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Our health facilities are still unsafe: why we all need to do something about TB infection control (29/5/08)

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TB infection control (IC) needs attention and activism

This special edition of HATIP covers infection control. It is aimed at health care workers, programme planners, community organisations and treatment advocates - all groups that have an important role in TB infection control.

This edition is kindly supported by the World Health Organization's Stop TB department.

Almost two years have passed since news of the outbreak of extensively drug resistant tuberculosis (XDR-TB) at the Church of Scotland Hospital in Tugela Ferry, South Africa was first announced to the world.[1] XDR-TB is defined as TB with resistance to at least rifampicin, isoniazid, a second line injectable drug (capreomycin, kanamycin or amikacin) and a fluoroquinolone.[2]

As HATIP reported previously (see December 2006 and January 2008) there was strong evidence that the initial outbreak in Tugela Ferry evolved locally and was spread to other patients at the hospital or possibly within HIV patient support groups.

The discovery led to panic and calls for compulsory detention of MDR TB patients, and highlighted the spread of TB within hospitals filled with people with HIV.

But after all the hoopla, have our health facilities, prisons, mines, or HIV care services, become any safer?

“Everyone talks about Tugela Ferry and what happened. But what has changed regarding TB IC? Nothing much, I’m sorry!” Dr Refiloe Matji said at the WHO’s Three I's for HIV/TB meeting, held this past April in Geneva. Dr Matji is the regional director of University Research Inc for Southern Africa. “And who should take on that responsibility? More hospitals are being built today but has anyone checked that TB IC is in place?”

(The Three I's are activities to reduce the burden of TB in people with HIV, including intensified case finding (ICF), isoniazid prophylaxis (IPT) and TB IC.)

South Africa’s Ministry of Health has now produced a new TB IC policy to respond to the crisis, but with the exception of the Church of Scotland Hospital in Tugela Ferry and a handful of other facilities (see below), most reports are that implementation of TB IC on the ground is either slow or not happening at all.

And with a few exceptions, there has been little action in many other resource-limited settings.

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"It's pretty clear that TB infection control is lacking pretty much everywhere in the world," said Dr Mario Raviglione, head of the Stop TB Department at WHO.

Drug-resistant TB is more common in Africa than people think

In a recent paper, Drs Ellen Zager and Ruth McNerney argue that the burden of MDR-TB in sub-Saharan Africa is more significant than people realise.[3] Traditionally, drug-resistant TB has been presented as a proportion of the total number of TB cases — and that proportion is quite high in places like Russia or China, but lower in Africa. However, Zager and McNerney write, "if one considers the incidence of new TB cases with drug resistant disease in terms of the population, then countries of sub-Saharan Africa have amongst the highest rates of transmitted MDR-TB in the world."

When looked at this way, South Africa moves up from number 25 in the list of high prevalence MDR-TB countries to number 4.

And the majority of MDR-TB cases in sub-Saharan Africa go undetected. Those that are diagnosed remain untreated for the most part.

For instance, Dr. Argata Guracha of Kenya's Ministry of Health told the Three I's meeting that Kenya had only 82 new confirmed cases of MDR-TB last year, about 250 cumulative (currently living). But only ten percent of these are on 2nd line treatment (which began this year). "Those not on treatment act as a reservoir for the spread of the disease," he said. "And even where we treat them - that's at the national referral hospitals - patients are not isolated. Isolation facilities are not [yet] available."

The risk of leaving known patients with MDR-TB without proper treatment, is that they may be tempted to seek care from doctors who institute inadequate treatment with second line drugs, resulting in treatment failure and emergence of XDR-TB. Patients may also self-medicate with the same risks of XDR-TB emergence.
XDR-TB cases confirmed in Botswana and Namibia

And now there is confirmed evidence that XDR-TB has either spread to or has evolved spontaneously in other African countries. The first report came in January, this year, when the government of Botswana announced two cases that were detected at Princess Marina Hospital in Gaborone.

Then on May 15, the Ministry of Health and Social Services in Namibia confirmed the detection of the country's first 8 cases of XDR-TB.[4] With

second-line drugs having been used since 1999, many more are likely to have gone unnoticed.

What is more troubling is that the cases were scattered throughout that country, indicating that XDR-TB is probably widespread and not clustered around one particular facility. Most were close to the border of Angola. One was in Katima Mulilo — less than four kilometres from the border post to Zambia and very close to Botswana and Zimbabwe.

It bears repeating: the drug resistant cases being identified in Africa are probably only the tip of the iceberg. The more we look, the more we're sure to find.

And the problem is sure to grow. According to a mathematical model published last year by the team in Tugela Ferry: "Without new interventions, about 1300 cases of XDR tuberculosis could arise in Tugela Ferry, KwaZulu-Natal by the end of 2012—most of which would be due to nosocomial transmission.[5] However, they estimated they could cut those numbers in half by practising fairly simple TB IC measures.

Poor TB infection control responsible for over half of TB cases in people with HIV?

But outbreaks of drug-sensitive TB within a health facility are likely to be much more common — just harder to detect. This should worry HIV programmes in particular because drug-sensitive TB is the leading cause of death in people with HIV. People should not be expected to put themselves at high risk of TB exposure in order to access HIV care.

For a host of reasons, it is difficult to determine precisely how much of the TB in people with HIV is acquired in health care settings, according to Dr Liz Corbett of the London School of Tropical Medicine and Hygiene and the Biomedical Research & Training Institute in Harare.[6]

"However, my guess would be that over 50% of TB disease, in some and perhaps many HIV clinic settings, is due to institutional transmission," she said.

That guess is primarily based on data from serial South African gold mining cohorts looking at TB in people living with HIV. Dr Corbett was involved in the first cohort study, which was carried out before there was an HIV care clinic and investigated the recurrence rate of TB in participants after they had been treated and cured.[7] Any active disease that occurred after a cure would be due to a re-infection (and not recrudescence of incompletely treated TB) and thus was a good way to measure TB transmission.

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Not long thereafter, Dr Alison Grant published a study in the same HIV-infected population looking at secondary isoniazid preventive therapy with placebo arm.[8] But in that placebo arm, the TB recurrence rate had doubled.

• Prior to establishment of the HIV care clinic, the TB recurrence rate was 8.2 per 100 person years in HIV-infected miners

• Once an HIV clinic was established, recurrence went up to 19.2 per 100 person years in miners not taking isoniazid (it was 8.6 per 100 PYs in those that did have secondary IPT)

What had changed? An HIV clinic had been set up at the mine.

Other factors could also be contributing the differences between cohorts (such as the age of the miners), but Dr Corbett's estimate highlights a little appreciated fact about the ART-scale up: that failure to include TB infection control in HIV and ART clinics has put people at serious risk of TB (re-) infection. In fact, Dr Corbett also suggested the high rates of TB that continue to be seen in people with HIV on ART may be partly due to the continuously high risk of TB exposure in the ART clinic.

Muhamed Mulongo, a programme officer for The AIDS Support Organization (TASO) who was also at the Three I's meeting, said that programmatic experience was leading his organisation to the same conclusion.

"About 30% of the patients we treat for TB are either getting it for the 2nd or 3rd time and we've realized that many of these patients have actually been in care for a long time. We are realising that more transmission of TB is taking place within the HIV clinics. I think our corridors are dangerous, somehow," he said.

Dr Alasdair Reid of UNAIDS voiced similar concerns: "When will people realise that the ART units being built around the world are actually TB transmission units? Because the ones I've visited have been the very typical long central corridor waiting area with no ventilation, where people sit for hours waiting for their ART treatment with coughing patients."

"As an unintended consequence of the ART scale-up, we may literally be spreading TB to people coming in for care," said Dr Bess Miller, of USAID and PEPFAR, at the STOP TB Symposium before the Union World Lung Health Conference last November:

The risk to health care workers

The healthcare system's most precious resource, its staff, is also at high risk of acquiring TB in their very own facilities — particularly those who

work closely with patients. “Part of the problem at my facility,” Dr Francois Venter of Johannesburg Hospital told HATIP, “is that they do feel safe – as evidenced by the complete lack of concern regarding TB IC”.

It’s a false sense of security.

In the 1990s, Dr. Anthony Harries and colleagues in Malawi reported that healthcare workers had a 12-fold higher risk of developing TB each year compared to the general population.[9] The annual risk of TB was high among all categories of HCW, especially clinical officers.

Speaking at the STOP TB Symposium last year, Dr Martin Jagui Moscoso described TB transmission among health workers in Peru, a country with a low incidence of HIV but a relatively high incidence of TB (100-200 per 100,000) and MDR-TB. In one study, the annual rate of tuberculin skin test conversion (TST: which can detect latent or recent TB infection in most cases) was 17% among medical residents at one facility.[10]

Then, in 1997, an outbreak of active TB in Almenara Hospital involved 44 health workers (36 of whom had confirmed TB).[11] The annual TB incidence that year for the laboratory staff was 6977 per 100,000, and for the rest of the medical staff 932 per 100,000. The only risk factor for TB in the laboratory was the use of common staff areas.

A systematic review looking at TST conversion among health care workers in Asia or South America reported an incidence of 5.8% (0-11.3%) per year on the job.[12] [13] An increased incidence of positive results on TST among health workers with frequent patient contact has also been reported from Côte d’Ivoire.[14]

About TB transmission

Only people with active pulmonary or laryngeal tuberculosis are infectious, but when they speak, spit, cough or sneeze without covering their mouth, they can propel fine droplets into the air (aerosols) containing infectious *Mycobacterium tuberculosis*.[15]

Despite this, “most patients appear surprisingly un-infectious,” said Dr Corbett. Current estimates are that someone with smear-positive TB may cause an average of 8-10 secondary infections per year and that only about 3 out of 10 household contacts become infected despite prolonged exposure.

But that’s the mean. There are wide variations in how infectious someone might be. A small number of people with TB seem far more infectious in experimental models and DNA fingerprinting studies. [16] [17] [18]

[19] Generally, these people are smear-positive, and some may also have laryngeal TB (along with pulmonary or cavitory TB).[20]

Other features of infectious people may be that: 1) they aren't on effective treatment yet (think of the undiagnosed patient sitting there coughing in the waiting room) because there is no triage, 2) they have yet to benefit from it (it generally takes a week or so on effective treatment for drug-sensitive TB to become less infectious) 3) they may be failing treatment because of drug resistance, 4) they may be non-adherent; 5) the doctor has prescribed an inadequate treatment regimen; 6) the drugs may be of inferior quality.

In one study, DNA fingerprinting of TB cases in a South African gold mining community indicated that one individual may have been responsible for about 15% of TB cases in the entire workforce (around 28,000 people).[21] This man had a prolonged period of infectiousness during a treatment failure lasting over 10 years.

It is not clear whether HIV increases susceptibility to becoming infected with TB, although it dramatically increases the likelihood of developing active disease. Most active TB disease in people with HIV appears to be recently acquired

Nor is it clear whether HIV increases infectiousness, however, because of the increased number of TB cases, HIV has dramatically increased the exposure to active TB in the community and health care settings in countries with a high burden of HIV.

A person with TB who is coughing without covering his or her mouth poses a greater risk to someone close by than someone sitting across the room. Even so, tiny droplets that could contain infectious bacilli can remain in a room without good ventilation for a very long time.

"A one µl droplet takes 24 hours to fall 3 metres in perfectly still air. So what happens with just a little bit of air movement? It may potentially be in that room, if it is all closed up, almost forever," said Dr Paul Jensen of the CDC at a Médecins sans Frontières' sponsored symposium on TB diagnostics last November in Cape Town before the Union World Lung Health Conference.
"Overall the risk of TB infection in African communities is 0.5% to 4% per year. The risk after 7 days in a hospital may be equivalent to 6 months to 1 year in the community," said Dr Corbett.

Reducing the risk of TB exposure through TB IC

"Infection control is not a new discovery," Dr Miller said during her talk in Cape Town. "It's been around but it's always something that we put on the back burner."

Indeed, the WHO first put out guidelines for TB IC in resource-limited settings in 1999, which have been updated with an addendum related to TB IC in HIV care settings —but these have been poorly implemented. The key activities recommended in WHO and CDC technical guidance are summarised below (see the guidelines themselves in the *Resources* section).

Five steps to infection control in HIV care settings for preventing TB transmission

From the TB IC in HIV Settings Addendum (this guidance is primarily for outpatient facilities such as ART clinics) (see resources)

Step I: Screen for TB — early recognition of cases or suspects is essential

This can be achieved by assigning a staff member to screen patients for prolonged duration of cough immediately after they arrive at the facility.

Step II: Teach cough hygiene

Clients who screen positive as TB suspects should be instructed to cover their mouth and nose when they cough or sneeze, and handed tissues or handkerchiefs if possible. Face-masks may be an option in some situations.

Step III: Separate

TB cases or suspects by the screening questions must be separated from other patients and requested to wait in a separate well-ventilated waiting area.

Step IV: Provide HIV/AIDS services

Triage symptomatic patients to the front of the line for the services they are seeking

Step V: Investigate for TB or refer

TB diagnosis on site or prompt (and effective) referral — followed by prompt treatment

Good work practice and administrative measures (has the greatest impact)

- A written infection control plan for each facility
- Administrative support for procedures in the plan, including quality assurance
- Training and supervision of staff
- Education of patients and increasing community awareness
- Coordination and communication with the TB programme.

- Increasing awareness: Increasing access to HIV testing, with ART, IPT and consideration of changing duties (although changing jobs has been an unpopular choice in most settings).

Environmental measures

- Ventilation (natural and mechanical)
- Filtration
- UV radiation

Personal respiratory protection

- Facemasks may prevent the spread of TB from the patient but teaching cough etiquette is less stigmatising
- N 95 respirators may protect health workers and patients but are expensive (generally only recommended for when other protections aren't sufficient — such as when seeing someone with drug-resistant TB).

Some have complained that the guidance is too technical or not well-suited to resource-limited countries. But with a little effort, some programmes have been able to adapt the policy to local conditions.

"In establishing national infection prevention control guidelines for TB in South Africa, it has become evident that most of these were derived from existing guidelines in developed countries. Though the principles were sound, the practices were not realistic for developing economies and generally not implemented in healthcare facilities," said Professor Shaheen Mehtar of Stellenbosch University and Tygerberg Hospital, near Cape Town, in a recent Lowbury Lecture. But Prof Mehtar and colleagues at Tygerberg Hospital took up the challenge and adapted the guidance as best as they could to their setting.

Updated WHO guidelines are in development that should include a package of action steps to help countries start improving TB IC taking into account differences in resources and settings. "We are developing straightforward guidance on what to do at national level in terms of TB infection control in health care and congregate settings and how to prioritise interventions," WHO's Dr Fabio Scano told HATIP.

But waiting for new WHO guidelines should not become the next excuse to do nothing. Countries or HIV programmes need to move ahead and adapt the existing guidance and develop tools, information education and communication materials and training packages. At the Three I's meeting, WHO, the CDC and other technical partners committed to providing technical assistance to help countries "translate" existing guidance into national policy and operating plans (to be discussed at more length in a future report on the Three I's meeting).

In addition, some helpful tools have already been developed such as those from The Integrated Management of Adolescent and Adult Illness (IMAI) (see resources). Others are being put together by MSF in Khayelitsha working with WHO (contact msfb-khayelitsha-ic@msf.org.za) and PEPFAR is working with ICAP to develop tools based on its experiences in the Eastern Cape.

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