An unusual cause of failure to thrive.

John Bosco Nsubuga (Intern Doctor), Department of Surgery, Kitovu Hospital, Masaka, Uganda.

Introduction.

Rare conditions always attract interest. Numerically they may not appear clinically important but by studying the patients and reviewing the literature much can be learned. The learning points may then be applied to our everyday practice.

Case Report.

A one-year-old female child was brought to the hospital by her mother who reported seeing and feeling a mass in the upper abdomen of the child from the age of four months. From age six months the child began to have occasional abdominal distension after meals, non-projectile vomiting producing yellow vomitus, colicky abdominal pains and some diarrhoea. The child was losing weight and appeared weak. Examination showed that she was under weight at 6kg. and was dehydrated. The abdomen was not distended but there was a soft 4cm. palpable mass located in the upper abdomen. Haemoglobin 10.3G/dl and the film showed hypochromic red blood cells.

The child was rehydrated and treated with dietary supplementation. However she only gained 0.3kg. in three weeks. An upper gastrointestinal barium study was carried out and showed no oesophageal or gastric abnormalities. The barium passed through a normal pylorus into a dilated proximal duodenum. A laparotomy was carried out and this revealed a ballooned duodenum running into a stricture at the duodenal-jejunal junction. No congenital bands or other gastrointestinal abnormalities were found. A side-to-side duodeno-jejunostomy was fashioned. Postoperatively the child progressed very satisfactorily being continued on dietary supplementation. The weight rose to 7.8kg (a gain of 1.5kg.). at eleven days at the time of discharge.

Comment.

If this child had had duodenal atresia she would most likely have presented within 24 hours of birth. Hypertrophic pyloric stenosis is most common in first born males and peak presentation is at around two weeks although may be delayed until the seventh week. There is no bile or yellow colouration in the vomitus. If duodenal obstruction is incomplete (i.e. duodenal stenosis) then presentation is usually delayed and results in:

- recurrent episodes of vomiting,
- aspiration,
- weight loss and failure to thrive.

Extrinsic duodenal obstruction or congenital bands may cause similar presentations. The recurrent vomiting may be bilious or non-bilious: the latter occurs if the obstruction is distal to the ampulla of Vater\(^1\). This vomiting leads to dehydration, electrolyte disturbance and weight loss. Generalised abdominal distension is most unusual: there tends to be a fullness in the epigastrium caused by duodenal and stomach dilatation.

The incidence of duodenal atresia / stenosis is 1:10,000 – 30,000 births. During embryological development the duodenal lumen is completely obliterated by epithelial cells. At 8 – 10 weeks’ gestation these epithelial cells gradually disappear and the lumen is canalised. Failure of this mechanism leads to partial (stenosis) or complete (atresia) of the duodenum. These anomalies usually occur in the first or second part of the duodenum and most commonly near the ampulla of Vater. The child in this report was unusual in that the stenosis was at the duodenal-jejunal junction.

Almost 50% of infants with this duodenal congenital abnormality also have another congenital abnormality:

- Down’s syndrome 30%

\(^1\) A. VATER (1684 – 1751) was a German anatomist who was born in Wittenberg. He became Professor of Medicine in Wittenberg.
• Cardiac defects  23 – 34%
• Oesophageal atresia  7 – 12%
• Other abnormalities include: gastrointestinal malrotation, anorectal anomalies, intestinal atresias at other sites, cloacal and renal tract anomalies.

Therefore it is important to examine every child carefully for these other possible problems. A further antenatal problem is polyhydramnios which occurs in 32 - 59%.

At the time of surgery it is important to bear in mind the possibility of associated biliary tract and pancreatic anomalies. The distal common bile duct may be duplicated or stenosed and choledochal cysts and an annular pancreas may occur.

**Pre-operative management and assessment** should include the correction of dehydration and electrolyte disturbance (although the facilities for measuring the latter are not likely to be available). Hypoglycaemia should be sort and corrected. A plain abdominal Xray may give useful clues as to the site of obstruction or stenosis: the stomach would appear dilated and the duodenal air double-bubble would indicate the extent of duodenal dilatation. If the stomach is aspirated and air gently insufflated (introduced) then these Xray signs would be made more obvious. If air is seen beyond the duodenal air bubbles then a stenosis is likely and other abnormalities may exist. A contrast (barium) study helps to sort out this latter problem.

If facilities allow and ultrasound of the abdomen might indicate associated renal and / or pancreatic abnormalities. In addition an echocardiogram may reveal septal defects or a patent ductus arteriosus. These are likely to have been suspected clinically.

The surgical approach is dependent on the operative findings. In the case reported a duodenojejunostomy seemed to most appropriate.

Longterm postoperative survival of these patients is possible and most are asymptomatic. However complications may occur months to years after surgery and include:
• Duodenal dysmotility,
• Megaduodenum and associated blind loop syndrome,
• Reflux of duodenal contents into the stomach and gastritis,
• Peptic ulceration.
• Gastro-oesophageal reflux,
• Cholelithiasis and cholecystitis.

The satisfactory and rapid recovery of this child after surgery was most gratifying and a credit to the team effort.

**Reference.**


**Acknowledgements.**

I am grateful to Sister Maura Lynch, FRCSI, (Senior Consultant Surgeon) Deo Kizito, M.Med. (Surg) (MUK) (Consultant Surgeon) and Tim Peet, FRCS (Visiting Consultant Surgeon) for permission to report this case and for advice.

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Diabetic nephropathy in a cohort of Ugandan diabetics.

David Tibbutt, DM, FRCP (Visiting Consultant Physician), Sister Davnet O’Kane, FIBMS and Laboratory Staff at Kitovu Hospital, Masaka.

Introduction

Data on the incidence and prevalence of renal failure among diabetics is based mainly on studies on patients in Europe and North America. How far can this information be extrapolated to our patients in sub-Saharan African countries like Uganda?

In the UK the main causes of death among diabetics under the age of 50 years are (Ref.):

- Cardiac 35%
- Renal 17%
- Hyperglycaemic coma 16%
- Cerebrovascular 10%
- Respiratory 5%
- Hypoglycaemic coma 4%
- Chronic neurological 3%
- Other 10%

Therefore it seems that renal disease causes death in just under one fifth of this group of patients. Is this the same in Uganda? The purpose of this brief study was to attempt to gain an insight into this question. Renal function tests (especially blood urea and creatinine) are not readily available in most Ugandan rural hospitals. At Kitovu Hospital the laboratory can measure blood urea. The problem with blood urea is that a normal result may not exclude renal failure: a patient on a low protein intake will have a lowered blood urea. Creatinine also underestimates the fall in glomerular filtration rate in the early stages of renal function deterioration. However if we observe for proteinuria this should give an indication of renal disease and probable failure. Once overt proteinuria has appeared in a diabetic patient then the development of nephropathy is to be expected and to progress to end-stage failure.

Method.

The cohort of diabetic patients was made up of consecutive attendees to the Medical Out-patient Clinic at Kitovu Hospital during September and October 2004. At the time of review all patients provided a specimen of urine for “Albustix” testing. Data concerning sex, age, the type (1 or 2) of diabetes, time since diagnosis of diabetes and the presence of hypertension were recorded.

Results.

Eighty patients were included in the study. The analysis of the data is shown in the Table 1.

<table>
<thead>
<tr>
<th>Group (No.)</th>
<th>Age (years): mean &amp; range</th>
<th>Sex M : F</th>
<th>Time since diagnosis (years): mean &amp; range</th>
<th>Hypertension No. &amp; %</th>
<th>“Albustix”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1 (37)</td>
<td>44.3 (12 – 74) 14 : 23 (1 : 1.6)</td>
<td>7.2 (1 month – 24 years)</td>
<td>14 (38%)</td>
<td>Trace 7 1+ 2</td>
<td></td>
</tr>
<tr>
<td>Type 2 (43)</td>
<td>59.6 (21 – 90) 15 : 28 (1 : 1.9)</td>
<td>3.3* (0 – 10 years)</td>
<td>23 (53%)</td>
<td>Trace 3 0</td>
<td></td>
</tr>
<tr>
<td>Totals (80)</td>
<td>29 – 51 (1 : 1.8)</td>
<td>5.2* (0 – 24 years)</td>
<td>37 (46%)</td>
<td>Trace 10 (12.5%) 2 (2.5%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Features of the cohort of 80 diabetic patients with the incidence of “Albustix” test results. [* for three patients the length of history was uncertain therefore they have been omitted from this column]

Twelve patients (15%) were found to have a trace (2) or 1+ (10) of proteinuria. More detailed analysis of these patients is stated in Table 2.
<table>
<thead>
<tr>
<th>Type of diabetes</th>
<th>Age (years): mean &amp; range</th>
<th>Sex M : F</th>
<th>Time since diagnosis (years) : mean &amp; range</th>
<th>Hypertension No. &amp; %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>42.3 (20 – 70)</td>
<td>3 : 9</td>
<td>7.1 (9 months – 15 years)</td>
</tr>
</tbody>
</table>

**Table 2:** Features of the 12 patients with proteinuria on “Albustix” testing.

The two patients with one plus of proteinuria were:
1. Female aged 31 years, history of 1 year and normotensive: blood urea 4.8mmol/L.
2. Female aged 53 years, history of 14 years and normotensive: blood urea 6.5mmol/L.

The blood ureas of the other patients were not measured.

**Discussion.**

If a urinary “Albustix” shows protein then the concentration in the urine is at least 200mg/dl (2G/L). The problem is that a trace or 1+ of proteinuria may not indicate abnormality and can occur in
- The upright posture or
- after exercise,
- fever.

2+ or more proteinuria is pathological. Most of our patients had taken a significant degree of exercise just to reach the hospital. A urinary tract infection may lead to this minor amount of proteinuria and such infections were not excluded (although none had symptoms). Therefore on the basis of the information from this study it cannot be certain that the proteinuria (trace and 1+) was the result of diabetic nephropathy. Nevertheless the results maybe reassuring and surprising. Where are the patients with diabetes and who progress to renal failure in Uganda?

Type 1 diabetics are usually normotensive until albuminuria has appeared (Ref.). However 38\% (14) of our Type 1 patients were hypertensive and only three of these hypertensives had proteinuria (trace or 1+). It is stated that 70 – 80\% of Type 2 diabetics are hypertensive at the time of diagnosis of diabetes but only 53\% of our Type 2’s were hypertensive. The inference from these data is that our Ugandan patients do not behave in the same way as Western groups. Could this be the reason for our not seeing renal failure as we might expect?

This is a relatively small study of only 80 patients and a much larger investigation is required to define just what is going on in the rural diabetic population. The appearance if microalbuminuria (less than 200mg/dl) is an important observation and likely to indicate that a patient is at risk of developing serious renal complications. Unfortunately the cost of the facility to monitor microalbuminuria it outside the resources of most hospitals. We know little if anything about those diabetic patients who fail to attend for follow-up review and when patients die in the community. Nevertheless there is does appear to be case for suspecting that our Ugandan patients (and perhaps all diabetic patients in sub-Saharan Africa) are different in the way that their kidneys respond to the metabolic disturbances of diabetes mellitus.

**Reference.**


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Do not forget the side effects of quinine.

Several of the side effects of quinine are similar to the symptoms of the underlying malaria that is being treated. Patients may feel that they are not improving and indeed may feel that they are deteriorating. The commonest group of side effects is called “cinchonism”:

- Tinnitus,
- Deafness,
- Nausea,
- Vomiting.

In addition patients may complain of

- Hot flushes,
- Abdominal pain: especially epigastric discomfort.

These symptoms can be very unpleasant and may reduce a patient’s willingness to comply with a seven days’ course.

**Hypoglycaemia** may result from stimulation of the pancreatic islet beta-cells. This is more common in pregnancy and infants. The risk is reduced by administering the quinine with glucose. However the nursing and medical staff must be aware constantly of the probability of hypoglycaemia.

The vasodilatation that occurs in malaria may lead to **postural (orthostatic) hypotension**. Quinine exacerbates this.

**Thrombocytopenia** may result from an immune mechanism associated with quinine but this is rarely of clinical importance. **Thrombocytopenia** may also be part of the disseminated intravascular coagulation syndrome.

**Rashes and angio-oedema** have been described.

**Confusional states** also occur but distinguishing malaria and quinine as the underlying cause is difficult.

**Blackwater fever** (haemoglobinuria) is a serious complication.

**Overdosage or self-poisoning** can lead to serious toxic effects:

- **Blindness** which if it recovers may leave the patient with tunnel vision.
- **Deafness** (severe).
- **Cardiac conduction defects and dysrhythmias**. An electrocardiogram (especially in infants) will show a prolonged Q-T interval even at therapeutic quinine doses but this is rarely of clinical importance.

Generally when used properly quinine is very safe. To be able to blame the drug for a particularly poor outcome is rare: it is much more likely that a fatal case arises from inadequate doses. It is essential that patients receive adequate doses as soon as possible after reaching medical help.

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2 The word “cinchonism” comes from cinchona. Cinchona is an evergreen tree found in the Andes in South America. The bark is valuable because it is a source of quinolone alkaloids. Two of these alkaloids are quinine and quinidine.
How to recognise and manage severe (complicated) malaria.

Worldwide there are 250 million cases of malaria each year. *Plasmodium falciparum* kills about 2 million each year and most of these are children in Africa. On the background of this huge mortality it is important to be able to identify the pointers to the patients at particular risk.

<table>
<thead>
<tr>
<th>Indicator of severity</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaemia</td>
<td>Haemoglobin &lt; 5G/dl: normocytic often on a background of a hypochromic microcytic picture.</td>
</tr>
<tr>
<td>Hypoglycaemia</td>
<td>Blood glucose &lt; 2.2mM/L. This is especially important in infants and pregnant women.</td>
</tr>
<tr>
<td>Respiratory problems</td>
<td>This may be caused by pulmonary oedema or the adult respiratory distress syndrome.</td>
</tr>
<tr>
<td>Shock</td>
<td>Systolic blood pressure &lt; 70mmHg.</td>
</tr>
<tr>
<td>Renal failure</td>
<td>24 hours’ urine volume &lt; 400ml (oliguria): serum creatinine &gt; 265 micromols/L</td>
</tr>
<tr>
<td>Bleeding</td>
<td>Spontaneous bleeding: there may be laboratory features of disseminated intravascular coagulation (DIC): fragmented red blood cells, raised levels of fibrinogen degradation products (FDP’s) and low concentration of fibrinogen.</td>
</tr>
<tr>
<td>Deep jaundice</td>
<td>Jaundice is common: haemolytic, hepatic and cholestatic elements.</td>
</tr>
<tr>
<td>Coma</td>
<td>Cerebral malaria: especially poor prognosis if Glasgow Coma Scale &lt; 6. Other causes of coma must be excluded.</td>
</tr>
</tbody>
</table>

It is an easy to determine any of these features except serum creatinine, FDP’s and fibrinogen: blood urea will give some idea of renal function. However the blood urea will also be raised in the presence of dehydration and lowered if the patient has had a low protein diet.

Once a patient is diagnosed as being in the severe category of malaria then he / she requires careful and frequent observation and appropriate action:
- Attention to fluid balance (frequent checks of jugular venous pressure, lung bases for crepitations, peripheral perfusion, skin turgor and urine volume) to ensure that under or over hydration does not occur and
- oliguria is detected early. If oliguria occurs, and referral to specialist care is not possible, then the following measures are advised:
  - Ensure that the patient is adequately hydrated and is then Restrict all fluid intake to fluid output plus insensible losses i.e.
    - urine volume (a urinary catheter is usually needed but remember that this will predispose to a urinary tract infection: this must be checked for when the catheter is removed and especially if dysuria and / or fever remain).
    - other losses including diarrhoea and upper gastrointestinal fluids (e.g. from gastric aspiration)
    - Insensible loss of 500ml per day in adults (adding 50 – 100ml for every 1 degree C rise in body temperature above 38 degrees C)
  - Trial of intravenous frusemide if oliguria persists: 250mg over one hour (dose for adults) (the reader is also referred to texts on the management of acute renal failure).
- Blood glucose³ 4-hourly (repeat if there is a sudden deterioration).
- Blood creatinine / urea (if available).
- Serial blood films to
  - Ensure clearance of parasites and
  - Check for features of DIC (fragmented red blood cells and thrombocytopenia).
- It is essential that the correct dose of quinine is given in relation to the patient’s weight (under dosing can be dangerously ineffective!!)

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³ This frequency may be difficult but the use of a handheld glucometer is invaluable and gives an immediate answer whereas waiting for results from the laboratory may have clinical disadvantages: the problem is that the glucose stix tend to be rather expensive.
• **Convulsions**: treat with intravenous or rectal diazepam. It is essential to watch respiratory function just in case the patient is hypersensitive to this drug and develops respiratory depression.

• **Glasgow Coma Scale** to monitor the level of coma: this is especially useful for the doctor and nurses taking over care from colleagues.

• Occasionally meningitis may be suspected in which case an LP must be considered.

• **Pulse rate, blood pressure and respiratory rate chart** is a useful indicator of a deteriorating situation. If tachypnoea has resulted from the fever of malaria then the breathing tends to be shallow. If the breathing is noisy with the use of accessory muscles then the situation is more serious and may indicate pulmonary oedema. If possible the patient should then be nursed sitting up and given a loop diuretic (e.g. frusemide) or a venodilator (e.g. isosorbide di- or mono-nitrate).

• If there is any suspicion of an **aspiration pneumonia** then appropriate antibiotics are needed: metronidazole 500mg 8hourly IV plus (ideally) cefuroxime 1.5G 8 hourly IV (doses for adults).

• General protective care of the unconscious patient including measures to prevent pressure sores.

• **Blackwater fever**: the haemoglobin may fall rapidly and blood transfusion may be needed. The haemoglobin should be checked daily at least. If an artemisinin drug is available then this can substitute for quinine but otherwise quinine should be continued.

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**Pitfalls in the diagnosis of malaria.**

In countries where infection with *Plasmodium falciparum* is common many (perhaps most) of the patients in an adult hospital ward have presented with features of malaria:

• “fever”,
• rigors, chills, shivers,
• sweating,
• diarrhoea,
• diarrhoea,
• abdominal pains,
• cough,
• headache,
• malaise,
• aching muscles (myalgia),
• aching joints (arthralgia).

It is easy to assume that all such patients have malaria. In peak seasons of malaria the likelihood of that assumption being correct is high. But beware!! Among this large number of patients there will be a few who have an alternative diagnoses. Such awareness should be heightened when:

• the blood slide for malaria parasites is negative (especially if done three times) AND
• the patient has had NO prior antimalarials (as for treatment or prophylaxis).

A full physical examination should always be performed: unusual features will point to the system needing greater attention:

• **Cough** with purulent sputum indicates a respiratory tract infection. Clinical features of **pneumonia** and / or **tuberculosis** must always be sort.

• **Local symptoms** e.g. painful joint suggesting **septic arthritis**.

• **Blood in diarrhoea** should suggest dysentery: shigellosis, amoebiasis, campylobacter.

• **Neck stiffness**: meningitis must be considered.

• **Lower abdominal pain** and perhaps vaginal discharge suggesting pelvic inflammatory disease.

• **Loin tenderness** and / or **dysuria** indicating infection of the urinary tract.

• **Associated problems** e.g. **sickle cell disease** should alert the physician to other infections with / without a sickle cell crisis. The latter may be complicated by malaria.

• Many of the **non-specific symptoms** (e.g. malaise, myalgia, “fever”, headache) could be caused by a virus infection: unless complicated by progression (to e.g. meningitis, Guillain
Barre syndrome) these are usually self-limiting. Such patients will often receive treatment for malaria in malarious areas: this is reasonable.

So the message: all “fevers” are not malaria. The clinician must always consider alternative diagnoses. No to do so may have serious consequences for the patient.

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**Tuberculosis in Africa – it really is an emergency.**

In the first issue of the African Journal of Respiratory Medicine an article describes the immense importance and threat of tuberculosis (TB) (Ref.). It is truly an emergency. Here are some facts extracted from the article:-

- Africa is the only continent where the incidence of TB is rising. However
- The rate of rise is 5% per annum (2003) whereas it was 15% in 1991.
- There are 8.8 million new cases of TB worldwide each year (2003). Of these
- 27% (2.4 million) were in Africa: note that Africa has 11% only of the world’s population so has more than twice the average TB occurrence.
- 80% of the worldwide total of TB occurs in nine African countries: Democratic Republic of the Congo, Ethiopia, Kenya, Mozambique, Nigeria, South Africa, Tanzania, Uganda, Zimbabwe.
- If a patient is HIV infected then he / she has a 5 – 15% risk each year of developing active TB. This is a major factor in the spread of the TB epidemic in Africa.
- There are 41 countries in the world with the highest numbers of HIV-infected TB patients: 29 (71%) of these countries are in Africa.
- In 2003 229,000 people in the world died from co-infection of TB and HIV: 80% of these deaths were in Africa.
- In the whole world 8% of TB patients are also infected with the HIV but in Africa it is 35%.

The aims of any TB control programme are:
1. Reduction of morbidity,
2. Reduction of mortality,
3. Reduction of transmission.

There is a system in place in Uganda to achieve these goals and we all need to make every effort to ensure that it works. The DOTS system, if vigorously implemented, is effective: there are six important elements:

1. Political commitment,
2. Quality assured bacterial diagnosis,
3. Standard short-course treatment with
4. Direct observation,
5. Reliable drug supply,

There are many factors which reduce the likelihood of successful control of TB:
- Poverty,
- Nutritional deficiency,
- Weak health service delivery
- Including access (transport, communication) to the service,
- Laboratory service,
- Insufficient trained staff,
- Poor contact tracing,
- Lack of education within the population of the importance of TB.

So what do we do?
- TB must be high on the political agenda nationally and internationally,
- The approach to TB and HIV must be combined and coordinated,
- Promotion of the involvement of community members,
Establishment of strategies for the medium (up to 5 years) and long term (10 years at least),
• Engagement of the medical professional associations,
• Co-ordination between the many agencies involved to ensure the most efficient and effective use of resources,
• TB / HIV training must be embedded in the training curricula of medical, nursing and allied health professional students.

We must be committed to a long term task. We can win the battle against TB but it needs everyone to become involved.

Reference

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From the Institute of Development Studies, University of Sussex, Brighton, UK

Id21, based at the Institute of Development Studies, UK, has kindly offered to provide "id21 Health Highlights" that may be of particular value for Healthcare Professionals in Uganda. The web site is www.id21.org/health. "Views expressed are not necessarily those of DFID, IDS, Id21 or other contributing institutions. Unless stated otherwise articles may be copied or quoted without restriction, provided id21 and originating author(s) and institution(s) are acknowledged."

Rectal artemether treats cerebral malaria in Ugandan children

Cerebral malaria is the most severe and life-threatening complication of malarial infection. Delays in treatment increase the chance that the disease will be fatal. A study in Uganda compared the efficacy and safety of rectal artemether against the standard treatment, intravenous quinine. Findings suggest that rectal artemether could be used to treat cerebral malaria in children where intravenous facilities are not available.

Most deaths from cerebral malaria occur within the first 24 hours. Many primary health care units in developing countries lack the capacity to give quinine intravenously. The extra time taken to reach a higher level health facility may be life-threatening. So researchers from Makerere Medical School, Uganda, tested an alternative drug: rectal artemether. They studied 103 children with cerebral malaria aged six months to five years at Mulago Hospital, Uganda’s national referral and teaching hospital in Kampala. Children received either intravenous quinine or rectal artemether for seven days.

Key results showed that:
• There were no differences between the two groups in parasitological or clinical outcomes, including the times taken to clear blood parasites, reduce fever, regain consciousness and restart feeding.
• The death rate was higher in the quinine group, but not significantly so.
• Neither drug had serious immediate side effects.

The researchers conclude that rectal artemether:
• is effective and well tolerated and could be used to treat cerebral malaria in children
• might be most useful for treating severely ill children at peripheral health units, without facilities for intravenous treatment
• might prevent potentially life-threatening delays in accessing effective anti-malarial treatment.
Uphill struggle – malaria control in Kenya’s highlands

Highland locations in east Africa are prone to malaria epidemics. Transmission rates are low, with big variations within and between years. The risk of malaria is equal across age groups as people have little or no immunity. But does every household have a similar risk?

Malaria risk within a geographical area depends on mosquito distribution, human contact with mosquitoes and human risk factors. Risk factors identified for malaria include distance to known mosquito breeding sites, household construction and crowding, and personal protection measures against mosquito biting. These in turn are influenced by the environmental landscape and socio-economic status. Researchers from London School of Hygiene and Tropical Medicine investigated the impact of some of these factors on malaria risk during a recent epidemic in the highlands of Nandi District, Western Kenya.

Through active case surveillance in three schools for ten weeks during a malaria outbreak, researchers found 129 cases which were matched to 155 controls. Analysis of human, household and environmental factors revealed that:

- Risk of malaria is higher in children who are underweight. This may be a biological effect or a marker for another socio-economic difference. There is no link between risk of malaria and stunting (chronic malnutrition).
- More malaria cases occur at altitudes below 1750 m. Altitude is linked to differences in temperature and availability of temporary freshwater pools for mosquito breeding.
- Malaria is less common in household of higher socio-economic status or where drugs are kept at home.
- Neither age nor sex is a risk factor.
- Differences in the construction or smokiness of a child’s room are not linked to risk of malaria. However, there is relatively little variation in house construction in the study area.
- Malaria risk seems to be unrelated to use of personal protection, but this is probably because use of bed nets and insect repellents is very low.

The researchers recommend that access to quick and effective treatment and targeted mosquito control, including residual house spraying, remain the priorities for effective malaria control in highland areas. Effective control requires good knowledge of risk patterns over time as well as space. Appropriate tools for epidemic prediction and early detection will be vital to appropriately target malaria interventions.

Contributor(s): Simon Brooker, Sian Clarke and Jonathan Cox
Further Information: Simon Brooker, Department of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, UK. Email simon.brooker@lshtm.ac.uk. Jonathan Cox, London School of Hygiene and Tropical Medicine. Email jonathan.cox@lshtm.ac.uk
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Fighting blindness: trachoma in Ethiopian children

Trachoma is the number one infectious cause of blindness worldwide. Globally it has blinded around six million people and another 150 million people have the disease. Blindness results from repeated episodes of active trachoma, which usually occur in childhood. In some areas of Ethiopia over half of young children have the disease.
Trachoma is linked with poverty as the presence of flies, poor sanitation and a shortage of water in the home all contribute to transmission of the disease. In 1997 the World Health Organisation launched a programme to eliminate trachoma. The programme is based on the SAFE strategy which has four elements - surgery, antibiotics, face washing and environmental sanitation. The Institute of Child Health, London, looked at levels of trachoma in children, aged 3 to 9 years, in 40 communities in Ethiopia in 2002 before the SAFE initiative was due to be launched there.

The study found that 72% of children had active trachoma. The number of children with trachoma fell as they grew older but by the age of nine, 20% of the children had corneal scarring caused by the disease. Sanitation in many of the homes was poor:

- Only 14% had a pit latrine while a quarter of families defecated in the back garden close to the home.
- Almost half of families brought their animals into the home at night.
- 40% of families took more than an hour to fetch water for household use; for 10% of families it took more than two hours to fetch water.
- The houses surrounded by the most flies were nine times more likely to have a child suffering from trachoma than the homes with no flies.
- Children with clean hair and faces were less likely to have trachoma, while children with discharge and flies in their eyes were more likely to have the disease.

The number of flies around the home is linked to several factors: the way rubbish is disposed of, how close the defecation site is to the home and how close to the home the cows are kept. The study found that keeping the home and the children clean and disposing of faeces in a hygienic way made a significant difference to the likelihood of the children becoming infected with trachoma.

The study recommends that families are educated on the causes of infection so that they take the following steps:

- Defecation sites need to be moved away from the home.
- Animals need to be moved further away from where the family sleeps.
- Rubbish disposal needs to be improved.

In addition:

- Basic water supply and sanitation need to be improved to help control all infectious diseases.
- In areas with such high levels of disease it may be most effective to give all young children oral antibiotics.
- The SAFE campaign to eliminate trachoma needs to be flexible, to adapt to regional differences.

Contributor(s): Phillippa Cumberland, Girum Hailu, Jim Todd
Further information: Phillippa Cumberland, Centre of Paediatric Epidemiology and Biostatistics, Institute of Child Health, 30, Guildford Street, London WC1N 1EH, UK. Tel +44 (0) 20 7813 8396. Fax +44 (0) 20 7905 2381.
Email p.cumberland@ich.ucl.ac.uk
Source: ‘Active trachoma in children aged three to nine years in rural communities in Ethiopia: prevalence, indicators and risk factors’, Transactions of the Royal Society of Tropical Medicine and Hygiene 99: 120-127, by P. Cumberland et al, 2005
Funded by: The International Trachoma Initiative, Trachoma, Prevention of blindness, World Health Organisation
http://www.who.int/pbd/blindness/trachoma/en/

Social marketing increases mosquito net supply and demand in Tanzania

The private sector is an important source of public health products. However, private sellers may have different goals and motivations to the public health sector. Private providers may focus on more affluent, urban markets, even though the need is greater elsewhere. Social marketing may be one way of harnessing the private sector to achieve public health goals.

Researchers with the London School of Hygiene and Tropical Medicine and the Ifakara Health Research and Development Centre, Tanzania, report on a study of a social marketing initiative in Tanzania. The Kilombero and Ulanga Insecticide – Treated Net Project (KINET) used a social marketing approach to create a market for insecticide-treated nets (ITNs) for malaria control. The study addresses two questions. Firstly, how does social marketing affect the market for ITNs, in terms of
price and coverage, and secondly, how far did the added cost of the social marketing model result in greater levels of coverage and social equity, as compared to an unaided commercial model.

Typically social marketing works to boost both the demand and supply of a product or service, to shift from low to high coverage. Between 1996 and 2000 this approach was piloted for ITNs in the Kilombero and Ulanga districts of southern Tanzania. An unassisted commercial trade in nets operating in a neighbouring area was used as a control for the study.

The studies findings include:

- Supply improved in both the social marketing and commercial areas, but the increase was greater in the former.
- The mean number of nets per household was higher in the social marketing area.
- The price of nets fell in both areas.
- In the intervention area every village had at least one outlet for the social marketing of nets, while commercial sector suppliers in both areas remained concentrated in the main population centres.
- Improved knowledge and information about ITNs in the intervention area led to increased demand, while there was only limited change in demand in the control areas.
- Nets were more costly through social marketing but achieved higher overall coverage, with higher coverage within the poorest income group, pregnant women, children under five and those living on the periphery of villages.

Social marketing can effectively influence both supply and demand for ITNs whilst improving equity and coverage. Policy lessons include:

- This ITN model can be used to understand the consequences of the social marketing of other public health products.
- It is important to measure the impact of social marketing across a population and broken down by population group rather than through cruder measures of sales volume which do not show how far equity, coverage and other public health goals are achieved.
- The analysis contributes useful data on the costs of improving coverage across specific target groups. In this case these were low income groups, vulnerable groups and those living on the periphery of their villages.

The study contributes positive evidence on the usefulness of social marketing in the global policy context provided by the Roll Back Malaria strategic framework and other initiatives.

Contributors: Nassor Kikumbih, Kara Hanson, Anne Mills
Further information: Kara Hanson, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, UK Tel +44 (0) 20 7927 2267, Fax +44 (0) 20 7637 5391. Email kara.hanson@lshtm.ac.uk
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Protecting HIV-infected Zambian children against opportunistic infections

Evidence suggests that co-trimoxazole can help prevent bacterial infections in HIV-infected children. The drug, which is cheap and widely available, has been recommended for infants of HIV-positive mothers and for certain HIV-positive children after infancy. How effective is this drug when bacterial resistance is high?

The Children with HIV Antibiotic Prophylaxis (CHAP) trial was designed to assess how effective co-trimoxazole is in preventing opportunistic infections and death in HIV-infected children in areas where drug resistance is high. The research team conducted a trial in children aged 1 to 14 in Zambia. Children were randomly assigned to one of two groups. Those in one group received co-trimoxazole, those in the other, the control group, were given a placebo. During the trial the children were regularly assessed. Blood tests were conducted at weeks 2, 12, 24 and every 24 weeks thereafter. The trial began in 2001 and ran until the data and safety monitoring committee recommended that it be discontinued in October 2003. By that time it was clear that the group receiving co-trimoxazole were gaining a substantial health benefit.
The authors report the following research findings:

- **Co-trimoxazole reduced mortality by 43% and hospital admissions by 23% compared with the placebo.**
- The reduced mortality was seen across all age groups and regardless of the strength of a child’s immune system, and was sustained for more than 12 months.
- Co-trimoxazole produced no allergic reactions.
- Use of the drug over an extended period of time does not appear to reduce its effectiveness.
- HIV-negative children in the trial had weaker immune systems than those of comparable children in industrialised countries.

The results indicate that the drug may still be effective as a preventive treatment even where high levels of resistance have been found in laboratory tests.

**Policy implications of this study include:**

- Immune system level thresholds for clinical care in industrialised countries are not necessarily appropriate for children in poorer countries.
- All children in Africa with clinical symptoms of HIV infection should receive co-trimoxazole regardless of their age or level of immunity.
- **Clinical care with co-trimoxazole and nutritional support should be given regardless of known levels of resistance to the drug.**

The costs and benefits of the approach advocated here must be assessed through economic analyses. It is not yet known whether co-trimoxazole will also benefit children receiving anti-retroviral drugs in settings where there are high levels of bacterial infection.

**Contributors:** Chifumbe Chintu, Ganapati J. Bhat, Diana M. Gibb

**Further information:** Diana M. Gibb, Medical Research Council Clinical Trials Unit, 222 Euston Rd, London NW1 2DA, UK

**Email:** d.gibb@ctu.mrc.ac.uk


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**Galvanising policy-makers to tackle zinc deficiency**

**Zinc deficiency is one of the top ten contributors to the disease burden in developing countries with high mortality. South-East Asia and sub-Saharan Africa are the worst hit. How should policy-makers tackle this problem?**

Researchers from the UK Institute of Child Health and UNICEF review current evidence on the public health uses of zinc. The balance of research suggests that:

- Zinc supplements improve the outcomes of children with diarrhoea.
- Regular zinc supplements can also prevent childhood diseases, including diarrhoea, coughs, pneumonia and malaria.
- Supplements may also prevent growth failure. This effect is greatest in those with low birth weights, stunted growth or zinc deficiency.

Until recently the World Health Organisation had only recommended increasing zinc intakes as part of food mixes to treat severe malnutrition. The WHO and UNICEF now recommend a **20 mg soluble zinc tablet for daily use in diarrhoea treatment** and propose to distribute blister packs of ten tablets. The most effective delivery system is not yet clear, however, but this approach seems better than adding zinc to oral rehydration solution (ORS) mixes, which is an untested option for diarrhoea treatment, and many countries promote the use of home made ORS. However, health services already find it difficult to achieve and maintain high levels of coverage of current treatments, such as ORS, and will face similar challenges distributing zinc.

Health planners have three options for providing zinc on a regular basis:

- supplementation
- fortification – the addition of zinc to foods
- increasing the intake of foods rich in zinc.
The researchers warn that zinc should not be promoted as a single supplement for prevention, as many people in developing countries suffer from multiple micronutrient deficiencies. Plus, zinc, iron, vitamin A and copper all potentially interact when used as single supplements. Trials are underway to test the usefulness of a combined micronutrient supplement during infancy, and for mothers during pregnancy and lactation, which could replace currently recommended iron and folate tablets used in the treatment of anaemia.

So far, experience of fortification in developing countries is limited to iodised salt and iron-fortified wheat flour and the risks of interactions between micronutrients in fortified food are unknown. Developing zinc fortification in countries with the highest mortalities will require innovative strategies, including small-scale community approaches.

The most sustainable long-term approach would be to improve people’s diets. **High protein foods tend to contain the most zinc, with greater availability in animal than plant foods.** Plant breeding programmes are trying to increase zinc concentrations and availability in cereals. Health educators can encourage household cooking methods that increase zinc availability in grains and beans, including sprouting, fermenting and soaking. However, this complex behaviour change will take time.

Overall, the researchers warn against overloading health systems with a new single nutrient programme to provide zinc. Instead, it should be delivered through existing channels and integrated into existing programmes, such as those for diarrhoeal disease or anaemia control.

**Contributor(s):** Roger Shrimpton, Rainer Gross, Ian Darnton-Hill and Mark Young

**Further information:** Roger Shrimpton, Centre for International Child Health, Institute of Child Health, London WC1N 1EH, UK. Email: Roger.Shrimpton@ich.ucl.ac.uk

**Source:** ‘Zinc deficiency: what are the most appropriate interventions?’, British Medical Journal 330: 347-349, by R. Shrimpton, R. Gross, I. Darnton-Hill and M. Young, 2005

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**Improving paediatric care in Kenyan hospitals**

Effective paediatric care requires a combination of skilled and motivated staff and the availability of equipment and supplies. A study of paediatric care in Kenyan district hospitals finds some workers committed to their role and interested in improving the quality of care. However, factors including the absence of guidelines and standards, and shortages of equipment do not encourage change are barriers to improvement.

In Kenya, district hospitals play a critical role in delivering the paediatric services that can improve child survival. The Millennium Development Goals (MDGs) include the reduction of child mortality by two thirds by 2015. Achieving this goal in Kenya will only be possible if paediatric care is readily available throughout the country in line with currently recommended standards. Researchers from the Kenya Medical Research Institute/Wellcome Trust Collaborative Programme in partnership with the Ministry of Health and Kenyan Medical Schools carried out a survey of Kenyan district hospitals to understand the country’s capacity for providing inpatient paediatric care. They visited 14 hospitals from 7 out of the 8 provinces in the country. They recorded the levels of resources and workloads in each hospital. In addition, they interviewed health workers and families of children receiving care.

The researchers found that hospital performance is influenced by many factors, including:

- levels of activity
- available human resources
- the staffs’ perceived priorities.

Levels of paediatric admissions varied as much as tenfold between hospitals, while provision of staff and resources did not reflect such large differences. Furthermore, **senior medical and nursing staff often considered paediatrics to be a low priority.** Further findings include:

- Basic equipment, like oxygen and laboratory services, is often unavailable. Some laboratory services, such as haemoglobin measurement, are not always used appropriately even when they are available.
- Staff report frustration at the limited amounts of equipment and supplies whilst trying to do their jobs as best as they can.
In the current context staff do not seem to think that the education or counselling of the families of hospitalised children is a major part of their duties. Families of hospitalised children report most disappointment with delays in receiving attention. They also dislike the formal and hidden charges that are made for treatment. However, they tend to be generally happy with the levels and quality of care received.

In summary, the study finds a picture of paediatric service provision that includes poor human resource management, deficiencies in the standards of provision of care and limited resources. The researchers suggest:

- Maximising the effectiveness of motivated individuals so that their technical and leadership skills are put to best use.
- Improving the quality of information that exists on paediatric care needs, resources and staff capacity.
- Implementing minimum standards of paediatric care in hospitals.
- Improving the quality of care provided.
- Reducing or eliminating the financial barriers that affect access to paediatric care.

Contributors: Mike English, Fabian Esamai and Aggrey Wasunna
Contact: Mike English, KEMRI/Wellcome Trust Collaborative ProgrammePO Box 43640, 00100 GPO, Nairobi, Kenya
Tel +254 2 720163. Fax +254 2 711673. Email menglish@wtnairobi.mimcom.net
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Low cost life saver: child health care in Tanzania

The Integrated Management of Childhood Illness (IMCI) strategy for improving child health has been adopted in many countries. What impact has it had so far in Tanzania? And is it more cost-effective than conventional approaches to child health care?

A World Health Organisation multi-country evaluation of IMCI was set up to identify information to help improve the delivery of the strategy. In Tanzania, the study focuses on two rural districts where facility-based components of IMCI are being implemented. Two neighbouring districts where IMCI was not implemented were included in the study as comparisons. The researchers compared, in both sets of facilities:

- the care given to sick children attending the facilities
- the health nutritional status of children in the community
- households’ responses to their sick children
- and child survival over the period from 1997 to 2002.

They also identified other factors that might influence child survival rates, and collected detailed cost of care data at national, district, hospital, primary care facility and household levels. In the two intervention districts, Morogoro and Rufiji, the council health management teams (CHMTs) gave high priority to the introduction of IMCI, partly due to technical and financial support from the Tanzania Essential Health Interventions Project. By mid-2000, they reported that over 80 percent of health workers managing children in primary care facilities had received an 11-day training in IMCI, with about 30% of training time spent in clinical practice.

Further research findings include:

- After the end of the period of phasing in IMCI, more than twice as many children were checked for cough, diarrhoea and fever, and sick children were more likely to be correctly classified and drugs correctly prescribed with IMCI than in comparison districts.
- During the phase-in period, the death rate for children under the age of five was virtually identical in the IMCI and comparison districts. Over the following two years it was 13% lower in the IMCI districts.
- Other factors, such as the use of mosquito nets or vitamin A supplements, were either equally prevalent or more prevalent in comparison than in IMCI districts, and so cannot account for the greater reduction in mortality in the IMCI districts.
The economic costs of IMCI per child were similar to or less than those of conventional child health care.

IMCI is affordable. District health management teams in Tanzania can implement IMCI using their existing health funds.

The evaluation shows that, with the use of IMCI, case management has improved and mortality rates are lower than in comparison areas. Facility-based IMCI is good value for money, and these findings support the widespread implementation of this intervention in Tanzania. No countries in Africa have yet implemented IMCI widely enough to show clear measurable impacts on mortality at national level. The findings suggest that facility-based IMCI can help to reduce child mortality within existing health budgets.

Contributor and Contact: Joanna Armstrong Schellenberg, London School of Hygiene and Tropical Medicine, 50 Bedford Square, London, WC1B 3DP, UK. Tel: +44 (0) 20 7299 4720. Email: dajobelo@aol.com


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Prescribing better health: utilising pharmacists in Ghana

Community pharmacies in developing countries have great untapped potential for improving people’s health through prevention and treatment. People in remote regions of Ghana often do not attend health clinics. They buy drugs from peddlers who have no medical training. A trained pharmacist can advise on how to treat common conditions and provide the right drugs in areas where health clinic services are limited.

The University of London's School of Pharmacy reviewed existing literature to identify ways that pharmacies could be better used as part of the public health system in Ghana. Patients often see a doctor at a health clinic who does not speak the local language. In comparison, chemist shops are open for long hours, offer quick and cheap treatment and the chemists – who have no formal training - are friendly local people who are part of the community. Pharmacies appear to be a valuable and underused resource for improving the nation’s health.

The following findings emerged from the review:

- Most pharmacists work in or near the cities. 837 of the country’s 964 pharmacies are based in the capital city Accra or in the Ashanti Region. Many people living in rural areas do not have access to a pharmacy.
- Many pharmacies do not have professional staff and the role of pharmacist is frequently taken on by someone with no formal training.
- When pharmacists are not available people buy their drugs from peddlers or licensed chemical sellers. Chemical sellers’ main objective is to make money, not to provide the most cost-effective treatment for the patient.
- The people often lack an understanding of the causes of their illnesses; many people did not know the role mosquitoes play in causing malaria.

Since 1992, people in Ghana have had to pay for their own drugs and other treatments. This has negatively impacted upon the health of poor sections of society. Many poor people do not visit a doctor because of the cost of the consultation. Some people do not follow their correct prescribed dosages because they want to make the drugs last longer. In these situations, the role of the pharmacist is crucial.

The review recommends the following:

- Current reforms in the Ghanaian health system should expand pharmacy services so they are available to more people. Pharmacists’ fees could be lowered in remote areas to encourage them to set up business in underserved parts of the country.
- Pharmacies should be included as a part of the national health service. National health programmes could use pharmacies to help educate communities on particular health issues.
• Every pharmacy should have a qualified pharmacist to give people correct advice, for example, on treating malaria or diarrhoea. They could also advise poorer patients on the most cost-effective way of tackling a health problem.
• Pharmacy assistants should be given training to give advice to patients when the pharmacist is not present.
• Services must be sensitive to local attitudes and needs. They should remain informal and approachable.

Contributors and Contact: Felicity Smith, Department of Practice and Policy, School of Pharmacy, University of London
29-39 Brunswick Square, London WC1N 1AX, UK. Email: felicity.smith@ulsop.ac.uk
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One hit wonder: single dose azithromycin could eliminate trachoma

Trachoma, caused by the bacterium *Chlamydia trachomatis*, is the most common infectious cause of blindness. To prevent trachoma blindness, health programmes in Tanzania and elsewhere currently offer an annual dose of the antibiotic azithromycin to everyone in areas where at least 20 percent of children have active disease. Is this the most effective and efficient dosing strategy?

Researchers from the London School of Hygiene & Tropical Medicine collected eye swabs to test for *C. trachomatis* infection before and 2, 6, 12, 18 and 24 months after mass treatment in Kahe Mpya village, Rombo District, Tanzania. Nearly a thousand residents received a single dose of azithromycin (or a course of tetracycline eye ointment). At 6, 12 and 18 months, researchers gave tetracycline eye ointment to anyone with clinically active trachoma.

Results showed that:
• The prevalence of infection fell from 9.5% at baseline, to 2.1% at two months, 0.9% at 12 months, and 0.1% at 24 months. The most intense infections were found in the youngest age groups.
• There were few new infections after mass treatment. At each time point, over 90% of the total community burden of infection was among people who were positive the previous time they were tested.
• At baseline, 30.6% of 1 to 9 years old children had trachomatous inflammation-follicular (TF) - the first sign of trachoma where the inner lining of the eyelid has small white dots called follicles. This index was 13.2% at two months and 16.3% at 24 months. The World Health Organisation recommends mass antibiotic treatment wherever the prevalence of TF in 1 to 9 year olds is 10% or greater.

These results suggest that one round of very high coverage mass treatment with azithromycin, perhaps followed by use of tetracycline eye ointment for active disease, can interrupt the transmission of *C. trachomatis* eye infections. Annual azithromycin treatment may not be necessary. The researchers examine other implications for practice in the field:
• Children under 10 years old accounted for the vast majority of the total burden of ocular chlamydial infection at each time point. Achieving high antibiotic coverage in this age group is therefore particularly important.
• The coverage of antibiotics was very high (over 97%) in this study. Routine antibiotic distribution in community-based trachoma control programmes usually covers only 80 to 90% of people. Research is needed to uncover reasons for this incomplete coverage.
• Screening and distribution of tetracycline to people with active disease following mass treatment may have helped to achieve these dramatic results, though analyses suggest that tetracycline treatment was not particularly effective.
• The fall in the prevalence of TF after treatment did not match the dramatic fall in the prevalence and intensity of *C. trachomatis* infection. An accurate, cheap, rapid field test for *C. trachomatis* is needed to assess prevalence, to help programme managers direct antibiotics to the neediest communities and to measure progress towards the elimination of trachoma.
Contributor and Further information from Anthony Solomon, Clinical Research Unit, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, UK. Email anthony.solomon@lshtm.ac.uk


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CAUTION

Every effort has been made to ensure that drug doses quoted in all the papers in this Newsletter are correct. However the reader is advised always to check the doses before prescriptions are made. Unless otherwise stated the doses quoted are for adults.