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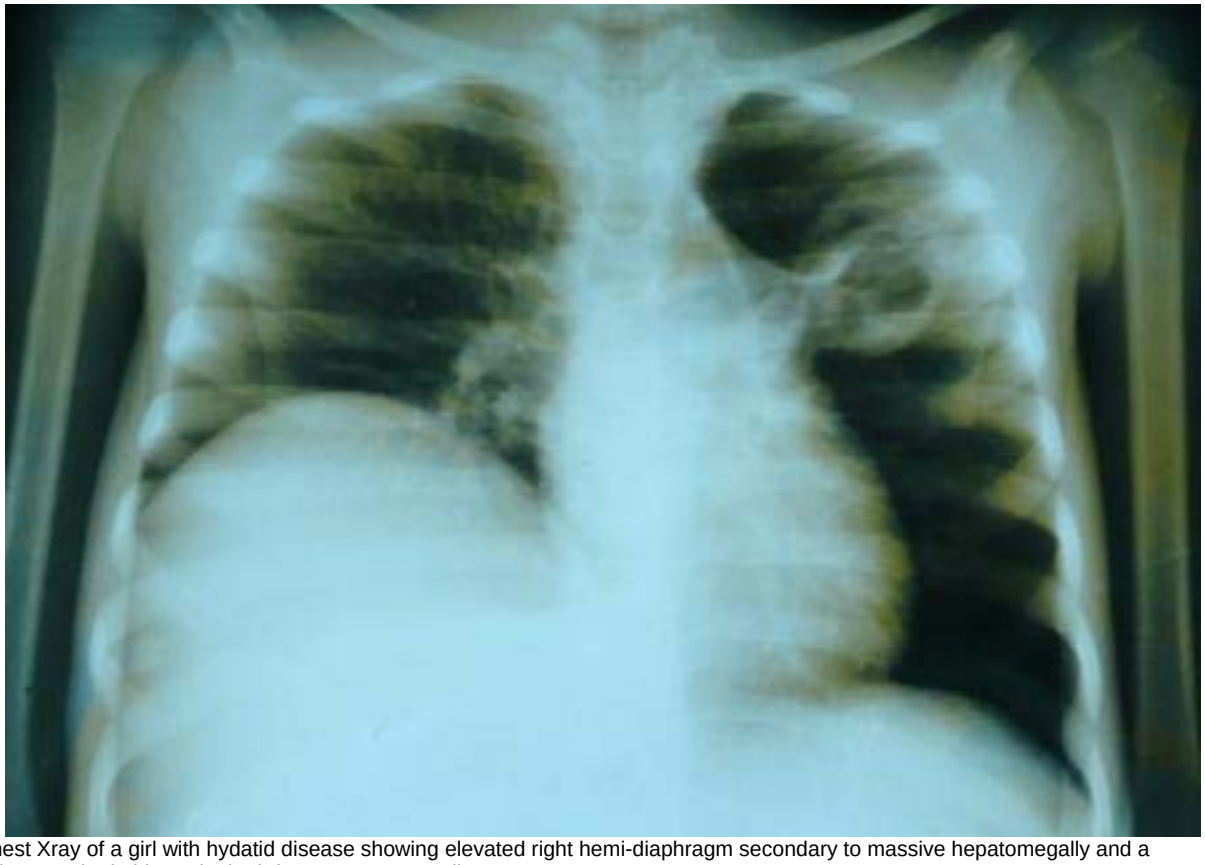

Chest Xray of a girl with hydatid disease showing elevated right hemi-diaphragm secondary to massive hepatomegally and a pulmonary hydatid cyst in the left upper zone. Credit: James Aryton

To inform, educate and positively influence the development of Health Services in the Southern Sudan

Contents

Editorial

We vividly recall on our first days as medical students being told that half of what we were about to learn in our degrees would be obsolete by the time we graduated. Such is the pace of advancement in medical knowledge and practice. A brand new edition of a medical textbook, by the time of publication, is already many months and perhaps years out of date. It is useful to reflect on these facts as we consider the place of peer-reviewed journals, such as the Southern Sudan Medical Bulletin, in our continuing professional development.

Firstly, medical therapies are constantly evolving; new drugs are being developed and existing treatments re-evaluated by the international medical community. 'Evidence based medicine' has become the cornerstone of the modern medical approach, and it's crucial to have a means of keeping abreast of the latest developments and keep our practice up to date. We owe this to our patients.

Second is the issue of applicability. It is good to read about approaches to medical management in the UK or even Northern Sudan, but the fact is our disease burden is different, our available resources are different, the cultural factors are different, and perhaps even the physiology of our population is different! This highlights the importance of having our own national journal, as the means to discuss and learn from each other about the specific needs and management issues of our population.

Thirdly, the ability to independently publish peer-reviewed studies and clinical audits is extremely important. The first step to making any real improvement in a system is the ability to take an honest look at how things are now and to publicly acknowledge the strengths and deficits. Only then can any meaningful progress be made. To bury one's head in the sand will never result in any improvement, and the published medium of scientific data is a powerful opponent to apathy and denial.

Lastly, it's important to recognise the value in building a national community of medical practitioners. We are all working towards the same goal: the healthcare of the people of Southern Sudan. This journal provides a forum for co-ordinating the discussion and dissemination of ideas, linking individuals, healthcare centres and hospitals, spanning primary and secondary care to help facilitate teamwork.

Drs James Ayrton & David Attwood

James Ayrton and David Attwood are UK doctors currently working in Juba Teaching Hospital as part of the St Mary's Juba Link - a partnership which seeks to promote continuing professional development, particularly through training in secondary medical care.

The **Southern Sudan Medical Bulletin (SSMB)** is a quarterly publication intended for Healthcare Professionals working in the Southern Sudan or those Healthcare Professionals in other parts of the world seeking information on health in the Southern Sudan.

It aims to offer education and information in all specialities and identify research that will inform the development of Health Services in the Southern Sudan. We plan to include reports of original research, critical/systematic reviews, case reports, clinical photographic materials, obituaries, letters to the Editor, use of drugs, medical news of public interest, nutrition matters, public health issues and stories of the health services in the Southern Sudan in the past.

The Bulletin is a publication of the St Mary's Juba link. It is published in mid-February, May, August and November each year and is free online at http://www.iow.nhs.uk/juba (under journals).

Readers are encouraged to print out copies and pass them to colleagues.

Guidelines for the Management of Suspected Microbial Keratitis in Settings with Limited Laboratory Facilities

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Introduction

Microbial Keratitis, also referred to as Suppurative Keratitis or Corneal Ulcer, is a potentially sight threatening condition that may present to doctors and nurses working in State hospitals and eye units in South Sudan.

Delay in treatment can result in development of complications that may lead to loss of sight or destruction of the eye. It is generally recommended that corneal scrapping and microscopic examination of smears be performed to identify organism type before initiation of therapy and that culture and sensitivity testing be undertaken to provide information necessary for subsequent treatment modification.

These recommendations, although good, are impractical in settings where laboratory facilities are not readily available or reliable. In this case initial choice of antibiotics therapy may be made without the benefit of Gram Stain Microscopy results.

In recent years, a number of new broad spectrum antibiotics have been introduced that as single agents have been effective in treating corneal ulcers. This seems to vindicate the position previously held by some ophthalmologists that extensive laboratory workup, although essential, only rarely changes the course of initial therapy, regardless of the basis on which such therapy was chosen.

A good history, clinical examination and knowledge of prevalence and sensitivity pattern of local isolates can assist the clinician select appropriate antibiotics for initial treatment of suspected case of microbial keratitis. This article presents guidelines that would aid the clinician in making such decision in settings where minimum or no laboratory support exists.

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Microbial Keratitis

The cornea is the transparent avascular part of the sclera that lies in front of the eye protected by the eyelids. It is covered by epithelium that provides the first line of defence against invading micro-organisms. The tear film spread on its surface by the blinking action of the lids contains lysozymes that have antibacterial activity against most bacteria.

Suppurative Corneal ulcer occurs following invasion of the cornea by pathogenic bacteria capable of penetrating intact epithelium such as *corynebacterium Diphtheriae*, *Neisseria Gonorrhoeae* and *H. influenzae.* Non surgical trauma is the commonest factor predisposing the cornea to infection with less virulent organisms that are usual commensals of the lid. Spontaneous invasion of the cornea may occur in patients with previous history of *Herpes Simplex, Exposure Keratopathy*, *Diabetes Mellitus, contact lens* wear and general immune suppression.

The prevalence of blindness directly resulting from complications of *Suppurative Keratitis* is estimated to be 5%[1]. This figure is likely to increase as other causes of corneal blindness decrease with improvement in immunization against measles, control of *Xerophthalmia,* and other corneal blinding diseases. In developing regions like India, Africa and Asia, *Suppurative Keratitis* is the second commonest cause of uniocular blindness after cataract[2]. Blindness caused by sequale of *Suppurative Keratitis* can be considered irreversible in parts of the world where corneal grafting services are non existent. Patients are therefore at increased risk of total blindness if the other eye should lose sight to other blinding conditions. Early recognition and treatment are therefore important to avert the sight threatening complication of this condition

The cornerstone of effective treatment is informed initial antibiotic choice with later modification as clinical cause dictate. At a primary and secondary eye care level and sometime in tertiary eye care centres without adequate laboratory support, such a choice has often to be made without the benefit of laboratory data.

Careful history, consideration of risk factors, evaluation of clinical characteristics of the ulcer and

knowledge of prevalence and sensitivity pattern of local isolates can guide the clinician in choosing appropriate initial therapy. The literature suggests that in temperate and tropical climates where agricultural activities and therefore trauma due to vegetative matter is common, Fungi are the most common cause of *Suppurative Keratitis* [3] although bacteria are still isolated with increasing frequency where no history of injury is reported[4]. Therefore in formulating therapeutic strategy in such environment it is important to keep in mind the possibility of infection with bacterial and non-bacterial pathogens.

Predisposing factors

Presence of certain risk factors may point to infection with specific organisms; therefore direct inquiry in the history can elicit important information that may indicate particular organism. Trauma with vegetative matter or objects contaminated with soil can predispose to infection with filamentous fungi especially *Fusarium* and *Aspergillus* while patients with immune-suppression may be susceptible to yeast infection.

Use of traditional eye medicine (TEM) in home treatment of *Microbial Keratitis* should be especially enquired for in the history. It is a common practice among poor rural peasants in developing countries where access to eye care is limited. In one study in India[5] 47% of patients were found to have used TEM before presentation to hospital. The prevalence of TEM use in Southern Africa is estimated to 24%[6].

People frequently consult traditional healers because they are affordable and available, can be paid in kind, are within easy reach of the patient and are highly regarded in their communities. While traditional healers have had a positive impact in resolution of psychiatric and psychosocial problems, their role in the management of Microbial Keratitis has largely been negative. Some traditional eye medications are corrosive, have been prepared under unhygienic conditions using plant and animal extracts that are often contaminated by pathogenic bacteria or fungi. Use of traditional eye medicine delays patients from presenting to hospital and may modify the clinical picture, thus making etiological diagnosis impossible

Use of contact lens is fortunately uncommon in rural communities in developing countries although it is becoming widespread in urban centers of some countries. Contact lens wearers may be at risk of infection with the parasite *Acantoamoebea Histolytica* or Pseudomonas species if daily wear contact lenses are used and cleaning is done with a home-made solution. It is a common predisposing factor in developed countries where trauma is less frequent and use of this device is widespread

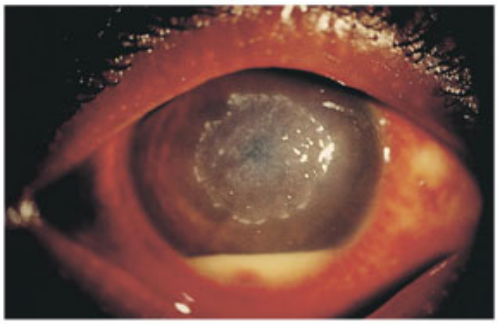
Previous *Herpes Simplex* Keratitis, Neurotrophic Keratitis or dry eyes are some of the other factors that can predispose to microbial Keratitis.

Clinical examination of the ulcer

A corneal ulcer is suspected in a patient complaining of sudden onset of pain, photophobia, discharge and reduced vision, in an inflamed eye that has a grey patch on the cornea. Severe ulcers involve more than half the corneal surface, penetrate to more than half corneal thickness and are complicated with hypopion – see Fig 1.

It is difficult to make etiologic diagnosis of an ulcer from history or clinical assessment alone but certain clinical characteristics may point to a particular etiologic agent.

Fig 1 Hypopion Ulcer



Note the round grey patch at the centre of the cornea and a collection of pus known as hypopion

Fungal ulcers have feathery edges (see Fig 2) and may be surrounded by satellite lesions. The ulcer tends to follow an indolent cause rarely causing much pain. Hpopion when present tends to adhere to the endothelial surface instead of settling to the bottom of the anterior chamber. History of vegetative injury or treatment with steroid containing preparations is often present.

Bacterial ulcers tend to be more acute, presenting within few days of injury and are characterized by pain, photophobia, tearing and redness of the eye. Pseudomonas

ulcers produce copious greenish yellow discharge and progress rapidly to hypopion formation and corneal perforation. The surrounding cornea may have ground glass appearance.

The most common bacteria include Staphylococcus Epidermidis, Stapohylococcus aureus, Pseudomonas Aeruginosa and streptococcus Pneumoniae. Fusareum and Aspergillus are common fungi

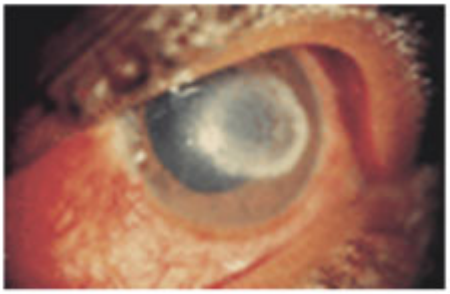


Fig 2 Fungal ulcer - note feathery edges

Value of Gram Stain Microscopy in Etiologic Diagnosis of Corneal Ulcers

Gram Stain Microscopy [GSM] is the recommended laboratory procedure that should be performed before initial antibiotic therapy is started. Where laboratory facilities are available this should be done as a routine procedure.. Where laboratory facilities are not adequate, it will be limited to cases with severe ulcers or when fungal infection is suspected from history or clinical examination. Gram stain will enable broad classification of organisms into Gram Positive and Gram Negative as well as fungal. It will also facilitate the building of a local database to act as a reference for future treatment decision and to examine changes in trends.

Sensitivity of Gram Stain Microscopy [GSM] varies in different studies ranging from 36% - 50%[7-9]. GSM tends to be positive in severe cases of bacterial infection or fungal infection and when antibiotic has not been used prior to presentation to hospital. It tends to be negative in small to medium ulcers.

Culture is the Gold standard that can confirm results of GSM and provide sensitivity data to enable modification of initial therapy. Corneal infiltrate should be sent for culture in all cases of severe ulcers, suspected fungal infection and those that are refractory to treatment. McLeod et al[8] (seeTable 1) compared the recovery rate of organisms by Gram Stain and Culture and found that in almost 49% of instances Gram Stain missed organism that were subsequently recovered on culture.

Table 1. Identification of organisms by gram stain and culture

Gram stain	Culture	%
Organisms demonstrated on stain	Corresponding organisms recovered on culture	26
No organisms demonstrated on stain	Organisms recovered on culture	49
No organisms demonstrated on stain	No organisms recovered on culture	25

In some cases[10], culture was not only negative in a case of positive smear but in fact it yielded different organisms from those seen on smear. From these studies, Only in a quarter of cases does culture result confirm a positive or negative smear.

Some of the reasons for the high false negative GSM rate are that patients with suppurative Keratitis usually always present late to hospital after a failed home treatment with either antibiotics or traditional eye medicine. The material obtained during scrapping is often small hence may not be sufficient for processing. Interpretation of corneal smears, traditionally done by primary physicians is time consuming and may call for expert knowledge of the practitioner.

Proper materials for obtaining corneal scrapping may not be stocked at the practitioners' office in adequate quantities. Thus it was shown[8] that where scrappings ware done, the procedure was often performed using cotton tipped applicator contrary to textbook recommendation that a metal Kumura spatula or wooden applicator be used in all cases. All these shortcomings may lead to low harvest rates of organisms seen in GSM.

Choice of initial antibiotic therapy

Initial antibiotic therapy may be chosen on the basis of Gram Stain Microscopy where this is available or it can be based on knowledge of most likely organisms as reported in local literature.

Evaluation of a patient with corneal ulcer

1. Take a good history paying attention to injury especially vegetative injury.
2. Find out if patient has instilled any traditional medicine preparation into the eye.
3. Carefully examine the ulcer and note presence of discharge, appearance of feather margins, and presence of satellite lesions, impending perforation and presence of hypopion.
4. Make a tentative diagnosis and chose initial broad spectrum antibiotics according to knowledge of prevalence and sensitivity.

Initial therapy based on results of Gram Stain Microscopy - see Table 2.

- If GSM shows a single organism, start therapy with topical Ciprofloxacin 0.3% given frequently two hourly till improvement then reduce to TDS.
- If GSM shows mixed organisms: start combination therapy with topical cefazolin and Gentamicin two hourly and assess daily.
- If GSM shows presence of Fungi or positive history of vegetative injury – add an antifungal either Natamycin or Econazole eye drops TID.

Modify therapy if no improvement and according to culture and sensitivity results. Do not change therapy if patient is improving on current therapy even if sensitivity results indicate lack of sensitivity to the antibiotic in use.

Table 2. Choice of antibiotics based on results of GSM

Organism identified by GSM	Drug	Frequency	Duration
Single bacterial pathogen	Topical Ciprofloxacin eye drops	2-hourly until improvement then 3 times/day	7 days or until cure
Mixed bacterial pathogens	Combination therapy with topical Cefazolin and Gentamicin 0.3% eye drops	2-hourly until improvement then 3-hourly	7 days
Fungal elements	Topical Natamycin 5% or Econazole eye drops	3 times/day	7 days

Initial therapy based on prevalence of local isolates

1. Always assume mixed infection with both gram positive and gram negative organisms.
2. If there is a history of vegetative injury or use of TEM, assume presence of fungi and evaluate ulcer carefully for signs of fungal infection such as feathery margins, satellite lesions etc.
3. Note if the patient is using contact lens.
4. Start broad spectrum antibiotics therapy with the following combination:
   - Topical fortified Cephazolin 5% or Ciprofloaxcin 0.3% combined with fortified Gentamicin 1.4% and Natamycin 5% or Econazole.
   - Combine both Subconjuntival injection of Gentamicin and topical eye drops.
   - Give eye drops half hourly until improvement, then reduce to TDS.

How to prepare fortified antibiotic eye drops

Gentamicin

Add 2ml parental Gentamicin (80mg) to 5ml of commercial Gentamicin ophthalmic solution (0.3%) to get final concentration of 14mg/ml.

Cefuroxime

Dilute 1g parental Cefuroxime in 2.5ml sterile water.

Take 2.5ml of this solution and add to 12.5ml of artificial tears to get final concentration of 50mg/ml.

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Preventing Iron Deficiency and Anaemia

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Anaemia, often due to iron deficiency, is one of the most widespread causes of mortality and morbidity in Southern Sudan, which probably has probably one of the highest rates in the world.

Anaemia means a person has a haemoglobin or haematocrit below the values in Table 1. It occurs when the body produces too few healthy red blood cells, loses too many or destroys them faster than they can be replaced.

Causes of anaemia and iron deficiency

Anaemia is caused one or more of the following:

- **Iron deficiency** that accounts for about 50% of anaemia cases worldwide. **Iron deficiency** is caused by:
  - a diet low in bioavailable iron.
  - loss of blood due to heavy menstruation, injuries, bleeding during delivery, or hookworm or schistosomiasis infections.
  - intestinal disorders affecting iron absorption.
- **Deficiency of vitamin B12, vitamin A and/or folate.** Folate deficiency causes megaloblastic anaemia. Folate needs are high during pregnancy.
- **Non nutritional causes** such sickle cell disease and **infections** especially malaria, HIV/AIDS.

Anaemia is common among young children and women of reproductive age because:

- Young children are growing fast and so must make new red blood cells quickly.
- Women and girls of reproductive age lose blood each month.
- Pregnant women must make many new red blood cells, provide iron for the foetus and may lose much blood during childbirth.

Dangers of anaemia and iron deficiency

- Severely anaemic people, including children, often die.
- Anaemia in pregnancy results in:
  - less iron passing from mother to foetus so the newborn has low iron stores
  - increased risk of blood loss during and after delivery, and of maternal death
  - increased risk of the baby being preterm, having a low birth weight and dying.
- Anaemia in surgical patients increases the risk of postoperative problems and death.

Some people may not be classified as 'anaemic' but are iron deficient. **Iron deficiency** (even without anaemia) reduces the immune status of all age groups and:

- Iron-deficient young children are apathetic and less active, and at risk of poorer-than-normal emotional and behavioural development.
- Iron-deficient older children and adults have poorer-than-normal ability to concentrate or do physical work for long periods.

Diagnosing iron deficiency and anaemia

Biological methods

The methods usually available in Southern Sudan to diagnose anaemia are haemoglobin (see Table 1), mean corpuscular volume (MCV) and mean corpuscular haemoglobin concentration (MCHC).

However, these can give misleading results if there is infection and do not necessarily mean a person is iron deficient.

People with infections especially HIV or other serious infections are often anaemic but may not be iron deficient. In the immune response to infection the body takes iron from the blood and stores it in the liver. Giving iron to these patients may be dangerous. Tests for iron deficiency include serum ferritin, serum transferrin receptor and zinc protoporphyrin (ZnPP). Refer patients with HIV or other serious infections for one of these tests when possible, or seek senior opinion.

Table 1. Haemoglobin and haematocrit cut-off levels for anaemia[1]

Age/Sex	Haemoglobin (Hb) below	Haematocrit below
	g/L	%
6– 59 months	110	33
5 – 11 years	115	34
12 – 14 years	120	36
Females >15 yrs:		
- not pregnant	120	36
- pregnant	110	33
Males >15 years	130	39

- In adults and adolescents: if haemoglobin is: <90 g/L anaemia is 'moderate'; <70 g/L (or haematocrit <20%) anaemia is 'severe'; <40 g/L anaemia is 'life threatening'.
- Anaemia is classified as a public health problem if 40% or more of pregnant women have a haemoglobin below 110 g/L.

Physical examination

- Check for pallor in the palms, nails, inner eyelids and tongue. **Severe anaemia** is indicated if any of these is abnormally pale.

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- An *indication* of **iron deficiency** is flatting and thinning, and later spooning, of fingernails and/or a diet low in available iron – see Box 1.

Ask about symptoms

An anaemic person may complain of:

- Feeling tired, ill, dizzy, or breathless when resting.
- Headache, fast-beating heart or swollen feet.

Find possible causes

- Ask about the diet, especially about foods that are iron-rich and/or increase or reduce iron absorption – see Box 1.
- Ask about heavy bleeding or chronic blood loss.
- Examine or ask about present or previous severe infection such as HIV, malaria or tuberculosis,
- Examine for intestinal parasites and ask if person has been de-wormed.

Preventing iron deficiency and anaemia

- Help families and communities to understand the causes and dangers of iron deficiency and anaemia.
- Explain that:
  - women need adequate iron stores before and during pregnancy - because of increased needs and to ensure babies are born with good stores. Their need for folate also increases.
  - spacing births gives women a chance to 'fill up' iron stores between pregnancies.
  - breastfeeding exclusively for 6 months – which, among other benefits to mother and baby, delays menstruation.
  - young children should not be fed unfortified commercial milk.
- Discuss practical ways to improve diets, particularly for women and young children (see below).
- Give prophylactic iron and folic acid supplements to iron deficient persons.
- Prevent or treat non-dietary causes of anaemia.

During and after childbirth:

- Control bleeding by encouraging women to:
- be delivered by a trained birth attendant or at a maternity unit if there is a risk of complications.
- start breastfeeding within ½ hour of birth. Breastfeeding makes the mother's uterus tighten and reduces bleeding.
- Wait two minutes after birth before clamping the umbilical cord so the baby gets more blood from the placenta.

Give prophylactic supplements

- Give oral iron and folic acid supplements to pregnant and lactating women, to females of reproductive age and to low birth weight babies – see Table 2.
- Do not give *routine prophylactic* iron or folic acid to children in malaria endemic areas as it may increase adverse effects and mortality unless they are proven to be iron-deficient[2].
- Explain the importance of taking supplements regularly for the full duration and how to deal with possible side effects – see Box 2.

Box 1. Improving diets

There are two forms of iron in foods:

Haem iron is type of iron in the blood, muscle and organs of animals, poultry, and fish – see pictures.

Non-haem iron is the type of iron in plants, milk, and eggs**.** Non-haem iron in breast milk is well absorbed but is poorly absorbed from most other foods — usually about 5% to 10%. However the proportion absorbed depends on:

- *Other foods in the meal.* Meat, fish and vitamin C–rich foods (fresh fruits and vegetables) increase absorption. Fermenting and germinating/malting cereals and legumes also improve absorption. Some foods contain anti-nutrients that decrease absorption if taken with, or immediately after, foods containing non-haem iron. These include tannins in tea and coffee and phytates in cereals.
- *Iron needs.* People with high iron needs (e.g. pregnant women or people with anaemia) absorb more than other people.

To prevent iron deficiency advise families to:

- Eat more meat (of any kind), fish, poultry and organ meats – the darker red the food the more haem iron it contains. These foods must be well cooked to kill parasites and pathogens.
- Eat more fresh vegetables and fruits (to increase absorption of non-haem iron from other foods in a meal). Foods high in non-haem iron include egg yolk, dark green vegetables, millet, sorghum and legumes.
- Avoid drinking tea or coffee with or soon after meals. Do not give tea and coffee to children.
- Eat fermented porridges and germinate/malt cereals and legumes to reduce phytates.
- Eat foods fortified with iron if feasible, such as some wheat flours. Families can use home fortification products if available.
- Breastfeed babies exclusively for 6 months and then to include iron-rich foods such as suitably prepared meat or fish in their diets.

Table 2. Prophylactic oral iron and folic acid dosage schedules to prevent and correct iron deficiency anaemia[1,3,4]

Group	Dosage/day [a]	Duration
Low birth weight infants <2500g	1 to 2 mg iron/kg body weight + 50 µg folic acid	2-24 months of age
Children 6-24 months.	2 mg iron/kg body weight + 50 µg folic acid[b]. Give on physician's advice.	6-12 months of age where anaemia prevalence is not high. 6-24 months of age where anaemia prevalence is high
Children 24-59 months	20-30 mg iron	At least once a week for 3 months every year
Children 6-11 years	30-60 mg iron	At least once a week for 3 months every year
Adolescents and women of reproductive age	60 mg iron + 400 µg folic acid[b] (folic acid helps prevent birth defects)	At least once a week for 3 months every year – or whatever routine is feasible
Women pregnant [c] and lactating	60 mg iron + 400 µg folic acid [b]	6 months during pregnancy and 3 months postpartum.

a Iron tablets usually contain 60 mg iron and folic acid tablets 400 µg folic acid. Iron syrup usually contains 20 mg iron/ml. Check before prescribing.

b Do not give folic acid if the person is taking sulphur-based drugs including sulfadoxine-pyrimethamine (Fansidar) for malaria as it may interfere with the action of the antimalarial.

c A *pregnant* woman should stop taking folic acid for one week after taking a dose of Fansidar.

Box 2. Problems with iron supplements

People may not take supplements regularly or for prescribed periods because:

- They do not understand why they should and they feel better after a few days. *So:* Explain that iron stores take a long time to 'fill up'.
- They get side effects such as stomach-ache, nausea, vomiting, constipation or diarrhoea. *So:* Warn of possible side effects and advise to take tablets with food or halve the dose for a few days.
- Stools are black. *So:* Explain that iron makes stools black and is harmless.
- Pregnant women believe iron makes their babies bigger and so delivery will be more difficult. *So:* Explain that iron makes mothers and newborns stronger and less likely to die during childbirth.

An overdose of iron can **kill** so warn recipients that they *must* take pills or syrups as prescribed. Young children can choke on tablets. **Strongly advise families to keep tablets and syrups out of children's reach.**

Treating *severe* anaemia

If the person is anaemic and the cause *is* iron deficiency, treat with iron and folic acid (see Table 3) and counsel on side effects (see Box 2.) – unless a transfusion is needed. Counsel on diet.

Table 3. Iron and folic acid dosages for treating severe anaemia[3]

Group	Daily dose		Duration
	Iron mg	Folic acid µg	
Under 2 years	25	100-400	3 months
2 –12 year	60	400	3 months
Adolescents and adults including pregnant women	120	800	3 months

- After completing 3 months of therapeutic supplementation, pregnant women and infants should continue the preventive supplementation schedule in Table 2
- Do not give folic acid if the person is taking sulphur-based drugs such as Fansidar.

Treating malnourished children

Most children with severe acute malnutrition are severely anaemic but it is dangerous to give oral iron until the child has been treated for infections, regains appetite and starts gaining weight[4; y]

Treating anaemia when there may be infection

- It is recommended *not to give iron* to people diagnosed as anaemic (by haemoglobin level) but who are *not* iron deficient. The cause of anaemia is likely to be infection and iron can make infections worse.
- If you diagnose or suspect that the person has an *acute* infection and you cannot measure iron stores, do not give iron but treat the infection. Follow up and give iron if the haemoglobin does not improve.
- If there is no infection or you are not sure, give iron, follow up and check to see if the haemoglobin improves. If it does not, look for and treat other causes of anaemia.
- People with severe chronic infections are often severely anaemic but *may* have good iron stores. Giving iron supplements to these people can be dangerous, especially if they have malaria, tuberculosis or HIV. Instead treat with erithropoietin if available. If this is not available, give iron (because *severe* iron deficiency anaemia can be life-threatening) but follow-up closely.

[y] In severely malnourished children the blood may have too little protein to bind the iron. Unbound iron can damage cell walls and stimulate the growth of pathogenic bacteria.

Note: We plan to cover the management of anaemia due to non-dietary causes in future issues.

A good diet prevents iron deficiency anaemia

From Nutrition during pregnancy and lactation. Job Aids on HIV and Infant Feeding. University Research Co., LLC/Quality Assurance Project http://www.qaproject.org/strat/stratHIVjobaidsintro.htm

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With thanks to Dr Louis Danga for contributing to this article and to Drs Pauline Andang'o, Alan Jackson and Lucy Malaba for their advice.

The Medical and Social Consequences of Alcohol Abuse

First of Two Articles

Dr Eluzai Hakim, FRCP Consultant Physician, St Mary's Hospital, Newport, Isle of Wight PO30 5TG UK*

Introduction

The prevalence of alcohol related illness in the Southern Sudan is unknown, though there is anecdotal information that alcohol related violence, marital discord, absenteeism from work and road traffic accidents which are related to the use of alcohol are common.

Humans have drunk alcohol for at least twelve thousand years. It has been used in religious rituals, in ancient cultures as diverse as Samaria, Babylon, Egypt, China and Anglo-Saxon Britain[1]. According to the World Health Organisation (WHO) 1.8 million people worldwide died in 2000 from alcohol related causes, 3% of all deaths worldwide[2]. In 2001, up to 1,000 of 3,479 deaths from suicide and self-inflicted injury were associated with the misuse of alcohol in the United Kingdom[3]. In the United States of America, each year 85,000 deaths occur along with substantial disability from medical, psychiatric consequences, injuries and "second-hand" effects such as road traffic accidents attributed to the use of alcohol. The estimated annual cost attributable to alcohol use in the United States is equivalent to US$185 billion[4].

As peace takes root in the Southern Sudan, so does social life outside a war situation lubricated with a drink or two. Repeated use of alcohol leads to habituation due to induction of liver enzymes, which increase the breakdown of alcohol. Consequently more alcohol is drunk each time in order to produce the same effect.

What is alcohol?

Alcohol or ethanol (C_2H_5OH) is a drug. It is a small water soluble molecule, a proportion of which is absorbed directly but slowly from the stomach. It is absorbed more rapidly from the small intestine and is freely distributed throughout the body. Absorption of alcohol is quicker if it is drunk on an empty stomach. Sherry with an alcohol concentration of 20% increases blood concentration more rapidly than beer (3 – 8%). Spirits such as whisky and gin (40%) delay gastric emptying and inhibit alcohol absorption. Hence people may still feel drunk the following day after much consumption of whisky or gin. Drinks aerated with carbon dioxide, for example whisky and soda and champagne, are absorbed quicker[5].

Human factors in alcohol absorption

Alcohol is distributed in water throughout the body, reaching different parts such as the brain, muscles, liver and the bone marrow. Exposure of the liver to alcohol is greatest because blood received from the stomach and intestine reaches the liver through the portal vein, which drains those structures. Relatively little alcohol enters fat tissue due to its poor solubility in fat.

Compared with males, females have relatively higher fat content and hence blood and tissue concentrations of alcohol are higher in females[5]. However other factors may also play a part in making females susceptible to the effects of alcohol.

Medical effects of alcohol

- Disruption of motor coordination such as driving a car or walking in a straight line due to effects of alcohol on the cerebellum, the part of the brain which modulates sensory-

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motor coordination. This predisposes to road traffic accidents, falls and other injuries.

- **Removal of the voluntary control of behaviour** (self control) and restraint exercised by the body through the prefrontal cortex of the brain. Hence those who have consumed much alcohol may become talkative, seek fights or urinate in public without due regard for the presence of other people[1].

- Those consuming alcohol may **seek rewards** such as sexual gratification without thinking of the consequences of their actions - such as unplanned pregnancy, or engaging in unprotected sexual intercourse - with the potential result of contracting serious illnesses such as HIV/AIDS.

- **Loss of intellectual abilities** such as memory, judgement, abstract thinking and reasoning. Being uncaring and untidy about one's personal appearance may be the first signs of alcohol abuse particularly in persons in responsible positions.

- Blindness due to optic atrophy if alcohol contaminated with methanol in poor brewing conditions is consumed. Cases of unexplained blindness in some middle class Southern Sudanese who have consumed locally distilled gin regularly have been noted over the years.

- Damage to peripheral nerves manifesting as foot drop, burning sensation in the feet and hands and leading to dropping of objects such as cups held or falls at the slightest tripping.
- **Direct injury to heart muscle** (cardiomyopathy) associated with atrial fibrillation (irregular heartbeat) leading to heart failure and strokes.

- Chronic pancreatitis and ultimately diabetes.

- **Gynaecomastia** (enlarged breasts in men), **atrophy of testicles** and **erectile impotence**. This is believed to be due to the effect of oestrogens whose concentration increases in the body as a result of poor inactivation in the liver which has already been rendered cirrhotic by excessive consumption of alcohol.

- **Foetal alcohol syndrome**: excessive alcohol consumption during pregnancy leads to foetal retardation, central nervous system abnormalities in the foetus such as small openings between the eyelids, thin upper lid, upturned nose, parallel folds on ears and mental retardation leading to impaired learning, slow reaction time and poor problem solving.

- **Dehydration**: alcohol inhibits the release of vasopressin from the posterior pituitary gland leading to increase in urine volume and consequently dehydration. This may lead to kidney failure if not corrected.

Social effects of alcohol

- **Marital disharmony** as a result of cash crisis, domestic violence, loss of job and social exclusion.
- **Violence** leading to homicides, assaults and sometimes burglary.
- **Failure at examinations** for those who are at school, college or university.
- **Loss of trust** by those close to the person abusing alcohol (no-one trusts a drunkard!).

These are some of the major consequences of chronic and excessive alcohol consumption. In the next article I shall be writing about the management of problem drinking to avoid the development of these problems. Drunk in small quantities alcohol may be beneficial.

There are ways round problems in life other than is encapsulated in this quote, "Alcohol is the anaesthesia by which we endure the operation of life" George Barnard Shaw 1856 – 1950.

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Tapes for measuring Mid Upper Arm Circumference (MUAC)

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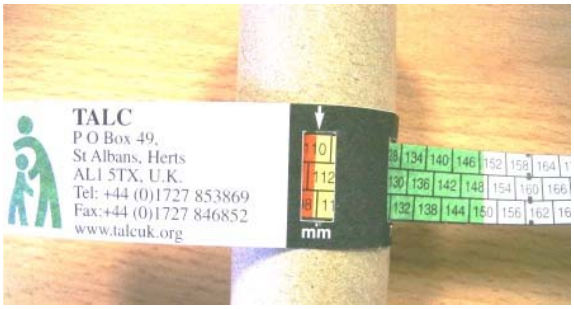
At a time when food is in short supply it is essential to have a simple method of identifying malnourished young children. The mid upper arm circumference (MUAC) of children aged 6 – 59 months gives an indication of the degree of wasting and is a good predictor of mortality. Research shows that it is equally good, if not better, than other measurements for screening young children and selecting those needing therapeutic feeding[1].

The MUAC tape (see figure) is a simple and reliable method of assessing MUAC and can, with training, be used by all level of health workers.

Teaching-aids At Low Cost (TALC) has been producing MUAC tapes for over 10 years and they have stood the test of time, with over a quarter of a million having been distributed. They are made from plasticized paper and are almost indestructible.

The tapes show colour-coded cut-off points indicating various levels of malnutrition for young children, and, on the back, suggest cut-off levels to identify at-risk pregnant women and adults with HIV/AIDS and/or tuberculosis.



The TALC MUAC tape and how to use it

References

1. Myatt Mark, Khan Tanya, Collins Steve. *A review of methods to detect severe malnutrition in the community for their admission to community based therapeutic feeding centres Food* and Nutrition Bulletin 2006 No3 supplement The United Nations University

MUAC – how to measure and when use it [1,2]

How to measure MUAC

MUAC is the circumference of the left upper arm and is measured at the mid-point between the tips of the shoulder and elbow. To measure:

1. Bend the left arm, find and mark with a pen the olecranon process and acromium.
2. Mark the mid-point between these two marks.
3. With the arm hanging straight down, wrap a MUAC tape around the arm at the midpoint mark.
4. Measure to the nearest 1 mm.

It is easy to measure MUAC even on very thin arms.

When to use MUAC

The major determinants of MUAC are muscle and sub-cutaneous fat, both important determinants of survival in malnutrition and starvation. MUAC is less affected than weight and height based indices (e.g. Body Mass Index) by accumulation of fluid (i.e. nutritional oedema, peri-orbital oedema and ascites). So MUAC is a good predictor of mortality. It is recommended for identifying young children with, or at risk of, severe acute malnutrition and adults with acute energy deficiency.

In children 6-59 month old, MUAC <110 mm indicates severe acute malnutrition and is recommended as a criterion of admission to therapeutic feeding programmes. Values between 110 and 120/125 mm indicate moderate malnutrition. Values below 250 mm in adults indicate severe wasting. More detailed cut-off values for young children are at http://www.who.int/childgrowth/standards/en

Note that MUAC is not sensitive enough to routinely monitor growth at young child clinics.

The MUAC Community Website http://tng.brixtonhealth.com

The MUAC Community Website is a free and open site for the dissemination and discussion of issues related to the use of mid-upper-arm circumference (MUAC) including, but not restricted to, case-definitions, surveys, and patient monitoring. Anyone can view the stories and comments on the site and view / download files attached to stories. Authenticated users can create, edit and delete their own stories, attach files to them, and comment on their own and other's stories.

References

1. United Nations System Standing Committee On Nutrition, Task Force On Assessment, Monitoring, And Evaluation, Fact Sheets On Food And Nutrition Security Indicators: *Mid-Upper Arm Circumference* SCN News Update March 2008 www.unsystem.org/scn
2. Notes from *The MUAC Community Website* http://tng.brixtonhealth.com
Image of TALC tape from http://tng.brixtonhealth.com

*MUAC straps are also available from Valid International Ltd. and can be delivered by courier directly to UNO, NGO, and MoH country offices. For prices and details email office@validinternational.org.

Mpower!…A Health Education Programme in Mundri

Contributed by Loes Jaspers** loesjaspers at gmail.com**. Photos from Mpower!

How did it all start?

Mpower! is a collaborative project of the International Federation of Medical Students' Associations-The Netherlands (IFMSA-The Netherlands) and the Mundri Relief and Development Association (MRDA).
Mpower! is a 'training of trainers' project organized by Dutch medical students in close association with South Sudanese peers.
From June-December 2007 the students and peers worked really hard to create a health education programme that deals with matters like health, sexuality, hygiene, sanitation, HIV/AIDS, safety, human rights and nutrition.
The results are stunning. A group of 40 local trainers are trained to give workshops in three different topics. For each of these topics a manual was developed. The 3 topics are:

1. Nutrition
2. Sexual and Reproductive Health
3. Hygiene and Sanitation

You can view the manuals online at http://www.roelkw.com/mpower/manuals/

How did it continue?

During the workshops we noticed there was a need for a focus on children (see photo of Julius, one of the trainees). Mothers asked many questions about child health care. "How can I take care of my child?", "How can I see when my child is sick?", "How can I love my child?". In response to this need a second project was developed in 2008 with a special focus on children. Below you can find the outline of the renewed project.

Mundri Under 5 Clinic

This clinic will become the heart of the project - see below.

Health Education

Workshops are given in the three topics of Mpower! listed above. The difference to last year is the special focus on children. A group of 9 trainers are being specially trained to give these workshops.
Subjects for the workshops are:

1. Nutrition → focus on children, pregnant women and a balanced diet
2. Sexual health and human rights → focus on family planning, STD's, HIV/AIDS and human rights
3. Hygiene and Sanitation → focus on general hygiene and personal hygiene of mother and child.

Home visits

The trainers will be visiting homes in order to reach people who live far outside the community. During these visits the trainers will discuss the importance of hygiene, sanitation and a good nutrition, and deal with family health issues. They will fill in checklists on sexual and reproductive health, and child health care. This will give the Mpower! crew the chance to get insights into the knowledge of the community. This is not only important for the people of Mundri, but also for our founders in The Netherlands and future funders.

Vaccination and Prevention Programme

This is final part of the project and is indispensable to secure the health of young children. We are investigating with different NGOs and funders the possibilities to implement routine vaccinations for all children in Mundri. Already two people involved in the project are capable of giving vaccinations. The biggest difficulties will be power failures and a reliable supply of vaccines.

Happily Ever After?

We started implementing Mpower! in June 2007 so it is still a young project. For the moment everything is going very well and there is enough money to continue it for some time. But for this project to be successful in the future, more money will be needed. We are now busy writing to potential funders in the hope that there will be sufficient money for Mpower! to continue as a successful project for many years to come!

Trainees were: Julius Bidal Morobu, Atim Hassen German, Rebecca Ezibon Tona, Benjamin Bishop Wisely, Stephen Sabah Wisely, Venson July Kenneth, Charity Edward, Cecilia Amjuma Bona, Sebit Manza Faki, Helida Saluwa Abel, Isaac Opi Repent, Michael Abdallah Paul, Elizabeth Silvano Faki, Jackson Monday Mbari, Viviana Kiden Apollo, Stephen Simas Simon.

Mundri Under 5 Clinic

We are presently starting the very first Under 5 clinic in Mundri. The general Health Care Centre has donated a building to Mpower! for this purpose. The building is in a very bad condition, but we have already started the renovation (see photo). This clinic will become the heart of the Mpower! project. The trainers will use it as their headquarters and the building will be used to:

- give education and health advice OR give nutrition and health education/advice
- weigh and measure children using their own growth charts
- monitor the health and wellness of children
- vaccinate children.

The location of the centre is perfect, because it is close to the Maternal Health Clinic. Every day many pregnant women are waiting outside this clinic for a visit to the doctor. This is an ideal opportunity for the trainers of Mpower! to educate the women about child health care and to tell them about the Under 5 clinic.

The trainers will counsel parents who come to the Under 5 clinic with their children. They will be able to refer children immediately if they are dehydrated or severely malnourished. The trainers are not doctors and so will refer children who need medical treatment.

Summaries/Extracts from journals, reports, etc.

Please send us more material for future issues of the Bulletin.

The Burden of Trachoma in Ayod County

Trachoma, a neglected tropical disease, is the leading cause of infectious blindness and is targeted for global elimination by the year 2020. A survey was conducted in Ayod County of Jonglei State, to determine whether blinding trachoma was a public health problem and to plan interventions to control this disease. The burden of trachoma in Ayod was found to be one of the most severe ever documented. Not only were adults affected by the advanced manifestations of the disease as is typical for older age groups, but young children were also affected. At least one person with clinical signs of trachoma was found in nearly every household, and 1 in 3 households had a person with severe blinding trachoma. Characteristics previously identified as risk factors were ubiquitous among surveyed households, but the authors were unable to identify why trachoma is so severe in this location.

Surgical interventions are needed urgently to improve vision and prevent irreversible blindness in children and adults. Mass antibiotic distribution may alleviate current infections and transmission of trachoma may be reduced if communities adopt the behaviours of face washing and safe disposal of human waste. Increasing access to improved water sources may not only improve hygiene but also reduce the spread of guinea worm and other water-borne diseases.

Citation: *King JD, Ngondi J, Gatpan G, Lopidia B, Becknell S, et al. (2008) The Burden of Trachoma in Ayod County of Southern Sudan. PLoS Negl Trop Dis 2(9): e299. doi:10.1371/journal.pntd.0000299*
http://www.plosntds.org/article/info%3Adoi%2F10.1371%2Fjournal.pntd.0000299

Contributed by Edward Luka, opikiza at yahoo.com

Is the end in sight for malaria deaths?

In Southern Sudan, as in other parts of Africa, malaria is a major killer of young children and cause of much morbidity. In 2006, 91% of the almost 900,000 global deaths from malaria were in Africa; only 3% of the African children in need got artemisinin-based combination therapy (ACT) and only 125 million Africans out of the 650 million at risk slept under treated bednets[1].

However, recent increased funding for malaria has led to increased access to malaria control interventions – indoor spraying, ACT and, especially, treated bednets. 22 million Africans are now protected by indoor spraying and, in some countries between 2001-2006, the proportion of children protected by bednets increased from 3% to 23%. In 7 African countries deaths from malaria were reduced by >50% between 2000 and 2006.

So it is good news that this September world leaders announced a multi-donor, multi-million dollar plan to end all deaths from malaria[2]. Key parts of the plan are the widespread introduction of a vaccine (RTS,S), presently in the final stages of its trials, and development of more effective vaccines. Perhaps there is real hope that malaria will not blight future generations of children in Southern Sudan.

1. WHO *WHO World Malaria Report 2008*. WHO, Geneva http://www.who.int/malaria/wmr2008. For more information on malaria see http://www.who.int/topics/malaria/en/index.html
2. Boseley S. *$3bn ploughed into fight against malaria* The Guardian (UK) 26 September 2008 p25

HIV treatment at same time as TB treatment halves death rate

The South African SAPIT study (Starting Antiretroviral therapy at three Points In Tuberculosis therapy) has found that taking antiretroviral drugs at the same time as TB treatment halved the death rate when compared with delaying HIV treatment until after TB treatment was completed. Up until now, many clinicians have preferred to wait until after the completion of TB therapy before initiating HIV treatment in a patient diagnosed with TB, citing concerns about immune reconstitution, drug interactions and drug toxicity.

The SAPIT study is a randomised open-label trial which recruited 645 adults diagnosed with smear-positive tuberculosis. It is designed to identify the optimal time to start HIV treatment in TB patients. Participants received a once-daily antiretroviral regimen of ddI/3TC and efavirenz at one of three time points during their course of TB therapy:

- Early integrated treatment: antiretroviral treatment started as soon as possible after TB treatment (within two months)
- Later integrated treatment: antiretroviral treatment started after the two-month intensive phase of TB treatment is completed, generally in months three or four of TB treatment.
- Sequential treatment: antiretroviral treatment started after TB treatment is completed, generally six to eight months after starting TB treatment.

The trial Safety Monitoring Committee decided to terminate the sequential treatment arm after an interim safety analysis showed that patients in the two integrated treatment arms had a 55% lower death rate than the sequential treatment arm. Translating these findings into public health practice could take time, and will require much thought about how to integrate HIV treatment into TB services.

Based on an item from HIV & AIDS Treatment in Practice (HATIP) #115 14 August 2008. See http://www.aidsmap.com/(→news→Africa)

Quiz (based on an article in issue 3 of the Bulletin)

What do you know about resuscitating newborns?

1. What is the first thing to do if the baby is blue?
2. Are drugs usually needed to resuscitate newborns?
3. After achieving good lung inflation, at what heart rate should you start chest compressions?
4. How many compressions and breaths should you give per minute?
5. When do you stop chest compressions?

See answers below.

Did you know that October 15, 2008 was the first-ever **Global Handwashing Day**? Handwashing with soap is the most effective and inexpensive way to prevent diarrhoeal and acute respiratory infections, which take the lives of millions of children in developing countries every year.

Times and technique are crucial in handwashing for diarrhoeal disease prevention. Hands must be washed at a minimum of **three** critical times: (1) before cooking or preparing food, (2) before feeding a child or eating, and (3) after defecation, cleaning a baby, or changing a nappy. The **three** elements of proper technique are to use water and soap, rub one's hands together at least **three** times, and dry them hygienically (e.g. with a clean towel or by air drying).

Extract from http://www.usaid.gov/our_work/global_health/eh/index.html

And do you know the top 10 causes of death in low-income countries? Answers below.

For your resource centre

A free DVD on IMCI Training

The **I**MCI **C**omputerized **A**daptation and **T**raining **T**ool (ICATT) provides a computerised training course and resource materials on the Integrated Management of Childhood Illness (IMCI). ICATT can be adapted and translated to suit different needs after which it can be "closed". The closed version (training player) can then be used for self-learning or in the classroom.

The content covers how to provide essential care to newborn children, and how to manage sick children and address their problems and needs in an integrated way. The DVD is developed and produced in limited quantities by WHO and can be copied. You need a DVD drive on your computer to use it.

The DVD is available from the WHO Regional Offices (through country offices) and from WHO-HQ (cah@who.int or dehaanf@who.int). For more information and support on ICATT go to www.icatt-training.org.

MotherNewborNews is a well-illustrated newsletter from MotherNewBorNet covering topics related to maternal and newborn care. Volume 2 Issue 2 2007 deals in detail with the 'Prevention and Treatment of Postpartum Hemorrhage'. You can download it from www.icddrb.org/MotherNewBorNet.

Pictures in AIDucation: African Communities Talking Sex, AIDS and Pictures (ISBN: 1-4251-5757-2) is new book that addresses the topic of HIV infections and AIDS through PICTURES. For more details and prices go to http://www.trafford.com/4dcgi/view-item?item=22039

A website on Severe Acute Malnutrition (SAM)
Visit the website of the **International Malnutrition Task Force (IMTF)** at http://imtf.org for information about severe acute malnutrition (SAM) and its management. This interactive site includes detailed and reliable treatment guidelines and training materials from international and national sources.

Answers to quiz

1. Open the airway
2. No
3. <60, or <100 and not improving
4. 90 chest compressions and 30 breaths (3 compressions to each breath) When the heart rate is >100, or if the baby has not responded to resuscitation after 20 minutes
5. When the heart rate is >100, or if the baby has not responded to resuscitation after 20 minutes

The top 10 causes of death in low-income countries are:

	% of deaths
Lower respiratory infections	11.2
Coronary heart disease	9.4
Peri-natal conditions	9.1
Diarrhoeal diseases	6.9
HIV/AIDS	5.7
Stroke and other cerebrovascular diseases	5.6
Chronic obstructive pulmonary Disease	3.6
Tuberculosis	3.5
Malaria	3.3
Road traffic accidents	1.9

Extract from WHO Fact sheet N°310 (updated October 2008) see http://www.who.int/entity/mediacentre/factsheets/fs310_2008.pdf

Notices

UGANDA ACTION FOR NUTRITION is organising the **1st UGANDA NUTRITION CONGRESS** in Kampala on 19th and 20th February 2009. The congress is particularly for participants in Eastern Africa and would be very relevant to nutritionists from Southern Sudan. For more information see www.ugan.org or email Robert Fungo at

rfungom@gmail.com

MOH-GOSS Juba Teaching Hospital Resource Center
is based in a special wing of the hospital and is open from Monday to Friday from 9:00am to 12:45pm and from 2:00pm to 5:00pm. It has a wide range of magazines, books and IT materials, and 7 computers connected to wireless network. For a list of materials visit http://www.librarything.com/catalog/jubath. The Center is supported by USAID and implemented by the Capacity Project-IntraHealth International in collaboration with Juba Teaching Hospital. For further information contact Tombe Ali Francis, the librarian/manager, by phone: 0477216408 or e-mail: tombe296@yahoo.com

A Mpower workshop

Send us *your* pictures (in jpg) so we can publish some of them in the future Bulletins.

Every effort has been made to ensure that drug names and doses quoted in this Newsletter are correct. However readers are advised to check the doses before prescriptions are made. Unless otherwise stated the doses quoted are for **adults**

Information to Authors

We encourage articles and news items from any health professional working in Southern Sudan, or with an interest in the country. The Editorial team can help with preparation of articles and reserves the right to edit items if necessary. Original Articles submitted to the Southern Sudan Medical Bulletin must not be submitted simultaneously to other publications and should not have been accepted for publication elsewhere. All articles may be peer-reviewed by two independent reviewers. Authors and members of the Editorial Board must declare any conflict of interest. Articles by an author suspected of medical or other misconduct will not be published.

This Bulletin is for all levels of health professional. Therefore we ask authors to make their items 'reader-friendly' by using short sentences, avoiding passive verbs, and explaining (or not using) technical terms or acronyms that some readers may not know.

Referencing articles

The Bulletin uses the Vancouver style in which references are cited in numerical order with the number in superscript in the text (for example, "treat according to latest guidelines[1.]"). Journal names may be written in full or abbreviated (e.g. BMJ for British Medical Journal). Page numbers should be written as 10 – 19. Please include websites if available. See examples below:

Articles

1. Majok MN, *New Treatment for Trypanosomiasis.* BMJ 2008; 400: 10 – 15.

Books

2. Lado CS, Woro ME. *Health Development in Southern Sudan.* Juba University Press: 2001.

Chapters

3. Gbuduwe C, Lumayat A, editors. *The Nodding Disease,* 10th Edition. Nairobi: East African Publishing House 1998.

Reports

4. Department of Health. *National Service Framework for Coronary Disease.* London: Department of Health 2000 (www.doh.gov.uk/nsf/coronary.htm).

Images

We like to include photographs and other images. Please send these in jpg or a compressible format (not Word) so the Bulletin is quick to download.