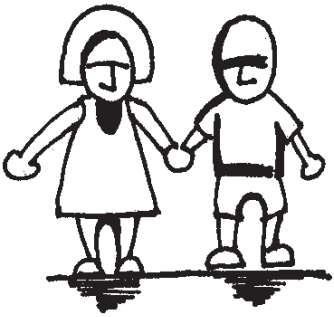
STANDARD TREATMENT MANUAL FOR CHILDREN



4th Edition 2017

A MANUAL FOR HEALTH WORKERS
SOLOMON ISLANDS

CONTACT DIRECTORY

AREA/DEPARMENT	PHONE
NRH Switch	23600
Paediatric ward ("Pikinini")	23600 Ext 237
Special care nursery	23600 Ext 215
Surgical team	23600 Ext 213
Emergency	23600 Triage Ext 225 Acute Area Ext 244 Resuscitation Ext 313
Obstetrics	23600 Ext 214
Medicines Information Centre (NRH Pharmacy)	24697 Sellcall: 5555
National Medical Stores: Reproductive and child health programs	30895 21202

National Referral Hospital Paediatrician on-call: 23600 Ext 237

ACKNOWLEDGEMENTS

- Dr Titus Nasi, Head of Paediatrics, National Referral Hospital
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Thanks to many health workers for their generous time in editing the final drafts of this Manual. Their contributions have been very valuable and have helped make this manual relevant and user-friendly.

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PREFACE

This is the fourth edition of the Solomon Islands Standard Treatment Manual and is the most widely used reference for the management of childhood conditions in this country. It is used at every level of the health system, and is an easy to use; first point of reference for all health workers. These guidelines are specifically directed towards the most common diseases affecting children in the Solomons.

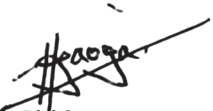
The Solomon Islands is a young nation with 41% of the population under 15 years of age. Whilst significant improvements in medical care have been made, there is still scope for better outcomes for sick young children. The Government of Solomon Islands, through the Ministry of Health and Medical Services endorses this manual and supports it as a tool for achieving the Sustainable Development Goals protecting the rights of young children to good health.

This edition has undergone major revisions and updates. The Standard Treatment Manual steering committee broadened the content included in these chapters, reflective of the increased capacity of health workers. Specific updates include a greater focus on communication and referral pathways, transfer and admission guidelines. Pharmacy and medicine administration instructions have been expanded, with a greater emphasis on dosage by weight, rather than dosing ranges. The neonatal section has been broadened in its scope, in line with changes in practice for Early Essential Newborn Care.

These guidelines are an important starting point for the assessment and treatment of sick children and newborns. There are references to other resources throughout this manual, in particular the WHO pocketbook 2nd edition. This manual is consistent with the new Solomon Islands antibiotic guidelines, the Solomon Islands tuberculosis guidelines, and WHO malnutrition recommendations.

I would like to take this opportunity to thank the committee of doctors, pharmacists and nurses who revised this manual. In particular Dr Nasi (Head of Paediatrics at the National Referral Hospital) and the entire paediatric team at NRH, doctors from the Centre for International Child Health at the University of Melbourne and NRH pharmacy representatives. I would like to gratefully acknowledge UNICEF Pacific who supported the funded the revision and printing.

I request all health workers to adhere and comply with the standards outline in this book.



Dr Divi Ogaoga
Director
Reproductive and Child Health Division
Ministry of Health and Medical Services

CONTENTS

ABBREVIATIONS

ACT	artemisinin-based combination therapy
BBA	born before arrival
CBG	capillary blood glucose
CSF	cerebrospinal fluid
CXR	chest x-ray
DPT	diptheria-pertussis-tetanus (triple antigen)
EBM	expressed breast milk
ECG	Electrocardiogram
ETT	endotracheal tube
G6PD	glucose 6-phosphate dehydrogenase
Hb	Haemoglobin
HIV	human immunodeficiency virus
IMCI	integrated management of childhood illnesses
IO	Intraosseous
IM	intramuscular injection
IV	intravenous injection
LD	loading dose
MD	maintenance dose
MPS	malaria parasite slide
MUAC	Middle upper arm circumference
NAP	nurse aid post
NGT	Nasogastric tube
NMS	National Medical Stores
NRH	National Referral Hospital
ORS	oral rehydration salts
PPD	purified protein derivative (test for TB)
PR	per rectum
RDT	rapid diagnostic test
ReSoMal	Rehydration solution for malnutrition
RHC	rural health clinic
RR	respiratory rate
SC	subcutaneous injection
SIADH	syndrome of inappropriate anti diuretic hormone
STI	sexually transmitted infection
TB	Tuberculosis
TFM	treatment failure malaria
UNICEF	United Nations Children's Fund
URTI	upper respiratory tract infection
UTI	urinary tract infection
VDRL	venereal disease research laboratory
WOB	Work of breathing
WHO	World Health Organisation
RUTF	Ready to Use Therapeutic Food

INTRODUCTION

DIFFERENT TREATMENTS

- The treatment regimens in this book are simple, safe and effective.
- They are for use in all health facilities in Solomon Islands, including hospitals.
- Doctors *sometimes* may use different treatments from those outlined in this book, depending on individual circumstances of the patient and availability of facilities and medications

WHEN TO USE THIS MANUAL

- This manual should be used whenever doctors, nurses or health workers in the Solomon Islands see sick children.
- It is important to check your diagnosis and carefully follow the treatment steps in this book
- This manual replaces all previous editions. Your old manual should be destroyed or put away as some treatments have changed or no longer recommended
- Supervisors and in-service trainers should go through the sections of this book whenever they give training to health staff on childhood diseases

HOW TO USE THIS BOOK

- A sick child may have more than one problem. Always use the 10-Step Check List for Children or the 7-Step Check List for Young Infants to avoid missing a problem that has not been noticed by the parents.
- Use the contents page to look up the diseases or conditions that the child has. Go to those sections of the book and decide on the severity of the problems and what treatments are needed.
- Always check drug doses in the Drug Dose Tables
- Please also refer to the other resources available including:
    - National Referral Hospital Paediatrician on-call (2360 Ext 237)
    - WHO Pocketbook of Hospital Care for Children (2nd Edition, 2013, the "blue book")
    - Solomon Islands Antibiotic Guidelines (1st Edition, 2015)
    - Early Essential Newborn Care Pocketguide
    - Call and speak with the National Referral Hospital Paediatrician on-call (23600, Ext 237)
    - Current standard treatment guidelines from Ministry of Health and Medical Services:
        - Tuberculosis
        - Malaria
        - HIV
        - Severe Acute Malnutrition

PAEDIATRIC RULES

1. IMMUNISE AT EVERY OPPORTUNITY

- Always check the Baby Clinic Book and immunise if the child is due or overdue. Refer to immunisation guidance and schedule.

2. **ADMIT CHILDREN WHO HAVE ANY OF THE FOLLOWING:**

- Intercostal recession or chest indrawing
- Severe dehydration
- Convulsion with fever
- Fever and not sucking or breast feeding
- Drowsiness, confusion, lethargy or unconscious
- Continued vomitting, abdominal pain or abdominal distension
- Oedema (swelling)
- Severe malnutrition
- Sudden onset of paralysis
- Swelling of limb or joint
- Under 6 months with whooping cough
- Stridor (noisy breathing)
- Swallowed poison
- Passing blood in the urine
- Vomits everything, vomiting blood
- Passing a lot of blood in the stool
- History of unconsciousness after head injury
- Suspicious injuries that do not fit the history given

3. ALWAYS WEIGH THE CHILD

- This is important for:
    - Giving correct fluid rates and medication dosage
    - Tracking weight loss or poor weight gain
    - Assessing dehydration
- Plot the weight on the weight chart in the child's clinic book

4. PROPER AND CAREFUL USE OF ANTIBIOTICS

- Do not give single doses of antibiotics or antimalarials when a full course is needed
    - To reduce the risk of ANTIBIOTIC RESISTANCE, always give the recommended course and encourage parents to give every dose

5. AVOID GIVING INJECTIONS UNLESS VERY UNWELL

- Always use a new needle and syringe when giving injections
- Contaminated needles may transmit HIV and other serious infections
- Intramuscular injections to children less than 2 years of age should be given in the upper and outer part of the thigh

6. ON PRESENTATION TO HEALTH FACILITY, ALWAYS:

- Weigh every child
- Measure the height or length of the child & the 'middle upper arm circumference' (MUAC)
- Record all the above details in the Baby Book
- Check and record all vital signs (including oxygen saturations if available)
- Check for up-to-date immunisation and plan for any catch-up vaccinations when child is well

THE 10-STEP CHECKLIST FOR CHILDREN

Follow ALL the steps for every child (>2 months)

STEP (1)➔	**IS THE CHILD TOO SICK? Check for General Danger Signs as follows:** • Unable to drink or breastfeed • Vomits everything • Convulsions • Very Lethargic or Unconcious:
	Give immediate treatment for diagnosis and ADMIT or REFER the child Continue steps 2 to 10
⬇	
STEP (2) ➔	**ASK ABOUT COUGH AND DIFFICULT BREATHING**
	Check for fast breathing, chest in-drawing and stridor
⬇	
STEP (3) ➔	**ASK ABOUT DIARRHOEA. CHECK FOR DEHYDRATION**
	Look for sunken eyes and check skin elasticity
⬇	
STEP (4) ➔	**ASK ABOUT FEVER**
	Look for signs of malaria, meningitis and other infections
⬇	
STEP (5) ➔	**ASK ABOUT EAR PROBLEMS**
	Look for signs of middle ear infection and mastoiditis
⬇	
STEP (6) ➔	**CHECK FOR ANAEMIA Look for pallor**
	If the child looks very pale, ADMIT or REFER
⬇	
STEP (7) ➔	**CHECK FOR MALNUTRITION**. Look for visible severe wasting or oedema of both feet ADMIT or REFER children with these signs Ask for BABY CLINIC BOOK to check the child's GROWTH Weigh the child and plot the weight on the age/weight graph
STEP (8) ➔	**Check IMMUNISATION record in BABY CLINIC BOOK**
	Give all due or overdue vaccines
⬇	
STEP (9) ➔	**ASSESS THE CHILD'S FEEDING**
	Give appropriate feeding advice
⬇	
STEP (10) ➔	**ASK ABOUT OTHER PROBLEMS**
	Look for skin sores and scabies Ask about worms. Give dose of Albendazole to the child every 6 months

DISCUSS WITH THE MOTHER / FATHER THE PROBLEMS THAT YOU HAVE FOUND, THE TREATMENT THAT YOU WILL GIVE AND WHAT THEY SHOULD DO

THE 7-STEP CHECKLIST FOR YOUNG INFANTS

Follow ALL the steps for every infant < 2 months

STEP (1)➔	**IS THE INFANT TOO SICK? Assess for TOO SICK signs:** • Unable to suck or breastfeed • Grunting • RR more than 60/min • RR less than 20 (or periods of apnea) • Weak or very fast (> 160/min) pulse • Severe chest in-drawing • Central cyanosis • Skin of arms and legs very cold • Convulsions Give immediate treatment and REFER or ADMIT the infant Continue Steps 2 to 8
↓	
STEP (2) ➔	**ASK ABOUT FEVER** Look for signs of bacterial infection or malaria
↓	
STEP (3)➔	**LOOK FOR JAUNDICE** Look for yellow eyes, skin and feet
↓	
STEP (4)➔	**ASSESS BABY'S WEIGHT** Weigh the baby and assess the growth curve
↓	
STEP (5)➔	**ASK ABOUT BABY'S FEEDING** Check feeding pattern: emphasize exclusive breast feeding
↓	
STEP (6)➔	**CHECK FOR MALFORMATIONS** Check mouth for cleft, feet for clubbing, back for spina bifida, genitali, anus
↓	
STEP (7))➔	**ASK ABOUT IMMUNISATIONS** Check the immunisation record and give vaccines that are due

DISCUSS WITH THE MOTHER / FATHER THE PROBLEMS THAT YOU HAVE FOUND, THE TREATMENT THAT YOU WILL GIVE AND WHAT THEY SHOULD DO

ADVICE FOR TRANSFERING PATIENTS

Please call and discuss Paediatric team at NRH for medical advice and for all patients requiring transfer.

When transfering patients consider

- Pain management
- Antibiotics
- IV Fluid management
- +/- Malaria treatment
- Oxygen supply
- Common newborn issues
- Referral letter and relevant treatment notes

1. **URGENT REFERRAL TO HOSPITAL**

AGE	Clinical Sign
Newborns	Birth-weight between 1-1.5 kg
	Birth-weight between 1.5–2.0 kg AND Respiratory distress or apnoea or sepsis
	Unexplained poor weight gain for more than 2 weeks after birth
	Birth asphyxia
	Respiratory distress
	Signs of shock (>3 seconds for capillary refill, weak pulse, cold hands)
	Infection
	Sepsis
	Meningitis
	Osteomyelitis / septic arthritis
	Any infection that does not improve after 48 hours of appropriate treatment
	Abdominal distension or bile (green) stained vomit
	Severe jaundice
	Congenital abnormalities: • Suspected congenital heart disease • Open abdominal lesions • Ambiguous genitalia • Imperforate anus
> 1 month	Emergency (danger) or priority signs that do not improve after 48 hours of appropriate treatment.
	Severe respiratory distress
	Obstructed breathing
	Convulsions
	Impaired consciousness / coma
	Difficulty feeding
	Central cyanosis
	Persistent vomiting
	Pallor
	Severe swelling of the feet or puffy eyes
	Signs of shock (>3 seconds for capillary refill, weak pulse, cold hands)
	Meningitis

	Unexplained fever for > 2weeks of appropriate and adequate treatment
	Unexplained weight-loss or malnutrition
	Tender and distended abdomen
	Dysentery
	Diarrhoea for longer than 2 weeks that does not improve with appropriate treatment
	Persistent bone/joint pain or swelling
	Surgical problems: • Intussusception (severe abdominal pain with bloody stool) • Burns • Appendicitis (sick child with severe right lower abdominal pain. May begin in the middle of the abdomen) • Severe injuries
	Unexplained recurrent infections
	Uncontrolled bleeding
	Passing urine a lot
	Sudden or progressive onset of paralysis
	Severe or unresolving jaundice
	Non-febrile convulsions that do not improve with anti-convulsants
	Hydrocephalus (abnormal increase in head circumference)
	Whiteness of the pupils of the eye(s)
	Sudden onset or progressive impairment of vision
	Poisoning

2. NON URGENT REFERRAL TO HOSPITAL:

- Children with slow development or who are poorly responsive
- Children with a persistent heart murmur
- Children with frequent asthma
- Malnourished children who do not respond to treatment for malnutrition
- Other children not responding to standard treatment
- Uncontrolled seizures

LIMIT THE USE OF INJECTIONS TO VERY SICK CHILDREN

- Most mildly or moderately sick children can take oral medicines
- When the child is very sick and unable to take anything oral, drugs should be given IV (or IM in some cases)
- When the child improves it is best to give oral treatment or by NGT (except for very young children with meningitis)

Advantages of giving ORAL treatment include:

- Kinder for children
- Safer with less complications than IV or IM injection
- No used needles and problems of safe waste disposal
- Allows some treatments to be given at home and gives parents the opportunity to be involved in treatment
- Less expensive

GIVING MEDICINES TO CHILDREN

- Always give dose based on a current weight
- Check children's doses with this book
- Doses should **NEVER** exceed the maximum adult dose
- Generally once a child is over 50kg and 12 years old they may receive the adult dose
- IV doses are not always equivalent to oral doses, check doses if the route of administration changes
- Read the 'notes' section in medicines reference books to find helpful information (e.g. best taken with food or important side effects to look for)
- Read orders carefully paying particular attention to the dose and units prescribed (e.g. mg OR mcg)
- If a dose prescribed requires more than one ampoule or one tablet - **double check the dose**

Practical tips

The child's family or carer should be shown how to give medicine to the child at home following these steps:

1. Wash hands well with soap and dry before touching the medicine
2. Carefully check label to make sure it is the **RIGHT** medicine, **RIGHT** amount and **RIGHT** time.
3. Always **keep medicines out of reach of children**
4. Always **seek medical help** when medication is taken accidentally or if given it the wrong way
5. Use clean, boiled then cooled water when making mixtures and measure the **RIGHT** amount

Oral medicines

i. Liquid preparations

- Always use a syringe to measure the dose
- Read doses and check measurements carefully – make it a habit to double check everything
- Shake mixtures before measuring out the dose
- Follow the storage requirements for the medicine, check if it needs to be kept in the fridge

- Do not add medicine to a drink or to a bottle. Give the medicine then allow the child to have a drink. If a child does not like the taste of a medicine squirt it into the side of the mouth towards the back and follow with a favourite drink

ii. Tablets or capsules
- Follow with water or a favourite drink
- For young chidren, many tablets can be crushed on a clean spoon and mixed with a little water or juice
- Some tablets should not be crushed or broken – check with your pharmacy officer or Medicines Information Centre (MIC) if you are not sure

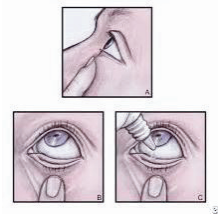
iii. Portion of a tablet or capsule
- Try to round doses (where appropriate) to an easily measured dose e.g. ¼, ½, full tablet
- If you cannot round the dose give the carers instructions and demonstrate how to get the correct dose
- For a portion of a dose crush and disperse the tablet in 10 ml of water and give the correct portion. Use a new tablet each time.
- To calculate the portion of mixture to give: (dose/tablet strength) x 10mL

  e.g. for a 40 mg dose of a 100 mg tablet:
  Crush and disperse the tablet in **10 mL** of water in a syringe
  Shake well
  Discard 6 mL of the liquid and give the child the remaining **4 mL**

For all oral medicines:
- Observe child to make sure medicine is not vomitted back up.
- If the medicine is vomited within **30 minutes** of taking, **repeat** the dose.

Rectal medicines
- Use of gloves is recommended when inserting a suppository
- Position the child on their left side with the upper leg bent and buttocks separated
- Moisten the suppository with lubricating jelly to help with insertion
- Insert gently to about half the length of the finger
  - For a bullet shaped suppository, insert the pointy end first
  - For a tear-drop shaped suppository, insert the larger rounded end first
- Hold the buttocks together for five minutes to stop the suppository being expelled
- Have the child lie down or sit for about 10 minutes
- Discourage the child from going to the toilet after the suppository has been given

Eye medicines
- Wash your hands
- Clean the eyes with a clean, damp towel
- Tilt head back - small children can lay on their back
- Make sure the dropper does not touch the eyes or eyelashes
- Pull down gently on lower eye lid
- Drop the solution or squeeze 1.5cm of ointment into eyelid
- Have the child close the eye for one minute
- Apply pressure to the inner corner of the eye to stop the loss of medication through the duct
- If giving more than one drop then wait five minutes in between drops to make sure everything gets absorbed



Note: eye ointments can temporarily blur vision

Ear medicines

- Put child on their side
- Straighten the ear canal
    - For infants the ear should be pulled back and down
    - For older children the ear should be pulled back and up.
- The child should remain on their side for five minutes to allow the drops to enter the ear
- Cotton wool can be used as a plug to prevent the drops from running out of the ear

GOOD DISPENSING PRACTICE

1. Take home medicine should always be given in dispensing bag
2. Only put one kind of medicine into each dispensing bag — do **not** mix two different types of medicine in the same bag
3. Always **label** medicines with:
    - Drug name, strength, quantity and expiry date
    - Patient name
    - Clear dosing instructions
    - Date of dispensing
    - Special Warnings such as '**may cause drowsiness'**
    - '**Keep out of reach of children'**
4. Help parents or carers to measure the dose at home
    - Mixtures – give a clean 5 mL or 10 mL plastic syringe, show the parent or carer how to measure out the dose and squirt it into the child's mouth (mark the dose measurement with a marker pen)
    - Tablets – cut all tablets into halves or quarters with a tablet cutter

Ask family to bring in child's medicines whenever visitng a nurse or doctor

SHORTAGE OF MEDICINES

If you run out of any of the medicines in this manual, contact your provincial pharmacy officer or National Medical Stores (NMS) urgently. Call a doctor or Medicines Information Centre (MIC) to advise on what drug to use instead.

Medicine Information Centre (MIC) Phone: 24697 Email: solomonmedinfo@gmail.com Sellcall: 5555 **National Medical Stores (NMS)** Phone: 30895
Write the number for **your** Second Level Medical Store here: ……

Avoid stock outs by placing your orders on time according to your order schedule. Always send **accurate** stocktakes to your second level medical store to avoid understocking or overstocking your shelves.

Check expiry dates regularly and order more stock for items that will expire soon. Remember **FEFO – first expired, first out** whenever dispensing stock.

ANAEMIA

- Haemoglobin carries oxygen in the blood
- Severe anaemia is defined as Hb less than 40g/l
- Anaemia is defined as low Haemoglobin (Hb) expected for age:

AGE	Hb less than
2 months	90
2 - 6 months	95
6 - 24 months	105
2 - 11 years	115
> 12 years	Girls – 120, Boys - 130

SIGNS & SYMPTOMS

- Pale skin, palms, gums/ tongue and conjuctiva (inside of eyelids)
- Weakness, confusion, restless or tiredeness
- Heart failure (fast heart rate, enlarged liver, fast breathing)
- Poor growth

CAUSES

- Low birth weight, low iron in mother during pregnacy
- Malnutrition, poor diet (iron and folate deficiency)
- Parasite infections (malaria, intestinal worms)
- Chronic or serious infection (tuberculosis, dysentery)
- Abormality of red blood cells
- Blood cancer (leukaemia)

INVESTIGATIONS

- Haemoglobin, full blood count, blood film, reticulocytes
- Malaria slide or RDT

MANAGEMENT

- Refer and admit the child:
    - If there is severe anaemia (Hb <40), oedema or the child is very unwell
    - Children with recurrent or persistent anaemia
    - With severe acute malnutrition

Treatment of anaemia

- Consider malaria treatment and give hookworm treatment with albendazole
- Give advice on good nutrition
    - Diet rich in meat, fish, chicken, peanuts, green leafy vegetables, beans, lentils
    - Eating raw, washed vegetables and fruit (such as paw-paw, mango, pineapple and orange) helps the body to absorb iron
- Give iron treatment (calculate doses carefully as Iron is toxic on overdose)
    - Re-check Hb after 4 weeks
    - Should be given orally if possible
        - Dose: **2 – 6 mg/kg/day <u>elemental</u> iron (max 200mg)**
        - There are different formulations available for iron. Always calculate on the amount of elemental iron in the mixture

For **Ferrous mixture 20mg/1ml** (contains 6mg of elemental iron in 1ml):

	WEIGHT (kg)			
MIXTURE	3 - 5.9	6 - 9.9	10 - 14.9	15 - 19.9
20mg/ml	1ml	2.5ml	4ml	5ml

- Plan to continue oral iron replacement for 3 months, recheck Hb
  - If no improvement, firstly check compliance with medication
  - Consider increasing dose
  - Consider alternative diagnosis (e.g chronic infection or disease)

- If the child cannot take oral iron, consider IM injection. Discuss with paediatrician.

BLOOD TRANSFUSION

Indications:

- Severe anaemia (Hb < 40 g/L)
- Heart failure or shock
- Severe infection
- Ongoing blood loss

When giving a blood transfusion:

- Cross-matched packed blood cells should be used. O^- for emergency
- Volume is approximately 20ml/kg
- To calculate the volume needed to increase Hb:
    - Volume of packed red cells = (desired Hb – actual Hb) x weight x 0.4
    - For example, to increase Hb from 30 → 100 in a 7 kg baby:
        - (100 – 30) x 7 x 0.4 = 196 ml of packed red blood cells
        - If using whole blood, multiply this volume by 1.5

- Blood should be transfused slowly over 4 hours
- Frusemide 1mg/kg IV should be given at the beginning of transfusion:
    - If signs of heart failure or
    - If there is normal circulating volume, such as in chronic severe anaemia
- Make sure the CORRECT bag of blood is given and never transfuse blood that has been out of the refrigerator for more than 2 hours.
- Make baseline recordings of temperature, respiratory rate and pulse rate, then observe patient closely every 15 minutes for transfusion reactions

MANAGEMENT OF TRANSFUSION REACTIONS

SEVERITY	SIGNS	TRANSFUSION	TREATMENT
MILD	Itchy rash	Slow rate	Promethazine 0.125mg/kg IM/IV (max 25mg) Continue if stable after 30 mins
MODERATE	Severe rash Fever Rigor Tachycardia	Stop	Hydrocortisone 4mg/kg IV (max 100mg) Promethazine 0.125mg/kg IM/IV (max 25mg) Nebulised salbutamol if wheeze If stable restart with new blood
SEVERE	Shock Hemolysis Bleeding Collapse	Stop	Maintain airway & give oxygen 0.9% saline bolus (20ml/kg) Give adrenaline 0.15ml 1:1000 IM Hydrocortisone 4mg/kg IV (max 100mg) Promethazine 0.125mg/kg IM/IV (max 25mg) Nebulised salbutamol if wheeze Consider and treat for sepsis

ASTHMA

- Asthma is caused by reversible tightening (bronchospasm) and inflammation in the airways
- Children with asthma usually have recurrent episodes of wheeze and cough that improves with salbutamol
- Think about asthma in any child older than 1 year who has shortness of breath, cough and wheeze.

SIGNS & SYMPTOMS

- The most important signs of severity are general appearance/mental state and increased work of breathing. Wheeze is a poor predictor of severity.
- Rapid breathing ("short wind"), tachycardia, difficulty talking
- Chest tightness, prolonged expiratory phase
- Improvement in symptoms with salbutamol
- Cough may be only at night or during activity
- Low oxygen saturations may be a late sign
- A silent chest is a pre-terminal sign

MANAGEMENT

There are two aspects to the management of asthma:

i. Treatment of an acute asthma attack
ii. Maintenance therapy for frequent & chronic asthma

A: TREATMENT OF ACUTE ASTHMA ATTACK

Most symptoms of asthma are improved with the use of salbutamol, which causes relaxation of airway muscle spasm. Salbutamol is best given by puffer and spacer:

- **Dose of Salbutamol using a 100mcg puffer and spacer**
  - **Less than 5 years: 6 puffs**
  - **More than 5 years: 12 puffs**
- A spacer can be easily made by cutting a hole at the base of a drinking bottle
- Salbutamol can be given by nebuliser in more severe attacks where there is difficulty co-ordinate inhalation with a puffer. Using a 5mg/ml solution - give 2.5mg (0.5ml) in <5yr old and 5mg (1 ml) >5yr old. Dilute to 4ml with normal saline.
- Salbutamol tablets (0.15mg/kg, max 4mg) can be used though are not as effective. *They should only be used when inhalers are not available*

SEVERITY	SIGNS & SYMPTOMS	INITIAL MANAGEMENT
MILD	Well in appearance Talking normally Slight shortness of breath Subtle or no increased WOB	**Salbutamol 1 dose = 6 puffs < 5 yo, 12 puffs > 5 years** Assess child in 20 minutes Good response: discharge with salbutamol as needed Poor response: treat as moderate
MODERATE	Well in appearance Short sentences Some increased WOB Tachycardia	Salbutamol puffer: 1 dose every 20 minutes Review after 3rd dose if no improvement treat as severe Oral prednisolone 1mg/kg
SEVERE	Agitated/confused/drowsy Moderate-severe WOB Tachycardia Short words/unable to talk May have silent chest (if poor air entry)	Salbutamol puffer: 1 dose every 20 minutes Oral prednisolone 1mg/kg (max 50mg) OR Hydrocortisone IV 4mg/kg (max 100mg) every 6 hours Consider Magnesium sulfate (first line) or aminophylline Consider Chest x-ray to exclude pneumothorax/foreign body Consider IV ampicillin if febrile IV fluids restricted to 2/3 maintenance

MEDICATIONS FOR SEVERE ASTHMA:

(i) Magnesium Sulfate ($MgSO_4$):

- Dosage: Magnesium sulfate 50% 50mg/kg (0.1 ml/kg) IV over 20 mins

(ii) Aminophylline:

- If not improving after a trial of Magnesium Sulfate
- Dosage 5mg/kg IV, given slowly in burette over 1 hour (loading dose)
- If required, the same dose can be repeated every 6 hrs as maintainence

(iii) Adrenaline:

- Consider adrenaline if not improving with the above measures and if very sick or $MgSO_4$/aminophylline not available
- Dosage: 0.01ml/kg 1:1000 (max 0.3ml) SC/IV
- Dose can be repeated once in 15 minutes if no improvement

DISCHARGE ADVICE:

- Discharge once not needing Salbutamol for 3 hours of longer
- Discharge home with a salbutamol weaning plan over the next 48 hours
- Give prednisolone (1mg/kg/day, max 50mg) each morning after food for 3 days
- Educate the parents on how to use an inhaler with a spacer (see below). Observe technique before discharge
- Create an 'Asthma Action Plan' for the family (see below)
- Any child with recurrent or severe episodes or interval should be referred to paediatric clinic to assess need for a steroid inhaler preventer (e.g: beclomethasone inhaler)

USING A SPACER

- A spacer is very important in children to distribute enough salbutamol to the lungs and is just as good as nebuliser
- A spacer can be sought from pharmacy or can be made by cutting a small hole in the bottom of a plastic bottle
- Holding the spacer device horizontally, give one puff into the spacer and allow the child to take several breaths
- Repeat until the desired dose of medicine is given

Cleaning instructions:

- Spacer should be cleaned once a week
- Wash in warm water containing a detergent or soap
- Do not rinse or wipe the space
- Allow to drip dry

ASTHMA MANAGEMENT PLAN

When sending a child with asthma home, it is useful to write down a plan for the parents to follow. This plan should tell the parents what medicine to give and when to come back

In their medical book, write for the parents

- What symptoms to look for: Cough, shortness of breath, increased breathing rate, wheeze
- How many puffs of **salbutamol** to give and how often
  - Child < 5 years 6 puffs, Child >5 yrs 12 puffs
  - Tell the parents to give salbutamol every 3 – 4 hours for a day or two, until the child improves
  - As the child improves, give 1 – 2 puffs of salbutamol
- Show the parents how to use the spacer. Watch them use it
- If you have started **prednisolone**, how much to give for how long
  - Usual dose is prednisolone 1mg/kg oral daily in the morning after food for 3 days
  - If the child is on a preventer (beclomethasone), also write this down

ASTHMA ACTION PLAN EXAMPLE:

Asthma Action Plan for: Tom Solomon (name of child)
Plan prepared by: P.Trician (name of doctor)
Plan prepared on: Tuesday, 21 July 2015 (date plan created)

If symptoms of Asthma (wheezing/chest-tightness/shortness of breath)

- For mild symptoms: take 2 puffs of salbutamol.
- For more severe symptoms: take up to 6 puffs of salbutamol
- Use your spacer if you have one. Repeat doses as often as you need to. Don't stop taking your preventer. If you need salbutamol more often than every 3 hours, see your doctor or go to hospital.

Current Episode

- Take your reliever as often as required until symptoms settle
- See your doctor or return to hospital if symptoms are getting worse or not settling
- Remember to continue your usual dose of preventer medication if you have one
- Take the prescribed dose of prednisolone for the next 2 days

Sport or Exercise

- If this usually makes you wheezy, before starting, take 2 puffs of salbutamol. You may need to repeat the dose if you also get symptoms during sport

When to seek help from the doctor/hospital

- If you have a bad attack or are worried
- If you need salbutamol more than every 3 hours
- If you get little or no relief from salbutamol
- Wheezing lasts more than 24 hours and is not getting better
- If you have a very severe attack: call an ambulance and take up to 6 puffs of salbutamol every 15 to 30 minutes
- Keep this plan readily available at all times. Please take this plan and all medications to all doctors visits. Give copies to others who are involved

B: MAINTAINENCE THERAPY: FOR RECURRENT OR CHRONIC ASTHMA

- It is useful to describe the pattern of asthma in a child who has regular attacks
- Asthma can be described as infrequent asthma, frequent asthma or chronic asthma:

Pattern	Symptoms	Symptoms at night:	Use of Salbutamol inhaler
Infrequent	Occasional	None	< Once a week
Frequent	Most days	< Once a week	Most days
Chronic	Every day	> Once a week	Multiple times every day

- In children with frequent or chronic asthma, a **preventer** medicine beclomethasone should be used.

Dosing: Beclomethasone inhaler (100mcg/puff)

Age	Dose of Beclomethasone
Under 2 years	1 puff twice daily
2 to 12 years	1 to 2 puffs twice daily

- When using Beclomethasone preventer
  - Best results are obtained when used with a spacer
  - It only works if used every day
  - To avoid oral thrush, children should rinse mouth with water after using beclomethasone
  - Ensure regular follow up with doctor

BREAST FEEDING

PROMOTE BREAST FEEDING

- It is safe, simple, readily available and cheap
- It contains all the nutrients that the baby needs to grow
- It reduces the risk of diarrhoea, pneumonia, malnutrition and other diseases
- Helps encourage bonding between mother and baby

FACTS ABOUT BREAST FEEDING

- Breast feeding should begin within the first hour after delivery
- The first yellow milk a mother makes (colostrum) should be given to the baby.
    - It should not be thrown away as it contains important immunoglobulins that are part of the baby's defense against infection
- The easiest and best schedule is 'on-demand' breast feeding
    - Infants who cannot demand feed (such as low birth weight or sick babies) should be fed every 2-3 hours
    - Infants who cannot suck on the breast (eg. very premature babies) should be given expressed breast milk (EBM) by cup/spoon or by NG tube
- Ideally all babies should be exclusively breast fed for the first 6 months
    - Solids should be introduced from 6 months
    - Cow's milk or powdered milk should be avoided before the age of 12 months because of the risk of iron-deficiency anaemia
- Breast feeding should continue for as long as possible.
- Breast feeding policies should be supported and upheld always
- Bottles with teats and baby cups with spouts should discouraged.
    - They are difficult to sterilize and may result in infections such as diarrhoea
- For facts about breast feeding in HIV positive mothers

DIFFICULTY BREAST FEEDING

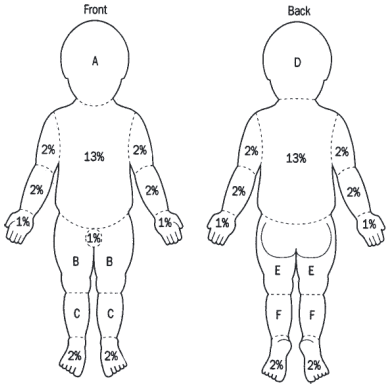
- Check the baby for underlying causes and treat:
    - Premature or low birth weight
    - Birth trauma
    - Infections (especially respiratory, meningitis, urinary tract infection)
    - Congenital problems such as cleft lip/ palate (feed with cup & spoon, refer to hospital) and trisomy 21
- Check the mother for any underlying problems (treat if possible, refer to midwife, paediatric nurse, paediatrician or obstetrician)
    - Maternal illness
    - Breast problem (cracked, flat or inverted nipples)
    - Adopting mother, never previously lactated
- Problems with 'inadequate' milk supply
    - Check baby is sucking frequently and well (check positioning/ attachment)
    - Check to see if breast milk supply is really inadequate. If poor milk supply:
        - Consider giving the mother a trial of metoclopramide 10 mg tds OR chlorpromazine 25mg tds (until the breast milk supply increases)
        - Encourage mother to suckle the baby frequently, even if there is no breast milk to begin with
    - Baby formula should only be used if prescribed by a doctor

BURNS AND SCALDS

Burns are an important cause of death in children

SIGNS & SYMPTOMS

- Assess how deep the burn is.
  - Partial thickness burns are pink or red, blistering, weeping and painful.
  - Full thickness burns are black or white, dry and not painful. These burns are more difficult to manage and the skin does not regenerate.
- Assess how much of the body is burnt
  - As an estimate, the size of the child's palm is approximately 1% of their total surface area
  - Use the picture below to calculate how much body area is burnt



	Age in years			
	0 yr	**1yr**	**5yr**	**10yr**
Head (A/D)	10%	9%	7%	6%
Thigh (B/E)	3%	3%	4%	5%
Leg (C/F)	2%	3%	3%	3%

- Children with a burn to the face (eyes/ eyelids, ears), neck, perineum or hands or >10% or deep burns should be referred urgently to hospital for admission.

CAUSES

- A burn is usually caused by a hot object coming into contact with the skin
- Chemicals such as acid can also cause burns
- Hot liquids like boiling water often cause partial thickness burns or scalds

MANAGEMENT

MANAGEMENT GOAL	NOTES
First aid	Immediately immerse burn in cold running water for 20 mins This is to reduce serverity, still of use up to 3 hours after the burn Do not place ice directly on the burn Irrigate chemical burns with large volumes of cool clean water
Assess burn area	Using the picture diagram above Burns < 10% : Give extra fluid by mouth (e.g. water, coconut, ORS) Burns > 10%: Refer to hospital urgently as they require IV fluids
Look for stridor	Or hoarse voice - this indicates upper airway inflammation Risk particularly in neck/facial burns
Give pain relief	Regular paracetamol and consider morphine (0.1mg/kg per bolus)
Clean & dress burn	Clean and debride away dirt or dead tissue with antiseptic solution/salt water Apply silver sulphadiazine (SSD) cream or any antiseptic cream daily
Fluids - 1st Day: **Fluids - 2nd Day**	Give an extra 4ml/kg for every 1% of area burnt PLUS maintenance fluids 1/2 of this extra fluid is given over 8 hours & remaining 1/2 over the next 16 hours Give 3/4 of the total fluids required in the first day
Give antibiotics	If the burn looks infected Cloxacillin IV/oral depending on severity Monitor for sepsis
Consider tetanus	First check tetanus status Give if not fully immunised, >5 yrs since last tetanus or uncertain history Use tetanus containing vaccine (e.g: dTpa/DTPa-IPV)
Encourage feeding	Begin oral feeding as soon as able Encourage a high calorie, high protein diet
Limb support	Reduced risk of contractures by: Splinting flexor regions to keep them extended Encouraging passive mobilisation of involved areas Refering child to physiotherapy and rehabilitation

Fluid Calculation Example:

Example: A 16 kg boy with a 19% burn to his body
Total fluid = normal maintence IV fluid (44) + extra fluid for burn
Normal maintanence fluid = (10 x 100) + (6 x 50)
= 1300 ml in 24 hours
= 54 ml/hr

Extra fluid = extra 4ml/kg for every 1% of area burnt
= 19% x 4 x 16
= 1216 ml total extra

1/2 of extra in first 8 hours = 608 ml in first 8 hours
= 76 ml/hr

1/2 of extra in next 16 hours = 608ml over next 16 hours
= 38 ml/hr for 16 hours

Total IV fluids
IV fluids for first 8 hours: = normal (54ml/hr) + extra (76ml/hr)
= 130ml/hr for 8 hours

IV fluids for next 16 hours = normal (54ml/hr) + extra (38ml/hr)
= 92ml/hr for 16 hours

CHILD ABUSE

DEFINITIONS

- Non-accidental injury: any soft tissue or bony injury that is not the result of an accident. This includes physical, sexual, emotional abuse and neglect
- Sexual abuse: any use of a child by an adult for sexual stimulation
- Emotional abuse: reducing self esteem, ignoring, isolating, rejecting or other behaviour that affects psychological, cognitive or social development of a child
- Neglect: failing to provide adequate care and a safe environment for a child

DIAGNOSIS OF CHILD ABUSE

- Be aware that child abuse is more common than we like to think and that it presents in many different ways
- Be alert to any inconsistencies in the history relating to an injury
- Make a careful examination of the whole child, not just of the presenting injury

Document all findings

- Be aware of suggestive injuries:
    - Physical examination
        - Lower limb fractures in a child who is too young to walk
        - Peri-orbital haematoma
        - Unusual burn marks
        - Multiple bruises on the back or buttocks
        - Brusing behind the ear
        - Retinal haemorrages
    - Imaging:
        - Multiple rib fractures (including old healing fractures)
        - 'Bucket-handle' fracture of the tibia
        - Multiple radial/ulnar fractures
- It may be difficult for young children to explain what has happened to them so use open, non-leading questions when child abuse is suspected

WHAT TO DO IF YOU SUSPECT A CHILD IS BEING MALTREATED OR NEGLECTED IN ANY WAY

- Refer all cases of suspected abuse to the hospital for further assessment
- Report all cases of suspected or proven abuse to the Social Welfare Division
- If you think a child is in danger of further abuse or injury you should admit the child, inform the Social Welfare Officer or paediatrician on-call as soon as possible
- Treat any physical injuries or sexually transmitted infections

The safety, health and well being of the child is of prime importance

Child abuse is EVERYBODY'S business

NO-ONE (including the parents) has the right to hurt a child in any way

COLDS/ URTI

- Colds or URTI (Upper Respiratory Tract Infections) are a common cause of fever and cough in children
- Mostly are viral and therefore do not usually require antibiotic treament

SIGNS & SYMPTOMS

- Fever
- Runny nose, sneezing
- Cough
- NO "danger signs": NOT fast breathing, NO chest indrawing, NO stridor

CAUSES

- Common colds are caused by viral infections

INVESTIGATIONS

- Consider malaria slide

MANAGEMENT

- Examine the child carefully
- If no fever present, reassure the parents and explain why the child is coughing
    - Explain that coughing helps to get rid of secretions in the chest and throat
    - It is not uncommon to have persistant coughing for up to a month (post viral cough)
    - If "no danger signs" or other causes of chronic cough (e.g: TB), it is ok to reassure the parents and arrange follow up
- If fever present
    - Check ears and treat otitis media if present
    - Check throat, if pus/white exudate and tender enlarged lymph nodes, on tonsils give:
        - Benzathine penicillin IM single dose
            - Child weighs < 20kg give 450mg (0.6 mega units)
            - Child weighs > 20kg give 900mg (1.2 mega units)

            OR
        - Penicillin V
            - Child < 10 years give 250mg orally every 12 hours for 10 days
            - Child > 10 years give 500mg orally every 12 hours for 10 days
    - Consider antimalarials
    - Give paracetamol if in pain
- Encourage oral fluids if child not eating well. Warm drinks can relieve a sore throat
- Do not give remedies containing atropine, codeine, mucolytics or alcohol as these may be harmful
- Teach the parents the "danger signs" warning signs of pneumonia (fast breathing and chest indrawing). Use an IMCI flip chart if you have one

CONJUNCTIVITIS, ORBITAL CELLULITIS (PRE-SEPTAL & SEPTAL)

CONJUNCTIVITIS:

- Conjunctival inflammation (thin layer that covers the white of the eye)

SIGNS & SYMPTOMS

- Bacterial conjunctivitis presents as irritated red eyes with purulent discharge stuck to the eye lid.
- Viral and allergic causes are usually non-purulent
- The eye may be watery and itchy
- May involve one or both eyes

CAUSES

- Infection: Bacterial or Viral
- Allergy
- Foreign body
- Blocked tear duct is common. Causes "sticky eye" with no inflammation

MANAGEMENT

- Refer to hospital any child with:
  - Who is unwell
  - Has pain or reduced vision
  - Any child with a foreign body
  - No improvement after 2 days of treatment

- *Mild bacterial conjuctivitis* (mild redness and minimal discharge)
  - Consider outpatient treatment
    - Chloramphenicol 0.5% eye drops 2 drops in the affected eye(s) every 2 hours for the first day then every 6 hours for a total of one week
    - If unavailable use tetracycline 1% eye ointment every 8 hours for one week
  - Advise carer to wash the eyes with clean salted water before apply drops/ointment. Also advise that conjuctivitis is contagious and to always wash hands with soap and water before and after touching the eye
  - If conjunctivitis fails to respond to initial treatment or is associated with more severe symptoms such as significant pain, loss of vision or photophobia treat as severe conjunctivitis and refer.

- *Severe bacterial conjuctivitis* (a lot of pus or redness or swelling of the eyelids)
  - Topical antibiotics alone are **insufficient**
    - Give cefotaxime 100 mg/kg IV or IM as a single dose

      OR
    - Ceftriaxone 50 mg/kg (maximum 1 gram) IV or IM as a single dose
    - If ceftriaxone/cefotaxime unavailable, use IM Benzylpenicillin 60mg/kg IV/IM every 8 hours for 5 days

- Severe conjunctivitis in a neonate (in the first 5 days of life) may be due to a STI
  - In neonates <1 month, replace ceftriaxone with **cefotaxime 50mg/kg** (max 2g) every 8 hours

- *Provide an STI pack for the mother and her sexual partner*

PRE-SEPTAL ORBITAL CELLULITIS:

- Soft tissue infection of the eyelids

SIGNS & SYMPTOMS

- Redness and warmth on the skin around eye
- Vision and eye range of movement usually normal

MANAGEMENT

- Cloxacillin 25mg/kg (max 500mg) orally every 6 hours for 7 days
  OR
- Amoxycillin/Clavulanate 25mg/kg (amoxycillin component, max 500/125mg) orally every 12 hours for 7 days

If severe, age < 5 years or not immunised treat as for *post-septal orbital cellultis*

POST-SEPTAL ORBITAL CELLULITIS:

- A less common, but more serious infection involving the eye socket with possible extension into the brain

SIGNS & SYMPTOMS

- Reduced vision
- Limited or painful eye movements
- Proptosis (bulging eyeball)

MANAGEMENT

- Admit child to hospital
- Commence IV/IM antibiotics as soon as possible
  - Cloxacillin 50mg/kg (max 2g) IV/IM every 6 hours
    AND
  - Ceftriaxone 50mg/kg (max 2g) IV/IM once daily
- In neonates <1 month, replace ceftriaxone with **cefotaxime 50mg/kg** (max 2g) every 8 hours
- Switch to oral therapy when good clinical response:
  - Amoxycillin/Clavulanate 25mg/kg (amoxycillin component, max 500/125mg) orally every 12 hours
- Total treatment duration usually 10 days

CONVULSIONS

Convulsions are sudden unintentional (involuntary) movements of the body.

SIGNS & SYMPTOMS

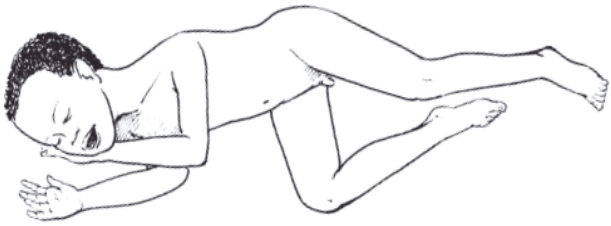
- Shaking of body; can be generalised (whole body shaking) or focal (part of body)
- Unresponsive, eyes rolling back, biting tongue or frothing of mouth
- Followed by post-ictal period (sleepiness after)

CAUSES

- Malaria
- Meningitis
- Hypoglycaemia
- Febrile convulsion
- Epilepsy
- Poisoning
- Head injury, hypoxic injury

INVESTIGATION

- Check blood sugar
- Malaria slide or Rapid Diagnostic Test (RDT)
- Consider lumbar puncture
    - Especially if signs of meningitis (fever, neck stiffness, bulging fontanelle)
    - DON'T do a lumbar puncture if the child is very sick or there are signs of raised intracranial pressure (unequal or unresponsive pupils, papilloedema, abnormal breathing)



How to position an unconscious child

MANAGEMENT

DURING SEIZURE	MANAGEMENT
Airway and Breathing	Clear airway; Place child on side and suction secretions if possible Make sure child is breathing; If not, give breaths using bag and mask Give oxygen
Glucose	Check blood sugar & treat as per the hypoglycaemia guideline
If seizure > 5-10 min	Give Midazolam IV/IO/IM 0.15mg/kg (max 10mg) Buccal/intranasal 0.3mg/kg (max 10mg) If Midazolam is not available then give Diazepam IV 0.2mg/kg (max 10mg) OR PR 0.3mg/kg (max 10mg) **Never** give diazepam IM Drugs given rectally are best given using a syringe with feeding tube cut at a short length (insert 4-5cm into rectum)
If still fitting after 10 minutes	Give a second dose of midazolam/diazepam Do not give more than 2 doses of diazepam
If still fitting after 20 minutes	IM/IV **phenobarbitone** (loading 20mg/kg over 15 mins, max 1g) **OR** IV **phenytoin** (loading dose 20mg/kg over 60 mins) Ensure a good IV line as phenytoin is damaging if IV leaks into skin Ensure also it is given in a different line to diazapam
Once fitting stops	Check temperature. If fever, look for a cause of the fever Consider investigation and treatment for malaria Consider a lumbar puncture and treatment for meningitis Consider epilepsy in the child who has had previous seizures without fever

ONGOING SEIZURE CONTROL

Children with epilepsy usually require *maintenance* anticonvulsants

MEDICATION	DOSAGE
If less than 3 yrs:	
Phenobarbitone	2.5- 5mg/kg/day in 1 or 2 doses (max 240mg per day) Use: Generalised or partial seizures
Phenytoin	2–4mg/kg/day every 12 hours (max 300mg per day) Use: Generalised or partial seizures Not for use during pregnancy
If more than 3 yrs:	
Sodium Valproate	5mg/kg every 12 hours up to max 20 mg/kg (max 2g) every 12 hours Use: all types of epilepsy (generalised, partial, absence) Not for use during pregnancy
Carbamazepine	2.5mg/kg every 12 hours, can increase over 2-4 weeks to 10mg/kg (max 500mg) every 12 hours Use: Generalised, partial seizures

DIARRHOEA

- Children with diarrhoea become unwell due to loss of fluid and electrolytes
- Ask about frequency of stools, weight loss, number of days, blood in stools
- Weigh child carefully and record in health book. Refer to any previous recents weights to compare and to track any chronic weight loss
- Always examine for other illness especially pneumonia or meningitis. Consider investigation for malaria

SIGNS & SYMPTOMS

- If the child has any two of the signs in severe column, then treat as severe:

	DEGREE OF DEHYDRATION		
ASSESSMENT	**None**	**Some**	**Severe**
General appearance	Well, alert	Restless, irritable	Lethargic, floppy, unconcious
Eyes	Normal	Sunken	Very sunken & dry
Thirst	Drinks normally	Thirsty	Drinks poorly
Skin pinch	Returns quickly	Returns slowly (<2 secs)	Returns very slowly (> 2 seconds)
Capillary refill	<2 seconds	2-3 seconds	> 3 seconds
Weight loss	<5%	5-10%	>10%
MANAGEMENT	Outpatient treatment Encourage oral fluids	Consider admission NG/Oral fluids Zinc Sulphate	Admit IV fluid bolus 20ml/kg (0.9% saline) Rehydration fluids: NG ORS or IV fluids Zinc Sulphate Consider antibiotics for sepsis Consider antimalarials

NOTES

FLUID MANAGEMENT:

- If an IV can't be placed, insert an NG tube or intraosseous. Give the same volume
- When child improved, give oral or NG rehydration fluids as described below

OTHER MANAGEMENT:

- Check electrolytes on admission and daily whilst having severe diarrhoea
- Weigh child on admission and uses regular weights to monitor rehydration status
- **Zinc sulphate** for 14 days
  - < 6 months give 10mg orally once daily
  - > 6 months give 20mg orally once daily
- Antibiotics are NOT required for most cases of diarrhoea. If blood in stool:
  - Trimethoprim+sulfamethoxazole 4+20mg every 12 hours for 5 days

  AND
  - Metronidazole 10mg/kg (max 400mg) orally every 8 hours for 7 days

  OR
  - Tinidazole 50mg/kg (max 2g) orally once daily for 3 days

Oral Rehydration Salts (ORS):

- For moderate dehydration, give ORS (over four hours). Show the carer how to give the ORS very slowly with a teaspoon to infants to prevent vomiting.
- If the child vomits, wait 10 minutes and give the ORS more slowly
  - If the child vomits repeatedly, give IV fluids
  - If eyelids become puffy, stop ORS and review the child after 3 hours

Age	< 4 months	4 – 12 months	1 – 2 years	2 – 5 years
Weight	<6kg	6-10kg	11-12kg	12-19kg
ORS (ml)	200 – 400	400 – 700	700 - 900	900-1400

  - The child can go home if they can drink ORS well. The family should offer as much ORS as they can drink and after every watery stool.
- When making ORS:
  - Always use boiled and cooled water (or rain water)
  - Measure the exact amount of water required. Check directions on packet
  - Dissolve ORS packet completely in water
  - If possible keep in the fridge. Discard after 24 hours
  - Wash the utensil very well before using it again

- For severely ill children consider:
  - Ciprofloxaxin 15mg/kg (max 500mg) orally every 12 hours
    OR
  - Ceftriaxone 50mg/kg (max 2g) IV/IM every 12 hours for 3 days

- For Severe Acute Malnutrition give special re-hydration solution for malnutrition (ReSoMal)

HOME MANAGEMENT:

- Give the child **more fluids more often**. Any locally available home fluid should be used e.g: thin soups from boiled vegetables (rice water, sweet potato water, banana water), green coconut water or cooled boiled water
  - Give child as much fluid as they will drink and after every watery stool
  - Continue giving the extra fluids until the diarrhoea stops
- Give the child plenty of food to prevent undernutrition
  - Continue to breast feed frequently.
  - Give fresh fruit or mashed banana to provide potassium.
  - Give freshly prepared foods. Rice, sweet potato or taro mixed with vegetable and meat or fish are good. Cook and mash or grind food well
  - Encourage the child to eat; offer food at least 6 times a day
  - After the diarrhoea stops, give an extra meal each day for two weeks
- Ask the mother to bring the child back for review if
  - Many watery stools or repeated vomitting
  - Very thirsty or inadequately drinking or eating
  - Fever and unwell
  - Blood in the stool
  - Symptom's persist greater than 2 weeks
- Counsel family that due to inflammation of the gut, loose bowel motions may continue for up to 2 weeks however the diarrhoea should slowly improve.
  - If persistant, see prolonged diarrhoea (>14 days)

PERSISTENT DIARRHOEA – LASTING MORE THAN 14 DAYS

SIGNS & SYMPTOMS

- Non-improving diarrhoea for more than 14 days
- Check for signs of dehydration and sepsis

MANAGEMENT:

- Consider admission
- Rehydration with ORS as per dehydration guidelines
- Encourage extra food
- Look for signs of malnutrition and treat if present

Antibiotics:

- Metronidazole 10 mg/kg (max 400mg) every 8 hours for 7 days

OR

- Tinidazole 50mg/kg as a single dose

AND

- Albendazole once daily for 3 days (do not give to children < 6 months of age)
- Child weighs < 10kg give 200mg
- Child weighs > 10kg give 400mg

- Zinc sulphate for 14 days
  - Child < 6 months give 10mg orally once daily
  - Child > 6 months give 20mg orally once daily

- Consider investigation and treatment for malaria
- Consider multivitamin treatment for 2 weeks
- Consider lactose intolerance:
  - May be temporary after an episode of gastroenteritis
  - Look for redness & inflammation around the anus
  - Avoid withholding breastfeeding unless absolutely necessary and seek further paediatric advice

Children with diarrhoea need more fluids more often

Discuss ways of preventing diarrhoea

(hand washing, using boiled water, using toilets)

Use an IMCI flip chart if you have one

DIARRHOEA WITH BLOOD - DYSENTERY

If only small specks of blood are present and the child is not very sick, no antibiotics are usually required although the child should be observed carefully

SIGNS & SYMPTOMS

- Very sick (fever, unwell, abdominal pain)
- Blood and mucus mixed throughout the stool.
    - Small amounts of blood in the stool for more than 3 days
    - Large amounts of blood in the stool
- Children with malnutrition are at greater risk of complications

MANAGEMENT

- Rehydrate according to severity of dehydration
- Give zinc sulphate for 14 days
    - Child < 6 months give 10mg orally once daily
    - Child > 6 months give 20mg orally once daily

- Consider antibiotic treatment if significant blood in stools or systemically unwell:
    - Co-trimoxazole 4mg/kg (trimethoprim component) every 12 hours for 5 days (max 160mg)

    AND
    - Tinidazole 50mg/kg (max 2 grams) daily for 3 days **OR** metronidazole 10mg/kg tds for 5 days (max 400mg) if tinadazole not available

- For severely ill children use:
    - Ciprofloxaxin 15mg/kg (max 500mg) orally every 12 hours
    - OR Ceftriaxone 50mg/kg (max 2g) IV/IM every 12 hours for 3 days

- If prolonged diarrhoea consider albendazole orally once daily for 3 days
    - Child weighs < 10kg give 200mg
    - Child weighs give 400mg
    - *Do not give albendazole to children < 6 months of age*

- Consider broad-spectrum antibiotic cover if evidence of sepsis in neonates and young infants and treat as per guideline

- Consider MPS or RDT and treatment with antimalarials

- Consider intussesception (blockage of the bowel), particularly in children aged 2 months to 2 years.

FEVER

- Fever is defined as an axillary (under the arm) temperature greater than 37.5°C
- Fever in itself is not dangerous as it helps the body to fight infection

CAUSES

The common causes of fever in children are:

- Common viral infections: upper respiratory tract infection, measles, gastroenteritis
- Common bacterial: pneumonia, meningitis, otitis media, urinary tract infections
- Other: Malaria, tuberculosis

INVESTIGATIONS

- Consider blood film or rapid diagnostic test for malaria parasites
- If possible, collect and test a urine sample

MANAGEMENT

- Treat the cause of the fever
- Consider antimalarials
- Consider giving paracetamol if fever above 38ºC **AND** the child is irritable
    - Dose: 15mg/kg (max 1g) every 4 to 6 hours (maximum 4 doses in 24 hours)
    - *Do not use aspirin in children for fever*
- Give extra fluids

Consider the following causes for fever greater than 7 days:

- Abscess
- Salmonella infection
- Infective endocarditis
- Rheumatic fever
- Tuberculosis

Fever helps the body to fight infection

Try to find and treat the cause of the fever

GLOMURULONEPHRITIS

Glomerulonephritis is inflammation of the kidney. Children with glomerulonephritis usually have oedema (swelling). They may also have blood or protein in their urine or high blood pressure. There are two main patterns: acute nephritis (sometimes called nephritic syndrome) and nephrotic syndrome.

Acute Nephritis

SIGNS & SYMPTOMS

- Haematuria (blood in urine)
- Oliguria (decreased urine output)
- Hypertension
- Oedema

CAUSES

- Inflammation of the kidney
- A common cause is Acute Post Streptococcal Glomerulonephritis (PSGN).
    - Usually follows a streptococcal skin or throat infection by 2 – 4 weeks

INVESTIGATION

- Urine dipstick and microscopy (looking for protein and red cells)
- Renal function and electrolytes
- Consider ASOT, Anti-DNAse
- Consider renal ultrasound

MANAGEMENT

- Admit and refer the child
- Monitor urine output and asses fluid clinically overloaded
- If poor urine output, assess hydration
    - If dehydration, carefully rehydrate
    - If signs of clinical overload then consider fluid restriction (1/2 maintenance) & frusemide 0.5-1mg/kg IV/PO
- Treat hypertension (refer to age-appropriate reference graphs):
    - Nifedipine
        - If child < 2 years give 2.5mg every 12 hours
        - If child > 2 years give 5mg every 12 hours

      OR
    - Enalapril
        - 0.1mg/kg/day in 1 or 2 doses gradually increasing to max 1mg/kg/day (usual adult dose 20mg to 40mg per day)
- Give **benzathine penicillin IM** as single dose to treat any underlying streptococcal infection:
        - Child weighs <20kg give 450mg (0.6 mega units)
        - Child weighs <20kg give 900mg (1.2 mega units)

PREVENTION

- Treat scabies/ skin infections in all children as this prevents the streptococcal infection that causes acute nephritis
- Always examine and treat the brothers and sisters of a child with acute nephritis for scabies/ skin infections

Nephrotic syndrome

SIGNS & SYMPTOMS

- Proteinuria (protein in urine, +++ or ++++ on dipstick)
- Hypoalbuminaemia
- Oedema: pitting of limbs/sacrum, periorbital, abdominal ascites, pleural effusions
- Complications: hypovolemia (decreased urine output, dizziness), infection and thrombosis

CAUSES

- Inflammation and damage to the kidney, causing protein loss in the urine. Reduced amount of protein in the blood causes oedema
- Main causes *Minimal Change Disease (MCD)* or *Focal Segmental Glomerulonephritis (FSGS)*

INVESTIGATION

- Dipstick for protein, blood & spot urine protein/creatinine ratio (>0.2 g/mmol)
- Blood tests for FBE, albumin, renal function (urea, creatinine and electrolytes)
- Consider testing for ANA (SLE) and Hepatitis B (if risk factors)
- Consider other causes of generalised oedema including malnutrition, liver disease, protein-losing enteropathy and congestive cardiac failure

MANAGEMENT

- Refer the child for admission to hospital
- Manage the oedema:
  - Low salt diet, daily weights and daily urine dipstick
  - Strict fluid balance with close attention to volume status
  - Strict bed rest not indicated as it increases further the risk of thrombosis
  - If severe oedema present, give frusemide 1mg/kg IV or spironolactone 1 mg/kg
- Prednisolone:
  - To induce remission, followed by a slow wean to reduce the risk of relapse. Symptoms usually improve within 2 weeks of starting treatment
  - Body surface area:

$$\text{BSA } (m^2) = \sqrt{\frac{\text{Ht (Cm) x Wt (kg)}}{3600}}$$

  - Dosage:
    - 60 mg/m^2 daily (max 60mg/day) for 4 weeks. Then:
    - 40mg/m^2 alternate day for 4 weeks
    - 20mg/m^2 alternate day for 4 weeks
    - 10mg/m^2 alternate day for 4 weeks
    - 5mg/m^2 alternate day for 4 weeks
- Whilst treating with prednisolone, prescribe
  - Isoniazid 10 mg/kg (max 300mg) as prophylaxis for tuberculosis**AND**
  - Ranitidine2mg/kg (max 150mg) every 12 hours (**OR** a PPI) as prophylaxis for prednisolone induced gastritis
- To minimise risk of infection, prescribe
  - Penicillin V until oedema resolves
    - Child < 5 years give125mg orally every 12 hours

- Child >5 years give 250mg orally ever 12 hours Ensure immunisations, particularly pneumococcal vaccine, are up-to-date

Relapse:

- 80-90% will respond to initial steroid therapy however 80% of these will have one or more relapses and 50% will have frequent relapses
- Relapses often associated with intercurrent infection
- Re-treat as above if proteinuria > 3+ for 3 consecutive days and discuss with paediatrican.

HIV INFECTION

- HIV (Human Immunodeficeny Virus) causes AIDS (Aquired Immune Deficiency Syndrome)
- If you suspect HIV, refer the child to your Medical Officer or paediatrician

SIGNS & SYMPTOMS

	CLINICAL FEATURES
INVESTIGATE FOR HIV	Unexplained persistent or recurrent fever Persistent diarrhoea (more than 2 weeks) Severe oral thrush (palate, gums, buccoal mucosa). Malnutrition which does not respond well to treatment ≥3 serious bacterial infections in 12 months (e.g: pneumonia, meningitis) Generalised lymphadenopathy or hepatomegaly with no apparent cause Recurrent chest infections, chronic lung disease TB responding poorly to treatment Progressive neurological impairment, microcephaly, developmental delay HIV dermatitis (red papular rash, extensive fungal or molluscum) Child of an infected parent
HIGHLY SUGGESTIVE	Pneumocystisis pneumionia (PCP) infection Oesophageal candidiasis Kaposi Sarcoma Acquired recto-vaginal fistula

CAUSE

- Children are infected by;
    - Spread from their parents/ mother who is infected (most common)
    - Before birth (virus crosses the placenta)
    - During or very soon after delivery
    - Blood transmission or by contaminated needles and syringes
    - Breast feeding (uncommon)

Not all babies who are born to HIV infected mothers are infected. Athough all of them will be positive on the HIV antibody screening test until the age of 15-18 months because of transfer HIV antibodies from the mother)

MANAGEMENT

GOALS	NOTES
Treat HIV symptoms	Treat quickly with correct standard treatment HIV infected children may take longer to respond to usual treatment
Nutrition	Maximise nutrition and monitor child's growth Counsel the mother about options/risks In general, encourage breast-feeding Commencement of solids at 6 months
Immunise	Ensure immunisations are given on time Arrange catch up vaccinations if behind BCG should be given to all babies unless symptomatic with HIV Measles should be given at 6 & 9 months (unless severely immunocompromised)
TB management	High rates of co-infection with TB/HIV Use Isoniazid prophylaxis (10mg/kg daily) in all HIV+ infants & children exposed to TB for 6 months For proven TB, refer to SI TB guidelines & STM for management If episodes of non-resolving pneumonia - consider TB treatment
PCP prophylaxis	All infants of HIV +'ve mothers should receive prophylaxis Prophylaxis should continue until >1 year, HIV negative AND no longer breast-feeding Any child with confirmed HIV should receive prophylaxis regardless of CD4+ count Use co-trimoxazole once daily, dose according to age as below: Child < 6 months 20/100mg (1/4 tablet) Child 6 months - 5 years: 40/200mg (1/2 tablet) Child > 5yrs: 80/400mg (1 tablet) Prophylaxis should commence at 1 month of age Cease once confirmed to be HIV negative and they are no longer breast-feeding
Treat infections	Initiate treatment promptly May take longer to recover i. Oral thrush: oral nystatin drops. If this fails oral ketoconazole ii. Prolonged/bloody diarrhoea: co-trimoxazole, albendazole AND tinidazole/metronidazole iii. Treat according to severity (refer to STM guide on pneumonia)
HIV prevention	HIV counselling and testing of at risk/symptomatic population Reduce risk of further mother-child transmission Good antenatal care (see national guideline) and avoid prolonged labour Discuss family planning - future pregnancies may lead to further HIV infected children Pregnancy also worsens health of HIV infected mother

HIV is a preventable disease.

Advise on the use of condoms to prevent HIV transmission

Discuss birth control

HYPOGLYCAEMIA

Sick children are at risk of low blood sugar (< 2.5mmol/L or < 3.0 in severely malnourished children). For neonatal hypoglycamia see neonatal hypoglycaemia guideline.

SIGNS & SYMPTOMS

- Sweaty, hunger, tremor, tachycardia, pallor, anxiety
- Lethargy, tiredness
- Headache, visual disturbance, dizziness
- Confused, drowsy, unconcious, seizures

CAUSES

- Increased use of sugar (e.g: fast breathing)
- Sepsis: particularly bacterial infection & malaria
- Medications: insulin, quinine
- Decreased intake (not feeding well)

INVESTIGATIONS

- Blood sugar (CBG < 2.5mmol/L or < 3.0 in severely malnourished children)
- Urine: dipstick for ketones

MANAGEMENT

- If you cannot check a blood sugar and the child is sick, fitting or unconcious, treat as low blood sugar and with anti-epileptic medication
- If the child is conscious - give sugary drink (e.g: breast milk, ORS or sugary water – add 4 level teaspoons of sugar to 200ml clean water)
- If decreased conscious state or unable to take oral
    - Give IV **10ml/kg of 5% dextrose**
    - If not available, use **1ml/kg of 50% dextrose** (with caution as can cause neurological impairment in overdose)
        - If you cannot insert an IV & the child is unconcious, insert a NG tube and give some sugary drink/dextrose into the NG tube
        - Consider IM glucagon if available:
            - Child weighs <25kg give 0.5mg (0.5 units)
            - Child weighs >25kg give 1mg (1 unit)
- Recheck blood sugar in 30 minutes and aim for BSL 4.0 – 8.0
    - If still low, repeat glucose IV bolus
    - If stable monitor BSL every 2-4 hours
- Maintain normal blood sugars:
    - If the child can drink, give plenty of fluids/ food with sugar. If the child is too sick to drink, give NG feeds or IV fluids containing 5% or 10% dextrose
    - Check blood sugar at least every 4 hours and increase or decrease the amount of glucose in the fluid depending on the blood sugar

IMMUNISATION

Immunisation protects children from serious, life threatening infections by protecting the individual and the community through the development of 'herd-immunity'

ROUTINE VACCINATION:

- The National Immunisation Policy gives free routine vaccination to children
- Clinics and hospitals should ensure vaccinations happen on scheduled dates
- Vaccination status should be recorded in the baby books and child health registers

OPPORTUNISTIC & CATCH-UP VACCINATIONS:

- *Every time a child presents to the health center or hospital should be seen as 'an opportunity' to ensure vaccinations are up-to-date and to provide 'catch-up' vaccinations.*
- 'Catch-up' vaccinations assist children in becoming fully vaccinated with best protection against disease as quickly as possible.
- If an infant misses his or her immunisations at birth (Hep B & BCG):
    - Give 'catch-up' BCG immunisation to reduce risk of TB infection (all children less than 5 years)
    - If the infant is more than 7 days old, then a 'catch-up' birth hepatitis B dose is not required. Give the Hep B doses (as part of the Pentavalent vaccine) according to the normal schedule.
- Always check whether the child's brothers and sisters and mother need any 'catch-up' immunisations

WITHOLDING VACCINATION

Consider witholding vaccination if;

- severe allergic reaction to a prior vaccine
- moderate or severe illness (temperature ≥39°C) should not be vaccinated until their condition improves.
- BCG vaccine if child is symptomatic with HIV infection
- In case of any doubts, for medical advice

ADMINISTRATION INSTRUCTIONS:

- Always immunise a child even if you have to open a new vial for only one child. Order more vaccines if necessary
- Do not use alcohol or an alcohol swab
- Do not rub vaccination site after administering injection

STORAGE INSTRUCTIONS:

- Before using any vaccine, check expiry date and vaccine vial moitor (VVM) on the ampoule or vial to ensure it is usable
- Expired Vaccines and VVM stage 3 & 4 should NEVER be used but discarded
  All vaccines should be stored in the main compartment of the refrigerator at +2 to +8ºC.
- During Outreach sessions , pack vaccines just enough for the session in a vaccine carrier with conditioned ice packs and a thermometer:
    - All multiple vaccines doses opened should be clearly labelled with date and time
    - Reconstituted BCG and Measles/Rubella vaccine should be discarded after 6hrs or end of session (Note MDVP does not apply to them)

- All unopened vaccines vials/ampoules should be safely stored in the refrigerator at the end of the session

Multi-Dose Vial Policy (MDVP):

- This applies to opened multi-dose vials of Hep B, TT, IPV. Vials can be kept and used for up to 28 days after opening as long as long as the below conditions are met:
  - The expiry date of the vaccine has not passed.
  - Vaccine vial montor (VVM) has not reached discard point- stages 3 & 4
  - Vaccine has not been damaged by freezing for freeze sensitive vaccines and stored at the recommended temperatures

SOLOMON ISLANDS IMMUNISATION RESOUCE

- For further immunisation information, immunisation questions or to report adverse immunisation events please contact National EPI Coordinator Childhealth, Unit office phone 21202

SOLOMON ISLANDS IMMUNISATION SCHEDULE

Age	BCG	HepB within 24 hrs	DTP-HepB-Hib (Pentavalent)	PCV	IPV	MR	TT
Birth	☺	☺					
6 weeks			☺	☺			
10 weeks			☺	☺			
14 weeks			☺	☺	☺		
1 year old						☺	
School entry (6 years old)							☺

INTRAVENOUS FLUIDS

Always try to give fluids orally or via NG tube where possible. It is safer with less complications.

HOW MUCH FLUID TO GIVE (MAINTENANCE FLUID)

- Children require different amounts of fluid depending on how much they weigh
- Therefore always try to obtain an accurate weight
- **For neonates, refer to neonatal section**

WEIGHT (kg)	DAILY RATE ml/day	HOURLY RATE ml/hr
3-10	100 x wt	4 x wt
10-20	1000 plus 50 x (wt - 10)	40 plus 2x(wt-10)
>20	1500 plus 20 x (wt - 20)	60 plus 1x(wt - 20)

	MAINTENANCE FLUID												
WEIGHT (kg)	4	6	8	10	12	14	16	18	20	30	40	50	≥60
RATE (ml/hr)	16	24	32	40	44	48	52	56	60	70	80	90	100

WHEN TO GIVE MORE

- Children who are shocked (cold extremities and weak and fast pulse and capillary refill >3 seconds) should receive an IV bolus of **20ml/kg** of 0.9% saline until perfusion improves (repeat if necessary)
- If a child is dehydrated, has severe gastroenteritis or losing fluid (surgical drain), they may require more fluid than calculated

WHEN TO GIVE LESS

- Children who are very unwell with *meningitis, severe malaria* or *severe pneumonia* need ***less*** fluid.
    - These children are at risk of 'SIADH', a condition which makes them retain water and can cause low sodium. Giving too much IV fluid to these children can be dangerous
    - Give only 2/3 total maintanence IV fluids for these children.
- Check electrolytes and sodium every day if possible whilst on IV replacement

WHICH FLUID?

- Sick children need water, glucose, electrolytes (sodium, potassium)
- If available, first use 0.9% saline + 5% dextrose (+/- 10mmol/KCl per 500ml)
- Or use Hartmann's, topping up each burette with dextrose (5% top up): in 100ml burette, add 90ml of Hartman's and 10ml of 50% glucose
- **3% dextrose and 0.3% saline should be avoided as it has a very low sodium concentration and can cause hyponatreamia and seizures**
- Always change to oral/ NG fluids as soon as possible

LYMPHADENOPATHY

SIGNS & SYMPTOMS

- Lymph node enlargement (neck, axilla, groin)
  - Make note of size, location, fluctuance, tenderness, overlying skin changes
- Look for signs of infection which may be causing lymph node enlargement
  - Otitis media, tonsilitis may cause neck lymph node swelling
  - Skin infection may cause lymph node enlargement

DIFFERENTIALS	**SUGGESTIVE FEATURES**	**SUGGESTED INVESTIGATIONS**
Infections		
Bacterial lymphadenitis	Acute onset. Often febrile. Large, warm, tender lymph nodes Secondary to tonsillitis, otitis media	Predominate clinical diagnosis FBE
Ebstein Barr Virus	Fatigue, fevers, muscle pain, sore throat Generalised lymphadenopathy Hepatosplenomegaly	Mainly clinical diagnosis FBE - atypical lymphocytosis
Non-TB mycobacterium	Commonly < 5years old, often well Usually unilateral lymphadenopathy Non-tender, slightly fluctuant node. May tether to underlying structures Overlying skin change/pus	Fine needle biopsy for: microscopy, culture, histopathology
TB mycobacterium	Non-tender lymphadenopathy Large glands, slowly growing History of exposure Fever, weight loss, night sweats	Mantoux, Chest x-ray Fine needle biopsy for: Microscopy, culture Histopathology
Cat-Scratch disease (Bartonella)	Tender lymph nodes. Usually axillary Cat-scratch (or lick) 2 weeks prior May have papule at site of scratch	Clinical diagnosis
HIV	Symptoms of HIV	
Malignancy: *Lymphoma/Leukaemia*	Weight loss, fevers, night sweats Bone pain, abdominal distension	Chest x-ray Abdominal ultrasound Blood Film Bone Marrow Aspirate
Rheumatological		
Juvenile idiopathic arthritis	Persistent fevers (>6 weeks) May have joint symptoms, malaise	Clinical diagnosis FBE + film
SLE	Malar rash, fevers, arthritis, mucositis Liver or renal dysfunction Carditis	Clinical diagnosis FBE + film Consider ANA, dsDNA, ANCAs

MANAGEMENT OF BACTERIAL LYMPHADENITIS:

- Mild (& systemically well)
    - Cloxacillin 25mg/kg (max 500mg) orally every 6 hours for 10 days
- Mod-severe (or systemically unwell)
    - Cloxacillin 50mg/kg (max 2g) IV every 6 hours for 10 days
- If abscess formation, arrange incision and drainage

MALARIA

- Malaria is a serious problem in the Solomon Islands
- Malaria in the Solomon Islands is caused by P. Falciparum (PF) & P.Vivax (PV)
- Severe malaria is a medical emergency
- Please also refer to the Solomon Islands malaria treatment guide

SIGNS & SYMPTOMS

- Fever
- Headache and body aches
- Respiratory distress
- Vomiting and/or diarrhoea
- Hepatomegaly, jaundice
- Pallor (pale)
- Convulsions or coma

INVESTIGATION

- Malaria slide (MPS) OR Rapid Diagnostic Test (RDT)
- Blood glucose

MANAGEMENT

- Consider malaria in any child with a fever. Check MPS or RDT
  - Note the type of malaria (thin film) and the parasite count (thick film)
  - A single negative film or antigen does not exclude malaria
  - If strong suspicion, thick and thin films should be repeated with fever spikes until positive test or 3 negatives obtained
  - RDT can remain positive for up to 6 weeks after malaria has been treated
  - Always think about other infections, even if the MPS or RDT is positive
  - A child with fever and decreased conciousness might have meningitis
  - Classify as uncomplicated versus complicated and manage accordingly

If you cannot test for malaria, treat presumptively
Very sick children should be treated for severe malaria

CLASSIFICATION:

SEVERITY	SIGNS & SYMPTOMS	ADMISSION/OUTPATIENT
Uncomplicated	Febrile though not unwell	Outpatient management Must tolerate oral medications
Complicated	Any 1 of the following Decreased conscious state Convulsions Respiratory distress Pallor, circulatory collapse/shock Jaundice or dark coloured urine Hypoglycaemia Oliguria Spontaneous bleeding High parasite count (>2%)	Admission to hospital Malaria treatment Monitor for complications

TREATMENT RECOMMENDATIONS:

	1st line treatment	**2nd line treatment**
P.Falciparum (uncomplicated)	Artemether-lumefantrine (20/120mg tablets) Dosage: < 5kg: ½ tablet twice a day for 3 days 5-15kg: 1 tablet twice a day for 3 days 15-24kg: 2 tablets twice a day for 3 days 25-50kg: 3 tablets twice a day for 3 days > 50kg: 4 tablets twice a day for 3 days Orally with breast or fatty milk or fatty food	Quinine Sulphate (1 tablet = 300mg quinine sulphate) Dosage: 10mg/kg (up to 600mg) orally every 8 hours
P.Vivax (uncomplicated)	Artemether-lumefantrine as above **PLUS** Primaquine Dosage: 0.25mg/kg (max 15mg) orally daily for 2 weeks (Primaquine should not be used in infants unde 6 months – discuss with paediatrician)	As above
P.Falciparum (complicated)	Artesunate IV/IM * Loading dose 2.4mg/kg. Repeat at 12hrs Maintenance 2.4mg/kg daily (start at 24 hrs) **Followed by** artemether-lumefantrine for 3 days as above when clinically improved *Artesunate PR can be used (10mg/kg) if IV unavailable before transfer	Quinine Loading dose 20mg/kg IV/IM (IV infusion over 4 hours) Maintenance: 10mg/kg IV/IM bd (IV infusion over 2 hrs) Followed by artemether-lumefantrine for 3 days as above when clinically improved

ERADICATION PHASE:

- P.Vivax needs treatment and eradication phase
- Primaquine therapy to eradicates live hypnozoites in the liver
- Discuss with paediatrician for duration of treatment
- Check G6PD status prior to starting treatment with primaquine
    - Primaquine can still be used in mild-moderate G6PD deficiency by dosing at 0.75mg/kg (max 45mg) oral weekly
    - If unable to test for G6PD status, monitor for dark yellow/brown urine (sign of haemolysis) and stop primaquine if this occurs

OTHER SUPPORTIVE MEASURES:

- If child is fitting, check BSL and treat with anti-convulsants
    - Fitting may be secondary to cerebral malaria, febrile convulsions or meningitis
    - Treat with antibiotics for meningitis
    - Perform a lumbar puncture once stable
- Hypoglycaemia is a feature of malaria (and a side effect of quinine treatment)
    - Check blood sugar every 6 hours if severe malaria or on quinine
    - For hypoglycaemia management refer to hypoglycaemia guideline
- Caution with fluid/balance as patients with malaria are vulnerable to fluid overload and pulmonary oedema
- Monitor and treat for other complications including:
    - Severe anaemia: give packed red cell transfusion
    - Metabolic acidosis: give oxygen, IV fluids
    - Acute renal failure
    - Spontaneous bleeding/coagulopathy
- Consider discharge when afebrile for 24 hours and able to tolerate oral medications

MALARIA PREVENTION:

- Encourage all families to sleep under a mosqito net.
- Mosquito nets should be impregnated with a chemical insecticide.
    - They can be obtained from the Ministry of Health

MALNUTRITION

- Malnutition is a deficiency in food and nutrients or frequent illnesses or infection that reduces appetite and food intake and utilization, resulting in the child not growing or developing normally
- Also refer to WHO Pocketbook and Solomon Islands Integrated Management of Acute Malnutrition for further guidance including outpatient management of moderate malnutrition

Severe acute malnutrition (SAM) is defined as:

- Severe wasting
  - Weight-for-length/height < -3SD (Z-score <-3) OR
  - Mid-upper arm circumference (MUAC) <115mm OR
  - Oedema of both feet (kwashikor with or without severe wasting)

- Children <-3SD weight-for-age may be stunted (short stature) but not wasted. Stunted children who are not severely wasted may not require admission unless they present with severe illness.

CAUSES

- Poor intake
  - Inadequete access to or provision of food or inadequate intake of food due to illness and decreased appetite
  - Dental caries limiting eating
  - Abdominal pains leading to decreased appetite
  - Social issues or neglect, adoption, poor parental health
- Increased losses
  - Increased gastroinestinal or renal losses
  - Any cause of vomiting or diarrhoea including infections
  - Malabsorption
- Increased requirements
  - Any chronic disease including renal, cardiac, respiratory, endocrine, hyperthyroidism, chronic infection including TB & HIV
- Poor utilisation
  - Genetic or metabolic conditions
  - Micronutrient deficiencies which may exacerbate poor utilisation
  - Inadequate care practices:
    - Inadequate hygiene practices
    - Limited knowledge of appropriate food choices and child care practices among caregivers

CLINICAL FEATURES

- History of low weight, loss of appetite, diarrhoea, cough > 2 weeks
- Known or suspected exposure to TB or HIV
- Dehydration, shock, lethargy, decreased conscious state
- Fever or hypothermia
- Macronutrient deficiencies (fat/protein/carbohydrate)
  - Decreased muscle bulk and subcutaneous fat stores
  - Decreased mid-upper arm circumference (MUAC)
  - Bilateral pitting oedema
- Micronutrient deficiencies (vitamin/trace elements/minerals):

- Pallor
- Eye disease: ulcers, dry cornea
- Mouth disease: mouth ulcers, gum disease, chellitis, glossitis,
- Skin changes: hyper or hypo-pigmentation, peeling, skin ulcers, secondarily infected bacterial lesions
- Others: goitre, rickets, neuropathy, hair and nail changes

INITIAL INVESTIGATIONS:

Bloods	FBE, blood film, EUC's, Ca2+, Mg2+ Consider liver function tests, MPS
Urine	Clean catch or mid-stream urine Dipstick and send for M,C & S
Stool	Send for M,C&S including OCP (ova, cysts, parasites)
Consider TB testing	If risk factors or suggestive features (see guideline)
Consider HIV testing	If risk factors or suggestive features (see guideline)

INITIAL MANAGEMENT PRIORITIES: SEVERE MALNUTRITION

ISSUE	MANAGEMENT
Assessment	Severe acute malnourished children should be assessed for presence of danger signs, medical complications and appetite. Severely wasted children with loss of appetite and medical complications should be admitted to inpatient treatment; children who have appetite and do not have medical complications may be treated as outpatients
Establish correct age	Ask parents, check birth record Correct for prematurity for babies born <36 weeks. Continue this correction until 2 years old
Anthropometry:	Weight, length/height, mid-upper arm circumference (MUAC) Weight child without clothes on the most accurate scales available Carefully measure parameter twice to ensure accuracy Calculate weight for length/height SD
Dehydration	If shocked, give IV bolus 15ml/kg Hartman's with top up to 5% dextrose over 1 hour (can give a second bolus) Otherwise re-hydrate slowly either orally or via a nasogastric tube Give special re-hydration solution for malnutrition (ReSoMal) (note: standard ORS has high sodium/low potassium not suitable for malnourished patients, if no other option dilute standard ORS sachet with 2 Litres water to make half strength) ReSoMal rate: - 5ml/kg every half an hour for first 2 hours - then 5-10ml/kg per hour for the next 4-10 hrs, alternating with F-75 If rehydration still needed at 10hrs, use F-75 at the same rate above Monitor rehydration, pulse rate, respiratory rate and urine output Monitor for over hydration. If concerns stop ReSoMal for 1 hr and reassess
Hypoglycemia	Check BSL on admission. If <3.0, treat as per hypoglycemia guideline (STM)
Hypothermia (temp < 35.oC axillary)	Common in underweight children Often indicates co-existing infection or hypoglycemia Keep away from draughts, keep covered, Kandora care for infants Warm the child, feed immediately, cover with antibiotics (see below)
Manage infection	Give all severely underweight children a broad-spectrum antibiotic - If stable give amoxycillin 25 mg/kg (maximum 500mg) orally every 12 hours for 5 days - If unstable give ampicillin 50mg/kg ((max 2g) IV and gentamicin IV daily (see dosing chart for age) Treat oral thrush with nystatin 1ml suspension in the mouth four times a day Treatment for parasitic worms: tinidazole/albendazole Treat other infections as appropriate including meningitis, pneumonia, skin infections, scabies Consider investigation and treatment for malaria if febrile and from a high risk area

RE-FEEDING:

Initial re-feeding (when medically stable)	Continue breast-feeding if able Initial supplemental feeding: frequent (2-3hrly) small feeds of low salt concentration & low lactose Nasogastric feeding if child eating <80% of the amount offered at 2 consecutive feeds Total fluid volume: 130ml/kg/day (or 100ml/kg/day if child has severe oedema) Refer to table for Volumes of F-75 per feed refer WHO pocket book
Catch-up feeding	Change to catch-up feeding once appetite has returned, metabolically stable, resolved oedema Transition from F-75 to F-100 over 2-3 days as tolerated Utilise ready to use therapeutic food (RUTF) if available and refer to WHO pocketbook In infants <6 months give expressed breast milk, F-75 or diluted F-100 (dilute to 1.5L) Monitor weight gain: poor < 5g/kg per day, moderate 5-10g/kg per day, good >10g/kg/day.
Address micronutrient deficiencies	Multivitamins including Vit A, folic acid, zinc, copper are present in F-75/100 and RUTF Give Vitamin A on day 1, 2 & 14 if signs of deficiency (e.g: corneal ulceration) or recent measles Vitamin A: < 6 months 50,000 U, 6months - 1 year 100,000 U, > 1 year 200,000 U Give iron orally 3ml/kg/day. Start once clinically stable & do not give if child is receiving RUTF
Discharge criteria	Breast-feeding/drinking/eating effectively Inpatient children can be transferred to outpatient treatment when they are clinically alert and well; medical complications are resolved; appetite is fully recovered and oedema has reduced or resolved. Children can be discharged from nutritional treatment When gaining weight and wt/ht is equal to or higher than -2SD or MUAC > 125mm and no oedema for at least 2 weeks
Follow-up	If fails to gain weight over 2-week period or loses weight between two measurements or develops loss of appetite or oedema, the child should be referred to hospital for further assessment. Once discharged from outpatient treatment, the child should be periodically monitored to avoid relapse
Preventative management	Educate parents regarding nutrition Encourage breast-feeding for as long as able. Start solids from 6 months Feed infants and children 4-6 times/day, give a variety of healthy foods Ensure immunisations are up-to-date and initiate catch-up vaccinations if required Arrange follow up review in community
Initial re-feeding (when medically stable)	Continue breast-feeding if able Initial supplemental feeding: frequent (2-3hrly) small feeds of low salt concentration & low lactose Nasogastric feeding if child eating <80% of the amount offered at 2 consecutive feeds Total fluid volume: 130ml/kg/day (or 100ml/kg/day if child has severe oedema) Refer to table for Volumes of F-75 per feed refer WHO pocket book
Catch-up feeding	Change to catch-up feeding once appetite has returned, metabolically stable, resolved oedema Transition from F-75 to F-100 over 2-3 days as tolerated Utilise ready to use therapeutic food (RUTF) if available and refer to WHO pocketbook In infants <6 months give expressed breast milk, F-75 or diluted F-100 (dilute to 1.5L) Monitor weight gain: poor < 5g/kg per day, moderate 5-10g/kg per day, good >10g/kg/day.
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MEASLES

- Measles is a viral infection which causes a red, raised rash
- It is transmitted by droplets produced by sneezing and coughing
- The incubation period is between 7 and 21 days
- Measles is very infectious from 7 days before until 2 days after the rash appears

SIGNS & SYMPTOMS

- Fever (before the rash appears)
- Blotchy red rash, starting on head/neck moving down over the body (day 3-7)
- Look for the 3 C's: Cough, Coryza (runny nose), Conjunctivitis
- Sore mouth
- Koplick spots (may have small white spots in mouth)
- Diarrhoea

PREVENTION

- Immunisation
- Avoiding contact with others who are infected

MANAGEMENT

Admission/Outpatient	Most can be managed as Outpatients Admit if complications: pneumonia, diarrhoea, dehydration, stridor Admit children with underlying cardiac disease/respiratory disease Admit if immunocompromised
Malnutrition	Consider nutritional status and SAM management
Treat co-existing infect	Oral thrush, conjunctivitis, pneumonia or diarrhoea Refer to relevant section in STM for treatment advice
Consider malaria	Consider investigation and treatment if from high risk area
Give Vitamin A	<6 months: 50,000 Units, 6 months - 1 year: 100,000 Units, >1 year: 200,000 Units Daily for 2 days. Give 3rd dose 2-4 weeks later if eye signs suggestive of Vit A deficiency
Immunise contacts	Give measles vaccine to all siblings aged 6 months-5 years if not fully vaccinated If unclear vaccination history, give measles vaccine. If 1st dose given early, the child still needs regular dose at 12 months Vaccinate all children in the ward >6 months who are not fully vaccinated

MENINGITIS

Meningitis is a very severe infection of the coverings of the brain (meninges)

CAUSES

- Bacteria (e.g: Meningoccous, Pneumococcus, Haemophilus, E.Coli)
- Malaria (meningitis can be a complication cerebral malaria)
- Viruses (e.g: enterovirus, HSV, VZ)
- Tuberculosis
- Fungus (e.g. cryptococcus)

SIGNS & SYMPTOMS

- Fever, headache, irritability, lethergy
- Poor feeding, vomiting or diarrhoea
- Bulging fontanelle (infants)
- Photophobia, neck stiffness (older children)
- Convulsions, decreased concious state

INVESTIGATIONS

- Blood sugar, electrolytes, full blood count, blood culture
- Consider malaria slide
- Consider fundoscopy
- Lumbar puncture (LP):
    - Try to do LP before starting antibiotics but NEVER delay treating a sick child, if the lumbar puncture is taking too long or there are contraindications such as raised intracranial pressure or bleeding disorders
    - If focal neurological signs are present do a fundoscopy first
        - If any concerns with raised intracranial pressure (papilloedema, unequal pupils, rigid posture, focal paralysis of any limb, irregular limb) then defer LP
    - If in a remote clinic, contact the nearest doctor by radio, give a stat dose of antibiotic and refer to the nearest hospital
    - Send CSF for:
        - Microscopy (including acid-fast bacilli) and culture
        - Biochemistry: protein and sugar
        - Gene X-pert: if suspicions of TB meningitis

CSF INTERPRETATION:

- If CSF clear, consider alternate diagnosis including treatment for malaria
- If CSF cloudy, blood stained or you can't get CSF, treat for meningitis
- If the child is very sick and you think they have meningitis, treat for meningitis even if the CSF is clear

	WHITE CELL COUNT Neutrophils (x10^6)	Lymphocytes (x10^6)	BIOCHEMISTRY Protein (g/L)	Glucose (CSF:blood ratio)
Normal (age > 1month)	0	≤5	<0.4	≥0.6 (or ≥2.5mmol/L)
Normal (age <1 month)	0*	≤20	<1.0	≥0.6 (or ≥2.5mmolL)
Bacterial meningitis	100-1000 (may be normal)	Usually <100	>1.0 (but may be normal)	<0.4
Viral meningitis	Usually < 100	10-1000 (may be normal)	0.4-1.0 (but may be normal)	Usually normal
TB meningitis	Usually <100	50-1000 (may be normal)	1-5	<0.3 (may be normal)

*The presence of any neutrophils in CSF is unusual & should raise concern about bacterial meningitis***

MANAGEMENT:

MANAGEMENT ISSUES	NOTES
Antibiotics	DO NOT DELAY ANTIBIOTICS - this is associated with worse outcomes 1st line: Ceftriaxone 50mg/kg (max 2g) IV bd OR if <2 months, cefotaxime 50mg/kg IV QID 2nd line: Benzylpenicillin 60mg/kg (max 3g) IV QID PLUS Chloramphenicol 25mg/kg (max 1 g) IV QID Review culture and sensitivities at 72 hours, adjust as necessary Duration: 14 days
Steroids	Dexamethasone 0.15mg/kg (max 10mg) IV QID Reduces the risk of hearing loss in bacterial and TB meningitis Must be started within 15mins before or 1 hr after antibiotics Contraindications: <2months, cerebral malaria, viral encephalitis, immunocompromised
Consider anti-viral treatment	If encephalopathy, vesicular rash or risk factors (e.g: HSV exposure) Dosage: Acyclovir IV 500mg/m2 (preferable) or oral acyclovir 20mg/kg 5 times per day
Feed/fluids	Feed orally/NGT if able. If shocked treat with bolus fluid as for sepsis protocol Ongoing IV fluids should be restricted to 2/3 maintenance (risk of SIADH)
Consider anti-malarials	If suggestive history of positive MPS If MPS negative, still consider treatment if very unwell or from high risk area
Monitor for convulsions	Regular (2hrly) neurological observations. Use anti-convulsive medication for fits.
Monitor for hypoglycaemia	Monitor BSLS 6-12hly. Treat hypoglycaemia
Chemoprophylaxis	Eradication of carriage of H.influenzae and meningococcaus Household contacts, contacts <4years, classroom contacts in epidemics Rifampicin: 5-10mg/kg (max 600mg) o daily 4 days OR Ciprofloxacin 10mg/kg (max 500mg) as a single dose
Arrange follow up	Children with meningitis are at risk of hearing loss and developmental delay Arrange follow up

Meningitis must be detected and treated early

Suspect meningitis in every sick child

Young babies have non specific signs. If in doubt, treat.

EARLY ESSENTIAL NEWBORN CARE

Newborn deaths are concentrated towards the first three days of life, especially the first 24 hours.

The most common causes of neonatal death are:

- Preterm birth complications
- Birth asphyxia
- Neonatal infections
- Congenital abnormalities

Early Essential Newborn Care (EENC) practices focus on improving the quality of care during labour, delivery and immediately after birth.

Most newborns only require simple supportive care during and after delivery. All babies (including if born by caesarean, sick or preterm), benefit from:

- Immediate thorough drying
- Skin-to-skin contact
- Early and exclusive breast-feeding
- Cord clamping after pulsations stop (no earlier than 1 minute).

BORN BEFORE ARRIVAL (BBA)

Some babies are born at home or before being brought to the clinic or hospital. It is important to weigh the baby, as babies less than 2.5kg need special care. These babies may be at added risk of infection.

MANAGEMENT FOR ALL BABIES:

- Leave baby with mother, support breastfeeding and keep skin-to-skin for 90 minutes (if baby is well) before other treatments below
- Weigh and examine the baby
    - If the baby looks unwell or has fast breathing (>60/minute), give oxygen by nasal catheter and commence treatment for infection
    - If the baby weighs less than 2.5kg, see guideline for low birth weight babies
- Vitamin K (phytomenadione) 1mg IM once
    - Use 1mg/1ml ampoule. Do NOT use 10mg/ml ampoule.
- Hepatitis B and BCG vaccines
    - Best given at or soon after birth
- Apply tetracycline eye ointment to both eyes once only
- Keep cord clean and dry

If discharged early, plan follow-up on day 3 for babies with risk factors (low birth weight, premature, risk of sepsis).

Please also look at the Early Essential Newborn Care Clinical practice pocket guide (pink book) or WHO Pocketbook of Hospital Care for Sick Children.

NEWBORN BABIES- INTRAVENOUS FLUIDS

All babies should be encouraged to breastfeed. If the baby is too premature to breastfeed, a nasogastric tube should be inserted and expressed breast milk should be given

Some babies are too sick to feed; these include babies with severe respiratory distress or babies with abdominal distension/ bowel obstruction. These babies should receive IV fluids.

How much fluid to give (maintenance fluid)

- Babies require different amounts of fluid than children. Total fluids required by a baby (oral or IV)

Day 1	60ml / kg / day
Day 2	90ml / kg / day
Day 3	120ml / kg / day
Then up to	150ml / kg /day

Example *The amount of IV fluid a baby weighing 2.4 kg needs on day 1 is*
2.4 x 60 = 144 ml / day
144 / 24 = 6 ml / hr

On day 2, 2.4 x 90 = 216 ml/ day, 216/24 = 9 ml/hr.

- When the baby is able to drink and amount of milk increases, reduce the amount of IV fluids.

When to give more

- Babies usually do not need more fluids than the maintenance amount shown above,
- Babies who are dehydrated, have ongoing losses (such as through a diarrhoea/vomiting) or spend a lot of time under phototherapy may need more fluid. It is important to closely monitor the baby (weigh baby daily) as it is easy to give them too much.

When to give less

- Very sick babies with respiratory distress or meningitis may need less fluid, as they can retain fluid. Check sodium levels and if low, restrict fluids to 2/3 maintenance.

Which fluid?

- Use 10% dextrose only, until day 2. DO NOT use this fluid after the first 3 days of life.
  - Top up 5% dextrose to make 10% dextrose
  - In 100ml burette, mix 90ml of 5% dextrose and 10ml of 50% dextrose
- Babies older than 2 days need sodium and other electrolytes.
  - Use 5% dextrose and 0.9% saline or if not available 3% dextrose + 0.3% saline.
  - Always top up to make 10% dextrose
- If the baby has low sodium, restrict the amount of fluid to 2/3 of maintenance and use Hartmann's or normal saline, topped up with glucose to make 10%
  - In 100ml paediatric burette, mix 80ml of Hartmann's and 20ml of 50% glucose
- Some babies need more glucose, especially if they are very sick or small. If blood sugar is low refer to hypoglycaemia guideline and discuss with paediatrician

NEWBORN BABIES LESS THAN 2.5 KG WEIGHT

Babies with low birth weight need special care. They are at risk of becoming cold (hypothermia), having low blood sugar (hypoglycaemia) and infection. Some babies are small because they are born prematurely (before they are due). Infection is an important cause of premature labour.

MANAGEMENT

- Keep the baby warm - Small babies get cold easily.
  - Keep the baby skin to skin when possible (together with mother or father) well wrapped up in a warm room.
- Start feeds within 1 hour of delivery
  - Babies who can suck should be breastfed.
  - Babies who cannot be breastfed should be given expressed breast milk (EBM) by cup and spoon. Change to breastfeeding when the baby starts to suck well from the breast.
  - Use a NG tube for those less than 1.5kg, or not taking EBM well by cup and spoon or are sick. Nasogastric tubes should be changed twice a week. When the baby can suck well, change to breast feeding or cup and spoon
  - If EBM unavailable consider IV access and fluids, transfer to hospital

Summary of amount of fluid required **every 3 hours** for a baby

	Day of Life							
Birth weight (kg)	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***> 8***
1 – 1.5	8	10	15	20	25	30	30	35
1.5 – 2	10	15	20	25	30	40	45	50
2 – 2.5	15	20	30	35	40	50	55	65
2.5 – 3	20	25	35	40	50	60	70	75
3 – 3.5	20	30	40	50	60	70	70	75
3.5 – 4	25	35	45	60	70	80	80	80

For babies less than 1.5kg:

- Give multivitamin liquid (1ml oral daily)
- Start iron supplements at 2 weeks of age, continue until 6 months
- Weigh the baby every day. Satisfactory weight gain is 20g per day, 100 – 150g/ week

NEWBORN BABIES – HYPOGLYCAEMIA

Most babies with hypoglycaemia are asymptomatic. Babies who are born with risk factors for hypoglycaemia require screening soon after birth. Risk for hypoglycaemia alone, or mild hypoglycaemia alone, does not require separation of mother and baby or admission to special care nursery.

Most asymptomatic babies can be managed with increasing the amount of oral feeds and do not need IV dextrose infusion, unless hypoglycaemia persists.

Normal blood sugar for a neonate is > 2.6mmol/L

Risk factors for hypoglycaemia include:

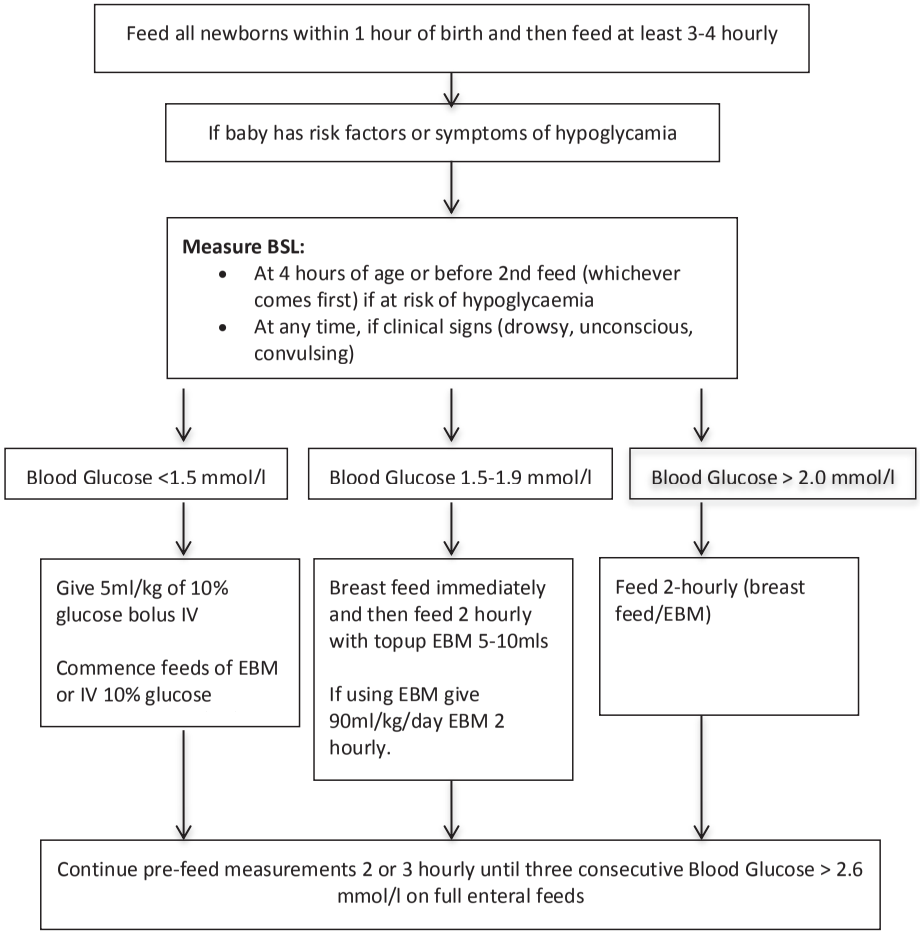
- Prematurity or IUGR
- Sepsis
- Perinatal asphyxia
- Hypothermia (low temperature)
- Respiratory distress
- Infants of diabetic mothers
- Rhesus isoimmunisation

Symptoms of hypoglycaemia may include:

- Jitteriness, high pitched cry, seizures
- Weak, inability to feed, apnoea

MANAGEMENT

Follow the chart below for treatment options:


Feed all newborns within 1 hour of birth and then feed at least 3-4 hourly
If baby has risk factors or symptoms of hypoglycamia
Measure BSL:
At 4 hours of age or before 2nd feed (whichever comes first) if at risk of hypoglycaemia
At any time, if clinical signs (drowsy, unconscious, convulsing)
Blood Glucose <1.5 mmol/l
Blood Glucose 1.5-1.9 mmol/l
Blood Glucose > 2.0 mmol/l
Give 5ml/kg of 10% glucose bolus IV
Commence feeds of EBM or IV 10% glucose
Breast feed immediately and then feed 2 hourly with topup EBM 5-10mls
If using EBM give 90ml/kg/day EBM 2 hourly.
Feed 2-hourly (breast feed/EBM)
Continue pre-feed measurements 2 or 3 hourly until three consecutive Blood Glucose > 2.6 mmol/l on full enteral feeds

NEWBORN BABIES – NEONATAL INFECTIONS

A neonate is a baby less than 4 weeks old. Neonates are at increased risk of serious infection. Infection in neonates may not be as obvious as infection in older children. Localising the source of infections in neonates is difficult; always consider meningitis (see below).

SIGNS + SYMPTOMS

- Temperature (high or low)
  - Fever (axillary temperature > 38.0 °C)
  - Hypothermia (temperature < 35.5 °C)
- Baby looks sick
  - Poor perfusion or cyanosis
  - Drowsy/ poor feeding
  - Respiratory distress, grunting, chest in drawing
  - Apnoeic episodes
  - Convulsions
  - Deep jaundice
- Localising signs
  - Skin pustules
  - Painful, swollen joints
  - Umbilical redness/ discharge
  - Bulging fontanelle
  - Severe abdominal distension

CAUSES

- Bacteria can be passed to the baby during delivery. Risk factors include
  - Maternal fever (temperature > 38°C during delivery)
  - Membranes ruptured for more than 18 hours
  - Foul smelling amniotic fluid/ offensive liquor
  - Meconium stained liquor
- Poor care of the umbilical cord stump. Keep cord clean and dry. Do not apply any ointments or medication to the cord stump.

INVESTIGATIONS (IF AVAILABLE)

- Blood sugar
- Malaria slide
- Full blood count
- Swab of skin pustule / umbilical stump
- Consider lumbar puncture, urine for microscopy/culture and blood culture

MANAGEMENT

Any neonate with any signs of sepsis requires IV antibiotics (IM if IV not possible)

- Refer and admit to hospital if:
  - Very unwell
  - Suspected meningitis
  - Severe respiratory distress
  - Deep jaundice
  - Not improving with treatment
  - Premature or low birth weight
- If severe respiratory distress or cyanosis, give oxygen by nasal prongs
- Check blood sugar
- If not feeding, give fluids either by NG tube or IV
- If hypothermic, keep warm

Give antibiotics

Treat for a minimum of 5 days:

- First line (preferred) antibiotics:

  - Ampicillin 50mg/kg IV / IM
    - 1st week of life every 12 hours
    - Week 2 to 4 of life every 8 hours
    - From 1 month every 6 hours

  AND

  - Gentamicin IV / IM
    - Neonate < 34 weeks post conception 3mg/kg once daily
    - Neonate > 34 weeks post conception 5mg/kg once daily
    - From 1 month 7.5mg/kg once daily

  AND

    - Quinine/artesunate if suspect malaria clinically (congenital / acquired)

If significant skin pustules, use **cloxacillin 50mg/kg** instead of ampicillin

- 1st week of life every 12 hours
- Week 2 to 4 of life every 8 hours
- From 1 month every 6 hours

- Second line antibiotics
  - If ampicillin is not available, replace with **benzylpenicillin 60mg/kg** IV / IM
    - 1st week of life every 12 hours
    - Week 2 to 4 of life every 6 hours
    - From 1 month every 4 hours
  - If gentamicin is not available, replace with **chloramphenicol 25mg/kg** IV / IM
    - 1st week of life every 12 hours
    - Week 2 to 4 of life every 8 hours
    - From 1 month every 6 hours

Chloramphenicol should be avoided in neonates (babies less than 1 month) unless no other treatment is available as it can cause 'grey syndrome' (grey skin, hypothermia, vomiting, rapid respiration due to vasomotor collapse)

NEONATAL MENINGITIS

Meningitis should be considered in all infants presenting with non-specific signs of sepsis, as the classical signs of meningitis are often absent. Babies who are very unwell may have meningitis and should be referred to hospital.

Additional features can include:

- Very drowsy or irritable with high pitched cry
- Reduced feeding
- Ap**n**oea's
- Bulging fontanelle
- Fitting

Babies with suspected meningitis should have a lumbar puncture

- If the CSF is cloudy, blood stained, or you cannot obtain CSF and you think the baby has meningitis, treat for meningitis

TREATMENT

- Cefotaxime 50mg/kg (max 2g) every 8 hours

AND

- Ampicillin 50mg/kg IV / IM
  - 1st week of life every 12 hours
  - Week 2 to 4 of life every 8 hours
  - From 1 month every 6 hours

Confirmed meningitis in neonates should be treated for 2-3 weeks, discuss with paediatrician.
If cefotaxime unavailable, start treatment with amp and gent as for sepsis and urgently refer to hospital

NEONATAL DRUG DOSES

- Add Cafeine Citrate
- Dose 20gm/kg oral, continue until 34 weeks
- loading dose then 5-10mg/kg oral daily
- continue until 34 weeks
- corrected gestation

NEWBORN BABIES- JAUNDICE

Jaundice is yellow colouring of the skin and eyes. It is caused by bilirubin, which is formed when red blood cells (haemoglobin) are broken down. Many babies have jaundice, which is normal and requires no treatment.

Abnormal Jaundice, which requires treatment includes

- Jaundice on the first day of life
- Jaundice lasting longer than 14 days
- Jaundice with fever
- Babies with severe jaundice; palms and soles deeply yellow

Signs & Symptoms

- Yellow colouring of skin, palms, soles, eyes (In normal jaundice, often only the skin and eyes are slightly yellow)
- Signs of infection (fever, baby looks unwell, not feeding; 62)
- Signs of anaemia (due to haemolysis)

Causes

- Serious infection (bacterial, syphilis, malaria)
- Haemolysis due to ABO incompatibility or G6PD deficiency (early onset jaundice)
- Physiological jaundice (from day 3-4)
- Prematurity
- Hypothyroidism and other metabolic disorders
- Liver disease such as biliary atresia
- Jaundice is also made worse if the neonate is dehydrated

Investigations

- Bilirubin level
- Full blood count and film if possible (?haemoglobin, ?sign of infection, ?haemolysis)
- Consider blood group of mother and baby, coomb's test, VDRL, liver function test, thyroid function, abdominal ultrasound

Treatment

- **Fluids** if the neonate is dehydrated and not feeding well (this helps to dilute the bilirubin)
- **Phototherapy** if severe jaundice. Begin phototherapy if jaundice on day 1, deep jaundice (palms and soles of feet), prematurity and jaundice or jaundice due to haemolysis. If bilirubin level available, use the following cut-offs

	Bilirubin level to begin phototherapy at	
	Term infant	***Premature baby***
Day 1	Any visible	Any visible
Day 2	> 260	> 220
Day 3	> 310	> 270
> Day 4	> 340	> 290

- **Antibiotics** if infection or syphilis is suspected
- Consider **antimalarial**
- If jaundice is prolonged (> 14 days), think about G6PD, red cell abnormalities (spherocytosis), hypothyroidism, liver problems (biliary atresia), and breast milk jaundice.

RESUSCITATION OF NEWBORN BABIES

Resuscitation of babies is very similar to resuscitation of children. Being prepared, ensuring airway is clear and helping with breathing are the most important steps. Also refer the essential early newborn care flowcharts for neonatal resuscitation

BE PREPARED

- Have suction equipment and a bag/mask (ambubag) ready BEFORE the baby is born

DRY BABY

- Dry the baby and keep warm during resuscitation to avoid hypothermia

AIRWAY

- Inspect and clear the airway
  - Gentle suction, tilt the head forward to neutral position, lift the chin
  - Stimulate the baby to breath

BREATHING

- If not breathing, give ventilation breaths
  - Use an ambubag OR mouth to face within 1 minute of birth
  - Give about **40 breaths/ minute**

CIRCULATION

- Check heart rate (feel umbilical stump, listen over heart with stethoscope)
- If < 60/ min after a minute of ventilation, give chest compressions
- Give about **100 compressions / minute**
  - **Try to give 3 compressions and 1 breath every 2 seconds**

Correct head position to open up airways and for bag ventilation.
Do not hyperextend the neck

Correct position of hands for cardiac massage in a neonate. The thumbs are used for compression over the sternum

DRUGS:

- Consider naloxone (0.1mg/kg) IM/IV if mother has had opioid analgesia (e.g. pethidine or morphine) and baby not spontaneously breathing. Babies must be observed for rebound respiratory depression
- If heart rate < 60 despite CPR, consider 0.01mg/kg adrenaline
- Check blood sugar, if <2.5mmol/L, give IV bolus

NEWBORN BABIES – DRUG DOSES: FOR BABIES LESS THAN 4 WEEKS

DRUG	DOSE	COMMENTS
ADRENALINE	0.01mg/kg ET, IV, SC, IM	
AMINOPHYLLINE	**Loading dose** 6mg/kg PO/IV **Maintenance dose** **Week 1:** 2.5mg PO/IV every 12 hours **Weeks 2-4:** 4mg PO/IV every 12 hours	Give IV infusion over 60 mins
AMPICILLIN	50mg/kg IV/IM **Week 1:** every 12 hours **Weeks 2-4:** every 6-8 hours	Duration depends on indication
CEFOTAXIME	50mg/kg IV **Week 1:** every 12 hours **Weeks 2-4:** every 6-8 hours	Duration depends on indication
CEFTRIAXONE	50mg/kg once daily IV/IM	**Avoid where possible in neonates < 1 month, use cefotaxime -** increased risk of severe jaundice Dose & duration depends on indication
CHLORAMPHENICOL	12.5 - 25mg/kg PO/IV/IM **Week 1:** every 24 hours **Weeks 2-4:** every 12 hours	Limited use in children due to side effects Main indication: meningitis where cefotaxime/ceftriaxone unavailable
CLOXACILLIN	50mg/kg IV **or** 25mg/kg orally **Week 1:** every 12 hours **Weeks 2-4:** every 8 hours	
DIAZEPAM	**Convulsions** 0.1-0.3mg/kg IV (not IM) **or** 0.3-0.5mg/kg PR	Prolonged CNS depression has been reported in neonates receiving diazepam; monitor patient closely Have life of diazepam in a neonate is 50-95 hours
DIGOXIN	**Oral** **<1.5 kg:** initially 8 MICROgrams/kg every 8 hours for 3 doses (24 hours) THEN 4-6 MICROgrams/kg daily in 1-2 divided doses **1.5-2.5 kg:** initially 10 MICROgrams/kg every 8 hours for 3 doses (24 hours) THEN 4-6 MICROgrams/kg daily in 1-2 divided doses **>2.5 kg:** initially 15 MICROgrams/kg every 8 hours for 3 doses (24 hours) THEN 10 MICROgrams/kg daily in 1-2 divided	Narrow therapeutic range: always monitor levels if possible If IV give loading dose over 30-60 minutes, give maintenance dose over 10-20 minutes

	doses **IV** **<1.5 kg:** initially 7 MICROgrams/kg every 8 hours for 3 doses (24 hours) THEN 4-6 MICROgrams/kg daily in 1-2 divided doses **1.5-2.5 kg:** initially 10 MICROgrams/kg every 8 hours for 3 doses (24 hours) THEN 4-6 MICROgrams/kg daily in 1-2 divided doses **>2.5 kg:** initially 12 MICROgrams/kg every 8 hours for 3 doses (24 hours) THEN 10 MICROgrams/kg daily in 1-2 divided doses	
GENTAMICIN	Give once daily for a maximum of 3 days: Neonates < 34 weeks post conception: 3mg/kg IV Neonates > 34 weeks post conception: 5mg/kg IV	Can be nephrotoxic/ototoxic Monitor urine output/renal function **Do not use for more than three doses without specialist approval**
NALOXONE	0.1mg/kg IM/IV/SC	Very short acting – monitor for recurrence of sedation for at least 4-6 hours
PHENOBARBITONE	**Loading dose** 20 mg/kg IV If necessary after 12-24 hours commence **Maintenance dose** 2.5-5 mg/kg/day in 1-2 divided doses IV or oral	Give injection slowly over 20 minutes
PHENYTOIN	**Loading dose** 15-20mg/kg IV over 30-60 minutes **Maintenance Dose** (commence 12 hours after loading dose) Preterm: 2mg/kg IV/PO Q12hr Term: 2-4mg/kg IV/PO Q12hr	
QUININE	10mg/kg TDS IV/ IM	
ZINC SULPHATE	1mg/kg orally once daily	Suspend half a 20mg tablet in 10mL of water – mixture 1mg/mL and give appropriate dose

All newborn babies should be given
Vitamin K (phytomenadione) IM 1mg
Hepatitis B vaccine (within 72 hours)
BCG vaccine at or soon after birth

OEDEMA

Oedema is swelling caused by fluid in the subcutaneous tissues. May be localised to an area (e.g: around the eyes) or generalised (whole body). Can be pitting or non-pitting.

SIGNS & SYMPTOMS

- Swelling best seen at the ankles, eyelids, sacrum (neonates), scrotum and feet
- May be hypotensive or hypertensive (depending on underlying cause)
- May be dehydrated and/or in shock due to low intravascular volume

CAUSES

- Low blood protein: Kwashiorkor/severe acute malnutrition, nephrotic syndrome, parasites, liver disease
- Reduced water excretion eg renal disease (glomerulonephritis), heart failure
- Obstruction of veins or lymphatics eg TB of lymph glands, malignacy

INVESTIGATIONS:

- Depends on underlying cause. Consider:
  - FBE: ?infection
  - LFT's: ?liver dysfunction, ?albumin
  - EUC's: ?renal dysfunction
  - Urine dipstick: ?proteinuria
  - Chest x-ray/echocardiogram: if concerns of heart failure

MANAGEMENT

- Most children with oedema need referral to hospital. Refer urgently if:
  - severe, generalised swelling,
  - respiratory distress
  - dark brown or red urine
  - hypertension
  - Signs of kwashiorkor (peeling skin, thin brittle hair) or severe malnutrition

- For a child that is otherwise well, treat the underlying cause and refer to appropriate STM guideline

- If child has oedema and looks unwell, determine if child has oedema and fluid *overload (hypervolaemic)* OR dehydration *(hypovolaemic)*
  - If child is fluid-overloaded (hypervolemic) and has signs of heart failure (enlarged liver, tachycardia, lower lung crepitations and reduced oxygen saturation) consider frusemide 0.5 mg/kg IM/IV/O
  - If child is dehydrated (hypovolemic) give fluid replacement
    - Orally/nasograstrically if not unwell/malnourished
    - Careful IV replacement if unwell/not tolerating oral
    - Give 20ml/kg 0.9% saline IV if in shock

OSTEOMYELITIS, SEPTIC ARTHRITIS, PYOMYOSITIS

- *Osteomyelitis* is infection of the bone
- *Septic arthritis* is infection of a joint
- *Pyomyositis* is infection of the muscle with pus present.
- These are serious infections as they may cause permanent damage and impairment in mobility

SIGNS & SYMPTOMS

- Fever, usually intermittent
- Warm, painful, swollen joint (septic arthritis) or limb/back(osteomyelitis/pyomyositis)
    - Pyomyositis commonly involves the thigh
- Irritability in neonate or infant
- Inability or refusal to move a limb/joint or to walk (in mobile child)
- Skin abscess/sinus draining from chronic underlying osteomyelitis

CAUSES

- Bacteria (*Staphylococcus aureus, Salmonella, Mycobacterium tuberculosis*)
- May be secondary to trauma or spread through the bloodstream from another site of infection (e.g: cellulitis, respiratory tract)

INVESTIGATION

- X-ray of bone and joint associated joint space. In early osteomyelitis, the x-ray may be normal as it takes up to 2 weeks for changes to be seen
- If associated skin wound/abscess, a culture of pus from wound
- Full blood count & blood culture, ESR

MANAGEMENT

- Referal to Orthopedic Team (osteomyelitis, septic arthritis) or General Sugical team (pyomyositis) for consideration of surgery
  - Septic arthritis requires urgent surgical drainage & joint lavage. This needs to be done as soon as possible to reduce the risk of permanent joint destruction
  - Pyomyositis usually needs incision and drainage of abscess
  - Chronic osteomyelitis may require sequestrectomy (removal of dead bone)

- Antibiotics
  - Start with empiric antibiotics (cloxacillin, see below)
  - Adjust according to culture result and sensitivities if known from joint or abscess collection

	OSTEOMYELITIS	**SEPTIC ARTHRITIS**	**PYOMYOSITIS**
SURGICAL DRAINAGE	Occasionally	Always	Usually
DURATION OF ANTIBIOTICS	6 weeks	3 weeks	2-3 weeks
IV ANTIBIOTICS	Cloxacillin 50mg/kg (max 2g) IV every 6 hours for the first 2 weeks	Cloxacillin 50mg/kg (max 2g) IV every 6 hours until good improvement	Cloxacillin 50mg/kg (max 2g) IV every 6 hours until good improvement
FOLLOW ON ORAL ABS	Cloxacillin 25mg/kg (max 1g) orally every 6 hours for 4 weeks	Cloxacillin 25mg/kg (max 1g) orally every 6 hours for the remaining time	Cloxacillin 25mg/kg (max 1g) orally every 6 hours for the remaining time

Please also refer to the Solomon Islands Antibiotic Guidelines

OTITIS MEDIA – ACUTE & CHRONIC

ACUTE OTITIS MEDIA

Acute otitis media (AOM) is an infection of the middle ear and is a common problem in early childhood

CAUSE

- Viral (25%)
- Bacterial: *Streptococcus pneumonia*, non-typable *Haemophilus influenzae*, *Moraxella*

SIGNS & SYMPTOMS

- Ear pain or irritability (young children)
  - Peak age prevelance: 6 – 18 months
- Red ear drum – dull in appearance (poor light reflex) and may be bulging
- Pus discharge from ear for less than 2 weeks
- May have decreased appetite, vomiting or lethargy
- May have associated signs of URTI including coryza, sore throat, cough

COMPLICATIONS:

- Perforation of the ear drum
- Febrile convulsions are commonly associated with AOM
- Mastoiditis, intracranial infections (meningitis, brain abscess)

MANAGEMENT

MANAGEMENT GOAL	NOTES
Consider antibiotics	*Most cases do not require antibiotics & resolve spontaneously* Observe children > 2 yrs, if not unwell and don't have recurrent infections
When using antibiotics	AOM without perforation - Amoxycillin 40mg/kg (max 1g) orally ever 12 hoursr for 5 days - If no response (72 hours), change to amoxycillin/clavulanic acid 25mg/kg orally ever 12 hours AOM with perforation - Amoxycillin 40mg/kg (max 1g) orally ever 12 hoursr for 14 days - 5 drops Ciprofloxacin 0.3% drops or Chloramphenicol every 12 hours for 14 days - Regular ear toileting/wicking 3 times per day IV antibiotics if systemically unwell with co-existing infections (e.g.: meningitis, pneumonia)
Analgesia	Give simple analgesia as required (paracetamol, ibuprofen)
Monitor	Avoid swimming or getting water into the ear during treatment phase If mastoiditis develops, refer urgently for surgical drainage

Ear 'toileting': for perforations

- Clean the ear with tissue paper to dry the ear. Show the carer as you do this:
  - Use a piece of toilet tissue, twist lightly from one corner to form a tissue spear
  - Tear off the tip at each end
  - Get carer to steady the child's head while you pull the top of the ear upwards and backwards to straighten the ear canal
  - Gently push and twist tissue into the ear canal until it stops (~2.5cm)
  - Leave in place for 2 minutes to absorb the pus
  - Gently remove the tissue spear
  - If soaked with pus, repeat with more spears until the ear is dry
  - Instill antibiotic ear drops

CHRONIC OTITIS MEDIA

Chronic otitis media is pus discharging for more than 2 weeks

MANAGEMENT GOAL	NOTES
Regular ear toileting	3 times per day Chloramphenicol OR Ciprofloxacin 0.3% drops 5 drops into the ear twice a day for14 days
Education	Family regarding ear toileting, keeping ear dry
Follow up	Review in 5 days. If ear discharge persisting - check that ear toileting is occurring - review technique of toileting and instilling drops - consider other causative organisms (pseudomonas, TB) Keep following-up every 2 weeks until ear is dry If a perforation persists for >3 months, consider referral to ENT These children are at risk of conductive hearing loss: - monitor for speech delay & behavioural difficulties

Cotton buds can cause damage to ear structures and should never be used! Also never plug a discharging ear with cotton wool

PERTUSSIS (WHOOPING COUGH)

Whooping cough occurs when the bacteria *Bordetella pertussis* gets into the respiratory tract and causes a bloody mucous to be formed

CAUSE

- Spread by air droplets
- Patients are contagious for 21 days after the onset of the cough, if untreated
- Non-vaccinated children most commonly affected. Can occur in immunised children but usually a more mild illness

SIGNS & SYMPTOMS

- Cough and runny nose for 1 week (1st stage) followed by spasmodic cough with 'whooping' sound. May also present as a non-specific persistant cough
- Vomiting often following a coughing spasm
- Apnoea or cyanosis during coughing spasms
- Fever is uncommon
- There may be no clinical signs on examination and children may appear well between coughing spasms

COMPLICATIONS

- Infants < 6 months are at greatest risk and are commonly infected by family members
- Apnoea
- Severe pneumonia
- Encephalopathy

INVESTIGATIONS

- Generally a clinical diagnosis
- If persistant cough or other suggestive symptoms (weight loss, night sweats) remember to assess TB exposure and consider investigations if risk factors
- Blood count (may be associated with high lymphocyte count)

MANAGEMENT

MANAGEMENT ISSUE	NOTES:
Consider admission	If < 6 month or an ex-premature baby OR If apnoeic or cyanotic episodes OR If not feeding well due to coughing or is dehydrated OR If other co-morbidities including congenital heart or respiratory disease
Consider antibiotics	Cough for **<**14 days (may reduce spread) If admitted to hospital If other complications (pneumonia, cyanosis, apnoea)
	If siblings / household or close contacts unimmunised or < 6 months (high risk)
Antibiotic choice	Erythromycin (> 1 month) 10mg/kg every 6 hours for 10 days OR Azithromycin 10mg/kg (max 500mg) orally once daily for5 days **OR if unavailable / contraindicated:** >1 month: Co-trimoxazole 4+20mg/kg (max 160/800mg) orally every 12 hours for 7 days
Manage complications	If apnoeic or cyanotic episodes, give oxygen and consider gentle suction and/or bag-mask ventilation Use NG/IV fluids if not feeding Consider anti-convulsant if seizures (...)
Exclusion	Exclude from school (& away from infants) until received 5 days of antibiotics **OR** Cough has been > 21 days (no longer infectious)
Arrange vaccination	Immunise siblings/contacts if behind in schedule
Antibiotic prophylaxis	Consider for siblings/close contacts < 6 months OR Immunodeficiency **OR** Pregnant mothers in last trimester of pregnancy If prophylaxis is indicated, give antibiotics using treatment doses as above
Educate family	Advise the coughing may last up to 8-12 weeks Encourage mother to continue feeding child

PNEUMONIA

Pneumonia is an infection of the lungs, usually caused by bacteria. It can occur as a secondary complication of other infections.

SIGNS & SYMPTOMS

- Fever, cough,fast breathing, increased work of breathing
- Poor feeding, vomiting, chest or abdominal pain

SEVERITY OF PNEUMONIA:

	MILD	**MODERATE**	**SEVERE**
Respiratory rate	Normal or increased	Increased	Markedly increased
Accessory muscle use *- intercostal recession* *- subcostal recession* *- nasal flare* *- grunting, head bob*	Mild or absent	Mild-moderate	Markedly increased
Oral intake	Normal or reduced	Often reduced	Reduced/no intake
Cyanosis	Not present	Unlikely	May be present
Conscious state	Alert, active	Usually alert May be distressed/agitated	Drowsy/lethargic

MANAGEMENT CHILDREN < 2 MONTHS OLD

Admit to hospital	Children <2 months should be referred and admitted for IV antibiotics
Antibiotics	Ampicillin 50mg/kg IV every 6 hours **PLUS** Gentamicin IV once daily - Neonate < 34 weeks post conception 3mg/kg - Neonate > 34 weeks post conception: 5mg/kg - Infant (>1 month old): 7.5mg/kg Duration of treatment: 5 days If not improving in first 48 hours, use cefotaxime 50mg/kg IV QID If *Staphylococcus* pneumonia suspected (severe or complications e.g. effusions, empyema): - Cloxacillin 50mg/kg IV - First week of life: every 12 hours - 1 week to 1 month: every 8 hours - From 1 month: every 6 hours **PLUS** - Gentamicin IV daily (dose as per age above) Treat for 5 days THEN Cloxacillin 25mg/kg orally (using dose intervals as above) for a total treatment of 3 weeks If not improving also consider investigations for: - pleural effusion, empyema (may require surgical drainage) - underlying TB - malignancy

MANAGEMENT CHILDREN ≥ 2 MONTHS OLD

MANAGEMENT GOAL	NOTES
Admission criteria	Oxygen requirement, moderate tachypnoea or systemically unwell OR Feeding difficulties/dehydration OR Failure to resolve with oral antibiotics OR Extensive consolidation OR Other complications (pleural effusion, empyema)
Antibiotics	***Mild disease:*** - Amoxycillin 40mg/kg (max 1g) orally every 12 hours for 7 days ***Moderate disease:*** - Ampicillin 50mg/kg (max 2g) IV/IM every 6 hours - Change to oral amoxycillin as above after 24-48hours if clinical improvement - Treat for a total duration of 7 days ***Severe disease (systemically unwell or not improving) – refer to hospital*** Cloxacillin 50mg/kg (max 2g) IV/IM every 6 hours **PLUS** Gentamicin IV/IM once daily (1 month - 10 years: 7.5mg/kg (max 360mg) **PLUS** Azithromycin 10mg/kg (max 500mg) orally once daily Treat with IV for at least 5 days of IV antibiotics. Then change to - amoxycillin+clavulanic acid (25mg/kg amoxyl component, max 875+125mg) orally every 12 hours - Treat for a total duration of 7 - 10 days
Consider Oxygen	If oxygen saturations <90% If systemically unwell (cyanosed, drowsy, restless, grunting) Give oxygen by nasal prongs (up to 2L) or face mask (4L or more) Do not run oxygen by face-mask at flow rate less than 4L due to risk of re-breathing Discontinue oxygen if the saturations remain stable at >90% for >15mins in room air
Consider Fluids	Encourage oral intake If dehydrated or poor oral intake give supplemental NG (safer) or IV fluids Restrict supplementary IV fluids to 2/3 maintenance (due to risk of SIADH) If shocked give 20ml/kg 0.9% saline IV and treat as per sepsis protocol Be wary of fluid overload in children who have congenital heart disease

POISONING

IMPORTANT INFORMATION

- What drug or poison was swallowed? Ask to see bottle/container if possible
- How much was taken? What time did it happened?
- Consider food poisoning (e.g: preparation of puffer-fish)
- What is the weight of the child?
- Were any other children involved?

MANAGEMENT:

GOAL	NOTES
Basic Resuscitation	Airway, Breathing, Circulation
Admit to hospital	Refer urgently if drowsy, unconscious or burns to mouth/throat
Treat hypotension/shock	Some drugs (e.g.: chlorpromazine) cause hypotension Give 20ml/kg 0.9% saline to restore circulation
Consider a glass of milk	Useful for corrosive ingestion as it dilutes the stomach and slows absorption
Consider charcoal	Binds to poisons and slows absorption Works best if given within first few hours Mix 5 g into 100ml of clean water & give as per dosage table (orally or NGT) Give 3 doses (20 mins between each dose)
Avoid inducing vomiting	*Induced vomiting generally not recommended* Never induce vomiting who has swallowed corrosive substances (kerosene, petrol, bleach, toilet cleaner or acid)
Antidote if available	High flow oxygen for carbon monoxide poisoning Opiate overdose (morphine, pethidine, codeine): naloxone 0.1mg/kg/dose (max 400mcg) Chloroquine overdose: - Diazepam 0.2mg/kg IV (0.5mg/kg rectal) (max 15mg) - Monitor for respiratory depression
Treat complications	Respiratory distress: give oxygen, consider x-ray & treatment for pneumonia / pneumonitis with ampicillinV 50mg/kg (max 2g) IV / IM every 6 hours Arrhythmia: baseline ECG and repeat if abnormal pulse Hypoglycaemia: e.g. secondary to B-blockers. Treat as per STM guideline Seizures: treat as per STM guideline
Discharge	When child well and after appropriate period of observation depending on poison Before discharge educate parents about keeping medicine/poisons safe

	WEIGHT (KG)					
	3 - 5.9	6 - 9.9	10 - 14.9	15 - 19.9	20 - 29.9	30 - 40
CHARCOAL (ml)	20	40	60	80	100	130

For management of petroleum compounds, organophaspates, aspirin, iron, morphine & carbon monoxide poisoning, refer to pages 30-33 of the WHO Pocketbook (2nd Edition, 2013) & Paediatric on-call team (NRH)

RESUSCITATION OF CHILDREN

GENERAL NOTES:

- Remember the **ABCDE** of resuscitation – **A**irways, **B**reathing, **C**ardiac, **D**isability, **E**xposure

- Be prepared! Check resuscitation equipment regularly

- If a patient is deteriorating or critically ill and likely to arrest, is is better if a resuscitation plan has been discussed with the family prior to the arrest
    - Depending on the cause of the illness, the underlying prognosis, co-morbidities and family wishes this plan may involve full cardiopulmonary resuscitation or comfort measures only
    - Ensure the family have a good understanding of the plan and are in agreement
    - If there are conflicting opinions between medical and family regarding the extent of resuscitation, always involve a senior doctor in the discussion
    - Once agreed ensure all medical/nursing staff need to be aware of the plan

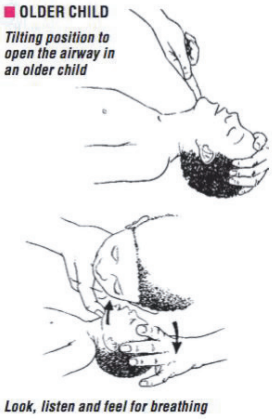
- Ensure critically ill patients and family have as much privacy as possible in case of arrest
    - Ideally move to own room or if this is not possible, have barriers available

- At the time of arrest, <u>always call for senior help</u>, assign the most experienced person to lead the resuscitation and give supporting roles to the other doctors/nurses
- These roles include:
    - A person for managing the airway and using bag and mask ventilation/intubation
    - A person for administering chest compressions (change this role frequently 2-5mins) as CPR is physically tiring
    - A person for drawing up fluids/medications
    - A person to keep time and document the resuscitation
    - If possible, a person to comfort the family and provide explanations.
    - Families should be encouraged to stay in the room during a resuscitation, if they wish to. Witnessing resuscitation, although traumatic, often assists in the families understanding and acceptance of an unsuccessful outcome

AIRWAY

- Establish a satisfactory airway
    - Position child's head: neutral positon < 1 year old or "Sniffing position" ≥ 1 year
    - Open the airway: Head tilt and chin lift, or jaw thrust

Neutral position to open the airway in an infant



Look, listen and feel for breathing

- Clear the airways: Consider brief suction of the mouth and pharynx
- If unconcious, protect the airway with a plastic oropharyngeal (Guedal) airway

BREATHING

- Assess breathing
    - Is the chest moving?
    - Can you feel air moving around the mouth/nose? (feel with back of hand)
- If breathing, give high flow oxygen (10L/min) and keep airway open
- If not breathing, provide ventilation (put air into the lungs)
    - Use an ambubag (infant < 2 yo: 500ml) and child > 2 yo (2L bag) and an mask that fits over the mouth/nose to give a tight seal OR
    - Give mouth to mouth resuscitation

- Give at least 20 breaths every minute
- Ensure chest rise and fall with each breath
  - If there is no expansion of lungs, check the airway again, suction and reposition
  - Consider endotracheal intubation if skilled practitioner and appropriate facilities available

CIRCULATION

- Currently there is no defibrillator available in Paediatrics (NRH) nor rural health centres
- Start cardiac massage/ compressions if:
  - You cannot feel or hear a pulse or the pulse is <60/minute
  - There are no signs of life
- Place the child on a hard surface
- Push down on the lower half of the sternum (centre of the chest) so that you squeeze the heart against the backbone
- Push to a depth of ½ of the chest cavity
  - For larger children/adults use the "heel" of the hand
  - For small infants use two fingers or a two-handed hold where both thumbs compress the sternum

- Aim for 100 compressions/minute
  - 15 compressions:2 breaths
  - Minimise interruptions

Consider a fluid bolus

- Give 20ml/kg of fluid (0.9% saline) if there is shock/ poor perfusion.
- Give IV or intraosseous as quickly as you can. Repeat if neccesary
- Check CBG. Give IV glucose bolus if CBG < 2.5 mmol/L

Consider adrenaline

- Give adrenaline if there is no heartbeat after breathing/ cardiac compression
  - Dose 0.01mg/kg = 0.1ml/kg of 1:10,000 adrenaline (IV/IO)
- ***There are two strengths of adrenaline 1:1000 (1 mg in 1ml) and 1:10,000 (1mg in 10ml)***
  - 1:10,000 strength adrenaline is preferable for resuscitation (if available)
  - 1:1000 strength is used as an IM injection in anaphylaxis
- If using 1:1000 strength adrenaline this must be diluted to make 1:10,000 prior to administration

- Draw up the 1ml of 1:1000 adrenaline out of the vial
- Dilute with 9ml of 0.9% saline. This is now 1:10,000 adrenaline
- Administer 0.1ml/kg of this 10ml solution as an IV push. e.g: a 12 kg child will require 1.2ml

- A second dose (0.01mg/kg) can be repeated after 4 minutes
- Adrenaline can also be given through an intraosseous line (0.01mg/kg) as well as an Endotracheal tube though use a higher dose (0.03mg/kg)

POST RESUSCITATION CARE:

- Re-evaluate ABCDE
- Monitor to ensure airway and breathing remain stable
- Close observation of vital signs
- 12-lead ECG
- Treat precipitating causes (sepsis, hypovolemia, hypoxaemia)
- Continue IV fluids to maintain blood pressure
- Maintain adequate temperature control

WITHDRAWAL/CESSATION OF RESUSCITATION:

- Involve senior doctors in the decision to cease resuscitation
- Ensure the following have been addressed:
  - Airway obstruction
  - Hypovolemia, hypoxia, hypo/hyperthermia, hypo/hyperkalemia, hypoglycaemia
  - Tension pneumothorax, cardiac tamponade, toxins, thrombosis
- Consider stopping resuscitation after 15 minutes if the above have been considered and corrected and there is still:
  - No response to stimuli
  - No signs of respiratory effort
  - No spontaneous cardiac output
  - Pupils fixed and dilated
- Discuss cause of arrest, resuscitation and eventual outcome with the family and answer any questions they may have
- Document resuscitation steps in the progress notes
- Organise for completion of death certificate and other relevant documentation

RHEUMATIC FEVER

Acute Rheumatic Fever (ARF) is a common cause of acquired childhood heart disease in Solomon Islands, most common in 5 - 14 year old children. The illness caused by a reaction to a bacterial infection (*Group A streptococcus, GAS*) which usually begins in the throat or potentially on the skin. ARF causes inflammation in joints and damage to the heart valves which can be permanent and is known as *Rheumatic Heart Disease (RHD)*

If child is unwell and suspect ARF, refer to the nearest hospital for investigations and treatment.

For further guidance please refer to the WHO Pocketbook of Hospital Care for children (2nd Edition, 2013) and the Solomon Islands Protocol on Rheumatic Heart Disease

CRITERIA:

- *Definite initial episode of ARF*
  - 2 major criteria OR 1 major and 2 minor criteria PLUS
  - Evidence of preceeding GAS infection (elevated serology or positive throat culture)
- *Definite recurrent episode of ARF* in a patient with a history of ARF or RHD
  - 2 major OR 1 major and 1 minor OR 3 minor PLUS
  - Evidence of a preceeding GAS infection
- *Probable ARF* (1st episode or recurrence)
  - A clinical presentation that falls short by either 1 major or 1 minor cirteria, or the absence of serology results, though ARF is considered the most likely diagnosis

JONES CRITERIA (based on a high risk population)

	CRITERIA	NOTES
MAJOR	Carditis	Suspect if new heart murmur Confirm on echo if available
	Polyarthritis	Swelling and pain of large joints, especially ankles and knees Usually asymmetrical and migratory May also present as mono-arthritis or polyarthalgia
	Sydenham's Chorea	Jerky, uncoordinated movements of hands, feet, tongue or face Disappears during sleep
	Erythema marginatum	Circular patterns of bright pink macules or papules Trunk and proximal extremities Difficult to detect in darker skin pigmentation
	Subcutaneous nodules	Small, round, painless nodules. Rare Elbows, wrists, knees, ankles, vertebrae
MINOR	Fever	Common, usually >38oC. Either at presentation or before
	Prolonged PR interval (ECG)	3 – 12 years: >0.16, 12 – 16 years: >0.18, 17+ years: >0.20
	Mono-arthralgia	Need to differentiate from infection
	Raised inflammatory markers	ESR >30 or CRP >30 (if available)

SIGNS & SYMPTOMS

- Signs of acute rheumatic fever: see Jones criteria above
- Signs of chronic rheumatic fever. Heart damage already done from this episode (late presentation) or previous episodes of rheumatic fever
    - Heart murmur
    - Heart failure (enlarged liver, tachycardia, lung crepitations)
- Signs of infective endocarditis (a serious complication of RHD, can be acute or chronic)

INVESTIGATIONS:

- Bloods:
    - FBE, ESR/CRP if available
    - Blood cultures if febrile (multiple if concerns of infective endocarditis)
    - Streptococcal serology: ASO and anti-DNase B titres
        - Can be normal early in the illness. Confirm by rising titres 2 weeks later
- Other:
    - Throat swab for GAS culture: preferably before giving antibiotics
    - ECG: looking for elevated PR interval, abnormal rhythm
    - CXR: looking for evidence of an enlarged heart or heart failure
    - Echocardiogram (if available): to confirm carditis and exclude infective endocarditis
    - Consider joint aspirate if concerns of septic arthritis as a differential

MANAGEMENT

GOAL	**NOTES**
Antibiotics - to treat Streptococcal infection	Single dose of Benzathine penicillin IM: Child weighs < 20kg give 450mg (0.6 mega units) Child weighs > 20kg give 900mg (1.2 mega units) Oral Penicillin V (phenoxymethylpenicillin): Child < 10 years 250mg orally every 12 hours for 10 days Child > 10 years 500mg orally every 12 hours for 10 days
Treat arthritis & fever	Paracetamol/codeine until diagnosis confirmed High dose aspirin once diagnosis confirmed
	- Aspirin is especially effective in reducing joint pain in ARF - Dosage: 20mg/kg (max 2g) every 6 hours - Duration: until joint symptoms resolve (1-2 weeks) - Once symptom free, wean and cease (max 6 weeks)
Manage carditis	Urgent echocardiogram (if available) Consider anti-failure medication if heart failure present clinically: - frusemide (1mg/kg orally or IV once daily initially, increase up to 2mg/kg orally every 6 hours if necessary) & fluid restriction for heart failure - consider digoxin/B-blocker if atrial fibrillation For severe carditis or pericarditis with effusion, consider prednisolone -1 mg/kg (max 80mg) - usually treat for 2 weeks and then taper by 25% each week

Manage chorea (if present)	No treatment usually required Ensure child safe (e.g.: when walking, around hot drinks etc.) If severe, can consider carbamazepine or sodium valproate
Submit details on RHD register	Fill out documentation at the health clinic/hospital Send to the Non-Communicable Disease (NCD) Department (Ministry of Health)

CONTINUING CARE

- **Continuous** antimicrobial prophylaxis at nearest clinic for confirmed cases & suspected cases where investigastions (echocardiogram, strep serology) are still pending
    - Benzathine penicillin IM every 28 days
        - Child weighs <20 kg give 450 mg (0.6 mega units)
        - Child weighs >20 kg give 900 mg (1.2 mega units)
    - **Or** if child refuses benzathine injections
    - Ongoing oral penicillin V
        - 250mg orally every 12 hours
- For confirmed cases continue monthly injections for a minimum of 10 years after the most recent episode of ARF or until age 21 (whichever is longer)
- Paediatric review is advisable prior to ceasing RHD prophylaxis

If rheumatic heart disease confirmed:

- Manage any heart failure if present (as above)
- Be aware of the risk of infective endocarditis
- These children may require additional antibiotic prophylaxis if undergoing surgical or dental procedures, consult *Solomon Islands Antibiotic Guidelines*

SEXUALLY TRANSMITTED (& CONGENITAL) INFECTIONS

All STIs should be recorded and reported to the STI/HIV department (Ministry of Health)

CONGENITAL SYPHILLIS

Infection of the fetus can occur at any stage of pregnacy leading topremature labour or stillbirth, intrauterine growth restriction or congenital malformations

If mother has positive VDRL during pregnancy antibodies cross placenta and baby will usually have a positive VDRL . This does not necessarily mean that the baby has congenital syphilis.

SIGNS & SYMPTOMS

Babies sometimes have no symptoms at birth and develop signs later including:

- Rhinitis or "snuffles" (develops at 1 week and worsens, may have pus/blood)
- Blisters or skin rash (red maculopular) or peeling skin, often on the palms or soles of feet
- Prolonged jaundice, anaemia, petechiae
- Abdominal distension with enlarged liver +/- enlarged spleen
- Generalised lymphadenopathy
- Sores around the mouth
- Pneumonitis
- Cataracts, deafness, teeth or nasal or long bone abnormalities
- Hydrocephalus, seizures, developmental delay

INVESTIGATIONS

- Blood VDRL test on mother and child
- FBE: May have low Hb and/or low platelets
- LFTs: May have abnormal LFTs, raised bilirubin
- X-ray of long bones: osteitis/ostechondritis can lead to deformity or fracture
- Consider CSF VDRL test if evidence of congenital syphilis. If any of the following abnormalities are present, this indicates neurosyphilis:
    - CSF VDRL test is reactive, high leucocyte count or protein > 400mg/L

MATERNAL RISK FACTORS FOR SYPHILIS TRANSMISSION
• Syphilis untreated or inadequately treated during pregnancy (e.g. not documented, non-penicillin regimen) • Syphilis treated less than 1 month prior to delivery • Insufficient decrease in VDRL titres after therapy or inadequate serological follow up to confirm treatment response

- If any of the above risk factors, assess for **evidence of congenital syphilis:**
    - **VDRL titres in baby higher than the mother**
    - Clinical signs of syphilis or suggestive x-ray changes

MANAGEMENT

i. Risk factors but no evidence of transmitted congenital syphilis:

- **Baby is well, VDRL titre in baby less than or equal to mother and no signs of congenital syphilis**
- Infants should receive benzathine penicillin 37.5mg (50,000 units)/kg single dose IM at birth
- Monitor and repeat VDRL every 3 months until negative

ii. Evidence of congenital syphilis:

- **If baby has any signs of congenital syphilis or VDRL titre in baby higher than mother**
- **Perform a CSF VDRL test, cell count and protein estimation**
  - Treat with Benzylpenicillin 60mg/kg IV,IM every 12 hours for 10 days
  - Repeat VDRL at 3 months and at 6 months if CSF findings suggestive of neurosyphilis

In both cases also treat the mother and father

GENITAL DISCHARGE IN YOUNG CHILDREN

- Suspect vulvovaginitis in girls with purulent vaginal discharge. Pain on passing urine may also be present as well as increasing voiding frequency
- This is a very **unusual** infection in children, and may indicate sexual abuse
- Send a swab for M, C & S
- Discuss the problem with a medical officer or paediatrician and reconfirm history with parents / guardians
- Consider full STI screen (e.g. syphillis, HIV, hepatitis B & C)

GONORRHOEA

Gonorrhoea is a STI caused by *Neisseria gonorrhoea* (Gonococcus*)*.

SIGNS & SYMPTOMS

- In the baby: Gonococcal opthalmia (eye involvement)
- In the older child: Uretheral/ vaginal discharge, dysuria and urinary frequency

MANAGEMENT

- In the baby (gonococcal conjunctivitis) – see conjunctivitis chapter

CHLAMYDIA

Chlamydia is a STI caused by *Chlamydia trachomatis*

SIGNS & SYMPTOMS

- Acute conjunctivitis with purulent discharge
- Usually occurs between 5 – 12 days of birth

MANAGEMENT

- Azithromycin 20mg/kg (max 1g) orally once daily for 3 days)

Neonates can later develop chlamydial pneumonia later (1-3 months of age)
Consider if neonatal conjunctivitis / afebrile pneumonia / staccato cough

Management:

< 1 month azithromycin 10mg/kg orally daily for 5 days
>1 month erythromycin 10mg/kg (max 500mg) every 6 hours for 7 days

SKIN DISEASES

Skin disease is common in children in the Solomon Islands and can be caused by *bacteria, fungus (e.g. ringworm), parasites (e.g. scabies) or viruses (e.g. molluscum contagiosum). They can also lead to serious infections of the blood.*

Also consider non-infectious causes of skin disease (e.g. eczema, allergies).

PREVENTION OF SKIN DISEASES

Skin diseases can often be prevented by good skin hygiene and use of soap and water

Advise parents

- Keep skin clean. Wash with soap and water daily, drying well between fingers and toes
- Do not share towels between infected children
- Get treatment for small skin sores early before they get big
- Use of medicated soaps may prevent small skin sores becoming serious

Prevention of spreading infection and re-infection

- Many skin diseases are contagious. Always treat other infected family members or contacts at the same time.

SKIN SORES AND ULCERS

- Clean dirt and dead tissue away with antiseptic solution (chlorhexidine/salt water)
- If the sore is infected, painful, swollen and red, apply antiseptic (e.g. chlorhexidine cream) three times a day until the sore is clean and pink
- Make sure that ulcers, sores and cuts are kept clean. Apply dry dressings every day
- If any of the sores are raised and / or chronic, consider yaws as a possible cause (see below)

BOILS OR ABSCESSES

Usually painful, and most frequently caused by *Staphylococcus aureus* infection

SIGNS & SYMPTOMS

- Swellings with pus in them, usually red, warm and painful

MANAGEMENT

- Cloxacillin 25mg/kg (max 500mg) orally every 6 hours for 7 days
- If pus is present arrange for incision and drainage
- If the child has a high fever and a hot, swollen, tender limb, they might have underlying osteomyelitis/septic arthritis/pyomyositis

IMPETIGO & CELLULITIS

Painful blisters caused by staphylococcal or streptococcal skin infection

SIGNS & SYMPTOMS

- Blisters and pustules rapidly spread and turn into irregular pussy sores with painful, shiny yellow weeping crusts.
- May be associated with conditions any condition where the skin is broken including scabies, eczema, lice,, fungal infections, molluscum contagiosum and herpes simplex infection

MANAGEMENT

- Clean scabs away with antiseptic e.g. chlorhexidine.
- Give cloxacillin 25mg/kg (max 500mg) orally every 6 hours for 7 to 10 days

YAWS

- Yaws are a contagious skin infection caused by Treponema pertenue
- Infection is spread by direct skin-to-skin contact. The infection can remain in the body for a long time without causing any visible problems, or it can cause chronic sores and / or bone problems
- Skin sores are typically
    - Raised and reddish brown, with a yellow crust. They may be ulcerated
    - Usually on the leg and painless
    - **Unresponsive to standard sore treatments**
- Children with Yaws often develop bone problems, with pain in the long bones and swellings of the fingers, forearms, legs and bridge of the nose.The skin sore may have healed by this stage.
- VDRL test is positive in Yaws
    - Children found to have a positive VDRL should be treated even if they don't currently have skin sores or bone problems
- Give
    - **benzathine penicillin** IM as single dose
        - Child <20kg give 450mg (0.6 mega units)
        - Child > 20kg give 900mg (1.2 mega units)

      OR
    - Azithromycin 30mg/kg (max 2g) orally as a single dose
- Contacts should also be treated

BAKUA (RINGWORM, TINEA IMBRICATA)

Fungal infection of the body or face. Highly contagious

SIGNS & SYMPTOMS

- Itchy, flaking skin (generalised or in local areas), can have different patterns

MANAGEMENT

- Clean skin with soap and water
- Firstline treatment, if 4 weeks of B.S.S. ointment fails: Clotrimazole 1% cream
  - Apply a thin amount to affected areas three times a day for 2 to 4 weeks
  - It is important that the cream is applied regularly and continued for 2 weeks after symptoms go away
- Secondline treatment: Griseofulvin 20mg/kg (max 500mg) orally once daily with fatty food for 4 to 8 weeks

SCABIES

Caused by mites *Sarcoptes scabiei* transmitted by skin-to-skin contact and is very contagious. The lesion is a burrow (a whitish zigzag channel) or can be a macule (flat) or a papule (raised).

SIGNS & SYMPTOMS

- Exremely itchy rash mainly between fingers, wrists, in the axilla, around the naval, genitals and inner sides of feet.
- Infants have a more widespread distribution of rash
- Itching may be much worse at night
- Scratching may cause secondary bacterial infection

MANAGEMENT

- Treat all household members as well as the child
- Wash all clothes, towels, blankets, mattresses etc thoroughly and dry in the sun
- Re-infestation is common, it's important to adhere to all treatments
- Counsel on prevention of skin diseases
- Benzyl benzoate 25% lotion
  - Must be diluted
  - < 2 yr: Dilute 1:3 (10ml Benzyl Benzoate with 20ml water)
  - 2 yr – 12 yr: Dilute 1:1 (25ml Benzyl Benzoate with 25ml water)
  - Wash child. Dry well everywhere
  - Apply diluted lotion all over body, below the neck, especially between fingers and toes. In infants up to 2 years, also apply carefully to scalp, neck, face and ears. Avoid eyes, mouth and mucous membranes
  - Leave for 24 hours, then wash off
  - **A second treatment after a week is required in all cases**
- For treatment resistent and/or crusted scabies and/or in immunocompromised children
  - Ivermectin 0.2mg/kg (no maximum dose) orally as a single dose (not recommended if child <15kg)
  - **A second dose after a week is required in all cases** – some cases may require additional dosing, speak to a doctor
- If scabies is infected (red, painful, pus present), treat with cloxacillin 25mg/kg (max 500mg) orally every 6 hours for 7 to 10 days

HEAD LICE

- Head lice are insects that live on the scalp and lay eggs (nits) on the hair and very contagious.
- Diagnosis of active lice infestation is made by observing a live, moving louse on the scalp.

MANAGEMENT

Family and close physical contacts should be examined and treated if live lice are found.
Wash bedding, combs and brushes thoroughly in hot water.

WET COMBING

- Use a fine-toothed comb after applying a generous amount of hair conditioner to wet hair.
- Repeat the process everyday for 10 to 14 days until no lice are found.
- This method works in about half of patients
- Alternatively, topical insecticides can be used:
  - Permethrin 1% topically, leave for a minimum for 20 minute before washing out

All lice treatments should be repeated 7 days later.

Wash hands thoroughly after using lice treatments.
Treatment failure may be due to incorrectly applied treatment or re-infestation.

SURGICAL PROBLEMS

A child with a tender, swollen scrotum or tender, distended abdomen or bile stained vomiting should be referred urgently to hospital

SCROTAL SWELLINGS

There are several causes for swelling in the scrotum. The most common ones include

- Hydrocele (collection of fluid around the testicle)
- Hernia (loop of bowel entering the scrotum)
- Testicular torsion
- Epididymo-orchitis

Hydrocele

- A common cause of swelling in the scrotum and is the result of fluid building up around the testicle. It usually has been there for a long time
- The child is well, feeds well and the scrotum is not painful to touch
- It is usually possible to feel a normal cord above the swelling
- The swelling is soft. When a torch is placed against it, it transilluminates (lights up) very brightly
- Hydroceles usually get better by themselves. If there is any doubt about the diagnosis or the child is older than 2 years, the child should be referred to the Surgical Team

Hernia (Inguinal)

- A hernia is caused when the opening to the scrotum is bigger than normal and a loop of bowel enters into the scrotum.
- Sometimes the loop of bowel slides in and out of the scrotum so that the swelling is only there sometimes (a reducible inguninal hernia). In this case the swelling can usually be pushed gently up and out of the scrotum and the scrotum is a normal colour.
    - These children should be referred to a surgeon
- In some children, the loop of bowel becomes stuck (non-reducible), causing a tender, swollen, sometimes discoloured scrotum. The child may be vomitting, or have other signs of bowel obstruction.
    - This is a surgical emergency, and the child should be resuscitated and referred urgently to a surgeon
- All neonates with inguinal hernias should be referred to a surgeon urgently

Testicular torsion

- The testicle is attached by a thin cord from above. Sometimes the testicle can 'twist' on itself, blocking the blood supply that comes through the cord
- This causes a sudden, very painful scrotum which may become discoloured.
- The child may be vomiting
- These children should be referred urgently to a surgeon in order to save the testicle. If operated within 6 hrs, 90% of testis will be preserved

EPIDIDYMO-ORCHITIS

- This is infection of the testis and epididymous (the cord above), it can be STI or non-STI related.
- The testis and scrotum is red, warm, painful, swollen. The child may have a fever and urinary symptoms.

TREATMENT

- Trimethoprim 4mg/kg (max 150 mg) every 12 days for 14 days
- If sexually active or concerned about sexual transmission, treat as per chlamydia / gonorrhoea

The child with sudden, painful swelling in the scrotum or a discoloured scrotum should be referred urgently to a surgeon

UMBILICAL HERNIA

- Umbilical hernias (a protruding umbilicus) are common
- They are usually harmless and get better by themselves as the child grows
- A very large umbilical hernia or a persistant umbilical hernia in an older child (> 6 years) should be referred to a surgeon

BOWEL OBSTRUCTION/INTUSSUSCEPTION/PYLORIC STENOSIS/APPENDICITIS

- All these conditions are serious and require the child to be made NBM, given IV fluids and urgent transfer and surgical referral arranged

Common Paediatric Surgical Conditions

CONDITION	HISTORY	EXAMINATION	INVESTIGATIONS	MANAGEMENT
Bowel obstruction (non-specific)	Bile stained (green) vomiting Colicky pain +/- blood in stools	Tender abdomen +/- distension +/- palpable mass +/-dehydration/shock	Abdo/CxR: - distended bowel loops - air fluid levels - +/- air under diaphragm (perforation) Abdominal ultrasound (if available) FBE: ?Hb ?WCC EUCs: ?K+ ?Na+ ?creatinine	Keep NBM IV fluids Urgent surgical referral NGT free drainage Antibiotics - Ampicillin - Gentamicin - Metronidazole Analgesia - Regular paracetamol - +/- prn morphine
Intussusception 2 month - 2 year old -most common - can be any age	Colicky pain (2-3x/hour) May pull up legs Vomiting (bile/non-bile) +/- diarrhoea +/- blood in stool (red current jelly late sign)	Pale during pain Lethargy May look well (between episodes) Tender abdomen +/- distension +/- upper abdo mass (sausage shape) +/- dehydration	Urgent ultrasound (if available) X-ray: dilated loops Bloods: as above	As per bowel obstruction Urgent surgical referral Operation: reduction
Appendicitis old child/teenager -more common -can be any age	Abdominal pain - initially vague central - localises to right iliac fossa Loss of appetite +/- vomiting, +/- fever	Tender abdomen (RIF) Abdominal guarding Reluctant to move/hop	*Mainly clinical diagnosis* Abdo ultrasound (if available) (do not delay theatre) Bloods: as above	As per bowel obstruction Urgent surgical referral Operation: appendectomy
Pyloric stenosis More common in: - boys, 1st born - family history	Presents at 2-6 weeks: Non-bilious vomiting - increasing force (projectile) - shortly after feed - babe hungry after vomit Weight loss or slow gain Diarrhoea usually not present	Dehydration Peristaltic waves (visible on abdomen) Abdominal mass - RUQ, size of an olive	Urgent ultrasound (if available) EUC's: low K+, low Cl-	NBM, IV fluids Urgent surgical referral Operation: pyloromyotomy

TUBERCULOSIS

- Tuberculosis is caused by *Mycobacterium tuberculosis*. Many children infected do not develop TB initially (latent infection) though have a higher risk of:
    - Progressing to active disease, usually occurs within one year of infection
    - Developing more severe forms of the disease (e.g: miliary and meningeal TB)
    - Developing extra-pulmonary disease
- Tuberculosis is difficult to diagnose in children
- Almost half of TB in children is extrapulmonary (lymph nodes, spine, meninges, pericardium, abdomen, joints, ears, eyes, skin)
- Risk of TB is increased when there is an infectious active case (bacteriologically positive, especially smear positive TB) in the same house, when the child is malnourished, has HIV/AIDS or measles infection in the past few months

Please also refer to the *Solomon Islands 'Stop TB' Standard Diagnosis, Treatment and Management Guidelines (2012)* and the *WHO Pocket Book of Hospital Care for Children (2nd Edition, 2013)*.

HISTORY:

- Symptoms related to site of infection (eg lymph node swelling, cough, meningitis)
- Unexplained weight loss or poor growth, especially when not responding to treatment/food supplementation
- Night sweats or unexplained fever
    - Continues for more than 2 weeks
    - Does not respond to antibiotic or antimalarial treatment
- Lethargy and malaise
- Prolonged cough and/or fever for longer than 2 weeks
- Vomiting if bowel obstruction from intestinal disease
- Slow Progressive neurological deterioration (blindness, hemiplegia)
- Contact with known case of TB
- Family history or household exposure to confirmed or suspected TB
- Always think about TB in the child who is
    - Malnourished and not improving with treatment
    - Still coughing for weeks after treatment with antibiotics
    - Still comatosed 48 hours after antibiotics/ antimalarials

EXAMINATION:

- Reduced growth and signs of malnutrition
- Reduced air entry or dullness to percusion on one side of the chest
- Enlarged, non-tender rubbery lymph nodes or a matted abscess, particularly in neck
- Signs of meningitis
- Abdominal swelling, sometimes with ascites (fluid filled) or a palpable mass
- Swelling or deformity in a joint or bone, including the spine
    - A sharp angle bend in the spine (backbone) is almost always caused by tuberculosis
    - TB arthritis is not painful. Consider septic arthritis if pain present

- Lethargy, decreased conscious state or coma caused by TB meningitis or tubercuolma (abscess)

INVESTIGATIONS

- TB score chart
- CXR: may demonstrate any of the following:
  - Parenchymal change and infiltrates
  - Hilar and mediastinal adenopathy
  - Right upper lobe consolidation
  - Pleural effusion
- A Turbuclin Skin Test (TST) or Mantoux
  - Give 0.1ml mantoux PDD intradermally and read at 48 – 72 hrs
  - Read the INDURATION (swelling), not the ERYTHEMA (redness)
- A TST should be regarded as positive:
  - >5 mm diameter of induration
    - In children who are immunosuppressed
    - This includes HIV-positive children and severely malnourished children
  - >10 mm diameter of induration: in all other children (whether they have received a BCG vaccination or not)
  - It is important to note that a negative TST does *not* rule out infection with *M. tuberculosis* or the possibility of a diagnosis of TB in a child
  - There can be false-positive as well as false-negative TST results
- Specimen for microscopy for acid-fast bacilli and culture:
  - Sputum: If old enough (usually not able to produce until > 5years of age)
  - Gastric aspirates: Collect 3 consecutive, early-morning NGT aspirates
  - CSF: if concerns of TB meningitis
    - If onset is rapid, do a lumbar puncture and treat according to result
    - If onset has been slow, **do not** do a lumbar puncture, but treat for bacterial meningitis and cerebral malaria
  - Pleural fluid/ascites fluid: If present and able to be 'tapped'
  - Sputum (if produced), CSF and tissue specimens can be sent for Gene X-pert testing
- Biopsy of lymph node for histology
- Routine HIV counselling and testing: should be performed on all children with suspected TB

MANAGEMENT

- **Registration**
  - Fill in TB Registration card at the time of diagnosis giving full details of patient's address. The **family** must also be investigated for TB.
- **Education**
  - The patient and the family must be told about the need for regular treatment and the need to complete the full course of treatment (usually 6 months, but sometimes 9 months)
- **DOTS** (Directly Observed Therapy)
  - Parents or guardians should observe their children taking medication and record each dose in the treatment card.
- **Treatment** is divided into intensive and continuation phases.

- The standard drugs for the treatment of TB are
  - Isoniazid (INH) 10mg/kg (range 7 – 15mg/kg) PO daily, max 300mg/day
  - Rifampicin (RIF) 15mg/kg (range 10 – 20mg/kg) PO daily, max 600mg/day
  - Pyrazinamide 35mg/kg (range 30 – 40mg/kg) PO daily
  - Ethambutamol 20mg/kg (15 – 25mg) PO daily
    - Ethambutmol can cause eye damage. Check vision before starting
- **Intensive phase** is given every day for 2 months.
  - This usually occurs in hospital
  - The 'Stop-TB' pre-prepared kit is currently used in the Solomon Islands. If available, the dosage recommendation for the kit is as follows:

Weight band	Number of tablets		
	Intensive phase		Continuation phase
	RHZ (60/30/150)	E (100)	RH (60/30)
4-6 kg	1	1	1
7–10 kg	2	2	2
11–14 kg	3	2	3
15–19 kg	4	3	4
20–24 kg	5	4	5

- **Continuation phase** is usually given daily for 4 months
  - This usually occurs as an outpatient, with close supervision
  - Most children receive **RIF/INH** daily for 4 months, using the same dose as the intensive phase (the dose should be adjusted if the child gains weight)

- **Special circumstances**
  - Extended Intensive phase (3 months instead of 2 months) if:
    - TB meningitis
    - TB osteomyelitis and spinal TB
    - HIV
    - Severe lung cavitation, with 3+ sputum
    - Sputum positive at completion of 2 months treatment
  - Extended Intensive phase (3 months) and Extended Contination phase (6 months instead of 3 months) giving total treatment of 9 months if:
    - Severe TB meningitis
    - Disseminated TB (miliary TB)
    - TB of bones and joints, percarditis or peritonitis

- **Isoniazid (INH) prophylaxis**
  - Any child less than 5 years who is a contact of a sputum positive patient should be given INH alone (do not give the combination isoniazid/rifampicin tablet) daily for 6 months at 5mg/kg/day
  - Prophylaxis should only be given after ruling out the possibility of an active TB

FOLLOW UP:

- Regular follow up is needed to ensure medication compliance, to continue education, to screen family contacts, to review nutrition and growth
- If intensive phase not completed in hospital, the child should be followed up weekly in the outpatient clinic until completion and then discharged to local hospital/clinic to montor the continuation phase of treatment

HOW TO USE THE TB SCORE CHART

BASIC SCORE

Length of illness:

- This means how long the child has been sick with a symptom e.g. cough, diarrhoea or swollen neck glands. Previous episodes should not be counted if the child recovered completely from them

Nutritional status:

- This refers to the child's position on the weight for age chart in the clinic book

Household contact history of TB:

- Ask the child's guardians directly about a household contact history.
  - If they give a convincing story of a close family relative or contact who was thin and coughing up blood, then score 1
  - If your health centre has written evidence of positive sputum in a close family member or contact then score 3

ADDITIONAL NOTES

Positive PPD Mantoux:

- regarding administration and reading Mantoux (TST)

Enlarged painless rubbery neck glands:

- Feel the child's neck from behind
- If in doubt and the child is otherwise well, treat with procaine penicillin or amoxycillin for 10 days and check the size of the glands after 2 weeks
- If the child has swelling of the face, he may have Burkitt's lymphoma and should be referred immediately to hospital

Malnutrition not improved after one month treatment:

- Treat the malnourished child
- If no weight gain after 1 month or weight loss after 2 weeks, score 3.
- In addition, any child with marasmus or kwashiorkor who shows any deterioration in condition should score 3 immediately and commence TB treatment

Unexplained abdominal swelling (ascites):

- Large spleen or liver should be excluded as the cause of the swelling, but if the child's abdomen feels abnormally firm (doughy) or is fluid filled (ascites) or masses are palpable which do not disappear with laxative treatment, then score 3
- A child with abdominal distention who is vomiting needs urgent referral to hospital

Coma for longer than 48 hours:

- Score 3 if coma has been present for more than 48 hours or the child has slowly developed an unexplained neurological sign

PAEDIATRIC TUBERCULOSIS SCORE CHART

Basic Score Chart - for each feature decide on score and write in box

FEATURE	0	1	3	SCORE
LENGTH OF ILLNESS	less than 2 weeks	2 to 4 weeks	More than 4 weeks	
NUTRITIONAL STATUS	More than 80% line	Between 60-80% line	Less than 60% line	
RECENT CONTACT HISTORY OF TUBERCULOSIS	No recent contact history	Verbal contact history	Sputum +ve contact history	

Give score for any other features (if present) as below:

SIGNIFICANT MANTOUX	SCORE 3	
ENLARGED, PAINLESS RUBBERY NECK GLANDS	SCORE 3	
NIGHT SWEATS OR UNEXPLAINED FEVER	SCORE 2	
ANGLE DEFORMITY OF SPINE	SCORE 4	
MALNUTRITION NOT IMPROVED AFTER 1 MONTH TREATMENTT...	SCORE 3	
FIRM, NON-FLUID, NON-TRAUMATIC SWELLING OF JOINT	SCORE 3	
UNEXPLAINED ABDOMINAL SWELLING (ASCITES)	SCORE 3	
COMA FOR MORE THAN 48 HOURS (with or without convulsions) Send to hospital if possible	SCORE 3	
	TOTAL	

If total score is 7 or more and the child has **no other disease more likely to explain the illness**, then commence **treatment** for tuberculosis according to the child's weight.

Notes:

a. Beware of **over scoring** a child as each item may be wrongly assessed if care is not taken.
b. Always keep a record of the score chart result in the child's notes so that it can be checked later by your supervisor.

URINARY TRACT INFECTION

Urinary Tract Infection (UTI) is a common cause of fever in children, especially young girls. Children who are very unwell with UTI might have pyelonephritis (infection of the kidneys)

SIGNS & SYMPTOMS

- Fever
- Non specific symptoms of irritability, poor feeding, vomiting, jaundice (infants)
- Dysuria, frequency, urinary incontinence, haematuria (older children)
- Loin pain/abdominal flank tenderness (suggestive of pyelonephritis)

CAUSES

- UTI is caused by bacterial infection of the urinary tract (commonly E-coli, Klebsiella)
- Abnormalities of the urinary tract increases the risk of UTI

INVESTIGATIONS

- Urine for analysis
  - Urine can be collected by 'catching' a sample in a bottle, insertion of a catheter or a supra-pubic aspiration.
  - Do not use 'urine bag' specimens as they are unreliable in diagnosing infection
  - A dipstick screening test is useful in older children
    - Children with UTI usually have + leucocyte esterase, + nitrates and +/- blood
  - Microscopy and culture of urine is the most reliable test
    - Look for raised leucocytes and evidence of bacteria
- Consider inpatient ultrasound to exclude urinary obstruction for children:
  - With an atypical UTI
  - Those not responding to treatment within 48 hours
  - Boys less than 3 months old (to exclude posterior urethral valves / other congenital urinary tract abnormalities)
  - Children with recurrent UTIs should have a non-urgent renal ultrasound
- In a child who is very sick with presumed / confirmed UTI or young (<3 months), consider meningitis and do a lumbar puncture if possible

MANAGEMENT

- Encourage breast-feeding/drinking. Give supplemental fluids via NGT / IV if poor feeding/vomiting

Oral antibiotics:

Children can usually be managed as an outpatient

- Trimethoprim 4mg/kg orally every 12 hours (max 150mg) for 5 days

OR if unavailable

- Co-trimoxazole 4mg/kg orally every 12 hours for 5 days

IV antibiotics needed if: (any one of the following)

- Young children (< 3 months)
- Systemically unwell (fevers and / or very sick)
- Not feeding well or dehydrated
- Not tolerating oral medicines
- Failed oral therapy

Give:

- Ampicillin 50mg/kg (max 2g) IV / IM every 6 hours

AND

- Gentamicin IV once daily
  - Neonate < 34 weeks post conception 3mg/kg
  - Neonate > 34 weeks post conception 5mg/kg
  - Infant (over 1 month) and child < 10 years 7.5mg/kg (max 360mg)
  - Child > 10 years 6mg/kg (max 560mg)

Check urine culture and adjust antibiotics according to sensitivities

- Children with persistent haematuria, proteinuria or oedema should be referred to a paediatrician. These children might have kidney problems such as glomerulonephritis or nephrotic syndrome

Antibiotic prophylaxis may be required in children with severe, recurrent UTIs. This should be discussed with a paediatrician.

WORM & OTHER PARASITIC INFECTIONS

Worm and other infections are usually caused by poor hygiene, contaminated water or contact of bare skin with soil in which the worm or worm eggs live.
Worms are particularly common in young babies and in children who often crawl around in or play in soil

CAUSES

- Hookworm (*Ancylostoma*), Roundworm (*Ascaris*), Strongyloides (*Strongyloides stercoralis)*
- Giarda (*Giardia Intestinalis*), Amoebiasis (*entamoeba histolytica*)

MANAGEMENT

INFECTION	POSSIBLE SYMPTOMS	INVESTIGATIONS	TREATMENT
Hookworm	Asymptomatic Early: Rash (hands/feet) Abdominal pain/nausea Cough/wheeze Late: anaemia	Ova in stool FBE: anaemia	Albendazole orally as a **single dose** Dose: Child weighs < 10kg 200mg Child weights > 10kg400mg *Not recommended in infants under 6 months* *Iron replacement if anaemic*
Roundworm	Asymptomatic Abdominal pain Anaemia GI obstruction (heavy parasite load) Cough/wheeze	Ova in stool FBE: anaemia	Albendazole orally as a **single dose** Dose: Child weighs < 10kg 200mg Child weights > 10kg400mg *Not recommended in infants under 6 months* OR Ivermectin 200mcg/kg (no max dose) orally as a **single dose** *Not recommended for children weighing < 15 kg* *Also treat siblings*
Strongyloides	Asymptomatic Skin itch, larva currens Abdominal pain, diarrhoea Fever, vomiting Weight loss, weakness Cough/wheeze	Larva in stool FBE: eosinophilia	Ivermectin 200mcg/kg (no max dose) orally as a **single dose** *Not recommended for children weighing < 15 kg* Repeat dose at day 14 OR Albendazole orally for 7 days Dose: Child weighs < 10kg 200mg

	Risk of dissemination (immunosuppressed)		Child weights > 10kg400mg *Not recommended in infants under 6 months*
Giardia	Asymptomatic Acute or chronic diarrhoea May have pale, greasy stool Abdominal pain Weight loss, weakness	Trophozoites/ cysts in stool	Metronidazole 10 mg/kg (max 400mg) orally every 8 hoursfor 7 days OR Tinidazole 50mg/kg (max 2g) orally as a single **dose** *Screen symptomatic family*
Amoebiasis	Asymptomatic Diarrhoea Dysentery Abdominal pain Liver, lung, brain abscess	Trophozoites/ cysts in stool	Metronidazole 10mg/kg (max 400mg) orally every 8 hoursfor 7 days

PREVENTION

Many worms/parasite are spread by hand to bottom to mouth. Educate patients and all family members about the importance of clean hygeine including:

- Washing hands with soap and water after going to the toilet and before touching food
- Keep fingernails short
- Keep toilets clean. Teaching children to use toilets and to wash hands
- Do not pollute the soil with sewerage/dispose of faeces proper
- Cooking meat well, especially pork. Wash fruit and vegetables well or cook well

PAEDIATRIC DRUG DOSES

How to use this section

- The drugs are listed in alphabetical order
  - Benzylpenicillin (crystalline penicillin) & Benzathine penicillin are listed under 'B'. Procaine penicillin and Penicillin V are listed under 'P'.
  - Generic names are used, except for the brand name Fansidar® (Sulfadoxine and Pyrimethamine) which is listed under 'F'. The symbol ® means a brand name.

- *Doses listed are for children and are correalted with dose reccomendations from WHO Pocketbook of Hospital Care for Children (2nd Edition, 2013)*

- For babies, refer to the baby dosing table
  - Doses are per kg of body weight. Always use an accurate weight. Adjust drug doses as the child grows.
  - The different routes are listed. Sometimes the dose is different, depending on which route is used - Always check!
  - Some drugs have a loading dose (a larger dose is given first) and then a maintenance dose.
    - These are shown as LD = loading dose, MD = maintenance dose
  - Some drugs can not be given IM (such as diazepam)
  - Common abbreviations used:
    - Number of doses per day:

      bd = twice a day; tds = three times a day; qid = four times a day;
      Q4hr = every 4 hours

    - Route:

      IV = intravenous; IM = intramuscular; SC = subcutaneous;
      PO = oral; PR = per rectal; INH = inhalation

- The 'Form' column shows the different forms the drug comes in
  - The concentration of injections are the concentrations (usually per 1ml) when the drugs are mixed according to the dilutions shown on page 95

DILUTION OF INJECTIONS

Drug	Reconstitution	Final volume	Final concentration	Administration	Notes	Stability
Ampicillin IV	500 mg vial 4.7 mL WFI 1 g vial 9.3 mL WFI	5 mL 10 mL	100 mg/mL 100 mg/mL	**IV injection:** *doses less than 30 mg/kg and less than 500 mg,* inject over at least 3 to 5 minutes. **IV infusion:** *doses greater than 30 mg/kg or 500 mg,* dilute to 30 mg/mL with NS and infuse over 30 mins	Rapid IV administration can cause seizures	Use immediately
Ampicillin IM	500 mg vial 1.7 mL WFI 1 g vial 3.3 mL WFI	2 mL 4 mL	250 mg/ml 250 mg/ml	**IM injection**: inject deep into a large muscle		Use immediately
Artesunate 600 mg vial IV	1 mL of 5% sodium bicarbonate and **5 mL** of sodium chloride	6 mL	10 mg/mL	**IV injection:** inject slowly over 2 to 3 minutes at a rate of 3 to 4 mL/minute	The powder is difficult to dissolve – shake for 2 to 3 minutes until completely dissolved. **Do not use** if solution cloudy or precipitate is present	Use immediately
Artesunate 600 mg IM	1 mL of 5% sodium bicarbonate and **2 mL** of sodium chloride	3 mL	20 mg/mL	**IM injection:** suitable		Use immediately
Benzathine penicillin IV	***CONTRAINDICATED*** *Never administer intravenously*					
Benzathine penicillin IM	Dissolve contents of vial in WFI			**IM injection:** inject slowly, rotate the site of injection for repeat doses.	Give doses greater than 900 mg as 2 injections at separate sites **900 mg = 1,200,000 units**	Use immediately
Benzylpenicillin IV	600 mg (1 MU) 1.6 mL WFI 3 g (5 MU) 8 mL WFI	2 mL 10 mL	300 mg/mL 300 mg/mL	**IV injection**: *infusion preferred in children* **IV infusion**: dilute with NS or G5 to	Rapid infusion may cause electrolyte imbalance and	Use immediately

				60 mg/mL or weaker and infuse over at least 60 mins	seizures **600 mg = 1,000,000 units**	
Benzylpenicillin IM	600 mg (1 MU) 1.6 mL WFI	2 mL	300 mg/mL	**IM injection**: suitable		Use immediately
Cefazolin IV	500 mg vial 4.8 mL WFI 1 g vial 9.5 mL WFI	5 mL 10 mL	100 mg/mL 100 mg/mL	**IV injection**: dilute to at least 10 mL and inject over 3 to 5 minutes **IV infusion:** dilute to 20 mg/mL or weaker with WFI and infuse over 10 to 60 minutes		Stable for 24 hours below 25 °C
Cefazolin 1 g IM	500 mg vial 2 mL lignocaine 0.5% 1 g vial 2.5 mL lignocaine 0.5%	2.2 mL 3 mL	225 mg/mL 330 mg/mL	**IM injection**: inject deep into large muscle		Use immediately
Cefotaxime IV	500 mg vial 4.8 mL WFI 1 g vial 9.6 mL WFI	5 mL 10 mL	100 mg/mL 100 mg/mL	**IV injection**: inject over 3 to 5 minutes (DO NOT INJECT RAPIDLY) **IV infusion:** dilute to 60 mg/mL or weaker with G5, NS or H and infuse over 15 to 30 minutes		Stable for 24 hours below 25 °C
Cefotaxime IM	500mg vial 1.3 mL lignocaine 0.5% 1 g vial 2.6 mL lignocaine 0.5%	1.5 mL 3 mL	330 mg/mL 330 mg/mL	**IM injection**: inject deep into the gluteal muscle	**WFI can be used if lignocaine not available*	Use immediately
Ceftriaxone IV	500 mg vial 4.8 mL WFI 1g vial 9.6 mL WFI	5 mL 10 mL	100 mg/mL 100 mg/mL	**IV injection:** doses up to 1 g may be diluted to 40 mg/mL with G5, G10, NS or GNS and injected over 3 minutes **IV infusion:** dilute to 40 mg/mL or weaker and infuse over 30 minutes	**Do not** mix with Hartmann's because a precipitate can form	Stable for 6 hours below 25 °C
Ceftriaxone IM	500 mg vial 1.3 mL lignocaine 1% 1 g vial 2.6 mL lignocaine 1%	1.5 mL 3 mL	330 mg/ml 330 mg/ml	**IM injection**: inject deep into the gluteal muscle. Inject no more than 1 g into each buttock	IM injection without lignocaine is very painful	Use immediately

Chloramphenicol 1 g vial IV	1 g vial 9.15 mL WFI	10 mL	100 mg/mL	**IV injection:** inject over at least 1 minute **IV infusion:** dilute to 20 mg/mL or weaker with G5, G10, NS, GNS or H and infuse over at least 15 minutes	Do not use if solution cloudy	Use immediately
Chloramphenicol 1 g vial IM	*Not recommended for IM administration*					
Cloxacillin 500 mg or 1 g vial IV	500 mg vial 4.6 mL WFI 1 g vial 4.3 mL WFI	5 mL 5 mL	100 mg/mL 200 mg/mL	**IV infusion**: dilute to 50 mg/mL or weaker with NS and infuse over at least 30 minutes		Use immediately
Cloxacillin 500 mg or 1 g vial IM	500 mg vial 2 mL lignocaine 0.5% 1 g vial 2.5 mL lignocaine 0.5%	2.4 mL 3.2 mL	210 mg/mL 310 mg/ml	**IM injection**: inject slowly into a large muscle	**WFI can be used if lignocaine not available*	
Frusemide 20 mg/2 mL IV		2 mL	10 mg/mL	**IV injection or infusion:** use undiluted or dilute to 1-2 mg/mL with NS or H and infuse over at least 20 mins. Maximum rate is 0.5 mg/kg/min not to exceed 4 mg/min	Administration at a rate faster than 4 mg/minute may result in tinnitus, vertigo and deafness	Stable for 24 hours at 25 °C
Frusemide 20 mg/2 mL IM				**IM:** suitable		
Gentamicin 80 mg/2 mL ampoules IV		2 mL	40 mg/mL	**IV infusion:** dilute to 10 mg/ml or weaker with G5, G10, NS, GNS or H and infuse over at least 20 minutes	Gentamicin is inactivated by penicillin and cephalosporin antibiotics - flush the line well before and after giving	
Gentamicin 80 mg/2 mL ampoules IM				**IM injection:** suitable		
Hydrocortisone 100 mg IV	Reconstitute with 2 mL of WFI or NS	2 mL	50 mg/mL	**IV injection***: in emergency situation* - inject over at least 30 seconds **IV infusion** : *preferred* - dilute to 5		Stable for 4 hours below

				mg/mL or weaker with G5, NS or GNS and infuse over at least 10 minutes		25 °C
Hydrocortisone 100 mg IM				**IM injection:** suitable, avoid injection into deltoid muscle		
Phenobarbitone 200 mg/1 mL IV	200 mg/1mL vial with 9 mL WFI (must be diluted to 20 mg/mL or weaker)	10 mL	20 mg/mL	**IV injection:** ***not recommended in children*** **IV infusion**: infuse at 1 mg/kg/minute or slower, maximum rate 30 mg/minute. Loading doses should be infused over 60 mins	Extravasation risk (pH=10.5) Stop if pain at the infusion site or patient develops patches of discoloured skin	Use immediately after dilution
Phenobarbitone 200 mg/1 mL IM		1 mL	200 mg/mL	**IM injection:** inject into a large muscle mass. Do not inject more than 5 mL at any one site	Solution is highly alkaline and may cause tissue damage after an IM injection	
Phenytoin 250 mg/5 mL ampoules IV		5 mL	50 mg/mL	**IV injection**: slow injection 1-2 mg/kg/minute with a maximum rate of 50 mg/minute. Flush well with NS to avoid irritation at the same rate as infusion **IV infusion:** *not preferred* but if necessary dilute with NS to a concentration of 5mg/mL and infuse over 30 to 60 minutes	Diluted phenytoin may precipitate - inspect for particles and only use clear solutions that are free from haze and precipitate	Use immediately after dilution
Phenytoin 250 mg/5 mL ampoules IM				*Not suitable for IM administration*		
Procaine penicillin (fortified) IV	***CONTRAINDICATED*** ***Never administer intravenously***					

Procaine penicillin	Reconstitute with 8 mL WFI, shake well before use	1 mL		**IM injection**: inject deep and slowly into the midlateral muscles of the	Aspirate prior to injection to ensure	
(fortified) 4 MIU IM (3 MIU Procaine penicillin, 1 MIU benzylpenicillin)				thigh	needle is not in a blood vessel, if blood appears withdraw and inject in another site **1 g = 1,000,000 units**	
Quinine 600 mg/10 mL IV		10 mL	60 mg/mL	**IV infusion**: dilute dose in 500 mL of G5 (preferred) or NS and infuse slowly over 4 hours, not faster than 0.5 mg/minute	Monitor pulse, blood pressure and blood glucose concentrations	Use immediatel y after dilution
Quinine 600 mg/10 mL IM	*Not suitable for IM administration*					

Fluids for dilution:
WFI = water for injection
G5 = glucose 5%
G10 = glucose 10%
NS = sodium chloride 0.9% (normal saline)
H = Hartmann's
GNS = glucose in sodium chloride 0.9%

Notes:

- Always take care to avoid contamination
  - Wipe the rubber of the vial with spirit or antiseptic solution before use
  - Use a new sterile disposable syringe and new sterile disposable needle for each new reconstitution
- Gently rock the vial after adding WFI until the solution is completely clear (or for suspensions – make sure the suspension is evenly dispersed)
- **Do not use** any solution that has a precipitate or discolouration
- Mark the reconstituted vial with the time and date of reconstitution if keeping for use later – always check how long reconstituted or diluted injections can be kept for – if there is no information, **discard immediately after use**.

DRUG DOSING TABLE

DRUG	DOSAGE	EXTRA NOTES
ADRENALINE	***For Resuscitation: 0.01mg/kg (IV/IO), 0.03mg/kg (ETT)*** Use 1:10000 vial if available Give 0.1ml/kg IV/IO of this solution If using ETT: 0.03ml/kg If only 1:1000 available, do n**o not give undiluted.** Draw up 1ml and diluted with 9ml 0.9% saline (to make 1:10:000) Give 0.1ml/kg of this made up solution (0.3ml/kg if using ETT) ***For anaphylaxis: 0.1mg/kg IM*** Use 1:1000 vial. IM injection only Age < 6 years: 0.1ml (=0.1mg adrenaline) 6 - 12 years: 0.3ml (= 0.3mg adrenaline) > 12 years: 0.5ml (= 0.5mg adrenaline) ***For severe viral croup: 0.5mg/kg nebulised*** *Use 0.5ml/kg of 1:1000 (max 5ml)*	
ALBENDAZOLE	400mg PO if >10kg 200mg PO if >6months & <10kg	Treat 1-3 days depending on indication Not recommended for < 6months Taken on an an empty stomach
AMINOPHYLLINE	Loading dose: 6mg/kg PO/ IV Maintenance Dose 5mg/kg PO/IV Q6hr **Neonatal** Loading dosing: 6mg/kg PO/IV **Neonatal** Maintaince Dose: 2.5mg PO/IV Q12hr (week 1), 4mg PO/IV Q12hr (week 2-4)	Give IV infusion over 30 mins
AMOXYCILLIN	25 - 40mg/kg PO Q12hr	Dose & duration depends on indication
AMPICILLIN	50mg/kg IV/IM Q6hr **Neonatal:** 50mg/kg IV Q12hr (week 1), Q8hr (week 2-4)	Duration depends on indication
ARTEMETHER 20mg/ LUMEFANTRINE 120mg	1.5mg/kg artemether 2mg/kg artemether/12mg/kg lumefantrine	Tradename: 'Co-artam'
ARTESUNATE	Loading Dose: 2.4mg/kg IV/IM Give a dose at 0, 12 & 24 hrs and then daily Maintenance Dose: 1.2mg/kg IV/IM OR 10mg/kg stat PR (50 & 200mg Supps available)	
ASPIRIN	Pain/fever :10 – 20mg/kg PO Q6hr Acute rheumatic fever: 20mg/kg PO Q6hr	Avoid in young children because of risk of Reye's syndrome Caution in patients with impaired renal function, low platelets, bleeding
AZITHROMYCIN	10 - 20mg/kg single dose PO	Dose & duration depends on indication
BENZATHINE PENICILLIN	37.5mg/kg single dose IM (50,000units/kg)	1mg = 1333 units (1.2 megaunits = 900mg)
BENZYLPENICILLIN	30 - 60mg/kg IV/IM Q6hr (50,0000 – 100,000 units/kg)	Also known as crystalline penicillin 1mg = 1667 units (1 megaunit = 600mg)
	Neonatal: 30mg-60mg/kg IV/IM Q12hr (week	

	1), Q6hr (>week 1)	
CARBAMAZEPINE	Starting dose: 2.5mg/kg PO Q12hr Increase over 2-4 weeks to 5-10mg/kg (max 500mg) PO Q12hr	
CEFOTAXIME	50mg/kg IV/IM Q6hr **Neonatal:** 50mg/kg IV Q12hr (prem), Q8hr (week 1)	Duration depends on indication
CEFTRIAXONE	50mg/kg Q12hr IV/IM OR 80 - 100mg IV daily **Neonatal:** same dosing if used	Dose & duration depends on indication Avoid where possible in neonates < 1months (increased risk of severe jaundice)
CHLORMENPHENICOL	12.5 - 25mg/kg PO/IM/IV Q6hr **Neonatal:** 12.5 - 25mg/kg Q12hr (week 1), Q8hr (week 2 - 4)	Limited use in Paediatrics due to side effects Main indication: meningitis where ceftriaxone/cefotaxime unavailable
CIPROFLOXACIN	10 -20mg (max 500mg) o bd (5 days)	
CLOXACILLIN	50mg/kg IV/IM Q6hr 12.5-25mg/kg PO Q6hr **Neonatal:** 50mg/kg IV bd (week 1), Q8hr (week 2 - 4)	Dose & duration depends on indication
CO-TRIMOXAZOLE **(Trimethoprim/ Sulphamethoxazole)**	Treatment (UTI): 4mg/kg Q12hr PO HIV interstitial pneumonia: 8mg/kg PO Q8hr (21 days)	Dose refers to Trimethoprim component Avoid in neonates who are jaundice/premature
DEXAMETHSONE	Severe viral croup: 0.6mg/kg PO single dose Meningitis: 0.15mg/kg IV Q6hr (2-4 days)	Contra-indicated in viral encephalitis, cerebral malaria, <2 months
DIAZAPAM	For convulsions: 0.2 mg/kg IV (not IM) or 0.5ml/kg (max 10mg) PR For sedation before procedures: 0.1-0.2mg/kg IV	Can be used if Midazolam is not available Dose can be repeated twice Monitor for respiratory depression in high doses
DIGOXIN	Loading Dose: 15mcg/kg stat IV Maintenance Dose: 3 – 5mcg/kg bd PO	
ERYTHROMYCIN	7.5 - 12.5mg/kg qid PO	Caution in children < 2months (association with development of pyloric stenosis)
ETHAMBUTAMOL	20mg/kg daily PO	Can cause optic neuritis Check visual acuity and colour vision before starting treatment Stop treatment immediately if visual symptoms occur
FERROUS SULPHATE	3 – 6mg/kg/day elemental iron PO	Ferrous mixture 20mg/1ml contains 6mg elemental iron in 1ml
FRUESEMIDE	0.5mg 1 – 2mg/kg PO/IV/IM Q12hr	
GENTAMICIN	Neonates < 34 weeks post conception: 3mg/kg Neonates > 34 weeks post conception: 5mg/kg Infants (over 1 month) and children <10 years: 7.5mg/kg Children > 10 years/Adolescents: 6mg/kg	Can be nephrotoxic/oto-toxic There is no Gentamicin levels currently available in SI Monitor urine output/renal function
GRISEOFULVIN	10-20mg/kg PO daily	
HYDROCORTISONE	2 – 4mg/kg Q6hr IM,IV	
IBUPROFEN	5 - 10mg/kg PO Q8hr	Caution in children with renal impairment or bleeding tendency
ISONIAZID	10mg/kg PO daily	
KETAMINE	*Loading dose:* 1 – 2mg/kg IV or 5 - 8mg/kg IM *Further dosing:* 0.5 – 1mg/kg IV prn or 1 – 2 mg/kg IM prn	
METRONIDAZOLE	Most infections: 7.5mg/kg PO/IV Q8hr Amoeba/Giardia: 10mg/kg PO/IV Q8hr	

MIDAZOLAM	Seizure control: IV/IO/IM 0.15mg/kg, Buccal/Intranasal 0.3mg/kg (max 10mg)	Use as first line in seizures. If not available, use diazapam Monitor for respiratory depression in high doses
MORPHINE	0.05 – 0.2mg/kg IM/IV PRN	Can be given every 4hourly if needed Monitor for respiratory depression in high doses
NALOXONE	0.1mg/kg IM/IV/SC	
NYSTATIN	100,000 units PO Q6hr	
PARACETAMOL	15mg/kg (max 1g) PO/PR/IV Q4-6hrly	Max doses in 24 hours
PENICILLIN V	Tonsillitis: 250mg if < 10years, 500mg if > 10 years RHD prophylaxis: 250mg o bd	
PHENOBARBITONE	Loading Dose: 15-20mg/kg stat IV/IM Maintenance Dose: 5mg/kg	Infuse over 30 mins
PHENYTOIN	Loading dose: 15mg/kg IV Maintenance Dose: 2mg/kg PO Q12hr (preterm) 2-4mg/kg PO Q12hr (term)	
POTASSIUM CITRATE	2 – 4mmol/kg/day PO	Dose may be given in 2-4 divided doses
PREDNISOLONE	1 - 2mg/kg PO daily	Consider isoniazid prophylaxis whilst on high dose prednisolone
PRIMAQUINE	0.25mg/kg PO daily (max 15mg)	Check for G6PD deficiency Monitor for haemolysis (pallor, dark urine)
PROCAINE PENICILLIN	50mg/kg daily IM (50,000 units/kg)	
PROMETHAZINE	0.125mg/kg PO Q6hr or 0.5mg/kg PO noct (max 15mg)	Do not use in children <2 years Can cause sedation
PYRAZINAMIDE	25mg/kg/day 35mg/kg daily PO	
QUININE	Loading Dose: 20mg/kg stat IM/IV Maintenance Dose: 10mg/kg IM/IV/PO Q8hr	Monitor for hypoglycaemia Give full treatment with Artemether/Lumefantrine once able to take PO
RIFAMPICIN	15mg/kg PO daily	Best absorbed if taken at least 1/2 hr before food Commonly causes GI upset My cause orange-red discolouration of urine/sweat/tears
SALBUTAMOL	Metered-dose inhaler (MDI) 2-6 puffs inhaled (<5 years old) titrated to needs 2-12 puffs inhaled (≥ 5 years old) titrated to needs Nebuliser: 2.5mg (<5 years old) inhaled 5mg (≥ 5 years old) inhaled Oral: 1month – 2 years: 100mcg/kg (max 2mg) Q6hr 2 – 6 years: 1-2mg Q6hr	1st choice: Preferred mechanism of salbutamol delivery Imperative to use with a spacer & provide education to family 2nd choice: if MDI/spacer unavailable Dilute to 4ml with normal saline 3rd choice: only to be used if MDI/nebuliser unavailable Only prescribe if MDI/nebuliser unavailable
TERBINAFINE	<20kg: 62.5mg PO daily 20 - 40kg: 125mg PO daily >40kg: 250mg PO daily	
TINIDAZOLE	50mg/kg single dose PO	
VITAMIN A	<6 Months: 50,0000 Units 6 -11 Months: 100,000 Units 1 - 5 years: 200,000 Units	Give Vitamin A to all children with measles PO daily (for 2 days) 3rd dose (on day 14) if severe malnutrition or evidence of eye disease
ZINC SULPHATE	1mg/kg daily PO	

REFERENCES

SOLOMON ISLAND REFERENCES:

- WHO Pocket Book of Hospital care for children (2nd edition, 2013)
- Solomon Islands Antibiotic Guidelines (1st edition, 2015)
- IMCI: www.who.int/child-adolescent-health/integr.htm
- Solomon Islands 'Stop TB' Standard Diagnosis, Treatment and Management Guidelines (2012)

OTHER RESOURCES:

- PNG Children's Standard Treatment Manual
- Royal Children's Hospital (Melbourne), Clinical Practice Guidelines
- Rheumatic Heart Disease Australia, RHD Guideline (2nd Edition, 2012)
- Antibiotic Therapeutic Guidelines
- Drug Doses (Frank Shann) (16th Edition, 2014)

USEFUL RESOURCES

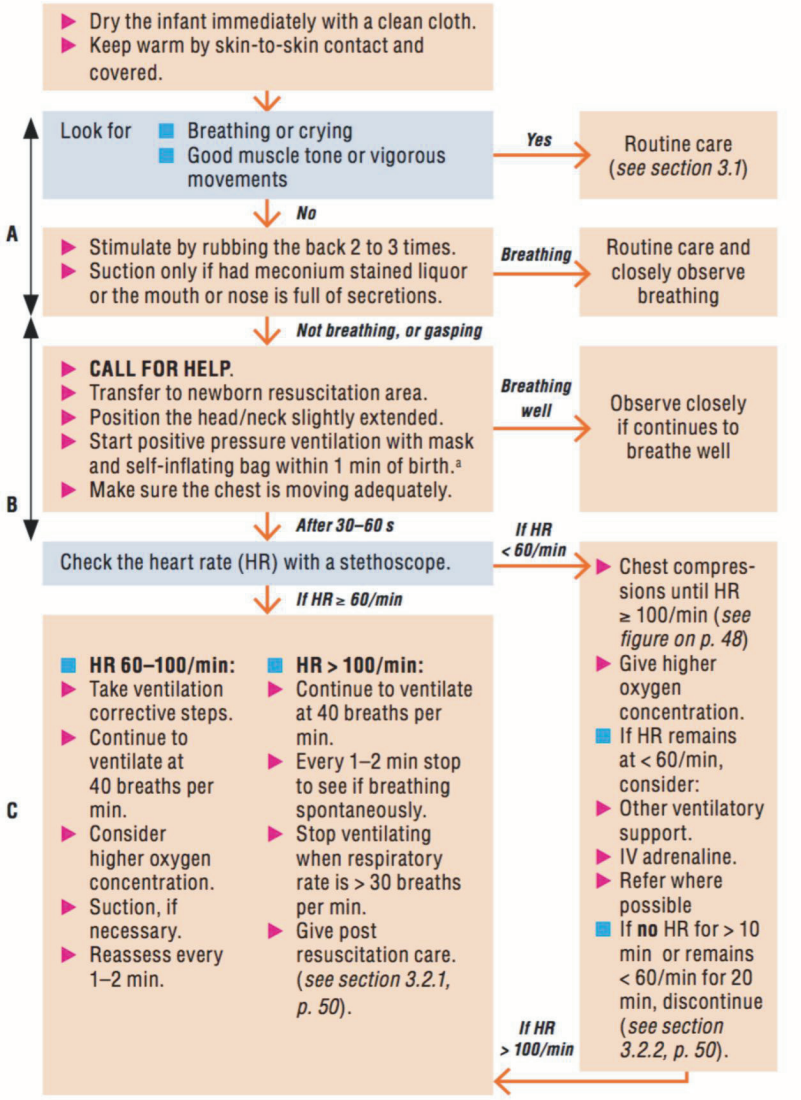
Paediatric & Neonatal Resources:

- WHO: www.who.int
- Royal Children's Hospital, Melbourne, Clinical Practice Guidelines, http://www.rch.org.au/clinicalguide/

Neonatal specific resources:

- Royal Prince Alfred, 'Newborn Care Guidelines' http://www.sswahs.nsw.gov.au/rpa/neonatal/protocols.html
- Victorian Department of Health & Human Services,'Neonatal ehandbook' http://www.health.vic.gov.au/neonatalhandbook/a-z.htm#all
- Auckland District Health Board 'Neonatal Clinical Guidelines' http://www.adhb.govt.nz/newborn/Guidelines.htm

Chart 12. Neonatal resuscitation: Flow chart



[a] Positive pressure ventilation should be initiated with air for infants with gestation > 32 weeks. For very preterm infants, it is preferable to start with 30% oxygen if possible. **A** and **B** are basic resuscitation steps