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Viewpoint

Keeping health facilities safe: one way of strengthening the interaction between disease-specific programmes and health systems

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Summary The debate on the interaction between disease-specific programmes and health system strengthening in the last few years has intensified as experts seek to tease out common ground and find solutions and synergies to bridge the divide. Unfortunately, the debate continues to be largely academic and devoid of specificity, resulting in the issues being irrelevant to health care workers on the ground. Taking the theme 'What would entice HIV- and tuberculosis (TB)-programme managers to sit around the table on a Monday morning with health system experts', this viewpoint focuses on infection control and health facility safety as an important and highly relevant practical topic for both disease-specific programmes and health system strengthening. Our attentions, and the examples and lessons we draw on, are largely aimed at sub-Saharan Africa where the great burden of TB and HIV/AIDS resides, although the principles we outline would apply to other parts of the world as well. Health care infections, caused for example by poor hand hygiene, inadequate testing of donated blood, unsafe disposal of needles and syringes, poorly sterilized medical and surgical equipment and lack of adequate airborne infection control procedures, are responsible for a considerable burden of illness amongst patients and health care personnel, especially in resource-poor countries. Effective infection control in a district hospital requires that all the components of a health system function well: governance and stewardship, financing, infrastructure, procurement and supply chain management, human resources, health information systems, service delivery and finally supervision. We argue in this article that proper attention to infection control and an emphasis on safe health facilities is a concrete first step towards strengthening the interaction between disease-specific programmes and health systems where it really matters – for patients who are sick and for the health care workforce who provide the care and treatment.

keywords health systems, disease-specific programmes, HIV/AIDS, tuberculosis, infection control

Introduction

At the recent XVIII International AIDS Conference in Vienna in July 2010, there was a well-attended 2-day pre-conference symposium entitled 'Bridging the Divide: Inter-disciplinary partnerships for HIV and Health Systems'. There were excellent presentations and much debate on global policy and the importance of strengthening health systems. Amongst some of us, however, there was a growing, unspoken concern regarding the need for concrete action to move this agenda forward, and we began to think about how we might translate the rhetoric into reality in the context of a district hospital or a health centre in a low-income country. Pertinent questions arose from attendees, two of which struck a cord with our concerns: '*Based on all the discussions, what would we do differently tomorrow?*'

and '*What on a Monday morning would entice HIV- and tuberculosis (TB)-programme managers to sit around the table with health system experts?*'

Long before this symposium was held, there had been much talk and writing on the interaction between health systems and disease-specific programmes, and the synergies and antagonisms of the effects of one in relation to the other (WHO Maximizing Positive Synergies Collaborative Group 2009). There are claims that disease-specific programmes overburden health systems that are already fragile in countries with few resources, and that they do not contribute to the strengthening of these systems. Others counter that weak health systems prevent progress in meeting disease-specific targets, and that disease-specific programs can contribute to strengthening health systems through their focus on specific outcomes (Ooms *et al.* 2008). The areas of mutual interest, the challenges and the solutions in this whole debate focus around the intersection between specific programmes and key components of the health system including governance and stewardship, financing, infrastructure development, procurement and supply chain management, human resources, health information systems, service delivery and supervision (Harries *et al.* 2009; Atun *et al.* 2010). The debate tends to be academic, largely focusing on international and national policy issues.

However, at the service delivery end of the spectrum in the context of HIV and TB programmes, one subject that epitomizes the intersection between disease-specific programs and the health system is infection control, an issue of critical importance for the safety of patients and health care workers. The issue of infection control is not new. In 1847, Ignaz Semmelweis, a Hungarian physician, showed that puerperal fever, a common cause of maternal mortality in the 19th century, could be drastically reduced by the simple means of hand washing with chlorinated lime solution in obstetric clinics (Semmelweis 1861). With the acceptance of Semmelweis's practice years after his death, puerperal fever is now an uncommon disease, even in resource-poor countries. However, the subject of infection control remains a crucial area of health care provision, especially in resource-poor countries in sub-Saharan Africa, and one which we think can help to strengthen the interaction between communicable disease programmes and health systems at the health facility level. In this paper, we enlarge on this theme. We highlight the risk of infections for patients and health workers attending health facilities, then outline the essential components for making infection control work in health facilities and finally conclude that infection control collaboration between HIV and TB programmes and health systems is the first step towards a broader framework that aims to strengthen health systems across general medicine, paediatrics, surgery and maternal health.

Risks of infection for patients and health care workers

At any one time, health care associated infections affect about 1.5 million people worldwide (Morris 2008). Around 5–10% of patients in hospitals in developed countries acquire health-care associated infections, the risks being considerably higher in poorer countries (Morris 2008). Examples of health care infections include the spread of methicillin-resistant *Staphylococcus aureus* and *Clostridium difficile*-related diarrhoea (most commonly as a result of poor hand hygiene practices), infection with HIV and hepatitis (as a result of low rates of testing donated blood, the re-use of syringes and needles or occupational needle-stick injuries), and nosocomial spread of *Mycobacterium tuberculosis* (as a result of poor airborne infection control).

In 2007, an estimated 85 million blood donations were given globally, yet 41 of 162 countries reported being unable to screen donated blood for one or more of the following infections: HIV, hepatitis B, hepatitis C and syphilis. Moreover, only 40% of blood donations in low-income countries were screened after basic quality assurance procedures (WHO, UNAIDS, UNICEF 2009). In Kenya, erroneous laboratory practices were cited as one of the most important causes of blood transfusion-related HIV transmission (Moore *et al.* 2001). Occupational needle stick injuries in nurses and surgeons are common throughout Africa, as a result of lack of safety devices or poor disposal mechanisms, and furthermore, there is a paucity or poor uptake of programmes offering post-exposure prophylaxis for those exposed to HIV or hepatitis B in this way (Newsom & Kiwanuka 2002; Van Oosterhout *et al.* 2009).

Health facility-based TB transmission is an important public health problem, exacerbated by the HIV/AIDS epidemic and the emergence of multidrug- and extensively drug-resistant TB. In areas of high HIV prevalence, HIV-related TB accounts for a large proportion of all admissions and outpatient consultations, resulting in intense risk for TB transmission within congested, poorly ventilated facilities (Corbett *et al.* 2007; Shenoi *et al.* 2010). Patients, especially those with HIV, who attend for long-term care almost certainly become exposed to appreciable, but generally unrecognized, levels of *Mycobacterium tuberculosis* in health facilities (Bock *et al.* 2007). This exposure in turn leads to infection and progression to TB disease. Health care workers are particularly at high risk of *Mycobacterium tuberculosis* and TB disease (Menzies *et al.* 2007). This can result in considerable morbidity and mortality (Harries *et al.* 2002), deepening the already

severe human resource crisis in low- and middle-income countries as well as creating fear and reluctance by health care workers to be assigned to HIV programs. Box 1 highlights some examples of infection risk at the health facility, the collaborative interventions and the mutual benefits that can be gained by both specific disease-control programs and health systems.

Making infection control work in health facilities

For infection control to work effectively in a district hospital or health centre and for the facility to become as safe as possible for patients and health-care workers, all the accepted building block components of a health system have to function well.

Box 1 Infection risk at health facility, collaborative interventions and mutual benefits for both disease control programs and health systems

Type of infection risk at health facility	Collaborative interventions	Mutual benefits
Spread of methicillin resistant *Staphylococcus aureus* and *Clostridium difficile* related diarrhoea	Provision of water sinks, soap and towels in out-patient and inpatient facilities	Encouragement of basic practice of hand-washing by health workers Reduced nosocomial transmission of infection to patients and health workers Reduction in hospital burden in terms of prolonged bed occupation and costs related to isolation and management of infected cases
Unscreened blood transfusions – risk of HIV, hepatitis B and C and syphilis	Procurement and uninterrupted supplies of rapid tests for screening	Improvement in quality standards of laboratory services Reduced transmission of infection to patients, health workers and their families Reduction in long term case load of HIV and chronic liver disease on health systems Improved trust and credibility of health services
Unsterile syringes, needles and medical or surgical equipment – risk of HIV and hepatitis B and C	Procurement and provision of adequate quantities of single use syringes and needles Provision and maintenance of sterilization equipment	Improvement in general standards of health facility hygiene Reduced morbidity associated with improved prevention Improved trust and credibility of services in key areas like vaccination and surgery
Health facility acquired tuberculosis (TB)	Improve cough etiquette and respiratory hygiene Improve patient-flow organization to reduce patient congestion Improve natural ventilation in hospital waiting rooms, consultation rooms and wards Systematic screening of health workers for TB on a scheduled basis Isoniazid preventive treatment for HIV positive health workers to prevent TB Antiretroviral treatment for eligible HIV-positive health workers	Improved patient and health worker friendly services Reduced health worker morbidity, mortality and attrition related to TB Reduced health worker absence from services because of TB and HIV Reduced risk of developing TB by both health workers and patients
Unsafe disposal of hospital generated waste – risk of sharp injury, secondary bacterial infections, HIV and hepatitis B and C	Set up a hospital waste management committee Set up a system for collection and disposal of waste Build incinerators and waste and needle disposal pits Make post exposure prophylaxis for HIV available	Cleaner and more pleasant hospital premises and facilities for both patients and health workers Reduce risk of injury and infections linked to sharps

Governance and stewardship: A multidisciplinary, infection control committee should be set up to provide the necessary guidance and accountability for local policy, plans, staff training, resource mobilization and reporting. Representation on the committee should be decided by the health facility, with guidance from the Ministry of Health, and could include clinical staff, nurses, laboratory and radiographic staff, administrative personnel as well as the community and people living with HIV.

Budgets from disease-specific programmes and district health allocations should be used in a coordinated manner to ensure sufficient financial support for specific activities. These could include (i) uninterrupted supplies of HIV, hepatitis and syphilis test kits for blood donations, (ii) installation of working sinks and purchase of soap and towels for hand hygiene, (iii) provision of fans and masks for appropriate airborne protection, and (iv) safety devices, proper waste disposal boxes for needles and syringes and functioning autoclaves for sterilizing surgical and medical equipment. Renovations or alterations to existing infrastructure might be necessary to improve control of airborne infection, and new infrastructure might be needed, for example to build guardian shelters so that relatives can cook and prepare food for their sick relatives allowing the wards to be kept free of smoke and cooking utensils.

In many low-income settings, a priority must be to prevent airborne TB transmission. Natural ventilation offers the most attractive and cost-effective tool for this (Escombe *et al.* 2007). More than 12 air changes per hour (the standard of care for preventing respiratory transmission of TB) can be achieved by open windows and doors, enlarged or additional windows (with attention to cross-ventilation), open sky-lights and the rebuilding of waiting rooms to make them open air, if appropriate. These renovations need not be costly and indeed provide much higher airflows than costly mechanical ventilation systems, which often function sub-optimally because of poor maintenance.

In many resource-poor countries, laboratory conditions and safety procedures are poor, particularly in relation to the diagnosis of TB, and there is therefore a need for more emphasis on standard operating procedures, education, training and supervision of staff to ensure that any policy guidelines that are produced are indeed acted upon (Nyirenda *et al.* 1998).

Attention must also be paid to other infections. For example, in malaria endemic areas, adult and children's beds in hospital wards should be fitted with insecticide-treated bed nets to avoid transmission in the health care setting. Safe waste disposal is a cross-cutting issue needing infrastructure, procurement and finances, and involves strategies for collection, transport and disposal at all levels of the health facility. Waste includes consumable materials such as syringes, needles and sputum containers as well as degradables such as food, laboratory specimens and placental tissue.

Procurement and supply chain management: An irregular supply of HIV and hepatitis test kits is an important barrier that prevents many low- and middle-income countries from screening blood collected for donations. Procurement of antiretroviral treatment (ART) for post-exposure prophylaxis is critical for protecting health care workers from HIV in the event of needle-stick injuries, although considerable advocacy and education are also needed to ensure that post-exposure prophylaxis is well utilized by the health workforce (Van Oosterhout *et al.* 2009). TB infection control practices depend on early case finding and timely treatment initiation in patients diagnosed with TB. Stock-outs of sputum containers, smear microscopy equipment (slides, reagents, functioning microscopes) and anti-tuberculosis drugs can severely hamper these efforts. Uninterrupted supplies are the key to sustaining important case finding and treatment activities.

Human resources: The world has a massive shortage of health workers, and no more so than in sub-Saharan Africa where an estimated 752 000 doctors and 670 000 nurses are needed to fill the gap between health care worker availability and health system needs (Hongoro & McPake 2004). There are various reasons for this workforce crisis, but low training capacity, poor working conditions, migration out of the health sector or out of the country and illness and death are the most important. Occupational health thus becomes a crucially important health system activity, demonstrating commitment to the well-being of the workers, both to ensure that health-care workers are given priority for health care protection and treatment and to further encourage their retention in the health system. Key interventions could include: offering HIV testing and the option for health workers who are HIV-infected to transfer to parts of the health facility that are at low risk of TB transmission; packages of care and treatment, including isoniazid preventive therapy for those heavily exposed to *Mycobacterium tuberculosis* and ART for health care workers who are HIV-infected (Makombe *et al.* 2007); and ART for occupational post-exposure prophylaxis.

Regular, reliable and timely collection and analysis of data is crucial for monitoring infection control. For the health care workforce, there are various indicators that could be measured. One of the agreed indicators for infection control measures in collaborative TB/HIV activities is the number of health care workers in a health facility who develop TB in the course of 1 year (WHO & UNAIDS 2009). This information requires an up-to-date inventory of health care workers in a given health facility

(as the denominator) and a registry to record data on occupational injuries such as needle sticks while on the ward or while performing surgery, the occurrence of serious diseases such as TB and HIV/AIDS and whether these have been treated with anti-tuberculosis drugs and ART, and finally deaths. Regular, timely data on the local health care workforce could help to empower a health facility with managing its human resource challenges. Measuring infection control in patients may be a more difficult task, but indicators could include measures of the number of surgical or obstetric infections occurring in the wards over time.

Service delivery: TB infection control depends on early identification, isolation and rapid initiation of effective treatment of tuberculosis suspects combined with good organization to avoid congestion and ensure appropriate patient-flow within facilities (WHO 2009). Nowhere is this more important than in HIV care clinics, where all patients either on ART or pre-ART should be screened for symptoms of TB whenever they come to the health facility. Health care staff need to focus on controlling the spread of airborne pathogens, by emphasising cough etiquette and respiratory hygiene, and ensuring that time spent admitted in healthcare facilities is minimized. Wherever possible, people living with HIV should be kept away from patients with suspected TB until TB treatment is initiated with evidence of response to such treatment. HIV infection control depends on use of universal precautions by health care workers, and appropriate safety procedures for handling of blood and body fluids.

None of the activities highlighted above, including the routine collection of data, will function unless there is regular supervision and review from within and without the health facility. Quarterly supervision, monitoring and evaluation of case finding and treatment outcomes in National TB Control Programmes has always been an essential component of the DOTS policy package, and this practice has been successfully extended to HIV care and treatment programmes as well (Libamba *et al.* 2006). Infection control committees would need to clearly dictate how these supervision activities are organized and implemented, with an important component being both positive and negative feedback to those responsible for infection control policy and practice within the health facility.

Conclusion

For health care workers in different disciplines in a busy district hospital or health centre to gather around the table on a Monday morning requires a topic of mutual interest, importance and relevance. Infection control and health facility safety fulfil these criteria, both for the health care worker fraternity and the constituency of patients who utilize the facility. Infection control fills the void, and provides relevant issues for discussion that require local leadership, a sound understanding of disease epidemiology, clarity of thought, community inputs and a pragmatic approach to finding solutions. Health systems cannot and should not be discussed in the abstract. They have to exist to optimally deliver services for real people, and they have to prevent and treat diseases that have names, such as TB and HIV/AIDS (El-Sadr & De Cock 2009). A focus on infection control provides the necessary specificity, the exemplary practice of which requires that all components of the health system function. This offers a first concrete start to bridging the current divide between disease-specific programs and health systems. It paves the way for a more comprehensive framework that embraces general medicine, paediatrics, surgery and maternal health and that takes into account other issues such as hospital antibiotic policy, hospital-acquired pneumonia, general hygiene, food hygiene and hospital laundry services. Without attention to infection control, hospitals risk again becoming regarded as places where you enter with one infection only to exit with another, and regressing backwards to those dark days in the 19th century when Ignaz Semmelweis dared to point the finger. In the 21st century we surely can do better.

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