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Burden and outcome of HIV infection and other morbidities in health care workers attending an Occupational Health Program at the Provincial Hospital of Tete, Mozambique

Esther Carrillo Casas[1], Tom Decroo[2], Jules Aimé Bonou Mahoudo[1], Jesus Maria Baltazar[3], Carla Das Dores[4], Luisa Cumba[4], Anja De Weggheleire[1], Veerle Huyst[1] and Emmanuel Bottieau[1]

1 *Department of Clinical Sciences, Institute of Tropical Medicine, Antwerp, Belgium*
2 *Médecins Sans Frontières, Tete, Mozambique*
3 *Provincial Hospital of Tete, Tete, Mozambique*
4 *Provincial Health Directorate of Tete, Tete, Mozambique*

Summary

OBJECTIVES To investigate the burden and outcome of HIV infection and other morbidities amongst a Mozambican hospital staff.

METHODS Within an occupational health service set up in April 2008 in the provincial hospital of Tete, Mozambique, we offered to all staff members an initial clinical, laboratory and radiological screening and followed them up prospectively until April 2010.

RESULTS A total of 47.5% of 423 health workers attended the program. The cohort (female-to-male ratio: 2.2; mean age: 39 years) consisted mostly of auxiliary staff (43%) and nurses (29.8%). At initial screening, 71% were asymptomatic. HIV infection (28.4%) and tuberculosis (TB) (21%) were the main reported antecedent illnesses. Laboratory screening revealed anaemia (haemoglobin level <10 mg/dl) in 9% participants, abnormal liver enzymes in 23.9% and a reactive non-treponemal syphilis test in 5%. Of 145 performed chest X-rays, 13% showed abnormalities. All 113 health workers not recently tested for HIV were screened, and 31 were newly diagnosed with HIV infection (resulting in an overall HIV prevalence of 43.8%). Nine cases of TB were diagnosed at screening/during follow-up. In April 2010, all but one of the participants were alive. All HIV-infected health workers under antiretroviral therapy were actively followed-up.

CONCLUSION Serious conditions were frequently diagnosed in health workers, in particular HIV infection. Mid-term outcome was favourable within this program. Creation of screening and care services dedicated to caregivers should be of highest priority in similar African settings.

keywords occupational health, health care workers, HIV, tuberculosis

Introduction

HIV infection among health care workers (HCW) constitutes one of the major threats to appropriate health care delivery in countries with a high HIV prevalence (Kober & Van Damme 2004; Uebel *et al.* 2007). Although HCW may be infected through occupational exposure, it is widely acknowledged that the vast majority of HIV infections are community-acquired (Mann *et al.* 1986). Illness and death of HIV-infected HCW have substantially worsened the deficit in human resources in health care facilities already overburdened by the HIV/AIDS epidemic (Marchal *et al.* 2005; Shisana 2007). In addition, HIV-infected workers are highly susceptible to airborne and other blood-borne occupational hazards in ill-equipped, understaffed and overstretched facilities (O'Donnell *et al.* 2010). Although the impact of HIV infection on the health workforce has long been observed (Mann *et al.* 1986; Buve *et al.* 1994), accurate and updated data on its burden among health workers remain scarce (Marchal *et al.* 2005). Studies conducted in South Africa in the last decade estimated that 15–20% of young health staff was living with HIV/AIDS (Shisana *et al.* 2004; Connelly *et al.* 2007). In a recent report from Malawi among HCW seeking care in a designated service, 63% were found to be HIV positive (Bemelmans *et al.* 2011).

Mozambique is one of the countries severely affected by the twin epidemics of HIV/AIDS and tuberculosis (TB), with a national adult HIV prevalence of 11.5%, according to a survey conducted in 2009 (Ministry of Health,

Mozambique 2009), and a TB incidence of 409 per 100.000 persons per year (WHO 2010). National data on HIV infection or other morbidities among HCW are not available. In the province of Tete, located in the central region of Mozambique, 79 AIDS-related deaths among HCW were registered by the provincial health administration in the period from 2004 to 2007, of which 15 occurred in the provincial hospital of Tete (PHT). A 'knowledge, attitude and practice' study conducted in 2006 reported 1815 episodes of sick leave by HCW in the city of Tete in 2005, for a total of 1200 HCW (University of Ghent, Belgium 2006 Internal document: 'Access of health personnel to STI/HIV/AIDS services in four districts of the province of Tete, Mozambique'). This study identified also several barriers to accessing HIV care for HCW, such as fear for stigmatisation, impression of a low ethical quality of HIV services, false sensation of protection against HIV and weak promotion of the available services. The major drawback mentioned however by most interviewed HCW was the perceived lack of confidentiality. There were indeed occasional reports of HIV status of HCW disclosed by hospital staff members to the community.

Given the perception that HIV-infected HCW were less adequately cared for than the rest of the community, an occupational health (OH) program specifically dedicated to staff was implemented at the provincial hospital. Such a program, recently formally endorsed by the International Labour Organization (International Labor Organization 2010), was already recommended by the World Health Organization (WHO) and the Ministry of Health of Mozambique at that time, but had not yet been implemented in the country. The program aimed at providing confidential, convenient and comprehensive occupational care (including HIV care) to the health staff. The objectives of the present study were to investigate the burden of HIV infection and other morbidities among the staff attending the OH consultation and to assess the mid-term outcome of the HIV-infected health workers within the program.

Methods

Study setting, design and participants

A prospective longitudinal study was conducted within the OH program (see description below) launched in April 2008 at the PHT, Mozambique, which offers secondary care to the 1.8 million inhabitants of the province of Tete. All 423 HCW (including auxiliary staff) of the PHT were invited to attend a new OH clinic located at the workplace, staffed by a medical doctor and an assistant nurse-counsellor. Invitations for staff to attend the clinic were organized through official administrative channels. First hospital staff were informed through a general presentation followed by clarification meetings in the different hospital departments. Then, each individual staff member received a written invitation from the hospital administration, and a letter with an explanatory note about OH.

All health workers coming to their first OH consultation were informed about the study objectives and were asked to participate. After consenting, baseline and follow-up clinical and laboratory data registered in OH individual files were also collected anonymously in an OH Excel database (from April 2008 to 2010). For the subset of HIV-infected HCW, baseline and follow-up data were linked within the software provided by 'Médecins Sans Frontières' for the Follow-Up and Care of HIV Infection and AIDS. The statistical descriptive analysis was performed with STATA 10.0 software. Proportions were compared with chi-square tests (or Fisher's test in case of n below 5).

The study was approved by the bioethical committees of the Institute of Tropical Medicine, Antwerp, Belgium and of the University Hospital of Antwerp, Belgium, and by the national ethical committee in Maputo, Mozambique.

Service package offered

The OH program offered a package of care aiming at preventing, diagnosing and treating major medical conditions affecting health staff within an integrated 'one-stop' service. The OH consultation consisted of two initial visits performed by a team of one medical doctor and one nurse counsellor. Because confidentiality issues were considered critical for the Mozambican staff, consultations were run initially by expatriate physicians (ECC until November 2009 and JABM from December 2009 to April 2010, and TD during the whole study period). A Mozambican physician (JMB) joined the team in June 2009, when health staff became confident in the program. All study physicians had a large experience in HIV and TB care in low-resource settings. Two nurses highly esteemed by the community of health workers for their counselling skills, commitment and discretion completed the team. The first visit consisted of taking the medical history, physical examination, HIV counselling and testing with rapid diagnostic tests in case of consent, blood sampling for haematology, biochemistry (blood glucose, liver and kidney functions), syphilis screening by rapid protein reagin (RPR) test and CD4 cell count in case of an HIV-positive result. Clinical examination, rapid testing and blood sampling were all performed in the same consultation room. Blood samples were sent to the laboratory with an identification code, only known by the OH staff. A chest X-ray was performed just after the first visit.

At the second consultation (about 2 weeks later), laboratory and radiological results were discussed.

Patients found with high blood pressure or abnormal liver enzymes during the initial visit were reassessed. In case of persistent arterial hypertension, treatment was started at the OH clinic following national protocols (diuretics in first-line). Workup for persistent abnormal liver enzymes was limited to inquiry on alcohol or drug abuse because serological testing for chronic viral hepatitis and ultrasonography were inconsistently available. For HIV-positive HCWs, appropriate treatments and prophylactic regimens were immediately dispensed in the consultation room if indicated, as well as isoniazid prevention systematically. After the initial two-visit screening, health workers were offered a yearly follow-up, except HIV patients and a few additional patients with other morbidities who were seen more frequently according to their specific needs for clinical and treatment monitoring.

The main principles driving the service were confidentiality, convenience and comprehensiveness. Confidentiality was safeguarded by the composition and small size of the OH team and guaranteed through the systematic use of identification codes randomly assigned in the invitation letter. Names of HCW were not registered in files, laboratory requests, results or identification cards. Convenience was ensured through offering a 'one-stop' consultation in a quiet room of the hospital compound, with 'on-the-spot' blood sampling and drug delivery, avoiding additional visits and queues at the laboratory or pharmacy. Comprehensiveness was enhanced by the general concept of the service, with delivery of general and individualized preventive and curative care for any health problem, not focusing only on HIV-related matters. First-degree relatives of sick HCW were also invited for screening and care if required. Purposely, consultations were adequately spaced (every 15–30 min) allowing longer and dedicated patient-provider interactions. A maximum of five screening visits (for new clients) and five follow-up visits were scheduled per consultation day, initially once a week and later on twice a week. Of note, defaulters of the HIV follow-up were actively traced. After completion of the study, the service continued to be offered as an integrated part of the hospital services.

Results

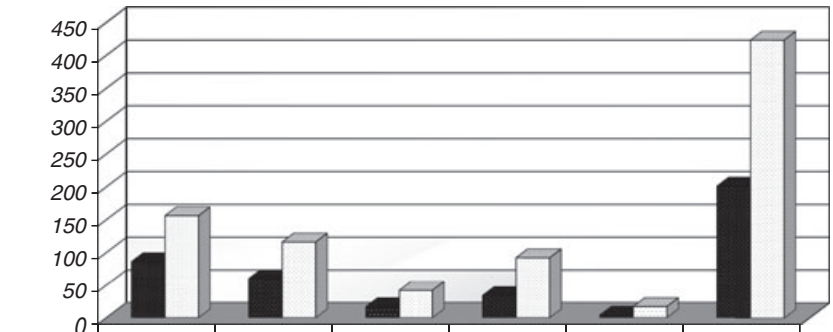
Baseline characteristics

From April 2008 to 2010, 201 (47.5%) of a total of 423 invited HCW attended for initial visits at the OH clinic. All 201 consented to participate in the study. The female-to-male ratio was 2.2. Mean age was 39 years (range: 22–79 years). The study population consisted mainly of support staff (n = 86, 43%) and nurses (n = 60, 29.8%). Attendance rates at the OH clinic for different categories of health workers varied from 55% for support staff to 23.5% for physicians (Figure 1).

Medical history

As shown in Table 1, of the 201 HCW enrolled in the study, 57 (28.4%) knew already that they were HIV-infected at the first visit, and 32 or just over half of these were already on antiretroviral treatment (median duration: 1.84 year; range: 0–5 years). Also, 42 participants (21%) reported a prior TB episode (including 24 of the 57 known HIV-positive HCW). The number of staff reporting previous TB was significantly higher for HIV-positive staff than for HIV-negative staff as shown in Table 2. Other reported medical conditions included arterial hypertension (5.5%) and asthma (3%).

Of note, 31 (15.4%) of the enrolled HCW had tested HIV negative within the last 3 months prior to study



	Support staff	Nurses	Administrators	Technicians	Physicians	Total
Attending	86	60	17	34	4	201
Total invited	156	116	42	92	17	423

Figure 1 Attendance rates to the occupational consultation according to job position.

Table 1 Symptoms, signs, laboratory and radiological features at initial occupational screening of attending HCW (n = 201) according to already known, newly diagnosed or absence of HIV infection

	Known HIV-positive HCW	New HIV infection diagnosed at screening	HIV-negative HCW	Total HCW
	n = 57	n = 31	n = 113	n = 201
Demographic data				
Female	41 (71.9)	21 (67.7)	75 (66.4)	137 (68.2)
Mean age (SD), years	39.3 (8.4)	38.5 (8.2)	39.3 (9.7)	39.2 (9.1)
Medical history				
History of tuberculosis treatment	24 (42.1)	3 (9.6)	15 (13.3)	42 (20.9)
Arterial hypertension	3 (5.3)	1 (3.2)	7 (6.2)	11 (5.5)
Asthma	1 (1.7)	–	5 (4.5)	6 (3)
Symptoms and signs				
No symptom	37 (64.9)	22 (71)	84 (74.5)	143 (71)
Cough	4 (7)	3 (9.5)	6 (5.5)	13 (6.5)
Diarrhoea	4 (7)	–	1 (1)	5 (2.5)
Weight loss	12 (21)	9 (29)	12 (10)	33 (16.4)
Genitourinary complaints	4 (7)	–	6 (5.5)	10 (5)
Fever	2 (3.5)	2 (6.5)	5 (4.5)	9 (4.5)
Elevated blood pressure (>140/90)	4 (7)	3 (9.5)	9 (8)	16 (7.9)
Complementary screening				
Haemoglobin level <10 g/dl	8 (14)	5 (16)	5 (4.5)	18 (9)
Alanine aminotransferase above 40 IU/l	17 (29.8)	6 (19.3)	25 (22.1)	48 (23.8)
Reactive rapid protein reagin	3 (5.3)	1 (3)	6 (5.5)	10 (5)
Abnormal urinalysis	4 (7)	1 (3)	–	5 (2.5)
Abnormal chest X-rays	7/49 (14.3)	7/23 (30.5)	5/73 (7)	19/145 (13)

Data are reported in n (%) unless otherwise mentioned; HCW, health care workers.

inclusion. The remaining 113 HCW (56.2%) reported having tested negative for HIV more than 3 months ago (n = 60), or never having been tested (n = 53).

Symptoms and signs at OH screening

Most (71%) HCW entering the OH program did not report any symptom during the screening visit. The most frequently reported complaints were (undocumented) weight loss and cough (Table 1).

Laboratory and radiological screening

All 113 study participants without recent HIV screening agreed to be tested. Most (28 of 31) patients who had tested negative within the previous 3 months agreed to a new screening (and one was found positive). Six HCW who had previously tested HIV positive asked for re-testing because they were on denial of being infected and all were confirmed positive. In total, 31 health workers were newly diagnosed with HIV infection, corresponding to 15.4% of the whole study cohort (and to 27.4% of 113 health workers not recently tested).

Anaemia (haemoglobin level below 10 g/dl) was diagnosed in 9% of the HCW, but was much more frequently seen in HIV-positive HCW (Table 2). Elevated liver transaminases (alanine aminotransferase above 40 IU/l) were found in 23.8% of HCW, although not associated with HIV infection. RPR testing was reactive in 5% of all HCWs tested. Urine strips results were abnormal in 2.5% of all HCWs tested.

Of 145 performed chest X-rays, 19 (13%) showed some abnormalities. Abnormal findings were more frequent in HIV-positive HCW (Table 2).

Tuberculosis

Nine individuals (4.5% of the study cohort) were newly diagnosed with active TB by the study physicians at screening (n = 4) or during follow-up (n = 5). Eight of them were HIV-infected, and one had smear-positive pulmonary TB. All patients were given anti-TB treatment according national guidelines and recovered uneventfully.

Follow-up and outcome of HIV-infected health workers

Of the 201 enrolled HCW, a total of 88 (43.8%) had an HIV infection. Of the 57 HCW with known HIV infection at the first consultation, 14 (24.5%) were not undergoing any active follow-up. Thirty-one (54%) of those 57 with

Table 2 Clinical, laboratory and radiological features of study participants according to HIV infection (already known or newly diagnosed)

	HIV-positive HCW (n = 88)	HIV-negative HCW (n = 113)	P
Medical history			
History of tuberculosis treatment	27 (32)	15 (13.5)	**0.003**
Symptoms and signs			
No symptom	59 (69)	84 (74.5)	0.4
Cough	7 (7.9)	6 (5.5)	0.4
Diarrhoea	4 (4.5)	1 (1)	0.1
Weight loss	21 (23.8)	12 (10.6)	**0.015**
Genitourinary complaints	4 (4.5)	6 (5.5)	0.7
Fever	4 (4.5)	5 (4.5)	1
Complementary screening			
Haemoglobin level <10 g/dl	13 (14.7)	5 (4.5)	**0.011**
Alanine aminotransferase above 40 IU/l	23 (26.1)	25 (22)	0.5
Reactive rapid protein regain	4 (4.5)	6 (5.5)	0.8
Abnormal chest X-rays	14/72 (19.4)	5/73 (7)	**0.02**

Data are reported in n (%).
HCW, health care workers. P values shown in bold are statistically significant.

already known HIV infection, as well as all 31 newly diagnosed health workers decided to be followed-up within the OH program (instead of the general HIV clinic or peripheral health care facilities).

The median CD4 cell count at screening was 400 (Q1–Q3: 325–492) in patients with known HIV infection already under treatment, 340 (Q1–Q3: 227–508) in those with known infection but not yet treated and 259 (Q1–Q3: 182–369) in those newly diagnosed. Antiretroviral therapy had to be initiated during the study period in 21 health workers (in line with the 2006 WHO recommendations). One HIV-infected health worker died because of a non-HIV-related condition and another one was transferred out. All other patients on antiretroviral therapy were alive and still actively followed-up as in April 2010. Of the 35 HIV-infected patients not requiring antiretroviral therapy, 19 (52%) did not come to regular follow-up, but all of them were alive. No important health event was reported in the HIV-uninfected cohort, re-seen once a year.

Of note, 20 relatives of HIV-positive HCW aware of their infection at study entry and an additional three relatives of newly diagnosed HCW decided to be followed-up in the OH program as well.

Discussion

To address the barriers faced by HIV-infected HCW, an OH program was designed and implemented in the PHT, Mozambique. This study reports the main epidemiological and outcome findings observed in the cohort of HCW who attended the program. The prevalence of HIV infection was higher than expected (43.8%), and a sizeable proportion of health workers had other potentially serious morbidities (TB, anaemia, liver enzyme disturbances, syphilis or arterial hypertension). Through the program, about 15% of the attendees were newly diagnosed with HIV infection and about 5% with TB. Of all screening tests performed, blood pressure measurement, HIV testing, chest X-rays, haemoglobin level and liver function tests were the most valuable as they detected abnormalities for between 7.9% and 27.4% of asymptomatic HCWs. Finally, a large majority of HIV-infected health workers accepted to be followed up within the program, and clinical outcome at 2 years was favourable.

The main limitation of this study is the probable selection bias towards the sickest HCW, including those already aware of their HIV infection, or possibly also towards those with highest behaviour risks. This may explain to some extent the surprisingly high HIV prevalence. Another possible explanation is the progressive concentration of HIV-infected health workers in the reference hospital, as this was the only place where HIV treatment was available before 2007 in the whole province. However, although probably overestimating the actual disease prevalence among health workers, our data suggest that the HIV burden must be considerable as a whole, underlining the relevance of such an occupational program.

The other important limitation is the attendance rate of just under 50% of the total work force. Consequently, prevalence rates of HIV and TB cannot be calculated. The reasons for non-adherence to the OH screening program, despite repeated invitations, are now being explored in a

qualitative research. To a certain extent, we are already aware that the concept of 'OH' itself remained unclear for some health workers. Also, and most probably, the occupational consultation remained unavoidably considered as a 'HIV testing consultation for HCW' despite all efforts made to provide general care. The results of the current qualitative research will be critical to consolidate the project and its sustainability.

In contrast to the disease burden, the morbidity pattern was not really surprising. Most pathological conditions were related to the high HIV prevalence in the setting. However, a high proportion of HIV-uninfected health workers were also found with liver enzyme abnormalities. Unfortunately, serological testing for chronic viral hepatitis B and C and ultrasonography of the liver were not always available during the study period, and follow-up of liver enzymes abnormalities was inconsistent. The absence of reliable and systematic data on this subgroup of participants is a weakness of this study and does not allow us elaborating robustly on this unexpected finding. A better documented study should clarify this observation in the future. Another issue which could not be fully addressed during this study is the protective impact of isoniazid prophylaxis that has been offered to all HIV-positive HCW according to Mozambican guidelines. Duration of follow-up was indeed too short for relevant reporting.

The lack of human resources for health has long been regarded as the main obstacle for addressing the HIV epidemic in highly endemic sub-Saharan African countries. Concerns about the general health of the caregivers have been raised repeatedly (Mann *et al.* 1986; N'Galy *et al.* 1988; Buve *et al.* 1994; Kober & Van Damme 2004). In South Africa, the staff vacancy rate in health facilities was as high as 38% in 2007 (Uebel *et al.* 2010). Workload, professional frustration, burn-out, but also HIV infection and sickness of the HCW themselves are the main causes of the attrition of HCW (Marchal & De Brouwere 2004; Marchal *et al.* 2005), underlining the urgent need to address their specific problems. Workplace-based HIV care programs have been reported by some private commercial companies and in a few health care settings (Collier *et al.* 2007; Bemelmans *et al.* 2011). Uebel *et al.* (2007) described three models of caregiver-centred HIV services in South Africa and Botswana and attributed also their success to a similar integrated, non-stigmatizing and free of charge approach. The additional strengths of our program were the more personalized patient-centred approach, the systematic provider-initiated HIV testing, the 'one-stop' service design and the general screening for other morbidities also frequently observed (Kruse *et al.* 2009). Finally, we report on the favourable mid-term outcome of the study participants, thanks to a very high proportion of HIV-positive health workers actively followed-up and adherent to the antiretroviral therapy. Although our study was not designed to quantify the long-term impact of the program on the health workforce, we can mention that only one hospital staff member died during the 2-year study period, compared with an average of five fatalities reported yearly before 2008. Of note, however, even in this strongly supported service, retention in care of untreated HIV-positive staff was not optimal, as observed in general HIV programs.

Other major challenges remain. First, the initial intervention of foreign physicians was perceived as essential for the success, also by our Mozambican counterparts, but this is not possible everywhere. The involvement of Mozambique physicians, ideally from the early stages of the process, is crucial for building-up and sustaining such projects. Punctuality with OH appointments and sustained supply of antiretroviral drugs in this parallel circuit are additional long-lasting challenges. The major issue, however, will be the scaling up of the OH program to health staff of peripheral facilities. In Tete, this will represent a fivefold increase in workload, which can only be addressed by simplifying the screening and follow-up procedure, as well as by task shifting. Our findings may allow us to limit the initial screening to the four or five most relevant tests, and most OH consultations could be standardized rather easily and performed by trained nurses. Nevertheless, close monitoring and evaluation of the programmatic quality will remain critical.

Finally, as highlighted by others (Nyblade *et al.* 2009), interventions to respond to the workforce crisis should address simultaneously all three individual, environmental and policy levels. For real sustainability, implementation of similar programs requires the strong commitment of the national health systems, far beyond just guideline writing.

In conclusion, we propose an innovative but demanding strategy aimed at caring for caregivers in HIV-burdened countries. We are convinced that keeping health staff healthy is feasible even in low-resource public systems and should be an ethically and pragmatically mandatory effort in any concerted strategy addressing the health workforce crisis in African countries.

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Corresponding Author Esther Carrillo Casas, Médecins Sans Frontières Operational Cell Amsterdam, Plantage Middenlaan, 14, Amsterdam, The Netherlands. E-mail: esther.casas@msf.org

