PERSPECTIVE

Diverse approaches to preventing occupational tuberculosis in health workers: cross-disciplinary or cross purposes?

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The vulnerability of health workers as a population at increased risk of tuberculosis (TB)¹ recently received global recognition in the Political Declaration on the Fight Against Tuberculosis following the United National General Assembly high-level meeting on Tuberculosis in September 2018.² This declaration poses a challenge to affected health systems—that of strengthening programmes to protect health workers. Despite the voluminous guidelines published over the past quarter century on the prevention and management of TB in health care and related facilities,^{3–7} studies in low- and middle-income countries where high levels of population TB incidence persist, continue to report low to modest levels of implementation of accepted prevention practices,⁸ accompanied by a high incidence of new tuberculous infections among health workers.⁹

Reasons for the low level of implementation include lack of management support and failure to prioritise staff well-being, inaccurate risk evaluation owing to underreporting of cases among health workers and reluctance of those affected to self-report illness due to stigma, lack of clear directives and training on necessary control practices, insufficient staff numbers (e.g., to carry out cough triage or improve patient treatment adherence due to high patient loads), inability to isolate infected patients and provide proper ventilation due to spatial and structural constraints, and inadequate supplies of respirators, among others.

To address the problem of how health workers can be better protected, we argue that insufficient attention has been paid to the use of different disciplinary approaches for the protection of health workers, and to the need to appreciate their complementarity so as to best use scarce resources amidst competing priorities. The purpose of this commentary is therefore to consider different approaches—infection prevention and control (IPC), occupational health and safety (hereafter referred to as ‘occupational health’) and FAST (Find cases Actively, Separate safely, and Treat effectively), a variant of IPC. We briefly outline their recent history, their potential competition in theory and in practice, and a way of thinking that would promote better integration in programme development and action. The Table provides a schematic guide to the differences and overlaps between the three approaches, with the caution that their expression will inevitably differ across facilities and jurisdictions.

Two of the study authors (RE and AY) are occupational medicine and public health practitioners with extensive experience in working with different components of health care systems, while the third (JS) is a social scientist specialising in health policy analysis.

Ethics approval and consent to participate were not required for this opinion piece.

APPROACHES TO PREVENTION

Infection prevention and control

The modern era of actions to protect health workers from occupational TB dates back to the late 1970s and 1980s after the increase in TB incidence in the United States and associated outbreaks among health workers in hospitals in some large cities. The emergence of human immunodeficiency virus (HIV) and of multi-drug-resistant TB found health facilities underprepared to deal with this resurgence of an old epidemic. The response was a series of guidelines for the prevention of TB transmission in US health facilities published by the Centers for Disease Control.^{3,4} These have become internationally authoritative.

The CDC guidelines set out three levels of primary prevention which have formed the basis of many subsequent policies, guidelines and practice: administrative, environmental and personal protection practices. The CDC also advocates screening and treatment of health care workers (HCWs) for latent tuberculous infection (LTBI) as preventive practice. While outbreaks in US hospitals were effectively contained by this package of measures, administrative-level measures, particularly early diagnosis, isolation and treatment of patients with TB, are frequently identified as the most effective of the triad.¹⁰

The difficulty of following these guidelines in low-resource, high TB burden settings was quickly recognised, however, and modified versions were developed by the World Health Organization (WHO) from the 1990s onwards.^{5,6} The WHO approach emphasises elements more in keeping with the needs of low-resource countries. The need for a health systems perspective was also recognised by the WHO, specifically the relationship between different levels of the health services, such as national, regional to district and facility. The ‘managerial’ level was made explicit in the WHO guidelines of 2009,⁶ which thus went beyond the CDC guidelines in which coordination responsi-

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TABLE Schematic comparison of three approaches in the prevention of TB in health workers

	IPC	FAST	Occupational health
Primary legal basis	Duty of care	Same as for IPC	Statutory: preventive and workers' compensation legislation
Primary target	Patients and public	Patients	Employees (may include students and volunteers)
Primary prevention	Administrative, environmental and respiratory protection	Administrative: patient screening, separation, treatment	As for IPC, consistent with hierarchy of prevention—measures at individual level, such as personal protective equipment, subordinate to prevention at source
Secondary prevention	May be coupled with screening employees when occupational health service is not available	Not a focus	Strong focus on screening of employees and surveillance for LTBI and disease, treatment, return to work and redeployment
Tertiary prevention	Not applicable	Not applicable	Strong focus on disability management, workers' compensation
Professionalisation, human resources	Specialised practitioners and/or clinical staff with extra training	Refocusing existing staff, with additional resources	Specialised practitioners and/or clinical staff with extra training
TB prevention framework	CDC/WHO/locally adapted guidelines	International partnerships	CDC, WHO, ILO guidelines, industrial relations, ethical practice codes, precautionary principle and worker rights discourse
Resources required	Risk assessment and monitoring, staff training, patient screening/triage, separation facilities, drug availability, engineering and structural changes, respirator procurement	Staff training, patient screening, including drug susceptibility testing, separation facilities, availability of effective drugs	As for IPC (with special focus on risk assessment), health and safety information system, service capacity for personal services: screening and medically treating employees and managing work capacity
Relative advantages	Primary prevention focus	'Switches off the tap' of infectiousness among TB patients	Supports primary prevention as well as secondary and tertiary prevention, including reduction of stigma
Relative disadvantages	May lack secondary and (usually) tertiary prevention components	Same as for IPC, with 'vertical' focus on one disease	Specialised skills in short supply, particularly in public sector. May be incorrectly viewed as part of human resource management and extraneous to direct patient care

TB = tuberculosis; IPC = infection prevention and control; FAST = Find cases Actively, Separate safely, and Treat effectively; LTBI = latent tuberculous infection; CDC = Centers for Disease Control and Prevention; WHO = World Health Organization; ILO = International Labour Organization.

bility was assigned to an 'infection control committee' as one of the administrative measures.

Occupational health

In respect of primary prevention, the approach of occupational health is the same as that of IPC, specifically risk assessment, control or elimination of the source (in this case transmission of infection from patients to employees), the use of structural or engineering controls such as waiting space design and ventilation to reduce exposure, and personal protective equipment as last defense. The occupational medicine component of occupational health has, in addition, a strong focus on secondary and tertiary prevention, i.e., counselling, screening, case finding, medical treatment, placement and disability management of employees.

There are other important differences between IPC and occupational health. IPC is primarily based on the common law principle of duty of care to all who are present in health facilities, the majority of whom are patients. Occupational health is worker-focused, and in many or most countries, backed by statutory regulation which, while allowing for some degree of self-regulation by employers, substitutes mandatory for voluntary protective practice, subject to state inspection and legal penalties for non-compliance.¹¹ The acknowledgement of TB in health workers with ap-

propriate exposure as an 'occupational disease' furthermore imposes service and legal responsibilities on the employer.¹² Finally, specific weight is formally assigned to worker agency, expressed, for example, through collective bargaining¹³ or joint health and safety committees.¹⁴

However, resistance to applying the idea of TB as an occupational disease from employers, the State and even fellow health workers, or to the extension of statutory supervision to health care, has been documented in the United States and the United Kingdom, for example.^{11,15,16} The history of occupational health and safety thus includes the political struggles of worker associations and labour unions to secure increasing and mandatory protection in the face of such resistance.^{15,16}

At the international level, a renewed influence of occupational health through the involvement of the International Labour Organisation (ILO) is apparent in a series of guidelines issued on HIV and TB, directed not only at primary, but also at secondary and tertiary prevention of TB and HIV.⁷ In promoting the implementation of best practices for health workers at risk of TB or HIV and those affected by these diseases, these guidelines go further than previous guidelines in calling for the prioritisation of the protection of health workers and of the goal of retention in the workforce. This involves an emphasis on more general principles

than those specific to IPC, including the need for health worker participation, and the respect of individual and gender rights, as well as labour rights.

In recent years, a new form of activism has appeared, led by TB Proof, a South African organisation of health care professionals (www.tbproof.org), with strong involvement from individuals with a history of TB, including survivors of drug-resistant disease.¹⁷ TB Proof has identified what it perceives as the lack of urgency in all aspects of primary, secondary and tertiary prevention, including the development of new drugs against resistant disease. The organisation has taken its message directly to students and junior health professionals as groups both at risk and most amenable to change, as well as to international forums. They have pressed the need for tertiary prevention, i.e., financial, emotional and job security support for health workers with permanent impairment such as loss of hearing owing to anti-tuberculosis treatment and lengthy temporary disability while on treatment for drug-resistant disease. Despite its voluntary network base, TB Proof has sought to establish health worker voice and agency across the whole spectrum of protection and support of those at risk and affected in health care workplaces.

FAST

In the face of the continued generalised epidemic of HIV-related TB and drug-resistant TB characteristic of high TB burden countries, the administrative component of IPC has recently been 're-focused' as a programme in the form of FAST.^{10,18} While its three components, i.e., active TB case finding in patients arriving at health facilities, separation to avoid onward infection and effective treatment are clearly not new, the point of departure is that these have not to date been fully implementable or implemented in many health care facilities. What is relatively new is the emergence of the technical capacity for early and rapid diagnosis of TB disease and of drug susceptibility of the organism using GeneXpert technology (Cepheid, Sunnyvale, CA, USA), as also the availability of effective treatment for some forms of drug-resistant TB. Taking these developments together with the premise that infectiousness can be drastically reduced within days of commencing treatment, the FAST argument is that the investment of resources in screening patients, making separation facilities available and ensuring effective medication add up to a new and promising programme of action.

The advocates of this approach have emphasised its narrowed primary prevention focus by promoting the term 'TB transmission control' rather than 'infection control' more generally and the argument that, 'Unlike hand washing...FAST implementation is not fundamentally an educational campaign for employees... (but) ... requires an investment in resources and specific personnel...' ¹⁰ An operational evaluation of FAST in Bangladesh has indicated successfully increased rates of detection of unsuspected TB and of drug-resistant disease.¹⁹ However, the impact of FAST on reducing TB rates in HCWs is still under study.

DISCUSSION

In a commentary aimed at reconciling the goals of disease-specific programmes and strengthening the overall health system in the context of the TB-HIV co-epidemic in sub-Saharan Africa, Harries et al. have argued that proper attention to infection control should be seen as serving both the goals of controlling TB-HIV and health system strengthening.²⁰ This argument should be extended to explicitly include occupational health. Managers of

health facilities may be wary of what they perceive as competing demands on resources across all these three levels of prevention; for example, the need to provide clinical services for patients with suspected TB, on the one hand, and the screening of staff for LTBI or active TB, provision of priority care for staff with TB or HIV and provision of other elements of an occupational health service, on the other. The demand on resources may be complicated by the different training and credentials of professional staff required, shortage of such skills and budgets required for different functions or programmes.

Attention to the ways in which IPC and occupational health differ in approach and resource requirements is a first step to appreciating their complementarity. However, both approaches should be seen as contributing to strengthening the overall health system. The goal of primary prevention of TB in the health care workplace is shared. Soundly based secondary prevention augments primary prevention through early and effective treatment of health workers with LTBI or active TB, as well as with HIV. Such a programme needs to take into account that health workers in high-burden settings are also exposed to a significant community risk of TB, which although not originating in the workplace, has a substantial impact on the workplace. Tertiary prevention, through adequate social security and/or workers' compensation benefits, encourages HCWs to divulge their TB diagnosis more readily, contributing to better clinical outcomes and accurate risk assessment.

The associated immediate health system benefits are reduced health worker absenteeism, morbidity and attrition, and reduced risk of onward TB transmission to patients and colleagues. Surveillance of tuberculous infection and disease in employees serves as an indicator of risk for everyone in the facility. An improved health and safety climate, the perceptions that workers hold about health and safety in their organisation, and elevated worker morale should in turn contribute to improved quality of care for patients.²¹

The potential divide is greater when considering a disease-specific programme such as FAST and an occupational health model which encompasses protection of health workers from all infectious occupational hazards. FAST has the advantage of being located within the domain of established clinical TB management practices, thus merging its objectives with those of national TB programmes. The FAST argument is that if effective, it will 'switch off the faucet', reducing the pressure on system-wide or 'downstream' protective practices, which is persuasive logic. However, it is important that its implementation be tempered by managerial understanding of the need for the health system to maintain readiness to deal with all respiratory airborne threats, some predictable, such as contagious paediatric diseases, and some unpredictable, exemplified by severe acute respiratory syndrome and Ebola. More generally, the relationship, including possible competition, between TB transmission control, more general IPC measures and occupational health needs to be understood by policy makers and health managers.

There are precedents for an integration of approaches. At the international level, integration of IPC and occupational health is a major recommendation of the WHO-ILO guidelines described above.⁷ In low- and middle-income countries, collaborations in Latin America, the Caribbean and South Africa between IPC and occupational health have resulted in the development of evidence-based training programmes with both disease-specific and more general targets, such as improved TB prevention and control, TB surveillance, hand hygiene, decreased needle-stick injuries, and renovations in the emergency department of one of the hospitals.²² Such measures serve both for the protection of the

workforce as well as for improving the overall efficiency and safety of patient care.

CONCLUSION

We argue that the recognition of the distinct yet complementary role of each of the professional disciplinary perspectives is essential in developing a programme to protect HCWs from occupational TB that is cross-disciplinary and not at cross purposes. Even if budget holders are 'invested' in one primary approach (for whatever local reason), they should have a clear understanding of the opportunity cost of adopting this approach within the range of options. FAST has appealed to clinicians focused on preventing the transmission of TB; however, there is a need to maintain infection control and occupational health preparedness beyond prevention of TB transmission, and FAST alone will not address this comprehensive need. Moreover, particularly in high TB burden settings, there is a duty of care, ethical and legal, with or without statutory requirement, to pursue primary, secondary and tertiary prevention. This cannot be done without both IPC and occupational health approaches, and on first principles, this is better done through explicit cooperation rather than as parallel, or even competitive, tracks.

Finally, we believe that the necessary experience and mutual respect among health facility managers and different professional groups, particularly in resource-strained settings, that comes with commitment to an integrated approach is more likely to provide a sustainable basis for protecting health workers in the long run.

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