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TB Control in Prisons

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1. Introduction

According to WHO, in 2010, there were 8.8 million (range, 8.5-9.2 million) incident cases of TB and 1.1 million (range, 8.5-9.2 million) deaths from TB among HIV-negative cases and an additional 0.35 million (range, 0.32-0.39) deaths from HIV-associated TB (WHO 2011). An examination of the map of estimated incidence rates by country and the breakdown of national figures in social strata rapidly reveals that global statistics conceal profound inequalities in the present intra- and inter-country distribution of the disease. Ninety-five percent of the global TB disease and TB death burden is found in poor countries. In highly industrialized countries, TB is currently limited to socially marginalized and other poor high-risk groups such as IV drug users, migrants from developing countries, and, over the past 30 years, HIV-infected persons.

Prison inmates[1] constitute a high risk-group for tuberculosis (TB) in both developing and the industrialized countries. Infection and disease rates remain much higher – from 5 up to more than 80 times – compared to national averages (Conninx R et al. 1995; Aerts et al. 2006; Dara et al. 2009). In their majority, inmates originate from marginalized populations characterized by poor socio-economic living conditions and associated poor life-styles, the over-representation *per se* of multiple high-risk groups already being a significant factor in explaining the markedly higher TB incidence and prevalence in prison populations. Greater population susceptibility include risk factors as urban dwelling, crowding, poor housing with lack of ventilation, limited access to health services and, at individual level, smoking and alcohol use, HIV-infection, exposure to indoor air pollution, diabetes mellitus, and under-nutrition (Rieder 1999; Lönnroth et al. 2009, 2010; Murray et al. 2011). Imprisonment conditions, globally worsening along a downward gradient of per capita gross domestic product, amplify those risk factors. Prisons tend to be overcrowded with poorly ventilated cells. The proximity of large numbers of individuals for an extended time in such conditions facilitates TB transmission. Moreover, prison populations often suffer from mal-nutrition or under-nutrition, in particular in low- and low-middle income countries. Also, the latter sometimes bear the burden of high or intermediate TB endemicity and generalized HIV-endemics with penitentiary health services being inexistent, sub-standard or difficult to access. Prisons thus constitute an ideal environment for TB transmission.

[1] The term « prison » refers in this text to all places of detention, jails (pre-trial detention) as well as prisons (detention of sentenced prisoners). The terms "inmates" or "prisoners" are used alternatively, referring to all categories of prisoners, sentenced prisoners, remand prisoners, female, male and juvenile prisoners.

TB in prisons does not only affect prisoners (but also prison guards or visitors). An habitually important yearly turn-over of prison populations make prisons a reservoir for TB transmission to the community at large. TB is spread by released prisoners who had been infected by TB in prison and are at risk of progression from latent TB infection (LTBI) to TB disease, prisoners with TB disease not diagnosed in prison, those under treatment but still not cured, and prisoners with sub-standard treatment. The way TB in prison influences TB and TB control in general populations has been explored by recent research. Stuckler et al. (2008) established a clear relationship between rises in incarceration rates and increased TB incidence and multi-drug resistant TB prevalence rates in Eastern European and Central Asian countries. Increases in the size of prison populations accounted for a 20.5% increase in TB incidence in the countries studied from 1991 to 2002. Based on these observations and on the fact that patterns of communicable diseases are thought to be influenced by the existence of pockets of high transmission, Basu et al. (2011) modeled the role of what they referred to as "institutional amplifiers" in the dynamics and control of tuberculosis epidemics. Prisons play the role of an "institutional amplifier" of TB with, similarly like, mines and communal hospital wards among others. Using this model, they demonstrated that even a substantial increase in case detection and treatment success rates, the traditional control measures, has little effect on the overall population incidence as long as hubs of transmission continue to exist. According to these authors, a key intervention to reduce TB incidence, prevalence and mortality in a community would consist in limiting the number of persons entering institutional amplifiers.

This preliminary remark shows that neglecting TB prevention and control in prison settings could have serious health consequences for both prisoners and the civilian population, in particular in those in middle-low and low income countries where incarceration rates are high, where TB control is poor, and where HIV infection rates are high.

2. The burden of TB in prisons

Many observational studies in the USA and Eastern Europe have reported the burden of TB in prisons, although they are largely heterogeneous due to differences in study design, study populations, sampling methods, and the quality of their methodology. Retrospective and/or point prevalence studies prevail. They document prevalence of TB infection and disease in new prison entrants, exposure to and transmission of TB infection and progression to TB disease within prison populations including prison guards, as well as transmission of TB from within prisons to extramural civilian populations. In the late 1970s, the discovery of two cases of infectious TB in a State prison in Arkansas in the US prompted a careful study evidencing rapid intramural spread of the infection, higher morbidity due to TB in prisons in compared to the general population and the transmission of the disease from a former inmate to individuals outside the prison (Stead 1978). With the transient rising incidence of TB in the late 1980s in the US, caused by prematurely dismantled TB services and fuelled, in parallel, by the emerging HIV epidemic, TB among prison populations received increased attention by researchers. The yearly number of published studies concerning TB in prisons as reported by MedLine and other databases started increasing. In 1989, a dramatic increase in the incidence of TB in prisons in New York State was reported with over half of the prisoners with the disease also having AIDS or infected

with HIV. (Braun et al. 1989; Darbyshire 1989) Outbreaks of multi-drug-resistant TB in New York State prisons in 1990/91 alerted US public health authorities and the international community (Valway et al. 1993, 1994; Drobniewski 1995). Nosocomial (MDR-)TB transmission from inmates to prison staff was reported from a California prison by CDC in 1993 (CDC 1993). An initial survey of TB incidence in a large number of States in nursing homes and correctional facilities in the US showed the aggregate TB incidence rate for inmates in correctional facilities to be 3.9 (95%CI: 3.35-4.49) times higher than the rate for persons of a similar age not incarcerated, thus more systematically confirming former observational evidence from individual prisons. (Hutton 1993) Other reports from the US which followed confirmed these findings. Increased public funding for TB control efforts and the consequent implementation of direct observed therapy (DOT) in high incidence areas and populations reversed TB incidence rates from 1993 onwards. In jails and prisons, however, better controlled TB also remained a major public health concern (Kendig 1998; MacNeil et al. 2005). Subsequent studies concentrated on specific determinants and risk factors such as increasing TB infection rates associated with increased time spent in the jail system (Bellin et al. 1993), HIV-infection and TB among risk groups such as intravenous drug users (IDU) (Pelletier et al. 1993), molecular demonstration on intramural transmission (Valway 1991; Ijaz et al. 2004), or the evaluation of control measures (Curtis et al. 1994; MacIntyre et al. 1997; Klopf 1998; CDC 2006). Reports on TB in prisons of Western European countries experiencing an evolution similar to that of the US soon confirmed the US findings. Studies conducted in Spanish prisons reported high prevalence of TB infection and illness upon admission in jail, described risk factors as HIV-infection, IDU status, malnutrition, or immigrant status. TB transmission in prisons, first described by conventional epidemiological methods, was underpinned by molecular techniques from of the 1990s. March et al. (2000) described 14 unsuspected active chains of TB transmission involving 65 patients in Barcelona prisons system combining conventional epidemiological techniques with DNA fingerprinting of *M. tuberculosis*. Recent transmission accounted for almost half of the incident cases, confirming observations made in Madrid prison population during the same period (Martin et al. 1994; Chaves F et al. 1997; Fernandez-Martin et al. 2000). In 2000, a study evaluated high TB incidence rates using molecular techniques in French prisons (Hanau-Berçot et al. 2000). In 2002, a systematic data collection by questionnaire in 52 European countries with 22 countries responding revealed a median TB notification rate of 232 per 100 000 inmates (0-17 808), highlighting the vulnerability of prisoners to TB, with the prison populations of Eastern European countries being the most affected (Aerts et al. 2006).

After the disintegration of the former USSR with subsequent economic liberalization the downward trends in notification of tuberculosis observed from the 1950s to the 1990s reversed throughout all former Soviet Union States. At the same time, the average age of TB patients declined, reflecting high levels of recent transmission. From the 1990s onward, a growing number of studies reported the high burdens of TB, in particular MDR-TB, in prisoners in the former USSR Republics (Drobniewski 1995 ; Drobniewski et al. 1996; Conninx et al. 1998; Kimerling et al. 1999; Aerts et al. 2000). Although there is in recent year a tendency towards a reduction in TB incidence among prison inmates, a higher proportion of TB patients among prisoners have MDR strains than in patients outside prison. A challenge is, too, the rising number of people infected with HIV.

TB is a major public health problem in Africa which also has a high prevalence of HIV infection. Active case finding surveys from Ivory Coast and Malawi reported, for the first time, high prevalence and incidence rates of pulmonary TB in an African prison in the 1990s (Nyangulu et al. 1997; Koffi et al. 1997). Cross-sectional studies from Tanzania (Rutta et al. 2001), Botswana (CDC Report 2003), Cameroun (Noeske et al. 2006) and others followed, all confirming high TB prevalence rates among inmates and suggesting TB prevalence being several fold higher in prison than among the civilian population. A review of all relevant English publications on TB in prisons in Sub-Saharan Africa (SSA) performed by O'Grady et al. (2011) concluded that there is evidence of an increasing prevalence of active TB in prisons in SSA with drug resistant TB increasingly being detected. In terms of the driving factors, the study identified HIV, living conditions, including overcrowding and poorly ventilated cells, as well as malnutrition associated with low immunity. Concerning the root causes of this situation, the authors identified lack of public funding and mismanagement of meager resources. In addition, prison health services were found to be insufficient.

Reports and studies from other continents confirmed the overall trend. Ferreira et al. reported high incidence rates of TB among incarcerated female prisoners, HIV-infection being a major risk factor in a Brazilian prison (1998). The observations were confirmed for other prison populations by study results from a Rio de Janeiro prison (Sanchez et al. 2005). A TB survey in Taiwan during 1998/99 based on mass radiographic screening showed high TB prevalence in all 29 jails and prisons studied (Chiang et al. 2002). TB prevalence and incidence among Thai prison inmates were shown to exceed by large those in the comparable civilian population (Sretrirutchai et al. 2002; Jittimanee et al. 2007). In the Karachi central prison, TB appeared to be 3.75 times higher than in the general population of the town (Rao 2004). A TB surveillance study in correctional institutions in Hong Kong over the period 1999-2005 found very high TB prevalence among prisoners before and within the first months of incarceration (Wong et al. 2008).

In spite the overwhelming published evidence of TB in prisons as a permanent and, perhaps, even a growing problem, some significant gaps persist on our understanding of TB in prisons as highlighted in the editorial of a recently published systematic review on studies evaluating the incidence of latent tuberculosis infection and TB in prisons worldwide and among the general population attributable to the risk of prison-to-community TB propagation (Baussano et al. 2010). It is still unclear how much TB there is in prisons, and it is not possible to give accurate estimates of the increased incidence of TB over community rates; the impact of specific prison conditions on TB transmission is yet to be evaluated; as is the fraction of TB among the general population due to disease among incarcerated groups.

3. Epidemiology of TB in prisons

Following the tuberculosis classification of the American Thoracic Society and the United States Centre for Disease Control (CDC, now Centre for Disease Control and Prevention), Rieder (1999) proposed a model allowing the distinction of four major stages for comprehending the dynamics of TB.

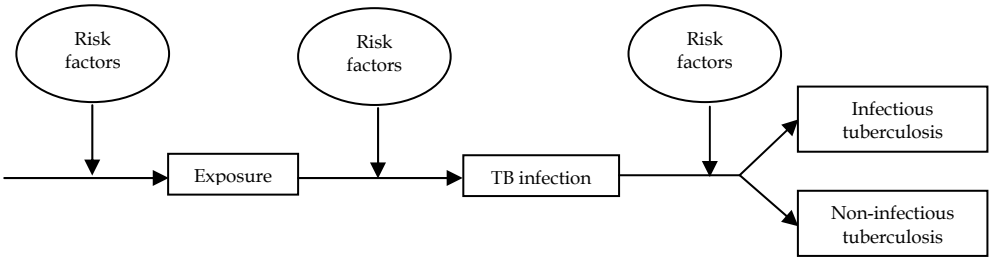

Fig. 1. A simplified model for tuberculosis epidemiology.
Figure adapted from Rieder (1999), p9.

Adapting this model to the conceptualization of the epidemiological framework for understanding the dynamics of tuberculosis in prisons, we will briefly discuss exposure to TB, infection with TB, and TB disease in prison before discussing TB control policies and strategies.

3.1 Exposure to tubercle bacilli in prison

The main factors determining the risks of exposure to tubercle bacilli are"… the number of incident infectious cases, the duration of their infectiousness and the number and nature of interactions between a case and a susceptible contact per unit of time of infectiousness" (Rieder (1999), p11). Concerning exposure to tubercle bacilli in prisons, the following practical observations could be made: (1) Empirically, a significant number of infectious cases is generally present in prison settings; (2) such cases tend to be infectious for a prolonged duration, either because they are not diagnosed (at entrance, during stay) or they are diagnosed late or are not treated at all treated or are poorly-treated; (3) infectious cases are in close and prolonged human contact in overcrowded and poorly ventilated cells.

3.2 Infection with tubercle bacilli in prison

The infectious bacterial disease is caused by M. tuberculosis. Humans are the principal reservoir for the *M. tuberculosis* complex with the pathogenic species *M.tuberculosis*, *M. bovis*, and *M. africanum,* the first being the most frequent cause of TB disease. Most commonly, TB affects the lungs. TB is an almost exclusively airborne infection caused by tubercle bacilli which spreads as infectious droplet nuclei. The link between the transmission of TB infection and overcrowding is a well-known phenomenon since the exploration of aerobiology in the 1950s and 1960s by Wells, Riley and their co-workers. Beggs et al. (2003) reviewed alternative epidemiological models representing the transmission of tuberculosis in confined spaces. The authors identified the following factors as crucial for effective TB transmission in confined spaces: long exposure periods, sufficient number of infectious droplet, small room volume, high occupancy density, low ventilation rate, proximity to the infector, and the infectiousness of the incident case. However, the number of infectious nuclei required to infect humans with any airborne infection is unknown. Regarding the infection of humans to become infected, it is difficult to measures factors like the virulence of the TB strain and the resistance of infected individual comes into play, as well as factors involved in the dynamics of the infection.

There are currently two main tools available for determining infection with MTB, namely: the tuberculin skin test (TST) and interferon-gamma release assays (IGRAs). Tuberculin, a concoction of antigens produced from killed tubercle bacilli, was first introduced by Koch. Subsequently, to increase the specificity of the tuberculin test was purificated, and the dose and administration technique standardized. Depending on the epidemiological situation (TB prevalence, presence of atypical mycobacteria, presence of HIV infection or other immune-compromising factors), the diameter of TST induration can indicate the probability of TB infection. Over the past decade two commercial have been developed and FDA-approved. IGRAs have become widely endorsed in high-income countries for diagnosis of latent TB infection (LTBI) and several guidelines on their use have been issued (Masurek et al. 2010). However, following a very recent Policy Statement, WHO concludes that there is insufficient data and low quality evidence on the performance of IGRAs in low- and middle-low income countries, typically those with a high TB and/or HIV burden, that IGRAs are more costly and technically complex to conduct than the TST and, as such, replacing TST by IGRAs as a public health intervention in resource-constrained settings is not recommended (WHO 2011). An overall conclusion can be that neither IGRAs nor TST can accurately predict the risk of infected individuals developing active TB disease nor that they can be used for the diagnosis of active TB; that in prison settings in high-income countries, IGRAs can play a key role in the diagnosis of latent TB infection; that TST in prisons in low and middle-low income countries is of limited value given the overall TB infection rate of the population and the HIV infection burden. Studies suggest that HIV-infected individuals are more likely to be infected after exposure to MTB (Daley et al. 1992).

In their systematic review of available published evidence on incident latent tuberculosis infection (LTBI) Baussano et al. (2010) identified six studies, 5 from the US and one from Brazil, all dating more than ten years. The median estimated annual incidence rate ratio (IRR) for LTBI was 26.4 (interquartile range: 13.0-61.8). The authors also estimated the fraction of LTBI in the general population attributable (PAF) to within-prison exposure to MTB for each study. The median estimated PAF for LTBI was 13.1% (8.1%-30.0%) for high-income countries and 6.3% (2.7%-17.2%) for studies from middle-low-income countries. These findings suggest that the within-prison spread of LTBI is likely to substantially affect the incidence of LTBI and TB in the general population.

3.3 Progression to tuberculosis disease in prisons

An estimated one-third of the human population is infected with MTB. Most of it does not develop TB disease. Why a particular person does or does not develop TB disease after having been infected by the tubercle bacilli is difficult to determine. On the other hand, a series of factors have been identified as being are more or less strongly associated with progression to TB disease once infected with MTB. Rieder (1999, p64) summarizes a selection of these risk factors together with their strength of association with the disease. Prison inmates are in particular concerned by the following among those factors (according to the strength of association): HIV infection, TB infection acquired less than one year ago, underweight and the quantity of the infecting dose. The first two factors have been identified in population based studies and the other two observed in numerous case-control studies. The strongest risk factor for developing TB is infection with HIV. The risk of disease after infection is 10 percent per year among people living with HIV without ART, compared

to 10 percent per lifetime among those who are negative. There is evidence that TB infection among HIV-infected patients progresses to TB more rapidly than among those without HIV infection. Habitually, inmates are characterized not only by one, but several factors at a time.

How can the magnitude of the TB problem in prison populations be quantified? Rieder et al. (2011) discuss in a recent paper the critically different calculations for epidemiological indicators of the TB burden in prisons. Case definition, depending on screening criteria and length of stay in prison, are as critical as the use of appropriate numerator and denominator data. For measuring TB prevalence the authors propose medical screening including TB screening at entry with clear case definition and appropriate bacteriological examinations, discarding cases diagnosed in the first 3 months of stay as cases prevalent at entry. Using a simple fictitious data set, the authors show the limitation of cross-sectional prevalence surveys as an instrument for assessing time trends in prevalence. For measuring TB incidence rate (person-time of observation at risk of developing the disease), the most appropriate measure for estimating the magnitude of the TB problem in a prison setting, the authors propose as denominator the exact date of entry, excluding the first 3 months, and the exact date of exit (occurrence of TB, release, end of the observation period).

Baussano et al. in their above-cited study identified only nineteen available published studies answering the criteria for assessing the risk of incident TB disease within prisons. They calculated the estimated median annual IRR for TB which was 23.0 (11.7-36.1). However, all but three of the studies retained for the review were dated from during the last century and only two had been carried out in low(-middle) income countries (Ivory Coast, Brazil), confirming the need to sustain research efforts in view of further up-to-date and accurate estimates on the increased incidence of TB in prisons.

4. TB control in prisons[2]

The control of TB in prisons and other congregate settings has to take in account the entrance point prevalence of infection among institutional residents (and staff), the potential for reactivation, the role of transmission within the institution, the potential for detection of infection and disease, the potential for prevention and treatment of disease, and the potential of the building environment to favor transmission (Nardell 1989). Effective chemotherapy is the single most important factor in reducing infectiousness in any situation and at any stage of the disease. This requires an effective TB control program with early case finding and subsequent successful treatment. Since the early 1990s, the principles of prevention, diagnosis, treatment, and care of TB have been codified by WHO in the so-called DOTS strategy (DOTS=directly observed treatment, short course). Key elements are political commitment with increased und sustained financing; case-detection through quality assured bacteriology; standardized treatment with supervision and patient support; an effective pharmaceutical supply and management system; and a monitoring and evaluation system and impact measurement. The DOTS strategy was expanded in 2006 to The Stop TB Strategy (WHO 2010a) and launched by the Stop Tuberculosis Partnership in a Global Plan to Stop TB in 2010 (WHO 2010b). Its objectives and components apply, in

[2] Cf. for the following: WHO 2007a

general, to TB control in prisons as well. And corresponding comprehensive guidelines on how to control and prevent TB in prisons are available since 1998 (Maher et al. 1998; Bone et al. 2000; Bock 2000; WHO 2007a; Dara et al. 2009). These guidelines, however, are seldom implemented in developing countries. And even in developed countries the strict and competent application of this recommendation is still hampered. Sosa et al. (2006) reported a tuberculosis outbreak in a correctional facility after two recently discharged inmates were diagnosed with TB. Despite prolonged symptoms and abnormal chest radiographs, the index case was not diagnosed while incarcerated and fifty three presumably exposed inmates and ten of 485 correctional staff had a conversion of their TST. – Taking as guiding principles the elements of the DOTS strategy and taking in account the six components of The Stop TB Strategy the following text will resume essentials of TB control strategies in prisons. The above cited guidelines provide the necessary additional technical details.

4.1 Political commitment with increased and sustained financing

Health care services and national TB services commonly are under the responsibility of a ministry of (public) health. Prison health care mostly is under a different ministry (Justice, Internal Affairs or other). For these latter ministries in charge, in particular in low- and middle-income countries, prison health stands seldom on a priority list. Consequently, prison health services are as a rule grossly underfunded. This underfunding influences negatively all components of the prison health system, the service delivery, the health workforce, infrastructures and medical products and technologies, the information system, financing of the users, the technical leadership and the overall governance. TB control cannot act as the main leverage for changing fundamentally this situation. National TB programmes (NTP), however, are generally well-structured and dispose of detailed technical guidelines. Preventive, diagnostic and treatment procedures and means, supply of drugs and laboratory consumables, recording and reporting tools, indicators for monitoring and evaluation are well defined. In addition, the principle of equivalence requires that prisoners have access to the standards of health care as the general population. Moreover, most PNTs in high-burden countries benefit today from external funding. Experience has clearly shown that prison TB programmes should be coordinated with and integrated in civil-sector TB programmes. Improved collaboration or integration contributes to strengthening the overall health system and make benefit a habitually weak prison health system. Linkage to the civilian sector has the additional advantage of facilitating treatment follow-up of release prisoners.

4.2 Case detection, including control of MDR and HIV

The DOTS strategy traditionally relies on passive case finding, meaning that TB cases are waited for presenting themselves spontaneously to health services in order to get diagnosed and treated. International guidelines (WHO 2007b) recommend on entry into prison a medical examination that should include TB screening. We saw that prison inmates belong rather to minorities or migrant groups or other segments of the population in which TB occurs with a higher incidence. The implementation of active case finding strategies should be standard. - One is the screening of new prison entries for active TB disease; this recommendation is valid or all type of prisons. Various screening tools have been proposed

and assessed, varying from symptom based (clinical) screening including anamnesis with regard to past or present TB treatment, over chest radiography, TST or IGRA, or a combination of this methods. What screening tools are used has to depend on NTP guidelines, local feasibility, and available means. Results of clinical scores may depend on the setting were they are applied and should be tested and adapted. The diagnosis of pulmonary TB (PTB) cannot be based neither on the result of chest radiography nor of TST or IGRA. According to WHO recommendations, all PTB B suspects should undergo appropriate bacteriological sputum examination. Sputum negative PTB suspects should be diagnosed according to the national NTP guidelines. An incomplete network of smear microscopy sites inside the prison system can be completed by collaboration with the civil-sector TB microscopy network. - The usefulness of periodic screening during the stay in prison is much debated, but its implementation seems unavoidable in high TB incidence prisons or compartments of prisons. Mathematical modeling of the TB epidemiological dynamic according to control strategy shows that also passive TB detection may remain a priority in TB control in general populations, it appears insufficient in highly TB-endemic prisons to produce a rapid decline in TB incidence (Legrand et al. 2008). Likewise, Uys et al. (2011) calculated TB transmission possibilities in low and high prevalence areas and settings and came to the conclusion that in high prevalence settings transmission is relatively unresponsive to changes in the number of infectious people. He coins the term of "transmission elasticity" to describe this phenomenon and he warns against excessively optimistic projections regarding the effectiveness of 'habitual' control strategies. For TB control in prison settings he strongly recommends two measures: ventilation and consequent contact tracing. – Finally, contact investigation around a newly detected case within the prison has been recommended. The mathematical modeling is confirmed by an observation published by Noeske et al. (2011) according to which consequent TB screening at entrance and active contact tracing are not able to keep up with TB transmission dynamics in largely overcrowded and non-ventilated cell blocks.

In high-income low-incidence settings like in the US, TST or IGRA for documenting TB infection in inmates at entrance or during prison stay as well as in prison staff is recommended. In low-income high-burden settings, this testing for LTBI is of limited value as a majority of young individuals are TB-infected and/or have received BCG vaccination which makes difficult the interpretation of the test. However, where a national policy for TB prevention in HIV infected individuals exists, the test might have a place in a range of instruments applied for excluding active TB and deciding for isoniazid (INH) or similar TB prophylaxis.

Ideally, all TB suspects should in addition to sputum smear microscopy undergo drug susceptibility testing (DST). Again, implementation of this policy depends on the local feasibility and the available means. In any case, prison inmates have to have access to the same facilities as the general population.

Seen the close association between HIV and TB, provider initiated voluntary counselling and HIV testing should be an integral part of the prison's TB control programme. Ideally, to all prisoners who are screened for TB a voluntary HIV test should be proposed. For prisoners tested positive, the whole range of further diagnostic exploration and prophylactic and definite treatment (ART) should be made available and accessible.

4.3 Treatment with supervision and patient support

Treatment and management of TB obey the same principles in prison as in the civil sector. At first glance, directly observed treatment seems easily to maintain as prisoners are in one place and always present. However, when prison health personnel are lacking or not motivated, observation of adherence to treatment is difficult. Charging prisoners with dispensing TB drugs leaves the correct administration of medications to the *alea* of multiple informal hierarchies and power structures. Ensuring that every dose of drugs is taken directly observed remains a challenge.

Another challenge are prisoners released while still on treatment. Formal referral with forms is basic, but not sufficient. Good experiences have been made by combining sensitization of the patient for the necessity to complete treatment, an agreement together with the patient on where and how to complete treatment, and social workers – or NGO members – constituting a kind of mediator between patients, the prison health service and the civil TB dispensary network susceptible to receive the once released prisoner. This needs mostly external funding as do incentive packages which are used in some settings to motivate patients.

4.4 Information, education and communication (IEC) for prisoners and prison staff

The evidence base for information, education and communication (IEC) for prisoners and prison staff is relatively weak compared with that for the other elements of the DOTS strategy. Most studies conclude that the effectiveness of current educational efforts in influencing prisoners' behavior remains largely unknown. In particular, studies have pointed out that education and counseling are not of much use to prisoners if they do not have the means to act on the information provided while they are in prison. Recognizing that prisons and other closed settings are important settings for IEC programs for both prisoners and staff about HIV and other infectious diseases, well-designed programs should be implemented in all prisons and other closed settings. Written materials should be appropriate for the educational level in the population in prisons. Furthermore, prisoners and staff should participate in the development of educational materials. Where possible, education delivered for prisoners by the prison system should be supplemented by peer education programs. In particular, prisoners must be provided with the prevention measures.

4.5 Drug supply and management system

The NTP must be made entirely responsible and capable of providing sufficient and adequate drugs and other consumables to cover the need of all patients in the civil sector as well as in prisons.

4.6 Monitoring, evaluation and impact measurement

The recording and reporting system in many low(-middle) income and high TB burden countries is weak. The causes for lack of motivation for prison health staff to report correctly are multiple: Lack of time because of personnel shortage, of essentials like registers, treatment cards, even stationary, together with poor training and supervision, and little use

of data for analysis. Regularly, too, prison administration intervenes in the technical reporting process for political reasons (too many deaths shed a bad light on the administration). Where there TB registers, treatment cards and report instructions they might differ from those of the TB program. For epidemiological purposes and better follow-up of patients the recording and reporting system for TB in prison should be identical with that of the civil sector. When a prison is collaborating closely with a civil sector diagnostic and/or treatment center without self having his status, patient management tools should be doubled in order to allow the prison health staff to follow-up the prison's TB patients according to the national guidelines. Reporting should be done to the civil-sector TB-program and, if needed on the basis of a written agreement, supervision and evaluation should be done together with or in close coordination with the NTP.

4.7 Infection control

To reduce the risk of TB transmission by infectious patients to susceptible individuals (other prisoners, staff, and visitors), early diagnosis and prompt treatment, but also the separation of patients during the period of infectiousness is recommended. The consultation room should be well ventilated as should the wards reserved for infectious TB patients. Patients should be educated with regard to cough hygiene. Whether personal protection (respirators for staff, disposable masks for patients, staff, and visitors) and engineering measures (negative ventilation for example) can be used will depend on available financial means.

5. Conclusion

At present, about 10 million people are incarcerated world-wide. The majority among them is at increased risk for TB which is largely a curable disease. TB prison control guidelines recommend technical solutions mainly formulated in operational public health terms. However, even most comprehensive TB control programs cannot succeed unless there is a fundamental change in confinement conditions like overcrowding, poor ventilation, under-nutrition, but also informal hierarchies, corruption and violence with consequences for access to health services contribute decisively to maintain the vigorous and vicious circle of TB transmission in prisons. Until then, inmates are doubly punished, incarcerated and incessantly exposed to TB, their situation remaining a shame to public health and to human rights.

6. Annex

TB control programmes in prisons: What would be a minimum standard?

The ideal TB control programme in a prison would include the following:

- government structures supporting TB programmes in both the civil-sector and penitentiary systems;
- written agreement on collaboration and coordination between prison and civil-sector TB programmes;
- prevention through the early detection of infectious cases; avoidance of overcrowding; good nutrition, ventilation and light; clear definition of infectious zones with clear policies on how to reduce transmission; and the use of masks and/or personal respirators;

- complete access to TB diagnosis and treatment for all prisoners entering the prison system;
- adequate treatment in line with national TB programme guidelines, including those for prisoners with MDR-TB and TB-HIV coinfection, using DOTS and an uninterrupted supply of drugs of guaranteed quality; and
- a guarantee by prison and civil medical personnel of continued treatment for infected individuals following their release from prison.

The penitentiary system must have:

- continuing human resource development that ensures an adequate number of staff with satisfactory background education and continuous training;
- a mechanism in place for timely investigation of TB suspects and early detection of individuals with active TB and their treatment;
- a network of laboratories carrying our quality-assured smear microscopy;
- drug susceptibility testing in a centralized laboratory of ensured quality, either in the civil sector or in the prison;
- a supply of quality second-line drugs for prisoners suffering from MDR-TB once the capacity to test prisoners for drug resistance is in place; and
- recording and reporting in close coordination with the civil sector.

Source:

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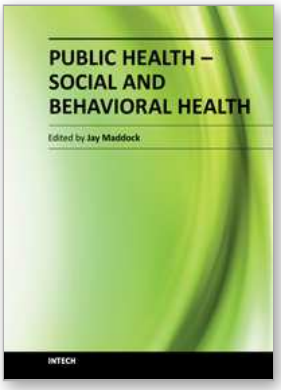

Public Health - Social and Behavioral Health
Edited by Prof. Jay Maddock

ISBN 978-953-51-0620-3
Hard cover, 570 pages
Publisher InTech
Published online 16, May, 2012
Published in print edition May, 2012

Human behavior accounts for the majority of morbidity and premature mortality throughout the world. This book explores several areas of human behavior including physical activity, nutrition and food, addictive substances, gun violence, sexual transmitted diseases and more. Several cutting edge methods are also examined including empowering nurses, community based participatory research and nature therapy. Less well known public health topics including human trafficking, tuberculosis control in prisons and public health issues in the deaf community are also covered. The authors come from around the world to describe issues that are both of local and worldwide importance to protect and preserve the health of populations. This book demonstrates the scope and some of the solutions to addressing today's most pressing public health issues.

How to reference
In order to correctly reference this scholarly work, feel free to copy and paste the following:

J. Noeske (2012). TB Control in Prisons, Public Health - Social and Behavioral Health, Prof. Jay Maddock (Ed.), ISBN: 978-953-51-0620-3, InTech, Available from: http://www.intechopen.com/books/public-health-social-and-behavioral-health/tuberculosis-control-in-prisons

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