL (250mcg/mL). Children below 10 years, use dose according to age.*
- *Steroids: Oral prednisolone 50mg stat for adults; children 1mg/kg for five days.*
- Observe for 15-30 minutes. *Repeat salbutamol nebuliser if PEFR <200*
- Observe and reassess after 30 minutes
- Take PEFR if increases by >50% = Improved, home

- Take PEFr if increases by $<50\%$ = Requires admission
- If improved, *home on prednisolone 50mg/day for three days then 10mg daily for two days, then stop*
- If no response – **admit**

NOTE: Steroids reduce inflammation of the airways. Their effects are delayed for at least 4 hours but they are important to prevent relapse. Oral steroids are as effective as those given parenterally in most patients. If you are not controlling the asthma with inhaled medication **do not hesitate** to commence steroids as above.

1.3.4 Diabetic Emergencies

Diagnosis - IS IT HYPOGLYCAEMIA OR HYPERGLYCAEMIA?

HYPO:

Rapid onset of pallor, sweating, tachycardia and odd behaviour, lapsing into unconsciousness if untreated.

HYPER:

Gradual onset of overbreathing, acetone breath, dehydration and depressed consciousness.

Hypoglycaemia

- Ensure ABC
- Do a glucometer reading
- Obtain blood for blood sugar, FBC and UEC
- Administer glucose: If conscious *give sweet soft drink or 3 teaspoons of sugar in a glass of water or 3 lollies*. Repeat after 10 minutes if needed.
- If unconscious or swallowing impaired, *give IV glucose; 50% dextrose (25-50mL) bolus via IV large cannula*. Repeat after 10 minutes if no response or *10% dextrose infusion and run full speed*.
- Repeat glucometer reading when level of consciousness improves.
- If satisfactory clinical improvement; send home but ensure a full meal is given within half hour to avoid a second hypoglycaemic episode
- Check drug therapy and follow-up clinic schedule

- Provide education/counselling about compliance, meals and home treatment of hypo attack, and discharge home
- If drowsiness persists; *give IMI glucagon 1mg; IV dextrose infusion with 10% dextrose and admit*

Ketoacidotic hyperglycaemia

Features

- Usually younger patients
- Drowsy and dehydrated
- Hyperventilating due to acidosis – sounds like they have just been exercising
- Vomiting, oliguria and abdominal pain
- In severe cases, may have also altered mental state, or loss of consciousness, and shock.

Initial treatment at A&E

- Insert IV line and infuse N/S; Run full speed 1 to 2 litres in first one hour
- Blood for FBC, Blood glucose, UEC, blood culture if febrile
- Cardiac monitor
- *Oxygen via mask*
- *Soluble insulin: Stat. 10 units IV plus 10 units IMI, followed by 6 units IMI hourly until half hourly plasma glucose falls to 10 mmol/L.*
- When glucose falls below 10mmol/L, *give 6 units soluble insulin IMI every 2 hours and change infusion to IV dextrose 5%.*
- Treat hypokalaemia confirmed by urgent potassium result. If low, *add potassium 10-20mmol into second litre of fluid.*
- Urinary catheter if unconscious, shocked or profound metabolic disturbance.
- Nasogastric tube if patient unconscious or vomiting. Note that acute gastric dilatation is a complication of this condition.
- Accurate observations: BP, PR, urine output, mental state
- **Admit**

1.3.5 Comatose Patient (Checklist)

- ABC as a priority

- Insert large bore needle and take blood for FBC, UEC, RBS, X-match if bleeding and blood culture if signs of infection
- Run IV fluids: N/S, rates depend on degree of hypovolaemia

C = CERVICAL SPINE

- Immobilise the cervical spine (sandbags or collar) if trauma known or suspected. In non-traumatic cases, check for neck stiffness.

D = DRUGS

- *Give 20-50mL IV of 50% glucose if immediate glucose check is low or delayed for any reason, especially with history of diabetes*

E = ENDOCRINE

- Check glucometer and blood glucose
- Consider the possibility of Addisonian crisis or myxoedema coma – if hypocorticism is possible *give hydrocortisone 100mg IV stat.*

E = EYES

- Check pupil size and reaction to light
- Look for unilateral dilated pupil (? Tentorial herniation)
- Check fundi

F = FITS

- *IV diazepam 10mg slow push, titrate to effect (Alternative treatment is midazolam IMI or IV)*

F = FEVER

- Check the temperature, may require rectal probe
- *Give rectal paracetamol suppository if febrile*

G = GLASGOW COMA SCALE

- Please refer to Section 21, **Table 21.1**
- Evaluate the verbal, motor and eye response to stimuli.

G = GASTRIC TUBE

- Insert nasogastric tube if intubated

H = HISTORY

- H/O of trauma, diabetes, medication, drug ingestion, epilepsy and psychiatric history

Neurological examination

Assess level of consciousness:

- Assign GCS
- Breathing pattern
- Eye signs
- Cough, gag and lash reflex
- Posture
- Spontaneous movement and response to pain
- Tone and tendon reflex
- Plantar reflex

General physical examination and investigations

- Blood for FBC, electrolytes, creatinine and blood glucose
- Radiology if indicated
- **Admission will normally be required**

1.3.6 Myocardial Infarction

Make a clinical diagnosis from history and presenting condition. Administer the following, one after another or simultaneously if possible and help is available:

- Ensure ABC; give oxygen by mask or nasally, at 10-12L/min
- Attach patient to cardiac monitor and ECG
- *Glyceryl trinitrate (GTN), one tablet sublingually stat.*
- *Aspirin 100 - 300mg chewed or dissolved before swallowing stat.*
- *Morphine 2.5mg IV stat and repeat every 5-10 minutes if chest pain persists. Maximum dose = 10-15mg.*
- *IV metoclopramide 10mg IV if needed*
- *Heparin, if patient is not responding to morphine. Give 5,000 units IV stat.*
- IV line, N/S TKVO
- Draw blood while inserting IV access for FBC, UEC, glucose and cardiac enzymes

- Give IV streptokinase (if available) where indicated and where there is no contraindication to its use. For precautions see below Section 2.2.7
- Reassess vital signs
- Transfer to ward when stable; CXR on way

1.3.7 Acute Poisoning

General principles

- Clear and maintain airway
- If breathing appears inadequate, ventilate with *Oxygen using bag and mask or ET tube*; never with mouth to mouth
- Check pulse; if unconscious and pulseless, do CPR
- Gastric aspiration where indicated and staff are competent (Contraindicated in reduced level of consciousness, unless airway secured with endotracheal tube) and in ingestion of volatile and corrosive substances
- Give charcoal
- Give antidote if available (**Table 1.2**)

Table 1.2 Acute poisonings and their antidotes

| Name of suspected agent/s | Antidote/s | Other management principles |
|--|------------------------------|--|
| Paracetamol | <i>Acetylcysteine</i> | If within one hour, give <i>charcoal</i> . If high level of ingestion is suspected, admit for consideration of <i>acetylcysteine</i> . |
| Aspirin® | <i>Oral charcoal</i> | <i>Vitamin K 10mg IMI stat</i> , maintain hydration and blood glucose level; admit |
| Carbon monoxide | <i>100% oxygen</i> | Consider this in all burns, smoke inhalation, coma or attempted suicide. Refer for admission |
| Corrosives like acid, bleach, disinfectant | <i>Milk and water orally</i> | Do not induce vomiting. Admit if oesophageal damage is suspected. |
| Petroleum | <i>Oxygen</i> | Do not induce vomiting. Admit if symptoms are severe. |
| Stone fish sting | | Put sting into warm water (almost hot but not burning). <i>Give pain relief with plain lignocaine 1%</i> , injected along sting track. <i>Opioid may be needed</i> . <i>Give tetanus toxoid if needed</i> . Refer to hospital if severe symptoms or suspecting foreign body. |
| Fish poisoning | | Presents with diarrhoea, abdominal pain, vomiting usually within 2-12 hours (up to 36 hours) from eating larger fish. Paraesthesia, pins and needles, muscle aches, depression, irritability, rarely breathing difficulty, slow pulse and low blood pressure. Induce vomiting if eaten fish in last 4 hours. Give IV fluid. Admit if symptoms are severe and risk of further neurological impairment. |
| Methylated spirit (methanol) | <i>Ethanol</i> | Admit for management in hospital as soon as possible |

Organophosphate poisoning has been taken out of these guidelines as there appears to be a low risk of exposure in Nauru with very little agriculture. The use of alternative insecticides is clearly a better option than continuing to use any organophosphate preparation.

- Coma with hypotension, respiratory depression and ↓ muscle tone suggest benzodiazepines with/without alcohol or severe tricyclic antidepressant poisoning.
- Coma with pinpoint pupils and slow respiration is typical of opioid poisoning (treat this with *naloxone*)
- Tinnitus, hyperventilation, deafness, sweating, nausea and tachycardia are typical of salicylate poisoning
- Agitation, tremor, dilated pupils, tachycardia suggest amphetamines, “ecstasy”, cocaine or sympathomimetics.

1.3.8 Seizures

Emergency management of seizures (Status epilepticus)

- ABC
 - Airway: insert between teeth
 - Insert padded spatula to prevent tongue biting
 - Protect the patient from injury and danger
- Administer oxygen
- Place in Coma position. Carefully observe pattern of seizure, looking for any focal features
- Insert IV and collect bloods
- Drug therapy if fit longer than 3-5 minutes

First line treatment

- *Diazepam IV* is the drug of choice. Dose as follows:
 - **Adults:** *Slow IV injection at 2mg/min until fit controlled. (Draw 10mg and give over 3 minutes). Repeat 5mg if fit not controlled after 15 minutes. Max. dose: 20mg.*
 - **Children:** *Slow IV injection at 0.2mg/kg OR rectal flush at 0.3mg/kg (Table 1.3). Dilute with 1mL water for injection. Use a 1mL or 2mL syringe. Repeat dose if fits not controlled after 5 minutes.*

Table 1.3 Diazepam dosing rates (Child)

| Age | IV Diazepam | PR Diazepam |
|----------------------|---------------|-------------|
| One yr (10kg) | 2mg = 0.4mL | 3mg = 0.6mL |
| Two yrs (13kg) | 2.5mg = 0.5mL | 4mg = 0.8mL |
| Three yrs (16kg) | 3mg = 0.6mL | 5mg = 1.0mL |
| Four/Five yrs (20kg) | 4mg = 0.8mL | 6mg = 1.2mL |

Note: Above Diazepam dose/administration also applies to **Febrile Convulsions** in children.

If diazepam is not available, use any of the following drugs instead:

- *Midazolam: Can be given nasally, buccal, IMI or IV. Nasal or buccal dose is 0.3mg/kg up to a max. of 7.5mg. IMI dose is 0.1mg/kg up to 5mg. Use the 5mg/mL strength. IV dose is 0.1mg/kg up to 5mg, slowly, over 2 minutes. Dilute the ampoule to make up a 1mg/mL strength. For the 5mg/mL strength, dilute 1mL of it, in 4mL of N/S.*

Second line treatment

- *Phenytoin IV: If still fitting after the above drugs. Dose = 15mg/kg and give over 30 minutes by slow IV infusion. For children: 3-5mg/kg BW by slow IV infusion*
OR
- *Phenobarbitone 10mg/kg IV or IM which may be repeated hourly up to a maximum of another two doses: followed by maintenance dose of 5mg/kg daily*

Further relevant managements of acute seizure

- Record details of fit from patient or witness
- Do relevant physical examination. Note if fever or meningism present.
- Investigations: FBC, glucose if history of diabetes, UEC, Blood culture if febrile
- **Admit**

Beware of acute dystonia associated with metoclopramide or chlorpromazine administration – usually in younger patients and treated with *parenteral benztropine*, and hysterical seizure which may resemble epilepsy.

1.3.9 Dehydration in Children

Symptoms and signs of dehydration

Table 1.4 Signs and symptoms of dehydration in children

| Signs / symptoms | Mild | Moderate | Severe | Comments |
|----------------------------|---------------------|----------|--------|--|
| | Loss of body weight | | | |
| | < 5% | 5-10% | > 10% | |
| ↓ urine output | | + | + | Beware watery diarrhoea, making nappies appear wet |
| Dry mouth | +/- | + | ++ | Mouth breathers are always dry |
| ↓ skin turgor | - | +/- | ++ | Beware of thin child, use several sites for assessment |
| Sunken anterior fontanelle | - | + | ++ | Crying increases pressure |
| Sunken eyes | - | + | ++ | |
| Tachypnoea | - | +/- | + | Metabolic acidosis and temperature worsen this |
| Tachycardia | - | +/- | ++ | Due to hypovolaemia, pyrexia and irritability |
| Drowsiness / irritability | - | +/- | + | |

Emergency treatment of dehydration

Mild dehydration

- Continue normal feeds / drinks of small amounts, frequently

- Add *Oral Rehydrating Solution (ORS)* or home-based fluids according to **Table 1.5** and until diarrhoea stops
- Teach caregiver how to mix the ORS

Table 1.5 ORS for mild dehydration in children

| Age | Volume of ORS |
|-------------|--|
| < 3 months | 50mL after each diarrhoea or vomiting |
| 4-6 months | 50-100mL after each diarrhoea or vomiting |
| 6-12 months | 100-150mL after each diarrhoea or vomiting |
| 1-2 years | 150-200mL after each diarrhoea or vomiting |
| >2 years | +200mL after each diarrhoea or vomiting |

- Advise caregiver to return if child's diarrhoea deteriorates, child is unable to drink, or has fever or blood in stool.

Moderate dehydration

- Monitor the child and follow the dosage for *ORS* in **Table 1.6**
- Review and admit if no improvement
- Give this volume of fluid (e.g. ORS) within first 4 hours

Table 1.6 ORS for moderate dehydration in children

| Age* | Weight | Volume of ORS |
|-------------|---------|---------------|
| < 4 months | <5kg | 200-400mL |
| 4-12 months | 5-8kg | 400-600mL |
| 1-2 years | 8-11kg | 600-800mL |
| 2-4 years | 11-16kg | 800-1200mL |
| >4 years | >16kg | 1.2-2.0L |

*Use the child's age only if you cannot measure the weight

- The estimated volume of ORS required can be estimated by multiplying the weight in kg, by 75.
- Show parent how to prepare the ORS
- Review child after 4 hours. If well, send home with advice to drink more fluid more frequently, continue feeding and return if: feverish, deterioration in diarrhoea, not drinking and/or blood in stool.

Severe dehydration

- Admit child for rehydration (**Table 1.7**) and management

Table 1.7 Treatment of severe dehydration in children

| IV fluid (Ringer's lactate, Hartmann's solution or N/S) | 30mL/kg in | Then 70mL/kg in |
|---|-------------|-----------------|
| <12 months | 1 hour* | 5 hours |
| Above 12 months | 30 minutes* | 2.5 hours |

* Repeat dose if radial pulse is very weak or non-detectable

- Reassess child every 15-30 minutes
- If hydration status is not improving, increase speed of IV fluid
- If able to drink, give *ORS 5mL/kg/hr*. Reassess child after 3 hours and 6 hours.

When an IV line cannot be inserted

- If child is unable to drink and an IV line cannot be inserted; insert an NGT and give *ORS at 20mL/kg/hour, for the first 6 hours*.
- Reassess every hour for 3 hours. If there is abdominal distension, reduce the infusion rate. If there is vomiting, refer case for IV fluid therapy. If hydration status is not improving in 3 hours, refer case for IV treatment.

1.3.10 Pneumothorax

Air in pleural space leading to partial or total collapse of lung.

Signs

- SOB
- Chest Pain
- Tracheal shift away from injured side towards normal side
- Decreased or absent breath sounds
- Signs of shock
- CXR if time permits

Potential Problems

- Disturbance of the airway and breathing
- Negative thoracic pressure
- Alteration of the integrity of the chest wall and rib cage
- Changes to central nervous system when hypoxia occurs
- Reduction in cardiac output

Management

- Position patient propped up and reassure
- ABC
- Give oxygen – *If using ventimask run 10–12L/min; 6L/min if using intranasal catheter*
- Attach monitors for recording of vital signs and cardiac function
- IV line and collect blood for investigations: FBC, UEC, Cardiac Enzymes
- CXR
- IV fluids:
 - *Plasma expander (e.g. Gelofusion®) 500mL and run fast if bleeding or in shock.*
 - *If not in shock, hook up N/S TKVO.*
- In a tension pneumothorax, insert an 18-gauge needle into the 2nd intercostal space, mid-clavicular line on the side of pneumothorax. When transferring to ward, an under-water seal chest tube inserted at the 5th intercostal space, anterior axillary line.

Drug Therapy

- Pain Relief: *Morphine IV 2.5mg stat and 1–2mg increments to max. of 5mg. **Please note:** Do not give if oxygen saturation below 90%, or depressed mental state, or hypotensive.*

Notes

You can get Pneumothorax from:

- Chest trauma, e.g. stab wounds
- Secondary to rib fracture injuring the lungs
- Secondary to COPD due to ruptured emphysematous bullae (spontaneous pneumothorax)

1.3.11 Burns

- ABC
- *Oxygen*
- Assess degree of burn using Lund - Brunker Chart
- Resuscitation Intravenous fluid – *Hartmann's solution or N/S. For first 24 hours:*
 - **Adults:** 4mL/kg x % area of burn (Rule of 9 chart)
 - **Children:** 3mL/kg x % area of burn

Note: Give half of the total volume for 24 hours in the first 8 hours then give the rest in the remaining 16 hours. The time noted here refers to the **time starting from the burn incident, and not** the time after being seen at hospital.

As an example: a 70kg adult who had 20% burn would need :

- 4mL x 70kg x 20 = 5,600mL per 24 hours
- Give 2,800mL (half) in the first 8 hours (350mL/hour)
- Give the remaining 2,800mL in the next 16 hours (175mL/hour)

Note: The above formula estimates the volume of the resuscitation fluid only. Remember to add the 'normal fluid requirements' for adults or children, on top of this volume.

- Closely monitor patient's pulse, BP, urine output and respiration during resuscitation

Pain Relief

- Morphine injection
 - **Adults:** *Morphine 10mg by IMI or 2mg IV every 5-10 minutes, max. of 10mg*
 - **Children :** *Below 12 months: 200mcg/kg IMI or SC*
1-5 years: 2.5-5mg IMI or SC
6-12 years: 5-8mg IMI or SC
Over 12 years: 10mg IMI or SC

Note: *IV morphine for children is 100mcg/kg.*

- *Tetanus prophylaxis: 0.5mL tetanus toxoid by SC injection (if indicated).*
- Cover and warm the patient

1.3.12 Drowning

Near drowning

Manage the following:

- Aspiration of vomitus and water
- Hypoxia
- Hypothermia

Emergency management

AIRWAY

- Lie patient on side
- Insert oropharyngeal airway
- Apply Suction

BREATHING

- If Breathing – give *oxygen via intranasal tubes or mask*. Assist breathing via bag and mask.
- If not breathing – initiate breathing by endotracheal tube

CIRCULATION

- Check for carotid pulse and apex beat
- If absent cardiac activity perform CPR

TEMPERATURE

- Warm the patient with warm covers

DRUGS

- *IV infusion with dextrose 5%*
- *IV hydrocortisone 200mg stat. Children 50–100mg IV stat.*
- *IV frusemide 40mg stat. Children 20–40mg IV stat.*

1.4 INFECTIOUS AND CONTAGIOUS DISEASES

1.4.1 List of Notifiable Infectious Diseases

Note: In Nauru, certain infectious diseases are “notifiable”.

A clinician who knows or suspects anyone may be suffering from a notifiable disease is obliged by law to notify the Director Medical Services.

- Dengue Fever
- Dysentery (all forms)
- Filariasis
- Food poisoning
- Gastroenteritis
- Hepatitis A or B
- Infectious conjunctivitis
- Tuberculosis
- Influenza
- Meningitis (all forms)
- Pertussis
- Pneumonia (all forms)
- Poliomyelitis
- Rheumatic fever
- Yellow fever
- Measles

One cannot over-emphasise the need to notify these diseases so that appropriate Public Health Surveillance and response activities can be carried out in a timely and effective manner.

1.4.2 Gastroenteritis / Food Poisoning

Common causes

Table 1.8 Common causes of gastroenteritis / food poisoning and related symptoms

| Cause | Incubation | Food | Symptoms |
|-------------------------|------------|----------------|-----------------------|
| <i>Staph. Aureus</i> | 1-6 hours | Meat, milk | D, V, P, shock |
| <i>Bacillus cereus</i> | 1–16 hours | Rice | D, V, P |
| <i>Salmonella</i> | 6–48 hours | Meat, eggs | D, V, P |
| <i>E.coli</i> | 1-2 days | Any food | D, V, P |
| <i>Campylobacter</i> | 1–3 days | Meat, milk | Fever, P, D |
| <i>Shigella</i> | 1–3 days | Any food | Bloody D, V, fever |
| <i>Vibrio parahaem.</i> | 2–3 days | Seafood | Watery D |
| <i>Cholera</i> | 12h–6 days | Water, seafood | Watery D, shock |
| <i>Rotavirus</i> | 1–7 days | | D, V, fever, cough |
| Botulism | 12–96hours | Preserved food | V, paralysis |
| Scombrototoxin | < 1hour | Fish | D, flushing, sweating |
| Chemicals | < 2hours | Food, water | Various |
| Mushrooms | < 24hours | Mushrooms | D, V, P, delusions |

D = diarrhoea; V = Vomiting; P = Abdominal Pain

Treatment

Mostly rehydration using ORS. *Antiemetic* is rarely needed in adults and anti-diarrhoeal is usually not required. IV fluid may be needed in cases of prolonged vomiting. Obviously, such cases may need admission for further investigation and management. In scombroid poisoning (from decayed or contaminated fish), *antihistamines* have a rapid effect on the histaminic symptoms.

Infestations

Treatment of common infestations are listed in **Table 1.9**. Note that for intestinal worms, *Trichuris* and *Strongyloides* occur in Nauru, but *Ascaris* (round worm) has not been detected by the laboratory.

Table 1.9 Infestations and treatment

| Infestation | Treatment |
|------------------|--|
| Intestinal worms | <p>For adults and children over 2 years:</p> <ul style="list-style-type: none"> - <i>mebendazole 100mg as a single dose and repeat after 2-4 weeks</i> - If the condition relapses, <i>mebendazole 100mg bd for 3 days</i> <p>For children under 10kg:</p> <ul style="list-style-type: none"> - <i>mebendazole 50mg bd for 3 days</i> <p>OR</p> <p>Adults and children >6 months and >10kg:</p> <ul style="list-style-type: none"> - <i>Albendazole 400mg as a single dose</i> <p>Child >6 months but <10kg</p> <ul style="list-style-type: none"> - <i>Albendazole 200mg once daily for 3 days</i> <p>Note: For children under 6 months and women in the first trimester of pregnancy; neither mebendazole nor albendazole should be used.</p> <p>OR</p> <p>Adults and children:</p> <ul style="list-style-type: none"> - <i>pyrantel (Combantrin®) 10mg/kg as a single dose</i> |
| Lice (head) | <i>Permethrin solution 1% (see Section 19.4.2)</i> |
| Scabies | <p><i>Benzyl benzoate application 25%</i></p> <p>OR</p> <p><i>Permethrin cream 5% (refer to Section 19.4.1)</i></p> |

1.4.3 HIV

The only case of HIV infection detected in Nauru up to September 2013 was a seaman who arrived by boat and died. So far no Nauruan living on the island has been found to be positive for HIV but screening only occurs for all blood donors, and for antenatal patients who give their consent.

Universal precautions as recommended by the “*RON Hospital Infection Control Manual*” must always be observed at A & E. Remember the following precautions:

- Ensure up to date immunisation against tetanus and hepatitis B
- Cover any open wounds / weeping dermatitis
- Wear gloves during contact with patients’ body / fluids
- Wash hands before and after every patient care
- Consider double gloves during invasive procedures
- Use goggles / masks to protect if aerosolisation is anticipated
- Wear mask if patient has TB.

1.4.4 **Septicaemia**

- A sick patient with: high fever and rigors, who may have embolic signs such as tender cutaneous nodules, enlarged spleen and optic fundal haemorrhages
- Primary source of the infection may not be obvious and treatment may often be based on “best guess” as to causal organism
- Take blood, urine and stool cultures, do FBC, UEC, CXR then admit case for further investigations and management

1.4.5 **Abscess**

- Incise and drain if possible

Give (flu)cloxacillin 500mg oral 6-hourly for up to 7 days
OR

*Cephalexin 250-500 oral 6-hourly or 500mg-1g oral 6-12-hourly
for 5-10 days*

OR

Clindamycin 150-450mg oral 6-8-hourly for 5-10 days

Other acute infections, cardiovascular and cerebrovascular conditions are covered under the relevant body systems in later sections of these guidelines.

1.5 WOUND MANAGEMENT

- Wounds often have medico-legal implications, therefore, record them properly
- From history note: **what, where, when, who caused the wound?**
- Is tetanus cover required?

1.5.1 Wound Examination

On examination, note site, dimension and preferably, draw it. Describe neuro-vascular damage, tendon injuries, loss of functions and bony fractures. Give an opinion on what could possibly have caused the injury (e.g. sharp or blunt instrument). Try to use the following descriptive terms where indicated: **incised wound, laceration, puncture wound, abrasion, bruises.**

Note: X-ray for suspected fracture or foreign bodies. Swab for bacteriology in infected wounds.

Do not explore the following wounds in A&E:

- stab wounds to neck, chest, abdomen or perineum
- compound fracture wounds requiring surgery
- wounds over infected joints or tendon sheaths
- most wounds needing neurovascular/tendon repairs
- wounds needing expert surgery (e.g. eye wounds)

However, arresting bleeding that cannot be arrested with pressure alone may be life saving at A&E before the surgical team arrives.

Note: Do not blind clip bleeding points with artery forceps. This may cause further neurovascular damage. Also, never leave a patient alone with a tourniquet on!

1.5.2 Wound Repair

Aims of wound repair

- Apposition
- Eversion
- Minimal tension

Anaesthesia

- Local
 - *Lignocaine 1 or 2% plain*
 - *Lignocaine + adrenaline (never in digits, ears or penis)*

Cleaning

- *Antiseptic e.g. chlorhexidine*
- Irrigation with N/S (copious amount). This is the most important measure.

Exploration

- Extent of wound
- Foreign bodies

Debridement

- Remove dead/devitalised tissue

Closure

- Primary
- Delayed primary
- Secondary

Dressing / immobilisation

- Gauze and bandage
- Plaster for tendons/fingers/joints
- Elevation
- Rest and immobilise

Remember: Heavily contaminated wounds should be thoroughly cleaned and dressed and should not be sutured. Crushed wounds of hands and fingers should also be cleaned and dressed only and not sutured.

1.5.3 Drug Therapy**Tetanus prophylaxis**

- Tetanus prophylaxis of wounded patients is given according to immunisation status:
 - Below 10 years: no tetanus toxoid needed if fully immunised

- 10 – 15 years: if patient has not received tetanus toxoid in the last five years, give *one booster dose 0.5mL SC injection*
- Over 15 years: if patient has not received tetanus toxoid in the last 5 years, give *one booster dose stat 0.5mL SC injection and repeat after 4 weeks*

Antibiotics

- Use only in contaminated wounds
 - (*Flu*)cloxacillin for 5 days

1.6 DOG BITE

This is a fairly common injury in Nauru. Dog bites inject a wide range of micro-organisms and should be treated as soon as possible.

Assume that Gram positive, Gram negative and anaerobic infections are present.

1.6.1 Dog Bite Treatment

- Clean the wound
- Remove any dead or non-viable tissue
- Ensure *tetanus prophylaxis* has been given:
 - Below 10 years: no tetanus toxoid needed if fully immunised
 - 10 – 15 years: if patient has not received tetanus toxoid in the last five years, *give one booster dose 0.5mL SC injection*
 - Over 15 years: if patient has not received tetanus toxoid in the last 5 years, *give one booster dose stat 0.5mL SC injection and repeat after 4 weeks*
- Antibiotic coverage: Presumptive therapy is necessary, use
 - *Amoxicillin/clavulanic acid 500+125mg orally, 12-hourly for 5 days*
 - If the commencement of the above is likely to be delayed, *give procaine penicillin (child: 50 mg/kg up to) 1.5 g IM, as 1 dose, followed by amoxicillin/clavulanic acid as above*
OR
 - *Doxycycline 100mg orally, OD*
PLUS
 - *Metronidazole 400mg orally, 12-hourly for 5-10 days*

2 CARDIOVASCULAR CONDITIONS

2.1 HEART FAILURE

2.1.1 Primary Disease Processes Which May Lead to Heart Failure

- Ischaemic heart disease: myocardial infarction, ischaemic cardiomyopathy
- Hypertension: systemic or pulmonary
- Heart valve disease: especially mitral and aortic valve disease
- Pericardial disease: constrictive pericarditis, tamponade
- Congenital heart disease
- High output states: cardiac beri-beri (alcoholics), Paget's disease, thyrotoxicosis

2.1.2 Contributing Factors

The following are generally **not** the primary cause of heart failure, but may exacerbate the physiological disturbance and therefore need to be considered when managing heart failure:

- Arrhythmias
- Drugs with negative inotropic action such as β -blockers, calcium antagonists, most antiarrhythmics
- Withdrawal of diuretics, ACE inhibitors, or digoxin, or poor compliance
- Fluid retention: steroids, NSAIDs, liquorice, anaemia
- Thyrotoxicosis – particularly in the elderly
- Infections (especially endocarditis and pulmonary infection)
- Pulmonary embolism
- Fluid overload (e.g. transfusion, renal failure).

2.1.3 Investigations

May be delayed while acute therapy is instituted and initial symptoms controlled.

- CXR (pulmonary venous congestion/oedema, cardiac size, pulmonary infiltrates)
- ECG (arrhythmias, ischaemia, past infarction)
- Myocardial injury markers: CK, troponin (will be available in Nauru shortly), ABG (hypoxia, metabolic acidosis – suggests lactic acidosis due to compromised peripheral circulation)
- Na⁺, K⁺ (urgently if ECG or rhythm abnormal), creatinine, Ca⁺⁺, PO₄
- FBC + diff.
- Echocardiography to assess LV function, valves, RV pressure estimate (urgent if tamponade or bacterial endocarditis suspected)
- TFT

2.1.4 Therapy

Correct any contributing factor such as arrhythmias, infection.

Acute pulmonary congestion, pulmonary oedema

- Sit patient upright
- *Oxygen at 4-6L/min to maintain SaO₂ >90%*
- *Glyceryl trinitrate – 0.6mg tablet sublingually. Repeat doses every 5 minutes in patient with acceptable blood pressure.*
- *Morphine 2.5-5mg IV slowly over 3-5 minutes, count respiratory rate every 5 minutes.* Care needed in patients with diminished level of consciousness and/or CO₂ retention.
- *Frusemide 40mg IV – repeat as necessary to initiate diuresis.* The effective dose will vary and a larger dose may be needed if patient is on frusemide maintenance or has renal impairment.
- Less distressed patients may not need morphine and *oral frusemide* may be sufficient. Be alert to poor absorption from an oedematous GI tract.
- If patient does not respond to initial treatment then CPAP by face mask; and haemodynamic monitoring should be considered.
- CPAP is useful if hypoxia persists after initial treatment and may avert the need for intubation and mechanical ventilation. It is best started before the patient becomes severely fatigued. If prolonged therapy with high O₂ concentrations is required, consider other ventilatory supports.

Compromised myocardial function

- Low output states can be managed by increasing myocardial contractility (inotropic support) or reducing the cardiac workload (pre load and after load reduction).
- Inotropic Support:
 - *Digoxin* for control of ventricular response in atrial fibrillation and atrial flutter, and has value as third line agent in heart failure with sinus rhythm. *Initial dose (if not already on maintenance treatment) of 0.5mg (IV or oral) then 0.25-0.5mg at 4 and 8 hours to complete a loading dose of 1-1.5mg. Maintenance dose 0.25mg per day usually given at night. In renal failure and the elderly, reduce the dose, usually to 0.125 mg per day*
 - *Intravenous adrenergic agonists* are useful as a short term emergency treatment in patients with severe heart failure on the basis of diminished myocardial function with low output and/or refractory congestion. They require ECG monitoring for arrhythmias.
 - *Dobutamine* is probably the best drug to use for its positive inotropic effect as it causes little tachycardia and minimises the increase in myocardial oxygen consumption. *Place 500mg (2 ampoules) in 500mL 5% dextrose (1mg/mL) and run at 10mL/hour (approximately 2.5mcg/kg/min). Increase dose as required to achieve clinical response. Doses up to 10-15mcg/kg/min can be used.*
 - If BP remains below 80mmHg systolic, a vasoconstrictor drug should be given (dopamine or adrenaline) to keep BP above 80mmHg and thus maintain coronary perfusion. *Give dopamine (2.5-5.0mcg/kg/min) by IV infusion. Can be increased to 7.5-10mcg/kg/min if necessary (2 hourly steps of 2.5mcg/kg/min).*
- Pre load reduction:
 - *Nitrates, diuretics, morphine*
- After load reduction:
 - If BP well maintained use vasodilator therapy. *ACE inhibitors* are the treatment of choice.
 - *ACE inhibitor dosing: The start dose of lisinopril for a patient with normal renal function is 2.5mg orally daily (target maintenance dose 20-40 mg orally daily).*

- *Spironolactone in low dosage (12.5-25mg/day)* has proven of benefit in heart failure when added to ACE inhibitors and loop diuretics.

2.1.5 Further Management

- Daily weigh. Fluid balance for the first 24 hours is essential to check diuresis. Thereafter a daily weight will provide the best indication of the effectiveness of diuretic therapy. Repeat CXR prior to discharge or if dyspnoea and/or clinical features fail to respond. Consider ECHO if cardiomegaly present (e.g. pericardial effusion).
- *Low molecular weight heparin such as enoxaparin 20-40mg SC every 24 hours.* Start on admission. Consider full heparinisation then *warfarin* in those with severe left ventricular impairment, or chronic atrial fibrillation.
- *Potassium supplements* may be needed with most diuretics. Supplements are unnecessary and potentially dangerous in renal failure. Monitor with *ACE inhibitor or potassium sparing diuretic treatment.*
- Confirm the primary disease process and exclude aggravating factors
- β -blocker drugs do not have any role in the management of acute heart failure. However carefully titrated administration of low dose β -blocker reduces mortality in stable chronic heart failure associated with diastolic dysfunction.

2.2 MYOCARDIAL INFARCTION

See also Section 1.2 for immediate management in A&E or OPD

2.2.1 Diagnosis

The diagnostic criteria for an acute myocardial infarction are 2 out of 3 from:

- Central chest pain lasting >30 minutes
- ST elevation (transmural or Q wave infarction)
- Cardiac enzyme release – creatine kinase (CK), troponin

2.2.2 Causes

Acute coronary occlusion due to:

- Coronary artery plaque rupture and thrombosis
- Emboli (rare)
- Spasm (Prinzmetal's angina, rare)

2.2.3 Clinical Features

Severe crushing retrosternal chest pain radiating to neck and arms is typical. However, atypical presentations are very common. May present as collapse, LVF, hypotension, peripheral embolus, stroke, or "malaise". A difficult diagnosis to exclude even with normal ECG. If in doubt, **admit**. If the initial ECG is normal then the diagnosis may be suspected on the basis of history alone and ECG repeated in 2-4 hours.

2.2.4 Investigations

- ECG daily for 3 days before discharge. Repeat ECG when pain resolved or if pain recurs.
- Cardiac Enzymes: A CK or troponin should be done on admission and at 8-12 hours and 24 hours after the onset of symptoms. For patients admitted more than 24 hours after the onset of pain, the above should be measured on three consecutive days.
- CXR can usually wait until normal working hours or prior to discharge. Indications for urgent X-ray:
 - Suspicion of aortic dissection (widened mediastinum, separation of calcified intima)
 - Moderate or severe cardiac failure
- Patients with suspected myocardial infarction require rhythm monitoring

2.2.5 Complications of Myocardial Infarction

- Left ventricular failure
- Deep vein thrombosis / Pulmonary embolism
- Dressler's syndrome (pericardial and/or pleural inflammation)
- Arrhythmias
- Cardiogenic shock / low cardiac output states
- Valvular dysfunction

- Myocardial rupture (septal or free wall)
- Mural thrombi (with systemic embolisation)

2.2.6 Management

“Time is Muscle”

- Expedite treatment and assess suitability for thrombolysis urgently

Transfer to Medical Ward (Intensive Room)

- Any patient with definite acute myocardial infarction is at risk from an acute arrhythmia and should be admitted to the Medical Ward

IV access

- IV insertion on admission. Flush 4 to 6-hourly with N/S.

Oxygen

- Should be administered to all patients with MI or unstable angina for the first 12 hours unless there is a strong contraindication

Pain relief

- Continuing pain suggests ongoing ischaemia which should be treated with *nitrates, β -blockers, calcium antagonists and morphine as required.*
 - *Give morphine IV according to severity and repeat up to 4-hourly if necessary. Draw morphine 10mg (1mL) up with 9mL of water for injection (1mg/mL). Give 2-3mg (2-3mL) increments until pain is controlled, observing the patient's BP and respiration.*
 - *Metoclopramide 10mg or prochlorperazine 12.5mg given IV at the same time reduces nausea and vomiting.*
- *Aspirin® 100mg chewed and then swallowed stat then 100mg orally daily if no contraindications*
- *Nitrates for continuing pain (isosorbide mononitrate)*

2.2.7 Thrombolysis

Current Indications for thrombolysis

- All patients presenting with acute myocardial ischaemic symptoms lasting more than 30 minutes with ST elevation on ECG
- New ST elevation greater than 1mm in at least 2 limb leads or greater than 2mm in 2 pre-cordial leads or new left bundle branch block with typical symptoms
- Thrombolytic therapy is beneficial if the duration from onset is <12 hours and occasionally up to 24 hours from onset of symptoms particularly if pain is ongoing or marked ST elevation

Figure 2.1 details the requirements for thrombolytic therapy.

Administration of streptokinase (SK)

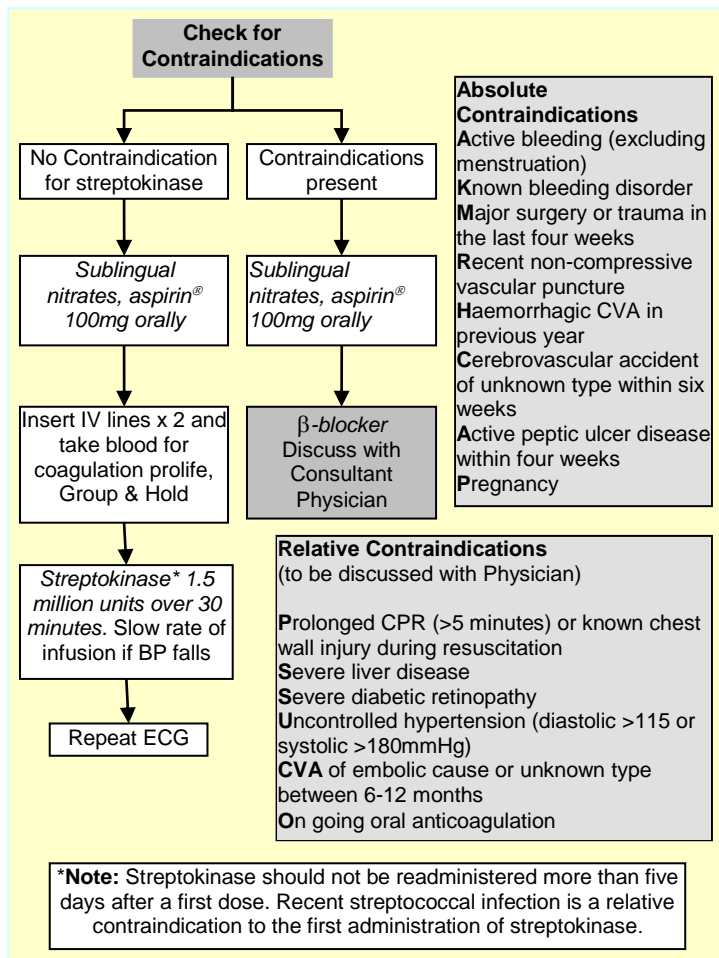
- *Add 1,500,000 units of streptokinase to 100mL N/S and infuse over 30 minutes*
- Continuous ECG monitoring with senior nurse and doctor in attendance
- 15 minutes pulse, BP and temperature for 12 hours, then hourly for 4 hours, then as needed
- Maintain availability of drugs and defibrillator
- Record times of:
 - onset of pain
 - first ECG, start SK, finish SK

Note

- If ST segment depression is present, or ST-T wave changes are non-specific but symptom / risk factors are suggestive of myocardial infarction, then *give β -blocker (atenolol 25-50mg oral daily, may need 100mg) as well as aspirin and nitrates.*
- Inferior infarct, check right sided leads for ST elevation (i.e. look actively for right ventricular infarction). **If AMI strongly suspected give thrombolysis.**
- Move to Medical Ward early
- Err on side of excess consultation with consultant physician

Monitoring requirements for thrombolytic therapy

Figure 2.1 Thrombolytic therapy



Complications

- Hypotension associated with streptokinase infusions:
 - Slow or stop streptokinase temporarily
 - Head down tilt
 - Consider giving *IV N/S 250mL boluses x 2-3* (contraindicated in LVF, particularly useful in right ventricular infarcts).
 - Consider *promethazine IV 25-50mg, adrenaline 0.1mg IV (1mL 1:10,000) very cautiously (wait and repeat at 5-10 minutes intervals)*. Adrenaline IV in a patient with an acute MI should only be given in the event of a catastrophic anaphylactic reaction since it may precipitate ventricular fibrillation.
- Allergic or febrile reactions which may vary in severity from rigors to typical anaphylaxis. Give hydrocortisone 100mg IV and/or promethazine 12.5-25mg IV stat.
- Haemorrhage – apply local pressure over all IV access and arterial puncture sites before starting thrombolysis. If significant bleeding occurs despite appropriate local pressure, administer 2-3 units fresh frozen plasma and seek advice from a senior consultant. If bradycardic atropine may be helpful. Give atropine 0.3mg IV with further doses over 30 minutes to a total of 1.2mg.

2.2.8 Other Treatments

- If thrombolytic therapy is not given, use *low molecular weight heparin e.g. enoxaparin 1mg/kg every 12 hours with a max. of 100mg per dose*. If there is moderate renal impairment or if reversal of the heparin effect is likely to be needed, use a continuous infusion of unfractionated heparin and monitor by APTT.
- *Hypnotics* if sleep disturbed
- *β -Blockers* – continue if patient is already on them and no contraindication exists. *β -blockers such as atenolol (25-50mg oral daily) or metoprolol, should be commenced on admission*. They should be continued for at least 2 years. Avoid in the first few hours after an inferior MI unless sinus tachycardia is present.
- *Amiodarone* may be indicated for some atrial and ventricular arrhythmias.

- **Continuing chest pain** in spite of appropriate morphine IV and sublingual nitrates; consider β -blocker therapy.

2.3 CARDIOGENIC SHOCK

2.3.1 Clinical Features

The presence of shock following myocardial infarction implies the loss of a large area of myocardium and carries an extremely high mortality (>80% in hospital).

- *Dobutamine* is probably the best drug to use for its positive inotropic effect; as it causes little tachycardia and less increase in myocardial oxygen consumption than other drugs (*refer to Section 2.1.4 for dosing instructions*). If BP remains below 80mmHg systolic, a vasoconstrictor drug should probably be started to keep the BP above 80mmHg and thus maintain coronary perfusion.
- *Consider early addition of dopamine in a dose of 2.5-5mcg/kg/min in the presence of baseline or evolving renal impairment.*
- About 20% of patients with cardiogenic shock have low LV filling pressure (e.g. right ventricular infarction or patients on diuretic therapy) and may benefit from fluid infusions (250mL bolus N/S, repeated if necessary).
- All patients with cardiogenic shock should be managed in medical ward with monitoring available

2.3.2 In-Hospital Management following Myocardial Infarction

- Mobilisation protocols – these protocols are available in Medical Ward. Some patients can be discharged as early as three days after admission.

Investigation after myocardial infarction

- 2D echocardiography should be considered in all patients to assess left ventricular function for prognostic reasons and review the need for on-going therapy with ACE inhibitors. Priority should be given to those with anterior MI, left ventricular failure or hypotension.

- Medical therapy should be tailored to each individual patient, but include *aspirin*® unless contraindicated, *β-blockers* unless contraindicated and *ACE inhibitors* if there is evidence of left ventricular dysfunction. *Nitrates* are appropriate for control of symptoms. Action to reduce the effects of any risk factor present – smoking cessation, cholesterol lowering agents, control of hypertension, diet if overweight.
- All patients after MI should start on *simvastatin*, 20 mg orally daily, if normal lipid profile and if high lipid profile, increase the dose to 40 mg orally daily.
- Overseas referral for coronary angiography should be considered if patients experience recurrent post infarction angina. Coronary angiography should also be considered if there is evidence of poor left ventricular function or congestive failure. Sub-maximal exercise testing should be considered if there is recurrent pain of uncertain origin during in-hospital mobilisation, or if patient needs reassurance as to their exercise capabilities prior to discharge.

2.4 ACUTE CORONARY SYNDROME (ACS)

- Angina of recent origin (<1 month) which is severe and/or frequent
- Severe prolonged or more frequent angina superimposed on previous stable angina
- Angina developing at rest or with minimal exertion
- Non ST elevation myocardial infarction

2.4.1 Definition

The pain experienced with unstable angina is similar to stable angina, though often more intense and of longer duration. It may also be associated with other signs such as sweating and nausea. Very often it is difficult to distinguish between unstable angina and acute myocardial infarction during the initial assessment of the patient. Thus, management in the first few hours will often be similar to that for myocardial infarction (see above).

2.4.2 Causes

- Coronary artery disease, often with intracoronary thrombus at the site of a ruptured plaque
- Coronary artery spasm

2.4.3 Investigations and Management

These are similar to the treatment of acute myocardial infarction except that thrombolysis is not indicated. A consultant physician needs to be involved. Daily ECG and cardiac enzymes on at least two occasions are mandatory, as is assessment of cardiac risk factors including lipids.

- Elevation of CK or troponin indicates high risk
- ECG changes such as ST depression or T wave inversion or any serial change over the first 24 hours suggest a poorer prognosis
- *Enoxaparin at 1mg/kg SC twice daily (max. 100mg/dose) should be started in patients with ECG changes suggesting ischaemia, a positive CK or a high index of suspicion of ACS*
- All patients with ACS should be given oxygen and require ECG monitoring for at least 24 hours.
- *Start aspirin, nitrate and a β -blocker (or calcium antagonist if β -blocker is contraindicated). If patient has presented with unstable angina on anti-anginal therapy, plan to discharge on increased doses or add another anti-anginal.* Patients should not be discharged on the same therapy as they were on at admission.
- Remember to investigate for anaemia, hyperthyroidism, heart failure
- Patients with prolonged episodes of chest pain (>20 minutes per episode) or with persistent abnormalities of sub-endocardial ischaemia (evolving T wave changes, reversible ST depression) are at very high risk of a major cardiac event during short term follow up. These patients should be considered for overseas referral for cardiac catheterisation to define their coronary anatomy and plan further treatment.
- All patients leaving hospital with the discharge diagnosis of unstable angina should be reviewed at least once in "Cardiac OP clinic" to assess symptom and review risk factor assessment

2.5 CARDIAC ARRHYTHMIAS

Note: Inappropriate treatment of arrhythmias can be rapidly fatal. Whenever possible, seek expert advice.

2.5.1 Aetiology

- Common in presence of structural cardiac disease, especially acute myocardial infarction
- Electrolyte imbalances (especially hypokalaemia) and acid/base imbalance may initiate and/or perpetuate the arrhythmia and these should be corrected
- Drugs including tricyclics, phenothiazines, theophylline, digoxin and anti-arrhythmics
- Hyperthyroidism

2.5.2 Clinical Features

- Check pulse at apex and wrist, blood pressure, tissue perfusion
- If there is evidence of hypotension or heart failure due to arrhythmia, urgent treatment is required
- Assess venous pressure waves:
 - Regular cannon waves in junctional rhythm.
 - Irregular cannon waves in ventricular tachycardia or heart block

2.5.3 Investigations

- ECG – 12-lead and rhythm strip with the best P wave. If bizarre/wide QRS complexes then check speed of paper.
- Check for abnormalities of K^+ , Mg^{++} , Ca^{++} , acidosis and hypoxia. Metabolic factors may contribute to the initiation/perpetuation of the arrhythmia.
- Thyroid function tests

2.5.4 Management

Ectopic Activity

- Atrial ectopics – often normal, benign. Look for atrial beat (may just deform preceding T wave) when diagnosing “extrasystoles”.

Does not require treatment. Ectopics classically suppressed in exercise.

- Ventricular ectopics – common, usually benign. May be confused with aberrant atrial ectopics. Treatment usually not required.

Heart Block

- Prolonged PR Interval:
 - 1st degree block does not require treatment. Monitor closely in anterior infarcts. Doses of β -blockers, calcium antagonists and digoxin should be reduced.
 - 2nd degree block:
- **Type I:** a progressive increase in PR interval until beat is dropped. May be observed in inferior infarcts but is more serious in anterior infarcts.
- **Type II:** PR interval normal or increased but beats lost in unpredictable fashion. Indicates disease in or below the bundle of His. This may progress to complete heart block and a very slow ventricular escape rhythm.
- Bifascicular block (bundle branch block + hemi block) – stable asymptomatic bifascicular block does not necessarily require treatment. However, following anterior myocardial infarction it may progress to complete heart block.
- Complete heart block requires monitoring in Medical Ward. If stable with regular ventricular escape rhythm and satisfactory blood pressure, may be observed overnight. Be prepared to use *isoprenaline* to maintain rate if atropine alone is not effective. Symptomatic AV block not associated with infarction usually merits referral overseas for placement of a permanent pacemaker.

2.5.5 Bradycarrhythmias

- Sinus Bradycardia – check for excessive β -blockade. Common after myocardial infarction. *Treat with atropine 0.6mg if heart rate <40bpm, if symptomatic or hypotensive. Smaller additional doses of 0.3mg may be required. Total dose of 2-2.5mg before atropine side effects occur. Isoprenaline may also be used. Place 2mg in 500mL 5% dextrose (5% dextrose water) = 4mcg/mL, and start at 1mL (4mcg) per minute but then run as slowly as possible (0.5-10mcg/min) to keep heart >60bpm.*

- Sinus Arrest – common in inferior infarction and usually benign, as nodal escape rhythm maintains adequate heart rate. It may require treatment with *atropine or isoprenaline* but rarely needs pacing. When sinus arrest is not associated with infarction, it is due to the sick sinus syndrome and requires permanent pacing if symptomatic.

Note: Inferior infarcts are associated with a wide range of rhythms which rarely have much adverse effect on myocardial performance. AV block is common. These arrhythmias are generally not treated vigorously apart from ventricular tachycardia and fibrillation. If they are persistent and cardiac function is impaired, treatment is indicated.

2.5.6 Supraventricular Tachycardia

- Always perform a 12 lead ECG
- **Sinus:** slow onset, pulse rate usually below 150/min, slows gradually with carotid sinus massage. Does not require treatment itself but requires an explanation as to its cause (e.g. LVF, anxiety, pain, hyperthyroidism, infection, hypoxia).
- **Paroxysmal Tachycardia:** sudden onset, rate usually >150/min. Carotid sinus massage causes either no response or reversion to normal or increased AV block. Atrial flutter usually gives a ventricular rate of approximate 150/min (2:1 block) and may be misdiagnosed as another SVT. If not distressed and not in failure and history of short-lived attacks either:
 - Do nothing
 - OR
 - Valsalva manoeuvre (supine)
 - Dive reflex – face into iced water
 - Carotid sinus massage at the upper point of the thyroid cartilage for 2cms up and down (one side at a time). Do not perform if carotid vascular disease present; check for carotid bruit.
- Monitor the effect of these manoeuvres with ECG, as this may induce 2:1 block
- *Adenosine given as a rapid bolus IV into a large vein, in increasing doses 6mg then 12mg, then 18mg, in step wise fashion at 2 minute*

intervals. Flush rapidly with 10-20mL saline, effective for AV nodal re-entrant tachycardia but will not revert atrial flutter.

- If unsuccessful and not on β -blockers: Verapamil 5mg by slow IV bolus (5 minutes) followed by 1mg/min to a total of 15mg if not on β -blockers. ECG monitoring required, measuring BP and with resuscitation equipment nearby as asystole may result.

Note: Verapamil should never be used for a broad complex tachycardia as this may be ventricular tachycardia. It has considerable negative inotropic effects and should not be used in the presence of ventricular dysfunction, hypotension.

- If on β -blockers and no structural cardiac disease present consider further β -blockade (make sure patient is not asthmatic).
- If unsuccessful, proceed to cardioversion if available.

Cardioversion

- The patient should be managed in the resuscitation room of the Outpatient Department, or ward. An experienced doctor with anaesthetic skills should be present. When sedated (either with midazolam / fentanyl or diazepam), start with 100J, then 200J, then 400J. Do not shock more than twice with 400J – consult physician.

2.5.7 Atrial Flutter

This rhythm is often mislabelled as paroxysmal atrial tachycardia because carotid sinus massage has not been performed to increase AV block, decrease ventricular rate and demonstrate flutter waves. If compromised, cardiovert as for paroxysmal tachycardia. If not compromised, digitalise using oral protocol given below. If spontaneous reversion to sinus rhythm does occur within 24 hours, the patient should be referred for cardioversion.

2.5.8 Atrial Fibrillation

New onset atrial fibrillation with rapid ventricular rate

- FBC, creatinine, Na^+ , K^+ , thyroid function tests
- Digitalise:

- Give 0.5mg digoxin initially (IV if in heart failure or nauseated).
- Give a further 0.25-0.5mg at 4 and 8 hours to complete a loading dose of 1-1.5mg
- Other options include:
 - Oral β -blocker, atenolol 25-100mg orally daily.
 - Oral calcium antagonist (e.g. verapamil)
 - Most patients with recent onset atrial fibrillation, will revert to sinus rhythm within 24 hours. Chemical cardioversion may be attempted in patients with structurally normal hearts.
- Heparin:
 - All patients with atrial fibrillation or flutter should be treated with *full dose low molecular weight heparin subcutaneous, unless there are contraindications. Warfarin may not be required if heparin started within 12-24 hours of onset of fibrillation and sinus rhythm achieved within 48 hours and there is no left atrial enlargement or major mitral valve abnormality.*
- Electrical cardioversion:
 - Indicated if there is cardiac compromise with hypotension, angina or impaired cerebral function or persistent atrial fibrillation. Consult physician.

Chronic atrial fibrillation on digoxin with rapid ventricular rate

- Exclude aggravating causes (ischaemia, heart failure, volume depletion, infection, alcohol).
- Check digoxin concentration and symptoms of possible digoxin overdose: nausea, vomiting, xanthopsia
- Add oral β -blocker or calcium antagonist as above.
- Add Aspirin® if heart structurally normal on echocardiogram.
- Consider warfarin if left atrium dilated or mitral valve abnormal, or age >70 years, previous embolic event

2.5.9 Ventricular Arrhythmias

Idioventricular (rate <100/min.)

- This is common after myocardial infarction and no treatment is required

Ventricular Tachycardia (VT)

- May be confused with SVT when aberrant AV conduction causes broad QRS complexes. Cannon waves and a variable first sound are suggestive of ventricular tachycardia. ECG diagnosis depends on P waves, and these are best seen in V1 or V2. P waves independent of ventricular rate or fusion beats are diagnostic.
- Remember VT may be prolonged and not associated with collapse.
- Treatment is by cardioversion. *Lignocaine 100mg IV can be used (and repeated x 1) but can precipitate hypotension or VF.* Unless an emergency this should be undertaken in hospital (HDU). In an emergency situation proceed to 200-400 Joules shock.
- If in doubt assume that all regular, broad complexes tachycardias are VT. Treatment of choice is cardioversion.

2.5.10 QT Prolongation

Acquired long QT

- Generally, QT prolongation is acquired and is associated with bradycardias, myocardial ischaemia, metabolic disturbances or drugs
- Causes of acquired QT prolongation:
 - Drugs
 - Antihistamines
 - Anti arrhythmics (Class 1, Class 3 [amiodarone])
 - Psychoactive drugs (lithium, tricyclics, haloperidol, phenothiazines)

Note: Drug interactions – The following may increase the concentration of the above drugs. Metronidazole, macrolides, SSRIs (Selective Serotonin Reuptake Inhibitors), fluconazole, grapefruit juice, diltiazem and many others.

- Check for possible causes and withhold any drugs that may be potentially responsible
- Correct all metabolic disturbances and treat ischaemia

Congenital long QT

Usually presents in patients younger than 40 years.

- Withhold all QT lengthening drugs
- Check and correct any metabolic disturbances
- Beta blockers may help suppress recurrent episodes
- Refer to physician for long term management

Torsade de pointes

- This polymorphic ventricular tachycardia is due to QT prolongation, either congenital or acquired. It may revert spontaneously; otherwise it may require immediate cardioversion.
- If recurrent, *magnesium sulphate 2-4g IV may be tried.*

Ventricular Fibrillation (VF)

- DC shock (see cardioversion, Section 2.5.6)

Amiodarone

- *Intravenous amiodarone* is very effective in the acute treatment of atrial and ventricular arrhythmias. However, potentially important side effects may occur with long term therapy.
- Amiodarone has less effect on myocardial contractility than other anti-arrhythmics. Therefore, *intravenous amiodarone may be the treatment of choice for arrhythmias if there is known severe left ventricular impairment or concurrent left ventricular failure. Give 5mg/kg or 150mg-300mg dissolved in 250mL of 5% dextrose over 30-60 minutes intravenously. Continue with 10mg/kg or 900mg/500mL/24 hours.*
- Because of risk of chemical thrombophlebitis, amiodarone should be given into a proximal arm vein. Consider a central line if planning to give more than 24 hours intravenous infusion.
- Patients receiving intravenous amiodarone should be on continuous ECG monitoring.

2.6 CARDIAC ARREST

See Section 1.2

2.7 HYPERTENSION

2.7.1 Description

A blood pressure (BP) elevated above normal, measured on three separate occasions, a minimum of 3 days apart:

Children: age related diastolic blood pressure equal to or above

- less than 6 years 80mmHg
- 6-12 years 84mmHg
- over 12 years 90mmHg

Adults: Systolic blood pressure >140mmHg and diastolic blood pressure >90mmHg.

A severe hypertension emergency is severe hypertension associated with some of the following:

- Neurological signs, e.g. severe headache, visual disturbances, confusion, coma and seizures.
- Pulmonary oedema

Table 2.1 Levels of hypertension

| Level of hypertension | Systolic mmHg | Diastolic mmHg |
|-----------------------|---------------|----------------|
| Mild | >140 | >90 |
| Moderate | >169 | >99 |
| Severe | >199 | >114 |

2.7.2 Classification

- Primary: idiopathic, “essential”
- Secondary: renal, endocrine or neurological disease, diabetes mellitus, coarctation of aorta, drug induced
- Malignant: severe hypertension with rapidly progressive end organ damage, e.g. acute left ventricular dysfunction, encephalopathy, retinopathy (haemorrhages, exudates and papilloedema) and renal failure.

2.7.3 Aetiology

- Renal: Acute nephritis, renal impairment (acute or chronic), renovascular and volume overload (especially dialysis patients)
- Endocrine: Cushing's syndrome, phaeochromocytoma, Conn's syndrome, hyperparathyroidism, hyperthyroidism, hypothyroidism, acromegaly
- Neurological: Raised intracranial pressure, autonomic neuropathy
- Diabetes mellitus: Both Type 1 and 2 patients are commonly hypertensive
- Coarctation of the aorta
- Respiratory: Obstructive sleep apnoea
- Drugs: Presence or absence (e.g. clonidine withdrawal)
- NSAIDs, steroids, sympathomimetics (including non-prescription drugs), alcohol, liquorice, cocaine, erythropoietin, cyclosporin.

2.7.4 Investigation

- Blood pressure measurements – lying and standing (should be confirmed by medical staff)
- ECG and CXR
- Collect blood for catecholamines before treatment, if phaeochromocytoma is suspected, as therapy will alter the blood levels
- Plain abdomen x-ray or ultrasound for renal size and calcification
- Urinalysis (dip-test for proteinuria / haematuria, microscopy for cells and casts)
- Plasma Na⁺, K⁺, Cl⁻, creatinine, Ca⁺⁺. Haemolysis of samples may obscure hypokalaemia.
- 24 hour urine collection for protein
- 24 hour urine for creatinine clearance, Na⁺, K⁺, VMA, metanephrines and free catecholamines
- Renin and aldosterone plasma levels if Conn's syndrome possible

2.7.5 Management of Hypertension

Management objectives

- Achieve and maintain the target blood pressure as close as possible to normal, which is systolic of 120mmHg and diastolic of 80mmHg

Non-drug treatment

- Weight loss if above ideal weight (normal weight for height has a BMI below 25, and normal waist circumference should be <100cm)
- Regular physical exercise (30-45 minutes exercise for 5 days a week)
- Stop smoking
- Restrict salt intake
- Moderate or no alcohol intake

Management of essential hypertension

Table 2.2 presents step wise management of hypertension.

All cases suspected of secondary hypertension should be referred to hospital for further investigations and treatment.

Table 2.2 Step wise treatment of hypertension

| Steps and their characteristics | Treatment | Target Blood Pressure |
|---|---|--|
| Step 1: Mild to moderate hypertension with no risk factors | Lifestyle modification (exercise, diet and lose weight) | Around 120/80mmHg and definitely below 140/90mmHg |
| Step 2: Failure of step 1 after 3-6 months implementation plus one risk factor, or deterioration of hypertension | Lifestyle modification and <i>Start an antihypertensive such as oral hydrochlorothiazide 25-50mg daily OR oral lisinopril 2.5mg daily OR oral atenolol 25mg daily.</i> | Control within 1-3 months Aim at 120/80 and definitely below 140/90mmHg |
| Step 3: Failure of step 2 after 1-3 months | Lifestyle modification. <i>If a thiazide was initiated, increase the dose or ADD an ACEI OR a β-blocker OR a calcium channel blocker.</i> Beware of diabetics when one should not use a β -blocker and a thiazide together. Titrate doses to effect on blood pressure. | Control within 1-3 months Aim at 120/80 and definitely below 140/90mmHg |
| Step 4: Failure of step 3 | Refer to specialist for further advice | |

Management of acute hypertensive crisis

Monitor blood pressure frequently.

- The excessive use of powerful IV hypotensive agents may lead to severe cerebral and myocardial insufficiency. Gentle reduction over hours and days enables compensatory vasodilatation and cardiovascular changes to develop and decreases possibility of end organ damage.

- Hypertensive encephalopathy in adults is usually associated with systolic BP >200mmHg and diastolic >130mmHg but can occur at lower levels if there has been a rapid rise in pressure. Aim to reduce diastolic to around 100mmHg only. Oral therapy is generally best but patients with evidence of hypertensive encephalopathy (confusion, restlessness, convulsions, hypoventilation, papilloedema) require IV treatment. Consider admission to HDU or Ward.
- **Oral therapy** – A calcium antagonist (e.g. amlodipine 5 to 10 mg OR nifedipine SR 20mg) OR a β -blocker can be used. Alternatively lisinopril 2.5mg oral may be used but should be avoided in the presence of hyponatraemia.
- **IV therapy** – for true acute hypertensive encephalopathy, i.e. sudden severe rise in diastolic blood pressure, give hydralazine 5 to 10 mg slowly IV, repeat at 20 mins interval if necessary.

Note:

- Do not treat a cerebrovascular accident with IV therapy – oral therapy is best which will result in a slower reduction in blood pressure and preserve cerebral autoregulation.
- If hypertension is associated with acute LVF or volume overload IV frusemide should be used along with an ACE inhibitor
- Pheochromocytoma, if suspected, requires α -blockade or the combination of α - plus β -blockade (e.g. labetalol). Avoid β -blocker monotherapy as it may cause paradoxical hypertensive crisis via unopposed α adrenergic activity.
- Plasma sodium gives some index of volume depletion and activity of the Renin-Angiotensin-Aldosterone system (RAAS) in hypertension. A low sodium usually indicates low circulating volume and high RAAS activity. The use of ACE inhibitors may produce profound hypotension.
- If hypertension is associated with withdrawal of clonidine or other centrally acting drugs used in hypertensive treatment avoid giving a β -blocker alone. Stopping clonidine may induce a phaeo-like state which is exacerbated by giving a β -blocker. Labetalol is recommended as it provides α - and β -blockade.

2.8 AORTIC DISSECTION

2.8.1 Clinical Features

This diagnosis should be specifically considered in all cases of acute chest pain. Pain is sudden and severe, most often in the interscapular region. It can mimic angina. Pain, hypovolaemic shock and an abnormal mediastinum on chest X-ray suggest aortic dissection. Seek urgent advice from the consultant physician on call.

2.8.2 Aetiology

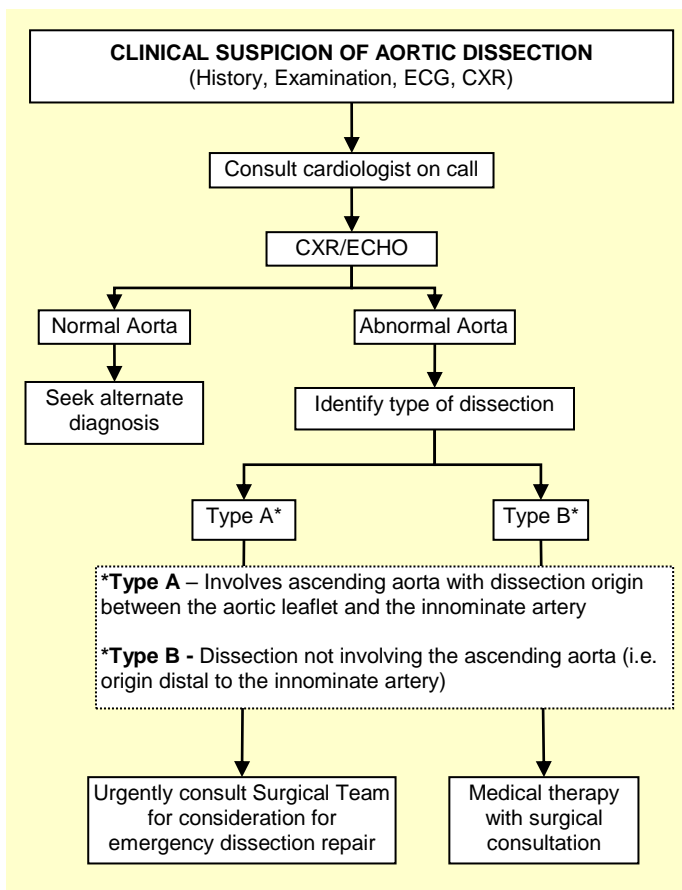
- Cystic medial necrosis
- Marfan's syndrome
- Atherosclerosis
- Hypertension

2.8.3 Investigations

See

Figure 2.2 for diagnosis of aortic dissection.

- CXR – widened mediastinum, pleural effusion mainly left sided, calcified intimal flap separated from aortic outline, high aortic arch.
- ECG – dissection involving the aortic root may occlude the coronary arteries, more often the right coronary to produce a myocardial infarction. LVH may be present from long standing hypertension.
- Consider echo
- Crossmatch blood

Figure 2.2 Diagnosis of aortic dissection

2.8.4 Treatment

- Aim to reduce systolic pressure to 100-120mmHg and reduce contractility of left ventricle
- Monitor BP and urine output
- *Give intravenous and later oral β -blockers unless contraindicated by: cardiac failure, bradycardia <60/min, heart block, and obstructive airways disease like bronchial asthma.*
- *Analgesia: morphine 10-15mg. Give prochlorperazine 12.5mg IV to prevent vomiting.*
- Seek advice urgently

2.9 BACTERIAL ENDOCARDITIS

Fever of unknown origin, especially if in association with cardiac murmur, must be considered suspicious. If in doubt treat as soon as blood cultures have been taken.

2.9.1 Investigations

- Blood cultures. Three venepunctures inoculating 2 bottles each time (even only 10 minutes apart) or 6 venepunctures (12 bottles) if antibiotics given in last 2 weeks.
- CXR
- ECG
- MSU x 2 before therapy
- Na+, K+, glucose, creatinine, bilirubin, ALP, AST
- FBC + diff.
- Echocardiogram

2.9.2 Treatment

- *Initial therapy – benzyl penicillin 2.4g every 4 hour PLUS gentamicin. Gentamicin dose of 1mg/kg not exceeding 80mg IV every 8 hours for 48 hours. Seek advice about subsequent dosage.*
- *(Flu)cloxacillin should be added if staphylococcal sepsis suspected (e.g. IV drug user, acute presentation, early embolic lesions).*

- Revise therapy in the light of the organism(s) isolated and its potential clinical significance and sensitivities, e.g. urgent valve replacement may be needed if staphylococcal or fungal endocarditis suspected.
- Closely monitor cardiac function, renal function and antibiotic levels

2.10 INFECTIVE ENDOCARDITIS PROPHYLAXIS

This section combines guidance from the NZ Heart Foundation (1999) with that from the Australian Therapeutic Guidelines: Antibiotic, version 14 (2010). This area of therapy has undergone continuing revision. In general the revisions lead to fewer indications for prophylactic antibiotics and the recognition that risks are not as high as thought earlier. At the point of clinical decision about whether to use antibiotics or not consult with your local microbiology laboratory so that your decision relies on local, contemporary sensitivity results for the organisms of concern.

2.10.1 Cardiac Conditions and Endocarditis Prophylaxis

Endocarditis prophylaxis is recommended

High risk category

- All patients with a previous episode of endocarditis ^a
- Prosthetic cardiac valves, including bioprosthetic and homograft valves ^b
- Complex cyanotic congenital heart disease (e.g. tetralogy of Fallot, tricuspid atresia, complex anomalies with functional single ventricle, or transposition of the great arteries)
- All major left-sided valve anomalies
- Surgically constructed systemic-pulmonary shunts, or conduits from the heart to the great arteries ^c

Moderate risk category

With the exception of those listed in the “low risk” category in the following section, most other congenital cardiac malformation carry a moderate risk. These include:

- All high-pressure (left sided) congenital anomalies even if minor, including supravalvular, valvular and subvalvular aortic stenosis, coarctation of the aorta, and ventricular septal defects
- All acquired valvular dysfunction, e.g. rheumatic heart disease
- Hypertrophic cardiomyopathy
- Mitral valve prolapse with valvular regurgitation and/or thickened leaflets and dysplastic myxomatous valves ^d
- Major congenital right-sided lesions, e.g. Ebstein's anomaly of the tricuspid valve and significant pulmonary stenosis.

Endocarditis prophylaxis for low risk category

- Isolated secundum atrial septal defect
- Complete surgical or device closure of atrial septal defect, ventricular septal defect, or patent ductus arteriosus (beyond six months after repair) ^e
- Previous coronary artery bypass graft surgery
- Mitral valve prolapse without valvular regurgitation or dysplasia
- Previous Kawasaki disease without valvular dysfunction
- Previous rheumatic fever without valvular dysfunction ^f
- Cardiac pacemakers (intravascular and epicardial) and implanted defibrillators
- Physiological, functional or innocent murmurs ^g

Notes:

- ^a Even if the underlying lesion is minor, a previous attack of endocarditis demonstrates risk.
- ^b The risk of endocarditis remains high after replacement of the native valve with any prosthesis.
- ^c All surgical conduits carry a high risk, particularly as the wall becomes irregular and thickened.
- ^d A degree of mitral valve prolapse is very common. Dysplastic, myxomatous mitral valves are associated with connective tissue anomalies, such as Marfan's syndrome, and with increasing age. Sometimes both these types of valves can leak with exercise, but an increased risk of endocarditis has not been shown unless valvular regurgitation is present at rest, or valve structure is very distorted.
- ^e Six months allows sealing of minute leaks around the periphery of the closure, and endothelialisation of surfaces.

The same period is advised for these lesions treated by percutaneous placement of a mechanical device. In the small number of patients with a residual leak, long-term prophylaxis may be recommended.

^f Prophylaxis is recommended when subclinical, echocardiography-demonstrated mitral or aortic regurgitation are present after acute rheumatic fever.

^g A systolic murmur (often associated with a fever) can be recorded in well over 50% of young children. Most of these are “benign systolic murmurs” where the heart is normal. This diagnosis is established by:

- Exclusion of any cardiac symptoms and any associated signs including reduced femoral pulses.
- Recognising the signs that are typical of the “benign murmur”, i.e. a grade 1-2/4 low-pitched, mid-systolic vibratory murmur, maximal around the 3rd to 4th left interspace and not radiating prominently to the suprasternal notch – unlike an aortic murmur, which is softer in the sitting than in the lying position.

2.10.2 Dental Procedures and Endocarditis Prophylaxis

Endocarditis prophylaxis recommended

In general, any procedures that causes bleeding from the gingiva, mucosa or bone. See

Table 2.3.

- Periodontal procedures including probing, scaling, root planning and surgery
- Endodontic instrumentation or surgery beyond **the apex**
- Application of matrix bands **below** the gingival margin
- **Subgingival** placement of gingival retraction cord/strips
- Placement of orthodontic bands, but not brackets
- **Intraligamentary** local anaesthetic injections
- Reimplantation of avulsed teeth and repositioning of teeth after trauma
- Oral surgical procedures including biopsy procedures and raising of mucosal flaps
- Surgical drainage of dental abscesses
- Extraction of teeth

Endocarditis prophylaxis NOT recommended

- Natural shedding of primary deciduous teeth
- Dental examination, **other than periodontal probing**
- Radiographic examination
- Local anaesthetic injections, **unless intraligamentary**
- Restorative dentistry where the procedure is above the gingiva
- Impressions, construction and placement of removable prosthodontics / orthodontic appliances
- Adjustment of orthodontic appliances
- Placement of rubber dam, **other than subgingival manipulation**
- Postoperative suture removal

2.10.3 Other Procedures and Endocarditis Prophylaxis**Endocarditis prophylaxis recommended**

See

Table 2.4.

Respiratory tract

- Tonsillectomy and/or adenoidectomy
- Surgical operations that involve the respiratory mucosa
- Bronchoscopy with a rigid bronchoscope (with or without biopsy)

Genitourinary tract

- Prostatic surgery, transrectal prostatic biopsy, cystoscopy, or urethral dilatation (even in the absence of infection)
- Surgical procedures **in the presence of infection**, e.g. urethral catheterisation, uterine dilatation and curettage, therapeutic abortion, sterilisation procedures, insertion and removal of intrauterine devices, **circumcision**

Gastrointestinal tract

- Sclerotherapy for oesophageal varices or oesophageal stricture dilatation
- Endoscopic retrograde cholangiography and biliary tract surgery
- Surgical operations involving the intestinal mucosa (other than endoscopic biopsy and percutaneous endoscopic gastrostomy)

Other sites

- Incision and drainage of focal sepsis, e.g. subcutaneous abscess. (Note that prophylaxis here will often necessarily be part of more prolonged antibacterial treatment).

Endocarditis prophylaxis NOT recommended**Respiratory tract**

- Endotracheal intubation
- Bronchoscopy with a flexible bronchoscope, with or without biopsy
- Tympanostomy tube insertion

Genitourinary tract

- Vaginal delivery, Caesarean section, vaginal hysterectomy
- Surgical procedures **in the absence of infection**, e.g. urethral catheterisation, uterine dilatation and curettage, therapeutic

abortion, sterilisation procedures, insertion and removal of intrauterine devices, circumcision

Gastrointestinal tract

- Transoesophageal echocardiography.
- Endoscopy with or without biopsy.
- Percutaneous endoscopic gastrostomy.

Other sites

- Procedures through surgically prepared skin, e.g. liver or kidney biopsy, dermatological procedures
- Cardiac catheterisation including balloon angioplasty
- Implantation of cardiac pacemakers, defibrillators and coronary stents

Table 2.3 Antibacterial recommendations for dental, oral, respiratory tract or oesophageal procedures

| | Moderate cardiac risk | High cardiac risk |
|---|---|---|
| Standard | <i>Oral amoxicillin 2g one hour before procedure PLUS oral amoxicillin 1g six hours later</i> | <i>Oral/intravenous ampicillin 2g PLUS IMI/IV gentamicin (2mg/kg, not >120mg) within 30 min of procedure. No subsequent dose recommended</i> |
| Penicillin Allergy* | <i>Oral cephalexin 2g one hour before procedure OR oral erythromycin 1.5g one hour before the procedure and 500mg six hours later</i> | <i>Clindamycin orally 600 mg one hour before procedure or clindamycin 15mg/kg IV immediately before procedure. No subsequent dose recommended</i> |
| <p>Notes</p> <p>Some international guidelines now recommend the same regimen for those with high and moderate cardiac risks. The options listed for high-risk cases are those with theoretically maximal preventative activity.</p> <p>Those who have received a β-lactam (either a penicillin or cephalosporin) within two weeks of the procedure, or are on long-term penicillin prophylaxis for rheumatic fever, need an erythromycin regimen from the moderate-risk category or any of the high-risk category options. In some of the latter, the synergistic killing of the combined β-lactam plus aminoglycoside overrides the possible reduced β-lactam susceptibility from prior β-lactam treatment.</p> <p>* The oral cephalexin is an option for patients whose penicillin allergy was not anaphylaxis or a rapid-onset skin reaction.</p> | | |

Table 2.4 Antibacterial recommendations for genitourinary tract and gastrointestinal tract (excluding oesophageal procedures)

| | Moderate cardiac risk | High cardiac risk |
|---|--|--|
| Standard | <i>Oral amoxicillin 2g one hour before procedure and oral amoxicillin 1 g six hours later.</i> | <i>IV ampicillin (or amoxicillin) 50mg/kg up to 2g just before the procedure or IMI 30 min before procedure PLUS IMI gentamicin 2mg/kg, 30 min before procedure, or IV just before the procedure FOLLOWED BY ampicillin (amoxicillin) at 25mg/kg up to 1g oral, IMI or IV six hours later.</i> |
| Penicillin allergy-immediate hyper sensitivity* | <i>Enterococci are the main concern. Gentamicin 1.5-2mg/kg IV over 2-3 minutes (not exceeding 140 mg).</i> | <i>Gentamicin 1.5-2mg/kg IV AND/OR if hypersensitivity not immediate –ceftriaxone may be used as a single IV dose. Consult with microbiology lab to determine likely current enterococcal sensitivity to other antibiotics</i> |
| Notes Prior or continuing penicillin treatment does not affect these regimens. * There is no oral option for those with penicillin allergy. The IV ceftriaxone/gentamicin regimen is an option for patients whose penicillin allergy was not anaphylaxis or a rapid-onset skin reaction. | | |

For acute rheumatic fever and rheumatic heart disease, see Section 15.5

3 CENTRAL NERVOUS SYSTEM (CNS) CONDITIONS

3.1 HEADACHE

Headache is a subjective symptom and placebo response rates may be high. However, one must be careful to consider potentially life-threatening conditions such as subarachnoid haemorrhage (SAH) or meningitis before issuing medicine that may mask signs and symptoms and unnecessarily delay proper management.

There are symptoms in assessing a headache that should warn the clinician of a possible serious organic aetiology (Table 3.1).

Table 3.1 Types of headache

| Type of Headache | Possible Organic cause |
|--|---|
| Sudden onset , particularly with confusion, drowsiness, vomiting or with mild stroke-like signs such as mild hemiparesis, ataxia or Horner's syndrome | SAH or intracranial haemorrhage, carotid or vertebral artery dissection, cerebral venous thrombosis |
| Recent onset , with confusion, drowsiness or fever | Meningitis, encephalitis, intracranial abscess or severe hypertension |
| Recent onset , in patients over 50 years of age | Brain tumour or temporal arteritis |
| After head injury , particularly with loss of consciousness or if severe or prolonged | Intracranial haemorrhage |

A careful physical examination should precede any reassurance that a headache is not due to a serious disorder.

Table 3.2 Benign headaches with symptoms

| Type of Headaches | Symptoms |
|---------------------------|---|
| Tension | <ul style="list-style-type: none"> • Recurrent attacks of headaches that are usually bilateral • Feeling of pressure or tightness that may extend around the head • There may be photophobia but nausea and vomiting are unusual • Rarely severe enough to prevent activities such as brisk walking • Commonest type of headache and it commonly occurs during late afternoon and evening |
| Migraine without aura | <ul style="list-style-type: none"> • Recurrent episodes of throbbing head pain which are often unilateral (frontal, occipital or hemicranial) and may swap sides between attacks • Attacks are often unpredictable • Pain is severe and often limits activities and may be associated with photophobia, nausea and vomiting • Untreated attacks may last from 4-6 hours to several days |
| Migraine with aura | <ul style="list-style-type: none"> • Recurrent attacks of migraine headaches similar to the above but accompanied with focal neurological symptoms, mostly visual such as flickering lights, zigzag lines, loss of part or all vision • Other symptoms may be impaired speech, paraesthesiae, vertigo and weakness • Symptoms typically last 15-30 minutes, occur at the start of some or all attacks and may mimic stroke |
| Tension-vascular headache | <ul style="list-style-type: none"> • A mixture of tension and migrainous headache. Often it is just tension headache with a degree of migraine symptoms |
| Rebound | <ul style="list-style-type: none"> • A form of chronic daily headache perpetuated by daily or near daily use of drug such as ergotamine / caffeine (Cafergot®) and analgesics. To avoid this headache, one must not use the medications for acute migraine for more than 3 times per week. Use a prophylactic strategy, as noted in Table 3.3). |
| Cluster | <ul style="list-style-type: none"> • Attacks are usually centred around the orbit with prominent autonomic symptoms (ptosis, tearing and redness of eye, nasal stuffiness) and headache does not swap side between attacks |

| | |
|-------------------------|--|
| | <ul style="list-style-type: none">• Shorter in duration than (untreated) attacks of migraine. Typically lasting from 15 minutes to 3 hours.• Multiple attacks each day for weeks or months, often occurring predictably at the same time of the day |
| Ice-pick | <ul style="list-style-type: none">• Sudden stabbing pains, often bilateral, typically lasting a few seconds, often very severe and can occur 30 or more times per day |
| Cough | <ul style="list-style-type: none">• Brief attacks of headache precipitated by coughing, sneezing, straining or bending over (distinguish from pre-existing headache that is momentarily aggravated by coughing) |
| Low pressure (postural) | <ul style="list-style-type: none">• Headache that resolves rapidly upon lying down |
| Exertional or sexual | <ul style="list-style-type: none">• Headache triggered by sustained physical exertion including sexual activity |

Table 3.3 Treatment of benign headache

| Type of headaches | Non-drug therapy | Drug therapy |
|--|---|---|
| Tension Headache | Massage with or without liniment, stretching affected tight neck and scalp muscles and/or cervical joints. Take regular exercise and try to be in control of build up of tension by relaxation exercises. | <i>Paracetamol 1g to 1.5g 4-hourly up to 4g daily.</i> For frequent (maybe mixed migrainous) attacks and where patient is seeking stronger analgesics, <i>give amitriptyline 10mg orally at night</i> OR <i>Oral sodium valproate 200mg bd up to 800mg bd.</i> These can be continued for 3-6 months and gradually reduced in dosage |
| Migraine (Acute) | Rest patient in a quiet room and avoid activities such as reading or watching television. | <i>Paracetamol 1-1.5g oral 4-hourly up to 4g daily.</i> If this does not relieve the attack, <i>ADD metoclopramide 10mg orally.</i> If nausea or vomiting, <i>give prochlorperazine 12.5mg or 25mg IMI</i> OR <i>Metoclopramide 5-10mg IMI or IV.</i> If above does not relieve the pain, <i>give ergotamine 2mg/cafeine, oral at onset or aura or migraine (max. of 6mg/day or 10mg per week).</i> |
| Persistent migraine (<i>status migrainosus</i>) - A migraine that fails to resolve after several days | | Refer for admission to hospital for parenteral fluid and other relevant investigations and therapy. |

| Type of headaches | Non-drug therapy | Drug therapy |
|---------------------------------------|--|--|
| Prophylaxis of migraine attacks | Keep a diary of attacks and avoid trigger factors; such as: diet, hormonal changes, life events such as work-related stress. | When more than 3 attacks per month; <i>give oral aspirin® 600mg bd</i> OR <i>A β-blocker such as propranolol 40mg 2 to 3 times daily (up to 320mg per day).</i> If no response to the above, <i>give amitriptyline 12.5mg by mouth at night (up to 150mg daily).</i> |
| Cluster headache | | <i>Verapamil SR 160mg 'daily up to 320mg daily</i> Refer if no response to this treatment. |
| Cough, exertional and sexual headache | | New onset exertional headache should be referred for exclusion of SAH or tumour |

3.2 SEIZURES

See Section 1.3.8.

3.3 MENINGITIS

See Section 12.2.1.

3.4 STROKE

Stroke (CVA) is a focal neurological deficit of vascular origin which lasts >24 hours. Stroke may be due to cerebral infarction (80%) or haemorrhage (15%). Approximately 5% of patients who present with a stroke-like syndrome do not have any apparent cerebrovascular pathology. The current approach to stroke therapy is aggressive primary and secondary prevention by the control of risk factors. Thrombolysis is gaining acceptance for thrombotic stroke within a few hours of onset but requires a dedicated stroke unit with capacity to perform rapid cranial imaging.

3.4.1 Primary Prevention of Stroke

Main risk factors are smoking, hypertension, atrial fibrillation, diabetes and hypercholesterolaemia. They must be aggressively controlled.

Hypertension

- Studies have shown that reducing BP by 5-6mmHg reduces the risk of stroke by 40%

Atrial fibrillation

- Warfarin treatment reduces the relative risk of stroke for AF patients by 70%. *Low dose Aspirin® -100mg orally daily* can be used if there is no structural cardiovascular defect, and especially if the patient is below 60 years of age.

Diabetes

- Diabetes is associated with a 2-fold increase of stroke so optimal blood sugar control should be a target to prevent stroke. Controlled trials of metformin treatment were associated with a reduction in cerebro-vascular events compared with a non-treated group.

Hypercholesterolaemia

- The positive association with stroke is weak. However, for the sake of achieving a healthy cardiovascular system, cholesterol must be well controlled by sensible eating and lots of exercise and statin therapy when indicated.

3.4.2 Acute Stroke

- Cerebral infarction results from thrombosis, embolus or rarely, from an episode of hypoperfusion
- Cerebral haemorrhage is associated with hypertension, bleeding disorders and intracranial tumours
- Presented below are common well known signs and symptoms associated with disruption of blood flow leading to damage of specific areas of the brain

Hemisphere injury

- Common following infarction in the internal capsule. It may present with some or all of the following: contralateral limb

weakness, flaccidity, ↓ reflexes, sensory loss, receptive or expressive dysphasia, homonymous hemianopia.

Pontine injury

- Caused by sudden occlusion of basilar circulation. It may cause quadriplegia and the “locked in” syndrome. Other features are pinpoint pupils and pyrexia.

Midbrain injury

- May produce coma, oculomotor nerve palsy
- Dilated pupils, hemi or quadriparesis.

Cerebellar injury

- May present with headache, vertigo, vomiting, nystagmus and ataxia.

Lateral medullary syndrome

- Caused by sudden occlusion of posterior, inferior cerebellar artery resulting in the characteristic vertigo and vomiting. Ipsilaterally, there may be palatal paralysis, Horner’s syndrome, cerebellar signs, sensory loss in face.
- Contralaterally, there may be sensory loss in the body.

Differential diagnosis for acute stroke

- hypo or hyperglycaemia
- head injury
- tumour
- infection
- migraine
- post-ictal states

3.4.3 Investigation

- Try to exclude differential diagnosis as noted above, especially treatable causes
- Do FBC/ESR, UEC, blood glucose, blood culture, CXR

Emergency CT

- (Not yet available in Nauru, Sept. 2013)

- In suspected SAH, head injury, cerebellar haematoma and patients on anticoagulation therapy

3.4.4 Management

- Establish good ABC
- Adequate oxygenation and hydration
- Avoid glucose-containing IV solutions, and prevent DVT by wearing firm support stockings and if not contraindicated; *give SC heparin 5,000 units bd*, for cases with lower limb paralysis and if cause of stroke was ischaemia
- Stabilise patient
- Refer for further investigations in the Ward and for early rehabilitation including physiotherapy

3.5 INVOLUNTARY MOVEMENT DISORDERS

3.5.1 Parkinson Disease

- Diagnosis is based on the presence of tremor, rigidity and bradykinesia, either together or alone
- Decision to treat depends on degree of confidence in diagnosis, functional and social disability, age and psychological and neurological condition of patient. Depression and dementia must be excluded.
- Treatment does not alter the progress of disease and individual response is variable
- Abrupt increases in anti-Parkinson's drugs may produce neuropsychiatric complications and abrupt dose reduction may result in acute akinetic rigid syndrome and the risk of precipitating a neuroleptic malignant-like syndrome.

Non-drug therapy

- education about long term prognosis of disease
- encourage exercise, socialise and try to lead as normal a life as possible

Drug therapy

- No need to treat early mild disease if it does not cause any disability
- *Levodopa+carbidopa*: orally 50mg/12.5mg 8-hourly, after meals; increase to 100/25mg 8-hourly over 1-2 weeks depending on response
- In some young patients, tremors can be better controlled by the addition of oral benzotropine 1-2mg daily up to 2mg bd
- In advanced diseases, nausea and vomiting are common adverse reactions. It is best to consult a specialist physician if available for further management advice.

3.5.2 Essential Tremor

Includes familial and late life tremor

- *Propranolol* 10mg bd up to 240mg daily in divided doses
- *Note: propranolol is contraindicated in known asthmatics*

3.5.3 Drug Induced Dystonia

- (e.g. oculogyric crisis after neuroleptic dopamine antagonist drugs such as metoclopramide)
 - *Benzotropine* 1-2mg, IMI or IV

3.6 EPILEPSY

Epileptic seizures are classified into:

- Generalised seizures such as: absence, myoclonic, tonic-clonic, tonic and atonic; and
- Partial seizures such as: simple, complex and secondary generalised.

The aim of pharmacotherapy is to prevent seizure recurrence preferably by monotherapy, and to prevent adverse effects.

3.6.1 Common Seizures and Drugs of First Choice

Absence seizure

- *Sodium valproate (absence and tonic-clonic), 10mg/kg/day orally in 2 divided doses, increase to 30-40mg/kg/day until seizure cease or adverse effects occur*

Myoclonic seizure

- *Sodium valproate 500mg orally daily for one week then 500mg bd for one week; increase up to 2.5g daily or until seizures cease or adverse effects occur*

Tonic-clonic generalised

- *Oral sodium valproate 500mg daily for one week, increased to 500mg bd for one week, increase up to 2.5g daily or until seizures cease or adverse effects occur (child: 10mg/kg/day in two divided doses, increase to 20mg/kg/day after 5 days. Usual maintenance is 20-60mg/kg/day*
OR
- *Phenytoin 300mg (child: 4-8mg/kg/day) orally daily (if tolerated) or 2 divided doses*
OR
- *Oral phenobarbitone 30mg daily; increase by 30-40mg every 3-4 weeks until seizures cease or if seizures are infrequent, until adverse effects limit further dose increase (child: 3-5mg/kg/day orally, 1-2 times daily).*

Tonic-clonic secondarily generalised

- *Oral carbamazepine 100mg daily, increase by 100mg each week up to 200mg bd (child: 5mg/kg/day orally in two divided doses, increase after 5 days to 10mg/kg/day, usual maintenance is 10-20mg/kg/day)*

Tonic-clonic undetermined if generalised or partial

- *Carbamazepine (same dose as above)*
OR
- *Sodium valproate (same dose as above)*

Simple partial

- *Carbamazepine (same dose as above)*

Complex Partial

- *Carbamazepine (same dose as above)*

Status epilepticus

See Section 1.3.8.

4 COMMON EAR, NOSE AND THROAT PROBLEMS

4.1 EAR DISORDERS

4.1.1 Acute Otitis Externa

Acute inflammation of the external ear, either due to diffuse inflammation secondary to infected dermatitis (commonest), or furuncular infection caused by either one, or a mixture of these bacteria: *Staphylococcus*, *Streptococcus*, *Escherichia coli*, *Proteus* species or *Pseudomonas*. It is characterised by the following:

- Very painful ear with pain and tenderness on moving the pinna
- External ear canal swollen and there may be conductive hearing loss
- Ear drums may be difficult and painful to try and visualise

Treatment

- *Topical: Framycetin 0.5% ear drops, 2 drops instilled into the ear, TDS*
- Keep the ear dry during treatment
- *Oral paracetamol for pain and fever,*
PLUS
- *(Flu)cloxacillin (child: 12.5mg/kg up to) 500 mg orally, 6-hourly for 5-7 days if no rapid response to topical treatment alone*
- Use a daily ear “wick” and antibiotic ear drops four times a day. (“Ear wick” is a small gauze soaked in antibiotic and corticosteroid used to lightly pack the external meatus to reduce swelling and facilitate healing). Avoid antibiotic ointment. Refer to senior staff if response poor or delayed.

4.1.2 Acute Otitis Media

Description

Inflammation with fluid in the middle ear, characterised by:

- Pain (ear ache)
- Loss of normal light reflex of ear drum

- Hypomotility of the ear drum
- Bulging ear drum
- Fever in about half the cases
- Redness of the ear drum
- Conductive hearing loss
- Usually associated with an attack of the common cold or an upper respiratory tract infection.
- Ear discharge
- Advanced cases may have tenderness over mastoid

Non-drug treatment

- Keep ears dry (no swimming)
- Use soft tissue to clean out any discharges (Do not use cotton buds)

Drug treatments

- More than 50% of acute otitis media will resolve without antibiotics
- If response poor or delayed commence
 - *Amoxicillin oral 8 to 12-hourly for 5 days (child: 15-30mg/kg up to 500 mg to 1 g*
 - OR*
 - *Cotrimoxazole oral bd (8/40mg/kg/day in divided doses)*
 - OR*
 - *Erythromycin if allergic to penicillin. Give treatment for 5-7 days.*
 - *Apply antibiotic ear drops to the affected ear 3-4 times a day (Use chloramphenicol or framycetin ear drops)*
 - *Paracetamol for pain relief*

Refer/consult

- Ear drums perforated
- No response after 3 days of treatment
- No pain relief
- Bulging ear drum not responding to treatment within 24 hours.

4.1.3 Acute Mastoiditis

Description

- Inflammation and tenderness of the mastoid bone usually the sequela of an inappropriately treated acute otitis media
- There is breakdown of the thin partitions between mastoid air-cells, a process that takes about 2-3 weeks
- A patient usually presents with a copious ear discharge with tenderness over the mastoid

Management objectives

- Establish the diagnosis if possible
- **Refer case urgently** to the surgical specialist as this will require surgical intervention

4.1.4 Chronic Suppurative Otitis Media

Pus discharging from the ear for more than 2 weeks.

- If the ear drum has been ruptured for >2 weeks, a secondary infection with multiple organisms usually occurs
- Multiple organisms make oral antibiotics alone less effective and patients may need to be referred
- If there is pain, suspect other conditions or complications such as mastoiditis

Treatment

- Dry mopping of the ear must be demonstrated to the child or care giver
- Roll a piece of absorbent material like tissue paper or cloth, into a wick
- Soak it in antibiotic ear drop or acetic acid in N/S solution
- Insert carefully into child's ear and leave it in place for one minute
- Remove and replace with a clean dry wick
- Watch the care giver do this procedure and once competent, advise to do it at home 4 times daily
- Continue dry mopping at home until the ear is dry and ready to heal
- If bleeding, give oral antibiotics and temporarily stop dry mopping
- Avoid getting the ear wet at all costs

Refer

- Painful ear especially over the mastoid
- No improvement in 2 weeks

4.1.5 Serous Otitis Media (Glue Ear)

- Also known as otitis media with effusion
- A sterile middle ear effusion characterised by niggly short-lasting pain in the ear especially at night.
- The drum may look dull and retracted and the colour may be yellowish or sometimes blue.
- Sometimes the drum may look injected with noticeable radial vessels running from the periphery to the umbo, and this may be misdiagnosed as otitis media. However, the child is well and afebrile, and the associated hearing loss has been recognised by parents and/or teacher for some time.
- Refer cases for surgical consultation

Treatment

- Prolonged antibiotic may benefit a few patients (one month of antibiotics)
- Bilateral suction myringotomy and insertion of ventilation tubes (grommets) to be carried out by the surgical consultant.

4.1.6 Otorrhoea (Discharge From the Ear)

- This is a very common complaint and the discharge may consist of pus, serous fluid, blood, CSF, or perilymph. In all cases referral or consultation with a surgical specialist is advised.
- CSF leakage in particular carries a high risk of intracerebral infection. Give prophylactic penicillin while seeking the surgeon's opinion, if there is any suspicion that this is the source of the discharge.

4.1.7 Vertigo

- An hallucination of movement.
- A sensation of rotation or movement of one's self (subjective vertigo) or of one's surroundings (objective vertigo), in any plane.

- The cause is usually peripheral but can be central. There may be nausea and vomiting. There must be nystagmus. If nystagmus is absent in the sitting position, a provocative positional test must be done.
- There are many causes. Acute labyrinthitis is a common peripheral cause and is usually self-limiting. However detailed diagnosis requires specialist help either from an accessible ENT consultant or a neurologist.

4.2 DISORDERS OF THE NOSE AND PARANASAL SINUSES

4.2.1 Epistaxis (Nose Bleeds)

- A common condition caused by either damage to the veins behind the columella in children or from arteries at the caudal part of nasal septum (Little's area). They are usually due to trivial trauma after nose picking or nose blowing.
- In elderly patients, arterial bleeding is usually at the posterior area and is often associated with degenerative arterial disease and hypertension.
- Rarer causes include: coagulation defects in blood, local vascular malformations as in hereditary telangiectasia, raised venous blood pressure – either generalised as in congestive heart failure, or localised, as in superior mediastinal obstruction.

Treatment

After assessment, if very mild epistaxis without significant blood loss and no more bleeding, do full blood count and if normal, reassure patient and discharge.

If bleeding is moderately severe, do:

- FBC/ blood coagulation screen/ Cross match blood where indicated
- If the patient is haemodynamically stable and there is no more bleeding after initial observation, and blood tests are normal, continuing rest and observation may be all that is required.

In severe cases :

- Intravenous fluid/blood replacement are usually indicated

- Stop the bleeding by nasal packing
- Insert a size 14 Foley's catheter in each nostril, inflate balloons and withdraw gently until they sit snugly against the posterior part of the nose, pack afterwards from outside.
- Remove after 3 days.
- Give *phenoxymethyl penicillin* or *oral amoxicillin* as prophylaxis during these three days
- Refer all severe cases of epistaxis for hospital treatment

4.2.2 Allergic Rhinitis (Hay Fever)

Hypersensitivity to allergens such as pollen, house dust, grasses, animal proteins and food. It is characterised by:

- Blocked stuffy nose with watery discharge
- Frequent sneezing accompanied by nasal itching and irritation
- Conjunctival itching and watering
- Oedematous pale grey nasal mucosa
- Mouth breathing and snoring at night

Non-drug treatment

- Avoid allergens

Drug treatment

- An antihistamine such as
 - *Promethazine (Phenergan®), loratadine, or chlorpheniramine*
- Refer if symptoms are severe

4.2.3 Sinusitis (Acute)

Inflammation of one or more of the nasal sinuses, that most often occurs after a viral nasal infection or allergic rhinitis. It can become secondarily infected by bacteria resulting in:

- Purulent nasal discharge (persistent or intermittent)
- Pain and tenderness over one or more sinuses
- Nasal obstruction
- Post-nasal discharge
- Headache and fever (occasional)

Non-drug treatment

- Steam inhalation with a teaspoon of “Vicks” ointment in the hot water

Drug treatment

- *Amoxicillin (child: 15 mg/kg up to) 500 mg orally, 8-hourly for 5-7 days*
OR
- *Doxycycline (child > 8 years: 4mg/kg up to) 200 mg orally, for the first dose, then (child > 8 years: 2mg/kg up to) 100mg orally daily for 5-7 days*
- *Give paracetamol for pain*
- *Antihistamines (such as promethazine, loratadine, chlorpheniramine, cetirizine), or pseudoephedrine orally may be helpful*
- Choice of antibiotics may be determined by the microbiological sensitivity of the causative organisms
- **Refer** if poor response over 5 days or development of oedema over sinuses or periorbital cellulitis

4.3 DISORDERS OF THE PHARYNX, LARYNX AND NECK**4.3.1 Acute Pharyngitis**

- A painful red throat without pus
- 90% of acute pharyngitis cases in infants and adults are caused by viruses. However, up to 40% cases of acute pharyngitis in school aged children may have *Streptococcus pyogenes* (Group A streptococcus).
- About 0.3-3% of untreated β -haemolytic *Streptococcus* pharyngitis cases lead on to rheumatic heart disease which is fairly common in Nauru.

Non-drug treatment

Home-made salt mouthwash may help, e.g. half teaspoon of salt, a teaspoon of lemon juice, in a glass of warm water, gargle for one minute twice daily.

Drug treatment

- **Oral paracetamol**
- Since this is commonly a viral infection, no need for antibiotic therapy in infants and adults
- *However for school age children, give oral phenoxymethyl penicillin (10mg/kg up to) 500mg orally 12-hourly for 10 days*
- **OR**
- *Benzathine penicillin G at a dose of 0.6 megaunit IMI stat (if <27kg) OR 1.2 megaunits IMI stat (if >27kg).*
- **This should be given if β -haemolytic Streptococcal Group A infection has been proven by laboratory test, or if there is strong suspicion on clinical grounds.**

4.3.2 Acute Tonsillitis**Description**

- Acute tonsillitis has many things in common with acute pharyngitis.
- Clinical features suggestive of *Streptococcus pyogenes* infection include fever ($>38^{\circ}\text{C}$), tender cervical nodes, tonsillar swelling, exudates and no cough

Drug treatment

- Drug treatment is similar to acute pharyngitis (see above)
- As both acute post-streptococcal rheumatic fever and glomerulonephritis occur in Nauru, err on the side of caution if there is any likelihood that throat infection may be streptococcal.
- *S.pyogenes* remains sensitive to penicillin according to microbiology results at the RON hospital (2013)

4.3.3 Treatment of Oral Moniliasis (Oral Thrush)

- *Sip nystatin suspension 1mL qid or apply gentian violet paint 1%.*

4.3.4 Neck Space Abscesses

Please note: All suspected neck space abscesses should be referred to hospital urgently.

4.3.5 Quinsy (Peritonsillar Abscess)

- *IV benzyl penicillin every 6 hours*
- *Pain relief PR/oral (aspirin® or paracetamol)*
- Oxygen and a clear airway is of paramount importance.
- If surgery is indicated pus must be released by incision under LA with the patient in a sitting position, with a large bore suction for the doctor to clear the pus.
- Alternatively – an “abscess tonsillectomy” is done under GA

4.3.6 Retropharyngeal Abscess

Diagnosis depends on examining a “Soft tissue lateral Neck”

X-Ray which would show increased AP diameter between the vertebral column and the airway.

Refer urgently.

What happens if left untreated or referred late?

Abscess could burst through the posterior pharyngeal wall and “drown” the patient by compromising the upper airways, potentially leading to asphyxia and death.

4.3.7 Ludwig’s Angina

Refer case urgently for hospital treatment.

4.3.8 Hoarseness and Stridor

Stridor

- Noisy breathing due to narrowing of the lumen of larynx or trachea. The presence of stridor is usually a very clear warning that one needs to act quickly to ensure the upper airway patency is not compromised any further or it may become fatal.

Causes of stridor in children

- Foreign body
- Acute laryngitis (croup)
- Epiglottitis
- Allergic reaction (anaphylaxis)

- Ingestion of corrosive agents
- Diphtheria (rare in an immunised population)

4.3.9 **Acute Laryngitis (Viral “Croup”)**

See Section 15.3.4.

4.3.10 **Acute Epiglottitis**

See Section 15.3.3.

4.3.11 **Diphtheria**

Infection with *Bordetella pertussis* is very rare now following the vaccination of all children against this infection. However, clinicians are reminded to keep an eye out for the typical appearance of adherent pharyngeal membrane which bleeds easily, on the background of a very sick patient. Suspected diphtheria cases should be referred **immediately** to hospital for further investigation and management.

5 COMMON EYE CONDITIONS

First and foremost, if in doubt, please contact, Eye Clinic, Public Health building. Current (2013) nurse in charge, Patrina Akua.

Eye conditions are common in Nauru and are treated at the Eye Clinic.

This service has a consultative link with Dr Jambi, PNG, who visits to perform elective eye surgery - especially cataract extraction with lens replacement (particularly in diabetic patients), together with removal of pterygium and other elective procedures.

5.1 ACUTE EYE CONDITIONS

5.1.1 **Stye (External Hordeolum)**

An acute small abscess of an eyelash follicle. It presents as a tender inflamed swelling(s) on the lid margin, which points through the skin. More than one lesion may be present.

Treatment

- No antibiotic treatment is required in most cases. Warm (not hot!) compress with a warm towel is beneficial.
- *Systemic antibiotic (oral flucloxacillin)* is only indicated in severe cases (associated cellulitis).

5.1.2 **Conjunctivitis**

An inflammatory, often purulent condition of the conjunctiva. It is commonly caused by a virus or bacteria (**Table 5.1**).

Table 5.1 Management of conjunctivitis

| Variables | Viral Cause | Bacterial Cause |
|--------------------------|---|---|
| Conjunctiva | Diffuse injection | Diffuse injected |
| Vision | Not affected | Not affected |
| Pain | No pain | No pain |
| Discharge | Usually watery | Usually mucopurulent. Eyes usually stuck together in the morning |
| Pupillary light response | Normal | Normal |
| Number of eyes affected | Commonly both eyes | Commonly one eye initially but can affect both eyes |
| Duration | Resolves after a few days | Few days and responds well to treatment |
| Treatment | Advise on self-limiting nature of illness. Stress infectiousness to others. | Antibiotic drops or ointment. <i>Use chloramphenicol eye drops 6-hourly for 5 days</i> OR <i>Chloramphenicol ointment tds for 5 days</i> OR <i>Soframycin eye drops 6-hourly for 5 days.</i> |

Warning: No steroid or steroid antibiotic combination e.g. soframycin / dexamethasone (Sofradex® or Framoptic-D®), should ever be used. This will aggravate viral conjunctivitis and can lead to disastrous results if the patient happens to have viral keratitis (infection of cornea).

Referral/consult

If patient does not improve after three days.

5.1.3 Subconjunctival Haemorrhage

The patient presents with deep red haemorrhage under the conjunctiva. It can be a result of trauma or spontaneous (no trauma). The patient is usually very worried. If there is no infection or significant trauma to the

eye, then patient is reassured that it will resolve over a period of one to three weeks.

5.1.4 Iritis

Inflammation of the iris is not very common but may be mistaken for conjunctivitis and treated inappropriately resulting in permanent damage to the eye.

Table 5.2 Signs and Symptoms of Iritis

| Variables | Iritis |
|--------------------------|--|
| Conjunctiva | Injected but mostly around the cornea |
| Vision | Usually blurred |
| Pain | Moderate pain associated with photophobia |
| Discharge | None |
| Number of eyes affected | Can be one or both |
| Duration | Few days to a week. Responds well to treatment |
| Pupillary light Response | Poor |
| Treatment | Regular <i>steroid drops and mydriatics (pupil dilators)</i> . Please contact Eye Clinic for discussion before starting treatment. |

5.1.5 Burns

Burns to the eye are most commonly due to radiation or chemicals. **The most important issue with these types of injuries is prevention.** The public should be advised to wear appropriate goggles for protection when welding or spraying.

Radiation burns

- Most common cause is arc welding. This is essentially a superficial burn of the cornea. There is usually a delay of six to ten hours after exposure before the burn becomes symptomatic.

- Symptoms vary from mild irritation and foreign body type sensation, to severe photophobia, pain and spasm of the eyelid.
- Because of the high absorption of radiation in the cornea, there is rarely any damage posterior to the cornea.

Treatment

- *Amethocaine eye drop (local anaesthetic drop) one or two drops stat ONLY*
- *Cyclopentolate 1% (dilators) eye drops to relieve muscle spasm*
- *Paracetamol orally for pain should be sufficient*

Warning: Topical anaesthetic drops if used often, cause erosion of the corneal epithelium and should NEVER be given to the patient to take home.

Patient should be reassured that damage is temporary and that symptoms will settle within 24 hours.

They should always be reminded to use protective goggles in future.

Chemical burns

When alkali based, can be severe as the chemicals penetrate the cornea rapidly. Burns from acids (e.g. car battery) are 'less' severe as they are less penetrative.

Treatment

- LOTS of irrigation with whatever is available on site, e.g. shower, water tap, hose
- Hold lid(s) apart and have continuous irrigation of the affected eye for several minutes
- If N/S is available, connect to a normal giving set and with lids held apart, irrigate for about an hour. At least 2L should be used. If available, a drop or two of a local anaesthetic in each eye before irrigating should be used.
- Patient should be advised on proper eye care protection in future

5.1.6 Eye Injuries

All eye injuries should be examined in good light and ideally under magnification. If local anaesthetic drops are available, put in a drop or

two before examining. This will make the patient more comfortable and therefore make your examination easier. If fluorescein strips are available, these should be used as they will make it easier to see foreign bodies using the blue light in your ophthalmoscope.

No foreign body present

- Reassure patient and give antibiotic drops or ointment.
Chloramphenicol eye drops, 6-hourly
OR
- *Framycetin (soframycin®) eye drops 6-hourly*
OR
- *Chloramphenicol eye ointments 8-hourly*
- Continue drops for about five days. Patient should be reviewed and if there is no improvement further consultation is needed.

Foreign body present

If you are trained to remove foreign bodies, then go ahead. If you are not trained to do this then refer patient to someone who is.

Penetrating eye injury

Patient should be discussed with Eye Department staff and referred immediately to RON hospital

Refer all suspected fractures especially with diplopia

5.1.7 Glaucoma

Raised intraocular pressure, usually in one eye. Symptoms include blurred vision, unilateral or temporal headache, nausea and maybe vomiting. Affected eye is red and feels firm and the affected eye's pupil may be dilated.

Drug Treatment (discuss with the Eye team first):

- *Oral acetazolamide 500mg stat. followed by 250mg 6-hourly,*
- *Instil 1% pilocarpine eye drops into affected eye every 30 minutes (if available)*
OR
- *Timolol eye-drops which are also used in chronic maintenance treatment.*

- Refer to the Eye clinic immediately.

5.2 CHRONIC EYE CONDITIONS

5.2.1 Pterygium

- Is a growth originating from the conjunctiva which invades the cornea. It is common in hot climates and may represent a response to chronic dry eyes and exposure to the sun. The symptoms are mainly related to the dryness associated with its elevation. Symptoms are typically worse with sun and wind, because of the greater chance for the eye to become drier.
- Prevention includes wearing protective sunglasses
- Treatment is surgical excision and timing of surgery depends on how severe the pterygium is and how bad the symptoms are.
- Recurrence can be as high as 100% depending on the technique used
- Symptomatic relief can be offered by artificial tears

5.2.2 Refractive Error

The conditions included here are short-sightedness (myopia), long sightedness (hyperopia) and refractive error due to aging (presbyopia). Of these the most common in Nauru is presbyopia. The other two are relatively uncommon.

It is normal with age to lose the ability to see up close as it is natural to lose the ability to accommodate with age. This happens around the age of 40 and is shown by the patient beginning to move the book away while reading before they can focus. The problem worsens with age and ultimately they will be unable to read. So long as the patient's distance vision is normal, it is certain that they will need reading glasses.

What about the 90 year old lady who reads without glasses? Some people develop cataracts as they age. Cataracts can cause patients to become short sighted and therefore can read without glasses. Their distance vision will be poor.

So in the patient over 40 years old: if their distance vision is good, they will NEED reading glasses and if they can read without glasses, their distance vision is most likely poor.

5.2.3 Cataracts

- Clouding of the lens - a degenerative process. With time the condition worsens and eventually will cause blindness. The presentation is usually with deteriorating vision over a period of time. Treatment is surgery where the old lens is removed and a new one implanted. Patient should then have good vision.
- Refer all cases

5.2.4 Diabetic Eye Disease

- Patients with diabetes develop maculopathy, and later, wider retinal damage as a result of damage to the small vessels. The three factors that determine the rate of development are: duration of being a diabetic, control of blood sugar and control of blood pressure. Prevention of diabetic eye disease is therefore focused on maximising control of blood sugar and blood pressure.
- Treatment available locally for diabetic eye disease is laser, but this only slows down the progression of the disease and does not stop it. Severe diabetic eye disease requires surgery overseas and costs around \$10,000 per eye, so prevention is cheaper than trying to get a cure. Despite the high cost this surgery usually does not fully restore sight and quite often does not improve vision.
- Intra-ocular injection of medicines to slow the rate of new vessel growth is available and effective but at present is very costly. This is likely to become available as costs fall once patent rights have expired.
- Diabetic patients should be examined at least once a year for diabetic eye disease and if they are found to have problems, this period is reduced as required.

5.2.5 Trachoma

- Trachoma is a form of chronic *Chlamydia* conjunctivitis. It is the leading cause of preventable blindness in the world, especially in developing countries. It is prevalent in Nauru and was found in

recent surveys – particularly in children 10-15 years of age.
Diagnosis is clinical.

- *Give azithromycin 1 g (child: 20 mg/kg up to 1 g) orally, as a single dose.*

6 DENTAL AND ORAL CONDITIONS

6.1 PAEDIATRIC DENTAL AND ORAL PROBLEMS

6.1.1 Teething

The eruption of the primary teeth (around 6 months old) is usually accompanied by inflamed and sore gingiva. There may be irritability, disturbed sleep and drooling. Teething does not cause high fever or convulsion.

Treatment

- Analgesic/anti-inflammatory *such as elixir paracetamol*
- “Teething ring” or something hard to chew on, like hard biscuits

6.1.2 Trauma to Soft Tissue and Primary (milk) Teeth

Small superficial oral lacerations heal spontaneously and no antibiotic is indicated. Dirty lacerations need surgical debridement and antibiotic if infected.

- Antibiotics used are:
 - *Phenoxy methyl penicillin 12.5mg/kg qid for 5-7 days*
OR
 - *Amoxicillin 25mg/kg tid for 5-7 days*
OR
 - *Benzyl penicillin, 15-30mg/kg IV every six hours*
- If hypersensitive to penicillin, use:
 - *Erythromycin 10-20mg/kg orally bd*
OR
 - *Cephalexin 6.25mg/kg orally every 6 hours*
OR
 - *Clindamycin (child: 5mg/kg up to) 300mg orally, q8H for 5 days*

Alveolar bone in a child is elastic and rarely fractures. Injuries to the primary teeth are usually loosening with/without displacement. Fractures to crown or root can happen.

Treatment includes *elixir paracetamol for pain/fever, oral penicillin or amoxicillin if infected* and referral for dental assessment.

6.1.3 Trauma to Secondary / Permanent Teeth

Permanent teeth start to erupt into the oral cavity at 5-6 years and continue up to the age of 21. After the initial eruption, root formation/development continues for a period of 18-30 months. Injuries during this phase have the potential to interrupt root development.

Injuries involved are mostly fractures of the root or crown and displacement (luxation, intrusion, extrusion or avulsion).

Treatment includes *oral paracetamol for pain* and **immediate dental referral**. Successful outcome depends on timely re-establishment of a normal periodontium (supporting structures around tooth).

6.1.4 Toothache

Toothache in a child is usually caused by either caries impacted with food, abscess, root infection or an erupting tooth.

Treatment includes paracetamol for pain/fever, phenoxy methyl penicillin or amoxicillin for infection and referral for further dental treatment.

6.2 INFECTIONS

6.2.1 Bacterial Infections

Causative organisms are usually a mixture of aerobic and anaerobic oral flora. All cases should ideally be referred to a dentist or dental therapist for appropriate treatment.

6.2.2 Gingivitis

- Presents as red swollen gums, that easily bleed on brushing teeth
- Antibiotic is normally not indicated in most cases
- Local dental care such as regular tooth brushing to control bacterial plaque is usually sufficient

6.2.3 Acute Necrotising Ulcerative Gingivitis (ANUG)

- This is a painful yellowish-white ulcer of the interdental papillae and gingival margins which bleeds easily
- Causative bacteria are a mixture of the anaerobes: *Borrelia vincentii*, *Fusobacterium fusiform*, *Bacteroidis* and *Treponema* species. The appearance of ANUG in an otherwise healthy individual may be the presenting sign of HIV infection.

Treatment

- Advise adequate oral hygiene
- 0.2% chlorhexidine gluconate mouthwashes (if available), adjunct to tooth brushing
- Metronidazole (10mg/kg up to) 400mg tds for 5 days
- Refer for dental debridement

6.2.4 Periodontal Abscess

- Localised collection of pus in a periodontal pocket of a tooth
- There is pain on lateral movement of the tooth and it may be quite mobile

Treatment

- Oral Amoxicillin 500mg tds and metronidazole 400mg orally tds for 5 days
- Refer for dental treatment

6.2.5 Chronic Periodontitis

This is usually caused by gram negative anaerobes which are also prominent in active disease. Teeth involved are usually mobile and painful.

Treatment

- 0.2 % chlorhexidine gluconate mouthwash (if available) bd
- Doxycycline 100mg orally bd for 5 days
OR
- Phenoxymethyl penicillin (child 12.5mg/kg) up to 500mg orally 6-hourly for 5 days,
PLUS

- *Metronidazole 400mg orally tds for 5 days (in moderately severe cases)*
- *Use erythromycin (child: 10 mg/kg up to) 500 mg orally, q6H for 5 days in place of penicillin in penicillin allergy*
- Pocket dental treatment for localised pus formation

6.2.6 Pericoronitis

This is an inflammation / infection of a gum flap (operculum) overlying a partially erupted tooth, usually a lower wisdom tooth (or lower three molars) - often traumatised by an overerupted upper wisdom tooth (or upper three molars)

Treatment

- Removal of the opposing upper third molar
- Adequate oral hygiene
- *Chlorhexidine gluconate 0.2% mouth wash*
- *Irrigation with 3% hydrogen peroxide*
- *Phenoxy methyl penicillin 12.5mg/kg four times daily for 5-7 days*
OR
- *Amoxicillin 25mg/kg three times daily for 5-7 days*
- If penicillin hypersensitive-
- *Erythromycin 10-20mg/kg orally twice daily*
OR
- *Cephalexin 6.25 mg/kg orally 6-hourly*

6.2.7 Facial Swelling and Infection

Facial swelling can either be due to odontogenic causes (e.g. caries, retained roots, periodontitis) or non-odontogenic causes (e.g. soft tissue infection, fractures, osteomyelitis, sialoadenitis, foreign body).

Infections can spread to the soft tissue around jaws, neck and cause cellulitis and suppuration. This can easily be life-threatening.

In the absence of systemic signs and symptoms, odontogenic causes can be usually treated by local dental care, such as removal of the infected pulp tissue.

If accompanying systemic signs and symptoms are present, the following treatment should be given:

- *Oral amoxicillin and metronidazole for 5 days*

Patients hypersensitive to penicillin should be given *either erythromycin or cephalexin*.

If progressive trismus arises and airway is compromised, admit case and give:

- *Penicillin G 1.2-2.4g IV qid*
OR
- *Ampicillin 1-2g IV qid*
PLUS
- *Metronidazole 1-2g IV tds*
PLUS
- *Gentamicin 3-5mg/kg/day IV* (ideally not exceeding 48 hours; in patients with poor renal function serious damage to the vestibular apparatus may result from gentamicin. Get an estimate of renal function before prescribing)
- Pus must be drained surgically by the dentist
- Be careful of poorly controlled diabetic and hypertensive patients, who may need antibiotic cover

6.2.8 **Septicaemia**

Septicaemia due to skin infection or cellulitis is usually caused by *Staphylococcus aureus* or *Streptococcus pyogenes*.

- Treatment is with *IV cloxacillin 1-2 g, 4 to 6-hourly*.

Patients hypersensitive to penicillin, give

- *Clindamycin (child:10 mg/kg up to) 450-900 mg IM/IV, every 6-8 hours*

In children, facial or periorbital cellulitis may be caused by *Haemophilus influenzae* or *Streptococcus pneumoniae* in addition to the above pathogens, add one of the following to the above:

- *Ceftriaxone 100mg/kg (max. 2g/day) IV once daily*

Children hypersensitive to penicillins or cephalosporins, give

- *Chloramphenicol 100mg/kg/day (max 3g/day) IV in 3 or 4 divided doses*

6.2.9 Viral Infections

Primary Herpetic Stomatitis

Causative agent is Herpes Simplex Virus 1 (HSV 1). It presents with multiple oral ulcers accompanied by fever, malaise, anorexia and irritability. In children, they may have drooling of saliva.

Treatment

- For symptomatic relief; soft diet and adequate fluid intake, since this is a self limiting illness
- *Antipyretic such as paracetamol*
- *Local antiseptic mouthwashes such as chlorhexidine 0.2% solution*
- *Aciclovir, 10mg/kg qid orally for 7-10 days*

Herpes simplex labialis (cold sore)

Causative agent is HSV 1. The virus is latent in the trigeminal ganglia and is reactivated as herpes labialis. It is precipitated by sunlight, trauma, systemic disease or stress. Papules are followed by blisters then pustules.

Treatment

- *Aciclovir cream (5%) applied qid early, before blisters appear.*

Herpes zoster (shingles)

Causative agent is Varicella Zoster Virus (VZV), the same one that causes chicken pox. It presents as an acute painful, vesicular rash along the dermatomal distribution of the sensory nerves; commonly of the trigeminal or the intercostal nerves.

Treatment

- *Aciclovir 800mg oral 5 times daily OR valaciclovir 1g oral, q8H for 7 days; beneficial only if started within 72 hours from the onset of the vesicles.*

Ophthalmic herpes zoster should be referred to the Eye clinic.

Please see Section 19.3.2 for Skin VZV infections.

6.2.10 Fungal Infection

Oral candidiasis

A white creamy plaque which leaves a red base when wiped off. Causative agent is usually *Candida albicans*, when triggered off by the use of antibiotics, steroids, unhygienic dentures, smoking and in immunocompromised hosts. It can be seen in neonates too.

Treatment

- Eliminate predisposing factors
- *Nystatin 100,000 U/mL suspension 1mL oral, q6H for 7-14 days.*
- For severe cases in immunocompromised hosts, give *itraconazole 100-200 mg oral, daily for 14 days OR nystatin suspension 2mL orally qid.*

6.3 PROTOCOL FOR PAINFUL TOOTH/TEETH

Where possible, refer case to the dental department for identification and treatment of cause of pain. Variation in an individual's response to pain is affected by fatigue, anxiety and sometimes depression.

While one is waiting for definitive dental treatment, the following analgesics could be given:

6.3.1 Mild Pain

- *Paracetamol 500mg-1g orally 4 to 6-hourly*
OR
- *Aspirin® 300-600mg 4 to 6-hourly (avoid in children, breast feeding mothers, people with gastric diseases and those with bleeding tendencies)*
OR
- *Other NSAIDS such as ibuprofen 400mg-1.6g bd*

6.3.2 Moderate Pain

- *ADD codeine 15-60mg qid oral to the above medications*

6.3.3 Severe Pain

- *Pethidine 25mg-100mg SC/IMI 2 to 3-hourly PRN*
OR
- *Morphine 2.5mg-10mg SC/IMI 2 to 3-hourly PRN*

6.4 ANTIBIOTIC PROPHYLAXIS IN DENTAL SURGRY

See Section 2.10.2 for full protocols.

6.5 BONE PROBLEMS

6.5.1 Alveolar Osteitis (Dry Socket)

Severe dull pain post dental extraction, two-three days later. Tooth socket appears 'dry' with exposed bone and no blood clots, gingiva is inflamed.

Treatment

- Analgesics
- Dental referral for LA debridement and curettage to initiate socket healing

6.5.2 Facial Fractures

Mandibular fracture (broken jaw)

For simple, undisplaced fractures, advise soft diet, PRN analgesia is sufficient. (No surgical intervention required).

For compound displaced fractures:

- *Amoxicillin 500mg tds orally*
OR
- *Penicillin G 1.2g IV qid*
PLUS
- *Metronidazole 500mg IV bd if infected;*
- Check tetanus toxoid status and give it if not covered
- Refer for dental surgery

In children, closed condyle or TMJ fractures, encourage early jaw movement (to prevent ankylosis), soft diet and paracetamol as analgesics. (**Do not use aspirin[®]**).

Midface fractures

- Le Fort types I, II and III or isolated midface fractures, refer for dental surgery.
- If compound fracture, *initiate benzyl penicillin 1.2g qid IV and metronidazole 1g qid IV for 5-7 days* while awaiting transfer for surgery.

Cerebrospinal fluid leaks

Fractures of the facial middle third and skull, which injure the dura, can cause CSF leaks and present as otorrhoea or rhinorrhoea. They predispose to meningitis and must be covered with antibiotics until the leak stops.

Recommended treatment:

- *Rifampicin 600mg oral daily*
OR
- *Chloramphenicol 500mg oral qid*
OR
- *Ceftriaxone IMI 250mg daily.*
- Continue for two days after CSF leak stops

Osteomyelitis

Please see Section 12.14.1.

6.6 NEUROLOGICAL PROBLEMS

6.6.1 Trigeminal Neuralgia

Characterised by an unilateral, sharp, stabbing and intermittent pain in division of the trigeminal nerve but no sensory loss. Diagnosed by relief following nerve block using *bupivacaine 0.5%*.

Treatment

- *Carbamazepine 100-200mg oral once or bd*
- *Dose can be increased to 400-600mg and even up to 1.2g/day.*

6.6.2 Bell's Palsy

- Acute unilateral, lower motor neurone type of facial palsy of unknown aetiology (maybe viral). Most recover spontaneously.
- It is advisable to protect the eye with pad or artificial tears to prevent corneal damage when eyelids cannot close properly.
- Steroids are of unproven value but still, certain authorities advise giving *oral prednisolone 5-10mg bd for 5 days, early during the disease to aid recovery.*

6.7 ULCERS AND OTHER ORAL CONDITIONS

6.7.1 Oral Ulcers

Oral ulceration is probably the most common oral mucosal disease seen. It can potentially be the most serious too. There are many causes and one must make careful history and examination to help diagnosis. Antibiotic use is rarely indicated. A corticosteroid cream application may help but if the ulcer does not heal in 2-3 week's time, refer immediately for dental assessment.

6.7.2 Human and Animal Bites

See Section 1.6.

6.7.3 Oral Burns

- A common chemical burn seen in adults is caused by putting aspirin® in the buccal sulcus to relieve headache. Treatment is to treat cause of headache and don't put aspirin® in the buccal sulcus!
- Burnt mucosa heals itself quite quickly.
- Chemical burns in children are usually due to ingestion of caustic liquids. Regular saline mouthwash should be done.
- In severe burns, admit case for IV fluids and antibiotics (usually penicillin). Periodic follow-up is needed to check for scarring and adhesions.

6.7.4 Sedatives for Dental Procedures

To be used in anxious patients such as those who are phobic to needles, or in children.

- *Use diazepam 5-30mg 0.5-1 hour before procedure. This can also be given in divided doses such as 5mg nocte, 5mg in the morning and 5mg at 0.5-1 hour before dental procedure.*
- *In children, diazepam 2mg (or according to age), is given either orally, IMI or PR at 0.5-1 hour before the procedure*

OR

- *Midazolam 0.1mg/kg orally, SC, IMI or IV*

6.7.5 Anti-Emetic Medications

Important especially for post-operative Oral and Maxillofacial Surgery (OMFS) patients on inter-maxillary fixation (wired jaws).

Treatment

- *Metoclopramide 10mg qid PRN IV or IMI*
OR
- *Prochlorperazine 12.5mg qid PRN IMI; or 5-10 mg orally or 25mg PR*
OR
- *Promethazine 25-50mg bd IMI*

7 ENDOCRINE CONDITIONS

7.1 DIABETES MELLITUS TYPE 1

7.1.1 Description

- Type 1 diabetes mellitus is an auto-immune disease which leads to destruction of the β -cells of the pancreas resulting in absolute insulin deficiency
- The metabolic condition resulting from this is characterised by chronic hyperglycaemia
- It usually presents with thirst, hunger, polyuria, lethargy, weight loss and/or ketoacidosis
- It is managed with insulin injections with the dose tailored to each individual's need

Characteristic features

- Onset at a young age
- Presentation with diabetic keto-acidosis (up to a third of all cases)
- Poor response to β -cell stimulation as demonstrated by change in plasma C-peptide induced by *IV glucagon* (C-peptide measurement can be performed in overseas laboratories but not currently in Nauru)
- Positive circulating autoantibodies to glutamic acid decarboxylase (GAD), to insulin (IAA) and to islet-cell antigen (IA2). These can be measured in overseas laboratories but commonly are not needed to make the diagnosis. They may prove to be valuable markers in those at risk of Type I diabetes.

7.1.2 Diagnostic Criteria

- FBS $>7\text{mmol/L}$ (on at least two different occasions)
- 2-hour plasma glucose $>11.2\text{ mmol/L}$ after a 75gm oral glucose tolerance test
- RBS $>11.2\text{ mmol/L}$ when associated with signs and symptoms of hyperglycaemia such as: loss of weight, polyuria, polyphagia, susceptibility to infection

- Measurements should be carried out using the glucose oxidase method in the hospital laboratory. Glucometer strips are not accurate enough for this purpose.
- Where the fasting blood sugar >5.6 mmol/L but <7 mmol/L; or a random blood sugar >5.6 mmol/L but <11.1 mmol/L; do an oral glucose tolerance test to test for diabetes.

All newly diagnosed type 1 diabetes cases must be urgently referred to a consultant physician.

7.1.3 Management Objectives

- Control blood sugar level within acceptable limits (HbA1c):
 - Under 12 years of age $<8\%$
 - Age 12-18 $<7.5\%$
 - Over 18 years $<7\%$
- Monitor for long term complications such as retinal disease, nephropathy, peripheral vascular disease and neuropathy
- Prevent acute complications (e.g. hyperglycaemic and hypoglycaemic coma)
- Improve and maintain quality of life
- Educate the patient to enable self-care including consultation with a dietician and advice on recognition and prevention of hypoglycaemia, injecting insulin and self-monitoring of blood glucose levels

7.1.4 Insulin Treatment

For fresh cases:

- *Subcutaneous injection of insulin at a total daily dose of 0.5 U/kg, using regular insulin for post-prandial glucose control and intermediate insulin to control fasting blood sugar*
- This may be achieved with twice daily injections or may require multiple doses. Doses are adjusted according to self-monitored blood sugar and under the direction of the diabetes clinic. Insulin requirements may rise over time as destruction of β -cell function progresses

7.1.5 Dietary Advice

All new type 1 diabetics must be advised on appropriate food intake by a dietician (or a trained member of the diabetes clinic staff).

7.2 DIABETES MELLITUS TYPE 2

7.2.1 Description

- Type 2 diabetes mellitus is the most prevalent form (up to 80% of all diabetics) and is a metabolic disorder characterised by chronic hyperglycaemia due to insulin resistance and relative insulin deficiency or both
- Its late complications result in reduced life expectancy and considerable use of health resources
- Macrovascular disease leads to an increased prevalence of coronary artery disease, peripheral vascular disease and stroke; and microvascular disease lead to diabetic retinopathy, neuropathy and nephropathy
- Patients are prone to bacterial infections

7.2.2 Management Objectives

- Keep the blood sugar level as close as possible to the non-diabetic level
- Recommended targets from the American Diabetes Association:
 - HbA1C <7%
 - FBS <7.8mmol/L
 - 1-2 hours post-prandial sugar of <10 mmol/L
- Prevent long term complications such as retinopathy or nephropathy and control commonly associated conditions such as hypertension, hyperlipidaemia
- Prevent acute complications such as hypo/hyperglycaemia
- Improve and maintain quality of life
- Educate and counsel patient to enable self-care
- Control or treat other risk factors for macrovascular disease such as smoking, hypertension, high cholesterol and heavy alcohol intake

7.2.3 Primary Prevention

One cannot over-emphasise the need to prevent diabetes in the first place. The risk factors for diabetes include:

- Inactivity
- Obesity (BMI >25, or increased waist circumference >100cm)
- Family history of diabetes
- Previous gestational diabetes
- Delivery of a very large infant (>4000gm)

Primary prevention should be aimed at aggressively managing these risk factors where possible.

Recommended preventive strategies

- Aim for a BMI of 20-25
- Increase physical activity to 30-45 minutes exercise, daily for 5 days a week (accumulated to >150mins/week), plus adopting a more active lifestyle.
- Example: take every opportunity at work to do some physical activity such as walking up stairs instead of using an elevator, walk to shops, walk or cycle for recreation, avoid watching too much TV or using the computer/internet for too long
- Healthy eating – all diabetics should have a consultation with a dietician (or if not available with a trained nurse working in the diabetes clinic). In general, eat a wide variety of food with low animal fat (<30% of the total energy content from fat), and plenty of fruit and fish. Remember to take off the skin and fat before cooking imported chicken and meat, bought from the shops.

7.2.4 Diagnostic Criteria

- See diagnostic criteria in Type 1 Diabetes, Section 7.1.2.

7.2.5 Treatment

Non-drug treatment

If the HbA1c is below 7%, start with:

- Lifestyle changes to decrease weight by healthy diet and increase in physical activities. Do this for 12 weeks.

- If the HbA1c is <7% (or FBS is back to normal <6mmol/L), continue to encourage the life-style changes implemented
- If the HbA1c is >7% (or FBS is not back to normal <6mmol/L), start oral medications

Drug Treatment

There is evidence from large international studies that intensive glycaemic control is associated with reduction (up to 50%) in microvascular complications (retinopathy, neuropathy, nephropathy).

Start pharmacological treatment with:

- *Metformin 500mg to 1g orally, 1-3 times daily with food, in addition to the above non-drug treatment strategies. Increase dose to a max. of 3g/day in divided doses, depending on blood sugar level.*
- **Caution:** Metformin may cause lactic acidosis, it is cleared predominantly through the kidney and it accumulates in renal impairment (GFR <60ml/min/1.73m²). It is contraindicated in patients with a GFR<30 mL/min. Stop metformin at least 48 hours prior to surgery, changing to insulin and resume only when there is good renal function and it can be tolerated by mouth.

If inadequate control with metformin alone, add a sulphonylurea:

- *Gliclazide 40 mg orally, 1-2 times daily, up to max. of 320mg daily. Take doses with or after meals.*

OR

- *Glibenclamide 2.5mg orally, 1-2 times daily, up to a max. of 20mg daily*
- **NOTE:** Sulphonylureas may cause weight gain which can partially negate the positive effects of stimulating insulin secretion.
- Glibenclamide may accumulate in older patients or those with renal impairment (greater risk of hypoglycaemia). In these patients gliclazide is the preferred sulphonylurea as it is cleared from the circulation by hepatic metabolism and only a small fraction is excreted in the urine.
- If the serum creatinine is >200µmol/L the patient is not a candidate for sulphonylureas and insulin treatment may need to be introduced.

- If the above does not provide good control, *give insulin*

Insulin Therapy

If persistent random blood sugars exceed 16.6mmol/L, there are signs of weight loss, polydipsia and/or polyuria, or the HbA1c is > 11%, consider insulin therapy, at least for 3 months.

Starting insulin therapy should be done only after consultation with the diabetes clinic.

There are several protocols which include :

- a **single** bedtime dose of an intermediate insulin, starting at 0.1-0.2U/kg.
- The risk from this is hypoglycaemia during the night (sweating, nightmares, morning dizziness or confusion)
- Alternatives are multiple dose insulin injections, dosing dependent on self-measured blood glucose levels. These adjustments should be undertaken in the diabetic clinic
- Encourage the use of the abdominal wall as the site of injection to facilitate absorption of insulin but rotate the injection sites to minimise the risk of lipodystrophy

7.2.6 Other Essential Managements

The place of routine prophylactic aspirin® is unclear and it carries a risk of bleeding. Many studies to date (2013) have shown no advantage in overall mortality or incidence of major vascular events in diabetic patients. However, as the main cause of death in Type 2 diabetes is either renal failure or a vascular event, it seems reasonable to recommend daily aspirin® 100mg in those with established vascular disease – angina, peripheral vascular impairment and in nephropathy – and with no contraindications, as would be done in non-diabetics.

- Manage high blood pressure with *an ACE inhibitor like ramipril or lisinopril, or a thiazide, or a calcium channel blocker, or combination of them.*
- **Caution:** do not combine a β -blocker and a thiazide because of their possible adverse effects on diabetes control
- *Give β -blocker like atenolol if there is ischaemic heart disease*

- If microalbuminuria:
 - *Give oral lisinopril 2.5mg daily*
OR
 - *Ramipril 10 mg daily* to delay the progression of nephropathy whether the patient is hypertensive or not.
- NOTE: Doses should be increased if diabetes mellitus **plus** hypertension with microalbuminuria
- Check lipid levels
- If diabetes mellitus plus hypertension plus obesity plus hyperlipidaemia plus HDL < 1 (insulin resistance); consider metabolic syndrome and be aggressive with non-drug and drug therapy.
- NOTE: Metabolic syndrome (diabetes, hypertension, hyperlipidaemia (together with hyperuricaemia) is commonly found in Nauru. This usually has a family history.
- *Treat hyperlipidaemia with oral simvastatin 40mg daily, increasing the dose if inadequate response occurs by six weeks*

7.2.7 Monitoring the Type 2 Diabetic

- HbA1c every 3-6 months
- Blood pressure every visit
- Lipid profile annually unless abnormal at diagnosis, then check 6-monthly
- Foot care
- Annual peripheral vascular survey

Eyes

- Do annual eye screening
- Apart from maintaining tight glycaemic control, photocoagulation therapy may prevent progression of retinopathy with or without macular oedema. More recently antagonists of VEGF (vascular endothelium growth factor) such as *intraocular bevacizumab* have been shown to arrest retinal vascular proliferation in diabetes without adverse effects. These therapies are only available through an ophthalmologist and, currently, only overseas.
- Refer within one week for urgent eye check if sudden visual loss, retinal haemorrhage or new vascular formation

- Refer within 2 months for eye check if cataract, macular oedema or inability to visualise the fundus

Kidneys

- Check annually for proteinuria; if positive check for urinary tract infection
- If urine is protein negative to dipstick, check albumin/creatinine ratio (ACR); if $>2.3\text{mg}/\text{mmol}$ in males or $>3.5\text{mg}/\text{mmol}$ in females: this constitutes microalbuminuria
- In microalbuminuria, intensify glucose control and *give ACE inhibitor to delay progress of nephropathy. Also ensure aspirin® is given, lipid control is optimal and patient stops smoking. Ensure blood pressure of $<130/80$ if possible.*

Neuropathy

- **Annual review**
- Pain is sometimes a prominent symptom in diabetic neuropathy and may be controlled with *tricyclic antidepressants which influence spinal cord pain transmission, selective noradrenaline reuptake inhibitors (fluoxetine) which have a similar action, or gabapentin* (not currently available in Nauru)

7.2.8 Acute Complications (Hyper / Hypoglycaemia)

Please see “Diabetic Emergencies”, Section 1.3.4.

7.2.9 Perioperative Management of Diabetes

Recommended regimen

- If on oral agents, omit drug. Restart when eating for at least 12 hours.
- If on insulin, *omit morning subcutaneous insulin. Start infusion using pump, of 1 litre 5 % dextrose water, at 100ml/hr, plus insulin infusion at 1 unit/hour. Measure blood glucose 2 to 4-hourly pre- and post-operatively and every hour during surgery. Do not change infusion rate if glucose is between 6.5-10mmol/L. Increase infusion rate to 1.5 units/hr if glucose is $>10\text{mmol}/\text{L}$. Decrease infusion rate to 0.5 units/hour if glucose is $<6.5\text{mmol}/\text{L}$.*

- If there is any delay in the surgery or the patient does not resume oral normal intake promptly post-operatively, the Na⁺, K⁺ and creatinine need to be monitored closely, at least 12-hourly.
- Seek advice of the physician or the diabetes clinic in any difficult situation

7.2.10 Other Conditions That May Produce Diabetes

- Overuse of corticosteroids
- Cushing's syndrome due to pituitary or adrenal pathology, acromegaly
- Pheochromocytoma (hypertension sustained or intermittent, tremor)
- Hyperthyroidism

7.3 HYPERTHYROIDISM

- Excessive production of thyroid hormones is a fairly common condition
- It presents with weight loss, fine tremor, increased appetite, restlessness, malaise, muscle weakness, exophthalmos (in the Grave's disease variant), tachycardia, AF, irritability, and other behavioural changes
- Diagnosis is confirmed by a Thyroid function test

All cases should be referred to the consultant physician for treatment.

7.4 HYPOTHYROIDISM

Low level of thyroid hormones can present as:

- Congenital hypothyroidism (frequency of 1:3500 live births). It is identified by high degree of clinical suspicion and confirmed by laboratory screening, during the neonatal period. Replacement therapy is ideally done before 2 weeks of age to prevent intellectual disability. Suspected babies should be referred to the paediatrician urgently for review.
- Children with slow growth, poor school performance, arrest of pubertal development

- Adults may have tiredness, weight gain, anorexia, cold intolerance, depression, psychosis, poor libido, puffy eyes, dry brittle hair, dry coarse skin, arthralgia, constipation, dyslipidaemia, anaemia, ataxia, mental slowness, poverty of movement, slow relaxing tendon reflexes, heart failure, pericardial effusion and even coma and death

Diagnosis is by thyroid function test.

Refer all children to the paediatrician and all adult cases to the physician, for management.

7.5 CUSHING'S SYNDROME

Excessive production of glucocorticoids hormone. Presents with:

- Weight gain (central)
- Growth arrest in children
- Change in appearance
- Depression/psychosis
- Hair growth and acne
- Muscular weakness
- Amenorrhoea/Oligomenorrhoea
- Thin skin, bruising and hypertension
- Compression fractures of the spine
- Fractures
- Proximal myopathy
- Moon face and buffalo hump
- Purple skin striae width >1 cm
- Glycosuria

Confirmation of diagnosis is by measuring the level of glucocorticoids in urine or blood.

Refer all confirmed or suspected cases to physician for investigation and treatment, which may involve overseas consultation.

8 FAMILY PLANNING AND CONTRACEPTION

See also “Family Planning: a global handbook for providers”

http://www.unfpa.org/webdav/site/global/shared/documents/publications/2007/family_planning.pdf

8.1 THE USE OF A CONTRACEPTIVE METHOD

The decision by a man or woman to use a contraceptive method will depend on definite behavioural changes, acquired and sustained, after it has developed through several well-known stages:

- One hears of the contraceptive method to be used and is convinced that it will be very beneficial for him or her;
- One becomes motivated enough to take the first steps in using this method on a regular basis;
- This acquired new behaviour is sustained and one becomes a regular user of this new contraceptive method.

It is important for the health worker to realise that the client should be supported with regular, appropriate feedback communication, during the stages of the development of this new behaviour. Otherwise, it may not be sustained and the newly acquired contraception method will fail.

8.2 NATURAL METHODS

There are natural ways of spacing out pregnancies such as:

- Rhythm method
- Abstinence from sex
- Coitus interruptus
- Prolonged breast feeding of babies by mothers to suppress ovulation.

Rhythm method is having sexual intercourse during the “safe days” of the menstrual period and no sex during the “not safe” days. However, this method has a high failure rate. This failure rate may improve if the woman know how to use her basal body temperature to monitor the safe and unsafe days more accurately.

Abstinence from sex is a good method but it causes stress and unfaithfulness amongst partners.

Coitus interruptus: the withdrawal of the penis just before ejaculation has the following disadvantages:

- high failure rate
- decreases sexual satisfaction in some partners
- often fails when partners are regular alcohol consumers.

8.3 BARRIER METHODS

- Condoms of varying makes, e.g. rubber latex, lubricated smooth surface and so forth.
- Diaphragms with spermicide

Indications of condoms for men:

- Used to prevent pregnancy and STI

Contraindications:

- Rubber allergy

8.4 ORAL CONTRACEPTIVES

- *Ethinylestradiol and levonorgestrel [COC]*
- *Norethisterone [Progestogen-only pill]*
- *Levonorgestrel [Progestogen-only pill]*

The policies for giving oral contraceptive pills (OCP) must be strictly observed :

- all new pill users (except post-partum cases) must use the combined OCP;
- start with the pill with the lowest content of oestrogen (example, *microgynon 30: oestrogen 30mcg and progestogen 150mcg*);
- breast-feeding women should not take OCP until 6 months post-partum or after the baby is weaned.

8.4.1 **Combined OCP**

Acts by preventing ovulation, thickens cervical mucus, prevents implantation and accelerates expulsion of the ovum.

Indicated in women who are:

- Sexually active from menarche to 40 years of age
- Non-lactating post-partum
- Nulliparous woman
- In need of short or long-term birth control
- Have acne
- Dysmenorrhoea and menorrhagia
- History of PID or depression

OCP's are contraindicated in the following conditions:

- Pregnancy
- < six weeks post-partum and breast feeding
- Thrombophlebitis or thromboembolic disorder
- History of CVA, IHD or complicated cardiac valvular disease
- Severe headache or hypertension
- Over 40 years especially if accompanied by diabetes or hypertension
- Liver disease
- Undiagnosed abnormal genital bleeding
- Over 35 years and heavy smoker

How to take the combined OCP

- First pill at first day of period, then take one pill a day
- Can also start on any other day but must abstain from sex or use other added contraception method for five days, for added protection
- If a pill is missed for 1-2 days, take one immediately and continue taking one every day
- If a pill is missed for more than 3 days, take one pill immediately but patient must abstain from sex or use an additional contraceptive method, for 3 days for added protection

8.4.2 **Progestogen only pills (POP)**

These pills act by preventing ovulation and thickening the cervical mucous.

Indications:

- For women where combined OCP are contraindicated
- People with headache or increased BP on combined OCP
- Lactating mothers who want to use pills
- Women of any age

Contraindications:

- Women with breast cancer
- Pregnancy

How to take POP

- Within 5 days of the onset of the menstrual period;
- Can be started at any time if not pregnant, if taken >5 days after menstrual period, abstain from sex or use another added contraceptive method for 5 days, for added protection.

8.5 INTRAUTERINE CONTRACEPTIVE DEVICES

- Standard copper containing IUD inserted at the ANC clinics or by midwives
- Acts in preventing fertilisation of the egg by simulating a foreign body type reaction, in the endometrium.

Indicated in women who :

- Cannot take OCP's especially smokers, hypertensive, those with IHD, cerebrovascular disease, diabetes, migraine, liver and breast diseases; prefer to use IUD
- Prefer to space children after the first one or two
- >4 weeks post-partum
- >21 years old and parous

IUDs are contraindicated in the following:

- Known or suspected pregnancy
- Cancer of genital tract

- Congenital uterine abnormality that distorts normal structure of uterus
- PID
- STI
- Undiagnosed abnormal genital bleeding
- Endometriosis
- Copper allergy
- Puerperal sepsis
- Post-septic abortion
- History of ectopic pregnancy

Please refer to the appropriate manual for proper method of insertion of the IUD.

8.6 INJECTABLE CONTRACEPTIVES

Acts by suppressing ovulation and thickens the cervical mucous secretion to prevent sperm from entering the cervix.

In Nauru:

- *Depot medroxyprogesterone acetate 150mg long-acting given IMI once a month.*

Indications:

- Women who do not wish to keep supplies of OCP at home
- Women who breast feed and are more than 6 weeks post-partum
- Post-partum women who are not breast feeding
- Women who cannot take OCP
- Mentally retarded women
- Women who are obese and/or smokers

Contraindications:

- Pregnant or suspected pregnant women
- Women with breast cancer
- Women with abnormal uterine bleeding
- Liver disease

Timing of injection:

- First injection within first 7 days of menstruation. It can be given in any other time but patient must not be pregnant and must abstain from sex or use additional contraception method for 7 days, for added safety.
- Dose is *150mg IMI every months (At 150mg/mL, it is 1mL per month)*

Implants with a longer duration of action are also available through the FP clinic.

8.7 POST-COITAL EMERGENCY CONTRACEPTION

Refer to the Nauru Evidence Based Guidelines in Family Planning for Health Workers.

9 GASTRO-INTESTINAL CONDITIONS

9.1 DYSPEPSIA / HEARTBURN / INDIGESTION

Simple indigestion is a common symptom, treated by adjusting diet and giving antacids such as *magnesium trisilicate*. Persistent pain, related to meals, especially if associated with weight loss, is an indication for investigation by barium studies, gastroduodenoscopy (surgical department) or both.

9.2 HAEMATEMESIS

9.2.1 Causes

- Oesophagitis
- Upper gastrointestinal tract cancer
- Mallory Weiss tear (after retching)
- Varices gastric or duodenal (note: high mortality)
- Peptic ulceration (ask about NSAIDs + aspirin® use)
- Acute stress erosions (shock, sepsis, NSAIDs)
- Abnormal haemostasis
- Swallowed blood

9.2.2 Management

Resuscitation takes precedence over diagnostic investigations. Gastroscopy should normally be performed within the first 24 hours. Advise the surgical team of all patients admitted with significant bleeding in case urgent intervention is required. A patient who continues to bleed heavily may require immediate surgery without other investigation unless varices suspected.

- Stabilise patient and monitor
- Give N/S IV, then blood when available
- Use Group O Rh negative blood in an emergency - two units are normally available from the blood bank at RON Hospital

Urgent surgical consultation if

- More than 3 units of blood need to be transfused

- Continuing or prolonged bleeding
- Perforation suspected

Gastroenterology consultation

- Urgent consultation in all patients over 60 as they tolerate bleeding poorly
- Gastroscopy should be considered and done urgently if varices are suspected as they may require ligation. Otherwise it should be done within 24 hours.

9.2.3 Therapy

Varices

- Urgent variceal ligation
- Sengstaken-Blakemore tube (if available) and transfer to HDU.
- Consider endotracheal intubation first to reduce the risk of aspiration if level of consciousness is impaired.

Acute stress ulceration

- *Ranitidine 300mg orally, bd OR 50 mg by slow IV injection or 2 hour infusion, 6-8 hourly.*

Peptic Ulceration

- Acute bleeding from a peptic ulcer
- Eradication therapy for *Helicobacter pylori* when this has been identified
- The following is recommended:
 - *Omeprazole 20 mg orally, bd for 7 days*
PLUS
 - *Clarithromycin 500 mg orally, bd for 7 days*
PLUS
 - *Amoxicillin 1g orally, bd for 7 days*
 - *If the patient is hypersensitive to penicillin, substitute metronidazole 400mg orally, tds for 7 days.*
- Other regimens are available for treatment failures

The two major causes of upper GI bleeding are ulceration related to either *H.pylori* infection or use of non-steroidal anti-inflammatory medicines. However, gastric cancer has presented in this way in Nauru.

9.3 NAUSEA AND VOMITING

9.3.1 Causes

Visceral

- Organic disease of oesophagus / stomach / bowel
- Pseudo-obstruction
- Mechanical – bowel obstruction / gastric stasis
- Acute abdomen
- Liver metastases

Toxic / metabolites

- Acute febrile illness / sepsis
- Ketoacidosis / uraemia / hepatic failure
- Medicines (e.g. digoxin, cytotoxics)

Neurological

- Vestibular / middle ear disease
- Increased intracranial pressure
- Cerebrovascular accident (especially brainstem)

Other

- Pregnancy
- Excess smoking, alcohol and other addictive drugs

9.3.2 Complications

- Aspiration pneumonia
- Haematemesis (Mallory Weiss tear)
- Oesophageal perforation (pain is a prominent feature)
- Malnutrition / dehydration
- Electrolyte / volume depletion
- Hypochloraemic alkalosis

9.3.3 Non-Drug Treatment

- Withhold food for a period
- Give clear fluid in frequent small quantities rather than big volumes at one go

- Maintain adequate hydration

9.3.4 Drug Treatment

- Give oral rehydration solution or intravenous fluid where indicated.
- Determine and treat the underlying cause. If antiemetics are indicated:
- Dopamine antagonists:
 - *Metoclopramide 10mg every 8 hours oral, IMI, IV but higher doses may be required*
- Phenothiazines:
 - *Prochlorperazine 12.5mg every 8 hours oral, IMI*

9.4 ACUTE DIARRHOEA (<2 WEEKS DURATION)

9.4.1 History

- Try and assess whether this has an infectious basis
- Initial history is important. Include severity of diarrhoea, fever, passage of bloody stool, any upper GI symptoms, history of recent surgery, radiation, drugs (especially antibiotics) and overseas travel or infectious contacts. Also record the food eaten and occupation. Ask about similar symptoms in relatives or friends.

9.4.2 Examinations

- Look for signs of dehydration, sepsis, abdominal tenderness and rigidity
- Digital rectal examination

9.4.3 Investigations

- Urgent erect and supine abdominal x-rays may be required
- FBC + diff, urea, creatinine, Na⁺, K⁺
- Blood cultures if patient is febrile or has been abroad
- Stool examination – a freshly collected stool specimen should be examined and the specific requests should reflect the clinical setting

Microscopy

- Bacteria: *Salmonella*, *Shigella*, *Yersinia*, *Aeromonas*, *Campylobacter* are routinely cultured.
- Viruses: Rotavirus is not routinely looked for but has probably been the cause of the recent epidemic outbreak of diarrhoea in small children in Nauru. It can be cultured through an overseas laboratory if needed
- *Cl. difficile*: Available on liquid stool if appropriate. Culture not routinely done
- Toxin assay
- Parasites: 3 faecal samples on separate days in PVA fixative for parasite examination
- Note: *Entamoeba coli* has not been detected in stool samples in Nauru

9.4.4 Management

General

- ORS as the first approach
- IV fluids may be required. Remember faecal losses of electrolytes may be very high. 100-120mmol Na⁺ and 5-15mmol K⁺ may be lost per litre of stool. An adult may lose more than 2-3L of fluid per day.
- Avoid constipating drugs (especially in children) as these may prolong symptoms
- Antimicrobials are not indicated for the majority of infective diarrhoeas

Specific infections

- *Salmonella/Shigella/Campylobacter* are usually self-limiting and antibiotics should only be used when illness is severe with systemic upset / septicaemia. These are notifiable diseases.
- Pseudomembranous colitis; always suspect when antibiotics have been taken within last few weeks. Sigmoidoscopy may sometimes be diagnostic but often is not necessary. If suspected check for *Clostridium difficile* toxin and treat.

- Treatment of choice *metronidazole 400mg every 8 hours orally or IV 7-10 days*. Is effective for relapse or recurrence.
- HIV – always suspect in at risk population. Almost all have some gut manifestation either directly due to HIV or secondary to CMV, *Cryptosporidia*, *Giardia*, *Mycobacterium avium intracellulare*, Kaposi's sarcoma, lymphoma. No cases have been detected in Nauru so far (2013).

Acute inflammatory bowel disease is suspected

- Toxic megacolon (diameter >5.5cm) should be considered in any person with inflammatory bowel disease, systemic toxicity and increasing diarrhoea. Requires daily plain abdominal x-ray and **review with early medical and surgical referral.**
- Steroids are drugs of choice in acute situation. *Give IV hydrocortisone 100mg every 6 hours then prednisolone 30-60mg/day orally.*
- Medical / Surgical consult if not responding in 48-72 hours
- *Sulphasalazine 1g qid daily, orally may be of benefit pending diagnosis in less severe attacks.*
- IV fluids, nutrition and antibiotics may be needed. Always consider other causes of diarrhoea and/or bleeding.

Notes: Other causes of diarrhoea include carcinoma, ischaemic colitis, diverticulitis, and constipation with overflow.

Laxative abuse may cause dehydration, muscular weakness and hypokalaemia. Consider this in chronic diarrhoea.

9.5 CONSTIPATION

9.5.1 Description

- A condition of decreased frequency of bowel action for the individual. There may be dry hard stools.
- Causes include: incorrect diet (low fibre), lack of exercise, pregnancy, old age, certain drugs, metabolic or endocrine causes, neurogenic, psychogenic, bowel cancer, ignoring nature's call.

9.5.2 Management

- Symptomatic relief
- Advise on diet and lifestyle
- Identify causes for referral

General Measures

- PR examination (a plain abdominal x-ray may be required)
- Look for treatable causes – cancer, hypothyroidism, hypercalcaemia
- Avoid constipating drugs (e.g. codeine, opiates, tricyclics, anticholinergics, calcium channel blockers, aluminium hydroxide)
- Dietary control e.g. increase fluid, fibre, fruit

Specific Measures

- Increase fluid intake
- Bulking agents. If no response then consider:
 - *Lactulose* has an osmotic effect but may cause excess flatulence
 - Faecal softeners (e.g. *docusate sodium*)
 - *Colonic stimulants* (e.g. *bisacodyl*, *senna*) useful in acute constipation. Side effects include cramps, electrolyte imbalance, melanosis coli (in chronic use), and “cathartic colon” and should not be used long term.
 - *Glycerine suppositories* / manual evacuation for faecal impaction

9.6 JAUNDICE

- If bilirubin unconjugated consider Gilbert’s or haemolysis
- If bilirubin increase in both conjugated and unconjugated – liver disease, cholestasis

9.6.1 Obstructive Jaundice (Cholestasis)

- Ultrasound is investigation of choice to exclude bile duct dilatation
- Check coagulation and if necessary correct with vitamin K
- If intrahepatic cholestasis, i.e. no duct dilatation, consider drug toxicity, primary biliary cirrhosis, or primary sclerosing cholangitis

- If extra-hepatic cholestasis (dilated ducts), consider common bile duct stones, stricture and tumours. Consult a surgeon. Gall-bladder / gall stone disease is common in Nauru.

9.6.2 Hepatic Jaundice

- Infectious causes – Hepatitis A, B, C, EBV, CMV, and rarely other viruses including Hepatitis D and E
- Acute alcoholic hepatitis
- Chronic liver disease – alcohol, autoimmune hepatitis, primary biliary cirrhosis, sclerosing cholangitis, medicines, toxins

9.7 ASCITES

In general ascitic fluid should be tested for the following:

- WBC and differential
- Albumin
- Culture – fluid placed in blood culture bottles
- Amylase
- Cytology
- Request TB culture if this infection is suspected

The difference between the serum albumin (g/L) and the albumin concentration in the ascitic fluid (g/L) is a useful marker. If the difference exceeds 11 g/L, portal hypertension is the likely cause of the ascites.

Spontaneous bacterial peritonitis is likely with a white count of $>500 \times 10^6/L$ with neutrophils predominant. *The initial treatment of proven or suspected peritonitis is cefuroxime 750mg every 8 hours.*

Management of ascites should consist of a low salt diet, *spironolactone 50-200mg daily with or without frusemide aiming for a weight loss of 0.5-1kg/day. Remove ascitic fluid by peritoneal tap, if necessary combined with IV albumin infusion. Give 8g albumin for every litre of ascitic fluid removed.*

9.8 LIVER FAILURE

9.8.1 Clinical and Biochemical Features

- Jaundice
- Coagulation defects (check prothrombin ratio)
- Hypoalbuminaemia
- Encephalopathy
- Ascites

9.8.2 Causes / Precipitants

Acute severe hepatic necrosis

- Drugs – paracetamol
- Alcohol
- Fatty liver of pregnancy
- Viral – hepatitis B + Delta superinfection
- Idiopathic

Chronic liver disease with acute deterioration

- GI haemorrhage
- Sepsis (especially Gram -ve)
- Spontaneous bacterial peritonitis
- Drugs (especially alcohol, benzodiazepines)
- Electrolyte disturbance and volume depletion (diuretics, hypokalaemia)
- Hepatocellular carcinoma (check α feto protein if available and/or ultrasound)

9.8.3 Treatment

- Treat any underlying cause (e.g. bleeding varices, sepsis)
- Stop all offending medicines
- Correct hypokalaemia, hypotension, hypoglycaemia
- If ascites present aspirate for diagnostic purposes
- *Correct coagulation defects with vitamin K 10mg IV slowly and fresh frozen plasma if hepatic synthesis of coagulation factors is unresponsive to Vitamin K, i.e. hepatocellular failure is advanced.*

If encephalopathy suspected

- Give high carbohydrate/low protein diet.
- *Gut sterilisation with neomycin 1g every 4 hours orally.*
- Purge with *lactulose 10-30mL tds adjusted to produce three loose stools per day.*
- Watch for alcohol withdrawal

9.9 ACUTE PANCREATITIS**9.9.1 Clinical Features**

- Pain is the dominant symptom and may range from mild to excruciating and may radiate to back
- Fever, tachycardia, hypotension, abdominal distension and rigidity may occur
- Shock
- Hypoxia
- Hypocalcaemia
- **Note:** Bacterial sepsis may also be present

9.9.2 Diagnosis

- Serum amylase is usually elevated at least x 5 above normal range in appropriate clinical setting. Other abdominal diseases may cause a lesser elevation of amylase.

9.9.3 Aetiology

- Biliary tract disease (especially gallstones)
- Alcohol
- Idiopathic
- Drugs
- Types I and V hyperlipidaemia

9.9.4 Management

- Treatment of shock
- Pain relief – pethidine is the first choice
- Bowel rest – nasogastric tube and aspirate gastric contents

- Oxygen therapy – serial blood gases (ARDS, acidosis)
- Correct electrolyte and calcium disturbances
- Antibiotics – if sepsis likely
- Consider surgical consult

Table 9.1 Poor prognostic factors in acute pancreatitis

| On Admission | At 48 Hours |
|------------------------------|----------------------------|
| Age >55 years | Haematocrit decreased >10% |
| WBC >16 x 10 ⁹ /L | Urea increased >15mmol/L |
| Glucose >7.5 mmol/L | Calcium <2mmol/L |
| LDH >350 U/L | PaO ₂ <60mmHg |
| AST >250 U/L | Fluid retention >6L |

9.10 ACUTE HEPATOCELLULAR DYSFUNCTION (HEPATITIS)

9.10.1 Hepatitis C

- This viral disease may remain latent for many years
- It is associated with previous blood transfusion and several cases have been diagnosed in Nauru through the routine screening of blood from volunteer donors. These are all being treated.
- The hepatitis C virus has shown increasing resistance to lamivudine and is best managed with *Tenofovir orally 300mg daily*

History

- Ask about recent medicines and other drugs and alcohol history, IV drug use, previous Hepatitis, blood transfusions, tattoos, and recent overseas travel

Non-drug Treatment

- Need to avoid taking unnecessary drugs that may adversely affect the liver
- Maintain oral rehydration
- Avoid alcohol
- Counsel patient on infectivity of hepatitis B, C and A viruses

Referral / consultation with specialised unit

- Severe symptoms
- Deteriorating liver functions
- In rare cases there may be a place for taking advice from (or referring to) an overseas hepatic transplant unit

10 GYNAECOLOGY AND OBSTETRICS

10.1 OBSTETRIC CONDITIONS

10.1.1 Abortion (Incomplete / Spontaneous)

Spontaneous termination of pregnancy before 28 weeks gestation after the last normal menstrual period. If dates are unknown or uncertain, delivery of a foetus under 1 kg in weight also fulfils this definition.

Management objectives

- Ensure the complete removal of the products of conception
- Control of bleeding
- Prevent bleeding
- In Rh negative mother prevent iso-immunisation
- Give psychological support

Non-drug treatment

- Monitor vital parameters such as Haemoglobin, pulse and BP
- Treat for shock if indicated
- Give counselling and support to patients
- Inform O and G specialist **immediately** if this diagnosis is suspected or diagnosed

Drug treatment:

- *IMI ergometrine 0.5mg every 4 hours, 3 to 5 doses*
- *Oxytocin 5-10 units IMI or oxytocin 20-40 units diluted in 1L of N/S or Hartmann's solution, run at 20-40dpm; depending on the frequency of the contractions; which should not exceed 5 contractions in 10 minutes. (Give only in inevitable or incomplete abortion and in pregnancies of 14 weeks duration or longer). Oxytocin infusion only given to miscarriages **after** the first trimester.*
- If bleeding continues, repeat treatment after 30 minutes.
- In Rh negative mothers give anti-D immunoglobulin IMI 250 IU if <12 weeks gestation and a single pregnancy: 625 IU if a multiple pregnancy. If more than 12 weeks at delivery give 625 IU within 72 hours of delivery.

http://www.transfusion.com.au/disease_therapeutics/pregnancy/guidelines-RhD-Ig

10.1.2 Anaemia in Pregnancy

Anaemia is pallor plus a haemoglobin of less than 11g/dL at any stage of the gestation, commonly due to iron deficiency, folate deficiency or both.

Prevention

At the antenatal clinic, patients should have their haemoglobins checked and be given routine daily folate and iron, especially in multiple pregnancies.

- 'Fefol' one orally daily (a combination of ferrous gluconate and folic acid)

Urgent review by the Obstetrician

- All patients with Hb <8g/dL
- Hb <10g/dL of patients over 34 weeks gestation
- Patients whose Hb is not responding to antenatal haematinics; Hb rise of less than 1.5g/dL over four weeks OR a Hb rise of less than 2g/dL over 6 weeks in early pregnancy.
- Any low Hb with an obstetric complication or high risk pregnancy
- Symptoms and signs of chronic blood loss
- Pallor, plus signs of other chronic diseases (e.g. chronic cough, presence of hepatosplenomegaly, dyspnoea)
- Evidence of heart failure

Drug treatment of established anaemia

In cases with established iron deficiency anaemia (by a hypochromic, microcytic peripheral blood film picture), *give ferrous sulphate orally at 200mg tds with food for one month, then continue the preventive regime as noted above.* If patients are intolerant of oral ferrous sulphate, give ferrous gluconate as 'Fefol'.

10.1.3 Antepartum Haemorrhage

- This is vaginal bleeding in pregnancy after 28 weeks of gestation to the end of the second stage of labour

- Ensure that the patient is resuscitated and stabilised properly (IV line, cross match blood)
- **Refer urgently to the Obstetrician**

10.1.4 Diabetes in Pregnancy (GDM)

- Gestational diabetes is diagnosed by a FBS >6.1mmol/L or 2 hours glucose level of >7.8mmol/L (after 75g glucose load of a Glucose Tolerance Test [GTT] –WHO guidelines)
- GTT is advisable where there is family history of diabetes, obesity, previous big baby, large for dates baby, previous IGT, previous IUGR and polyhydramnios
- GTT is best done at 28 weeks gestation
- Please note that all GDM should be managed in hospital

Management of GDM at antenatal visit

- Diet and exercise
- Monitor blood sugar regularly by the obstetrician
- If not controlled on diet alone, admit and *give insulin preprandial or bd* depending on blood sugar levels.
- *Use separate doses of intermediate acting (isophane insulin 2/3 of the dose) and short acting (soluble insulin 1/3 of the dose) twice daily, rather than the combined formulation. Two third of doses to be given in the morning and 1/3 in the evening. Only give the premixed insulin if dose matches the fixed premixed combination.*
- Management is intensive and must be done on a weekly basis follow-up at Antenatal clinic, after 34 weeks gestation and onward
- Aim blood sugar level to be at 5-10 mmol/L while avoiding hypoglycaemia

Management at labour

- Must be supervised by obstetrician
- Hourly check of blood sugar, aiming at 5-10 mmol/L
- Management of blood sugar by the obstetrician throughout labour
- Induce by ARM with syntocinon where required after assessment by the obstetrician
- If elective caesarean section is indicated then follow usual protocol as directed by obstetrician

Post-natal care

- Stop insulin after delivery
- Test sugar level regularly – e.g. twice daily and fasting
- Arrange for a repeat GTT after 6 weeks and refer for follow-up at diabetes clinic. **This is important. Patients with GDM have a 60% risk of developing type 2 diabetes in later life if not careful with diet and exercise.**

10.1.5 Hypertension in Pregnancy

Pre-eclampsia, or pre-eclamptic toxemia (PET)

This is hypertension at 20 weeks pregnancy or later with:

- Proteinuria
- BP at 140/90mmHg or more, on two occasions about 4 hours apart
- Eclampsia is the presence of seizure in patients with hypertension in pregnancy

Table 10.1 Levels of severity of hypertension in pregnancy

| Level | BP mmHg | Proteinuria |
|---------------|---|-------------|
| Mild | Systolic 140-150 OR Diastolic 90-100 | + |
| Severe | Systolic above 160 OR Diastolic above 110 | ++ |

Management objectives

- Reduce maternal and foetal morbidity and mortality
- Refer all patients with hypertension to the obstetrician

Table 10.2 Treatment of hypertension in pregnancy

| Severity | Non-drug treatment | Drug treatment |
|---------------------------------------|--|---|
| Mild | <ul style="list-style-type: none"> - May be managed without admission 37-38 weeks of gestation and weekly review of BP, weight, urine analysis, foetal heart rate, foetal size. - Bed rest - Education of signs requiring follow-up - Admit at 38 weeks for delivery | <ul style="list-style-type: none"> - Initially no medicines. Monitor and refer to obstetrician - May need to start on <i>methyl dopa 250-500mg orally daily if BP rises</i> OR - <i>Nifedipine SR 20mg orally daily rising to a maximum of 40mg bd.</i> |
| Severe (Eclampsia) prophylaxis | <ul style="list-style-type: none"> - Oxygen - Stabilise if needed before urgent referral to obstetrician | <ul style="list-style-type: none"> - <i>Continue antihypertensives</i> - <i>Give IV magnesium sulphate 4g over 15-20min, followed by 1-2g/hour</i> - <i>Alternatively, give magnesium sulphate IMI 5g every 6 hours</i> - <i>If blood pressure remains high, give hydralazine IV 5mg every 20 minutes</i> - <i>If BP >160/110 urgent referral to the obstetrician</i> - <i>Anticipate delivery once mother is stable</i> |

Caution:

Magnesium overdose is characterised by respiratory depression, absent knee jerks. *Antidote is calcium gluconate as 1g IV slowly over 2-3 minutes (10mL of a 10 % solution).*

Referral

Urgent referral of severe pre-eclampsia and eclampsia to the obstetrician.

10.1.6 Eclampsia

This is the presence of seizures in a patient with severe PIH.

Treatment

- Airway
- Oxygen
- *IV magnesium sulphate 4g over 15-20 minutes (dilute 4g in 200mL 5% dextrose water); thereafter at 1-2g/hour (5g in 500mL N/S)*
- *Magnesium sulphate can also be given 5g IMI every 6 hours*
- *If magnesium sulphate is not available, give IV diazepam (valium®) or phenytoin in the usual manner of treating seizures (Please see Section 1.3.8)*
- *Phenytoin can be infused as 500mg in 100mL N/S run in over 20 minutes.*
- *Control BP with IV hydralazine 5mg every 20 minutes or infusion by diluting 40mg in 40mL N/S and give 10mg every hour and double every 30 minutes until satisfactory response.*
- In severe cases, baby has to be delivered to save mother's life. (decision to be made by the obstetrician)
- Refer to Section 10.1.5 for antidote for magnesium toxicity

10.1.7 Normal Labour

Normal delivery

- The onset of regular uterine contractions at term
- Accompanied by progressive cervical dilatation
- Eventual delivery of baby

Labour is divided into three stages

- First stage: from onset of labour to full dilatation of cervix
- Second stage: from full dilatation to full expulsion of the baby
- Third stage: from the delivery of the baby to the delivery of the placenta.

Non-drug treatment

- Psychological support of mother
- Hydration and nourishment of the mother

Table 10.3 Drug treatment in labour

| Problem | Drug and dosage | Indications and precautions |
|--|--|--|
| Mother | | |
| Analgesics | <i>Pethidine IMI 50-100mg immediately PLUS Metoclopramide 10mg OR Promethazine 12.5-25mg</i> | Maternal pain and distress |
| | <i>Lignocaine</i> | Local anaesthetic for episiotomy at second stage: do not exceed 20mL of a 2% solution |
| Inadequate or uncoordinated uterine contractions | <i>Oxytocin IV 5-10 units in 1000mL of 5% dextrose water / Hartmann's solution</i> Initiate at 5-10 dpm then increase by 10dpm every 30 minute intervals until 60dpm or 4-5 contractions every 10 minutes (response is achieved). | <ul style="list-style-type: none"> - Only for primipara - Titrate for individual needs - Contraction frequency should never exceed 5 per 10 minutes only use for uncoordinated or inadequate contractions |
| Rh incompatibility | In Rh negative mothers: <i>give anti-D immunoglobulin IMI 250 IU if <12 weeks gestation and a single pregnancy: 625 IU if a multiple pregnancy. If more than 12 weeks at delivery give 625 IU within 72 hours of delivery.*</i> | Must be given whenever required for Rh-negative mothers |
| Baby | | |
| Neonatal conjunctivitis prophylaxis | An ophthalmic antibiotic ointment such as <i>1% chloramphenicol</i> | In selected cases where obstetrician feels that there is a reasonable risk of neonatal infection |
| Bleeding prophylaxis | <i>Vitamin K IMI 1mg, immediately after birth</i> | Can be used routinely to prevent hypoprothrombinaemia |

*http://www.transfusion.com.au/disease_therapeutics/pregnancy/guidelines-RhD-Ig

Referral (usually urgent)

- Prolonged labour
- Post-partum haemorrhage
- Incomplete delivery of placenta
- Any complications of mother and baby

10.1.8 Prelabour Rupture of Membrane (PROM)

- This is premature rupture of membrane before labour has begun. Preterm PROM occurs before 37 weeks and term PROM occurs after 37 weeks.
- Diagnosis is seeing a pool of liquor and confirmed by speculum examination. Management depends of confirmation of PROM and gestational age of baby.
- If there is foul smelling watery vaginal discharge, fever, chills, abdominal tenderness and increased foetal heart rate; it may mean there is chorio-amnionitis.

Treatment of term PROM

- Aseptic speculum examination confirm diagnosis
- Do a high vaginal swab for bacteriological examination
- 80% will proceed to labour with conservative management
- If no uterine activity in 24-36 hours, augmentation with syntocinon or prostin E₂ gel 1mg should be started, to induce labour.
- *Oral (preferred) or vaginal misoprostol* has been shown to be probably the most effective agent for cervical ripening. It is available for the management of post-partum haemorrhage in Nauru but is not registered for the induction of labour at the present (2013).
- *Prophylactic erythromycin 500mg oral qid*

Preterm PROM

- *Give a course of dexamethasone 8mg tds for 3 doses only OR 12mg bd for two doses only at 28-36 weeks if threatened labour is imminent*
- Daily maternal temperature
- Weekly low vaginal swab without speculum

- Induce delivery and give antibiotics at first sign of chorioamnionitis

Chorioamnionitis

- *Erythromycin at 500mg tds for 5 days, has been shown to prolong pregnancy by about 7-10 days but does not reflect improvement in the perinatal mortality*
- Antibiotic regime should follow microbiological findings on vaginal swabs
- Induce labour where indicated
- Delayed labour needs to be delivered by Caesarean section if there is obstetric indication – aim for a normal delivery

10.1.9 Preterm Labour

- This is labour before 37 weeks gestation.
- *Give a course of dexamethasone 8mg tds for 3 doses only OR 12mg bd for two doses only at 28-36 weeks if threatened labour is imminent*
- Aim of treatment is to arrest labour for at least 24 hours to give time for the dexamethasone given to the mother to enhance foetal maturity. This reduces respiratory distress at birth.

Drugs used

- *Nifedipine (20mg SR orally stat, repeat after 30 minutes, then 3-8 hourly thereafter for 48-72 hours, as long as BP does not drop significantly (max. dose is 160mg/day)*
- This should allow the two or three dose course of dexamethasone to work
- *Indomethacin is effective but cannot be used after 32 weeks since it may cause premature closure of ductus arteriosus.*

10.1.10 Puerperal Sepsis

This is an infection of genital tract at any time between the onset of rupture of membranes or labour and the 42nd day following delivery or miscarriage in which two or more of the following are present:

- pelvic pain
- fever > 38.5°C

- abnormal vaginal discharge or bleeding
- delay in the rate of reduction of the size of the uterus

Risk factors for puerperal sepsis

- prolonged rupture of membrane (24-48 hours)
- Localised infection in perineum, vagina, cervix or uterus
- Poor hygiene
- IUFD
- Lowered host immunity (anaemic, malnourished)
- Prolonged or obstructed labour
- Frequent vaginal examinations
- Caesarean section
- Instrument deliveries
- Unrepaired tears
- PPH
- Diabetes

Investigations

- HVS, FBC, MSU and Blood culture

Treatment

- *Ampicillin 2g IV stat then 1g qid*
PLUS
- *Gentamicin 5mg/kg IV every 24 hours (max dose of 240mg/day)*
PLUS
- *Metronidazole 500mg IV tds, then change to oral 400mg tds*
- Treat for 1-2 weeks

10.2 GYNAECOLOGICAL CONDITIONS

10.2.1 Abnormal Menstrual Bleeding

- Abnormal menstrual bleeding needs a cause established before empirical treatment is considered. Refer to gynaecologist.

- This is increased menstrual flow either in volume, duration and/or frequency, including menorrhagia or dysfunctional uterine bleeding.
- In managing these cases, always assess current contraceptive use.

Drug treatment

- *Ibuprofen oral 200-400mg tds after food when needed for 2-3 days* (Ibuprofen may reduce blood loss in menorrhagia associated with IUCD, PID or anovulatory menorrhagia following puberty)
- *Oral contraceptives which cause atrophy of the endometrium and thereby reduce bleeding*
- *If bleeding is severe and signs of anaemia are present, give ferrous sulphate 200mg tds after food for at least 1 month*

Referral

- If no improvement
- Every girl under 12 years of age with vaginal bleeding before the development of secondary sexual characteristics
- For the investigation of other causes such as sexual abuse, tumours of the genital tract
- Severe anaemia

10.2.2 Dysmenorrhoea

Pain associated with the menstrual cycle.

- Primary: where no known cause is identified
- Secondary: where a cause is identified (e.g. uterine myoma, adenomyosis, endometriosis, pelvic infection)
- **Refer** to Gynaecologist

Management objectives

- Determine cause and treat accordingly
- Symptomatic relief

Non-drug treatment

- Mostly for primary dysmenorrhoea
- Reassure woman with dysmenorrhoea of nature of condition
- Encourage patient to carry on with normal everyday activities

- Exercise, massage and heating pad to lower abdomen

Drug treatment

Two main group of drugs are used: the NSAIDS and the OCP. The NSAIDs decrease prostaglandin production and the OCP causes atrophy of the endometrium and reduce bleeding.

- Primary dysmenorrhoea:
 - *give ibuprofen 200-400mg tds after food when needed, for 2-3 days*
OR
 - *naproxen 500mg orally initially, followed by 250 mg every 6-8 hours prn*
OR
 - *diclofenac, orally or rectal, 75-150mg daily in 2-3 doses (max. 200mg daily)*
- For secondary dysmenorrhoea, treat the underlying pathology where present e.g. PID, tumour

10.2.3 Ectopic Pregnancy

This is pregnancy outside the uterus presenting with missed menstruation, sudden lower abdominal pain, shock, anaemia and sometimes vaginal spotting.

Any reproductive age female with abdominal pain and vaginal bleeding should be treated as an ectopic pregnancy until proven otherwise.

Immediately refer all cases of suspected ectopic pregnancies after initial shock is treated appropriately.

10.2.4 Post-Menopausal Bleeding

- Bleeding at one year or more after menstruation has normally ceased
- Refer all cases to exclude underlying malignancy and other pathology

10.2.5 Vaginal Discharge

- Normal vaginal discharge is white and generally not malodorous. The pH is 4 and it contains epithelial cells, bacteria but no significant white cells

Abnormal vaginal discharge

Patient usually presents with one or more of the following symptoms:

- offensive vaginal secretion with staining of underwear
- change in vaginal secretion colour or odour
- itching or redness of vulva
- burning or pain on passing urine or during intercourse
- lower abdominal pain

One or more of the following may be present during examination:

- vaginal discharge
- lower abdominal tenderness
- pain on moving cervix
- cervical tumour

Common causes of vaginitis

- Candida:
 - *Clotrimazole OR miconazole vaginal cream nightly for three days*
 - OR*
 - *Clotrimazole 500 mg, insert 1 pessary into the vagina at bedtime as a single dose*
- Bacterial vaginosis:
 - *Metronidazole*
 - OR*
 - *Clindamycin orally*
- Trichomoniasis:
 - *metronidazole orally either 2g once or 400mg bd for seven days*
- Atrophic vaginitis:
 - *treated by oestrogen cream*

In a pregnant woman, lower abdominal pain related to pelvic infection is rare. If a pregnant woman has lower abdominal pain, such a patient is usually ill and requires referral.

Always look for STI and treat appropriately. See Section 20 and WHO guidelines for the syndromic management of STIs.

Non-drug treatment

- Counsel on risk-reduction behaviours and increased risk of transmitting HIV if one has STI
- Promote use of condoms
- Counsel on the need for sex-partners to be investigated and treated

Drug treatment:

- *Amoxicillin 500mg orally tds for 7 days*
PLUS
- *Doxycycline 100mg orally bd for 7 days*
PLUS
- *Metronidazole 2g immediately and 400mg orally bd for 7 days*

Caution: Metronidazole is contraindicated at first trimester of pregnancy and doxycycline is contraindicated in pregnancy, breast-feeding and in children less than 12 years old.

If there is evidence that candidiasis is the cause of the discharge, *add clotrimazole pessary inserted into the vagina, 500mg at night as a single dose.*

Referral

- history of missed or overdue period (consider ectopic pregnancy)
- recent abortion or delivery
- abnormal vaginal bleeding
- temperature above 39°C
- abdominal rebound tenderness or other GIT symptoms in women
- pregnant woman with lower abdominal pain related to pelvic infection - rare presentation.
- Cervical mass / tumour

11 IMMUNISATIONS

See also: Table of WHO / UNICEF recommendations

http://www.who.int/immunisation/policy/Immunisation_routine_table1.pdf

All immunisation schedules are managed by Public Health staff.

* Hepatitis B vaccine should be given within 24 hours of birth. If not given at the time of birth, it should be given as soon as possible in the first week of life.

11.1 TETANUS VACCINE FOR PREGNANT WOMEN

Women who have received 5 or more doses of tetanus containing vaccines (DTP, DT, TT or Td) during her lifetime, should have one dose of tetanus vaccine during pregnancy, if last dose was >10 years ago.

For women who have received 1-4 doses of tetanus containing vaccines, in her lifetime, but not in previous pregnancy, or has never been pregnant: give the regime below, until she has a total of five doses.

Example, if she has had 1 dose already, then give 4 more, if she has had 3 – give just 2 more doses and so forth.

Those with no history of any form of tetanus vaccine, give this regime:

- first dose - at first contact (at early pregnancy)
- second dose - at least 4 weeks after first dose
- third dose - at least 6 months after second dose
- fourth dose - at least 1 year after third dose (or at subsequent pregnancy)
- fifth dose - at least one year after fourth dose (or at subsequent pregnancy).

*Please refer also to the “**Republic of Nauru Immunisation Handbook**”, second edition, 2005.*

12 INFECTIONS AND RELATED CONDITIONS

Please see Section 1.4 for the treatment of some common infections in Accident and Emergency.

12.1 CARDIOVASCULAR SYSTEM INFECTIONS

Endocarditis – Please see Section 2.9.

12.2 CENTRAL NERVOUS SYSTEM INFECTIONS

12.2.1 Meningitis

Meningitis is inflammation of the meninges caused by infection due to either bacteria, virus or fungus. Signs and symptoms include:

- Intense malaise, severe headache, fever, photophobia and vomiting
- The patient is irritable and prefers to lie still
- Neck stiffness and a positive Kernig's sign appear within a few hours
- However, in milder cases and many viral meningitides, there may be few signs
- In uncomplicated meningitis, consciousness is not impaired, although patient may be delirious with high fever
- Papilloedema may occur
- The appearance of drowsiness, lateralising signs and cranial nerve lesions indicate complication such as venous sinus thrombosis, severe cerebral oedema or hydrocephalus. Or, it may mean there is an alternative diagnosis such as encephalitis or brain abscess.

Causative agents

- Bacteria: *Neisseria meningitides*, *Haemophilus influenzae*, *Streptococcus pneumonia*, *Staphylococcus aureus*, *Listeria monocytogenes*, Gram negative bacilli, *Mycobacterium tuberculosis*, *Treponema pallidum*.
- Viruses such as Echovirus, Coxsackie, mumps, Herpes simplex, HIV and EB virus
- Fungi such as candida and Cryptococcus

- The first three bacteria listed above account for 70% of all meningitis and the remaining 30% is caused by the remaining agents (except in Hib-vaccinated children where *Listeria monocytogenes* takes over *Haemophilus influenzae*'s place).
- In neonates, *Listeria monocytogenes*, group B streptococcus and gram negative bacilli are important pathogens.

Treatment

Ideally, treatment should follow CSF laboratory findings. However, if a lumbar puncture cannot be done; one should not delay treatment, especially if case is suspected of being meningococcal meningitis.

Pre-hospital treatment

- *Benzyl penicillin* 60mg/kg up to 3g IV or IMI stat
- In patients hypersensitive to penicillin, give *ceftriaxone* 50mg/kg up to 2g IV stat.

Urgently refer case for hospital treatment

- Give *ceftriaxone* (child: 100mg/kg up to) 4g IV, daily in one or two divided doses for 7-10 days

PLUS

- *Benzyl penicillin* (child: 60mg/kg up to) 1.8g 4-hourly IV for 7-10 days

OR

- *Ampicillin* (child 50mg/kg up to) 2g IV 4-hourly for 7-10 days.
- Above are empirical treatments
- Treatment should be guided later by CSF laboratory findings
- Giving *dexamethasone* shortly before antibiotics has been shown to improve the prognosis of bacterial meningitis
- *Streptococcus pneumoniae* and *Listeria monocytogenes* are treated with *benzyl penicillin*
- *Neisseria* and *Haemophilus* are treated with *ceftriaxone* and if sensitive to *ampicillin*, change to the latter antibiotic
- If *Cryptococcus neoformans* is isolated, give *amphotericin B* OR *fluconazole* if available. Always suspect this agent in HIV cases with meningitis.

Prophylaxis

- Contacts with *Neisseria Meningitidis* cases are treated with rifampicin (neonate <1 month: 5mg/kg; 10mg/kg up to 600mg) 600mg bd for 2 days
OR
- Ceftriaxone 250mg (child: 125mg) as a single dose (preferred option during pregnancy)
OR
- Ciprofloxacin 500 mg orally, as 1 dose (preferred option for women taking oral contraceptives)

12.2.2 Specific Causes of Meningitis or Encephalitis

Herpes simplex encephalitis

- Aciclovir 10mg/kg IV, tds for at least 14 days
- For neonates, use aciclovir 20 mg/kg IV, 8-hourly for 21 days

Classic features are headache, neck stiffness, fever, photophobia and drowsiness. However, they may not be present in early cases. Neonates may present with anorexia, apnoea or fits. Meningitis should be considered in any febrile patient with headache, neck stiffness, neurological signs or ↓ conscious level.

Meningococcal meningitis

This can cause coma and death within few hours of first symptoms. Skin rash occurs in 50% cases (starts with maculopapular rash before petechiae).

Management

- Start antibiotics immediately (unless a LP can be done almost immediately, **do not wait** for investigation or confirmation).
- Give benzyl penicillin (60mg/kg up to) 1.8 to 2.4 g IV, 4-hourly for 5-7 days

For patients hypersensitive to penicillin (excluding immediate hypersensitivity), give

- Ceftriaxone (child: 100mg/kg up to) 4g IV, daily
OR (child: 50mg/kg up to) 2g IV, 12-hourly for 5-7 days
OR

- *Chloramphenicol IMI or IV; (25mg/kg per dose up to 2g; except in neonates).*
- Consult with appropriate consultant regarding the need for steroid.
- LP is needed for diagnostic purposes but be careful with ↑ intra cranial pressure (usually manifested as confusion/coma, hypertension, bradycardia, papilloedema).
- Patients must be admitted for full treatment, under strict isolation procedures.

Streptococcus pneumoniae meningitis

In adults, *S. pneumoniae* is the most likely organism.

- Assuming lumbar puncture has been performed (Please note that LP is contraindicated in cases suspected of raised intra-cranial pressure; who may present with: slow pulse, rising blood pressure, progressive depression of consciousness).
- *Give Benzyl penicillin (child: 60 mg/kg up to) 1.8 to 2.4 g IV, 4-hourly for 10 days. Very ill patients may require treatment for up to 3 weeks.*

PLUS

- *Chloramphenicol: 750mg – 1 g 6-hourly for 10-14 days.*
- Benzyl penicillin is effective against *S. pneumoniae* and the *meningococcus*.

ALL suspected meningitis cases must be discussed with specialist / consultant.

- In the rare case of *H. influenzae* meningitis in an adult, give *ceftriaxone for up to 21 days combined with single daily dose gentamicin for 3 days; both drugs given IV.*

Other causes of meningitis

Viral, fungal, TB, *H.influenzae* and listeria. These other causes would need ward investigations for proper diagnosis and appropriate treatment.

- *H.influenzae* prophylaxis: All contacts of the index case – e.g. family members, school students
- **Adult** – *Rifampicin 600mg orally daily for 4 days or 600mg bd for 2 days*

- **Child** - over 4 weeks – Rifampicin 10mg/kg/dose (max. 600mg) orally daily for 4 days
OR
- Ceftriaxone 250mg IMI as a single dose – if unable to take Rifampicin or pregnant.

12.3 DENGUE FEVER

- Relatively rare in Nauru - sporadic cases (three in 2013), but no epidemics

12.3.1 Description

Dengue fever is a viral disease transmitted from human to human by being bitten by an infected mosquito. It normally presents with:

- Fever $>38^{\circ}\text{C}$, >2 days; plus any two of the following:
- Body aches, retro-orbital pain, rash, giddiness, bleeding, low blood pressure ($<100/60\text{mmHg}$)
- In children, with any two of the following: poor drinking, low urine output, bleeding, rash, cold/blue extremities, leucopaenia.
- It can present as dengue haemorrhagic fever where the following laboratory findings are added to the above presentations: low platelet count ($<100 \times 10^9/\text{L}$), haematocrit for adult ($>50\%$) and in children ($>40\%$).
- The most serious presentation is the Dengue Shock Syndrome (DSS), the patient presents in cardiovascular shock.

12.3.2 Management Objectives

- Try to confirm the diagnosis by laboratory testing, as soon as possible, especially in the absence of an outbreak
- Push oral fluids, for adults: 4-6L/24 hours and for children: push 2-3L/24 hours or 7mL/kg/hour
- *Use oral paracetamol and remember that NSAIDs and aspirin are contraindicated*
- Educate patients and guardians of danger signs that need hospital care such as: poor drinking, vomiting, bleeding, coldness of extremities, less urine, drowsy or restless child, child is unable to sit up and any bleeding

- Push fluids in early, to prevent DSS (use oral or IV fluid)
- Admit severe cases especially dengue haemorrhagic fever and impending DSS
- Counsel friends and relatives of public health measures needed to prevent the spread of dengue fever such as using mosquito nets, reduce breeding sites of the vector, avoid people movement especially in the evenings and at night

12.3.3 Treatment

For non-complicated dengue fever:

- Treatment comprises of oral paracetamol and lots of oral fluids as noted above (can be done at home)
- For dengue haemorrhagic fever: In mild cases, treatment can be done as an outpatient case. For severe cases, admit for hospital care. In such cases, IV fluid is usually necessary, monitored by serial haematocrit and platelet counts.
- In dengue shock syndrome (DSS), urgent admission is required, and immediate IV fluid therapy, using either N/S or Hartmann's solution. Infuse 10-20mL/kg bolus fast; this may be repeated 2-3 times, in profound shock. Once vital signs improve, maintain IV fluid at 7mL/kg/hour. Monitor haematocrit and haemoglobin every 4-6 hours to guide fluid replacement.
- If the initial 3-4 boluses of IV fluid do not give any improvements, change IV fluid to *gelofusion*[®] at 10-20mL/kg/bolus and give 1-2 boluses.
- The severity of the DSS can be reduced, by prompt and adequate IV fluid replacement.
- In refractory shock, despite adequate fluid replacement and if haematocrit drops by >10%, fresh blood transfusion is indicated.
- Please note that plasma leakage lasts for about 24-48 hours. After this period, IV fluid must be reduced or stopped especially if there is pleural effusion or ascites. If there is pulmonary oedema; give small doses of *frusemide*.

12.4 DIABETIC FOOT INFECTION

- **By far the most important infections of the soft tissues**
- Needs URGENT attention

- Obtain surgical opinion early especially if debridement is needed
- In minor infections - *metronidazole 400mg orally, 12-hourly PLUS cephalixin 500 mg orally, 6-hourly*
OR
- *Amoxicillin/clavulanic acid 875+125 mg orally, 12-hourly PLUS clindamycin 600 mg IV, 8-hourly.*
- In more severe infections, always consult and refer. Usual treatments include:
 - *Metronidazole 500mg IV, 12-hourly*
PLUS
 - *Cloxacillin 2 g IV, 6-hourly*
PLUS
 - *Gentamicin 4-6mg/kg IV, daily (adjust dose for renal function)*

For patients hypersensitive to penicillin (excluding immediate hypersensitivity), in the first regimen above substitute cephazolin for cloxacillin

- Cover needed for anaerobes, gram positive and gram negative organisms
- *Cephazolin* provides cover for both gram positive and gram negative organisms
- Failed treatment of infection in diabetics often is the first step towards amputation

12.5 EYE INFECTIONS

Please refer to Section 5.

12.6 GASTROINTESTINAL INFECTIONS

12.6.1 Acute Diarrhoea of Unknown Cause

- **First rehydrate the patient** (see Section 1.3.9)

No antibiotic is indicated unless there is evidence to suggest invasion by a pathogen; such as persistent fever and bloody diarrhoea. In the absence of these signs, *loperamide* can be used as anti-diarrhoeal in adults but should be avoided in children.

12.6.2 Diverticulitis

For mild infections:

- *Amoxicillin/clavulanic acid (875/125mg) orally bd for 5-7 days*
OR
- *Metronidazole 400mg bd orally for 5-7 days*
PLUS
- *Cephalexin 500mg orally qid for 5-7 days.*

For severe infections, treat as for acute peritonitis due to perforated viscus.

12.6.3 Acute Peritonitis

- *Amoxicillin (ampicillin) (child 50mg/kg up to) 2g IV qid*
PLUS
- *Gentamicin 4-6mg/kg (child <10 years old 7.5mg/kg; child >10 years old, 6mg/kg) IV daily*
PLUS
- *Metronidazole (child 12.5mg/kg up to) 500mg IV bd*
- Refer case for surgical review

12.6.4 Shigellosis

- Antibiotic is indicated in all cases, for public health reasons, although it is effective clinically in only moderate to severe infections
- *Use cotrimoxazole (child: 4/20mg/kg up to) 160/800mg orally bd for five days,*
OR
- *Ampicillin (child 25mg/kg up to) 1g orally qid for 5 days.* Oral ampicillin rather than amoxicillin is used because of its relatively poor GIT absorption.

12.6.5 Intestinal Helminths

For adults and children over 2 years:

- *Mebendazole 100mg as a single dose and repeat after 2-4 weeks*
- *If the condition relapses, mebendazole 100mg bd for 3 days*
 - *For children under 10kg: mebendazole 50mg bd for 3 days*

Note: For children under 6 months and women in the first trimester of pregnancy; neither mebendazole nor albendazole should be used.

OR

For adults and children:

- *Pyrantel (Combantrin®) 10mg/kg as a single dose*

OR

Adults and children >6 months and >10kg:

- *Albendazole 400mg as a single dose*

Child >6 months but <10kg

- *Albendazole 200mg once daily for 3 days*

12.7 GENITAL TRACT INFECTIONS

12.7.1 Epididymo-Orchitis From a Urinary Tract Source

- *Use trimethoprim (child: 6mg/kg up to) 300mg orally daily for 14 days*

OR

- *Amoxicillin/clavulanic acid (child 22.5mg/kg up to) 875/125mg orally bd for 14 days*

OR

- *Cephalexin (child: 12.5mg/kg up to) 500mg orally qid for 14 days*

For severe infections,

- *Give IV ampicillin (child: 50mg/kg up to) 2g qid*

PLUS

- *Gentamicin 4-6mg/kg (child: <10 years old, 7.5mg/kg and >10 years old, 6mg/kg) IV daily. Continue IV treatment until there is clinical improvement then change to an appropriate oral medication to complete 14 days course.*
- *Adjust gentamicin frequency according to renal function. See Section 18.7.3.*

12.7.2 Epididymo-Orchitis Sexually Acquired

- *Amoxicillin 500mg orally tds for 10-14 days*

PLUS

- *Doxycycline 100mg bd orally for 10-14 days.*

Sexually transmitted infections: Please refer to Section 20 and the WHO syndromic approach to treating these diseases.

12.8 HIV

- Please refer to appropriate publications on HIV treatment or to Public Health staff.

12.9 LEPROSY

This is a chronic bacterial infection with *Mycobacterium leprae*, of the skin, peripheral nerves and upper airways. It presents as a continuous spectrum, with lepromatous (multi-bacillary) at one end and tuberculoid (pauci-bacillary) leprosy, at the other. In the lepromatous form, there are multiple nodules, macules, papules and diffuse infiltrations which are usually symmetrical. The tuberculoid skin lesions on the other hand, are usually single, sharply demarcated, anaesthetic and asymmetrical. Peripheral nerve involvement in the latter is common and severe. The nerve involvement is manifested as anaesthesia, wasting, trophic ulcers and the nerves themselves may be enlarged and tender, especially at the ulna nerve (elbow), peroneal nerve (near head of fibula) and the greater auricular nerve.

Diagnosis is confirmed by the demonstration of AFB in skin smears or from biopsies of typical skin lesions (supported by typical histological appearance).

Treatment of all leprosy cases should be supervised by Public Health staff. Several patients are currently undergoing treatment in Nauru.

WHO regimen includes:

- *Rifampicin 600mg orally monthly*
- *Clofazimine 300mg orally monthly and 50mg orally daily*
- *Dapsone 100mg orally daily.*
- This regimen is given for 12 months. The monthly medications are closely supervised by the Infectious Disease section of Public Health.

- For tuberculoid leprosy, a shortened regime can be given: *Rifampicin 600mg monthly and dapsone 100mg oral daily. This is given for only 6 months.*
- Treatment is given until skin smears are negative.

12.10 MALARIA

Malaria cases in Nauru have always been imported. Local transmission does not happen because the vector (*Anopheles* mosquito) which transmits the malaria parasites has not been detected in the country.

Signs and symptoms of malaria infection include fever, chills, sweats, headache and there may be cough, shortness of breath and diarrhoea. In severe infections, there may be pulmonary oedema, cerebral oedema, liver failure, renal failure, shock and death.

Diagnosis is by the identification of the malaria parasites in a blood film (in someone with history of travel to a malaria endemic country.).

12.10.1 Treatment

Plasmodium falciparum

- *Quinine sulphate (child: 10mg/kg up to) 600mg (<45 kg: 450mg) orally tds for 7 days,*
PLUS
- *Doxycycline (child >8years old: 2mg/kg up to) 100mg orally bd for 7 days. Need not commence on day one. (Not to be given to children <8 years old)*
- *In cerebral malaria, give quinine dihydrochloride (20mg/kg), diluted in 500mL N/S solution, run slowly over 2-4 hours. Repeat every 8 hours at 10mg/kg. Once patient improves, change to oral.*

Plasmodium vivax

- *Chloroquine 155mg base 4 tablets (child: 10mg base/kg) orally initially then 2 tablets (child: 5mg base/kg) six hours later and on days 2 and 3.*
- *To eliminate the hepatic parasites, give primaquine (child: 0.3mg/kg up to) 15mg daily orally for 14 days.*

12.10.2 Malaria Prophylaxis

- Avoid the vector when travelling to endemic areas using insect repellents, wear light coloured, long-sleeved shirts and trousers during the evening, stay in mosquito screened rooms from dusk till dawn, avoid wearing perfumes and aftershaves at night.
- *Chloroquine two tablets orally weekly*
OR
- *Doxycycline 100mg daily orally (2 days prior, to 4 weeks after leaving malarious areas)*

12.11 MYCOBACTERIAL INFECTIONS (TUBERCULOSIS)

See also WHO guidance:

http://www.who.int/tb/features_archive/new_treatment_guidelines_may_2010/en/index.html

- Tuberculosis is managed by the staff of Public Health in Nauru

Tuberculosis is by far the most important of the mycobacterial infections, in terms of its clinical implications as well as its public health impacts. It causes a whole spectrum of clinical infections ranging from pulmonary infection, meningeal infection, peritoneal infection, bone infection, genital infection and others. It is associated with HIV infection. From the public health perspective, it is easily transmissible from one person to another and the recently identified multi-drug resistant strains have proven to be very difficult challenges to health workers throughout the world. It remains one of the major global causes of mortality and morbidity.

12.11.1 Management Objectives

To diagnose cases as quickly as possible using chest X-ray and sputum for acid fast bacilli (3 sputum samples should be collected: one each morning, for three consecutive days)

- Refer cases to the infectious diseases section for treatment, as soon as possible

- Treatment to utilise the recommended DOTS (Directly Observed Treatment Strategy)
- Ensure contacts are traced, for the possibility of positive sputum test. This is necessary for case finding and to reduce the risks of transmission of bacteria in the community.
- Counsel patient and relatives on the mode of transmission and how to prevent the spread of the infection.

12.11.2 **Standard Short Course Therapy for Tuberculosis**

- Consists of *2 months of daily rifampicin, isoniazid, pyrazinamide and ethambutol followed by*
- *4 months of rifampicin and isoniazid*
- Ethambutol should be withdrawn once sensitivity shows the mycobacterium to be sensitive to the other drugs.

Daily course

- *Rifampicin (child: 10mg/kg up to) 600mg (<50 kg: 450mg) orally daily for 6 months*
PLUS
- *Isoniazid (child: 10mg/kg up to) 300mg orally daily for 6 months*
PLUS
- *Pyrazinamide 2g (<50 kg or child: 35mg/kg up to 1.5g) orally daily for two months*
PLUS
- *Ethambutol (child ≥ 6 years) 15mg/kg orally daily for 2 months.*

Twice weekly

- *Rifampicin 15mg/kg up to 900mg orally for 6 months*
PLUS
- *Isoniazid 15mg/kg orally for 6 months*
PLUS
- *Pyrazinamide 3.5g (<50kg or child: 75mg/kg up to 3g) orally for 2 months*
PLUS
- *Ethambutol (child ≥ 6 years) 45mg/kg orally for 2months.*

12.12 PROPHYLACTIC ANTIBIOTIC TREATMENT

See Sections 2.10 and 21.6.4.

12.13 RESPIRATORY TRACT INFECTIONS

See Sections 15.3 and 18.6 - 18.7.

12.14 SKIN, MUSCLE AND BONE INFECTIONS

12.14.1 Osteomyelitis

Usually caused by *Staphylococcus aureus*.

- Give IV cloxacillin 2g 6-8 hourly until patient is afebrile and then substitute oral (flu)cloxacillin for at least 4, usually 6 weeks.
- Managed only after consultation/assessment by surgeon and consideration of the microbiological sensitivity of the causative agent. Surgical drilling of affected bone may be indicated. Consultation with the microbiology laboratory may be needed in the rare event where the infection is caused by an MRSA (methicillin resistant *staph aureus*) and selection of alternative treatments should be guided by the sensitivity of the organism(s).

12.14.2 Septic Arthritis

- Treat only after consultation and hospital referral
- Give cloxacillin 2g IV 6-hourly for at least 7 days followed by oral (flu)cloxacillin 500mg-1g; 6-hourly for a further 3-4 weeks
- Surgical drainage is usually needed if pus develops in the joint space

12.15 STAPHYLOCOCCAL INFECTIONS

- *Staph. aureus* can cause impetigo, scalded skin syndrome, toxic shock syndrome, septicaemia, joint/bone/soft tissue infections, endocarditis, and meningitis.
- Treatment is with (flu)cloxacillin or erythromycin.

12.16 STREPTOCOCCAL INFECTIONS

- *Streptococcus pyogenes* and other strep. species may be present without symptoms, but can cause pharyngitis, tonsillitis (sore throat), cellulitis, erysipelas, lymphangitis, scarlet fever, endocarditis or septicaemia. Later sequelae may include rheumatic fever and glomerulonephritis.
- *Strep.* and/or *staphylococci* may cause necrotising fasciitis, impetigo or toxic shock syndrome
- *Treatment is with penicillin or erythromycin.* Necrotic tissue and pus need to be debrided and drained.
- Suspected β -haemolytic streptococcal throat infection should be swabbed for MCS and *treated for 10 days with phenoxy methyl penicillin or benzathine penicillin: one dose.*

12.17 TYPHOID FEVER

- This is a systemic disease caused by *S.typhi*, characterised by fever, headache, arthralgia, anorexia, abdominal pain and tenderness and constipation
- Infection is transmitted by the oro-faecal route especially from “carriers” of the typhoid bacilli, through poor hygienic practices during food preparation
- About 3% of untreated patients with typhoid fever become healthy “typhoid carriers” who continue to excrete the bacilli through their faeces
- Diagnosis is based on a positive culture of the blood or urine during the first two weeks of febrile illness, or a positive stool culture at the 3rd to 5th week after the onset of illness.
- Without antibiotic treatment, the mortality rate is 12%. With adequate antibiotic treatment, it falls to <1%.

Based on the microbiological susceptibility, the following treatments are recommended:

- *Amoxicillin (child: 25mg/kg up to) 1g orally, 6- hourly for 14 days*
OR
- *Cotrimoxazole (child: 4/20mg/kg up to) 160/800mg orally, 12-hourly for 14 days*
OR

- *Chloramphenicol* (child: 25mg/kg up to) 500-750mg, orally 6-hourly for 14 days.

Alternative regimes include:

- *Ciprofloxacin* (child: 15mg/kg up to) 500mg orally; 12-hourly for 14 days

OR

- If oral therapy cannot be tolerated, or clinical response is delayed, such as fever for more than 7 days; give *ceftriaxone* (child: 75mg/kg up to) 3g IV daily until susceptibility results become available and an appropriate oral regimen can be chosen.

For chronic typhoid carriers; treatment is oral *ciprofloxacin* at a dose of 500mg- 750mg, 12-hourly for 28 days. This treatment is carried out by the Public Health infectious disease section staff.

12.18 URINARY TRACT INFECTIONS

12.18.1 Acute Cystitis

Example of common causative microorganisms are *Escherichia coli* and *Staphylococcus saprophyticus*. The following patients need further investigations to exclude any underlying pathology:

- Male of any age
- Females below 5 years of age
- Pre-menarche females with recurrent UTI

Non-pregnant women

- *Cephalexin* 500mg bd oral for five days
OR
- *Nitrofurantoin* 50mg qid orally for 5 days,
OR
- *Amoxicillin/clavulanic acid* 500/125mg orally bd for 5 days

Fluoroquinolones should not be used as first-line agents as they are the only orally active agents available for infections due to *Pseudomonas aeruginosa* and other multi-resistant bacteria.

- If resistant to all the above, give *ciprofloxacin 500mg orally bd for 3 days*.
- Treatment failures are usually due to either multi-resistant organisms, pyelonephritis, stones, or re-infection with the same organism.

Cystitis in Men

An underlying urinary tract abnormality is common and there is often associated infection of the posterior urethra, prostate or epididymis. Cases should be fully investigated to exclude any abnormality. Any regime used for cystitis in non-pregnant women could be used but duration should be for 14 days.

Pregnant women

- *Cephalexin 250mg orally qid for 10-14 days*
OR
- *Nitrofurantoin 50mg orally qid for 10-14 days*
OR
- *Amoxicillin/clavulanic acid 500/125mg orally bd for 10 to 14 days.*
- Amoxicillin is only recommended if susceptibility of the organism is proven. Over the last 12 months in 2012-3, ALL *E.coli* tested in microbiology lab have been fully or partially resistant to ampi/amoxicillin.

Children

- *Cephalexin 12.5mg/kg up to 500mg orally qid for 5-10 days,*
OR
- *Amoxicillin/clavulanic acid 22.5mg/kg up to 500/125mg orally bd for 5-10 days*
OR
- *Cotrimoxazole 4/20mg/kg up to 160/800 mg orally for 5-10 days*
- After initial infective episode, prophylactic antibiotic should be started until urinary tract investigation is completed.

Fluoroquinolones (e.g. ciprofloxacin) should be avoided in children unless deemed necessary on microbiological grounds.

12.18.2 Acute Pyelonephritis

Mild to moderate infection

- *Cephalexin (child: 12.5mg/kg up to) 500mg orally qid,*
OR
- *Amoxicillin/clavulanic acid (child: 22.5mg/kg up to) 500/125mg orally tds*
OR
- *If causative bacteria are resistant to the above agents or it is Pseudomonas aeruginosa, then use ciprofloxacin 500mg bd.*
- Ciprofloxacin should be avoided in children unless deemed necessary on microbiological grounds.
- Treatment should be continued for a total of 14 days. Follow-up urine for culture should be done at the completion of the therapy.

Severe infection

- Give parenteral antibiotic especially if there is associated septicaemia.
- *Ampicillin or amoxicillin (child: 50mg/kg up to) 2g IV qid,*
PLUS
- *Gentamicin 4-6mg/kg (child: <10 years; 7mg/kg, ≥10 years; 6mg/kg) IV daily. Monitor renal function and adjust dose accordingly*
- Treat for 14 days; towards the end of the therapy, use oral appropriate antibiotics.
- *If the aminoglycoside (gentamicin) cannot be used, give ceftriaxone (child: 50mg/kg up to) 1g IV daily.*

13 MUSCULOSKELETAL CONDITIONS

13.1 ARTHRITIS

13.1.1 Osteoarthritis

- A very common condition affecting about 20% of the population or 50% of those over 60 years of age
- It is a disease of cartilage which becomes progressively thinned as the arthritis progresses
- Presents with pain, worst in the evenings, aggravated by movement and relieved by rest. There is commonly morning stiffness lasting half an hour and stiffness after sitting. Disability depends on the joint affected.
- Signs include swollen painful joint with crepitus on movement. Deformity of the joint, especially of the knees, is common
- Diagnosis is by clinical examination and X-Ray
- ESR and other blood tests are normal

Management

- Reduce weight
- Non-weight bearing exercise to improve muscle power
- *Paracetamol / NSAIDs* to control symptoms
- *Intra-articular corticosteroids* preceded by aspiration of any fluid in the joint
- Surgery (joint replacement) if available

Precautions

Apart from paracetamol, all the NSAIDs are contraindicated in people with peptic ulcer disease. NSAIDs should not be used in people with renal and heart diseases. NSAIDs should all be taken after meals or with milk.

13.1.2 Rheumatoid Arthritis

- A symmetrical inflammatory polyarthritis with extra-articular involvement of other organs. There is progressive joint damage causing severe disability in young people, and demanding considerable resources in their management.

- It affects 2% of the population worldwide and can begin at any age from 10-70, commonly 30-40.
- It is associated with HLA-DR4 (70%), and 5-10% have a family history. Cause is unknown.
- Presents with insidious onset of pain and stiffness in the small joints of hands and feet and later other joints; bilaterally.
- Pain is worst in the morning and stiffness may be for several hours.
- Joints are swollen, tender, deformed and have limited movements. Skin nodules are common and surrounding joint tissues are also inflamed, causing bursitis, tenosynovitis and muscle wasting.
- The eyes may be dry and scleritis present. Polyneuropathy, anaemia, splenomegaly and pleural effusion can also be seen.
- Diagnosis is by clinical picture, X-Ray and blood tests (Rheumatoid factor, ANA, high ESR)

Management

- Counsel the patient after confirmation of diagnosis
- Symptomatic treatment using NSAIDs
- Control of disease with long term suppressive therapy, *such as corticosteroids given orally or by intra-articular injections and sulphasalazine*
- Regular supervision and management of complications
- Rehabilitation of the disabled patients

Drug treatment

- The NSAIDs can be used in treating rheumatoid arthritis.
- There are available disease-modifying antirheumatic drugs (DMARDs) which can also be used in this condition, to reduce the regular usage of the potentially harmful NSAIDs. The DMARDs include:
 - *Methotrexate tab given at a dose of 5-15mg orally once a week*
PLUS
 - *Folic acid at 1mg for 3 to 7 days each week which may be added to reduce gastrointestinal toxicity and mouth ulcers*
 - The FBC, platelet and LFTs must be monitored carefully while taking this medication.*
 - OR*

- *Prednisolone given at 5-7.5mg orally daily*
OR
- *Sulphasalazine tab given at a dose of 1g orally, 2-3 times a day. Again, FBC, platelet and LFT should be monitored on a regular basis.*

Consult specialist physician for further management advice.

13.1.3 The Spondyloarthropathies

- Conditions characterised by inflammatory back pain, synovitis (lower limbs, asymmetrical), sacroiliitis (X-ray), absence of Rheumatoid laboratory findings, Anterior uveitis
- Most common is ankylosing spondylitis, which can progress to cause “bamboo spine”. Management is with *NSAIDs*, exercise programme, and *sulphasalazine* to suppress inflammation.
- Reiter’s syndrome and psoriatic arthritis are other examples of this group
- Refer to physician for further advice

13.1.4 Infective Arthritis

- Infection of the joint is commonly caused by *Staphylococcus aureus*. It can also be caused by *Streptococci*, *Neisseria* or gram negative bacilli.
- It presents with a dramatic, single inflamed joint and fever. Aspiration of the joint confirms turbid (pus) fluid which usually confirms an infective cause by microbiological tests.
- Treatment should be started immediately with *IV antibiotics*, initially with *cloxacillin* and later, guided by the microbiological sensitivity. Surgical drainage of the joint effusion is frequently indicated.
- See Section 12.14 on skin, muscle and bone infections.

13.1.5 Gout

- Gout is the abnormality in uric acid metabolism that results in the deposition of sodium urate crystals in joints causing arthritis, in

soft tissue causing tophi (and tenosynovitis), and in the urinary tract causing uric acid stones and nephropathy.

- It is most commonly seen in men and post-menopausal women.
- Typical presentation is an acutely inflamed joint (usually the first metatarsophalangeal joint), with tophi seen in the ear lobes.
- Diagnosis is made by the identification of uric crystals in aspirated joint fluid and a high uric acid level in the blood. On the other hand, a normal uric acid level does not exclude gout.
- Potential contributing factors include drugs such as thiazides, low dose aspirin®; excessive alcohol intake and diet high in purines and its precursors such as shell fish.
- Management of an acute attack involves an initial high dose of NSAIDs. This dose is gradually reduced over a one-week period.

Usual initial doses of commonly used NSAIDs:

- *Naproxen at 750mg orally stat, followed by 500mg orally bd,*
OR
- *Colchicine given at 1.2mg orally stat followed by 0.6mg every 6 hours, up to 2.4mg daily or as tolerated.*
- *In patients with renal impairment or where NSAIDs are contraindicated, use prednisolone at 20-40 mg orally daily until the acute attack subsides. Taper the dose over 7-14 days. Intra-articular injection of corticosteroids can be given (e.g. methylprednisolone acetate 40-80mg intra-articularly).*

Avoid aspirin since it may exacerbate the attack. All NSAIDs should be taken after meals.

In some patients, preventing attacks of gout can be achieved by using oral allopurinol when:

- Frequent acute attacks
- Tophi or chronic gouty arthritis
- Renal stones
- Very high serum uric acid level ($>0.55\text{mmol/l}$)
- Prophylaxis when treating malignant disease.

Allopurinol may precipitate an acute attack and it must not be given within 3 weeks of an acute attack. However, if an acute attack occurs

while one is on allopurinol, it is advisable not to stop taking the allopurinol.

- *Dose is 300mg oral daily but reduced to 100mg daily, in people with renal disease.*
- *Concurrent with the introduction of allopurinol, it is advisable to give colchicine 0.5mg orally daily (max. 0.5mg bd), to prevent an acute attack of gout. This colchicine is given for three weeks only.*

13.1.6 Other Arthropathies

Pyrophosphate arthropathy (pseudogout) is a disease of older people (>60 years old with male = female incidence). It is more difficult to control compared to gouty arthritis. *NSAIDs are used for symptomatic relief and intra-articular corticosteroid injection may be helpful.*

- *Paracetamol at 0.5mg-1g orally every 4-6 hours as necessary up to 4g a day.*

Osteoporosis

- This condition probably exists in Nauru although not commonly recognised
- It is a loss of bone matrix which occurs especially in post-menopausal women and ageing inactive people.
- Two other risk factors are smoking and excessive alcohol intake.
- It does occur in older men but is often undiagnosed.
- Unchecked it leads to fractures - often at comparatively low impact and involving long bones and the vertebrae. The kyphosis seen in many elderly women is the most obvious consequence of osteoporosis.
- Diagnosis is made by clinical appearance and by bone densitometry. In the absence of densitometry, plain X-rays may reveal the characteristic porotic bone.
- Treatment is with:
 - *Oral calcium supplements (calcium citrate 2.38g orally daily) together with Vitamin D as colecalciferol 1000 international units orally daily.*
- Plasma calcium needs to be monitored periodically to detect possible hypercalcaemia

- If these treatments are not effective, bisphosphonates should be considered. They are not currently on the Nauru EML but include:
 - *Alendronate 70 mg orally, weekly on an empty stomach (and washed down with copious fluids to prevent damage to the oesophagus).*

13.2 BACK PAIN

Back pain is such a common problem that when one presents with it, a clinician's role is to identify the potentially serious causes before treating the symptoms. The potentially serious conditions which can present as a back pain include infection, neoplasm, Paget's disease of bone and a possible vertebral fracture especially in an osteoporotic bone.

Back pain due to these conditions is usually:

- Localised
- Uninfluenced by posture or movement
- Spinal mobility may be normal or very limited hypomobility
- No diurnal variation
- Patient may have other constitutional symptoms such as fever and feeling ill

When these conditions are suspected, the patient must be urgently referred for further evaluation by a clinician in a hospital setting.

On the other hand, the more common mechanically caused back pain usually have the following characteristics:

- Pain is generalised
- Pain is worse at the end of the day
- Pain is worse on sitting and movement and least when lying down.
- Patient is otherwise well
- Tenderness is diffuse

Once the potentially serious conditions have been excluded, adequate analgesics using NSAIDs should be given.

Non-drug treatment such as rest, physiotherapy and graded mobilisation should also be carried out. If symptoms deteriorate or fail to

significantly improve by 10-14 days, the case must be referred for further investigation and treatment by a senior clinician.

13.3 SOFT TISSUE RHEUMATISM

This is a group of conditions with similar features. They cause musculoskeletal or joint pain that arises from structures surrounding joints, such as tendon sheaths, bursae. These conditions include bursitis, tenosynovitis, frozen shoulder, fibromyalgia.

Many are treated (preferably) by local corticosteroid injections rather than by anti-inflammatory drugs. However, if these injections are not available, then the NSAIDs should be used.

13.4 BONE DISEASES

Bone disorders such as osteomalacia, rickets, Paget's disease, osteomyelitis and neoplasia of bone should all be referred to a clinician in a hospital setting for investigation and managements.

14 NUTRITIONAL AND BLOOD CONDITIONS

14.1 NUTRITIONAL DISORDERS

14.1.1 Overweight and Obesity

Overweight and obesity must be treated because they are associated with increased risk of developing diabetes, ischaemic heart disease and cerebrovascular disease and the development of osteoarthritis, hernia, varicose veins, gall stones, breathlessness, hyperlipidaemia, back pain and proneness to accidents. Obesity is common in the Pacific Islands and Nauru is no exception.

Obesity is defined as increased BMI (males >30 and females >28.6) and a waist circumference of >102cm for men and 88cm for women. However, to simplify the definition, BMI of 30 may be taken as the cut-off point for both males and females. BMI between 25 and 30 is referred to as overweight.

BMI (Body mass index) = weight kg / (height metres)²
 Overweight - BMI \geq 25
 Obese - BMI \geq 30

Table 14.1 Interpretation of BMI results

| Height (cm) | Weight (kg) at which BMI reaches 30kg/m ² |
|-------------|--|
| 150 | 67.5 |
| 155 | 72.1 |
| 160 | 76.8 |
| 165 | 81.7 |
| 170 | 86.7 |
| 175 | 91.9 |
| 180 | 97.2 |
| 185 | 102.7 |
| 190 | 108.3 |
| 195 | 114.1 |
| 200 | 120 |

“Ten points” guideline to the management of obesity

Presented below is a ten point guideline to help clinicians with the management of people with obesity (based on the Australian National Health and Medical Research Council recommendations, <http://www.nhmrc.gov.au/media/releases/2013/new-clinical-practice-guidelines-managing-overweight-and-obesity>).

The website provides detailed advice on weight reduction programs.

- Discuss weight with patient and whether measurements should be taken at this stage (i.e. BMI and waist circumference)
- Assess and treat co-morbidities associated with weight and determine the patient's need to lose weight
- Ascertain the patient's readiness and motivation to lose weight
- Assess why energy imbalance has occurred
- Assess how energy imbalance has occurred
- Determine the level of clinical intervention required
- Devise goals and treatment strategies with patient
- Prescribe or refer for dietary or physical activity advice
- Prescribe medication or refer for obesity surgery, and/or conduct or refer for behavioural modification as appropriate
- Review, assist and change programme as required

14.1.2 Vitamin Deficiencies

Isolated vitamin deficiencies are rare in people eating a balanced diet but need to be considered in protracted illness especially of the gastrointestinal tract and in children who are not thriving. Characteristics are shown in **Table 14.2**.

Table 14.2 Vitamin deficiencies

| Vitamin | Signs and symptoms | Prevention | Treatment |
|-----------------------------|--|---|--|
| Fat soluble vitamins | | | |
| Vitamin A | Night blindness, dryness of conjunctiva and cornea (xerophthalmia), Bitot's spots and blindness especially in children | Take adequate green leafy vegetables and dairy products | <i>Oral retinol palmitate, 50,000 units for two days or Vitamin A – 50,000 units , IMI stat</i> |
| Vitamin D | Osteomalacia in adults or rickets in children | Adequate sunlight exposure and a balanced diet | <i>Oral vitamin D₂ supplements; 250 mcg daily (monitored by regular calcium level).</i> |
| Vitamin E | Severe cases result in anaemia and neurological problems | Vegetable oils and fish | |
| Vitamin K | Bleeding tendencies | Leafy vegetables and avoid antibiotics that destroy intestinal bacterial flora. In newborns, vitamin K 1mg IMI. | <i>Vitamin K (phytomenadione) 10mg IMI</i> |

| Vitamin | Signs and symptoms | Prevention | Treatment |
|-------------------------------|--|-------------------------------------|--|
| Water soluble vitamins | | | |
| Thiamine | Beriberi (wet and dry) and Wernicke-Korsakoff syndrome especially in alcoholics (dementia, ataxia and nystagmus) | Balanced diet | <i>Thiamine 50mg IMI followed by 20mg oral daily. For Wernicke-Korsakoff syndrome, give thiamine 50-100mg IMI or IV for 3 days then oral 20mg daily.</i> |
| Riboflavin | Angular stomatitis of mouth, red inflamed tongue and seborrhoeic dermatitis around nose and genitals | Leafy vegetables and dairy products | <i>Riboflavin 5 mg Orally daily as a vitamin B complex (multivitamin tablets)</i> |
| Niacin | Dermatitis, dementia and diarrhoea (pellagra) | Plant products, meat and fish | <i>Vitamin B complex (multivitamin tablets)</i> |
| Vitamin C | Scurvy and anaemia | Fruits such as orange juice | <i>Ascorbic acid up to 1g daily and encourage to eat a lot of fruit</i> |
| Vitamin B12 and folate | Megaloblastic anaemia | Balanced diet | <i>Vitamin B12 1mg IMI monthly and folate 5mg orally daily</i> |

14.2 BLOOD CONDITIONS

14.2.1 Anaemia

- Anaemia is defined as reduced haemoglobin of <13g/dL for males and <11.5g/dL for females
- Common causes include blood loss, iron deficiency, B12 and folate deficiency, bone marrow failure and haemolytic diseases
- Diagnosis of these causes can only be done by laboratory investigation. Consequently, all cases of suspected anaemia should be referred for management in the hospital. Treatment usually involves the treatment of the cause of anaemia.

Iron deficiency anaemia

- Treated by *oral iron (ferrous sulphate) 300mg tds for 3 weeks. Folate 5mg daily should also be given to help production of more blood cells.*
- Treat the cause of the iron deficiency (e.g. menorrhagia or GIT bleeding)

Anaemia of chronic renal disease

- This is associated with deficiency of the renal hormone erythropoietin and may also have an element of iron deficiency.
- An erythropoietin analogue, *darbepoetin given weekly in an initial dose of 0.45 mcg/kg may help increase the haemoglobin. This dose can be increased according to the response. Oral iron is usually given as well.*
- Adverse effects include bone pain and hypertension but patients often feel much better for a modest increase in Hb produced by this agent

14.3 MYELOPROLIFERATIVE DISORDERS

Uncontrolled clonal proliferation of one or more of the cell lines in the bone marrow - erythroid, myeloid and/or megakaryocyte lines. Examples include polycythaemia rubra vera (PRV), essential thrombocythaemia, myelofibrosis or chronic myeloid leukaemia.

All these cases should be referred to a specialist physician for hospital treatment.

PRV is usually treated by regular venesection and/or *oral hydroxyurea*.

14.3.1 Leukaemia

Acute leukaemia usually presents with signs and symptoms of anaemia, bleeding tendencies and bruising, lymphadenopathy, infections and hypertrophied gums.

All suspected and confirmed new leukaemia cases must be admitted to the hospital.

14.4 BLEEDING DISORDERS

Bleeding tendencies can be due to any of the following:

- Vitamin K deficiency (e.g. too much warfarin)
- Liver disease
- Deficiency in coagulation factors such as haemophilia
- Disseminated intravascular coagulation (DIC)
- Low platelets or abnormal platelet function

All cases should be referred to a physician for hospital management.

14.4.1 Warfarin Therapy

Warfarin is used to prevent thromboembolism in the following conditions:

- Atrial fibrillation
- Prosthetic cardiac valves
- Deep vein thrombosis (recurrent)
- Mitral stenosis
- Transient ischaemic attacks
- Arterial disease
- Pulmonary embolism treatment and prevention

- Warfarin anticoagulant action begins in hours to days, in relation to the half lives of coagulation factors 2, 7, 9 and 10. Full antithrombotic action takes some days to achieve.

Management

- Start warfarin 5 days before it is planned to stop heparin (which was initially given)
- Take precaution in patients who may be more sensitive to warfarin, especially patients >65years old, with low body weight, altered liver function or on medications known to increase sensitivity to warfarin
- Monitor the warfarin effect using regular INR (coagulation test)

Recommended first 5 days of treatment:

Table 14.3 Warfarin, first 5 days of treatment

| Day | INR | Warfarin dose |
|-----|---|---|
| 1 | Within normal range | 5mg (except for relatively young patients with no co-morbidities: they can be started on 10mg for days 1 and 2) |
| 2 | <1.5 1.5-1.9 2.0-2.5 >2.5 | 5mg or 10mg for the above 3mg 1mg seek advice |
| 3 | <1.5 1.5-1.9 2.0-2.5 2.5-3.0 >3.0 | 5mg 3mg 2mg 1mg seek advice |
| 4 | <1.5 1.5-1.9 2.0-3.0 >3.0 | 10mg 6mg 2mg seek advice |
| 5 | <1.5 1.5-1.9 2.0-3.0 >3.0 | 10mg 8mg 3mg seek advice |

Once the warfarin dose is stabilised, the patient can be regularly followed ensuring that the INR is in the recommended levels (see **Table 14.4**). Patients should be seen no more than one month between visits, or more frequently if needed.

Table 14.4 Recommended INR levels for warfarin treatment

| | INR* | Duration |
|---------------------------------------|-------|-------------|
| Pre and perioperative anticoagulation | 1.5-2 | Days |
| Treatment of DVT | 2-3 | 12-26 weeks |
| Treatment of PE or massive DVT | 2-3 | 26-52 weeks |
| Treatment of recurrent DVT or PE | 3-4 | Life long |
| Atrial fibrillation | 2-3 | Life long |
| Prosthetic valve | 2-4 | Life long |
| Arterial disease | 3-4 | Life long |

*Prothrombin ratio

Drugs that potentiate warfarin effect

- Antibacterials (cephalosporins, cotrimoxazole, isoniazid, macrolides, metronidazole, penicillins, quinolones, tetracycline)
- Antifungals (ketoconazole, fluconazole and miconazole)
- Cardiovascular (amiodarone, anti-lipid drugs, propranolol, quinidine, verapamil)
- Central nervous system (antidepressants: tricyclics and selective serotonin reuptake inhibitors)
- Gastrointestinal (cimetidine, omeprazole)

Drugs expected to decrease warfarin effect

- Antibacterials (rifampicin)
- Central nervous system (carbamazepine, phenytoin, barbiturates)
- Others (cholestyramine, vitamin K, vitamin rich foods e.g. avocado, broccoli)

Some herbal medicines may interact with warfarin too (refer to appropriate literature)

Management of patients on warfarin therapy undergoing surgery

The following is a suggested management plan for patients having elective surgery. However, the final decision on what prophylaxis to use (if any) is taken by the surgeon and anaesthetist caring for the patient.

Before surgery

- Withhold warfarin for 4 days prior to operation day. Aim is for INR to drop to <1.5 on day of surgery.
- Commence low molecular weight heparin (e.g. *enoxaparin 1mg/kg 12-hourly*) at treatment dose when INR is <2 . Last dose prior to surgery given in morning, the day before surgery (i.e. no low molecular weight heparin on the day of surgery)
- Test INR on day of surgery: if >1.5 , discuss with surgeon and anaesthetist.

After surgery

- Restart warfarin with patient's usual daily dosing and low molecular weight heparin, commencing 12-24 hours after surgery.
- Discuss with surgeon and anaesthetist before restarting the therapy.
- Continue with heparin until the INR is >2 .

15 PAEDIATRIC CONDITIONS

15.1 COMMON EMERGENCY CONDITIONS IN CHILDREN

15.1.1 Managing a Choking Infant

- Lay infant on your arm or thigh in a head down position
- Give 5 blows to infant's back with heel of hand
- If obstruction persists, turn infant over and give 5 chest thrusts with 2 or 3 fingers, about 2cm below level of nipples but at the midline
- If necessary, repeat sequence with back-slaps

15.1.2 Managing a Choking Child (>1 year of age)

- Give 5 blows to the child's back with the heel of hand with child sitting, kneeling or lying
- If the obstruction persists, go behind the child and pass arm around child's body, form a fist with one hand immediately below the child's sternum, place the other hand over the first one and pull upwards into the abdomen, repeat this Heimlich's manoeuvre 5 times
- If necessary, repeat this sequence with the back slaps again

15.2 PROBLEMS OF NEONATES AND YOUNG INFANTS

15.2.1 Routine Care of the Newborn at Delivery

- Dry baby with a clean towel
- Observe baby and look for satisfactory breathing or crying, good muscle tone and good pink colour
- Give baby to mother as soon as possible, place on chest or abdomen (so-called 'Kangaroo care')
- Cover baby to prevent heat loss
- Encourage breast-feeding within first one hour
- (the last two steps prevents hypothermia and hypoglycaemia)

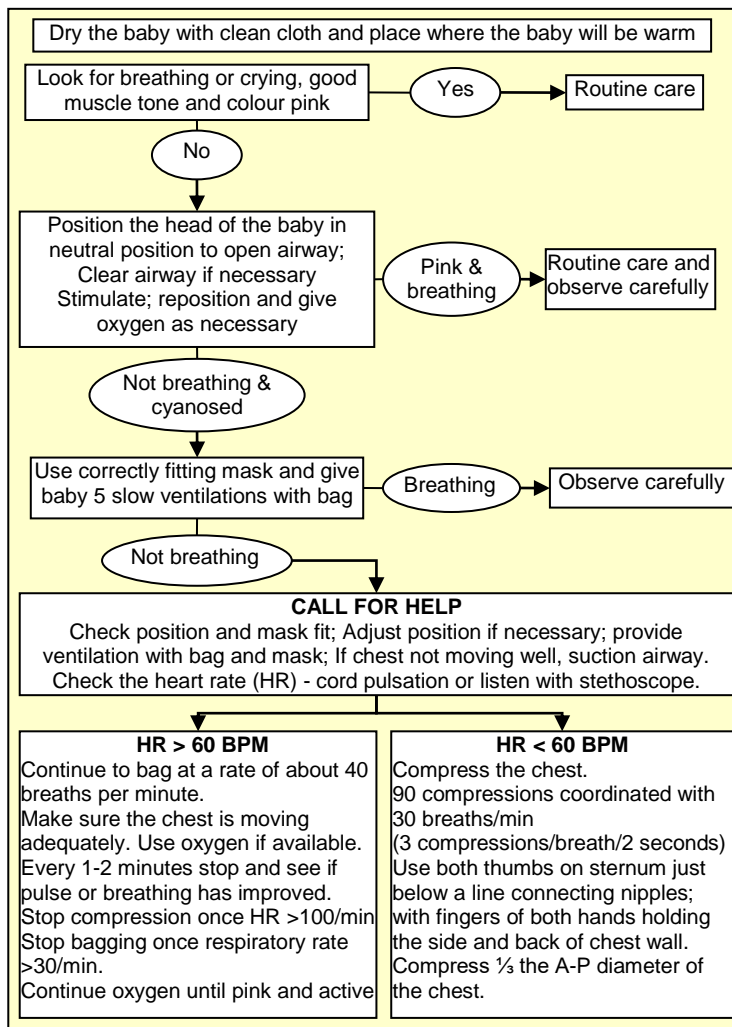
- Remember to give BCG and hepatitis B vaccine to all newborn babies
- *Vitamin K 1mg IMI once (Use the 1mg/0.5mL ampoule; **NOT the 10mg/mL ampoule**)*
- *Remember to give naloxone 0.1 mg/kg IM if mother received narcotics during the delivery*

15.2.2 Neonatal Resuscitation

At risk babies who may need resuscitation:

- Babies born to mothers who have chronic illnesses
- Mother who had previous foetal or neonatal death
- Mother with PET, multiple pregnancy or preterm delivery
- Abnormal presentation of foetus
- Prolapsed cord
- Prolonged labour
- Premature rupture of membrane
- Meconium stained liquor

However, many babies in need of resuscitation cannot be predicted.

Figure 15.1 Steps in neonatal resuscitation

15.2.3 Prevention of Neonatal Infections

- Use basic hygiene and cleanliness during delivery
- Special attention to cord and eye care
- Exclusive breast feeding
- Strict procedures for hand-washing for all staff and family members, before and after handling babies
- Avoid incubators (wherever possible encourage 'Kangaroo Care')
- Remove IV line when no longer needed
- Avoid unnecessary blood transfusions
- Strict sterility for all procedures such as injections

15.2.4 Management of Child with Perinatal Asphyxia

Initial management is effective resuscitation, (see **Figure 15.1**).

Problems in the days after birth

- Convulsion: Treat with *phenobarbitone* and check the glucose level
- Apnoea: Common after severe birth asphyxia. May be associated with convulsions. Manage by *nasal oxygen*, bag and mask (CPAP if available).
- Inability to suck: Feed with EBM via NG tube. Be extra careful with delayed emptying of stomach to avoid regurgitation
- Poor motor tone: Recovery of motor tone or ability to suck within one week indicates a good outcome. If no recovery after one week, usually means significant brain damage.

15.2.5 Danger Signs in Newborns and Young Infants

- Unable to be breast fed
- Convulsion
- Drowsy or unconscious
- Respiratory rates <20/min or apnoea (cessation of breathing) >15 seconds
- Respiratory rate >60/min
- Grunting and severe chest indrawing
- Central cyanosis

Emergency management of danger signs

- Clear airway
- Give nasal oxygen
- Bag and mask if needed
- Give *ampicillin and gentamicin 3mg/kg/day (or cefotaxime for cover against Gm negative organisms)*
- Check glucose. If you can't, assume hypoglycaemia and give IV glucose - particularly if baby drowsy or convulsing
- Give vitamin K if not given already
- Admit baby and notify paediatrician

15.2.6 Serious Bacterial Infections in Neonates

Risk factors include:

- Maternal fever (during labour or just before delivery)
- Rupture of membrane more than 24 hours before delivery
- Foul smelling amniotic fluid

Danger signs include:

- Deep jaundice
- Severe abdominal distension
- Painful swollen joints, reduced movement and irritability if these parts are handled
- Many or severe skin pustules
- Umbilical redness extending to periumbilical skin or umbilicus draining pus
- Bulging fontanelle

Admit all patients with danger signs and notify paediatrician immediately.

Neonatal meningitis

Usually presents with the following signs:

- Bulging fontanelle
- Convulsion
- Irritability
- Reduced feeding
- High pitched cry

- Apnoeic episodes

Treatment includes giving *cefotaxime 50mg/kg 12-hourly OR Ceftriaxone 50mg/kg 12 hourly*. If you suspect neonatal meningitis admit baby and notify paediatrician immediately.

15.2.7 Other Common Neonatal Problems

Jaundice

More than 50% of normal newborns and 80% of preterm infants have some jaundice. Jaundice can be divided into normal or abnormal.

Abnormal (non-physiological jaundice)

- Jaundice on first day of life
- Jaundice that lasts longer than 14 days in term babies or jaundice that lasts longer than 21 days in pre-term babies
- Jaundice with fever
- Deep jaundice of palms and soles with deep yellow colour

Normal (Physiological jaundice)

- Skin and eyes yellow but none of the above

Possible causes of abnormal jaundice

- Serious bacterial infection
- Haemolytic diseases due to blood group incompatibility or red cell structural defects (e.g. G6PD deficiency; spherocytosis)
- Intrauterine infection (**TORCH**: Toxoplasma, Other organisms, Rubella, Cytomegalovirus, Hepatitis), or congenital syphilis
- Liver disease such as hepatitis or biliary atresia
- Hypothyroidism
- Cephal-haematoma

Investigations for abnormal jaundice include

- FBC
- Blood type of mother and baby including Coomb's test
- Syphilis test
- Liver function test
- TFT and liver ultrasound
- Septic workup

Treatment

- *Phototherapy in hospital where treatment will be further guided by serum bilirubin and the treatment of potential cause.*

15.3 COUGH OR DIFFICULTY BREATHING

This can be caused by any of the following:

- Pneumonia
- Severe anaemia
- Congenital heart disease
- Tuberculosis
- Pertussis
- Foreign body
- Effusion or empyema
- Pneumothorax
- *Pneumocystis carinii* in AIDS cases

15.3.1 Pneumonia

This is an infection of the lung usually caused by either virus or bacteria. Specific causes cannot be determined by clinical or CXR appearance. It is classified as very severe and severe to facilitate treatment plans.

Very severe pneumonia

Very severe pneumonia is classified as a cough with breathing difficulty plus at least one of the following:

- Central cyanosis
- Inability to breastfeed or vomiting every time
- Convulsion, lethargy or unconsciousness
- Severe respiratory distress

In addition, some or all signs of pneumonia or severe pneumonia may be present, such as fast breathing:

- Birth - 11 months ≥ 60 breaths/min
- 1 to 5 years ≥ 40 breaths/min

Other associated features

- Nasal flaring, grunting in young infants, head nodding

- Indrawn chest wall
- Signs of pneumonia on auscultation
- Pleural rub
- Abnormal vocal resonance

Management of very severe pneumonia

Always admit for CXR, pulse oximetry if available and further treatments.

Antibiotic therapy

- *Ampicillin 50mg/kg IMI every 6 hours and gentamicin 7.5mg/kg IMI once a day; for five days.*
- *If child is well, continue treatment in hospital or at home with oral amoxicillin (amoxil®) 15mg/kg tds*
OR
- *Give ceftriaxone 50mg/kg IMI or IV 12-hourly*
OR
- *Give chloramphenicol (25mg/kg IMI or IV every 8 hours), until child improves then change to orally, 4 to 6 hourly for a total course of 10 days.*
- *If Staphylococcal infection suspected give cloxacillin (50mg/kg IMI or IV every 6 hours). When child improves, change cloxacillin to oral 6-hourly for a total course of 6 weeks.*

Oxygen therapy if available

- Give oxygen to all children with severe to very severe pneumonia. If pulse oximetry is available, use this to guide oxygen therapy. Give oxygen to children with oxygen saturation <90%.

Supportive care

- If child has fever $\geq 39^{\circ}\text{C}$, give *paracetamol*
- If wheeze is present, give short acting bronchodilator
- Remove by gentle suction any thick secretions in the throat which the child cannot clear
- Encourage breast feeding and maintenance fluid

Severe Pneumonia

Check that signs of very severe pneumonia are *not* there (e.g. central cyanosis, severe respiratory distress, vomiting everything, convulsion)

Diagnosis is made if cough with difficulty in breathing and at least one of the following signs:

- Lower chest indrawing
- Nasal flaring
- Grunting

In addition, fast breathing:

- Birth - 11 months ≥ 60 breaths/min
- 1 to 5 years ≥ 40 breaths/min

PLUS

Chest indrawing and other auscultation signs of pneumonia.

Treatment of severe pneumonia

- **Admit**

Give:

- *Benzyl penicillin (50,000 units/kg IMI or IV for at least 3 days)*
OR
- *Ampicillin 25mg/kg dose IMI 6 hourly*
- When child improves, *change to oral amoxicillin (25mg/kg 8 hourly for a total of 5 days).*
- If child does not improve in 48 hours, switch to *chloramphenicol 25mg/kg tds IMI or IV until child improves, then change to orally, 6 hourly for a total of 10 days course.*
OR
- Give *ceftriaxone 50mg/kg IMI or IV 12-hourly* until improvement evident, then change to
- *Oral amoxicillin 25mg/kg 8-hourly for 5 days*

Non-severe pneumonia

The child has pneumonia but does not have the signs and symptoms of severe or very severe pneumonia.

- Treat as an outpatient case
- *Use cotrimoxazole (4mg/kg of trimethoprim; 20mg/kg of sulphamethoxazole), bd for 3 days*
OR
- *Amoxicillin 25mg/kg bd for 3 days*

Follow-up

- Encourage caregiver to feed child and review in 2 days time or earlier if child is more ill
- If improved, finish the 3 day course
- If not improving, and there are signs of severe or very severe pneumonia, admit and manage accordingly

15.3.2 Pleural Effusion and Empyema

A child with severe or very severe pneumonia can develop pleural effusion or empyema.

Clinical signs include:

- Chest is dull to percussion with reduced air entry over area
- Pleural rub can be heard in its early development
- CXR shows fluid in one or both sides of chest
- Especially in empyema, fever persists in spite of antibiotic treatment

Treatment:

- Drainage by pleural tap/s
- *Antibiotic such as chloramphenicol 25mg/kg IMI or IV 6-hourly until the child improves then orally 6-hourly for a total of 4 weeks;*
- *If infection is due to S.aureus, give cloxacillin 50mg/kg IMI or IV every 6 hours **and** gentamicin 7.5mg/kg IMI or IV once a day. When child improves continue (flu)cloxacillin orally 6-hourly for 3 weeks total. Discontinue gentamicin after 7 days*

15.3.3 Epiglottitis

This is a medical emergency; seen in children under 5 years of age, but occasionally seen in older children and adults. It is usually caused by *Haemophilus influenzae* type b. It is uncommon in countries that immunise children with vaccine for this infection (Hib vaccine).

Symptoms include:

- Sore throat
- Hoarseness
- Stridor

- Drooling and apprehension

Diagnosis is confirmed by:

- Direct visualisation of a 'cherry red' epiglottitis (but do not manipulate epiglottitis or it may cause laryngeal spasm).
- Blood culture is usually positive for *haemophilus influenzae* type b.
- **Admit. Notify paediatrician immediately.**

Treatment

- *Ceftriaxone 80-100mg/kg/day as a single dose or divided 12-hourly, IV (not to exceed 4g/day or 2g/dose).*
OR
- *Cefotaxime 200mg/kg/day, divided 6-8 hourly, IV (not to exceed 12g/day)*
OR
- *Amoxicillin in susceptible isolates*
OR
- *Chloramphenicol (50mg/kg up to) 1g IV immediately and followed by 25mg/kg up to 1g 6-8 hourly; in penicillin sensitive patients.*
- These regimens are continued for 5 days. However to eradicate haemophilus carrier status, give *rifampicin (neonate <1 month 10mg/kg; child: 20mg/kg) up to 600mg daily for 4 days to both contacts and case.*
- Vaccinate all <5 year old contacts with *Hib vaccine*
- **Please remember to urgently refer cases with stridor for surgical assessment in case of need for urgent tracheostomy**
- The use of nebulised adrenaline and steroid to help clear airway can be used in acute epiglottitis, and is described below in Section 15.3.4 - viral croup.

15.3.4 Viral Croup

Definition

A condition caused by various respiratory viruses, which leads to the obstruction of the upper airway. It can be life threatening when severe.

Croup is divided into mild and severe.

Mild croup is characterised by:

- Fever
- Hoarseness of voice
- Barking and hacking cough
- Stridor heard only when child is agitated

Severe croup, which occurs mostly in infants, is characterised by:

- Stridor when child is quiet
- Rapid breathing and indrawing of lower chest wall

Mild croup treatment

Managed at home with supportive care, including:

- Encourage oral fluids
- Breastfeed and feed as appropriate
- Paracetamol for fever

Severe croup treatment

Admit and treat as follows:

- *Steroid treatment - One dose of oral dexamethasone (0.6mg/kg) or oral prednisolone 1mg/kg twice a day for three days (Please note that 1mg prednisolone is equivalent to 5mg hydrocortisone or 0.15mg dexamethasone).*
- *Adrenaline treatment - Give the child a trial of 2mL of nebulised adrenaline (1:1000 solution). Repeat hourly if effective. (Remember, its effect may last only 2 hours).*
- Please note that antibiotic is not necessary
- Signs such as severe indrawing chest wall and restlessness are most likely to be indications for tracheostomy and not for oxygen (Oxygen is only indicated in severe airway obstruction, just before tracheostomy.)
- Avoid using mist tents as they are ineffective and they separate infant from caregiver

15.3.5 Coughs or Cold

These are common, self-limited viral infections requiring only symptomatic care. Antibiotics should not be given. Most episodes end within 2 weeks. Coughs > one month may be due to asthma or tuberculosis.

Common features of the “common cold”

Cough, nasal discharge, mouth breathing and fever. Wheezing may occur in young children.

The following are *absent*:

- Fast breathing
- Lower chest indrawing
- Stridor when child is calm
- General danger signs

Treatment of cold

- Treat as an outpatient
- Soothe throat and relieve cough with safe remedy such as warm sweet drink
- Relieve high fever ($\geq 39^{\circ}\text{C}$) with *paracetamol* if fever is causing distress
- Do not give antibiotics (they are not effective and they do not prevent pneumonia)
- Do not give medicated nose drops
- Do not give remedies that contain atropine, codeine or alcohol (they may be harmful)

Follow-up

- Feed child
- Watch for *fast* breathing or *difficulty* breathing. Return if these develop.
- Return if child becomes more sick or unable to drink or breastfeed

15.4 CONDITIONS PRESENTING WITH WHEEZE

- In the first 2 years of life, wheezing is mostly caused by acute viral respiratory infections, presenting as bronchiolitis, coughs and colds
- After 2 years of age, most wheezing is due to asthma
- Sometimes, children with pneumonia present with wheeze, especially those below 2 years of age

15.4.1 **Bronchiolitis**

- Lower respiratory tract viral infection, which typically, severely affects infants.
- It comes in annual epidemics and is characterised by airways obstruction and wheezing.
- Respiratory syncytial virus is a common causative agent.
- Secondary bacterial infection can be common in some situations.
- Episodes of wheeze may occur for months after the initial one but will eventually stop.

Diagnosis

- Wheeze not relieved by 3 doses of rapid acting bronchodilator
- Hyperinflation of chest with increased resonance to percussion
- Lower chest indrawing
- Fine crackles or rhonchi on auscultation
- Difficulty feeding, drinking owing to respiratory distress

Treatment

Most children can be treated at home, except the following, who will need to be admitted for hospital treatment:

Signs of severe or very severe pneumonia:

- Central cyanosis
- Inability to drink or speak
- Convulsions, lethargy or unconsciousness
- Lower chest wall indrawing
- Nasal flaring
- Grunting in young infants

Or signs of respiratory distress:

- Obvious discomfort in breathing
- Difficulty in drinking, feeding or talking

Antibiotic treatment

- For home treatment, give *cotrimoxazole* (4mg/kg trimethoprim, 20mg/kg sulphamethoxazole) twice a day or *amoxicillin* (25mg/kg 2 times a day) orally for 3 days, if child has fast breathing.

- If there is respiratory distress (e.g. the child has lower chest wall indrawing but is able to drink and feed, and there is no central cyanosis); *give benzyl penicillin 50,000 units/kg IMI or IV every 6 hours for at least 3 days. When the child improves, switch to oral amoxicillin for 3 days.*
- If there are signs of severe pneumonia (central cyanosis and inability to drink), *give chloramphenicol (25mg/kg IMI or IV every 8 hours) until child improves then switch to oral chloramphenicol for a further 10 days*
OR
- *Ceftriaxone 50mg/kg IMI or IV 12-hourly until child improves. Then switch to oral treatment with oral amoxicillin for a further 10 days.*

Other treatments

- *Give oxygen in severe cases*
- *Give paracetamol in fever*
- If child does not respond to treatment, do a chest X-ray to exclude tension pneumothorax which may complicate this condition.

15.4.2 Asthma

Reversible airways obstruction, characterised by recurrent episodes of wheezing often with cough, which responds to bronchodilators and anti-inflammatory drugs. Antibiotic is not indicated unless there are signs of pneumonia.

Diagnosis

- History of recurrent episodes of wheezes and coughs
- Lower chest wall indrawing
- Prolonged expiratory audible wheeze
- Reduced air intake when obstruction is severe
- Absence of fever
- Good response to treatment with bronchodilators

Treatment

- First wheeze episode with no respiratory distress - treat at home with supportive care only

- In respiratory distress or recurrent attacks, give salbutamol by nebuliser or inhaler
- If child responds to this treatment, send home on inhaler
- If no response and child is getting worse (cyanosed and not drinking); admit and notify paediatrician immediately and give:
 - *Oxygen*
 - *Give nebulised salbutamol (dose as recommended), on a regular basis (use oxygen to drive the nebuliser at a rate of 6-9 litres per minute)*
 - *If no response after 3 doses, give IV aminophylline 5-6mg/kg, up to 300mg over 20 minutes. Follow-up dose is 5mg/kg every 6 hours as an infusion. Do not give this if child had received any form of aminophylline in previous 24 hours. Stop infusion if pulse rate >180/minute, or child is vomiting and has headache and convulsion.*
- If no response to above, do Chest X-ray to exclude pneumothorax
- Follow-up treatment will usually include oral or inhaled steroids depending on severity of case

15.5 RHEUMATIC FEVER

15.5.1 Description and Treatment

This is an inflammatory disease that occurs in children and young adults (first attack usually occurs between 5 and 15 years of age), as a result of infection with group A β -haemolytic *Streptococci*. It affects the heart, skin, joints and central nervous system. Pharyngeal infection with group A *Streptococci* (occasionally skin infections), may be followed by the clinical syndrome of rheumatic fever.

Diagnosis is made using Jone's criteria:

Major criteria

- Carditis
- Polyarthrititis
- Chorea
- Erythema marginatum
- Subcutaneous nodules

Minor criteria

- Fever
- Arthralgia
- Previous rheumatic fever
- Raised ESR or C-reactive protein
- Leucocytosis
- Prolonged PR interval on ECG

Plus evidence of past *streptococcal* infections, such as positive group A *Streptococci* throat swab or raised anti-streptolysin O titre, or history of scarlet fever.

A positive is at least the presence of either: two major criteria, or one major criterion and two minor criteria.

Rheumatic valvular disease usually affects the mitral and aortic valves, causing any combination of the following: mitral stenosis (commonest), mitral regurgitation, aortic stenosis or aortic regurgitation.

Treatment of acute rheumatic fever

- **Admit** to hospital; do HB, WBC, ESR, antistreptolysin titre, ECG, chest X-rays
- Register in rheumatic fever register / notify case
- Rest in bed give supportive therapy (e.g. treat heart failure and give oxygen if needed)
- Eradicate any residual *streptococcal* group A infection with a single shot of *IMI benzathine penicillin* or oral *phenoxymethyl penicillin* for one week
- Give aspirin
- In active carditis give *prednisolone*, 60-120mg in four divided doses until clinical syndrome has improved and ESR has fallen to normal.
- Prevent recurrence by giving *monthly benzathine penicillin* or oral *daily phenoxymethyl penicillin*.

Prevention of recurrence of rheumatic fever

- No cardiac involvement – *benzathine penicillin 1.2 megaunits, IMI every 28 days up to the age of 21*

- With cardiac involvement – as above but recommended up to the age of 40 years

Compliance with oral prophylaxis is poor in most communities (where it has been researched); however it is included in many guidelines. Where compliance to oral medication is good, one can *give phenoxymethyl penicillin orally 250-500mg bd.*

15.6 DIARRHOEA

See Section 1.3.9.

15.7 COMMON SURGICAL PROBLEMS IN CHILDREN

See Sections 21.2, 21.3.

16 PSYCHIATRIC CONDITIONS

In emergency, phone the Mental Health toll-free line **556-5000**

The Nauru Mental Health service is based on home management of patients supervised by nursing staff with extended training in Psychiatry. Around 30 patients are managed in their homes and cared for by the family. These include those with schizophrenia, bipolar disease, major depression and substance-induced mental disorder. Beds may be used at the RON hospital if needed but there is no designated in-patient ward. Medication is administered by the nurses in the home including long-acting, injected fluphenazine. This service should be contacted about any psychiatric problems arising in other services.

16.1 PSYCHOTIC OR MANIC PATIENT

Adult patients with dangerous behaviour to themselves or to others.

- *IMI chlorpromazine 400-800mg/day, in divided doses. Increasing dose until symptoms controlled, then gradually reducing to a dose of (orally) 100-400mg daily. It is seldom necessary or beneficial to exceed 2000mg (2g) daily. Monitor BP since chlorpromazine usually cause postural hypotension*
OR
- *IMI haloperidol 5-10mg is given and repeated hourly until control of psychotic symptoms is achieved. Maximum dose is 60mg. Can be given in medically ill patients. Then gradually reduce to a maintenance dose of (orally) 5-30mg daily, in divided doses.*

Note: Withhold medication if the patient is feverish. Contact Mental Health Services staff (To rule out Neuroleptic Malignant Syndrome).

If extrapyramidal side-effects (EPS) are manifested, especially dystonia, then give *IMI benztropine 2mg once every 40 minutes within 2 hours (i.e. 3 doses only)*. If the patient fails to respond then report immediately to the mental health service staff.

16.2 ANTIDEPRESSANTS

16.2.1 Depression with Suicidal Behaviour

- Admit the patient
- Use fluoxetine as first-line treatment
- The older tricyclic antidepressants are rarely used as first-line but may be used if fluoxetine fails.

Contraindication for Amitriptyline

- Patient with prostatic hypertrophy, as acute retention may be induced
- Patient with cardiac disease because of the Amitriptyline tendency to either produce or aggravate arrhythmias that may lead to sudden death.
- Other side-effects of Amitriptyline – Postural Hypotension: Common in the first few weeks of treatment and blood pressure usually returns to normal in a month. The patient should be advised to get slowly out of bed or up from chairs and avoid standing in one position for too long.
- Paralytic ileus: This is rare but serious. The drug should be stopped. Refer the patient to general hospital.

16.3 ANTI-ANXIETY

16.3.1 For Anxious Patients

Patients present with an acute attack: *Diazepam tabs 2-10mg qid* then refer the patient to the mental health service staff.

17 RENAL & URINARY TRACT CONDITIONS

17.1 GLOMERULONEPHRITIS

- This refers to a group of renal disorders in which there is immunologically mediated injury to the glomeruli
- The pathogenesis usually involves either deposition of *in situ* immune complexes (most cases), or deposition of anti-basement membrane antibody (<5% cases). Both mechanisms activate secondary inflammatory reactions which lead to the glomerular damage causing the signs such as haematuria and proteinuria.
- All suspected cases of glomerulonephritis must be referred for hospital management.

17.2 NEPHROTIC SYNDROME

- A syndrome characterised by heavy proteinuria, hypoalbuminaemia and generalised oedema. Hypercholesterolaemia is also a common feature.
- Any of the glomerulonephritides can cause nephrotic syndrome, however, in children it is commonly caused by the minimal change one. This usually responds to management with high dose corticosteroid.

All cases should be referred to the paediatrician or physician for hospital management.

17.3 URINARY TRACT INFECTION

Please see Section 12.18.

17.4 CALCULI

- Stone in the urinary system is a common problem which affects about 1-2% of a population at any given time
- It affects male > females (2:1)
- About 50% of patients with stones will form others within a ten year period

- Most stones are made up of calcium oxalate and this is the type commonly seen in males. However, the mixed infective ones are more common in females. (ratio of 2:1 compared to males)
- It is important to recognise the risk factors for stone formation, such as: dehydration, hypercalcaemia / hypercalciuria, hyperoxalouria, hyperuricaemia / hyperuricosuria, infection, cystinuria, renal tubular acidosis, primary renal disease
- Stone in the renal pelvis causes pain on movement
- Stone in the ureter is severe and colicky, starts at the flank and radiates to the groin (genital area)
- Stone in the bladder is usually associated with UTI and it presents with frequency and dysuria
- When it obstructs the urethra, it causes painful distension of the bladder
- All stones can cause haematuria
- Diagnosis is confirmed by plain abdominal X-Ray and Intravenous pyelogram (IVP), or ultra-sound if available
- Management includes adequate analgesia, such as *morphine 15mg-30mg IMI; repeated as necessary*. Stones less than 0.5cm in diameter usually pass through but those >1cm usually need intervention.
- Refer to the surgical team

17.4.1 Prophylaxis

Where no metabolic abnormality is present (such as hyperuricaemia), patients are advised to take a lot of oral fluid, aimed at producing at least 2-3 litres of urine a day. To achieve this goal, one must drink at least 5 litres of fluid (water) a day. It is wise to reduce the intake of food fortified with calcium and vitamin D. For cases with uric stones, *give oral allopurinol (300mg daily) if renal function is normal*.

17.5 URINARY TRACT OBSTRUCTION

- Common causes include: calculus, blood clot, sloughed papillae, tumour, prostatic obstruction, accidental ligation of ureter during surgery.
- Symptoms include loin pain radiating to the groin which may be aggravated by increased fluid intake.

- All cases of urinary tract obstruction should be urgently referred to the surgical team for management.

17.6 BENIGN PROSTATE ENLARGEMENT

17.6.1 Description

- A very common condition which affects males over 60 years of age.
- Enlargement of the prostate causes obstruction to the outflow of urine.
- Symptoms include frequency of urination, difficulty in initiating urination, post-void dripping and reduced forcefulness of the urinary stream.
- Acute retention causes suprapubic and flank pain from distended bladder and ureters. Eventually, overflow incontinence may occur.
- Rectal examination - a smooth, enlarged prostate gland.

17.6.2 Non-Drug Treatment

- Insert an indwelling bladder catheter to relieve obstruction

17.6.3 Drug Treatment

- *α -1 receptor blockers are effective in improving urinary flow. Give terazosin orally daily in an initial dose of 1 mg rising to a maximum of 10mg according to symptoms.*
- All α -1 receptor blocking drugs may produce orthostatic hypotension. Increase doses gradually and measure lying and standing blood pressure at each visit.
- *Antibiotics if there is associated urinary tract infection or suspected prostatitis.*

Refer all cases to surgical team

17.7 PROSTATE CANCER

- Prostate cancer is one of the most common cancers in older men

- Approximately 80% of men at age 80 years old have a focus of prostate cancer in their prostates. However, most appear to lie dormant.
- Symptoms may be similar to a benign enlargement of prostate. However, on rectal examination, one feels a hard, irregular prostate.
- Some cases may present with bone pain due to metastatic disease

17.7.1 Management

All suspected cases must be referred to the surgical department for further investigations and treatment.

17.8 RENAL FAILURE

Renal failure is impairment in the kidney's excretory function due to reduced GFR. This is accompanied to a variable extent by failure of other kidney functions such as erythropoietin production, vitamin D hydroxylation, disruption of acid-base and electrolyte balance.

It is classified as either acute (days to weeks) or chronic renal failure (months to years).

17.8.1 Acute renal failure

- Causes of acute renal failure are conveniently classified into pre-renal, renal and post-renal. However, there may be a combination of these broad classifications in any individual patient.
- Pre-renal causes include: hypovolaemia, hypotension or reduced cardiac output
- Renal causes include: acute tubular necrosis which can either be the consequence of the pre-renal causes or the following: endotoxic shock, renal vasoconstriction, sepsis, NSAIDs
- Post-renal causes include all those factors that can cause urinary tract obstruction (see Section 17.5)

17.8.2 Chronic Renal Failure

- In Nauru, the commonest cause of chronic renal failure is diabetes mellitus.
- Other causes include glomerulonephritis, pyelonephritis, renal vascular disease, polycystic disease, multisystem disease such as SLE. A significant percentage (15%) of chronic renal failure has no identified cause.
- All cases of suspected or confirmed acute and chronic renal failures, should be initially referred to the medical team for management and further advice, regarding clinic follow-up
- Haemo-dialysis if required can be performed in Nauru.

Prevention of chronic renal failure

- Detect and treat ascending urinary tract infection in children
- Tight metabolic control of diabetes with regular monitoring of renal function and microalbuminuria (see Section 7)
- Early detection and treatment of causes of urinary tract obstruction
- Avoid unnecessary nephrotoxic drugs
- Care with the use of NSAIDs and ACE Inhibitors in people with renal impairment
- Prevent, detect and treat essential hypertension adequately
- Manage pre-renal causes aggressively

17.9 DRUGS AND THE KIDNEY

17.9.1 Pre-Renal Effects

This is when drugs cause impairment in kidney perfusion through:

- hypovolaemia (as caused by potent loop diuretics such as frusemide)
- decreased cardiac output (as seen with β -blockers)
- decreased renal blood flow (as seen with ACE Inhibitors)
- renal salt and water loss (as seen in hypercalcaemia induced by vitamin D therapy)

17.9.2 Renal Effects

- Drugs can affect the kidney by causing either acute tubular necrosis, acute tubulo-interstitial nephritis or chronic tubulo-interstitial nephritis
- Drugs that cause acute tubular necrosis include aminoglycosides and amphotericin B
- In acute tubulo-interstitial nephritis, patients frequently present with fever, arthralgia, skin rash and oliguria. The disease is caused by a cell mediated hypersensitivity reaction to drugs such as: penicillins, sulphonamides, NSAIDs. Treatment include withdrawal of the offending drug and *high dose corticosteroid (such as oral prednisolone 60mg daily)*.
- All cases should be referred to the medical team for treatment including short- or longer-term dialysis if required

17.10 RENAL DISEASE IN THE ELDERLY

- Renal failure in the elderly is usually caused by renal vascular disease or urinary tract obstruction. It may be aggravated by the progressive glomerular sclerosis seen in this age group.
- UTI is common in old age especially if bladder emptying is impaired. In males, this impairment is commonly caused by obstruction due to enlargement of the prostate, but in females, it may be due to a neuropathic bladder. UTI should be treated in all cases.
- Another common problem seen in the elderly is urinary incontinence. Once any associated UTI has been treated, a case with established incontinence is not easy to manage. Usually, the only management that can be provided is to ensure that the patient has adequate facilities to allow good nursing care (e.g. toilet, commode, incontinence pads). If necessary, the patient may need to be catheterised.

18 RESPIRATORY CONDITIONS

18.1 RESPIRATORY FAILURE

18.1.1 Definition

Respiratory failure is defined as either a $\text{PaO}_2 < 60\text{mmHg}$ or $\text{PaCO}_2 > 50\text{mmHg}$, occurring in a patient breathing air, at rest. Respiratory failure is **not a disease** but reflects the inability of the lungs to maintain normal gas exchange.

18.1.2 Classification

- Type I Respiratory Failure (gas exchange/hypoxaemic) – causes include pulmonary oedema, infections, inflammatory lung disease and pulmonary embolism.
- Type II Respiratory Failure (ventilatory/hypercapnic) – causes include COPD, asthma, massive obesity, kyphoscoliosis, CNS depression due to drugs, neuromuscular disease and pneumothorax.

Both types of respiratory failure may be **acute** or **chronic**.

18.1.3 Patient Assessment

The **underlying cause** for the respiratory failure must be determined to enable appropriate treatment in each case.

18.1.4 Management

Consider each of the following:

Airway Protection

- An oropharyngeal airway should be used pending recovery or intubation

Reversal of Precipitating Cause

- Always consider the possible contribution of infection, cardiac failure and bronchospasm. These may not be the primary cause of the respiratory failure but are readily treatable.
- Drug induced – opiates may be reversed with *naloxone 0.2-0.4mg IV*. As *naloxone* has a short half life respiration should be

monitored frequently and naloxone repeated as necessary. May need to be hourly.

- Benzodiazepine induced respiratory failure may be reversed by giving *flumazenil* (dose 0.3-2mg IV). *Precautions as for naloxone.*

Clearance of endobronchial secretions

- This may improve ventilation and help prevent atelectasis and infection. Patients may require regular chest physiotherapy

Oxygen Therapy

- See Section 18.4

Mechanical Ventilation

- Indicated on the basis of the overall clinical condition rather than blood gases alone. Evidence of deterioration or lack of clinical improvement is strong indication for intervention.

Indications for mechanical ventilation if it is available:

- Severe hypoxia (<50mmHg) despite high (>50%) inspired oxygen concentration
- Significant hypoxia (<60mmHg) and or hypercapnia (>45mmHg) along with:
 - *Diminished/ing level of consciousness*
 - *Diminished/ing chest expansion*
 - *Evidence of respiratory muscle fatigue*
 - *Sputum retention*
 - *Thoracic cage trauma / lung contusion*

18.2 OBSTRUCTIVE SLEEP APNOEA (OSA)

Classically presents with day time hypersomnolence, and nocturnal snoring and/or apnoea(s). It is a common and frequently missed diagnosis. Consider OSA in patients who have:

- Unexplained respiratory or right sided heart failure
- Motor vehicle or industrial accidents related to sleepiness
- Hypertension
- Impotence
- Morning headaches
- Lethargy and depression

- Acromegaly, hypothyroidism, Marfan's syndrome, retrognathia

If OSA is suspected, refer to Physician for full evaluation.

18.3 CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

18.3.1 Definition

COPD is not a disease process but a clinical syndrome and consists of various mixtures of:

- Chronic bronchitis
- Emphysema
- Small airway disease
- Bronchial hypersensitivity / asthma

18.3.2 Aetiology

- Smoking
- Asthma
- Bronchiectasis
- Occupational exposures (cadmium, silica dusts)
- Cystic fibrosis
- α -1 antitrypsin deficiency

18.3.3 Causes of Acute Deterioration

- Bronchitis (viral or bacterial)
- Increased bronchial irritability
- Pneumonia
- Pneumothorax
- Pulmonary embolism
- Left ventricular failure
- Sepsis
- Drugs (e.g. β -blockers, NSAIDs)
- Acute abdomen
- Chest pain (e.g. trauma, osteoporosis)
- Post-operative sedation / retention of secretions

18.3.4 Investigations

- Peak expiratory flow rate (PEFR). Meters are available through Pharmacy.
- Arterial blood gases (not oximetry alone). Will shortly be available through the hospital laboratory (September 2013).
- Sputum culture
- CXR
- ECG

Table 18.1 Severity assessment in COPD

| Emergency: respiratory arrest, unconscious patient, upper airway compromise | | | |
|--|-------------------|-----------------|--------------------------|
| Other categories | Mild | Moderate | Severe |
| Speech | Sentences | Phrases | Words |
| Respiratory rate (per min) | Normal | 18-25 | >25 or <12 |
| Pulse rate (per min) | <100 | 100-120 | >120 |
| PaO ₂ (related to steady state level) | Normal | <60 (on air) | <60 (on O ₂) |
| PaCO ₂ * (related to steady state level) | Normal or reduced | >45 (on air) | >50 |
| pH | Normal | Close to normal | Falling (<7.3) |

*If the HCO₃ level is raised and pH normal this suggests chronic CO₂ retention

18.3.5 Management

Emergency Action

- Prepare for emergency intubation and assisted ventilation

Severe exacerbation

- Commence controlled oxygen therapy, aiming to maintain a PaO₂ >60mmHg or SpO₂ (haemoglobin oxygen saturation) >90% (see Section 18.4 on Oxygen Therapy).
- Monitor for rising PaCO₂ (see Section 18.4 on Oxygen Therapy). If pH <7.3 or failure to respond to initial therapy, notify Physician on call.

- *Nebulised salbutamol + ipratropium 0.5mg stat and 2-6 hours according to clinical response. Use compressed air if PaCO₂ elevated.*
- Insert IV line for *salbutamol infusion* (refer to Section 18.5 on Asthma). Consider *hydrocortisone 200mg IV every six hours*.
- Consider use of CPAP if intubation inappropriate
- Consider *IV antibiotics* if the patient has two out of three of the following:
 - Purulent sputum
 - Increased sputum production
 - Increasing dyspnoea
- The choice of antibiotics is essentially the same as recommended for Community Acquired Pneumonia (Refer to Section 18.6)
- Consider chest physiotherapy if concerns about sputum retention
- Theophylline cannot reliably be used long-term without monitoring its plasma concentration – not available in Nauru

18.3.6 Mild or Moderate Exacerbation

- *Oxygen* (see Section 18.4 on Oxygen Therapy)
- *Nebulised salbutamol 5mg + ipratropium 0.5mg. Repeat 4-6 hourly according to clinical response. Use compressed air if PaCO₂ elevated.*
- *Oral prednisolone 40mg stat; then 40mg daily until clinical response adequate; then 20mg daily for an equal number of days; then stop or reduce to usual maintenance dose*
- *Oral antibiotic may be appropriate*
- Consider chest physiotherapy

18.3.7 Monitor Progress

Oxygen therapy

- Monitor SpO₂ and aim to maintain SpO₂ >90%
- Monitor for hypercapnia (symptoms of drowsiness and/or confusion)
- Perform ABG if evidence of falling SpO₂ or clinical deterioration

Clinical monitoring

- Check for fatigue – beware respiratory paradox

- Pulse rate
- Sputum volume and appearance
- PEFR / spirometry

Adjustment of treatment

- Individual patient needs may change during the course of treatment including the frequency and dose of nebulised bronchodilator, intravenous therapy, fluid and electrolyte requirements and bronchial secretions (chest physiotherapy for retained bronchial secretions). Commence oral therapy as soon as condition stabilises. Bronchodilators should be given as Metered Dose Inhaler (MDI) and spacer.

Discharge Planning/Rehabilitation

- Most patients will be ready for discharge when their functional status has returned to near their pre exacerbation state. It is helpful to obtain PEFR / spirometry and ABG at discharge.
- A COPD Action Plan should be considered for all patients

Outpatient Management

Preventive measures:

- COPD education and Action Plan
- Smoking cessation
- Nutritional advice and supplements
- Influenza vaccine each 'autumn' season
- Pneumococcal vaccine (revaccinate every 5 years)
- Medical surveillance: through OPD

Regular Follow Up

- Specialist review, as required, with spirometry / PEFR. Recommended for those with severe disease ($FEV_1 < 30\%$ predicted or $PaO_2 < 55\text{mmHg}$).

18.4 OXYGEN THERAPY

AIM – to prevent important tissue hypoxia and thereby reduce morbidity and mortality. However, note there is virtually no evidence-based data on the therapeutic use of oxygen in most acute clinical situations.

18.4.1 Indications

- PaO₂ less than 60mmHg or SpO₂ <90%
- Conditions such as myocardial infarction, carbon monoxide (CO) poisoning, acute/severe anaemia where marginal increases in arterial oxygen content may be beneficial
- At risk of hypoxia such as post-op, LVF

18.4.2 Pulse Oximetry

- This is very useful for determining haemoglobin oxygen saturation (SpO₂) i.e. oxygenation. However, it does not assess haemoglobin level, ventilation (CO₂) problems, cardiac output or tissue perfusion. It is useful for monitoring but is not a substitute for arterial blood gases. Remember that changes in PaO₂ above 100mmHg will not change the haemoglobin oxygen saturation. Oxygen therapy is indicated primarily to relieve hypoxia not dyspnoea.

18.4.3 Administration of Oxygen

- Oxygen is a drug and must be prescribed on the drug administration chart indicating flow rate and device.
- Do not withhold oxygen in severely hypoxaemic patients merely to get a “baseline blood gas estimation”
- Do monitor oxygen administration carefully according to the clinical circumstances

Nasal cannulae

- 0.5-4L/min provide an inspired oxygen concentration of 24% to 40% depending on the flow
- Remember that this is uncontrolled oxygen therapy and it is not possible to accurately predict the inspired oxygen concentration (FiO₂)
- Most patients can be treated with oxygen using nasal cannulae. This mode is most comfortable for the patient and in the absence of profound gas exchange problems, will provide more than adequate oxygen saturation levels

- It allows oral intake, communication and the easy use of nebulisers. It does not cause the sense of suffocation some patients have with a face mask
- For a flow rate of 0.5L/min you will need a low flow oxygen meter

Variable concentration mask

- Use initially in COPD patients during the acute phase
- Use 24% initially when there is a possibility of CO₂ retention

Standard mask

- This is also uncontrolled oxygen therapy. 6-10L/min provides about 50% oxygen therapy depending on the patient's ventilation levels
- The initial method of choice in acutely hypoxic patients i.e. acute asthma, pneumonia, LVF and pulmonary embolism
- Do not use these at flow rates less than 6L/min as CO₂ retention can occur through rebreathing. A reservoir bag can further increase the percentage oxygen

High flow humidified

- Used for long term therapy where drying of the bronchial secretions needs to be avoided. It is only indicated in special circumstances but can provide more accurate inspired oxygen concentrations than other methods.

18.4.4 Adjusting the Dose

- Do the ABGs show evidence of chronic CO₂ retention? i.e. a compensated respiratory acidosis (elevated HCO₃ level), together with chronic hypoxaemia. If so, take care to avoid CO₂ retention.
- Using a pulse oximeter as a monitor, adjust flow rates:
 - For nasal cannulae in 0.5-1L/min steps
 - For variable concentration masks in percentage increments
 - For standard masks in 2L/min. steps
- Get the haemoglobin oxygen saturation (SpO₂) to about 90%, wait about five minutes at each step for those with COPD
- Once stable, if there is any risk of CO₂ retention, check the blood gases about 30 minutes later

- The predicted oxygen percentages supplied by masks and nasal cannulae are not precise

18.4.5 Monitoring

- **Pulse monitoring provides an estimate of capillary haemoglobin oxygen saturation. It does not assess the adequacy of ventilation nor the gas exchange status.**
- Arterial blood gas analysis must be performed on admission and in many cases at regular intervals to assess response to treatment
- Hyperoxia can induce hypercapnia by a combination of worsening ventilation perfusion mismatch and to a lesser extent depression of respiratory drive. It is unpredictable and emphasises the importance of arterial blood gas monitoring. If the patient is at risk, monitor blood gases every 30 minutes until stable. Sometimes, following the initiation of oxygen therapy, the PaCO₂ may rise by 10-15% then stabilise. This may be the cost of adequate oxygenation and is acceptable as long as there are no adverse clinical events.

18.5 ASTHMA

See also Section 1.3.3 for abbreviated emergency management.

Asthma is a clinical syndrome characterised by variable airflow obstruction secondary to inflammation of the airways. An acute asthmatic episode is usually the response to a trigger agent which may be either specific (e.g. pollen, animal dander, viral infection) or non-specific. Typical symptoms include dyspnoea, wheeze, chest tightness and cough. They vary from being almost undetectable, to severe, unremitting and sometimes life threatening.

The assessment of the severity of an acute attack of asthma and the immediate treatment occur in parallel.

The severity of asthmatic episodes is frequently underestimated. All patients should have the following measured:

- PEFR / spirometry
- Respiratory rate
- Pulse, blood pressure, temperature

- Pulse oximetry/arterial blood gases

18.5.1 Guidelines for Assessing the Severity of Acute Asthma

Individual features should not be interpreted in isolation. An overall assessment of the severity should be made using clinical judgement and the following guidelines (**Table 18.2**).

Table 18.2 Severity assessment in acute asthma

| Measure | Severity | | |
|--|--------------------|----------|--|
| | Mild | Moderate | Severe |
| Speech | Sentences | Phrases | Words |
| PEFR (% of predicted or previous best) | >60% | 40-60% | < 40% or < 150 L/min if best peak flow unknown |
| FEV ₁ (% predicted) | >60% | 40-60% | <40% or absolute value less than 1.0L |
| Respiratory rate | Normal | 18-25 | >25, <10 |
| Pulse rate | <100 | 100-120 | >120 |
| Oximetry | >94% | 90-94% | <90% |
| PaO ₂ | Test not necessary | <80mmHg | <60mmHg |
| PaCO ₂ | Test not necessary | <40mmHg | ≥40mmHg |

DANGER SIGNS:

Exhaustion, confusion, bradycardia, unconsciousness, silent chest on auscultation, signs of respiratory muscle fatigue (indrawing of lower costal margin, abdominal paradox)

18.5.2 Immediate Management

See also Section 1.3.3.

Specific treatment is dependent on severity. All patients should be treated with *nebulised (using O₂ 6-8L/min) bronchodilator in the first instance*. Other therapy is added depending on the response and reassessment of severity.

Table 18.3 Management of asthma

| Severity | Management | | Monitoring |
|----------|--|--|---|
| Mild | <i>Nebulised salbutamol 5mg every 4 hours + prn*</i> <i>Prednisolone 40mg orally stat then daily</i> | | PEFR after initial treatment qid Pulse, respiratory rate qid |
| Moderate | <i>Nebulised salbutamol 5mg every 4 hours + prn*</i> <i>Prednisolone 40mg orally stat then daily</i> | | PEFR 2 to 4-hourly. Pulse oximetry** |
| | Add | Oxygen to maintain O ₂ sat >95% (usually 2L/min by nasal cannulae) | Pulse, respiratory rate, BP qid |
| | Contact | Physician if not improving | Monitor for hypokalaemia which may be exacerbated by β-agonist therapy |
| | Perform | CXR if condition deteriorates or evidence of a complication† | |
| Severe | Increase | <i>Nebulised salbutamol 5mg up to 2-hourly. Ipratropium 0.5mg every 4 hours. Oxygen 8L/min by Hudson mask. Adjust to maintain O₂ sat. >95%</i> | ICU or Intensive Room (Medical Ward) Oximetry/arterial blood gases |
| | Add | Intravenous access. IV hydrocortisone 200mg stat then every 6 hours (for 24 hours). Fluids N/S 1L 6-hourly initially. | Continuous ECG Pulse, respiratory rate, BP 2-hourly |

| | | | |
|----------------------|----------|---|--|
| Danger Signs Present | Contact | Physician | Special nurse |
| | Perform | CXR in all cases [†] | Serum potassium 12-hourly |
| | Increase | Oxygen to high flow system | Resuscitation or Intensive Care Unit Nurse and doctor to stay with patient at all times |
| | Contact | ICU Team + Physician | |
| | Add | Consider:- <i>IV salbutamol 250mcg loading dose then salbutamol infusion (5mg/100mL) at 10-30mL/hr. See^{††}</i> | |
| | | | |

Notes:

* It is essential that all nebulised bronchodilators are given with oxygen 6-8L/min.

**Pulse oximetry is very useful in assessing the adequacy of tissue oxygenation in patients with asthma. It does not reflect the adequacy of ventilation. An initial arterial blood gases measurement should be made in all patients admitted to hospital unless severity assessed as mild.

[†] Patients with life threatening asthma, or severe asthma not responding to initial treatment, and patients in whom there is any suspicion of a complication require a CXR. Complications which might be identified include pneumothorax, surgical empyema, atelectasis and consolidation. All CXRs should be done at the bedside unless the patient is accompanied to X-ray by a nurse or doctor.

^{††} Intravenous bronchodilators:

- *Salbutamol: Loading dose 250mcg IV or IMI. Prepare intravenous infusion by adding salbutamol 5mg/mL and make up to 100mL with 5% dextrose. Infuse at 10-30mL/hr.*

Table 18.4 Key Points - Acute severe asthma in adults

| |
|---|
| Life Threatening Features <ul style="list-style-type: none"> • FEV₁ or PEFR <33% predicted (or of usual best) • Silent chest, cyanosis, or feeble respiratory effort • Bradycardia or hypotension • Exhaustion, confusion or coma |
| Management <ul style="list-style-type: none"> • High Flow Oxygen (40-60%) • <i>Salbutamol + ipratropium via oxygen driven nebuliser (initially continuous)</i> • <i>Corticosteroids</i> • <i>Loading dose IV salbutamol 250mcg with subsequent infusion (5mg/mL salbutamol made up to 100mL with dextrose 5%, infuse at 10-30mL/hr)</i> • CXR to exclude pneumothorax • ICU or Medical Team review |
| Important Points <ul style="list-style-type: none"> • Pulse oximetry does not assess adequacy of ventilation – ABG must be measured • Patients with life threatening asthma may not be distressed • A normal CO₂ in an asthma attack is a marker of severe disease |

18.5.3 Subsequent Management

Depends on the severity of the attack and the patient's response to initial treatment.

General Measures

- Observation: Close observation should continue in patients with severe asthma until there is an objective evidence of sustained improvement.
- Positioning: Recommend sitting upright and/or leaning forward.
- Continue treatment
 - Oxygen – according to arterial blood gases / oximetry
 - β_2 -agonist – *if condition improving continue to give 4-hourly*
 - Ensure *stat dose of prednisolone* has been given (see **Table 18.3**)
- Monitoring: Repeat PEFR (or FEV₁) 15-30 minutes after starting treatment then as required depending on severity.

- Arterial blood gases should be repeated within two hours of starting treatment in the following circumstances:
 - The initial $\text{PaO}_2 < 60\text{mmHg}$
 - The initial PaCO_2 high normal or raised
 - The patient's condition deteriorates
 - Measure and record heart rate and respiratory rate, at least qid

18.5.4 Failure to Improve

- WORSENING ASTHMA – check the adequacy of treatment e.g. check drugs given, dosage and adequacy of drug delivery.

Therapeutic options

- Increase the dose/frequency of β_2 -agonist.
- Add *ipratropium bromide 0.5mg every six hours*.
- Consider using an intravenous bronchodilator.

Consider the possibility of a complication or an alternative diagnosis:

- Pneumothorax
- Cardiac arrhythmia
- Left ventricular failure
- Laryngeal or tracheal obstruction
- ARDS
- Pulmonary embolism

All patients who fail to improve or deteriorate despite initial treatment must be monitored closely and discussed with the senior consultant or the Physician on call.

Unhelpful Treatments

- Sedatives are contraindicated
- Antibiotics are not indicated unless there is evidence of bacterial infection (fever, purulent sputum, CXR opacity)
- Percussive physiotherapy

Indications for Intensive Care

Patients with the following features usually require observation and management in ICU:

- Hypoxia: $\text{PaO}_2 < 60\text{mmHg}$ despite receiving high flow oxygen
- Hypercapnia: $\text{PaCO}_2 > 50\text{mmHg}$ or rising
- Increasing fatigue
- Confusion, drowsiness, impaired level of consciousness
- Respiratory arrest

18.5.5 Management During Recovery and Following Discharge

Interval asthma control should be assessed by specific questioning directed at the following features:

- Nocturnal waking and morning chest tightness
- Interference with exercise
- Use of rescue bronchodilator
- Peak flow values
- Days off work or school
- Use of inhaled / oral corticosteroids and salbutamol nebuliser for exacerbations
- Compliance with preventer therapy
 - Frequent requirement for courses of oral steroids
 - Poor self-management skills
 - Poor social circumstances
 - Psychological impairment

Self Management Skills

- Was there an avoidable precipitant?
- How did the patient react to worsening asthma?
- Did the patient follow an Asthma Self-Management Plan? If not, construct one.
- Was there any delay in seeking help?

The key to asthma control is education and **good self-management skills**. Admission to hospital does not necessarily mean a failure of self-management but may provide an important learning opportunity. All patients should have the following while recovering from an acute attack:

- Assessment of education needs – refer if appropriate to nurse or physiotherapist

- Check inhaler technique and instruction on the use and interpretation of readings from a peak flow meter
- Introduction to the Asthma Self-Management Plan and basic self-management skills
- An arrangement for ongoing follow-up and education as an outpatient

18.5.6 Treatment on Discharge

This will obviously vary from case to case but usually the patient will receive:

- *Inhaled corticosteroid – beclomethasone 400-800mcg daily*
- *Prednisolone 40mg daily for 1 week then 20mg daily for 1 week (longer course may be required for chronic severe asthma)*
- *β_2 -agonist inhaler to use as required (NOT regularly)*

Advice regarding common side effects of these medications:

- β_2 -agonists: palpitations, anxiety, cramps
- Inhaled steroids: dysphonia, thrush – use mouth rinsing and a spacer
- Prednisolone (short course): euphoria or dysphoria, hypertension, hyperglycaemia, mild indigestion, insomnia

Table 18.5 Asthma self-management plan

| STEP | PEAK FLOW | SYMPTOMS | ACTION |
|------|-----------------|--|--|
| 1 | 80-100% of best | Intermittent/few | Continue regular inhaled corticosteroid; take bronchodilator for relief of symptoms. |
| 2 | 60-80% of best | Waking at night with asthma or coughing | Double the dose of inhaled corticosteroid |
| 3 | 40-60% of best | Increasing breathlessness or poor response to bronchodilator | Start oral steroids and contact a doctor |
| 4 | <40% of best | Severe attack | Call emergency doctor or ambulance immediately |

18.6 COMMUNITY ACQUIRED PNEUMONIA (CAP)

18.6.1 Assessing the Microbiological Causes

- Gram stain of sputum sometimes provides a guide to initial therapy
- *Streptococcus pneumoniae* causes 50-70% of cases
- Patients with chronic lung disease often develop *Haemophilus influenzae* and *Moraxella catarrhalis* pneumonia
- Consider HIV-related infections (*pneumocystis carinii*) in those patients in recognised risk groups (homosexuals, prostitutes, intravenous drug users and haemophiliacs)
- Mycoplasma often occurs in “epidemics” among young people every 3-4 years

Note

- Abnormal liver function tests and gastrointestinal symptoms may occur with any type of pneumonia
- Patients with Mycoplasma pneumonia have often had symptoms for 2-3 weeks and have failed to respond to β -lactam therapy prior to admission. Myalgias are common.
- Pneumococci are showing increasing penicillin resistance, however, these can still be adequately treated in the respiratory tract with high dose penicillin

18.6.2 Assessing Severity

- This is essential as it directly influences initial management and patients with severe pneumonia can deteriorate rapidly
- Indicators of severe pneumonia at or during admission:
 - Respiratory rate $>30/\text{min}$
 - Diastolic BP $<60\text{mmHg}$
 - Confusion (MSQ <8)
 - Blood urea $>7.0\text{mmol/L}$

The presence of two or more of these criteria indicates an increased risk of death. Such patients must be monitored carefully and receive dual or triple antibiotic therapy.

Additional severity indicators include

- Age >60 years
- Pre-existing medical condition (especially cardiorespiratory and neurological)
- PaO₂ <55mmHg on air or oxygen
- WBC <4 x 10⁹/L or 30 x 10⁹/L
- CXR evidence of multiple or spreading infiltrates

Patients with these features should also be carefully monitored for signs of deterioration.

18.6.3 Investigations

The number of investigations depends on clinical circumstances:

- CXR – PA and lateral
- FBC + diff
- Na⁺, K⁺, urea, creatinine, glucose
- Sputum sample for Gram stain (rapid result)
 - Rinse mouth out with water prior to collection
 - Prior antibiotic usage must be recorded
 - Sputum may be refrigerated (4°C) for up to 24 hours but must reach the lab within 4 hours of warming to room temperature.

Consider whether specific tests are indicated:

- Blood cultures – 2 sets prior to antibiotics (10mL in each bottle)
- Oximetry (or ABGs for severe cases or where there is chronic respiratory or cardiac disease)
- Serology – acute specimen for the following if available:
 - Respiratory viruses
 - Legionella species
 - Mycoplasma pneumoniae (IgM and IgG)
- Throat and nasopharyngeal swabs for viral antigen detection and culture especially if influenza is suspected

18.6.4 Additional Investigations

Pleurocentesis

- Should be performed when a significant (>1cm on lateral decubitus CXR) parapneumonic effusion is present on CXR. Inexperienced staff must be supervised.
- Send for Gram stain, culture, total and differential WBC, total protein, glucose, LDH
- Contact Physician early if empyema or complicated parapneumonic effusion suspected

Bronchoscopy Indications include

- Immunocompromised patient
- Life threatening pneumonia
- Multiple CXR changes
- Deterioration despite appropriate initial treatment
- **Contact Physician on call**

18.6.5 Management

- Assess severity
- Resuscitate
- Choose antibiotics: **Usually empiric**
 - Depends on: clues as to likely pathogen
 - Severity
 - Initial Gram stain
- Antibiotics must be administered without delay in patients with pneumonia
- Initial antibiotic **MUST** cover *Streptococcus pneumoniae*
- Obtain sputum sample for microscopy as soon as possible – involve a physiotherapist if necessary but do not delay giving antibiotics while awaiting sputum sample result

Table 18.6 Antibiotic treatment for community acquired pneumonia

| Targets | First choice | Alternative |
|--|--|---|
| Majority – young, non-smoking, no underlying lung disease | | |
| Must cover <i>streptococcal pneumonia</i> | <i>Benzyl penicillin 1.2g 6-hourly IV</i> | <i>Benzyl penicillin IV</i> |
| Older patient, COPD, Smoker | | |
| Must cover <i>H. influenzae</i> and <i>M. catarrhalis</i> | <i>Benzyl penicillin 1.2g 6-hourly PLUS Gentamicin 5-7mg/kg as a single IV dose. Timing of subsequent dose determined by renal function.</i> | <i>Cefuroxime IV</i> |
| Mycoplasma or Legionella suspected | | |
| | <i>Benzyl penicillin 1.2g 6-hourly IV PLUS Erythromycin 500mg 6-hourly orally</i> | <i>Tetracycline* oral ciprofloxacin</i> |
| Little improvement with initial therapy | | |
| <i>Chlamydia species Legionella species</i> | <i>Benzyl penicillin 1.2g 6-hourly IV PLUS Erythromycin 500mg 6-hourly orally</i> | <i>Tetracycline*</i> |
| Resistant <i>Pneumococci</i> Isolated | | |
| | <i>Benzyl penicillin >9.6g over 24 hours – either continuous infusion or divided doses</i> | Discuss with Physician |

*No IV preparation available

Change to oral therapy once patient afebrile for 48 hours and clinically improving.

18.6.6 Severe Community Acquired Pneumonia

Antibiotic choice is generally empiric and should cover most bacterial causes.

- *Benzyl penicillin 7.2-10.8g over 24 hours in divided doses IV PLUS*
- *Erythromycin 500mg q6h orally PLUS*
- *Gentamicin 7mg/kg as a single IV dose. Timing of subsequent doses dependent on renal function. See Section 18.7.3 for gentamicin dose frequency.*
- *If mild penicillin allergy suspected, give cefuroxime 1.5g IV q8h instead of benzyl penicillin*
- *If staphylococcal pneumonia suspected, ADD cloxacillin 2g q4h IV*
- *If strongly suspect Legionella infection and patient's condition is deteriorating, ADD rifampicin 600mg oral q12h or ciprofloxacin 500mg oral q12h and contact Physician*

18.6.7 Life Threatening Pneumonia

Use ceftriaxone 2g every 12 hours IV, gentamicin as a single IV dose and erythromycin 500mg q6h IV

Initial general management

- Controlled oxygen therapy – prescribed on basis of arterial blood gases/oximetry
- Insert intravenous line
- Fluids:
 - Use N/S
 - Treat septic shock aggressively
 - Monitor response to fluid challenge by measuring pulse rate, BP, peripheral perfusion and urine output
- Antibiotics (see above)
- Recordings:
 - The first 24 to 48 hours is the time for particular vigilance (monitor temp., pulse rate, BP, respiratory rate, urinary output, initially 1 to 4-hourly). Ensure that nursing staff report any change promptly to medical staff.
- Physiotherapy – indications:

- May be useful to assist in obtaining a sputum sample
- May help with sputum clearance, especially in patients with underlying COPD

Subsequent management

- Patients must be reviewed regularly to ensure that they are not deteriorating. Beware of tachycardia, tachypnoea, hypotension and $\text{SpO}_2 < 92\%$
- All cases of severe CAP should be discussed with:
 - Physician
 - Microbiologist
 - ICU Intensivist if available

At discharge

- Appropriate oral antibiotic
- Total duration of 7-10 days in uncomplicated pneumonia
- Longer (14-21 days) course required for complicated disease (e.g. COPD, severe pneumonia or *Legionella*)
- Stop smoking – refer for smoking cessation programme
- Check spirometry in all smokers and alert GP or refer Physician if significantly impaired
- Instruct patient to contact their GP if they develop fever, chest pain or increasing dyspnoea
- Follow up appointment with GP or hospital team at 6 weeks to include:
 - CXR – **this could be arranged by the hospital team prior to discharge**
 - Convalescent serology if considered relevant

Note

- CXR may take up to 3 months to clear especially in older patients and those with COPD
- Physiotherapy may be needed if sputum retention likely

Common complications

- Parapneumonic effusion – seen in up to 40% of cases. Should always be aspirated to exclude empyema and complicated parapneumonic effusions.

- Large simple parapneumonic effusions ($> \frac{1}{3}$ of hemi thorax), all complicated parapneumonic effusions and all empyema should be immediately referred to the Physician.

Other considerations

- Any pneumonia that doesn't resolve at usual rate – consider endobronchial obstruction, tuberculosis, or other causal organisms
- Recurrent pneumonia in same patient – consider endobronchial obstruction, bronchiectasis, foreign body
- Recurrent chest infections – consider immune status:
 - IgG/IgA deficiency
 - Acquired Immunodeficiency Syndrome
 - HIV
 - Cystic fibrosis

18.7 HOSPITAL ACQUIRED PNEUMONIA (HAP)

- The incidence of HAP is around 0.7% of all patients
- In most post-operative patients presentation is usually with fever, deteriorating gas exchange and CXR infiltration
- Medical patients may become more unwell very quickly – the diagnosis should be suspected in any medical patient developing a fever

18.7.1 Investigations

- Sputum sample – involve a physiotherapist if necessary
- Blood cultures – 2 sets, 10mL in each bottle
- WBC + diff.
- CXR

18.7.2 Management

- Physiotherapy – especially if patient has underlying lung disease
- Oxygen if indicated
- Bronchodilators if history of airflow obstruction
- Antibiotics

Mild/moderate

- *Ampicillin 1g q6h IV*
ADD
- *Erythromycin 500mg q6h if patient immunocompromised (alcoholics, diabetics, steroids, cytotoxics) or failing to respond to initial therapy*

Severe

Criteria include tachypnoea >30/min, urea >7.0mmol/L, hypotension, PaO₂ <55mmHg on oxygen, anyone in ICU

- *Ceftriaxone 2g IV q12h*
PLUS
- *Gentamicin* (see dose frequency in Section 18.7.3)
PLUS
- *Erythromycin 1g q6h IV*
- Infections +/- anaerobic organisms are common. Antibiotic therapy must be guided by culture results. There is no recognised standard regimen and pulmonary isolates that are antibiotic resistant are common
- Steroids are not helpful

18.7.3 Dose Frequency of Gentamicin

Gentamicin is a valuable antibiotic where Gm negative infection is suspected. It has serious adverse effects on the vestibular apparatus and on the kidney if the plasma concentration rises too high or does not fall adequately between doses. While an initial dose can be calculated as a dose/kg body-weight, the frequency of subsequent doses depends on renal function.

An estimate of creatinine clearance (Ccr) can be made from the Cockcroft –Gault formula where:

Ccr = (140-age in years) x body mass(kg) x a constant (1.23 men, 1.04 women) – all divided by the serum creatinine in micromole/L

In a 70kg 60yr old male with a serum creatinine of 100 micromole/L the calculation is:

$$(140-60) \times 70 \times 1.23 = 6888 \text{ divided by } 100 = 68.9 \text{ mL/min.}$$

In general, gentamicin should be given as a single daily dose.

Table 18.7 Dose frequency for IV gentamicin according to Ccr

| Estimated Ccr (mL/min) | Dose frequency |
|------------------------|--|
| >60 | 24 hourly |
| 40-60 | 36 hourly |
| 30-40 | 48 hourly |
| <30 | Consult with renal dialysis unit staff |

18.8 PLEURAL EFFUSION

18.8.1 Classification

The differentiation between exudates and transudates is the essential first step in the diagnostic evaluation

18.8.2 Investigations

- Diagnostic pleurocentesis may be undertaken by medical staff with appropriate experience. A lateral decubitus CXR will allow identification of free fluid. Pleurocentesis may be performed safely if 10mm width free fluid is identified on a lateral decubitus CXR or if loculated fluid is identified and can be reached with ultrasound guidance. Use a 20mL syringe with a 22G needle under sterile conditions.
- Measure plasma total protein, glucose and LDH levels for comparison with pleural fluid

18.8.3 Tests to be Performed on Pleural Fluid

- Glucose
- LDH
- Total protein
- Total and differential WBC
- Gram stain and culture
- Cytology

18.8.4 Exudate / Transudate

99% of exudates meet one or more of the following criteria:

- Pleural fluid total protein $>30\text{g/L}$
- Pleural fluid total protein / serum total protein ratio >0.5
- Pleural fluid LDH / serum LDH >0.6

If transudate – further tests are usually not needed. Seek cause, e.g. heart failure, cirrhosis, nephrotic syndrome, acute glomerulonephritis, peritoneal dialysis, myxoedema (but 5% malignant effusions are transudates).

If exudate – assess the differential white cell count (total WBC is of limited diagnostic value)

- If lymphocytes predominate consider malignancy, tuberculosis, connective tissue disease
- If neutrophils predominate consider parapneumonic effusion, empyema, pulmonary embolus, pancreatitis, subphrenic abscess, early tuberculosis

Criteria for parapneumonic effusion and empyema:

- Simple parapneumonic effusion: glucose >2.5 , LDH <1000
- Complicated parapneumonic effusion: glucose <2.5 , LDH >1000 .

18.9 PNEUMOTHORAX

18.9.1 Causes

- Traumatic – usually after chest trauma with rib fracture
- Spontaneous
- Chronic obstructive pulmonary disease
- Acute severe asthma – often with pneumomediastinum
- Iatrogenic – usually after cannulation of the neck/subclavian veins, lung biopsy (FNA or transbronchial) and occasionally after an anaesthetic

18.9.2 Clinical Signs

Symptoms vary from mild dyspnoea with or without pleuritic chest pain to tension pneumothorax with cardiovascular compromise.

Signs include:

- Reduced chest wall movement on the affected side
- Diminished breath sounds on the affected side
- Surgical emphysema in the neck or over chest wall
- Deviation of the trachea – may be deviated towards the affected side or in tension pneumothorax towards the opposite side

18.9.3 Investigations

- CXR – at the bedside if the patient unwell

Note: The CXR tends to underestimate the size of the pneumothorax.

- Arterial blood gases.

18.9.4 Treatment

- Discuss case with Physician
- Treatment is not always required. A small pneumothorax in the absence of underlying lung disease may resolve on its own over 3-10 days.
- Simple aspiration is recommended for a larger spontaneous pneumothorax without underlying lung disease.

Intercostal tube drainage is recommended in the following circumstances:

- Tension pneumothorax (if life threatening use a 14G IV cannula in the 2nd intercostal space anteriorly and place an intercostal tube thereafter)
- Respiratory compromise
- Traumatic pneumothorax or haemopneumothorax
- Failed simple aspiration
- **Tube placement** – usually in anterior axillary line, through 5th or 6th intercostal space, directed upwards and posteriorly

- Inpatient cases with pneumothorax should be managed by either the Physician on the Medical Ward or by the Surgical team if traumatic

Follow Up

All patients must have a follow up CXR at 10-14 days to ensure that the pneumothorax has resolved. Recurrent pneumothorax may be an indication for pleurodesis – referral to the Physician or Surgeon is recommended. Advice should be given about air travel (not advised within 6 weeks) and scuba diving (contraindicated).

18.9.5 Intercostal Tubes

The insertion and management of intercostal tubes is a complex and specialised area. Patients requiring chest tube management should normally be cared for by physician with respiratory training or by surgical teams.

Contraindications

- Bronchial obstruction on the affected side
- Thickening of the visceral pleura
- Loculated pleural effusion. CT scan advised in this setting
- Coagulopathy
- Chest wall infection

Emergencies

Acute deterioration in the patient's condition:

- Check all tube connections and underwater seal system
- Administer oxygen
- Bedside CXR
- Notify the Physician on call

Development of subcutaneous emphysema:

- This is most likely to occur in the setting of COPD with an air leak and is precipitated by temporary blockage of the tube
- Check all tubes for kinks/blockages
- Administer oxygen
- Urgent bedside CXR
- Notify the Physician on call.

19 SKIN CONDITIONS

19.1 SKIN INFECTIONS - BACTERIAL

19.1.1 Acne

Acne (pimples) commonly causes facial complexion problems that occur in young people and some adults. It may also involve the neck, chest, back and upper arms. The bacteria *Propionibacterium acnes* sometimes multiply and cause inflammation and acne.

Suggested therapy for different presentations of acne

Mild mainly comedonal or papulopustular acne:

- *Apply benzoyl peroxide at night. Apply every second night for the first 2 weeks to reduce irritation.*
- *Benzoyl peroxide 2.5% to 5% cream or gel*
- Use a gel in individuals with oily skin, and a cream for those with dry or sensitive skin. To reduce irritation; cleanse with a low-irritant, pH-balanced, soap-free cleanser, twice a day.
- If inadequate control after 6 weeks, *ADD erythromycin 2% gel topically, in the morning.*

For mild truncal acne, consider:

- *Salicylic acid 5% lotion topically, daily*
- *Use benzoyl peroxide for long-term maintenance*

Moderate papulopustular acne +/- trunk involvement +/- nodules:

- *Apply benzoyl peroxide 2.5 – 10% cream to face at night as for mild comedonal or papulopustular acne, increasing strength and application as tolerated*
PLUS
- *Doxycycline 50 to 100mg orally, daily*
OR (if doxycycline is not tolerated or contraindicated
e.g. in pregnancy)
- *Erythromycin 250 to 500mg orally, twice daily*

- If there is no response by 6 weeks or insufficient response by 12 weeks, increase dose or change antibiotic. Consult with dermatologist if possible.
- Females have the option of adding an oral contraceptive with a favourable androgenic profile, while on antibiotics. Improvement with oral contraceptives can be slow; therefore, a 3- to 6-month trial is recommended.

Moderate to severe acne +/- nodules +/- cysts:

- For the face, use an oral antibiotic:
- *Doxycycline 100 to 200mg orally, daily*
OR (if tetracyclines are not tolerated or are contraindicated e.g. in pregnancy)
- *Erythromycin 500mg orally twice daily.*
- If the cystic acne is particularly severe or there is a family history of cystic scarring acne, start antibiotics, together with an oral contraceptive in females unless contraindicated, and organise early referral to dermatologist.
- If there is no response by 6 weeks, or if condition improves and then relapses, consider changing the antibiotic, adding a low-androgenic oral contraceptive in females, and/or referring to a dermatologist, if available, for *isotretinoin* therapy.
- Unless contraindicated, females should have been taking the oral contraceptive for at least one cycle with a negative pregnancy test before starting oral isotretinoin as retinoids are potentially teratogenic

Maintenance therapy and follow-up

A minimum trial of at least 6 weeks is usually necessary before assessing response following a change in therapy. Best results often require combination therapy, which can be expensive over a long period.

19.1.2 Impetigo and Folliculitis

Impetigo

Impetigo is a skin infection caused by *Streptococcus* and/or *Staphylococcus aureus* bacteria. It is often called "school sores" because

it affects mostly children but can be seen at any age and is quite contagious.

Folliculitis

Folliculitis is the name given to a group of skin conditions in which there are inflamed hair follicles. The result is a tender red spot, often with a surface pustule. Folliculitis can be due to infection, occlusion, irritation and specific skin diseases.

Treatment of impetigo and folliculitis

- Until culture result is available, suspect *S. aureus* as a pathogen
- Diagnosis can be confirmed by skin swab to identify the infective organism and establish antibiotic susceptibility

For mild or localised infections, use

- *Saline or soap and water topically, 8-hourly to remove crusts*
PLUS
- *Neomycin/ bacitracin topically, 8-hourly for 10 days*

For severe, widespread or recurrent infections, use

- *Cloxacillin (flu)cloxacillin (child: 12.5mg/kg up to) 250mg orally, 6-hourly for 10 days*

For patient hypersensitivity to penicillin (excluding immediate hypersensitivity), use

- *Cephalexin (child; 12.5 to 25mg/kg up to) 250mg orally, 6-hourly for 10 days*

For patients with immediate penicillin hypersensitivity, use

- *Erythromycin (child; 12.5 to 25mg/kg up to) 250mg orally, 6-hourly for 10 days*

If *Streptococcus pyogenes* is confirmed:

- *Saline or soap and water topically, 12-hourly to remove crusts*
PLUS
- *Benzathine penicillin (child: 30–45mg/kg up to) 900mg IMI, as one dose*

OR

- *Phenoxy methyl penicillin (child: 10mg/kg up to) 500mg orally 6-hourly for 10 days*

For patients with hypersensitivity, use

- *Erythromycin (child: 12.5 to 25mg/kg up to) 250mg orally, 6-hourly for 10 days*

Recurrent or resistant impetigo

Consult with dermatologist.

19.1.3 Boils and carbuncles

Boils

Boils (also called furuncles) are caused by an infection of the hair follicles with the bacteria *Staphylococcus aureus*.

Carbuncles

Carbuncles are collection of boils with multiple drainage channels. The infection is usually caused by *Staphylococcus aureus*, is painful and normally results in extensive slough of the skin.

Treatment of boils and carbuncles

- Small lesions may be treated with drainage alone
- Large lesions, spreading cellulitis or the presence of systemic symptoms require antibiotic treatment in addition to surgical incision and drainage. Investigate by microscopy and culture.
- While awaiting culture results, use:
 - *(Flu)cloxacillin (child: 25mg/kg up to) 500mg oral, 6-hourly for 5 to 7 days*
- For patient hypersensitivity to penicillin (excluding immediate hypersensitivity), use
 - *Cephalexin (child: 25mg/kg up to) 500mg oral 6-hourly for 5 to 7 days*
- For patients with immediate penicillin hypersensitivity, use
 - *Erythromycin (child: 12.5 to 25mg/kg up to) 250mg oral, 6-hourly for 10 days.*

19.1.4 Erysipelas and Cellulitis

Erysipelas

- Erysipelas is a type of cellulitis generally caused by group A *streptococci* most commonly seen in the skin as widespread erythema and oedema often with a raised tender erythematous edge
- The organisms gain entry through fissures in the skin, e.g. in a toe-cleft, and the skin becomes red, swollen and tender
- Fever, malaise and hallucinations often accompany the cutaneous features. With recurrent disease the area affected, e.g. the foot and the lower leg, may become lymphoedematous
- Erysipelas may affect both children and adults
- The risk factors associated with this infection include local trauma (break in the skin), skin ulceration, and impaired venous or lymphatic drainage

Cellulitis

- Cellulitis is a common bacterial infection of the skin, which can affect all ages
- It usually affects a limb but can occur anywhere on the body
- Symptoms and signs are usually localised to the affected area but patients can become generally unwell with fevers, chills and shakes
- If there is no increased warmth over the skin it is unlikely to be cellulitis

Treatment of erysipelas and cellulitis

- Mild early cellulitis and erysipelas: to cover *Staphylococcal aureus* and *Streptococcus pyogenes*, use
 - (Flu)cloxacillin or cloxacillin (child: 25mg/kg up to) 500mg orally, 6-hourly for 7 to 10 days
- If *S. pyogenes* is confirmed, or suspected due to clinical presentation or local susceptibility pattern, use
 - Phenoxymethyl penicillin (child: 10mg/kg up to) 500mg orally, 6-hourly for 10 days or procaine penicillin (child: 50mg/kg up to) 1.5g IMI, daily for at least 3 to 5 days

- For patient hypersensitivity to penicillin (excluding immediate hypersensitivity), use
 - *Cephalexin (child: 25mg/kg up to) 500mg orally , 6-hourly for 7 to 10 days*
- For patients with immediate penicillin hypersensitivity, use
 - *Erythromycin (child: 12.5 to 25mg/kg up to) 250mg orally, 6-hourly for 10 days*
- If culture is negative, or not possible, continue therapy for 10 days on the assumption that the infection is due to *S. pyogenes* (as trials have shown that 5 days therapy does not eradicate *streptococci* and is not sufficient to prevent poststreptococcal glomerulonephritis)
- If patients have recurrent attacks, long term preventive treatment with penicillin may be considered

Preventable measures

- Examine patient for tinea pedis, if present treat aggressively
- After treatment, the patient should keep oral antibiotics on hand for immediate use if there is a recurrence. In case of frequent recurrence, continuous prophylaxis is recommended with
 - *Phenoxy methyl penicillin 250mg orally bd*
- Patient with recurrent cellulitis should be referred for an infectious diseases physician for assessment

19.2 SKIN INFECTIONS - FUNGAL

19.2.1 Tinea

Tinea is a type of fungal skin infection caused by a variety of fungi; affecting different parts of the body which include the trunk, scalp, groin, feet and the nails. The pharmacological treatment for tinea fungal infection are detailed in **Table 19.1**.

Note: Griseofulvin may accelerate the metabolism of the oral contraceptives and extra precautions (barrier methods) should be used while taking the course. Hepatic reactions also occur and liver function tests should be measured before and during the course.

Table 19.1 Treatment of tinea fungal infection

| Types of Tinea | Treatment | |
|-----------------------------------|--|--|
| | Topical | Oral |
| Tinea capitis | None | <i>Griseofulvin (child: 15 to 20 mg/kg up to) 500mg orally, daily for at least 2 weeks</i> OR <i>Itraconazole caps 200mg daily for 7 days</i> |
| Tinea cruris | <i>Clotrimazole 1% topically, cream at night and use a talc in powder form by day for 2 to 4 weeks.</i> | <i>Griseofulvin (child: 10 to 20mg/kg up to) 500mg to 1g orally, daily for at least 4 weeks (up to 3 months)</i> OR <i>Itraconazole Caps 200mg daily for 10 days</i> |
| Tinea Pedis Tinea Corporis | <i>Whitfield's ointment to be applied twice daily until the infected skin shed (usually at least 4 weeks)</i> OR <i>Clotrimazole 1% topically, cream at night and use a talc in powder form by day for 2 to 4 weeks.</i> | <i>Griseofulvin (child: 10 to 20mg/kg up to) 500mg to 1g orally, daily for at least 4 weeks (up to 3 months)</i> OR <i>Itraconazole caps 200mg daily for 10 days</i> |
| Tinea Barbae | <i>Clotrimazole 1% topically, cream at night and use a talc in powder form by day for 2 to 4 weeks</i> | <i>Griseofulvin (child: 10 to 20mg/kg up to) 500mg to 1g orally, daily for at least 4 weeks (up to 3 months)</i> OR <i>Itraconazole caps 200mg daily for 10 days</i> |
| Tinea Unguium | None | <i>Itraconazole caps 200mg daily for 24 to 52 weeks</i> OR <i>Griseofulvin (child: 15 to 20mg/kg up to) 500mg orally, daily is an acceptable alternative but requires treatment for at least 12 months</i> |

19.2.2 **Ptyriasis Versicolor (Tinea Versicolor)**

- Common condition in adolescence and young adulthood caused by *Malassezia* yeasts, which are normal commensals of the skin
- Seen particularly those between 20 and 30 years of age
- Common in tropical climates and is exacerbated by heavy sweating
- Patients present with small patches of hyperpigmentation or hypopigmentation; well-demarcated

Topical treatment

- *Salicylic acid lotion 5% to be applied 2 to 3 times daily*
OR
- *Clotrimazole 1% topically, 2 to 3 times daily for at least 10 days*
OR
- *Selenium sulphide- 2.5% solution applied to wet skin. Leave on for not <10 minutes or leave on overnight. 7-10 days treatment.*

Note: Griseofulvin is **ineffective** against these yeasts.

19.2.3 **Candidiasis**

Candida is the name for a group of yeasts (a type of fungus) that commonly infect the skin causing ‘candidiasis’, ‘candidosis’ or ‘moniliasis’.

Cutaneous candidiasis

Topical agents

- *Clotrimazole 1% topically, 2 to 3 times daily. Continued for 14 days after symptoms resolve.*

Note: Griseofulvin is **not** active against *Candida albicans*

If necessary for inflammation, *ADD*

- *Hydrocortisone 1% cream topically, 2 to 3 times daily.*

If there is poor response or topical treatment is impracticable, refer to dermatologist or senior physician.

Vulvovaginal candidiasis

Vulvovaginal candidiasis can be treated with:

- *Nystatin 100 000 units/5g vaginal cream (1 applicatorful)*
OR
- *Nystatin 100 000 units pessary intravaginally, 12-hourly for 7 days*

19.3 SKIN INFECTIONS - VIRAL**19.3.1 Warts And Molluscum Contagiosum****Warts**

- Warts are benign tumours caused by infection with Human Papillomavirus (HPV)
- Warts are particularly common in childhood and are spread by direct contact or autoinoculation. This means if a wart is scratched, the viral particles may be spread to another area of skin
- It may take as long as twelve months for the wart to first appear
- Common warts arise most often on the backs of fingers or toes, and on the knees
- Plantar warts (verrucae) include one or more tender inwardly growing ‘myrmecia’ on the sole of the foot
- Facial warts often take the form of multiple tiny plane lesions
- Genital warts are very common. They are often transmitted sexually and predispose to cervical and vulval cancer.
- In children, warts frequently resolve spontaneously within 2 years, making aggressive therapy inappropriate

Molluscum contagiosum

- Molluscum contagiosum is a viral skin infection resulting in small, harmless skin growths
- Molluscum contagiosum resemble acne at first. Later, when the spots enlarge, they often have a waxy, pinkish look with a small central pit. Sometimes there are as many as a hundred spots on one individual.

Treatment

For common warts, plantar warts, plane warts, genital warts, molluscum contagiosum, use:

- *Podophyllin with or without occlusion applied daily*
- First, the skin should be softened in a bath or bowl of hot soapy water
- Apply to normal skin with Vaseline (petroleum jelly) or cover with adhesive elastic plaster with a hole left for the wart, and apply the substance to the wart. Apply more tape over the top to increase occlusion.

Note: Podophyllin must not be used in pregnancy or in women considering pregnancy. It is not recommended for use on wart areas of more than 10 square centimetres, as it can be toxic.

For treatment of plane warts, use with caution on the face; a small area should be tested first and the preparation applied sparingly and accurately. Plane warts on the face are very difficult to treat and are often best left untreated.

19.3.2 Herpes Zoster (Shingles)

- The first sign of shingles is usually pain, which may be severe, in the areas of one or more sensory nerves, often where they emerge from the spine
- The pain may be just in one spot or it may spread out
- The patient usually feels quite unwell with fever and headache
- The lymph nodes draining the affected area are often enlarged and tender

Treatment

Antiviral treatment can reduce pain and the duration of symptoms, but it is much less effective if started more than one to three days after the onset of the shingles.

- *Paracetamol to reduce fever and pain (do not use aspirin in children as this is associated with Reye's syndrome)*
- *Calamine lotion and/or oral antihistamines to relieve itching*
- *Bathe lesions with saline 3 times daily to remove crusts and exudates*

- *Oral antiviral medication is recommended in circumstances such as facial shingles, those with poor immunity, the elderly*
- *Aciclovir (child: 20mg/kg up to) 800mg orally, 5 times daily for 7 days (safe in children and pregnancy)*
- *Oral antibiotics may be needed for secondary infection*
- *(Flu)cloxacillin (child: 12.5mg/kg up to) 250mg orally, 6-hourly for 10 days*
OR
- *Erythromycin (child: 12.5 to 25mg/kg up to) 250mg orally, 6-hourly for 10 days*

Post-herpetic neuralgia may be difficult to treat successfully. It may respond to tricyclic antidepressant medications such as *amitriptyline* or *anti-epileptic medication* such as *carbamazepine* and *sodium valproate*.

19.3.3 **Chickenpox (Varicella)**

- Chickenpox is a highly contagious disease caused by the varicella zoster virus (Herpes zoster).
- In children with a normal immune system and uncomplicated varicella, antivirals are not recommended because the benefits are only marginal.
- However adults and children with existing skin disease (e.g. Atopic dermatitis) are more at risk for severe disease with complications.

Treatment

In immunocompromised patients with severe disease with complications of varicella (e.g. pneumonitis or encephalitis), use

- *Aciclovir 10mg/kg IV, 8-hourly for 7 to 10 days*

For less severe disease, use oral therapy as for herpes zoster.

Superinfection of varicella skin lesions with *streptococcus pyogenes* and/or *Staphylococcus aureus* may occur and should be treated as for impetigo or cellulitis as appropriate.

For most healthy patients with chickenpox symptomatic therapy is usually all that is required.

- *Paracetamol to reduce fever and pain (do not use aspirin in children as this is associated with Reye's syndrome)*
- *Calamine lotion and/or oral antihistamines to relieve itching*
- *Consider oral aciclovir (antiviral agent) in people older than 12 years who may be at increased risk of severe varicella infections*
- *Aciclovir (child: 20mg/kg up to) 800mg orally, 5 times daily for 7 days (preferred in children and pregnancy)*

19.3.4 German Measles (Rubella)

- Rubella, also known as German measles is a viral disease characterised by rash, swollen glands and fever.
- The disease is usually mild and of little significance unless the patient is pregnant.
- Infection of a pregnant woman (congenital rubella syndrome) commonly results in miscarriage, stillbirth, or birth of an infant with major birth abnormalities.

Treatment

There is no specific treatment for rubella. The disease is usually mild and self-limiting.

19.3.5 Measles

- Measles is a highly contagious disease caused by the measles virus
- Initially the symptoms are like the common cold with fever, conjunctivitis (sore red eyes), cough, and characteristic Koplik spots (small white spots in the mouth)
- Between days 3 to 7 of the illness a red blotchy rash appears on the face that then becomes more generalised
- Measles is also known as English measles, rubeola and morbilli

Treatment

There is no specific treatment for measles which is why immunisation is so important. Treatment for mild cases of measles is supportive.

- Give *paracetamol* for fever
- Maintain fluid intake to prevent dehydration
- Provide nutritional support if necessary
- Observe high-risk individuals carefully to prevent complications

Severe cases of measles usually require hospitalisation. Antibiotics may be given to treat secondary bacterial infections from complications such as otitis media, infectious diarrhoea, pneumonia and sepsis.

19.3.6 Herpes Simplex Labialis (Cold Sores)

Herpes simplex is one of the commonest infections of humankind throughout the world. There are two main types of herpes simplex virus (HSV); type 1, which is mainly associated with facial infections and type 2, which is mainly genital, although there is considerable overlap.

Complications

- Urethritis proctitis
- Neurogenic (nerve) pain
- Meningitis
- Widespread infection in debilitated patients

Treatment

Minor attacks:

- Mild cases of viral oral ulceration can be treated symptomatically with systemic analgesics and topical anaesthetic drugs (e.g. Lignocaine gel)
- Mouthwash may prevent secondary infection and act as an adjunct to oral hygiene. Topical corticosteroids are contraindicated.
- For antiviral therapy, use:
 - *Aciclovir 5% cream topically, every 4 hours while awake for 4 days at the first sign of recurrence*

Severe primary attack, severe recurrent attack or recurrent attack complicated by *erythema multiforme*:

- Oral antiviral therapy is recommended in severe herpes simplex virus infections on any part of the skin or oral mucosa, particularly in primary and progressive infection, or if the patient has difficulty eating or swallowing, or when the attacks is complicated by *erythema multiforme*.
- Use:

- *Aciclovir (child: 10mg/kg up to) 400mg orally, 8-hourly for 5 days (preferred in children and in pregnancy, seek expert advice)*

If unable to swallow, use

- *Aciclovir (for all ages) 5mg/kg IV, 8-hourly for 5 days*

Frequent disabling recurrences, frequent recurrences complicated by erythema multiforme, or in HIV-infected patients with chronic lesions:

- *Aciclovir (child: 10mg/kg up to) 200mg orally, 12-hourly for up to 6 months (safe in children and pregnancy)*

If there is a breakthrough during prophylaxis, higher doses may be successful. Treatment should be stopped after 6 months and restarted in the event of recurrence.

19.4 SKIN INFESTATIONS

19.4.1 Scabies

- Scabies is caused by infestation with the mite *Sarcoptes scabiei var. hominis*, a human pathogen that is spread by close physical contact between infected persons
- Human scabies is not acquired from animals
- Scabies is common in school-age children. If untreated, it will usually spread to all members of a patient's family
- Scabies is acquired by skin-to-skin contact with someone else with scabies. The contact may be quite brief such as holding hands.
- Norwegian scabies (crusted scabies) is a very contagious variant in which there is little itch but numerous mites. These cause a generalised scaly rash that may affect the scalp.

Treatment

- *Benzyl Benzoate application 25%*
 - Child <2 years – dilute with 3 parts of water; Child 2-12 years and sensitive adult: dilute with equal parts of water.
 - Bathe in the evening (bathing with warm water not necessary anymore. This will also minimise the risk of systemic absorption leading to systemic toxicity).

- Apply over the whole body paying particular attention to the webs of the fingers and toes
- Repeat without bathing on the following day and wash off 24 hours later; a third application may be required in some cases
- Treat all family members, wash clothing, bed sheets and blankets, and mattress to be left in the sun
- **Note:** Avoid contact with eyes and mucous membranes; do not use on broken or secondarily infected skin; or in pregnancy and breastfeeding. Do not apply to the head and neck except in the elderly who have experienced treatment failure, where application to the scalp, neck, face and ears may be needed.

OR

- *Permethrin 5% cream*
 - Child >6 months
 - Apply over the whole body to dry skin from neck down paying particular attention to hands and genitalia, and under the nails with a nailbrush. Note: May need to extend to the face, neck, scalp and ears in elderly, children and for those who have experienced treatment failure
 - Leave on the skin for a least 8 hours (usually overnight) and reapply to hands if they are washed. Wash off after 8-12 hours
 - The time may be increased to 24 hours if there has been treatment failure
- *Systemic antibiotics if necessary*
- *Oral antihistamines (promethazine) may be useful at night to minimise scratching due to the allergic reaction caused by the mites and their products.*

Note: All antiscabetic agents have a better success rate if used on 2 occasions, 1 week apart.

Please note: Gamma benzene hexachloride cream is no longer recommended.

19.4.2 **Pediculosis Capitis (Head Lice)**

This condition is prevalent in school children. In children, infestation should be suspected when excoriation is seen and impetigo is evident around the hair margin. Infestation occurs from the close touching of heads and is often widespread within a class of schoolchildren.

Treatment

Some cases can be cured by wet combing (applying hair conditioner to wet hair and using a fine nit comb) every day for 10 to 14 days until no lice are found. This method has only about a 40% success rate.

Alternative, topical insecticides can be used. The currently recommended topical treatment for head lice is:

- *Permethrin 1% topically, leave for a minimum of 20 minutes*
 - All lice treatment should be repeated 7 to 10 days later, and the conditioner and combing method (above) should be used the next day to check that there are no further live lice on the scalp
 - In between treatments use the same combing method twice, removing all eggs less than 1.5cm from the scalp with head lice comb or pulling them off with fingernails. These eggs may contain viable larvae. Wet combing should be repeated weekly for several weeks after cure to detect recurrence.
 - Wash hands thoroughly after using lice treatment
 - Do not blow dry hair
 - Lice treatment should not be used on children under 2 years of age without medical supervision
 - Wash pillow cases on hot cycle and combs and brushes in hot water (60°C)
 - Family and close physical contacts should be examined and treated if live lice are found. The patient's school should be notified but it is not necessary to exclude children with head lice from school after their initial treatment.
 - The presence of nits on the hairs more than 1.5cm from the scalp only indicates previous, not active, infestation

Resistant head lice

For head lice that are resistant to one of the topical insecticides above, the recommended treatment is:

- *Repeat treatment using another insecticide*
OR
- Wet combing
 - Combing is easier with shorter hair styles, but shaving the head is not necessary

If this fails, use

- *Trimethoprim + sulphamethoxazole (child: 2 + 10 mg/kg up to) 80 + 400mg orally, 12 hourly for 3 days. Repeat after 10 days.*
- Effectiveness of the trimethoprim + sulphamethoxazole is due to the destruction of symbiotic bacteria in the gut of the lice

19.4.3 **Pediculosis Corporis (Body Lice)**

- This condition is usually found only in those with gross lack of hygiene, such as vagrants
- The skin of affected individuals is often thickened, pigmented and excoriated
- Lice, often few in number, may be evident on seams of clothing worn next to the skin. The clothes should be autoclaved.

Treatment

Treat as for head lice, applying the preparation to the whole body, but avoiding contact with eyes and mucous membranes. The parasites and eggs are found in clothing and bedclothes, which should be discarded, hot washed or sealed in plastic bags for 30 days.

19.4.4 **Pediculosis Pubis (Pubic Lice)**

- *Phthirus pubis* colonises pubic, axillary, beard, and body hair. It may also involve eyebrows and eyelashes
- It is transmitted by close physical contact, often sexual. It is most often seen in adults. Contact tracing is essential.
- Examine the whole body surface including eyelashes and eyebrows
- Shaving pubic hair is also helpful
- Underwear and bedclothes should be washed
- Treatment failure may be due to re-infection, and family and sexual partner(s) should therefore be checked and treated as appropriate
- Treatment of the infestation are the same for the head lice

Infestation of the eyelashes

White soft paraffin is applied thickly to the eyelashes twice a day for 8 days to suffocate the mites. The nits may then be physically removed with fine forceps. This may be difficult, requiring slit lamp control. In this situation, referral to the eye clinic is recommended.

19.5 OTHER SKIN DISORDERS

19.5.1 Nappy / Diaper Rash

Nappy rash rashes in the diaper area that are caused by various skin disorders and/or irritants.

Generic rash or irritant diaper dermatitis (IDD) is characterised by joined patches of erythema and scaling mainly seen on the convex surfaces, with the skin folds spared.

Diaper dermatitis with secondary bacterial or fungal involvement tends to spread to concave surfaces (i.e. skin folds), as well as convex surfaces, and often exhibits a central red, beefy erythema with satellite pustules around the border.

Differential diagnosis

Other rashes that occur in the diaper area include seborrhoeic dermatitis and atopic dermatitis. Both seborrhoeic and atopic dermatitis require individualised treatment.

- Seborrhoeic dermatitis, typified by oily, thick yellowish scales, is most commonly seen on the scalp (cradle cap) but can also appear in the inguinal folds
- Atopic dermatitis, or eczema, is associated with allergic reaction, often hereditary. This class of rashes may appear anywhere on the body and is characterised by intense itchiness

Causes

Irritant diaper dermatitis (IDD) develops:

- when skin is exposed to prolonged wetness
- increased skin pH caused by urine and faeces

Urine's effects

- Wetness alone macerates the skin
- Softens the stratum corneum
- Greatly increases susceptibility to friction injury
- Affects skin pH
- Ammonia and urea exposure (direct irritant)

Diet's effects

The interaction between faecal enzyme activity and IDD explains the observation that infant diet and diaper rash are linked, since faecal enzymes are in turn affected by diet.

- Breast-fed babies have a lower incidence of diaper rash
- Most common in infants 8–12 months old (change in diet – from milk to solid food)
- Significant change in an infant's diet (change in milk formula or from milk to solid food)
- Post-antibiotic treatment
- Diarrhoea (previous 48 hours)

Secondary infections

- *Candida albicans* (most common)
- *Staphylococcus aureus*

Treatment

- Discontinue diaper use (most effective but not most practical!)
- Zinc oxide and castor oil ointment (*Petroleum jelly can be used as a protectant if “zinc oxide and castor oil” is not available*)
- Clotrimazole creams (*in extreme cases*)
- Hydrocortisone cream 0.5% (*low concentration*) sometimes used to treat symptoms of diaper rash (*does little to clear up the rash on its own*)
- Antibiotic may be required if secondary infection is present

Practical points for prevention and treatment of nappy rash

- Check the baby's diaper often and change it as soon as it's wet or soiled
- Carefully clean the baby's bottom between diaper changes. Use plain warm (not hot) water with or without a very mild soap

- Allow the baby's skin to dry completely before putting on another diaper
- Use products that contain “zinc oxide and castor oil” ointment or petroleum (such as Vaseline) to protect the baby's skin from moisture
- Avoid using plastic pants
- If diaper rash persists, change the type of wipes, diapers or soap used

19.5.2 Insect Bites Reaction

Topical antipruritic such as calamine lotion may provide rapid relief. If this is inadequate, use:

- *A potent corticosteroid like betamethasone 0.05% topically, twice daily until itch has settled (max. of 1 week on the face)*

Note: Persistent nodules and ulcerated lesions should be referred to a dermatologist.

Severe acute reaction to insect bites may be treated with:

- *Prednisolone 25-50mg (approx. 0.5mg/kg) orally, daily until settled*

19.5.3 Eczema/ Dermatitis

There is no clear distinction between dermatitis and eczema therefore the terms are used interchangeably. Dermatitis is a non-specific inflammatory response of the skin to a combination of endogenous (individual susceptibility) and exogenous (external) factors. It manifests as an erythematous rash that is usually itchy and sometimes scaly. In the acute stage, there is spongiosis (intracellular oedema) and superficial inflammation.

There are several different types of eczema, many of which look similar but have very different causes and treatments. The first step in effective treatment of eczema is a correct diagnosis.

Atopic eczema

- Atopic eczema is the commonest form of eczema and is closely linked with asthma and hayfever
- It can affect both children and adults, usually running in families
- One of the most common symptoms of atopic eczema is its itchiness (or pruritis), which can be almost unbearable
- Other symptoms include overall dryness of the skin, redness and inflammation
- Constant scratching can also cause the skin to split, leaving it prone to infection
- In infected eczema the skin may crack and weep ('wet' eczema)

Treatment

Treatments include emollients to maintain skin hydration and corticosteroids to reduce inflammation.

- *Aqueous cream to be applied 3 times daily to the affected dry skin*
- *Betamethasone 0.1% cream to be applied twice daily sparingly to the affected area*

Allergic contact dermatitis

- Develops when the body's immune system reacts against a substance in contact with the skin
- The allergic reaction often develops over a period of time through repeated contact with the substance. For example, an allergic reaction may occur to nickel, which is often found in earrings, belt buckles and jeans buttons. Reactions can also occur after contact with other substances such as perfumes and rubber.
- In order to prevent repeated reactions it is best to prevent contact with anything that you know causes a rash

Treatment

- *Promethazine (up to) 25-50mg orally daily may reduce the itching, and is particularly helpful at night-time*
OR
- *Adults: Chlorpheniramine 4mg every 4-6 hours, max 24mg daily.*
- *Children: 1-5 years: 1mg every 4-6 hours; 6-12 years: 2mg every 4-6 hours; max 12mg*
- *Hydrocortisone 1% cream if associated with inflammation*

Irritant contact dermatitis

This is a type of eczema caused by frequent contact with everyday substances, such as detergents and chemicals, which are irritating to the skin. It most commonly occurs on the hands of adults and can be prevented by avoiding the irritants and keeping the skin moisturised.

Infantile seborrhoeic eczema

A common condition affecting babies under one year old, the exact cause of which is unknown. Also referred to as cradle cap, it usually starts on the scalp or the nappy area and quickly spreads.

Although this type of eczema looks unpleasant, it is not sore or itchy and does not cause the baby to feel uncomfortable or unwell. Normally this type of eczema will clear in just a few months, though the use of moisturising creams and bath oils can help to speed this along.

Treatment

If the cradle cap doesn't improve with frequent washing or if the rash spreads to other areas, *use:*

- *Ketoconazole 2% shampoo*
PLUS
- *Hydrocortisone applied twice daily sparingly for any inflamed or reddened areas*

Adult seborrhoeic eczema

- Characteristically affects adults between the ages of 20 and 40
- It is usually seen on the scalp as mild dandruff, but can spread to the face, ears and chest
- The skin becomes red, inflamed and starts to flake
- The condition is believed to be caused by a yeast growth. If the condition becomes infected, treatment with an anti-fungal cream such as:
- *Ketoconazole 2% cream* may be necessary
OR
- *Corticosteroid betamethasone 0.1% lotion*

Varicose eczema

- Varicose eczema affects the lower legs of those in their middle to late years, being caused by poor circulation

- Commonly the skin around the ankles is affected, becoming speckled, itchy and inflamed
- Treatment is with *Aqueous cream and betamethasone cream 0.1%*
- If left untreated, the skin can break down, resulting in an ulcer

Discoid eczema

- Is usually found in adults and appears suddenly as a few coin shaped areas of red skin, normally on the trunk or lower legs
- They become itchy and can weep fluid

Treatment

- Aqueous cream to be applied to the affected area twice daily.
- *Promethazine (up to) 25-50mg orally daily may reduce the itching, and is particularly helpful at night-time*
OR
- **Adults:** *Chlorpheniramine 4mg every 4-6 hours, max 24mg daily.*
- **Children:** *1-5 years: 1mg every 4-6 hours; 6-12 years: 2mg every 4-6 hours; max 12mg*
- *Hydrocortisone applied twice daily sparingly for any inflamed or reddened areas*
OR
- *Betamethasone valerate 0.1% cream depending on the severity and the area affected*
- *Systemic steroids by mouth (prednisolone) or injection (hydrocortisone) are reserved for severe and extensive cases of nummular dermatitis. Systemic steroids are usually only necessary for a few weeks, and any residual dermatitis can be treated satisfactorily with steroid creams and emollients.*
- *Antibiotics ((flu)cloxacillin) are important if the dermatitis is weeping, sticky or crusted. Sometimes nummular dermatitis clears completely on oral antibiotics, only to recur when they are discontinued.*

19.5.4 Urticaria

- Urticaria or hives is a transient pruritic localised oedema in which each individual lesion lasts less than 24 hours
- The same reaction taking place in sub-mucosa and subcutaneous tissue is termed angioedema

- Urticaria of more than 6 weeks duration is termed chronic urticaria
- Urticaria wheals are raised erythematous and oedematous plaques with sharp serpiginous borders surrounded by erythematous halo and have a blanched centre, the diameters ranging from a few millimetres to several centimetres

Treatment

- Identification and removal of the triggering factors.
- *Antihistamine therapy, promethazine and chlorpheniramine. If one group of antihistamine fails use an antihistamine from a different group.*
- *Calamine lotion may eliminate itching*
- Avoid aspirin® and if angioedema is present; *inject 0.3 – 0.5mL adrenaline (1:1000) SC*

19.5.5 Vitiligo

Vitiligo is a common acquired heritable melanocytopenic disorder characterised by progressive well-circumscribed white macules, ocular abnormalities, autoantibodies and is associated with other autoimmune diseases. The macules of vitiligo have well-defined border. The border may have a red halo (inflammatory vitiligo) or a rim of hyperpigmentation.

Treatment

- *Topical or systemic corticosteroid*
OR
- *Sunscreen*

19.5.6 Bullous Pemphigoid

Bullous pemphigoid is a blistering skin disease which usually affects middle aged or elderly persons. It is an immunobullous disease, i.e. the blisters are due an immune reaction within the skin.

- Characteristically, crops of tense, fluid-filled blisters develop
- They may arise from normal-looking or red patches of skin, and the blisters may be filled with clear, cloudy or blood-stained fluid
- Bullous pemphigoid is usually very itchy

- It may be localised to one area but is more often widespread, often favouring body folds
- In severe cases, there may be blisters over the entire skin surface as well as inside the mouth

Treatment

If the pemphigoid is very widespread, hospital admission may be advised so the blisters and raw areas can be expertly dressed. Antibiotics may be required for secondary bacterial infection.

- *Prednisolone (child up to) 50mg daily then slowly titrate back over months to years to a maintenance dose of 5-10mg daily.*

As systemic steroids have many undesirable side effects, other medications are added to ensure the lowest possible dose (*aiming for 5 to 10mg prednisolone daily*). These other medications may include:

- *Topical corticosteroids like betamethasone cream 1% and hydrocortisone cream 1% to applied twice daily until infection clears up.*
- *Doxycycline orally 100mg daily to treat secondary infection.*

Treatment is usually needed for several years. In most cases the pemphigoid eventually clears up completely and the treatment can be stopped.

19.5.7 Psoriasis

Psoriasis occurs in 1% to 3% of the population world-wide. The disease is transmitted genetically, most likely with a dominant mode with variable penetrance; the origin is unknown. Psoriasis is associated with an increased frequency of certain histocompatibility antigens, the most significant association is with HLA-CW6. The disease is lifelong and characterised by chronic, recurrent exacerbations and remissions that are emotionally and physically debilitating. Men and women are equally affected.

Management of Psoriasis

- Psoriasis, in most cases, can be controlled with therapy
- It is important that treatment is appropriate for the type and site of psoriasis

- In a mild case, emollients or a weak topical corticosteroid may suffice, but disabling or disfiguring psoriasis may warrant the use of systemic drugs such as antimetabolites or immunosuppressants.

Treatment of different types of psoriasis

- Table 19.2.

General measures

- Stress can aggravate the disorder
- Exercise and reduction of alcohol intake
- Weight reduction will help patients with flexural psoriasis or plantar psoriasis

Antibiotics

- Psoriasis occasionally becomes infected, usually with *Staphylococcus aureus*
- Flexural psoriasis can become infected with coliforms
- Guttate psoriasis may be triggered by an upper respiratory tract streptococcal infection and, if proven, requires treatment with *Phenoxy methyl penicillin or suitable alternative*
- Palmoplantar pustular psoriasis may respond to *tetracyclines* (which owes their efficacy to the anti-inflammatory effects)

Corticosteroids

- Topical corticosteroids are potent inhibitors of cytokine production, resulting in anti-inflammatory and antimitotic effects
- They are the most commonly employed agents in therapy of psoriasis
- In general terms, the more potent preparations are used to treat thicker areas of skin or thicker plaques of psoriasis
- The major adverse effects with the use of topical corticosteroids are skin atrophy, sometimes with the formation of striae, and telangiectasia
- These effects are seen most often in the flexures and on the face, and special care is required when using topical corticosteroids in these sensitive areas

Emollients

- Where scaling or irritation are prominent features, the soothing actions of emollient creams or ointment offers prompt relief
 - *Use emulsifying ointment*

Keratolytics

- Salicylic acid is used to lift and soften thick scale in psoriasis in the form of ointment
 - *Use salicylic acid 5% (in emulsifying ointment) topically daily*

Systemic therapy

- Refer to dermatologist if one is available

Table 19.2 Treatment of different types of psoriasis

| Type of Psoriasis | Treatment |
|---------------------------------|---|
| Plaque – mild, moderate | <ul style="list-style-type: none"> • <i>Topical corticosteroids</i> |
| Plaque – widespread | <ul style="list-style-type: none"> • <i>Topical corticosteroids *</i> |
| Guttate | <ul style="list-style-type: none"> • <i>Penicillin</i> • <i>Topical corticosteroids</i> |
| Flexural | <ul style="list-style-type: none"> • <i>Mild to moderate topical corticosteroids</i> |
| Erythrodermic | <ul style="list-style-type: none"> • <i>Hospitalisation, baths, emollients *</i> |
| Palmoplantar – pustular | <ul style="list-style-type: none"> • <i>Tetracycline, topical corticosteroids *</i> |
| Palmoplantar – hyperkeratolytic | <ul style="list-style-type: none"> • <i>Whitfield's ointment</i> • <i>Salicylic acid 5% ointment</i> |
| Scalp – mild | <ul style="list-style-type: none"> • <i>Topical corticosteroid lotions</i> • <i>Tar shampoo</i> |
| Scalp –severe | <ul style="list-style-type: none"> • <i>Tar shampoo</i> • <i>Systemic therapy (Specialist drug)</i> |
| Nail | <ul style="list-style-type: none"> • <i>Potent topical corticosteroids, systemic therapy (Specialist drug)</i> |
| Genital | <ul style="list-style-type: none"> • <i>Topical corticosteroids</i> |

* For persistent cases, refer to dermatologist

20 STI (SEXUALLY TRANSMITTED INFECTIONS)

All suspected STIs should be referred to the clinic run by Public Health staff.

Management is based on the syndromic approach of WHO:

<http://www.who.int/hiv/pub/sti/en/STIGuidelines2003.pdf>

A Nauruan guideline will also be available shortly.

21 SURGICAL CONDITIONS (COMMON)

21.1 PREPARATION FOR SURGERY

- Always see the patient before surgery, on the day of surgery
- Check patient's notes and ensure he/she is fasting if required
- Ensure consent form is signed by patient or guardian and the patient and relatives are fully informed of the procedure and outcome as well as the associated risks and complications
- Preoperative checklist must be done in the ward before transporting patient into the operating theatre

21.1.1 Preoperative Fasting

- In adults undergoing elective surgery, use the '2 and 6 rule'. That is, intake of water can be allowed up to '2' hours prior to induction of anaesthesia and a minimum of '6' hours of fasting for solids and milk.
- In children undergoing elective surgery, use the '2-4-6 rule'. That is, intake of water and other clear fluid up to '2' hours prior to induction of anaesthesia, breast milk up to '4' hours prior and solids and formula milk up to '6' hours prior to induction of anaesthesia.

21.1.2 Diabetic Patient Undergoing Surgery

- May need *glucose-insulin infusion* during perioperative fasting
- Stop *metformin* two days before major elective surgery and can recommence two days after surgery
- Minimise fasting period prior to surgery: ideally place them first in morning list (see also Section 7.2.9)

21.1.3 Operative and Post-Operative Notes

After any operation, an "operative note" must be written in the patient's chart. It should include at least:

- Names of persons in attendance during procedure
- Pre- and post-operative diagnosis
- Procedure done including the presence of tubes or drains

- Findings
- Length of procedure
- Estimated blood loss
- Anaesthesia record (including drugs administered) - may be on separate sheet
- Fluids given
- Specimens removed
- Complications
- Post-operative management plan (including orders for vital signs, pain control, rate and type of IV fluid, other medications and laboratory investigations)

21.1.4 After Care

Prevent complications with:

- Deep breathing exercises/coughing
- Early mobilisation
- Adequate nutrition
- Pressure sore prevention
- Adequate pain management
- Deep vein thrombosis prevention

21.2 SURGICAL PROBLEMS IN NEWBORNS AND INFANTS

21.2.1 Birth Defects

Refer babies born with obvious structural birth defects to surgeon as soon as possible. Some may require early surgical intervention. The common birth defects include:

- Cleft lip/palate
- Talipes equinovarus (club foot)
- Spina bifida
- Hypospadias
- Imperforate anus

21.2.2 Intestinal Obstruction

Signs and symptoms of bowel obstruction may be subtle and nonspecific. Suspect bowel obstruction in newborn and neonates with vomiting, abdominal distension and no passage of meconium or stool.

Causes of bowel obstruction in newborn and neonates include:

- Neonatal sepsis and necrotising enterocolitis
- Intestinal atresia and stenosis
- Malrotation with volvulus
- Meconium ileus/plug
- Imperforate anus
- Hirschprung disease
- Pyloric stenosis (usually presents at 4 – 6 weeks of life but may present as early as the first week)

Management

- Place infant in an incubator for close observation and temperature control
- Nurse in supine or on the right side with the head elevated
- Place a nasogastric tube (NGT: 8– 10 FG) and allow free drainage
- Start IV fluid (maintenance fluid plus replacement)
- Keep nil by mouth
- Refer to Paediatricians
- Consult Surgeon

21.3 SURGICAL PROBLEMS IN CHILDREN

21.3.1 Acute Abdominal Conditions

Present a diagnostic dilemma because numerous disorders present with abdominal pain and presentation may be atypical in children. In acute surgical abdomen, pain generally precedes vomiting.

Signs and symptoms

Signs and symptoms that suggest an acute surgical abdomen include:

- severe or increasing abdominal pain with progressive deterioration
- bile-stained or feculent vomitus
- involuntary guarding or rigidity

- marked abdominal distension
- marked abdominal tenderness (localised or generalised)
- rebound tenderness
- signs of acute fluid or blood loss into abdomen

Common surgical causes:

- Appendicitis
- Bowel obstruction
- Abdominal trauma
- Strangulated hernia (umbilical/inguinal)

Investigations

- Plain abdominal x-ray
- Erect CXR
- USS (ultrasound scan) of abdomen and pelvis
- Renal function test and serum electrolytes (UEC)
- Liver function test
- FBC (Hb and WCC)

Management

- Keep nil by mouth
- IVF resuscitation. If in shock or hypovolaemic, infuse normal saline at 20ml/kg bolus and reassess
- May need NGT for free drainage
- Commence on *IV antibiotics (usually ampicillin, gentamicin and metronidazole)*
- Adequate analgesics (*morphine or pethidine*)
- Refer to surgeon

All cases of peritonitis require referral to surgeon.

21.3.2 **Pyomyositis, osteomyelitis and septic arthritis**

These are serious infections in children and it is often difficult to be sure which one is present. Common causative organism is *Staphylococcus aureus*.

A sick child with painful swollen limb and fever may have osteomyelitis. A sick child with painful swollen joint(s) and fever may have septic arthritis. A sick child with painful swelling in the muscle and fever may have pyomyositis. Early surgical intervention (incision and drainage) is important.

Management

- Admit ward
- Refer to Surgeon

Investigations

- Blood tests – Hb & WCC
- Blood Culture
- X-ray of affected limb or joint. *Remember that in acute osteomyelitis there is no periosteal change within the first two weeks of infection and x-ray may appear normal.*
- USS to rule out collections in the affected limb

Treatment

- *IV antibiotics: Cloxacillin 25 – 50mg/kg every 6 hours*
- Adequate pain control

21.4 PRINCIPLES OF IMMEDIATE MANAGEMENT OF TRAUMA

21.4.1 Common Fractures and Dislocations

- Immediate assessment of the whole patient is required to exclude other injuries and complications before examination of the skeletal injury
- Apply Paediatric Trauma Centre (PTC: USA) or Early Management of Severe Trauma (EMST: Australia) principles and stabilise patient's Airway, Breathing and Circulation with C-Spine protection before doing secondary survey and assessing for fractures

21.4.2 Limb Fractures

Suspect fracture in a limb which is painful, swollen and deformed and has unusual movements and crepitus, limited range of motion and loss of function.

Examine the limb for:

- Any wound communicating with the fracture
- Evidence of vascular injury or compromise
- Evidence of nerve injury
- Evidence of visceral injury

Management of uncomplicated closed fractures of the limbs

- Splint and elevate
- Give adequate analgesics. May require morphine or pethidine injection.
- Do appropriate X-rays as indicated
- Refer to Surgeon

Management of compound fractures

- Resuscitate if hypovolaemic or in shock
- Administer broad-spectrum antibiotics (*Cephalosporin +/- an Aminoglycoside*)
- *Prophylaxis against Tetanus* (as in wound management, Section 1.5)
- Splint and elevate limb
- Give adequate analgesics. May require morphine or pethidine
- Do appropriate X-rays as indicated
- Refer to Surgeon. May need early surgical debridement

Management of fracture associated with multiple injuries

- Stabilise Airways, Breathing and Circulation with C-spine protection
- Apply a rigid neck collar
- Identify life-threatening conditions in order of risk and initiate supportive treatment
- Splint fracture
- Refer to Surgeon

Dislocations of Limbs

Joints which are commonly dislocated include shoulder and small joints of the hand and fingers. Other joints (hip, elbow, ankle, and knee) can occasionally be dislocated during trauma. Dislocations need immediate reduction, therefore need urgent referral to surgeon.

Suspect dislocation in a joint which is painful, swollen, deformed and has restricted range of motion. In posterior hip dislocation the hip is slightly flexed, adducted and internally rotated. That is, bent and twisted in toward the middle of the body.

Management

- Adequate analgesics
- X-ray to confirm diagnosis and to rule out associated fracture
- Elbow and some shoulder dislocation can be reduced under sedation in the ED but hip and some shoulder dislocation may be difficult to reduce under sedation so will require GA.
- Refer to Surgeon

21.4.3 Head Injury

- Suspect head injury in all trauma patients presenting to the emergency department with impaired level of consciousness
- The priority is the stabilisation of airway, breathing and circulation (ABC) before attention to other injuries
- Always suspect associated cervical injury and immobilise neck with a rigid collar until cleared
- Patients with altered level of consciousness and under alcohol or other intoxication must be treated as having head injury until further assessment when sober
- Check and record pupillary size and reaction to light
- Check for weaknesses of the limbs and asymmetry in limb movements.

Trauma patients with the following signs and symptoms should be referred to the surgeon:

- GCS<15 at initial assessment
- Post-traumatic seizure (generalised or focal)
- Focal neurological signs

- Signs of a skull fracture (including cerebrospinal fluid draining from nose or ears, haemotympanum, boggy scalp haematoma, post auricular or periorbital bruising)
- Loss of consciousness
- Severe and persistent headache
- Repeated vomiting (two or more occasions)
- Amnesia – Post-traumatic and retrograde

Management

- Stabilise airway and C-spine, breathing and circulation – ABC
- Apply rigid neck collar (during Airway management)
- Nurse head up 20%
- Assess level of consciousness by the Glasgow Coma Scale (GCS, **Table 21.1**) and determine severity of Head Injury (**Table 21.2**). The management of patients is guided by clinical assessments based on the Glasgow Coma Scale score.

Table 21.1 Glasgow Coma Scale and score

| Features | Responses (Scale) | Score |
|-----------------------------|-------------------------------------|-------|
| Best Eye Opening | Spontaneous | 4 |
| | To Speech | 3 |
| | To Pain | 2 |
| | None | 1 |
| Best Verbal Response | Orientated | 5 |
| | Confused conversation | 4 |
| | Inappropriate Words | 3 |
| | Incomprehensible Sounds | 2 |
| | None | 1 |
| Best Motor Response | Obey Commands | 6 |
| | Localise pain | 5 |
| | Normal Flexion (Withdrawal to pain) | 4 |
| | Abnormal Flexion | 3 |
| | Extension of limbs to pain | 2 |
| | None | 1 |
| Total Score | 3/15 – 15/15 | |

Table 21.2 Degree of head injury by Glasgow Coma Scale score

| Degree of Head Injury | GCS Score |
|-----------------------|-----------|
| Mild | 13 – 15 |
| Moderate | 9 – 12 |
| Severe | 8 or less |

- Refer all patients suspected of Head Injury to surgeon.
- Patients with severe head injury need intubation and ventilation. Therefore anaesthetist must also be informed.

21.4.4 Spinal Injury

Suspect spinal injury in all unconscious patients and patients with multiple injuries until proven otherwise by x-ray and clinical evaluation. It is important to assess the entire spine.

Management

- ABCDE and Resuscitation
- In-line Immobilisation of the spine. Apply rigid neck collar and stabilise patient in supine and neutral position on a hard back board.
- In conscious patients undertake sensory and motor examination and determine level of injury
- X-ray Spine (AP and Lateral views)
- Refer to Surgeon

21.5 MISCELLANEOUS SURGICAL PROBLEMS

21.5.1 Trauma

Common causes of trauma in Nauru include motor bike accidents, assaults and self-inflicted injuries. The majority is alcohol related. Most cases are minor soft tissue injuries and only require treatment in the Emergency and Outpatient Department.

Cases that require hospitalisation and referral to surgeon include

- Multiple Injuries
- Shock
- Suspected head injury

- Suspected airway, chest and intra-abdominal injuries
- Suspected spinal injuries
- Fracture and dislocations
- Extensive soft tissue injuries including deep lacerations and tendon, nerve and vascular injuries

Management (according to PTC and EMST principles)

- Primary survey (ABCDE) and resuscitation
- Including monitoring, IDC and NGT insertion
- Secondary Survey – Careful methodical examination from head to toe and the back
- Including investigations like X-rays, FBC, UEC and X-match
- Ongoing re-evaluation
- Refer to Surgeon

21.5.2 Burns

Management

Primary survey (ABCDE) – Assessment of:

- Airway and Breathing. Beware of inhalation injury and rapid airway compromise.
- Circulation: Fluid replacement
- Disability: Compartmental syndrome
- Exposure: Percentage area of burns

Estimate extent of burns – Depth and percentage body surface area. Do not include erythema or superficial burns.

- Use ‘rule of nines’ to calculate total size of partial and full thickness burns in adults. In uneven areas estimate using palm of the patient. The outstretched palm with the fingers is roughly 1% of the Total Body Surface Area (TBSA)
- In infants and children use the Lund and Browder chart to calculate burn size.

Secure good IV access and administer fluid therapy:

- Burns greater than 15% in adults and greater than 10% in children warrant IV fluid replacement
- Use crystalloids, preferably Hartmann’s solution

- Calculate fluid requirement using the Parkland formula
Total fluid requirement in 24 hours
 $= 4\text{ml} \times (\text{total burn surface area (\%)}) \times (\text{body weight (kg)})$
- Half given in first 8 hours and the remaining half given in next 16 hours
- Children should receive maintenance fluid in addition
- Aim to maintain urine output of 0.5-1.0 ml/kg/hour in adults and 1.0-1.5 ml/kg/hour in children
- Adequate pain relief with morphine infusion
- Ensure prophylaxis against tetanus
- Insert IDC and monitor urine output
- Refer to surgeon

Criteria for hospital admission:

- Second or third degree burns greater than 10% TBSA in patients younger than 10 years or older than 50 years
- Second or third degree burns greater than 20% TBSA in persons of other age groups
- Second or third degree burns that involve the face, hands, feet, genitalia, perineum, or major joints
- Third-degree burns greater than 5% TBSA in persons of any age group
- Electrical burns, including lightning injury
- Chemical burns
- Inhalational injury
- Burns in patients with pre-existing medical disorders (e.g. psychosis, diabetes, chronic renal failure) that could complicate management, prolong recovery, or affect mortality
- Patients with burns and concomitant trauma (e.g. fracture, head injury)

21.5.3 Wound Management

Wounds range from simple to complex and from acute to chronic. Each has its own features that make caring for it a clinical challenge. Our role is to facilitate natural recovery through choices that promote healing and prevent complications.

Priorities in wound management

- Reducing or eliminating causative factors (pressure, shear, friction, moisture, circulatory impairment, and/or neuropathy)
- Providing systemic support for healing (blood, oxygen, fluid, nutrition, and/or antibiotics)
- Applying the appropriate topical therapy (remove necrotic tissue or foreign body, eliminate infection, obliterate dead space, absorb exudate, maintain moist environment, protect from trauma and bacterial invasion)

Remember!

- Do not do primary closure or suturing of contaminated wounds - which include human and animal bites
- Animal and human bites need aggressive debridement and treatment with antibiotics

Tetanus prophylaxis

- Consider in all wounded patients
- Below 10 years of age – *no tetanus toxoid required if fully immunised*
- 10–15 years – *if not given tetanus toxoid in the last 5 years, give one booster of 0.5ml IMI*
- Over 15 years – *if not received tetanus toxoid in the last 5 years, give 0.5ml IMI and repeat after 4 weeks*

21.6 OTHER COMMON SURGICAL PROBLEMS IN ADULTS**21.6.1 Acute Abdomen in Adults**

Signs and symptoms that suggest an acute surgical abdomen include:

- Severe or increasing abdominal pain with progressive deterioration
- Bile-stained or feculent vomitus
- Involuntary guarding or rigidity
- Marked abdominal distension
- Marked abdominal tenderness (localised or generalised)
- Rebound tenderness
- Signs of acute fluid or blood loss into abdomen

Common surgical causes

- Appendicitis
- Cholecystitis / cholelithiasis
- Peptic ulcer disease / gastritis
- Pancreatitis
- Bowel obstruction
- Abdominal trauma
- Strangulated hernia (umbilical / inguinal)
- Gynaecological causes (PID, Ectopic pregnancy, twisted ovarian cyst)

Initial Investigations

- Abdominal X-ray (erect & supine)
- Erect CXR
- USS of abdomen and pelvis
- Renal function test and serum electrolytes (UEC)
- Liver function test
- Serum Amylase
- FBC (Hb and WCC)

Management

- Keep Nil By Mouth
- IVF Resuscitation – correct dehydration and electrolytes
- NGT for free drainage
- Adequate analgesics (*Morphine or Pethidine*)
- Insert IDC and monitor urine output
- Start *antibiotics*
 - *Ampicillin 1gm q6h IV*
 - PLUS*
 - *Metronidazole 500mg q8h IV*
 - +/-*
 - *Gentamicin 5mg/kg once daily IV*
- Refer to surgeon

21.6.2 Bowel Obstruction

Suspect bowel obstruction in adult patients presenting with the following signs and symptoms:

- Abdominal pain
- Vomiting
- Constipation
- Abdominal distension

Common Causes

- Adhesions (following previous abdominal surgery)
- Hernia
- Faecal impaction
- Volvulus
- Tumour

Investigations

- Blood Tests – FBC, UEC, LFT
- X-rays – Erect CXR, AXR (supine and erect)
- USS Abdomen and pelvis

Management

- Keep NBM
- IVF Resuscitation – correct dehydration and electrolytes
- NGT for free drainage
- Adequate Analgesics (*Morphine or Pethidine*)
- Insert IDC and monitor urine output
- Start antibiotics:
 - *Ampicillin 1gm q6h IV*
 - PLUS*
 - *Metronidazole 500mg q8h IV*
- Refer to Surgeon

21.6.3 Soft Tissue Infections

Most are self-limiting and easily treated with local measures and antibiotics. However, in diabetics and immunosuppressed patients they can be life-threatening, therefore prompt diagnosis with aggressive surgical debridement and systemic antibiotic may be required.

Cellulitis and Erysipelas

Presents initially as rapidly expanding, tender, erythematous, firm area of skin. Systemic signs and symptoms can eventually evolve. Common

causative organisms are group A β -haemolytic *Streptococcus* species and *Staphylococcus aureus*.

Management

- Admit ward for IV antibiotics if having fever and systemically unwell
- Antibiotics:
 - *Ampicillin 1gm IV q6h*
OR
 - *Cloxacillin 1gm IV q6h*
OR
 - *Cephazolin 1gm IV q8h*
- Analgesics
- Rest and elevate limb
- Refer to Surgeon

Abscess

- Presents with signs and symptoms of inflammation with induration and fluctuance
- Common causative organism is *Staphylococcus aureus*
- In immunosuppressed patients gram-negative organisms (*Klebsiella*, *Enterobacter* and *Proteus* species) can be involved
- Abscess needs surgical drainage

Management

- Antibiotics – *Cloxacillin 25 – 50mg/kg q6h orally or IV*
- Analgesics
- Refer to Surgeon for incision and drainage

Necrotising Fasciitis

- Present with signs and symptoms of cellulitis but the patients are profoundly ill and toxic
- Important to recognise early and treat. It needs aggressive treatment and surgical debridement
- Causative agents are usually polymicrobial and include both anaerobes and aerobes

Management

- IVF Resuscitation

- Antibiotics:
 - *Ampicillin 1gm IV q6h*
PLUS
 - *Metronidazole 500mg IV q8h*
PLUS
 - *Gentamicin 5mg/kg IV once daily*
- Blood Investigations – FBC, UEC, LFT
- Blood Culture
- Refer to Surgeon

21.6.4 Surgical Antibiotic Prophylaxis

Orthopaedic Procedures

- “Clean” procedures e.g. internal fixation of bones:
 - *give Gentamicin 5mg/kg as a single daily dose for 2 days*
(adjust if renal function impaired)
OR
 - *Cloxacillin 1g IV 6- hourly for 24 hours*
OR
 - *A combination of cloxacillin and gentamicin*

If wound has the chance of being contaminated with *C. perfringens* (gas gangrene), *ADD benzyl penicillin 1 megaunit 6-hourly, IV for 5 days.*

Oropharyngeal and thoracic surgery

- *Give cephazolin 1gm IV at induction*

Genitourinary

- If no pre-existing infection, give:
 - *Ampicillin 1g IV*
PLUS
 - *Gentamicin 5mg/kg IV at induction*
- If pre-existing infection, *give and continue same antibiotics as patient is already receiving based on urine culture and sensitivities.*

Caesarean section

- Give:
 - *Ampicillin 1gm IV or Cephazolin 1gm IV before skin incision*

PLUS

- *Gentamicin 5mg/kg IV slowly before skin incision*

Gynaecological surgery – Hysterectomy, termination of pregnancy

- Either
 - *Ampicillin 1-2gm IV*
 - OR**
 - *Cephazolin 1gm IV*
 - PLUS**
 - *Metronidazole 500mg IV at induction of anaesthesia*

Elective gastro-duodenal, biliary, colonic or appendix surgery

- *Give ampicillin 1-2G IV*
- If major colonic surgery, **ADD** *metronidazole 500mg IV at induction*

Lower limb amputation

- In non-diabetic, give:
 - *Benzyl penicillin 2 megaunits IV*
 - OR**
 - *Cloxacillin 1-2gm IV 6-hourly starting at induction and continued for 48 hours*
 - PLUS**
 - *Metronidazole 500mg IV at induction followed by 500mg IV q8h for 48 hours*
- If amputation is for diabetic sepsis:
 - ADD**
 - *Gentamicin 5mg/kg IV slowly at the time of induction as a single dose*

Intra-abdominal infections

e.g. cholecystitis, cholangitis, diverticulitis

- Culture and sensitivity are often not available. It is important to use antibiotics that cover the patient for gram negative and anaerobic infections.
- Intestinal *Streptococci* (*S.faecalis*) may also play a part in the infection.

- If no culture result is available to guide treatment, give *gentamicin 5mg/kg IV slowly as a single dose – repeated as a daily single dose over the next three days in the presence of normal renal function*. If renal function is impaired, consult with physician for advice about dosage. See also Section 18.7.3 (dose frequency of gentamicin).
 - *Gentamicin 5mg/kg IV slowly (over 20 minutes) as a single dose*
PLUS
 - *Metronidazole 500mg IV q8h (convert to oral when improved) for 7 days*
PLUS
 - *Ampicillin IV 6-hourly for 7-10 days (convert to oral amoxicillin 500mg tds when patient is able to take oral medication)*

22 PALLIATIVE CARE

Palliative care aims to improve the quality of life of patients and their families when facing life-threatening and terminal illness, through the prevention and relief of suffering, by means of the early identification and treatment of pain and other problems, be they physical, psychosocial or spiritual. This service is not developed in a formal way in Nauru at present and most palliative care is given by the patient's family group and friends.

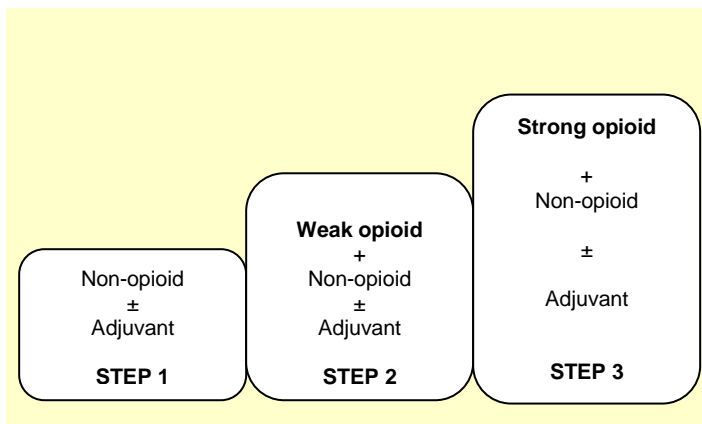
It is a multi-disciplinary task which, when fully developed, requires the co-operation and participation of the clinician, nurse, other allied health workers (pharmacist, dietician, psychologist, physiotherapist), family members, community groups, volunteers and last but not the least, pastoral care staff and chaplains.

The goal of this multi-disciplinary team is to provide care that leads to the achievement of the best possible quality of life for patients and their families and friends.

This STG will mention only specifically medical interventions.

22.1 PAIN MANAGEMENT IN TERMINAL CASES

Figure 22.1 The WHO analgesic ladder



22.1.1 Step 1

Non-opioid analgesic ± adjuvant.

- A non-opioid is used for analgesia on the first step of the ladder. This is usually *oral paracetamol 1g 6-hourly*. An adjuvant might be *amitriptyline for neuropathic pain*.
- An alternative to paracetamol would be a NSAID. At the same time, the NSAID could be adjuvant therapy if the pain is originating from the bone. People with high risk of gastrointestinal side effects should also get *oral ranitidine, at 150mg at night*.
- If this is not effective, move to step 2

22.1.2 Step 2

Weak opioid (e.g. codeine) + step one analgesic ± adjuvant.

- Recommended dose of *codeine is 30-60mg every four hours up to a max of 240mg daily*.

- **Note:** About 10% of the population respond poorly to codeine due to deficiency of liver enzymes that convert the codeine to its active metabolite
- If pain is not controlled by this action, move to step 3

22.1.3 **Step 3**

Strong opioid like morphine + non-opioid (in step 1) ± adjuvant.

- *Start with morphine elixir at 5mg orally 4-hourly and stop the weak opioid*
- *If a weak opioid was not taken initially, start morphine at 2.5-5mg every four hours*
- *Elderly, cachectic and renal failure patients should also be started at 2.5-5mg orally every four hours*

22.1.4 **Dose Adjustment**

- Switching to slow release preparations of morphine can be done as long as the total daily dosage of morphine is the same
- Titration of morphine dose is slowly done upwards until effective pain control is achieved. There is no upper dose for morphine unless the patient suffers from distressing and uncontrollable adverse effects.
- Opioid tolerance and dependence should never be barriers to giving morphine to achieve optimum pain relief. Any increase of need for morphine is usually due to the disease process and not tolerance.

22.1.5 **Management of Opioid-Induced Adverse Effects**

Constipation

- Inevitable with morphine use
- Starting a laxative at the same time as the morphine reduces future problems of faecal impaction
- Constipation should be prevented by giving regular stool softener PLUS stimulant, titrated to maintain the patient's normal bowel opening

Nausea and drowsiness

- Nausea and vomiting is experienced by two thirds of patients started on morphine; this usually resolves within a few days. An antiemetic can be given during this time, e.g.:
 - *Metoclopramide 10mg orally tds.* However, this should not be given if there is intestinal colic, especially in association with bowel obstruction.
 - *Haloperidol, 0.5-1mg at night is an appropriate alternative*
OR
 - *Prochlorperazine 5-10mg orally every six hours*
 - *Dexamethasone 2-8mg every 8 hours can be effective in intractable nausea and vomiting*
- Drowsiness is common during the first week of starting morphine and patients should be advised against driving during this time

Opioid toxicity

Classic signs of opioid toxicity include:

- Pinpoint pupils
- Hallucinations
- Drowsiness
- Vomiting
- Respiratory depression
- Confusion
- Myoclonic jerks

These occur when the dose is increased too rapidly, in renal impairment, poor response to morphine, or where an adjuvant therapy has caused pain relief and baseline morphine dose has not been reduced.

When toxicity signs occur, morphine should be stopped and started at lower dose later. If there is dehydration, IV fluid can dilute the morphine; reducing the active level and signs of toxicity, much more quickly. The delirium symptoms of toxicity may be treated with *haloperidol* while the toxicity resolves.

Respiratory depression rarely occurs unless excessive dose of morphine was given. *Naloxone can be used in this situation at a dose of 20µg every two minutes until the respiratory rate is satisfactory.*

22.1.6 Other Symptoms in the Terminally Ill

Dyspnoea

- Can be caused by anaemia, heart failure, COPD, chest infection, pericardial effusion, anxiety and superior vena cava obstruction
- Simple non-specific measures can produce relief. These include sitting up in bed, oxygen, controlled breathing techniques and management of anxiety with a *benzodiazepine (like diazepam 5mg orally)*.
- Other specific causes should be treated accordingly

Cough

- Non-productive cough can be managed by using a *cough suppressant* unless there is dyspnoea. If it is due to tumour, *dexamethasone at a dose of 6-8mg daily* may be beneficial.
- Productive cough should be treated with *nebulised saline, physiotherapy and an expectorant*

Hiccups

- Rebreathing from a bag can be beneficial. Prolonged hiccups can be treated with *haloperidol 1.5mg oral 8-hourly to a max. of 9mg/day. Another alternative is chlorpromazine 25mg orally 8-hourly to a max. of 200mg/day.*
- *Metoclopramide, 10mg oral 8-hourly to reduce gastric distension*
- *Anti-epileptics such as carbamazepine or sodium valproate can be used if the hiccup is due to an intracranial disease*

Pruritis

- Apply a surface cooling agent (such as an appropriate aqueous skin lotion)
- Use a soap substitute
- *Give oral antihistamine like promethazine*
- *Use rifampicin for chronic cholestasis*
- *Use anxiolytics such as diazepam*

Retained Secretions (Death Rattle)

- Reposition the patient
- Exclude pulmonary oedema and treat appropriately with diuretic.

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pyogenes is characterised by skin 1% cream 1% cream