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Doctors on Move: Providing health care for rural communities in South Sudan

PLUS:

- Clinical manifestations of pulmonary TB
- Poisoning by anti-malarials
- Increasing burden of DM in Kenya

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Cover photo: *Dr. Fredrick Khamis Lt, operating on a huge intra-abdominal hydatid cyst during a Doctors on Move Medical Camp in Torit, March 2013 (credit Doctors on Move).*

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Reviewers are listed on the website

Learning clinical practice

How do you learn clinical practice? What should we do to ensure that the right numbers of skilled, safe doctors are in the right places to provide the healthcare that the people of South Sudan need?

Clinical practice is learnt from a balance of teaching and experience, and the most valuable experience for the young doctor is challenging experience. By its very nature, this is stressful. Workload is significant – there is a difference between coping in a busy clinic and being overwhelmed. But other factors are also important. Young doctors need to be committed to mastering difficult tasks, and sustaining their effort and confidence in difficult conditions. To work safely they need to work with more experienced colleagues, who can provide supervision, feedback, support and encouragement. To ensure they get the right experience they need to work to a curriculum, and within a programme, so that their learning can be managed.

Postgraduate medical education (PGME) should offer young doctors teaching, clinical experience, supervision and support.

So, postgraduate medical education (PGME) should offer young doctors teaching, clinical experience, supervision and support. It should be able to assess their progress, and to recognise when they are ready for safe, independent practice. Senior doctors must lead and strive to improve medical education. In their turn, junior doctors must be committed not only to learning their profession, but also to delivering healthcare to the people of South Sudan when and where it is needed.

The new Basic Medical Training (BMT) curriculum, which was launched in April 2013, offers young doctors a programme of teaching and clinical work experience leading towards safe, independent practice. Its launch provides a framework for the future development of PGME in South Sudan.

The initiative is being supported from the UK with clinical and educational expertise, but central to its success are the doctors of South Sudan, both senior and junior, whose leadership, commitment and skills are critical.

There is much still to do, but the prize is significant: effective postgraduate medical education in South Sudan, and improved healthcare for the people of South Sudan. Or, to paraphrase Derek Bok (former president of Harvard University), if you think education is hard work, try working without it.

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Clinical manifestations of pulmonary and extra-pulmonary tuberculosis

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The clinical manifestations of tuberculosis are dependent on a number of factors: age, immune status, co-existing diseases, immunization status to the bacillus Calmette-Guerin (BCG); virulence of the infecting organism and host-microbe interaction.

Before the advent of the HIV epidemic, approximately 85% of reported tuberculosis cases were pulmonary only, with the remaining 15% being extra-pulmonary or both pulmonary and extra-pulmonary sites [1]. One large retrospective study [2] of tuberculosis in patients with advanced HIV infection reported:

- Pulmonary involvement alone 38%,
- Extrapulmonary sites alone 30%,
- Both pulmonary and nonpulmonary 32%

Extrapulmonary involvement tends to increase in frequency with worsening immune compromise [3].

A. Systemic effects of tuberculosis

Tuberculosis involving any site may produce systemic (i.e. not organ specific) symptoms. The frequency of fever ranges from 37 to 80% [4, 5]. Loss of appetite, weight loss, weakness, night sweats, and malaise are also common [4].

The most common haematologic manifestations are increases in the peripheral blood polymophonuclear leukocyte count and anaemia. Each occurs in approximately 10% of patients with apparently localized tuberculosis [6, 7]. In some instances, anaemia or pancytopenia may follow direct involvement of the bone marrow.

Hyponatremia, which may occur in 11% of patients [8], is caused by the production of an antidiuretic hormone-like substance in affected lung tissue [9].

Tuberculosis is associated often with other serious disorders including:

- HIV infection,
- alcoholism,
- drug abuse
- chronic renal failure,
- diabetes mellitus,
- neoplastic diseases.

The clinical features of these diseases and complications may modify those of tuberculosis and so hinder diagnosis [10].

B. Pulmonary tuberculosis

Clinical features

Cough is the commonest presentation. Initially it may be nonproductive, but as inflammation and tissue necrosis ensue, sputum is produced. Haemoptysis is occasionally a presenting symptom but usually results from previous disease and may not indicate active tuberculosis. It may arise from tuberculous bronchiectasis, rupture of a dilated vessel in the wall of a cavity (Rasmussen's aneurysm), bacterial or fungal infection (especially Aspergillus mycetoma) in a cavity or erosion into an airway (broncholithiasis). Inflammation of the lung parenchyma adjacent to a pleural surface may cause pleuritic pain. Dyspnoea is unusual unless there is extensive disease and may result in respiratory failure [11, 12]. Rales or crackles may be heard in the area of involvement and bronchial breathing indicating consolidation.

Radiographic features

Chest X-ray abnormalities are nearly always found. However in the presence of HIV infection, a normal X-ray is more common. In primary tuberculosis the process is generally seen as a middle or lower lung zone infiltrate, often with associated ipsilateral hilar adenopathy. Compression of airways by enlarged lymph nodes may cause atelectasis and is more common in children. If the primary process persists beyond the time when specific cell-mediated immunity develops, cavitation may occur ("progressive primary" tuberculosis) [13].

Tuberculosis developing as a result of endogenous reactivation of latent infection usually causes abnormalities in the upper lobes and cavitation is common (See figure 1). In the immunocompetent adult intrathoracic adenopathy is uncommon but may occur with primary infection. In contrast, intrathoracic or extrathoracic lymphatic involvement is quite frequent in children. As tuberculosis progresses, infected material may be spread via the airways into other parts of the lungs, causing a patchy bronchopneumonia. Erosion of a parenchymal focus of tuberculosis into a blood or lymph vessel may

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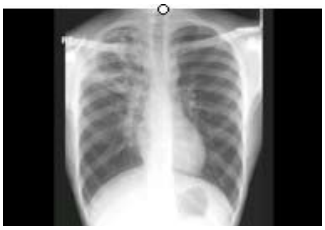


Figure 1. Chest radiograph Right upper zone cavity

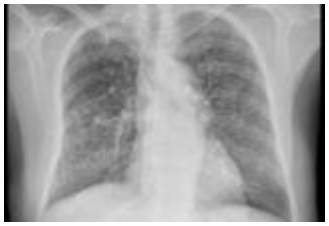


Figure 2. Chest radiograph Miliary tuberculosis

lead to dissemination of the organism and a "miliary" (evenly distributed small nodules) pattern on the chest X-ray see figure 2). Disseminated tuberculosis can occur in primary disease and may be an early complication of tuberculosis in children (both immunocompetent and immunocompromised). When it occurs in children, it is most common in infants and the very young (<5 year).

Healed tuberculosis presents a different radiologic appearance. Dense pulmonary nodules, with or without visible calcification, may be seen in the hilar area or upper lobes. Bronchiectasis of the upper lobes sometimes occurs from previous pulmonary tuberculosis. Pleural scarring may also appear [13, 14].

In patients with HIV infection, the nature of the radiographic findings depends to a certain extent on the degree of immunocompromise. Tuberculosis that occurs relatively early in the course of HIV infection tends to have the typical radiographic findings [15, 16]. With more advanced HIV disease the findings become more "atypical" - cavitation is uncommon, and lower lung zone or diffuse infiltrates and intrathoracic adenopathy are frequent.

C. Extrapulmonary tuberculosis

Extrapulmonary tuberculosis usually presents a more difficult diagnostic problem. It is less common and, therefore, less familiar to most clinicians [17, 18].

Extrapulmonary tuberculosis in HIV-infected patients. The high frequency is related to the failure of the immune response to contain M. tuberculosis, thereby enabling haematogenous dissemination and subsequent involvement of single or multiple non-pulmonary sites.

Disseminated tuberculosis occurs because of the inadequacy of host defenses in containing the infection. The organism proliferates and disseminates throughout the body ("miliary" tuberculosis"). The presenting features are generally nonspecific and characterized by the following systemic effects [19, 22]:

- fever,
- weight loss,
- night sweats,
- anorexia,
- weakness.

Physical findings are also variable and in descending order of frequency are:

- fever,
- wasting,
- hepatomegaly,
- pulmonary findings,
- lymphadenopathy,
- splenomegaly.

A finding strongly suggestive of disseminated tuberculosis is the choroidal tubercle, a granuloma in the retinal choroid [23].The chest X-ray is abnormal in most patients at the time of diagnosis approximately 85% of patients have the characteristic radiographic findings of miliary tuberculosis. Other abnormalities may be present including upper lobe infiltrates with or without cavitation, pleural effusion and pericardial effusion.

Lymph node tuberculosis. Tuberculous lymphadenitis usually presents as painless swelling of one or more lymph nodes. The nodes most commonly involved are those of the posterior or anterior cervical chain or those in the supraclavicular fossa. Frequently the process is bilateral and other noncontiguous groups of nodes can be involved [24]. With continuing disease the nodes may become matted and the overlying skin inflamed. Rupture of the node may result in formation of a sinus tract, which is slow to heal. Intrathoracic adenopathy may compress bronchi, causing atelectasis leading to lung infection and perhaps bronchiectasis being particularly common in children.

Pleural tuberculosis. There are two mechanisms by which the pleural space becomes involved in tuberculosis. Early on a few organisms may gain access to the pleural space and, in the presence of cell-mediated immunity, cause a hypersensitivity response [25, 26]. Commonly, this form of tuberculous pleuritis goes unnoticed, and the process resolves spontaneously. In some this involvement of the pleura is manifested as an acute illness with fever and pleuritic pain. If the effusion is large, dyspnoea may occur but effusions generally are small and rarely bilateral. In approximately 30% of patients there is no radiographic evidence of involvement of the lung parenchyma even though parenchymal disease is nearly always present [27, 28].

The second variety of tuberculous involvement of the pleura is empyema. This is much less common than tuberculous pleurisy with effusion and results from a large number of organisms spilling into the pleural space, usually from rupture of a cavity or an adjacent parenchymal focus via a bronchopleural fistula [29]. A tuberculous empyema is usually associated with evident pulmonary parenchymal disease on chest X-ray and air may be seen in the pleural space.

Genitourinary tuberculosis tends to present with local symptoms with systemic symptoms being less common [30, 31]. Dysuria, hematuria and frequency of micturition are common. Flank pain may be noted. However, often there is advanced renal destruction by the time of diagnosis [32]. In women genital involvement is more common without renal tuberculosis and may present with pelvic pain, menstrual irregularities and infertility [31]. In men a painless or only slightly painful scrotal mass is probably the most common presenting symptom of genital involvement.

Symptoms of prostatitis, orchitis or epididymitis may also occur [30]. The finding of pyuria in an acid urine with no bacterial organisms isolated from a routine culture should prompt the possibility of an evaluation for tuberculosis by culturing the urine for mycobacteria. Acid-fast bacillus (AFB) smears of the urine should be done, but the yield is low. The suspicion of genitourinary tuberculosis should be heightened by the presence of abnormalities on the chest film. In most series, approximately 40% to 75% of patients with genitourinary tuberculosis have chest radiographic abnormalities; although in many these may be the result of previous, not current, tuberculosis [30, 31].

Skeletal tuberculosis. The usual presenting symptom is pain [33]. Swelling of the involved joint may be noted with limitation of motion and occasionally sinus tracts. Systemic symptoms of infection are not common. Since the epiphyseal region of bones is highly vascularized in infants and young children, bone involvement is much more common in these groups. Approximately 1% of young children with tuberculosis will develop a bony focus [34]. Delay in diagnosis can be especially catastrophic in vertebral tuberculosis, where compression of the spinal cord may cause severe and irreversible neurologic sequelae, including paraplegia. Early in the process the only abnormality noted may be soft tissue swelling. The initial changes may be particularly difficult to detect by X-rays of the spine, but in advanced cases a fusiform paravertebral abscess is visible. Computed tomographic (CT) scans and magnetic resonance imaging (MRI) of are more sensitive and should be obtained when there is a high index of suspicion of tuberculosis - see figure 3.

Bone biopsy may be needed to obtain diagnostic material if the chest radiograph is normal and the sputum smear and culture are negative.

Central nervous system tuberculosis. Meningitis can result from direct meningeal seeding and proliferation during a tuberculous bacillaemia either at the time of initial infection or at the time of breakdown of an old pulmonary focus. It may result from breakdown of an old parameningeal focus with rupture into the subarachnoid space. The consequences of subarachnoid space contamination are diffuse meningitis or localized arteritis. In tuberculous meningitis the process is located primarily at the base of the brain (35).

Symptoms include those related to cranial nerve involvement as well as headache, decreased level of consciousness and neck stiffness. In most series more than 50% of patients with meningitis have abnormalities on chest film, consistent with an old or current tuberculous process and often miliary tuberculosis.

Physical findings and screening laboratory studies are not particularly helpful in establishing a diagnosis. In the presence of meningeal signs on physical examination, lumbar puncture is usually the next step. If there are focal findings on physical examination or if there are suggestions of raised intracranial pressure, a CT scan of the head, if it can be obtained expeditiously, should be performed before the lumbar puncture. With meningitis, the scan may be normal but can also show diffuse oedema or obstructive hydrocephalus. The other major central nervous system form of tuberculosis, the tuberculoma, presents a more subtle clinical picture [36]. Tuberculomas are generally seen as ring-enhancing mass lesions. The cerebrospinal fluid is usually normal. The diagnosis is established by CT or MRI and subsequent resection, biopsy or aspiration of any ring-enhancing lesion (See figure 4).

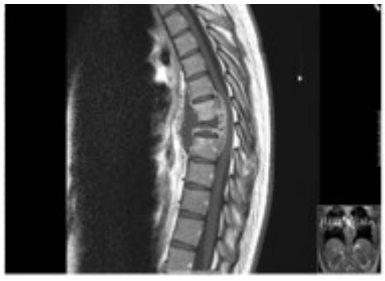
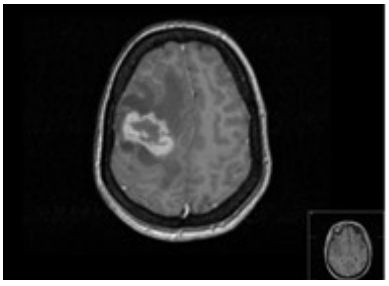


Figure 3. Magnetic resonance image (MRI) showing destruction of T12/L1 vertebrae

Figure 4. MRI head: Tuberculoma with surrounding oedema (differential diagnosis cerebral toxoplasmosis, lymphoma



Abdominal tuberculosis. Tuberculosis can involve any intra-abdominal organ and the peritoneum. The clinical manifestations depend on the areas of involvement. Tuberculosis may occur in any location from the mouth to the anus, although lesions proximal to the terminal ileum are unusual. The most common sites of involvement are the terminal ileum and caecum [37]. In the terminal ileum or caecum the most common manifestations are pain, which may be misdiagnosed as appendicitis or intestinal obstruction. A palpable mass may be noted that, together with the appearance of the abnormality on barium enema or small bowel films can easily be mistaken for a carcinoma. Rectal lesions usually present as anal fissures, fistulae or perirectal abscesses.

Tuberculous peritonitis frequently presents with pain often accompanied by abdominal swelling [37-40]. Fever, weight loss, and anorexia are also common. The combination of fever and abdominal tenderness in a person with ascites should always prompt an evaluation for intra-abdominal infection and a paracentesis should be performed. However, this is often not diagnostic, and laparoscopy with biopsy is recommended if tuberculosis is suspected.

Pericardial tuberculosis. The symptoms, physical findings, and laboratory abnormalities may be the result of either the infectious process itself or the pericardial inflammation causing pain, effusion and eventually haemodynamic effects. The systemic symptoms produced by the infection are nonspecific. Fever, weight loss and night sweats are common [41-43]. Cardiopulmonary symptoms tend to occur later and include cough, dyspnea, orthopnea, ankle swelling and chest pain. The chest pain may occasionally mimic angina but usually is described as being dull, aching, and affected by position and inspiration. Apart from fever, the most common physical findings are those caused by the pericardial fluid or fibrosis–cardiac tamponade or constriction. In the absence of concurrent extracardiac tuberculosis, diagnosis of pericardial tuberculosis requires aspiration of pericardial fluid or, usually, pericardial biopsy.

All figures from the author.

References

1. Farer L. S., Lowell L. M., Meador M. P. Extrapulmonary tuberculosis in the United States. *Am. J. Epidemiol.* 1979;109:205–217.
2. Small P. M., Schecter G. F., Goodman P. C., Sande M. A., Chaisson R. E., Hopewell P. C. Treatment of tuberculosis in patients with advanced human immunodeficiency virus infection. *N. Engl. J. Med.* 1991;324:289–294.
3. Jones B., Young S., Antoniskis D., Davidson P., Kramer F., Barnes P. Relationship of the manifestations of tuberculosis to CD4 cell counts in patients with human immunodeficiency virus infection. *Am. Rev. Respir. Dis.* 1993;148:1292–1297.
4. Arango L., Brewin A. W., Murray J. F. The spectrum of tuberculosis as currently seen in a metropolitan hospital. *Am. Rev. Respir. Dis.* 1978;108:805–812.
5. Kiblawi S. S. O., Jay S. J., Stonehill R. B., Norton J. Fever response of patients on therapy for pulmonary tuberculosis. *Am. Rev. Respir. Dis.* 1981;123:20–24.
6. Cameron S. J.Tuberculosis and the blood. Tubercle 1974;55:55–72.
7. Carr W. P. J., Kyle R. A., Bowie E. J. W. Hematologic changes in tuberculosis. *Am. J. Med. Sci.* 1964;248:709–714.
8. Chung D. K., Hubbard W. W. Hyponatremia in untreated active pulmonary tuberculosis. *Am. Rev. Repir. Dis.* 1969;99:592–597.
9. Vorken H., Massy S. G., Fallat R., Kaplan L., Kleeman C. R. Antidiuretic principle in tuberculous lung tissue of a patient with pulmonary tuberculosis and hyponatremia. *Ann. Intern. Med.* 1970;72:383–387.
10. Kramer F. T., Modelewsky A. R., Walinay A. R., Leedom J. M., Barnes P. F. Delayed diagnosis of tuberculosis in patients with human immunodeficiency virus infection. *Am. J. Med.* 1990;89:451–456.
11. Huseby J. S., Hudson L. D. Miliary tuberculosis and the adult respiratory distress syndrome. *Ann. Intern. Med.* 1976;85:609–611.
12. Grzybowski S., Fishault H., Rowe J., Brown A. Tuberculosis among patients with various radiologic abnormalities followed by the chest clinic service. *Am. Rev. Respir. Dis.* 1971;104:605–608.
13. Grzybowski S., Fishault H., Rowe J., Brown A. Tuberculosis among patients with various radiologic abnormalities followed by the chest clinic service. *Am. Rev. Respir. Dis.* 1971;104:605–608.
14. Stead W. W., Kerby G. R., Schlueter D. P., Jordahl C. W. The clinical spectrum of primary tuberculosis in adults: confusion with reinfection in the pathogenesis of chronic tuberculosis. *Ann. Intern. Med.* 1968;68:731–745.
15. Chaisson R. E., Schecter G. F., Theuer C. P., Rutherford G. W., Echenberg D. F., Hopewell P. C. Tuberculosis in patients with the acquired immunodeficiency syndrome: clinical features, response to therapy and survival. *Am. Rev. Respir. Dis.* 1987;136:570–574.
16. Pitchenik A. E., Rubinson H. A. The radiographic appearance of tuberculosis in patients with the acquired

immune deficiency syndrome (AIDS) and pre-AIDS. *Am. Rev. Respir. Dis.* 1985;131:393–396.

17. Alvarez S., McCabe W. R. Extrapulmonary tuberculosis revisited: a review of experience at Boston City and other hospitals. *Medicine* 1984;63:25–55.
18. Weir M. R., Thornton G. R. Extrapulmonary tuberculosis: experience of a community hospital and review of the literature. *Am. J. Med.* 1985;79:467–478.
19. Grieco M. H., Chmel H. Acute disseminated tuberculosis as a diagnostic problem. *Am. Rev. Respir. Dis.* 1974;109:554–560.
20. Munt P. W. Miliary tuberculosis in the chemotherapy era with a clinical review in 69 American adults. *Medicine* 1971;51:139–155.
21. Prout S., Benatar S. R. Disseminated tuberculosis: a study of 62 cases. *S. Afr. Med. J.* 1980;58:835–842.
22. Sahn S., Neff T. Miliary tuberculosis. *Am. J. Med.* 1974;56:495–505.
23. Massaro D., Katz S., Sachs M. Choroidal tubercles: a clue to hematogenous tuberculosis. *Ann. Intern. Med.* 1964;60:231–241.
24. Kent D. C. Tuberculous lymphadenitis: not a localized disease process. *Am. J. Med. Sci.* 1967;254:866–874.
25. Berger H. W., Mejia E. Tuberculous pleurisy. *Chest* 1973;63:88–92.
26. Ellner J. J. Pleural fluid and peripheral blood lymphocyte function in tuberculosis. *Ann. Intern. Med.* 1978;89:932–933.
27. Stead W. W., Eichenholtz A., Strauss H. K. Operative and pathologic findings in 24 patients with the syndrome of idiopathic pleurisy with effusion presumably tuberculous. *Am. Rev. Respir. Dis.* 1955;71:473–502.
28. Stead W. W., Eichenholtz A., Strauss H. K. Operative and pathologic findings in 24 patients with the syndrome of idiopathic pleurisy with effusion presumably tuberculous. *Am. Rev. Respir. Dis.* 1955;71:473–502.
29. Johnson T. M., McCann W., Davey W. Tuberculous bronchopleural fistula. *Am. Rev. Respir. Dis.* 1973;107:30–41.
30. Christensen W. I. Genitourinary tuberculosis: review of 102 cases. *Medicine* 1974;53:377–390.
31. Simon H. B., Weinstein A. J., Pasternak M. S., Swartz M. N., Lunz L. J. Genitourinary tuberculosis: clinical features in a general hospital. *Am. J. Med.* 1977;63:410–420.
32. Lattimer J. K. Renal tuberculosis. *N. Engl. J. Med.* 1965;273:208–211.
33. Berney S., Goldstein M., Bishko F. Clinical and diagnostic features of tuberculous arthritis. *Am. J. Med.* 1972;53:36–42.
34. Gutman L. Extrapulmonary tuberculosis. *Semin. Pediatr. Infect. Dis.* 1993;4:250–260.
35. Auerbach O. Tuberculous meningitis: correlation of therapeutic results with the pathogenesis and pathologic changes: II. Pathologic changes in untreated and treated cases. *Am. Rev. Tuberc.* 1951;64:419–429.
36. Damergis J. A., Leftwich E., Curtin J., Witorsch P. Tuberculoma of the brain. *J.A.M.A.* 1979;239:413–415.
37. Bhansali S. K. Abdominal tuberculosis: experience with 300 cases. *Am. J. Gastroenterol.* 1977;67:324–337.
38. Borhanmanesh R., Hekmat K., Vaezzadeh K., Rezai H. R. Tuberculous peritonitis: prospective study of 32 cases in Iran. *Ann. Intern. Med.* 1972;76:567–572.
39. Burack W. R., Hollister R. M. Tuberculous peritonitis: a study of forty-seven proved cases encountered by a general medical unit in twenty-five years. *Am. J. Med.* 1960;28:510–523.
40. Singh M. M., Bhargova A. M., Jain K. P. Tuberculous peritonitis: an evaluation of pathogenetic mechanisms, diagnostic procedures and therapeutic measures. *N. Engl. J. Med.* 1968;281:1091–1094.
41. Harvey A. M., Whitehill M. R. Tuberculous pericarditis. *Medicine* 1937;16:45–94.
42. Rooney J. J., Crocco J. A., Lyons H. H. *Tuberculous pericarditis. Ann. Intern. Med.* 1970;72:73–78.
43. Schepers G. W. H. Tuberculosis pericarditis. *Am. J. Cardiol.* 1962;9:248–276.

Poisoning by anti-malarial drugs

David Tibbutt[a]

Poisoning, deliberate or accidental, with drugs used to treat malaria, seems to be uncommon although data is not available from South Sudan. A study in Uganda suggested around 3% of all cases of poisoning admitted to hospital had taken chloroquine: no other anti-malarial drugs were involved [1].

The commonly used drugs used to treat malaria in South Sudan are artemether with lumefantrine (as "Co-artem" or "Riamet"), artesunate and amodiaquine, quinine and occasionally doxycycline. Chloroquine is infrequently used because of parasite resistance but nevertheless will be included in this review.

Chloroquine and Quinine [2]

Chloroquine[1] and quinine will be considered together as there are similarities in their toxic effects. Both drugs are quickly absorbed by the gastrointestinal tract and symptoms of poisoning usually appear within three hours of ingestion.

The clinical features of poisoning include:

- **Drowsiness, convulsions and coma** and
- **Hypotension** and **cardiac dysrhythmias** (especially ventricular tachycardia and fibrillation) leading to cardiac arrest. Ventricular dysrhythmias may be anticipated from changes on the electrocardiogram (ECG): inversion of T-waves, prolongation of QT interval and widening of the QRS.
- **Respiratory failure.**
- **Diplopia** (double vision), blurred vision, narrowing (constriction) of the visual field ("tunnel" vision) and blindness.

The toxic effects on the cardiovascular system tend to be more severe from **chloroquine** than quinine. Toxicity on the eye (**oculotoxicity**) is the major problem from **quinine** poisoning.

The side effects of pharmacological treatment with quinine are common and become exaggerated when the patient has taken a toxic dose:

- **Nausea** and **vomiting,**
- **Deafness** and **tinnitus,**
- **Vasodilatation** (flushing sensation more obvious in a pale skin). This may be exacerbated by the vasodilatation caused by the malaria itself and so cause postural (orthostatic) hypotension.
- **Abdominal pain** (especially epigastric) and
- **Visual impairment.**
- **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.
- **Thrombocytopenia** may result from an immune mechanism associated with quinine but this is rarely of clinical importance. It may also be part of the disseminated intravascular coagulation syndrome.
- **Rashes** and **angio-oedema** have been described. Itching without a rash is a recognised problem affecting a number of Africans.
- **Confusional states** also occur but distinguishing malaria and quinine as the underlying cause is difficult.
- **Blackwater fever** (haemoglobinuria) is a serious complication.
- **Hypokalaemia** is very common with chloroquine poisoning: even though a facility for serum potassium assay is absent the hypokalaemia should be assumed.

The quantity of **chloroquine** ingested is a useful predictor of the likely symptoms and problems to expect [2] (see table 1).

The ingestion of over 5 grams of chloroquine and systolic hypotension (less than 80mmHg) almost always lead to a fatal result[2].

If the plasma concentration of **quinine** is less than 10mg/L the symptoms are usually mild but if greater than 15mg/L the risk of permanent visual damage and cardiac dysrhythmias is high.

Management of poisoning

The priority is always to stabilise the poisoned patient with attention to the **A**irway, **B**reathing and **C**irculation.

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1 Chloroquine is a 4-aminoquinolone and comes as a number of salts mainly the phosphate and sulphate.

2 An electrocardiogram that shows a QRS duration of >0.12 seconds is also a serious prognostic indicator.

Table 1: The quantity of chloroquine ingested and likely symptoms and signs

Dose Ingested (grams)	Severity	Symptoms / signs
<2	Mild	Visual / vomiting
2 - 3.5	Moderate	Vomiting / visual
>3.5 - 4	Severe	Cardiac toxicity / convulsions.

Ideally management should be carried out in an intensive care facility especially if the patient is shocked with hypotension. Adequate **hydration** should be established. **Mechanical ventilation** may be needed with the added support of very **carefully titrated adrenaline** [3] particularly if there is chloroquine poisoning. Adrenaline may increase the risk of cardiac dysrhythmias.

If the ECG shows an intraventricular block then intravenous 250ml 8.4% **sodium bicarbonate** (i.e. 250 mmol) is indicated.

Gastric lavage should be considered if the patient arrives at the medical unit within one hour of ingesting quinine or chloroquine. If possible activated charcoal 50 – 100G should then be given: this dose may need to be repeated every six hours depending on the clinical response.

There is no evidence that **diazepam** is cardiac protective. It is indicated for convulsions.

Hypokalaemia may increase the risk of cardiac dysrhythmias. It might be tempting to give routinely an intravenous infusion of potassium. However during the recovery period severe "rebound" **hyperkalaemia** may develop. Therefore it is probably wise not to give extra potassium unless frequent serum potassium measurements can be made and the results immediately available.

Artemether and Lumefantrine

These are usually used as a fixed-dose combination artemisinin-based combination treatment (each tablet contains 20 mg artemether and 120 mg lumefantrine) (e.g. "Co-artem", "Riamet").

Common side effects include cough, anorexia, nausea and vomiting, diarrhoea, palpitations, joint (arthralgia) and muscle pain (myalgia), headache, dizziness, lethargy and insomnia. The problem with many of these symptoms is that they can be caused by the underlying malarial process. There are also a number of rare but more severe adverse reactions: rash (including urticaria), oedema of mouth and lips, dyspnoea and chest tightness, dysphagia, palpitations, fever, severe headaches and muscle weakness.

Reported experience of overdosage with this drug combination is sparse. The time after ingestion that each component reaches peak plasma concentration is different: for artemether it occurs at about 2 hours and for lumefantrine at about 6-8 hours. So this could have implications for the onset and duration of toxic effects

The cardiac toxic effects are similar to those from chloroquine and in particular the prolonged QT-interval problem which may lead to serious irregular tachycardia. If the patient is likely to have hypokalaemia then the risk of this complication is increased. If there is a history (or family history) of a heart rhythm disorder or heart failure then this combination antimalarial is probably best avoided. The likelihood of toxicity is increased by taking grapefruit juice as this raises the blood level of the drug. Anti-retrovirals may exacerbate the chance of a prolonged QT as will the use of quinine or chloroquine after a course of artemether - lumefantrine. There are many other drugs which may interfere with the effects of this artemether – lumefantrine combination and include amitriptyline, disopyramide, flecainide, procainamide, quinidine, sotalol, azole antifungals (e.g. fluconazole, ketoconazole), cisapride, clomipramine, fluoroquinolone antibiotics (e.g. ciprofloxacin), imipramine and macrolide antibiotics (e.g. clarithromycin) [4]. The effectiveness of hormonal contraceptives and women should be advised to use an alternative method.

Management of poisoning

Given the similar toxic effects, especially the cardiac ones, to chloroquine and quinine the principles of management should be the same. The benefit of gastric lavage is doubtful but the use of activated charcoal should be considered.

Because of the uncertainties of the effects and outcome of poisoning the patient must be observed carefully (pulse rate and rhythm and blood pressure) and for at least six hours after ingestion. If possible the serum potassium should be measured looking for hypokalaemia. It is always wise to exclude hypoglycaemia. An ECG would indicate the development of a prolonged QT interval and the risk of dysrhythmias.

Artesunate and Amodiaquine

This is another artemisinin-based combination treatment ("Coarsucam"). Amodiaquine is a 4-aminoquinolone similar to chloroquine.

Many side effects have been described including weakness, headache, dizziness, anorexia, nausea, vomiting, abdominal pain, diarrhoea and an itchy rash [5].

Artesunate

As with other artemisinins toxic effects are infrequent

[6]. More serious ones rarely noted include neutropenia, anaemia, haemolysis and hepatitis as indicated by raised liver enzymes.

Amodiaquine

There is a significant and potentially serious risk of neutropenia especially in children infected with HIV [7]. In addition cases of hepatitis have been described. For this reason amodiaquine has been discontinued in some countries. However there appears to be little experience of overdosage. Increased muscle tone, involuntary movements, convulsions and syncope have been described. Because of its similarity to chloroquine the expected problems include

- Hypotension and cardiogenic shock.
- Intraventricular conduction problems: the QRS on ECG becomes widened and the QT interval prolonged.
- Ventricular tachycardia and fibrillation.

Management of poisoning

This is as for chloroquine, quinine and the artemether - lumefantrine combination.

Doxycycline

Generally this is a non-toxic drug although nausea, vomiting and hypersensitivity reactions and rashes may occur. In most cases of overdosage specific measures are not required and gastric lavage is unnecessary. In the unlikely event of frequent or prolonged convulsions then treatment should be along conventional lines with oxygen and intravenous diazepam (10-20 mg in adults; 0.1-0.3 mg/kg body weight in children) or lorazepam (4 mg in adults and 0.1 mg/kg in children). The blood sugar should be checked.

Learning points

1. Experience with managing the toxic effects of antimalarial drugs is limited. However they are very widely used and the opportunities for self-poisoning are great.
2. The potential for serious toxic effects exists especially those affecting the cardiovascular system.
3. The availability of cardiac monitoring is widespread and hence clinical observation (pulse rate and rhythm, blood pressure, respiratory rate) is crucial.
4. All members of the clinical team should know about the "ABC" i.e. Airway, Breathing and Circulation.
5. The bed-side test for blood sugar is a simple measurement and should never be forgotten as a possible cause of a changed conscious level.

References

1. Tibbutt, D.A. Poisoning with drugs and chemicals in South Sudan: how big is the problem? *SSMJ*. 2011; 4(4): 90 – 91.
2. Jaeger, A. Quinine and chloroquine. *Medicine* 2012; 40(3): 154 – 155.
3. Jaeger, A., Sauder, P., Kopferschmitt, J. And Flesch,F. Clinical features and management of poisoning due to antimalarial drugs. *Medical Toxicology* 1987; 2 242 – 273.
4. Drugs information online : Coartem http://www.drugs.com/cdi/coartem.html#wizsKjZ808TiOxB4.99
5. Olliaro, P and Taylor, W.R.J. *Amodiaquine for the treatment of uncomplicated falciparum malaria.* WHO/CDS 3 April 2002.
6. Rosenthal, P.J. Artesunate for the treatment of severe falciparum malaria. *N. Engl. J. Med* 2008; 358: 1829 – 1836.
7. Gasasira, A.F., Kamya, M.R., Achan, J. et al. High risk of neutropenia in HIV-infected children following treatment with artesunate plus amodiaquine for uncomplicated malaria in Uganda. *Clin. Inf. Dis.* 2008; 46(7): 985 – 991.

Author's comment

During my research for this review I was amazed to discover how little information seems to be available on experience with the toxic effects of the combination drugs (ACT's). This seems to me to be an excellent opportunity for colleagues in South Sudan to record any experience and report to this journal ... this could be an important contribution to medical science and practice.

Acknowledgement

I am grateful for having access to "TOXBASE" (www.toxbase.org) which is a UK "National Poisons Information Service" commissioned by the Health Protection Agency.

Diabetes Mellitus: the increasing burden of disease in Kenya

Tiffany L.E. Jones

Introduction

Non-communicable diseases (NCDs) are the leading cause of death globally and diabetes mellitus is the 4th main contributor [1]. It is characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, action or both [2]. There are three main types: type 1 (TIDM) (10%), 2 (TIIDM) (85%) or gestational (5%)[3] affecting 347 million people [4]. There were about 1.3 million deaths in 2008 [4] predicted to increase to over 2 million by 2030 [1]. The burden of diabetes is disproportionately high in low-middle income countries [5,6].

Burden of disease and diabetes

Kenya has a heavy disease burden with an average life expectancy of 56 years [7]. The main challenge arises from communicable diseases (CDs) (e.g.malaria and HIV [7,8]) accounting for about 62% of deaths [9]. Despite successes to control CDs [8], health status has stagnated due partly to the increase of NCDs [8,10] causing 28% of all deaths in 2010; diabetes accounted for 2% of this [7,9]. The World Health Organization (WHO) estimates that the prevalence of diabetes in Kenya at 3.3% [3,8,11] and predicts a rise to 4.5% by 2025 [12]. However, two-thirds of diabetics may be undiagnosed [10,11]. The double demand from CDs and NCDs has hindered Kenya's progress towards achieving the Millennium Development Goals (MDGs) [8]. It is therefore necessary to assess the increasing burden of diabetes and provide cost-effective strategies for its prevention and control.

Funding of healthcare in Kenya

The funding, structure and administration of a health service is key to achieving success. Kenya's healthcare system is financed predominantly through private sources [13]. Private businesses operate 43% of health facilities, government 41% and non-governmental organizations 15% [14]. However the government owns most hospitals, health centres and dispensaries [14]. In 2006 Kenya's total health expenditure (THE) was 4.6% of gross domestic product with 29US$ per capita being spent on health [15], below the WHO recommended 34US$ for provision of a minimum health package [15,16]. Kenya's focus has been to control CDs which account for the majority of THE [7,12,13]. A disproportionate expenditure is allocated to urban areas for curative care [7]. In East Africa the average total annual cost for care of a type 1 diabetic is 229US$ with 60-70% of this being used to purchase insulin [12]. Kenya does not have adequate funds for diabetes prevention or care. Kenyans who can, independently fund their care [13,14], leaving many diabetics and their families at risk of poverty and poorer health [1]. Some save money through non-compliance; increasing the risk of complications [10]. Nearly 50% of Kenyans live on less than 1US$ daily [14,17]. Kenya has developed a more positive attitude to prevention and public health, increasing THE from 9% (2001/2002) to 23% (2009/2010) [7]. But this needs to be accompanied by a more effective healthcare system.

Figure 1. Health Centre treating local community of Muhoroni, Nyanza Province, Western Kenya

Structure and management of Kenya's healthcare system

Kenya's health facilities are distributed regionally. Community dispensaries and health centres [14] provide the most basic level of service [17]. Sub-district hospitals, provincial hospitals and the Kenyatta National Hospital (KNH), provide more specialist services [14,17]. After the 2007 elections the hierarchical healthcare structure was divided [17]. The maintenance of two bodies controlling the same function created overlap in the planning and implementation of processes [12,17]. Widespread disparities in provision [17], may be attributed to socio-economic, gender and geographical differences [8], with

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only 77% of Kenyans who are ill utilizing the healthcare available [17]. Health worker distribution is also uneven, with greater numbers in hospitals and urban areas [7,12]. Hospitals often have public and private levels co-existing, managed by the same staff [17]. Conditions within public wards are poor compared to the unaffordable private wards [14,17]. As in many sub-Saharan African countries, the health system is organised to treat acute rather than chronic conditions [10,18,19], with a lack of primary healthcare to tackle chronic diseases such as diabetes [11,12] (see figure 1).

Management of diabetes in Kenya

Diabetes requires long-term follow up, with uninterrupted access to medication and specialist care [10]. Many health workers lack adequate knowledge and training [12, 20] thus exposing diabetics to suboptimal management. Many health facilities do not routinely screen for hyperglycaemia [11].

The high cost and low availability of insulin in Kenya [12] with inadequate patient follow up [10] contribute to poor management [6]. Although the Kenyan government subsidizes insulin to reduce price for patients, supplies frequently run out and there is miscommunication between local depositories and central medical stores to restock [12].

The "Leadership for Education and Access to Diabetes Care" Initiative (Novo Nordisk), aimed to provide insulin at lower prices to least developed countries (LDCs). However the price is often marked up for profit [12], forcing many patients to buy from private sources at prices over 60% higher [12]. Unsurprisingly, many patients have poor glycaemic control [6] and a quarter of all hospital admissions in Kenya are diabetes-related [21].

Risk factors for diabetes

A Kenyan study reported that a family history of diabetes in a 1st degree relative conferred a relative risk of 2.2. Higher rates of diabetes are found in urban areas [3]. Urbanisation and adoption of 'Western lifestyles' have led many Kenyan's towards risk factors for TIIDM [20]. Kenya has seen increases in abdominal obesity, poor dietary habits, excess alcohol consumption and physical inactivity [2,3,5]. Childhood starvation is also associated with TIIDM (relative risk of 2.08) [3]. Such modifiable risk factors need to be targeted.

Knowledge and attitudes toward diabetes

There is a low level (perhaps under 30%) of public awareness and knowledge about diabetes in Kenya [11,12,22]. Knowledge differs according to education and region [22]. Most respondents have poor behaviours towards diabetes [22]: 41% show an unwillingness to adopt healthier lifestyles. Although an increased level of knowledge is associated with good practice for diabetes prevention, 49% with adequate knowledge failed to put this into practice [22].

The National Diabetes Educators Manual (2010) [23] was produced acknowledging the need for further education of healthcare staff and the public. The effectiveness of the scheme is yet to be confirmed.

Diabetic complications

Many diabetics in Kenya are diagnosed with irreversible complications [6, 11], likewise half of TIIDM patients in

ANSWER TO PHOTO QUIZ FOR OUR READERS

Photograph sent by Kivumbi J. Bonabantu, Mariallou Hospital.

Question: Why do you think this child is wearing such a heavy bracelet?

Answer: This boy with a broken humerus came to Mariallou hospital for analgesics following reduction of the broken bone using this traditional method of traction – a mould made of mud.

Congratulations to **Dr. Ruot Garjiek Teny,** Akobo County Hospital, South Sudan, for submitting the correct answer.

the UK have complications at diagnosis [24,25]. In Africa infection and acute metabolic complications are the most common causes of death [6], compared to cardiovascular/ renal complications in Western countries [1,6].

Diabetic ketoacidosis (DKA) accounted for 8% of diabetic admissions in a study at KNH, 30% of patients died within 48 hours of presentation [26]. Foot ulcers are seen frequently at many tertiary clinics in Kenya and are associated with poor glycaemic control, infection, hypertension and dyslipidaemia [11]. This has encouraged provision of community mobile podiatry services [11].

The WHO report that diabetics require up to triple the healthcare resources compared to non-diabetics [1]. Diabetes threatens Kenya's healthcare system and the wider economy with loss of productive workforce [22].

Prevention of diabetes

The burden of diabetes is recognised. Kenya is addressing the need for improvements through the launch of a National Diabetes Strategy in 2010 [11,20]. This aims to prevent or delay the development of diabetes, improve the quality of life by reducing complications and premature mortality [11]. Key interventions prioritise prevention, early detection and control. Hospital diabetic clinics have been established in the nine provinces [20] but access remains a challenge due to travel distances [12]. A Diabetes Education Programme has also been implemented for healthcare staff [12]. Success of such strategies is dependent on their sustainability and local ownership [20]. To date there has been little evaluation of the strategy [12] so policy makers cannot make informed suggestions for improvements.

Discussion

Funding and structure

The Kenyan government recognises the threat from NCDs and is committed to improving health by widening access to quality care [27]. The National Diabetes Strategy (2010-2015) is fundamental to this aspiration. Ultimately a positive political environment is required for success [10].

Prevention and control of diabetes

The current disease burden indicates a need for more resources for prevention and health promotion, with primary healthcare taking greater responsibility for chronic diseases. Effective primary care should lower hospital admissions and reduce overall cost. The WHO recommendations are now a focus of the Kenyan government [28], however the financial demands for curative care reduce funding available for implementing such policies [7]. The WHO recommends changes in financing and delivery of services for chronic conditions within Kenya and other sub-Saharan African countries [18]. Funding needs to be reassessed and allocated appropriately, with a greater proportion to NCDs especially diabetes. A lower financial burden on individuals by increasing public funding should

- Reduce poverty,
- Increase treatment compliance,
- Improve diabetic control and
- Reduce complications, thus
- Reducing further burden on healthcare services.

Education focusing on prevention and management is crucial to reducing the burden of diabetes [29,30]. Current strategies for patient and healthcare staff need evaluation. This should be targeted at high risk groups, e.g. those with a diabetic family history, obesity, physical inactivity, glycaemic impairment. Increased knowledge may change attitudes towards diabetes and aid prevention by motivating individuals to take responsibility for their health [22]. The UK 'change4life' strategy was implemented to increase healthier behaviour [31] and Kenya could use this as a model.

Health promotion strategies enables self-assessment for risk of diabetes and identify common symptoms, thus encouraging access to health services [22]. Educating families with a family history of diabetes could reduce modifiable risk factors [3] and be used for screening.

Diabetes is not a priority for many healthcare staff [12]. There is a need for continuing professional education of all healthcare workers. Screening of those at increased risk and monitoring of symptomatic patients should be encouraged. Such individuals need instruction to modify their risk factors. Investment should be sought to train more healthcare workers, particularly within rural and poorer areas [10].

Diabetes should be aggressively managed by regular clinic attendance [22] and patients assisted, where practical, to take responsibility for their own blood glucose monitoring [32]. This improves the chance of achieving optimal glycaemic control [22]. Healthcare workers should also monitor blood pressure and provide footcare [1].

The improvement of education needs to be met with improved availability of diagnostic equipment and appropriate affordable treatments (insulin is on the WHO essential drugs list). This means a greater allocation of funds, purchasing through tenders and pooled procurement [10]. A task easier said than done.

Managing complications

For individuals with existing complications, regular checks should be provided to prevent further deterioration.

This requires strict management of blood glucose, blood pressure and lipids with regular follow up [33].

Data collection and research

The lack of clear data on the epidemiology of diabetes makes informed policy decisions difficult [12]. The WHO's Global Strategy 'Prevention and Control of Noncommunicable Disease' recommends that countries track NCDs, their risk factors and determinants [1]. Robust evaluation of interventions to establish the most cost effectiveness is required.

Kenya's challenges

The utilisation of health services by Kenyans is increasing but access to quality healthcare remains limited [7]. Poor health service infrastructure and unavailability, shortage of health, administration and management personnel and financial constraints restrict delivery of an adequate service [7]. Kenya cannot fund even the WHO minimal level care package to each citizen [16].

Conclusion

Kenya has a challenging health landscape with the burden of diabetes and other NCDs adding to the existing challenge of CDs. Tackling the burden of diabetes presents many difficulties. There remains inadequate funding for the effective implementation of an effective strategy for the prevention, detection and management of diabetes. Lack of awareness and an increasing prevalence of diabetic risk factors are critical obstacles to overcoming diabetes in Kenya [12]. This is reflected by the many patients presenting with complications. The financial strain from diabetes hinders Kenya's achievement of their UN MDGs [1] and Vision 2030 [11].

Kenya has an opportunity to reduce the burden of diabetes but funding needs to be concentrated on public health and primary healthcare interventions. In turn this requires changing population behaviours to adopt healthy lifestyles. Intensive management and monitoring of diabetics is crucial with matched diagnostic and medical availability.

Evaluation of implemented strategies and epidemiological research are essential. This would inform decisions leading to optimal care quality and cost effectiveness.

References

1. World Health Organization. Global Status Report on noncommunicable disease. 2010; http://www.who.int/nmh/publications/ncd_report_full_en.pdf.
2. World Health Organization. About Diabetes. 2012; Available at: http://www.who.int/diabetes/action_online/basics/en/index.html.
3. Chege M. Risk factors for type 2 diabetes mellitus among patients attending a rural Kenyan hospital. African Journal of Primary Health Care and Family Medicine 2010;2(1).
4. World Health Organization. Noncommunicable Diseases Factsheet. 2011; http://www.who.int/mediacentre/factsheets/fs355/en/index.html.
5. World Health Organization. Diabetes Factsheet. 2012; http://www.who.int/mediacentre/factsheets/fs312/en/index.html.
6. Azevedo M AS. Diabetes in Sub-Saharan Africa: Kenya, Mali, Mozambique, Nigeria, South Africa and Zambia. International Journal of Diabetes in Developing Countries 2008;28(4):101-108.
7. The World Health Organization. Kenya Draft Health Financing Strategy. Report of an External Review. Commissioned by the Ministry of Medical services Government of Kenya. 2012; http://www.who.int/providingforhealth/countries/Kenya_HFS_review_June2012.pdf.
8. World Health Organization. Kenya , Country Cooperation Strategy , at a glance. 2009; Available at: http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_ken_en.pdf.
9. World Health Organization. Noncommunicable disease country profiles, Kenya. 2011; http://www.who.int/nmh/countries/ken_en.pdf.
10. Beran D. The Diabetes Foundation Report on implementing national diabetes programmes in sub-Saharan Africa. 2006; http://www.access2insulin.org/uploads/4/9/1/0/4910107/iif_full_final.pdf.
11. Republic of Kenya. Ministry of public health and sanitation. Kenya National Diabetes Strategy. First Edition. 2010; http://diabetes-communication.org/wordpress/wp-content/uploads/2012/09/Kenya-National-Diabetes-Strategy-2010-2015-Complete.pdf.
12. Mcferran L. Obstacles to diabetes care in Kenya. Medical Journal of Therapeutics Africa 2008;2(2):127-129.
13. Ministry of Medical Services. Ministry of Public Health and Sanitation. Kenya National Health Accounts. 2009-10; http://www.who.int/nha/country/ken/kenya_nha_2009-2010.pdf.
14. Wamai R. The Kenya Health System- Analysis of the situation and enduring challenges. JMAJ 2009;52(2):134-140.
15. World Health Organization. World Health Statistics Report. 2009; http://www.who.int/gho/publications/world_health_statistics/EN_WHS09_Full.pdf.
16. Centre for strategic international studies. The global health policy centre. Kenya: The big picture on health. 2012; http://www.smartglobalhealth.org/pages/kenya-mission/kenya-health.
17. Turin D. Healthcare Utilization in the Kenyan Health System: Challenges and Opportunities. Student pulse 2010;2(9):1-3
18. World Health Organization. Innovative Care for Chronic Conditions: Building Blocks for Action. Geneva. 2002; http://www.who.int/chp/knowledge/publications/

icccglobalreport.pdf.

19. Diabetes leadership forum. Diabetes:the hidden pandemic and its impact on sub-Saharan Africa. 2010; http://www.novonordisk.com/images/about_us/changing-diabetes/PDF/Leadership%20forum%20pdfs/Briefing%20Books/Sub-Saharan%20Africa%20BB.pdf,
20. World Diabetes Foundation. Kenya launches Africas first naitonal diabetes strategy. 2010; http://www.worlddiabetesfoundation.org/stories/kenya-launches-africas-first-national-diabetes-strategy.
21. Kenya diabetes management and information centre. Diabetes in Kenya. 2012; http://dmi.or.ke/about-diabetes.php.
22. Maina W, Ndegwa A, Njenja E, Muchemi E. Knowledge, attitude, and practices related to diabetes among community members in four provinces in Kenya: a cross sectional study. African journal of diabetes medicine 2011;19(1):15-18.
23. Republic of Kenya. Ministry of Public Health and Sanitation. Kenya National Diabetes Educators Manual. First Edition. 2010; http://diabetes-communication.org/wordpress/wp-content/uploads/2012/09/KENYA-NATIONAL-DIABETES-EDUCATORS-MANUAL-Complete.pdf.
24. 24. UKPDS Group. UK prospective diabetes study UKPDS. VIII. Study design, progress and performance. Diabetologia 1991;34(12):877-90.
25. Diabetes UK. Diabetes care across the UK. 2012; http://www.diabetes.org.uk/Guide-to-diabetes/Support_for_managing_your_diabetes/diabetes_care_and_you/Diabetes_care_UK/.
26. Mbugua PK, Otieno CF, Kayima JK, Amayo AA,. Diabetic ketoacidosis: Risk factors, mechanisms and managment strategies in sub-saharan Africa. A review. East African Medical Journal 2005;82:197-203.
27. Ministry of Medical Services. Ministry of Public Health and Sanitation, Kenya. Kenyas Health policy 2012-2030. 2012;http://www.healthresearchweb.org/files/KenyaHealthpolicyfinalversion.pdf.
28. 28. World Health Organization. World Health Report 2008- Primary Health Care (now more than ever). 2008; Available at: http://www.who.int/whr/2008/en/. Accessed 27,12, 2012.
29. National Institute for Clinical Excellence (NICE). The Managment of Type 2 Diabetes. NICE clinical guideline 66. 2008; http://www.nice.org.uk/nicemedia/pdf/CG66NICEGuideline.pdf.
30. Diabetes UK. State of the Nation 2012, England. 2012; http://www.diabetes.org.uk/Documents/Reports/State-of-the-Nation-2012.pdf.
31. National Health Service U. Change4life. 2013; http://www.nhs.uk/Change4Life/Pages/why-change-for-life.aspx.
32. National Institute for Clinical Excellence (NICE). New guideline for the NHS on the diagnosis and management of type 1 diabetes in adults 2011; http://www.nice.org.uk/nicemedia/live/10944/29401/29401.pdf.
33. National Health Service, UK, Evidence. Clinical Health Summaries, Diabetes. 2011; http://www.cks.nhs.uk/diabetes_type_2

PHOTO QUIZ FOR OUR READERS

1. What name is given to this facial physical sign?
2. What is the underlying cause?
3. What parts of the body are most likely to be the infected foci?
4. Describe the cardiovascular complications.
5. What is the risk of sucking out (aspirating) secretions from the trachea?
6. With what apparently minor symptom might a neonatal case of this condition present?

See answers in the next issue.

We are grateful to Dr. David Webster for providing this photograph of his experience in Amudat Hospital, Uganda when he was there as Medical Superintendant in the 1960's.

Doctors on Move: A South Sudan team of doctors working free of charge for rural communities

Doctors On Move is a South Sudan indigenous non-profit, non-commercial and non-political organization founded in March 2012. The organization was registered (Reg.no 1710) and incorporated in accordance with the South Sudan NGOs act 2012 in March 2013. The Founders are South Sudanese health professionals and non-health professionals working in Gudele Medical and Surgical Home, a private hospital, and other institutions based in Juba, South Sudan.

The team members created this organization to meet their social responsibility of providing secondary medical services to the most needy living in the rural areas in South Sudan, where there is a severe shortage of highly skilled health professionals and poor health infrastructure.

Doctors on Move have the following objectives:

1. Building/empowering the practical clinical skills of the existing health providers (doctors, clinical officers, midwives and nurses) in remote hospitals or facilities with severe shortage of skilled health providers

2. Provide special surgical services to the people in state/county hospitals which cannot be conducted by the residing medical officer(s)/surgeons.

3. Provide relevant maternal, newborn and child care services

4. Provide mental health care services.

5. Provide appropriate training for health providers working in lower resource health facilities.

6. Conduct outreach specialist consultations to offer special clinical services to the people with chronic diseases such as asthma, epilepsy, diabetes etc.

7. Promote research into rare medical conditions.

8. Design appropriate low cost methods for secondary health care intervention which can be applied to solve common or rare medical conditions.

9. Develop distant learning and consultation networking for health professionals across the country.

The funding of Doctors On Move comes in the following ways:

- Members and wellwishers contribute both in kind and cash. i.e hiring a vehicle for the outreach trips, taking time out to travel with the team to work free for a short time.
- 2% from monthly income of Gudele Medical and Surgical Home.

Dr Margaret Itto (4th from right) State Minister of Health, Eastern Equatoria, launched DOM medical camp in Torit, March 2013

The future plan for Doctors on Move is to become one of the leading NGOs in providing and filling the gap in secondary healthcare to the people and the health facilities in the South Sudan where there are severe shortage of skilled health personnel through focused short term and regular trainings of most needed skills.

To achieve this, Doctors on Move would like to build a wider involvement and participation of various skilled South Sudanese health professionals working both in the South Sudan and abroad; as well as health volunteers from other countries who are interested to join the team in improving the health situation in the rural communities.

In order not to affect our day to day activities, DOM activities planned to take place in any State are organized by its members in collaboration with relevant state ministry of health in advance. The organization mobilizes the necessary resources, and members of the team get a short time out from their work places without interfering with their respective jobs.

The organization will soon have a complete schedule for its Move and hopes this will be accessible both at SSMJ and the organization's website www.domss.tk. We hope it will be useful for those willing to join the planned

(Left) Dr. Danga and patient with Nodding Syndrome with residual right eye injury which needs reconstructive surgery

(Right) Dr. Danga training on Helping Babies Breathe, Torit

(Below) Dr. Martin Maring Consultant Obstetrician runs Special Clinic, Torit

outreach activities to register, and to express their area of interest in working with the Doctors on Move team.

We want to enlighten and introduce DOM to readers of the SSMJ, and explain that, although the organization is small, the work we are doing is big. The organization believes that wider involvement and participations of all individuals, and other NGO support in various forms means we will achieve more.

The biggest challenge that Doctors On Move is facing today is that the organization does not have its own vehicles for an outreach activities. Hence, the organization either hires vehicles or depends on vehicles given out for temporary use by friends of Doctors on Move.

Your involvement will help support our vital vision of taking medical services to the people; and hence our medical specialist volunteers will be able to move out more frequently and regularly to reach the most needy people who have no means to travel to search for secondary health care services elsewhere. No matter how much you donate, it always counts for the success of our mission.

For more details contact

Dr. Louis Danga Email: wedanga@hotmail.com

All figures belong to Doctors On Move

DOCTORS ON MOVE AND NODDING SYNDROME

Doctors On Move (DOM) has identified Nodding Syndrome & epilepsiy amongst the most neglected diseases in the Rural Communities in the Western Equatoria and West of Central Equatoria State. DOM medical team identified the following amongst the long list of problems/effects of Nodding Syndrome & epilepsies that needs immediate collaborative interventions:

- Increasing cases of both Nodding Syndrome & epilepsies amongst the Communities
- Most affected people are children aged 5 to 18 years, this will directly threaten their growth potentials, school attendances and future participation in the national development
- Almost all affected children have dropped from school or have not been to school due to various reasons related to the disease
- Majority of affected people have no access to health services and care (drugs, health education)
- Majority of the patients buy their own medicine, which is unsustainable, take them irregularly and in wrong dosages.
- Majority of affected people and families are living with stigma.

To combat the above Nodding Syndrome & epilepsy health related problems, DOM is developing Rehabilitation & Integrated Health Care Services (RIHCS) for children and families affected by Nodding disease/epilepsy in the Central & Western Equatoria States. The RIHCS package includes the following:

- Active surveillance and early diagnosis
- Nodding Syndrome/epilepsy awareness and management of stigmas
- Distribution of relevant anti-epileptic drugs & multivitamins, especially the combined Vitamin B1 B6, B12
- Nutritional support
- Treatment of co-existent conditions and any complications.
- Training of health workers from within the communities to support implementation of the RIHCS package
- Re-integration into schools
- Research

A seasonal variation of the three Leading diagnoses over fifty months at the Duk Lost Boys Clinic, South Sudan

Reed, William[a], Dannan, Tom[b], Friedman Daniel[c], MD, Manyok Gabriel[d], Connor Barbara[e], MD, Reed David[f], MD

Introduction

The Duk Lost Boys Clinic, a Primary Health Care Clinic in Duk Payuel, is the only Duk County clinic in continuous operation during the study period, serving an estimated 70,000 to 100,000 South Sudanese in Jonglei State. (Figure 1) Maternal Child Health capabilities include prenatal care, immunizations and transfusion capability, HIV/TB/Leishmaniasis testing and treatment, nutrition, ultrasound, and midwife attended delivery. Obstacles to clinic access include lack of roads and commercial transportation, political insecurity, and heavy flooding during the wet season, typically April-November. The objective of this study was to describe seasonal variation of monthly patient visits, and totals of the leading three primary diagnoses over the first fifty months of operation.

Figure 1. The Duk Lost Boys Clinic

Methods

Monthly Clinic Activity Reports were analyzed for number of total patients, and number of patients with diagnoses of malaria, diarrheal disease, and respiratory illness--the three leading primary diagnoses at the clinic. These data were analyzed for correlation with wet and dry season. A t-test ($p<0.05$) was used to determine correlation between the incidence of the three leading diagnoses and wet versus dry season.

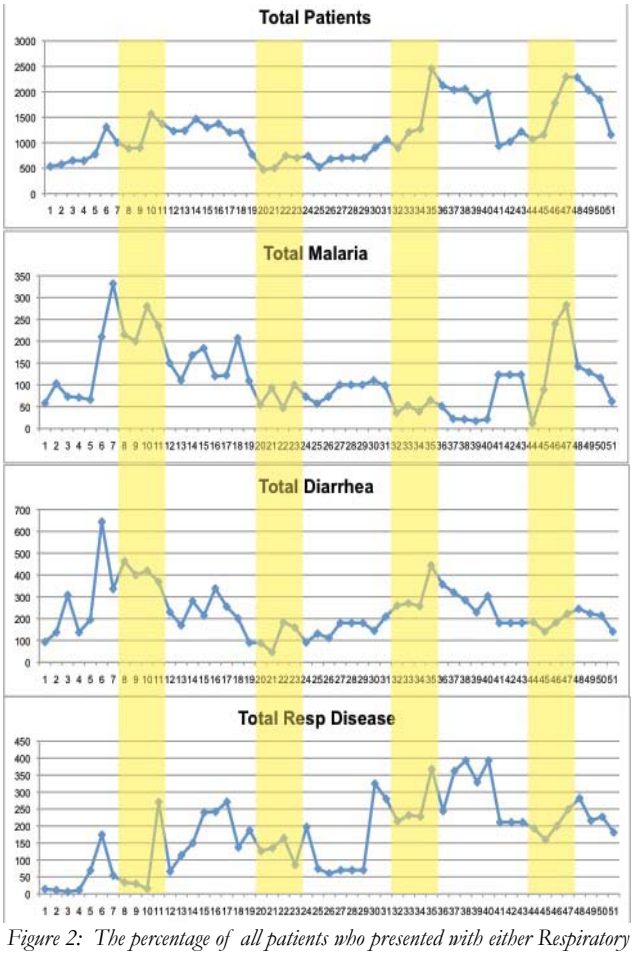

Figure 2: The percentage of all patients who presented with either Respiratory Illness, Diarrhea, or Malaria (Yellow lines = Dry season)

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b Syracuse University;
c Department of Internal Medicine, Massachusetts General Hospital;
d Duk Lost Boys Clinic, Data Manager;
e Duk Lost Boys Clinic, Medical Director;
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Figure 3. Children playing in Duk village

Results

Total patient visits: 59,915; monthly mean: 1198 (range 471-2457). Respiratory Illness mean: 173 (range 6-393); Malaria mean: 114 (range 12-332). Diarrheal Illness mean: 230 (range 46-644).

Discussion

It is very likely that patients' inability to travel and access the clinic due to flooding, political instability, as well as potentially, cultural stigmas are major factors influencing how many patients present to the clinic when, and with what disease symptoms. However, these preliminary results offer insight into complexities of planning for surge-capacity, staffing, and medication requirements during seasonal variations.

Conclusion

Monthly data reports do not demonstrate a statistically significant seasonal difference between wet and dry season incidence of total visits or the three leading primary diagnoses at the clinic during the study period.

Limitations

Inaccurate or incomplete data in several monthly reports required estimation and averaging to complete the data set for analysis. Varied interpretation of final primary diagnosis associated with staff turnover was also a potential confounder

Acknowledgements

Special thanks to the many who have supported the John Dau Foundation in its quest to help develop sustainable health care at the Duk Lost Boys Clinic. Above all, thanks to the staff at the clinic who work tirelessly towards this goal.

Research Beyond Google

This resource at http://oedb.org/library/college-basics/research-beyond-google provides research tools beyond searching in Google. Google, the largest search database, currently has around 50 billion web pages indexed. But Google can only index the visible web, or searchable web. The invisible web, or deep web, is estimated to be 500 times biggerand includes databases and results of specialty search engines that the popular search engines simply are not able to index. This link includes: **Deep Web Search Engines, Books Online,** and **Medical and Health.** Under Medical and Health it lists the following free sites:

PubMed — A service of the U.S. National Library of Medicine that includes over 16 million citations from MEDLINE and other life science journals for biomedical articles back to the 1950s. Includes links to full-text articles and related resources.

National Institutes of Health — A searchable encyclopedia of health topics.

U.S. Global Health Policy — A data bank of world health information, sortable by country, disease, condition, program, or demographic.

Centers for Disease Control Data & Statistics — A data bank of statistical health information compiled by the CDC.

ClinicalTrials.gov — Search nearly 150,000 clinical studies from 182 countries around the world.

Thanks to Daniel Strauss danielstrauss1988@gmail.com for providing this item.

LETTERS TO THE EDITOR

MANAGEMENT OF MALARIA AT JUBA TEACHING HOSPITAL: A CLINICAL AUDIT (1)

Dear Editor,

The above article by David Attwood and Stephen Raimon is excellent and very relevant to the said environment. There are lots of questions I would have liked to ask but to keep the spirit of research alive I would like to settle for a few.

My questions are:

1. Were the authors involved in the patient care from April to July 2011 inclusive? If not do they think daily basic clinical teaching on the ward round would have made a difference even without the protocol and the intervention part of which was bed side teaching? If yes what had gone wrong before the audit?

2. According to the authors' introduction malaria was "the leading cause of mortality in the Medical Department of Juba Teaching Hospital (JTH)". There has however been a report in 2006 suggesting malaria may not be the leading cause of death in the very same setting but worse resources in time (2). Would they kindly give a reference?

3. The pillars of Malaria Control Program are reduction of transmission, reduction of morbidity and reduction of mortality (3). The authors reviewed 50 (fifty) case notes in July 2011 and 40 (forty) in December, 2011 but did not report on fatality the very primary outcome of managing severe and complicated malaria (4). They recommended as number 1 "A mortality study to assess the impact of the restructure on malaria related death". Was there any study limitation for their omission? Now that they have missed a "golden" opportunity, against what would they assess the impact of the said restructuring?

References

1. Attwood, D; Raimon, S. Management of Malaria at Juba Teaching Hospital: a Clinical Audit. *SSMJ*; 5(3): 56-61.
2. Tombe, M; A report and sequelae of a specialist volunteer physician: *SSMJ;* 5(4): 92-95.
3. Ministry of Health. The Goal of Malaria Control in Uganda: Uganda Malaria Control Strategy 2005/06 – 2009/10: 26.
4. Government of Southern Sudan. Severe and Complicated Malaria. Prevention and Treatment Guidelines for Primary Health Care Centres and Hospitals; 2006: 95-101.

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THE AUTHOR'S RESPONSE

Dear Dr Martin Tombe,

In your letter you asked a number of questions. My responses correspond to the three points:

1. The authors were not involved in patient care from April to July 2011. In our opinion, basic clinical teaching would not have made a difference because patients with malaria were dying because of complex multifactorial system failings, of which training was one aspect. There were no drugs, patients were not being clerked on admission so the diagnosis was often missed, nurses were not giving the medications, and there was no HDU for patients needing oxygen and monitoring. Most significantly, there was poor motivation and morale amongst the staff, who needed empowering. Training alone would not have bridged this gap. In fact, without addressing the other issues no one would have attended training.

2. The Malaria Consortium has demonstrated through research that malaria is "a leading cause of mortality in South Sudan and in the under five age group is the biggest cause of mortality" (ref: http://www.malariaconsortium.org/pages/sudan_sudan.htm). In 2008 myself and James Ayrton analysed the mortality data for Juba Teaching Hospital (A retrospective analysis of mortality distribution at Juba Teaching Hospital, SSMJ Feb 2009) and although it is not in the study It was evident that malaria was the leading cause of mortality. I also ran a mortality study alongside the malaria study and I would be happy to supply the draft figures which show that malaria was the leading cause of mortality in the Medical Department. I never published the data because I left a month after our audit and although I could demonstrate an improvement in malaria care, the study was too underpowered to demonstrate an improvement in mortality, especially when allowing for confounding variables such as the dry season.

3. Our work was an audit not a mortality study. I completely agree that it would have been extremely desirable to combine this audit with research that demonstrates a reduction in malaria mortality. However, there were serious issues with data collection due to poor note-keeping (an assessment and diagnosis of the patient were seldom mentioned) and archiving. This was not rectified until we had completed a comprehensive overhaul of the medical department, which included better note-keeping. In my opinion an adequately powered study would have taken one year to complete and as I was there for four months it couldn't be done.

I hope this helps with your enquiries.

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Resources

General

Special notice: Pocket Book of Hospital Care for Children: Guidelines for the Management of Common Childhood Illnesses

WHO has published the second edition of this essential book. The PDF version of the book can be freely downloaded at http://apps.who.int/iris/bitstream/10665/81170/1/9789241548373_eng.pdf. From World Health Organization, 2013. 434 pp. 2.3 MB.

Videos on newborn care

Global Health Media Project has six new videos on newborn care best practices available on our website

http://globalhealthmedia.org/newborn/videos. The topics are: Sepsis, The Cold Baby, Jaundice, Thrush, The Home Visit, and Giving an Intradermal Injection. The primary target audience are frontline health workers in primary and district level facilities. The films are available free-of-charge for use in low-resource settings through our Creative Commons license. Low-resolution versions are available for download on our website.

Send any feedback, especially from those of you who are directly involved with training frontline health workers to dvandyke AT madriver.com.

Nutrition

Maternal and Child Nutrition

On 6th June, a new Series of papers was launched by The Lancet on Maternal and Child Nutrition containing the strongest evidence to date on the extent of undernutrition and successful interventions to address it. The key findings are:

- Undernutrition causes 45% of child deaths, resulting in 3.1 million deaths annually.
- Stunting is slowly decreasing globally but still affects 165 million children.
- Adolescent girls are an important target group for nutrition interventions.
- Scaling up 10 specific nutrition interventions to 90% coverage could reduce stunting by 20% and save around 1 million lives.
- Nutrition-sensitive programmes in agriculture, social safety nets, early child development and education have enormous potential to contribute to improved nutrition.
- Political commitment and leadership are fundamental for improving nutrition.

See http://www.thelancet.com/series/maternal-and-child-nutrition

Nutrition Exchange

Nutrition Exchange at http://www.ennonline.net/nutritionexchange is an annual digested read of Emergency Nutrition Network's main publication, Field Exchange. About one quarter the size of a typical Field Exchange issue, it offers a snapshot of key articles that have featured in the last year or so. It also includes updated information on references, guidelines, tools and training.

It is for those working in emergency nutrition and food security or related fields who either do not have the time to read a full Field Exchange article, or prefer to read a less technical version of a programme or research experience. Nutrition Exchange will also introduce the issues covered in Field Exchange to those who have not come across them before. Nutrition Exchange is available in Arabic and English. See the June 2013 issue at http://www.ennonline.net/nutritionexchange

To register to receive new issues of Nutrition Exchange go to www.ennonline.net

The Healthy Growth Project: Promoting healthy growth and preventing childhood stunting

This project aims to create global awareness of the link between healthy growth and complementary feeding, and develop tools and a framework to promote healthy growth in countries with a high burden of stunting. Associated goals include:

- Shift national focus from monitoring underweight to stunting with the vision of nutrition as a long-term development investment
- Highlight association between undernutrition in early life and the development of overweight/obesity, with attendant risk of non-communicable diseases

See http://www.who.int/nutrition/healthygrowthproj/en/index.html

WHO recommendations for the prevention and treatment of postpartum haemorrhage

Given the availability of new scientific evidence related to the prevention and treatment of PPH, this document updates previous WHO recommendations and adds new recommendations for the prevention and treatment of PPH. The primary goal of this guideline is to provide a foundation for the implementation of interventions shown to have been effective in reducing the burden of PPH. Health professionals responsible for developing national and local health policies constitute the main target audience of this document. Obstetricians, midwives, general medical practitioners, health care managers and public health policy-makers, particularly in under-resourced settings are also targeted. This document establishes general principles of PPH care and it is intended to inform the development of clinical protocols and health policies related to PPH. See http://www.who.int/iris/bitstream/10665/75411/1/9789241548502_eng.pdf

WHO guidelines on salt and potassium intake

The new WHO guidelines confirm that adults should consume less than 2 grams of sodium, or 5 grams of salt, per day. A reduction in sodium intake is needed to reduce blood pressure and risk of heart disease in adults. The potassium guideline indicates that adult should consume at least 90 mmol per day (3510 mg per day). Increasing potassium intake reduces blood pressure and decreases a person's risk of heart disease.

You can access the following documents at this links:

- Sodium guideline http://www.who.int/nutrition/publications/guidelines/sodium_intake/en

- Potassium guideline http://www.who.int/nutrition/publications/guidelines/potassium_intake/en

CMAM Toolkit: Rapid start-up resources for emergency nutrition personnel

https://sites.google.com/site/stcehn/documents/cmam-toolkit

The CMAM (Community-based Management of Acute Malnutrition)Toolkit is a collection of tools for program managers to begin implementation of CMAM programs, either at the onset of a crisis or during a protracted crisis, as a new emergency nutrition activity. The toolkit is an easy-to-use well-illustrated compilation of existing tools and resources that allow managers to rapidly access needed inputs and begin implementation as soon as possible, without needing to spend a lot of time searching for certain tools.

The toolkit is not meant to be used as a replacement of national protocols. When starting up any emergency nutrition program, the first resource for program managers is the Ministry of Health. See also the Home Page of Save the Children's Emergency Health and Nutrition site at https://sites.google.com/site/stcehn/home

Infection

WHO/UNICEF Global Action Plan on Pneumonia and Diarrhea

Pneumonia and diarrhea are two of the leading causes of death for children under 5. They are responsible for nearly one-third of under-5 deaths. As the global health community aggressively pushes to holistically address child mortality under A Promise Renewed, the WHO/UNICEF Global Action Plan on Pneumonia and Diarrhea (GAPPD) looks to coordinate and integrate efforts around pneumonia and diarrhea. See http://www.who.int/iris/bitstream/10665/79200/1/9789241505239_eng.pdf

In addition, The Lancet is launching a series of four papers, all of which have informed the development of the GAPPD – see The Lancet Volume 381, Issue 9876.

The new WHO HIV guidelines

The guidelines recommend that all HIV-positive children under the age of five start treatment immediately. Everyone aged five and over, who have a CD4 cell count below 500 cells/mm3, are also recommended to start treatment.

Tuberculosis and diabetes in Tanzania

A strong association was found between tuberculosis and diabetes and that diabetes was associated with tuberculosis among both participants with or without HIV co-infection.

Ref: Danish Medical J: 2013 Jul;60(7):B4673. The double burden. http://tinyurl.com/pbyzf73

Research Priorities for Chagas Disease, Human African Trypanosomiasis and Leishmaniasis

This WHO report identifies key research priorities through systematic review of research evidence and input from stakeholders on these three distinct insect-borne diseases. seeResearch Priorities for Chagas Disease, Human African Trypanosomiasis and Leishmaniasis

Ref: TDR Disease Reference Group on Chagas Disease, Human African Trypanosomiasis and Leishmaniasis. WHO Technical Report Series, No 975, World Health Organization

TDR for research on diseases of poverty is of special interest to health workers in South Sudan. http://www.who.int/tdr/en/

Featured Reports:

1. A single treatment for visceral leishmaniasis under study

2. Health systems research symposium in Beijing, just beginning with live reporting by web cast

3. A Tale of 3 Villages - malaria and pneumonia treatment by community volunteers in Africa

Featured publication: Research priorities for helminth infections

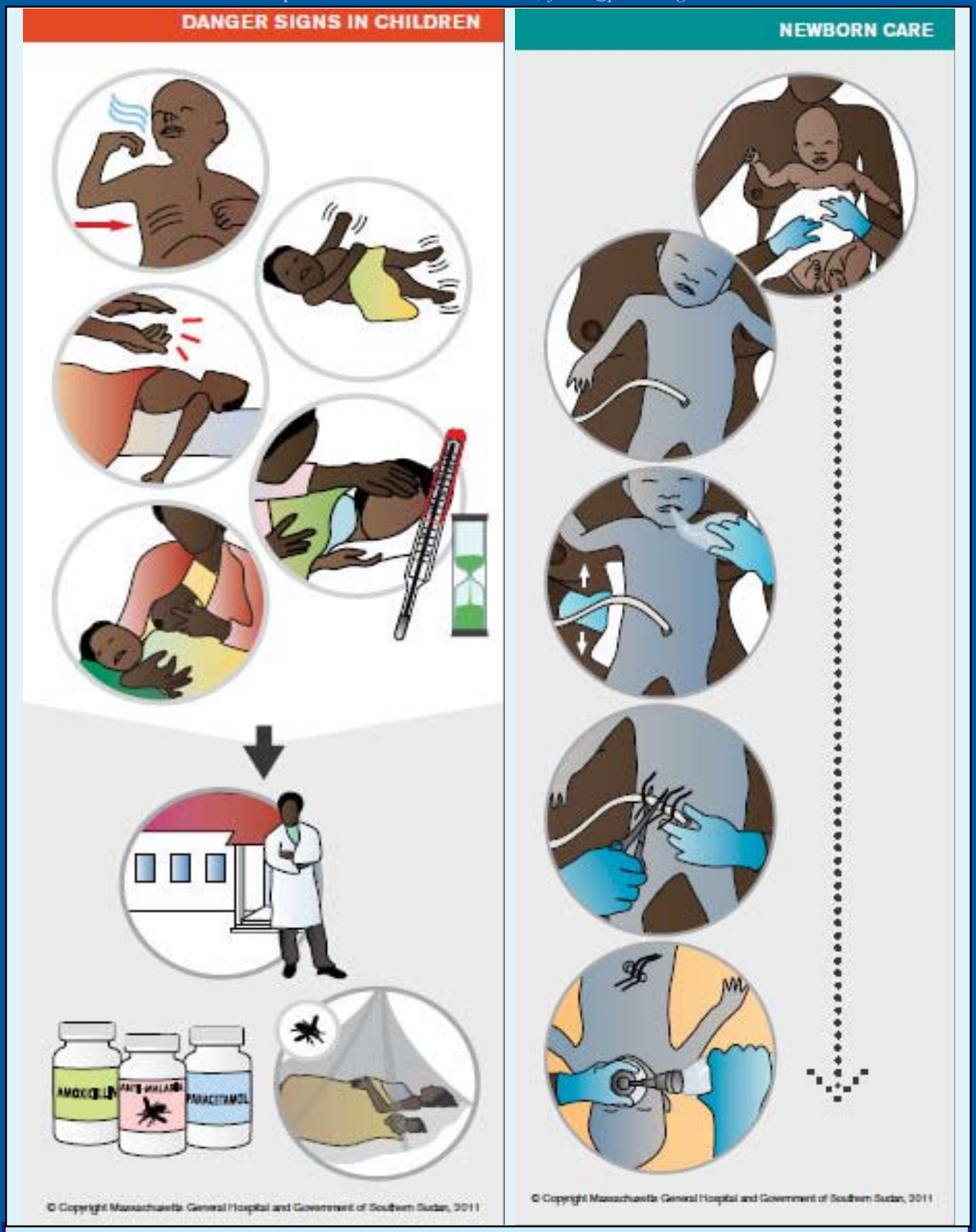
News items:

1. Guidance framework released for testing genetically modified mosquitoes

2. VL elimination by 2015 on track with new research

Infectious Diseases of Poverty (http://www.idpjournal.com), a new open access journal, has been launched in partnership with the National Institute of Parasitic Diseases (NIPD), China CDC. The inaugural issue focuses on the health system framework for controlling infectious diseases of poverty, discussing treatment strategies and innovative programmes which provide a link between policy level and academic research. In particular the article, 'Infectious disease emergence and global change: thinking systemically in a shrinking world' by Colin D Butler, challenges some of the current dogmas and gives a new perspective on global change and emerging infectious diseases (http://www.idpjournal.com/content/1/1/5).

Examples of checklists for community-based frontline health workers in South Sudan Here are two of nine checklists from the Maternal, Newborn, and Child Survival (MNCS) Initiative, which was developed and implemented countrywide by Massachusetts General Hospital and the Ministry of Health. These two checklists illustrate the basic steps in newborn care (drying, assessing, clearing airway, tying and cutting the cord, and ventilating with bag-mask-device) and dangers signs in young children (fast indrawing breathing, convulsions, unconsciousness, high temperature and refusal to eat). For more information, please contact: Dr Thomas Burke, *tfburke@partners.org*.



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