

PART ONE: CHAPTER 12.

COMMON PAEDIATRIC EMERGENCIES

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INTRODUCTION

The Paediatric Emergency Unit has remained one of the busiest units of any hospital offering paediatric services worldwide. In the tropics, where the majority of countries classified as 'developing' are found, the situation is further compounded as most of the cases for which children are brought to emergency units are usually conditions that would originally not result in emergencies, but end up as emergencies and become life-threatening due to late presentation. In a retrospective study at the Lagos University Teaching Hospital (LUTH) three decades ago, Ransome-Kuti reported a staggering figure of 10,135 children seen in the Children's Emergency Room over a one-year period. The number has remained fairly constant as shown in a subsequent report by Lesi et al.

The disease pattern presenting as paediatric emergencies is peculiar and fairly similar in most tropical countries of the world. An age-specific trend in disease pattern is also evident from available reports. The physician working in the emergency room in the tropics needs to be well versed in these diseases because of the necessity for early diagnosis and systematic approach to treatment. This chapter gives a bird's eye view of the common paediatric emergencies. More detailed consideration of each condition will be found in other chapters.

Age-specific paediatric emergencies

a. **Neonatal Period** Common emergency problems encountered in the tropics are low birth weight, birth asphyxia, jaundice and infections; including septicaemia and meningitis.

b. **Infancy** The principal diseases presenting as emergencies and causing significant morbidity in this age group are acute respiratory infections especially bronchopneumonia, bronchiolitis, and diarrhoeal diseases with the complications of dehydration and protein-energy malnutrition.

c. **Age group 1-5 years** Malaria and its complications of severe anaemia, heart failure and febrile convulsion has been identified as the leading cause of emergency morbidity in this age group. Others conditions presenting commonly as emergencies in this age group are diarrhoeal disease and its complications, acute respiratory infections, haemoglobinopathies and home accidents, including burns and poisoning. Accidental poisoning has attained a great prominence in recent times in the developing countries of the tropics as parents and caregivers are no longer available at home, due to tedious work schedules in order to meet up with financial demands. Chemical agents or drugs most commonly involved in the tropics are hydrocarbon

(kerosene) and alcohol. Other items are caustic soda, cow's urine concoction, iron and salicylates.

d. **Age group 6-15 years** Unlike in other age groups, they are liable to endemic diseases common in the environment and thus commonly present in emergency units with exacerbation of chronic diseases, including malaria, sickle cell haemoglobinopathies, bronchial asthma, cardiac failure from congenital or acquired cardiac lesions, as well as seizure disorders. Cases of rape are also seen where the acute trauma is the physical injury but with potential for long term psychological effects.

EVALUATION AND MANAGEMENT OF SELECTED PAEDIATRIC EMERGENCIES

In the tropics, with a high concentration of less developed countries of the world, there are limited medical resources. Efforts to get access to needed medical care are usually grossly delayed either by ignorance, lack of transportation facilities or bureaucratic bottlenecks in seeing the attending physicians. Thus, by the time the patient is evaluated, the condition might have assumed life-threatening dimensions. The management therefore requires a systematic approach with the aim of identifying the disorder as fast as possible and beginning emergency treatment, even before a complete history and physical examination is obtained. The initial assessment involves a survey and maintenance of the patient's airway, oxygenation, circulation and the neurologic status.

Febrile convulsion

Fever with convulsion remains an important and one of the commonest emergencies among children in the tropics. The commonest cause is malaria. Others are upper respiratory tract infections, pneumonia, urinary tract infections, viral infections, and otitis media. Management involves:- maintaining a clear airway, oxygen administration (if necessary), preventing injury, and aborting convulsion with intravenous diazepam 0.3mg/kg; or intramuscular paraldehyde 0.1mg/kg. Thereafter, the provoking infection/ cause of fever is identified and treated accordingly. Temperature is reduced by tepid sponging, use of fan, and antipyretics. The presence of meningitis needs to be excluded through a lumbar puncture for cerebro-spinal-fluid (CSF) examination. Consideration may be given for prophylactic anticonvulsant like phenobarbitone for complex and/ or recurrent cases, maintaining for about 3yrs or till 5 years of age. A significant proportion of Nigerian children with febrile seizures would have received various traditional mixtures before presenting in hospital e.g. cow's urine mixture in western Nigeria, with the consequence of metabolic disturbances like electrolyte derangement and hypoglycaemia, or crude oil in the Niger Delta region of Nigeria, which could result in respiratory complications. Therefore, these

complications of misguided interventions should be looked for and corrected where they exist.

Acute malaria

Severe attacks of acute malaria develop between ages 6 months and 2 years. Presenting features include: hyperpyrexia, headache, vomiting, convulsion, severe anaemia, cardiac, renal and liver failure, as well as impaired consciousness and coma. Risk factors for fatal outcome are severe anaemia, hypoglycaemia, lactic acidosis, deep coma, repeated convulsions, decerebration and renal failure. With the advent of multidrug resistant strains of the parasite, accurate early diagnosis of the disease is of prime importance.

Treatment can be specific and / or supportive.

Specific treatment involves use of antimalarials, which could be single drug regimen, two drugs used sequentially if the first proves ineffective, or fixed dosage combination.

Supportive treatments involve blood transfusion for severe anaemia, intravenous fluids for Vomiting and nutritional build up with natural protein food or foreign protein in under-nourished patients.

Severe anaemia

Aetiological factors in anaemia is age- related;

- a. **Newborn to 3 months of life** Causes include,
 - i. Haemolysis e.g. from infection, usually viral and gram- negative organism, ABO and/ or Rhesus materno-foetal incompatibility, congenital red cell defects e.g. hereditary spherocytosis, enzymopathies such as Glucose 6- phosphate dehydrogenase (G6PD) and pyruvate kinase deficiencies.
 - ii. Blood loss from obstetric complications like abruptio placenta, placenta previa, damage to placental vessel, foeto-maternal haemorrhage, twin- twin transfusion, large cephalhaematoma or sub galeal cyst; bleeding from injuries caused by certain socio- cultural practices e.g. circumcision (male and female) uvulectomy and various scarification marks; insecurely tied umbilical cord; haemorrhagic disease of the newborn and certain bleeding disorders.
 - iii. Infection, as an entity or super imposed
 - iv. Physiological anaemia e.g. the anaemia of prematurity.
 - v. Iatrogenic causes e.g. repeated blood sampling for investigation
- b. **First 2 years of life** Causes of anaemia include Infection and infestation (malaria), protein- energy- malnutrition (P.E.M), genetic disorders e.g. haemoglobinopathy, and dietary iron and folic acid deficiency.
- c. **2 years and above** Causes in the tropics are mainly infection and infestation – malaria, helminthiasis; protein- energy malnutrition, haemoglobinopathies, blood loss from accidents or gastro- intestinal bleeding as well as chronic infections like tuberculosis.

Treatment of most cases of anaemia presenting as emergencies usually require urgent blood transfusion, since they are often complicated with anaemic heart failure. In this case, packed cells 5-10mg/ kg should be given slowly, with frusemide given simultaneously. Whole blood should be given for correction of shock and improvement of oxygenation.

A consensus of guidelines on indication for blood transfusions developed by Vos J and Gumodoka B et al and adopted by the World Health Organization (WHO) is shown table 12.1.

Table 12.1.

Consensus of guidelines on indication for blood transfusions

A. In Patients with Chronic Anaemia	
1.	Under- five year- old children.
i.	Hb. <4g/dl, and any disorder, which may precipitate or aggravate the symptom of Anaemia.
ii.	Hb. >4g/ dl and the child also has: <ul style="list-style-type: none"> - Congestive cardiac failure (CCF) - Hypoxic spells (restlessness, dyspnoea, inability to suck, but no other sign of CCF).
2.	Children aged 5 years or more.
i.	Congestive cardiac failure (CCF) due to anaemia, regardless of the level of Hb.
ii.	Hb. <5g/ dl, with any of the following, <ul style="list-style-type: none"> - Frank and impending CCF - Hypoxia - Severe infection. - Haemolytic sickle cell crisis
B. In patients with acute blood loss	
1.	Hypovolaemic shock which develops or persists following treatment for acute blood loss i.e., <ul style="list-style-type: none"> - Effort to stop the bleeding - Volume replacement with crystalloids (normal saline, Ringer's lactate up to 50mls over a maximum of 12hours) and/ or colloids.
2.	Active bleeding, which persists after more than 25% of the normal blood volume has been lost.

Other modalities of treatment for severe anaemia include exchange blood transfusion, (for severe neonatal septicaemia) and the use of recombinant erythropoietin.

Heart Failure

The most common causes of heart failure seen in childhood in the tropics are severe anaemia and complicated bronchopneumonia. The pathophysiology of heart failure in anaemia is largely the result of high demand for oxygen and the peripheral vasodilation, which increases the workload of the heart.

In bronchopneumonia, there is pulmonary venous congestion, resulting in tachypnoea, dyspnoea

on exertion (poor feeding in small infants) orthopnoea (in older children), crepitations and rales.

Investigations will include essentially; chest-x-ray, haemoglobin estimation, white blood count, serum electrolyte/ urea/ creatinine (kidney status). Treatment will depend on causes. Heart failure as a result of severe anaemia usually resolves instantly with correction with blood transfusion and treatment of underlying cause.

In bronchopneumonia, treatment involves;

a. General measures:

- i. cardiac position and humidified oxygen
- ii. mild sedation, as necessary, with morphine sulphate 0.05mg/ kg or phenobarbital for 1-2 days occasionally indicated.

b. Drug therapy:

i. Digitalis glycosides;

Total digitalising dose (TDD); 0.04-0.06mg/ kg given as ½ TDD stat, ¼ TDD at 6-8 hourly interval.

Maintenance dose of digoxin is started 12hours after the final TDD e.g. ¼ TDD 24hourly. Monitoring for digitalis toxicity using Electrocardiography (ECG) is an essential part of management.

ii. Diuretics;

This relieves the patient of the excess fluid. Commonly used diuretics are frusemide and thiazides diuretics with or without aldosterone antagonist (Spironolactone). Dose of Frusemide is 1-2mg/ kg/ dose intramuscularly, intravenously or orally, depending on the patients convenience and could be given 24hourly, 12hourly, or 8hourly depending on the severity.

Side effects of diuretics therapy include hypokalaemia and hypochloaemic alkalosis, both of which may increase the risk of digitalis toxicity.

iii After-Load Reducing Agents;

These improve cardiac output by reducing systemic venous return. The three classes are venodilators (Nitroglycerine, Nitrates), arteriolar vasodilators (Hydralazine Captopril) and mixed Vasodilators (Nitroprusside, prazosin). These agents become necessary when clinical condition is difficult to manage with diuretics and Digitalis.

Bronchiolitis

Bronchiolitis, an inflammation of the bronchioles is a disease of infants. It is predominantly caused by the respiratory syncytial virus. Obstruction in the bronchioles by inflammatory processes is predominantly the basic pathophysiology. In partial obstruction, where more air goes in than can come out, hyperinflation of the lungs ensues. In severe cases, the particular segment may have their bronchioles completely occluded by a sea of mucous membrane, causing alveolar collapse.

The presenting features are those of upper respiratory obstruction manifesting with catarrh, wheezing, cough, cyanosis and dyspnoea. The condition affects both lungs with hyper-resonance on percussion and fine expiratory rhonchi on auscultation. However, fine crepitations are heard in a few cases.

Chest-x-ray is normal in most cases. There may be patchy opacities, which are areas of collapse of the alveoli. In cases presenting with hyperinflation, the diaphragm could be depressed to a level where it pushes the liver, which is felt, below the right costal margin.

Treatment is mainly supportive, and includes oxygen, fluids, and nursing care. Antibiotics could be administered for super-imposed bacterial infection in some cases. Bronchodilator drug in the form of nebulization may be needed in cases with severe bronchospasm.

The prognosis is excellent as they usually recover within a week.

Sickle cell crisis

- i. Clinically, sickle cell disease patients present with recurrent crises which are often precipitated by malaria and other infections, especially those involving respiratory, urinary, and gastro-intestinal tracts. These crises may be vaso-occlusive or anaemic, and are responsible for frequent emergency presentations in this condition. The vaso-occlusive crisis is the commonest type of sickle cell crisis.

Anaemic crises are sudden. The severe anaemia which occurs in sickle cell subjects result from massive haemolysis (haemolytic crisis), or the pooling of red blood cells in the spleen or pulmonary beds (acute sequestration variety), and lastly from failure of the bone marrow (aplastic crisis). Infection and bone pain crisis are the main precipitating factors.

During crisis, it is important to determine the nature of the crisis and give appropriate treatment. Management of vaso-occlusive crisis e.g. bone pain crisis, consists of the following measures:

- a) Relief of pain with oral paracetamol 15-20mg/ kg/ dose, 6-8 hourly for mild / moderate pains and i.m. pethidine 1mg/ kg/ dose or morphine 0.1mg/ kg/ dose, for severe pain. Warmth is applied to the affected parts
- b) Fluids are given liberally (2-2.5L/ m2/ 24 hours orally or i.v.) to maintain good hydration.
- c) Any infection, especially malaria is treated appropriately.
- d) Monitoring of the packed cell volume (PCV) and prompt transfusion with packed cells or sedimented red cells if PCV falls below 15%.

Management of the anaemic crisis involves blood transfusion in most cases. Packed cells or sedimented cells are used for haemolytic and aplastic crises, while whole blood is used in sequestration crisis because of the need to expand the circulatory blood volume and combat shock. The cause of the crisis is identified and treated.

Cerebrospinal Meningitis

This is defined as the inflammation of meninges due to any cause. Most common bacterial organisms

are *Haemophilus influenza* type B, *Streptococcus pneumoniae* and *Neisseria meningitidis*. Also, in the neonatal period, there is a peculiar tendency for infections to be caused by gram-negative organisms e.g., *Klebsiella*, *Coliforms*, *Pseudomonas*, *E. coli*, *Proteus*, and group B beta haemolytic strept. In the tropics, more than 70% of cases of bacterial meningitis are caused by either *Streptococcus pneumoniae* (pneumococcus), or *Neisseria meningitidis* (meningococcus).

Lumbar puncture for cerebrospinal fluid (CSF) analysis is the most important investigation. In the side room, appearance is observed (hazy, turbid, purulent) as check for protein. CSF sugar can be done using the dextrostix (usually low in bacterial meningitis). Antibiotics are the definitive treatment usually consisting of i.v. therapy for 10-14 days at least; 10 days for the older child and 21 days in the neonates. For pneumococcal and meningococcal meningitis, penicillin (crystalline penicillin) is the earliest drug of choice, while chloramphenicol is the drug of choice for *Haemophilus influenza* meningitis. Thus, while awaiting laboratory culture result a combination of crystalline penicillin 0.2-0.4 mg/kg/day 6 hourly, plus gentamycin 5-7.5 mg/kg/day 8 or 12 hourly plus chloramphenicol 50-100 mg/kg/day will suffice. Other management modalities include, antipyretics/analgesics and dexamethasone 0.3-0.5 mg/kg/day, given 8 hourly, to reduce the inflammatory reaction. If convulsion occurs phenobarbitone is given. I.V. fluid is given (60% of maintenance because of syndrome of inappropriate anti-diuretic hormone (ADH) secretion) using 4.3% dextrose in 0.18 Normal saline.

Neonatal Jaundice

Neonatal hyperbilirubinaemia in the tropics is associated with high morbidity and mortality in babies delivered at home and those discharged home early after hospital delivery. The most single important factor associated with poor prognosis is the exposure of the Glucose-6-phosphate dehydrogenase (G6PD) deficient baby to icterogenic agents. Others are associated infections and delay in presentation at the hospital. Commonly available icterogenic agents include naphthalene balls used to preserve the clothes of the babies and their mothers, menthol containing balms/powder applied to the umbilical cord/stump and possibly traditional herbs applied to the cord and scarification marks.

Management involves initial assessment through good history, physical examination and investigation. Treatable causes must be identified when present and treated. Effort is made to keep the serum bilirubin at safe levels for the baby. Two main treatment modalities that have been shown to be effective in the tropics are Phototherapy and Exchange Blood Transfusion. A number of factors guide the physician as to the treatment modality to be adopted. These include;

a) age of baby at presentation.

- b) gestational age/ birth weight.
- c) level of serum bilirubin (unconjugated).
- d) presence of stress factors- e.g. infection, asphyxia, and acidosis, which make the blood brain barrier more permeable to bilirubin, with greater risk of damage.

Risk factors in jaundiced infant include, family history of significant haemolytic disease, vomiting, lethargy, poor feeding, fever, onset of jaundice before 2nd day, high pitched cry, dark urine and light stool (suggesting biliary obstruction).

Hydrocarbon Poisoning

- a) Kerosene, a volatile hydrocarbon is the single most common cause of poisoning in childhood in any community in the tropics. This is because it is available in most homes, where it is used for lighting and as cooking fuel. Secondly, it is stored in food bottles which attract children and, because of overcrowding, these children get easy access to it. When ingested, it is readily absorbed from the stomach and excreted by the lungs. It is also inhaled into the lungs as the child is drinking it or during vomiting. Inhalation into and excretion from the lungs produces a chemical pneumonitis and pulmonary oedema. The main clinical features include cough, dyspnoea, tachypnoea, nausea and vomiting. They may be confusion, drowsiness or coma, due to depression of the central nervous system. On auscultation, there are usually coarse crepitation with rhonchi in the lung fields. Chest radiograph shows hyperexpansion with patchy consolidation in the lung fields. There may be no symptoms when the quantities ingested are small. Management is therefore essentially symptomatic. More detailed discussions on these topics can be found in appropriate sections of this book.

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PART ONE: CHAPTER 13.

THERAPEUTICS IN PAEDIATRIC PRACTICE

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In classical usage, the term therapeutics refers to the aspect of medicine that deals with treatment and cure of diseases. Paediatric practice, especially in developing countries, necessarily addresses the whole child, in health and disease, including his physical, socio-economic and emotional environment. Thus a complete overview of the care of the child will revolve round a cycle that includes the child, parents/guardians, the family, the community, the health facility and the health care givers. With this premise we shall look at therapeutics in the context of the child in –

1. Primary health care,
2. Out-patient treatment,
3. The hospitalized child and
4. Common management problems.

Generally, individuals differ in their responses to efficacy or even safety of drugs. Data on efficiency and even safety of drugs are continually being collated even while the drug has been approved for use and is fully in use. This is even more so in paediatrics. These differences in response can be due to age of the patient, disease of the organs of drug elimination (liver, kidneys or even the lungs), the concurrent use of other drugs, foods or even chemicals, tolerance level to a drug depending on previous use of the drug and genetic factors. Well-defined end points have to be established prior to therapy. These may be clinical e.g. fever reduction, or maybe, surrogate markers e.g. blood pressure, which have clinical outcome.

In the past, therapeutic decisions had often been based on impressions and traditions. Presently, however, objective evaluation of factual knowledge in therapeutics has led to the concept of 'evidence – based medicine'. This concept is simply, improved clinical practice based on incorporated evidence from information that is tracked down and critically appraised. In paediatric practice, intervention in the early life of an individual to prevent death or minimise morbidity, requires a high quality and safe medical care. Evidence-based medicine helps achieve these. Currently, some advocates are of the view that standard guidelines (evidence-based medicine) should be the yardstick for determining malpractice or even medical negligence suits. Evidence-based medicine, if well applied, guides patient management in such a way that expectations are realized, problems anticipated and wastages reduced. Unfortunately, even in developed regions, practice of medicine often lags behind knowledge by several years. This concept also has its shortcomings.

A therapeutic agent has a pharmacological effect of the agent as well as a non – specific placebo effect of the effort. These placebo effects depend on the