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## Review

## Tuberculosis control in prisons: current situation and research gaps



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## SUMMARY

**Background:** Tuberculosis (TB) in penitentiary services (prisons) is a major challenge to TB control. This review article describes the challenges that prison systems encounter in TB control and provides solutions for the more efficient use of limited resources based on the three pillars of the post-2015 End TB Strategy. This paper also proposes research priorities for TB control in prisons based on current challenges.

**Methods:** Articles (published up to 2011) included in a recent systematic review on TB control in prisons were further reviewed. In addition, relevant articles in English (published 1990 to May 2014) were identified by searching keywords in PubMed and Google Scholar. Article bibliographies and conference abstracts were also hand-searched.

**Results:** Despite being a serious cause of morbidity and mortality among incarcerated populations, many prison systems encounter a variety of challenges that hinder TB control. These include, but are not limited to, insufficient laboratory capacity and diagnostic tools, interrupted supply of medicines, weak integration between civilian and prison TB services, inadequate infection control measures, and low policy priority for prison healthcare.

**Conclusions:** Governmental commitment, partnerships, and sustained financing are needed in order to facilitate improvements in TB control in prisons, which will translate to the wider community.

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## 1. Introduction

Tuberculosis (TB) remains a major public health problem, posing specific challenges in numerous geographical areas, particularly in low- and middle-income countries (LMICs) where more than 80% of the global TB burden resides.<sup>1</sup> Additionally, with the current slow (2%) annual decline in TB incidence and the emergence of drug-resistant TB and TB/HIV co-infection, most

LMICs will not meet the Millennium Development Goals (MDGs) for TB control by 2015 set by the United Nations.<sup>1</sup> Despite recently gained increased public and political awareness, TB remains a major infectious disease in prison systems, such as in Eastern Europe, for several reasons. These include, but are not limited to, the high prevalence of drug-resistant TB forms, i.e. multi- and extensively drug-resistant TB (M/XDR-TB),<sup>1–14</sup> and intravenous drug use among HIV-infected individuals, which makes prison populations more susceptible to the development of TB.<sup>15</sup>

Prisons are considered reservoirs facilitating *Mycobacterium tuberculosis* (MTB) transmission within their walls, as well as to the community at large. Transmission occurs through prison staff,

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visitors, and released inmates. The estimated prevalences of latent TB infection (LTBI) and active TB disease in prison systems are reported to be much higher than the average estimates in the general population, irrespective of the economic status and the population TB burden of the country.<sup>16</sup> In European prisons, the prevalence of TB is estimated to be up to 17 times higher than in the general population.<sup>17</sup> A similar epidemiological situation has been described in LMICs, including Bangladesh, Thailand, Ethiopia, and Brazil, where TB prevalence has been reported to be almost four-, eight-, seven-, and 64-times higher, respectively, among prisoners compared to the general population.<sup>18–27</sup> Factors known to contribute to the transmission of MTB strains and that hamper TB control are overcrowding, delayed case detection, poor contact detection, inadequate treatment of infectious cases, high turnover of prisoners, and poor implementation of TB infection control (IC) measures.<sup>28,29</sup> In addition, limited access to timely and quality health care services further exacerbate the situation.

In response to the continuing challenges facing the control of TB and M/XDR-TB, and as the current Global Plan to Stop TB (Stop TB Strategy) 2011–2015 is in its final year, the World Health Organization (WHO) has recently developed the post-2015 End TB Strategy with the goal to end the TB epidemic by 2035.<sup>30</sup> In order to define strategies that efficiently address the End TB Strategy targets, knowledge about solutions for improved TB control in prison systems is needed. In this review, we summarize published knowledge on the challenges of TB control in prison systems and discuss potential solutions, including research priorities for TB control in prisons, in relation to the three pillars of the End TB Strategy.

## 2. Methods

Articles included in a recently published systematic review on TB control in prison services by Vinkeles Melchers et al.<sup>31</sup> were reviewed; these publications were dated up to June 2011. In addition, relevant articles in English were identified by searching PubMed and Google Scholar, with a temporal range of 1990 to May 2014. Studies were identified using combinations of the search terms “Tuberculosis or TB”, “TB Control”, “Management”, “Public Health”, “Prison\* or Jail\*”, and “Prisoner\* or Inmate\*”. Studies in languages other than English and studies published before 1990 were excluded. Articles were also excluded if they described challenges in TB control among populations other than prisoners (e.g., TB contact tracing in the community, health care workers). The selection of articles was based on their public health relevance to TB control in prisons. The references of selected articles were also evaluated to identify additional relevant publications. In addition, conference abstracts of the International Union Against Tuberculosis and Lung Diseases and publications from the WHO over the last 23 years were screened for relevant articles. A total of 637 citations and 332 abstracts were screened, resulting in the inclusion of 96 publications in this review. Because no systematic variables were extracted from the publications included, the challenges and solutions have not been rated on the quality and validity of the evidence.

## 3. Results and discussion: current evidence

Barriers to tackling TB in prisons are complex and linked strongly to other aspects of both the health and criminal justice systems, and with the cultural, historical, and economic situations of each country. These barriers are summarized in Table 1,<sup>32</sup> and are discussed below in relation to the three pillars of the End TB Strategy.

### 3.1. Pillar 1: Integrated, patient-centred care and prevention

#### 3.1.1. Universal drug-susceptibility testing and systematic screening of contacts and high-risk groups

The lack of well-equipped laboratory facilities in prisons is well documented.<sup>1,4,20,22,33,34</sup> In addition, a systematic review found that approximately 21% of all studies reporting on TB screening in prisons described the lack of a well-organized health system,<sup>31</sup> potentially leading to the ongoing spread of TB to other prisoners, prison staff, visitors, and to the general population upon release from the prison.<sup>23,35,36</sup> In the absence of adequate diagnostic tools in the prison services, health professionals attempt to use the diagnostic capacity of the civilian sector through national TB programmes (NTPs), such as sputum smear microscopy, chest radiography, and sputum culture.<sup>34</sup> The use of diagnostic services external to the prison system may, however, lead to a delay in diagnosis due to a lack of coordination between the prison and the civilian sector laboratory networks.<sup>17,37,38</sup>

Another main challenge to TB diagnosis is the quality of the bacteriological services. Sputum smear microscopy is not always performed with quality control. Microscopes are poorly maintained, staff may lack quality training in the use of diagnostic tools,<sup>22</sup> and quality assurance including proficiency testing is rarely done.<sup>22,39</sup> The introduction of the GeneXpert MTB/RIF assay is considered an important breakthrough in the fight against TB and multidrug-resistant (MDR)-TB. For the first time, a molecular test is simple and robust enough to be introduced outside the conventional or reference laboratory setting, detecting TB and

**Table 1**

Key barriers to tackling TB in prisons according to the three pillars of the End TB Strategy

<b>Pillar 1: Integrated, patient-centred care and prevention</b>
Lack of laboratory capacity, insufficient quality control, and absence of new and improved diagnostic methods
Interrupted supply of quality medicines
Absence of an efficient mechanism for direct observation of treatment
Lack of adequate medical facilities
Lack of collaborative TB/HIV activities
Emerging drug resistance
Intravenous drug use among prison populations
Lack of drug substitution and needle exchange programmes
Lack of safer sex programmes for HIV prevention
Limited social support of vulnerable populations
Limited attention to comorbidities (HIV, hepatitis, psychiatric disease)
Weak integration between civilian and prison TB services, continuum of care for released prisoners
High incarceration rate
<b>Pillar 2: Bold policies and supportive systems</b>
Low priority that policymakers give to health care (including TB) within the prison system
Insufficient commitment of prison authorities to address TB prevention, control, and care
Unclear responsibilities of different ministries and health authorities
Stewardship of prison health, mismanagement of TB control in penitentiary institutions
Shortage of qualified and motivated human resources
Shortage of staff training/education and appreciation
Limited or poor patient education
Stigmatization of prisoners with TB
Lack of access to prisons by community representatives, NGOs, and organizations with the capacity to support the vulnerable population
Insufficient surveillance, supervision, monitoring, and evaluation systems
Inadequate IC measures due to overcrowding and/or organizational and legal challenges in the timely separation of patients
<b>Pillar 3: Intensified research and innovation</b>
Lack of funding
Lack of commitment by research institutes
Legal difficulties with research in prison systems

TB, tuberculosis; NGO, non-governmental organization; IC, infection control.

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