

A profile of respiratory disease in an African medical ward

A. D. HARRIES, MD, MRCP, DTM&H, *Medical Specialist*

R. SPEARE, MB, PhD, *Medical Officer*

JACK J. WIRIMA, MB, MRCP, DTM&H, *Principal Medical Specialist*

*Department of Medicine, Kamuzu Central Hospital, Lilongwe, Malawi**

Respiratory diseases cause much disability and many deaths all over Africa. Hospital-based studies in Nigeria [1], Kenya [2], Uganda [3] and Ethiopia [4] showed that respiratory disease accounted for 20–25 per cent of all medical admissions, largely as a result of pneumonia and tuberculosis. In 1972–1973 in Blantyre, Malawi, 767 (34%) of 2,230 medical admissions to the Central Hospital had respiratory tract disease [5]. Of these patients, 86 per cent had pneumonia or tuberculosis, 4 per cent chronic bronchitis, 3 per cent asthma and 2 per cent upper respiratory tract infections, two patients had bronchial carcinoma and the remainder had infections such as lung abscess or empyema. Despite social and economic progress and despite the evidence that cigarette smoking and the consequent emergence of smoking-related disease is increasing alarmingly in Africa [6], it is our impression that in Malawi this pattern of respiratory disease has remained unchanged.

To test this impression, we reviewed the profile of respiratory disease in 1986 at Kamuzu Hospital, Lilongwe, the capital city of Malawi. The hospital serves both as the general hospital for Lilongwe District, with a local population estimated at 965,000, and as the referral hospital for the Central and Northern regions of Malawi, with a total population of 3.5 million. The hospital has one 48-bed non-fee paying medical ward occupied almost exclusively by Malawian Africans. Between January and December 1986, 4,700 new patients were admitted to the non-fee paying medical ward. Respiratory disease was the primary diagnosis in 1,376 (29.6%) of 4,641 medical admissions, and was responsible for 132 (31.4%) of 421 medical deaths. Table 1 shows the pattern of respiratory disease, duration of hospital stay and mortality. Pneumonia and tuberculosis together comprised 80% of all respiratory diseases, and were responsible for 83% of respiratory deaths.

Lower respiratory tract infection

Table 2 shows the major groups of lower respiratory tract

infection and their clinical features. Pneumonia was diagnosed on the basis of clinical features, radiographic appearances, and up to three sputum smears negative for tubercle bacilli. Tuberculosis was diagnosed largely on positive sputum smears. The diagnosis of sputum-negative pulmonary tuberculosis depended on suggestive clinical features, radiographic appearances and failure of patients to respond to standard antibiotics. An exudative pleural effusion with a predominance of lymphocytes was regarded as tuberculous. Haemorrhagic effusions or effusions that did not respond to anti-tuberculous chemotherapy warranted biopsy with an Abraham's needle.

Pneumonia

Lobar pneumonia was diagnosed in 548 patients and bronchopneumonia in 99 patients. The length of illness prior to hospital admission was usually short, and 365 (56%) patients had symptoms for less than seven days. Night sweats and weight loss occurred in a few patients, usually in those with an illness of several weeks duration. Extrapulmonary manifestations on admission included: diarrhoea in 59 (9%) patients, vomiting in 27 (4%), jaundice in 31 (5%), tender hepatomegaly in 16 (2%). Twenty-eight patients with severe pneumonia also had pyogenic meningitis but *Streptococcus pneumoniae* was cultured in only nine CSF specimens. Twenty-one patients had associated diseases which included rheumatic heart disease [7], diabetes mellitus [6] and carcinoma of oesophagus [4]. Patients with severe or extensive disease or with associated meningitis received parenteral penicillin and chloramphenicol; those judged to be less severely ill were usually treated with oral penicillin or tetracycline. Of the 329 patients who received oral penicillin, 317 responded well, but 12 patients became worse clinically and radiographically; five of them responded to a course of oral tetracycline but the others died despite a change to parenteral broad-spectrum antibiotics. The development of a pleural effusion during treatment did not necessitate a change in antibiotics, in contrast to the development of lung abscess or pericardial empyema which were treated with broad spectrum antibiotics and metronidazole. Sixteen of 28 patients with pneumonia and meningitis died, and these largely accounted for the high mortality

*Address for correspondence: Dr A. D. Harries, Department of Medicine, Kamuzu Central Hospital, PO Box 149, Lilongwe, Malawi, Central Africa.

Table 1. Pattern of respiratory disease in the medical ward, Kamuzu Central Hospital, Lilongwe.

	Number	Male	Female	Mean age (years \pm SD)	Hospital stay (days) Median (range)	Deaths
Total respiratory admissions	1,376	831	545	34 (\pm 13)	5 (1-64)	132
Pneumonia (%)	647 (47)	387	260	32 (\pm 12)	5 (1-26)	57
Tuberculosis (%) ^a	457 (33)	278	179	36 (\pm 13)	—	53
Upper respiratory tract infection (%)	123 (9)	74	49	30 (\pm 11)	4 (1-16)	1
Asthma (%)	70 (5)	32	38	31 (\pm 11)	3 (1-19)	2
Chronic obstructive airways disease (%)	26 (2)	19	7	51 (\pm 14)	10 (2-21)	0
Pleural effusion (%)	56 (4)	39	17	35 (\pm 11)	—	8
Empyema	13	10	3	36 (\pm 16)	35 (15-60)	3
Pleurisy	11	7	4	29 (\pm 6)	4 (1-14)	0
Pneumothorax	4	1	3	29 (\pm 11)	16 (12-30)	0
Lung abscess	9	7	2	41 (\pm 19)	18 (11-64)	1
Cor pulmonale	12	9	3	40 (\pm 14)	15 (9-20)	1
Neoplasia ^b	17	12	5	46 (\pm 15)	20 (14-32)	11
Non-tuberculous pulmonary fibrosis	4	4	0	45 (\pm 5)	9 (9-13)	0
Miscellaneous ^c	3					

^aIncludes fibro-caseous, infiltrative and miliary TB; pleural effusion, empyema, lung abscess and pneumothorax.

^bIncludes bronchial carcinoma (4), pleural effusion (5), laryngeal cancer (2) and pulmonary metastases (4)

^cIncludes aspergilloma (1) and two undiagnosed cases of haemoptysis.

amongst patients treated with parenteral penicillin and chloramphenicol.

Pulmonary tuberculosis

The pattern of tuberculous pulmonary disease is shown in Table 3. Fibrocaseous and infiltrative disease was the most common form of presentation. Deaths occurred largely in those who were malnourished and showed advanced radiological changes. Five of 49 patients with pleural effusion had blood stained fluid. All cases of pneumothorax were a result of tuberculosis. Despite the long period of supervised treatment in hospital, few patients with tuberculosis absconded. Most patients gave a long history of illness prior to admission, although in five the duration of illness was less than seven days. Cough, weight loss and night sweats were common symptoms, but fever and signs of consolidation were found in less than a third of patients (Table 2). In contrast to patients with pneumonia, extrapulmonary manifestations were uncommon. Twelve patients had associated extrapulmonary tuberculosis: six had cervical lymphadenopathy, one peritonitis, two pericarditis and three had enteritis. Twenty patients had associated diseases which included diabetes mellitus [5], hepatic cirrhosis [3] and nephrotic syndrome [2].

Tuberculosis was treated in accordance with the policy of the Malawi National Tuberculosis programme [7]. New sputum positive patients and those with miliary tuberculosis received, under supervision, streptomycin, rifampicin, isoniazid and pyrazinamide every day for eight weeks or until sputum became negative, at which time they were discharged home on isoniazid and thiacetazone for a further six months. Patients who relapsed after treatment were readmitted to hospital and received streptomycin for two months and rifampicin, isoniazid, pyrazinamide and ethambutol every day for 12 weeks and

were then discharged home on rifampicin, isoniazid and ethambutol three times a week for five months. Sputum-negative patients remained in hospital for the first month and received streptomycin for one month and isoniazid and thiacetazone for 12 months.

Empyema, lung abscess and pleurisy

Thirteen patients had empyema; pulmonary tuberculosis was the cause in four and bacterial pneumonia in two. In the remainder the aetiology was uncertain and patients were treated with antibiotics and tuberculous chemotherapy. In nine patients with lung abscess, pulmonary tuberculosis was the cause in two, carcinoma of oesophagus with aspiration in one, and bacterial pneumonia with septicaemia in the remainder. Except for tuberculosis patients, treatment was with parenteral penicillin and/or chloramphenicol together with oral metronidazole. All eleven patients with pleurisy responded to anti-inflammatory agents and oral penicillin.

Upper respiratory tract infection (n = 123)

Among the 123 patients, the following conditions were diagnosed: acute laryngo-tracheitis/tracheo-bronchitis/bronchitis in 83; acute tonsillitis/quinsy in 33; acute sinusitis in four and acute otitis media in three. Patients with tonsillitis/quinsy received penicillin while those with sinusitis and otitis media were treated with cotrimoxazole.

Non-infectious respiratory tract disease

This accounted for 8.7 per cent of all respiratory admissions (Table 1), most of them because of asthma. Thirty-one (44%) required oral corticosteroids for control. Twenty-six patients had chronic obstructive airways dis-

Table 2. Lower respiratory tract infections and clinical features

	Pneumonia	Pulmonary tuberculosis*	Non-malignant pleural effusion	Empyema	Pleurisy	Lung abscess
Number	647	344	51	13	11	9
<i>Symptoms</i>						
Median duration	6 days	3 months	2 months	3 months	2 days	2 weeks
Cough (%)	642 (99)	339 (99)	44 (86)	10	8	9
Chest pain (%)	342 (53)	136 (40)	28 (55)	4	11	6
Haemoptysis (%)	102 (16)	103 (30)	2 (4)	1	—	3
Dyspnoea (%)	73 (11)	71 (21)	19 (37)	5	—	—
Night sweats (%)	29 (5)	206 (60)	27 (53)	8	—	8
Weight loss (%)	25 (4)	250 (73)	35 (69)	10	—	5
<i>Signs</i>						
Temperature above 37.5°C (%)	524 (81)	98 (28)	17 (33)	6	6	6
Consolidation (%)	273 (42)	125 (36)	—	—	—	3

*Includes only new cases with fibrocascous, infiltrative or miliary tuberculosis.

Table 3. Pattern of pulmonary disease with tuberculosis

	Number	Sputum positive (%)	Absconded from hospital Rx (%)	Deaths (%)
Fibrocascous/ infiltrative	389	281 (72)	11	47 (12)
New patients	335	232 (69)	9	45 (13)
Relapsed patients	54	49 (91)	2	2 (4)
Pleural effusion	49	3 (6)	0	4 (8)
Miliary	9	1 (11)	2	2 (22)
Empyema	4	0	1	0
Pneumothorax	4	2	0	0
Lung abscess	2	2	0	0
<i>Total</i>	457	289 (63)	14 (3)	53 (12)

ease. Ten had pure emphysema and nine were cigarette smokers or ex-smokers. Six of the twelve patients with cor pulmonale had chronic obstructive lung disease, which in the others was the result of fibrocascous pulmonary tuberculosis or non-tuberculous pulmonary fibrosis. All four cases of bronchial carcinoma presented with collapse of a lung.

Seasonal influences

There were 4,445 patients residing within Lilongwe District which has a wet season from November to April and a dry season from May to October. Temperature, rainfall and relative humidity are measured daily at three different points within the District.

All cases of pneumonia, pulmonary tuberculosis (fibrocascous, infiltrative and miliary), upper respiratory tract infection and asthma came from within Lilongwe District. There was a strong negative correlation between the monthly relative humidity and pneumonia admission rate ($r = -0.862$, $p < 0.001$, $n = 12$) but no significant correlation with ambient temperature (Fig. 1). Asthma was

more common in the wet season; 48 patients were admitted during December to May when relative humidity was greater than 70 per cent in contrast to 22 patients admitted from June to November when relative humidity was less than 70 per cent. Other respiratory disease admissions were unaffected by climatic changes.

Discussion

The high proportion of medical admissions presenting with respiratory disease, and the pattern of respiratory disease, are very similar to that found in Malawi 15 years ago [5] and accord well with hospital based studies from other African countries [1-4]. Pneumonia and tuberculosis still account for 80 per cent of all respiratory disease while smoking-related diseases such as chronic obstructive airways disease and bronchial carcinoma are uncommon. The main difference lies in the much larger number of admissions, probably because Kamuzu Central Hospital serves a local population of almost one million, in contrast to the central hospital in Blantyre which in 1973 served a local population of half a million.

Admission rates from pneumonia and asthma show seasonal variation. There is a large increase in cases of pneumonia during the dry months of the year. Microbiological studies were not performed, but it is widely held that *Streptococcus pneumoniae* is responsible for nearly every case of lobar pneumonia in Africa and is often one of the pathogens in bronchopneumonia [8]. Transmission of the pneumococcus is facilitated when relative humidity is low, perhaps because the organism survives longer, and because there is drying of the respiratory tract and reduced host resistance to bacterial invasion as a result of impaired IgA secretion. High pollen counts occur in Lilongwe District during the warm rainy season, and this may account for the increased frequency of asthmatic attacks at this time of year.

The diagnosis of pneumonia was generally easy when patients presented with a short history of illness associated with cough, chest pain, fever and signs of consolidation.

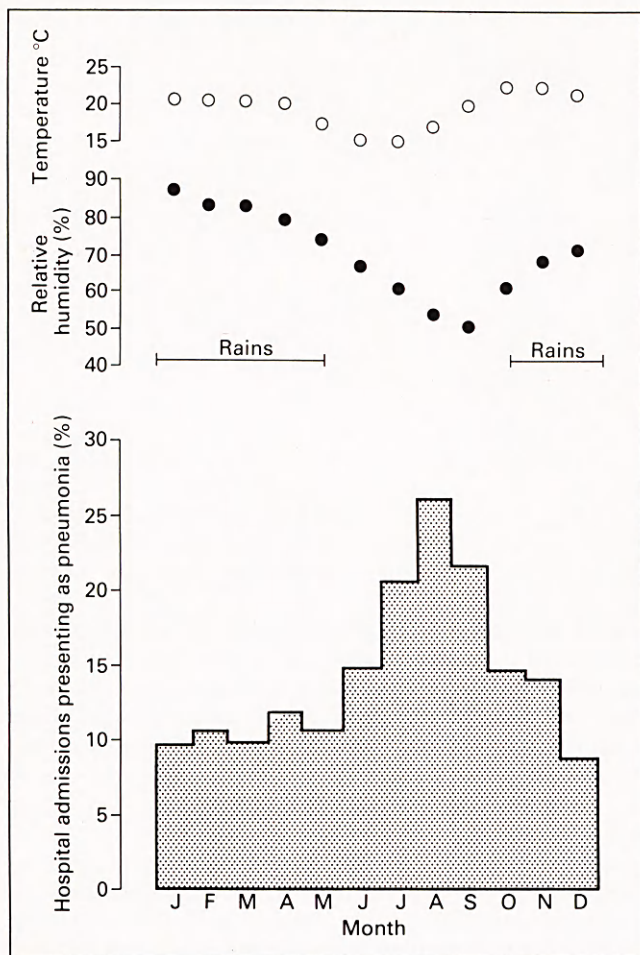


Fig. 1. The percentage of medical admissions from Lilongwe District presenting to hospital with pneumonia shown in relation to monthly temperature, rainfall and relative humidity.

However, when patients were admitted with a history of illness for several weeks associated with night sweats and weight loss, differentiation from pulmonary tuberculosis was difficult; this often resulted in prolonged hospital admission in order to obtain several sputum smears and to assess the clinical response to antibiotics. Extrapulmonary manifestations such as diarrhoea and jaundice were not found as frequently as has been reported from West Africa [9,10], but could nevertheless cause confusion in diagnosis. Penicillin was the usual treatment for uncomplicated pneumonia, and the excellent response supports the belief that the majority of our cases were caused by *Streptococcus pneumoniae*. An analysis of these organisms isolated from CSF specimens at Kamuzu Central Hospital in 1986 showed that all but one of the isolates were sensitive to penicillin and all but two were sensitive to tetracycline [11]. We favour the use of oral penicillin for treatment of patients who are mildly or moderately ill with pneumonia. Injections are inconvenient for nurses on our overcrowded wards, they are uncomfortable for the patient and they may carry dangers (not least of which is the potential transmission of HIV infection from unsterile needles) [12]. The economic

factor is also important. Ten days of oral penicillin V 500 mg four times a day in September 1986 cost the equivalent of 50 pence which was double the cost of benzylpenicillin injections for two days followed by oral penicillin. In the few patients who did not respond to penicillin, tetracycline was sometimes successful, possibly because patients had an atypical pneumonia caused by *Mycoplasma pneumoniae*. The good outcome in most of our patients with uncomplicated pneumonia contrasts with the high mortality observed in patients with pneumonia and meningitis. Pneumococcal meningitis, despite high doses of appropriate antibiotics, has a mortality of about 50 per cent in many African countries [13], and the mortality is even higher when meningitis is associated with lobar pneumonia.

Tuberculosis is still a major cause of morbidity and mortality in Malawi where the annual risk of infection amongst the population is 0.6 per cent [7]. Patients with tuberculosis can usually be distinguished from those with other respiratory tract infections by the chronicity of the illness. However, a small percentage present with acute illness, hence our reason for trying to obtain sputum smears in all patients admitted with cough and evidence of lower respiratory tract infection. Despite the length of hospitalised treatment, compliance was generally good and only 3 per cent of patients absconded. Deaths usually occurred early in the course of treatment in patients who were ill, malnourished and with extensive radiological disease. However, we are beginning to see an increasing number of patients with less severe disease who develop hypersensitivity reactions in association with HIV infection, and the mortality rate, despite corticosteroids, is high (unpublished observations).

We feel that the pattern of respiratory disease in Malawi, dominated largely by pneumonia and tuberculosis, is unlikely to change for some time. In many developing countries control measures have as yet had little impact on the incidence and spread of tuberculosis [14]. Vaccination offers the best hope of controlling pneumococcal infection, but it is far too expensive for widespread use in Africa. At present smoking-related respiratory disease appears not to be a major problem, and it is vital for countries like Malawi not to let such disease emerge when the control of infectious and nutritional disease is not yet in sight.

References

1. Laukner, J. T. (1961) *West African Medical Journal (NS)* 10, 3.
2. Turner, P. (1962) *East African Medical Journal*, 39, 121.
3. Patel, K. E. and Lwanga S. K. (1971) *East African Medical Journal*, 48, 76.
4. Bayu Teklu (1981) *Ethiopian Medical Journal*, 18, 135.
5. Brown, K. G. E. (1975) *East African Medical Journal*, 52, 509.
6. Editorial (1984) *Lancet*, i, 23.
7. Nyangulu, D. S. (1986) *Malawi Epidemiological Quarterly*, p18.
8. Bayu Teklu, Warrell, D. A. and Femi-Pearse, D. (1984) *Principles of Medicine in Africa* (ed E. H. O. Parry) 2nd edn, p761. Oxford: Oxford Medical Publications.
9. Hall, E. W. and Parry, E. H. O. (1963) *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 57, 206.
10. Tugwell, P. and Williams, A. O. (1977) *Quarterly Journal of Medicine (NS)*, 46, 97.
11. Harries, A. D. and Wirima, J. J. (1988) *Medical Quarterly (Journal of the Medical Association of Malawi)* (In press)

Australia's Bicentennial

'Nine sailing ships, rolling in heavy seas and weaving through a 600-strong welcome flotilla of small craft, sailed into Botany Bay yesterday at the end of an eight month voyage, recreating that of the first convict fleet to establish a penal colony in Australia.' Thus did *The Times* (19 January 1988) report the modern day adventurers' arrival, which was greeted by a naval gunfire salute and a fireworks display, and which symbolized the start of Australia's year-long bicentennial celebrations. It was at Botany Bay, just south of Sydney, that Captain Arthur Phillip—later to become Australia's pioneering governor—set foot on Australian soil and raised the Union Flag on 18 January 1788.

It was sometime in the summer of 1786 that the Home Secretary of the time, Lord Sydney, authorized the establishment of a colony in New South Wales and commissioned Captain Phillip to govern the colony. He in turn appointed John White a surgeon of the first fleet on the recommendation of the commander of the *Irresistible*, Captain Sir Andrew Snape Hamond, where White was then serving as surgeon. He considered him 'a young man—he was then about thirty years of age—of much credit to his profession and of that sort of disposition and temper that render him a very proper person for such an establishment.'

The First Fleet left England in March 1787 and John White kept a journal of the voyage which took them to the Canaries, Rio de Janeiro and the Cape of Good Hope. When Botany Bay was eventually reached in January 1788, White wrote: 'To see all the ships safe in their destined port, without ever having by any accident been one hour separated; and all the people in as good a state of health as could be expected or hoped for, after so long a voyage, was a sight truly pleasing, and at which every heart must rejoice'—a glowing testimony to the care bestowed on the preparations for the voyage.

The stay at Botany Bay was brief; reconnaissance had shown that Port Jackson was infinitely superior as a site for the colony, and White was enthusiastic in its praise. 'Port Jackson I believe to be without exception the finest and most extensive harbour in the universe, and at the same time the most secure; being safe from all the winds that blow. It is divided into a great number of coves to which His Excellency has given different names. That on which the town is to be built is called Sydney Cove. It is one of the smallest in the harbour, but the most convenient, as ships of the greatest burden can with ease go into it, and heave out close to the shore.'

White's journal describes the setting up of the colony and the difficulties encountered. Outbreaks of scurvy and

dysentery and lack of accommodation for the sick were the first problems. Within a year the incidence of sickness had greatly increased and a hospital was built. Nevertheless White, a keen amateur naturalist, found time to accompany Governor Phillip on two journeys of exploration. He noted that the 'Trees of this country are immensely large, and clear of branches to an amazing height. While standing, many of them look fair and good to the eye and appear sufficient to make a mast for the largest ship, but when cut down, they are scarcely convertible to any use whatever. At the heart they are full of veins, through which an amazing quantity of astringent red gum issues. This red gum I have found very serviceable in an obstinate dysentery which raged at our first landing, and still continues to do so though with less obstinacy and violence.'

On 30 February a specimen of the New Holland Cassowary was brought into camp, and was the first of many specimens of birds and animals White described and sent to England, some finding their way into John Hunter's museum in Leicester Square.

White's *Journal of a voyage to New South Wales* was published in 1790; copies with coloured plates sold for sixty-six shillings, and the book was translated into German, Swedish and French. The journal itself ended in October 1788, but the appendix, containing descriptions of animals and birds, had a brief introduction by John Hunter in which he wrote: 'It is much to be wished that these gentlemen who are desirous of obliging their friends and promoting the study of natural history, by sending home specimens, would endeavour to procure all the information they can. . . .' When, on 15 April, White discovered the great brown King's Fisher he referred his readers, as he did for some other species, to the description of the bird in Mr Latham's *General synopsis of birds*. This Mr Latham was the father of Dr Latham, Fellow of the College, who about that time was refurbishing the College library, and may well have himself have purchased the copy of White's *Journal* for the library soon after it was published. At least we know he borrowed the College copy in 1795.

By this time White, already affected by the severe strain of his duties, had applied for and eventually obtained leave to return to England, for which he sailed in December 1794, leaving the colony far healthier than it had been five years before. He never returned to Australia and being superannuated in 1820 spent his last years at Brighton, and died at Worthing in 1832 at the age of 75.

LEONARD PAYNE