

ORIGINAL ARTICLE

Pitfalls of TB management in prisons, revisited

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Abstract

Almost 10 years ago, attention was drawn to the many pitfalls involved in the treatment of tuberculosis (TB) in prison settings, based on field experience from the ICRC (International Committee of the Red Cross) (Coninx et al., 1995). Since that time, the ICRC has continued working in the field of TB in prisons, either directly or by supporting the local programmes in different countries. Further experience gained since then has, if anything, confirmed and reinforced the worries caused by the specific problems posed both by the prison environment and by “prisoner-patients” for the treatment of TB. Medical staff working in prisons need to be familiar with these issues if tuberculosis is to be managed and treated successfully. With the menace of drug-resistant TB no longer merely a marginal problem but arguably becoming a direct menace to public health, it becomes all the more important to be aware of these pitfalls. This paper addresses the following:

- why prison settings are especially difficult for TB detection and management;
- why prisoners can be particularly difficult patients;
- how different resistant strains of TB are produced or enhanced in prisons;
- added difficulties in treating MDR-TB in prisoners; and
- how and why the association of TB and HIV complicate TB, and MDR-TB, treatment in prisons even further.

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Keywords: *Tuberculosis, prison healthcare*

Introduction

The specific features of the prison environment and of “prisoners as patients” require specific approaches for the efficient management of TB (Stern, 1999). This is all the more important with the advent and increasing dissemination of resistant forms of *Mycobacterium tuberculosis* including multi-drug resistant (MDR) strains. Prisons are sometimes thought to be “ideal places” for the treatment of tuberculosis. Unfortunately, certain specific difficulties inherent to the custodial setting, and the fact that prisoners are very different

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from a “normal” patient population, make TB management in prisons quite a lot more complex than most health professionals expect (Reyes & Coninx, 1997). Prisons are a central focal point for the pooling of both normal and resistant strains of the TB bacillus. The difficulties inherent to TB management in prisons will be magnified when treatment of MDR-TB is implemented, as the consequences of failure shall be more serious. Finally, with HIV very fast developing as another major plague in prisons, the equation becomes even more complicated, and the consequences of mismanagement more dire.



The fact that prisons are reservoirs of TB and MDR-TB can no longer be ignored by Health Authorities, as this has become a public health issue. There is, however, another issue at stake regarding Human Rights. Contracting tuberculosis is not and should not be part of a prisoner’s sentence. In the prisons of the developing world, particularly in countries with high rates of TB, contracting TB, or worse, MDR-TB, in a prison can amount to a death sentence if adequate treatment is not available (Levy et al., 1999).

The situations and “pitfalls” described in the following pages are based on experience from TB programmes in prisons in Eastern Europe, Asia, Latin America and Africa. Obviously not all prisons present all of the specific problems described. Not all prisoners are uncooperative or systematically try to “deceive the system”. Many prisoners are quite happy to cooperate with medical staff. Unfortunately, the prisons in those places where TB is most prevalent are often the ones with the most problems. There are, in many countries, prisoners who do try to trick, or take advantage of, the system. This article intends to inform medical staff who have never worked in a prison environment about these many pitfalls. It used to be said that it was sometimes preferable to do nothing at all, rather than run an inefficient TB programme which could lead to the creation of resistant strains of *Mycobacterium tuberculosis*. With the advent of MDR-TB programmes, it is now essential to know how to avoid situations in the prisons that can thwart the proper management of all forms of tuberculosis. MDR-TB is bad enough—to ignore these pitfalls could and will lead to even more serious forms of resistant TB. What is now called “XDR-TB” or extremely resistant tuberculosis, i.e. strains of *M. tuberculosis* that are not only MDR but also resistant to at least three “families” of second-line drugs, has already been detected in some of the prisons where the ICRC is supporting TB programmes. Hence the urgent need to “tighten up” TB programmes in prisons everywhere.

Why prisons?

Tuberculosis is today a major health issue in prisons around the world. The prevalence of TB in prisons is higher, sometimes much higher, than in the general population. In countries with a high prevalence of TB in the outside community, prevalence of TB can be 40, 80 or even 100 times inside the prisons. In the past decade or so, resistant forms of *M. tuberculosis*, and particularly MDR-TB strains, have appeared in prisons and become

a major concern. If untreated, or treated inefficiently, prisoners with contagious TB with resistant bacilli will be an additional health hazard for fellow prisoners and staff alike. Furthermore, TB and resistant forms of TB can spill out into the community and create a public health hazard (Coninx et al., 1998).

Until very recently, prisons were not taken into consideration in national health strategies. Prisons around the world are under the responsibility of the Ministries of the Interior or Justice. Close links with the Health Ministry are unfortunately still the exception. Furthermore, Health Ministries have little knowledge about (and most often no influence on) the health situations of the country's prisoner population (Levy, 1997).

Prisoners' health

Health in prisons is not just about prisoners. Prisons are small communities in themselves, with custodial personnel, health staff and many others, such as lawyers, delivery personnel, sanitary technicians, repairmen, etc., coming in and out every day. Visitors enter and leave prisons after coming into close contact with the prisoners on a regular basis, several times a week or even more often.

Prisons are closed communities, but certainly not hermetically so. If an infectious disease such as TB is present amongst the prisoner population, it will spread via these visitors that span the gap between the prisons and the outside community. In Latin America, they are called "poblaciones puente", or "bridge populations", an expression that well illustrates this continuity and possible flow of contagion between prisons and the outside world. Prisoners, or at least the majority of them, are eventually released from prison. If those with TB have not been detected, or have not received proper treatment, they will spread TB outside into their families and the community.

In many high-TB burden countries, health officials in the Ministry of Health still have no clear idea as to what the real situation in their prisons is like. The issue of TB has certainly been one of the main issues motivating Health Ministries to become involved in prison health. Political authorities in general may need to be convinced that prisoners are indeed members of the overall community, temporarily confined inside the prisons, but who will sooner or later rejoin the outside world. Even if only for protection of the Public Health, the authorities *must* include the prisons in their overall health policies (Aerts, 2000). Finally, from a purely Human Rights point of view, prisoners forfeit their liberty when they are sentenced to prison, but not their right to receive adequate healthcare while in custody.

Contracting tuberculosis is not part of a prisoner's sentence

Tuberculosis: a disease particularly difficult to manage in prison settings

The menace of MDR-TB today magnifies the already ominous TB situation in very many of the world's prisons. Resistant tuberculosis does not just "happen"—it is a man-made problem. The same laxity, neglect, lack of motivation, sometimes even corruption which have led to treatment failures in the management of "normal" TB can and will have disastrous effects if the same shortcomings are applied in the management of MDR-TB. Medical staff working in prisons need to be aware of the many pitfalls and specific difficulties that have led in the past—and still do lead—to the selection of resistant strains

of TB. As mentioned above, these same deficiencies could ultimately lead to the development of strains of the bacillus that could be practically incurable. The entity known as “XDR” (extremely or extensive drug resistance) is already a reality in some countries and in prisons of Eastern Europe and Asia.

Prisons are active pools and reservoirs of TB that need specific attention and management (Maher & Grzemska, 1998)

“The only way to control TB anywhere, is to control it everywhere.”
Professor Lee Reichman¹

Trying to “cure TB” in a country without at the same time “curing the prisons” is like treating a patient for an infection without incising and draining the patient’s purulent abscess.

Prisons are bad for tuberculosis (Reyes & Coninx, 1997)

Prisons and TB

Prisons of course differ from country to country and the living conditions therein depend on the economic development of the state on the whole. The same holds true for the quality of the medical services provided. This being said, even states with adequate resources often do not invest in prison health and neglect the public health issues that flourish inside them. Prisons can be extremely unhealthy places. Prison health services, particularly in countries with high prevalence rates of TB, are often inadequate. These factors can have disastrous effects on the development and dissemination of contagious diseases such as tuberculosis.

Prisons are not mere static containers packing together large populations with different diseases, including tuberculosis. Prisons are dynamic, and can be seen as cumulating different factors, all of which are detrimental for the treatment of TB.

Prisons receive tuberculosis

Prisoners do not represent a cross-section of outside society. Prisoners are overwhelmingly male, in the age range between 15 and 45 years, and come predominantly from poorly educated and socio-economically deprived sectors of the general population. Tuberculosis is a disease of poverty. Offenders often belong to minority or migrant groups, and many live on the very margins of society. They enter prison with a higher risk of already being unhealthy. Offenders often have little education, and, for a variety of reasons, do not take care of their health. Often living in unwholesome settings, they are much more likely to already suffer from a variety of debilitating diseases, including tuberculosis. Additional health problems such as drug addiction, and of course alcoholism—both rampant in many prisons—can contribute to a deteriorated state of health.

Prisoners thus constitute a high-risk population for tuberculosis. Many prisoners already bring tuberculosis into prisons.

All prisoners should be screened on entry as they constitute a high-risk population group for tuberculosis.

Specific studies are on-going in high-TB burden countries to determine what proportion of prisoners enter the prisons with resistant strains of *M. tuberculosis*, and what proportion develop resistance because the standardized first-line treatment they receive does not take into account their resistance patterns. Studies on the “amplification of resistance” are being carried out in many countries, including several countries—all high-TB burden of the former Soviet Union.

Prisons concentrate tuberculosis

Prisons in developing countries and high-TB burden countries are often overcrowded well beyond their official “capacity”. Overcrowded prisons facilitate the spread of tuberculosis infection, as bad ventilation often accompanies overcrowding, adding to the risk of contagion of the airborne disease. Arriving prisoners are put into cells very often without even a cursory health check, thus finding themselves pooled together in unhealthy settings, putting all at risk of contagion if TB is present (Slavukij et al., 2002; Kimmerling, 2000).

Prisoners often suffer from impaired immunity due to many factors, such as concomitant disease, a harsh and unhealthy living environment and malnutrition. Psychological factors, such as persistently high levels of stress due to the ever-present uncertainties of prison life may also adversely affect their immune system. Prisons are also often very violent places. To these one must add the constant nervous tensions of often shaky family relationships.

HIV infection will obviously be the most serious factor aggravating the situation. The sum of all these factors make prisoners more vulnerable to becoming infected with and developing tuberculosis disease.

Bad ventilation (Figure 1) in prisons is sometimes due to “security screening” that neither allows for proper circulation of air in the cells, nor allows sunlight to enter.

Even in less crowded premises, the fact that prisoners are locked up in close proximity for long stretches of time enhances contagion (Figure 2). Such overcrowding is not rare in many countries, some of them high-TB burden countries.

Ventilation in prisons

In some countries, prisoners can freely go outside their cells during the daytime, and even get outside into the fresh air. In the evenings, usually at nightfall but sometimes well before, prisoners are locked up, and thus spend between 8 and 12 hours or more locked up inside their cells. In most countries, the minimum “one-hour” daily in a courtyard, as prescribed by the United Nations Minimum Standards, is all the fresh air prisoners get. Many countries do not even respect this standard, either through neglect or because of lack of sufficient numbers of staff to ensure prisoners can go outside while respecting the constraints of security. Climate will also be a factor to take into account. In winter in



Figure 1. Prison shutters keeping out light and ventilation.

cold countries, prisoners may not get to go out at all for months on end. This may not necessarily be because prison officers do not want to take them out. In many cold-winter countries, understandably, the prisoners themselves may not want to go out into often sub-zero temperatures.



Figure 2. Overcrowding in a prison cell.



Figure 3. “Security blinds” impeding proper ventilation and sunlight from coming into the cell.

Ventilation of cells will often be reduced to a minimum during a cold winter. If there is no system by which cell windows can be easily opened and then shut again, prisoners may use blankets or plastic sheeting or whatever they have to close up all openings so as to allow no draught in—and therefore have no adequate ventilation.

In cold climates, windows may be crammed “airtight” with any object available, as shown in Figure 4. Sunlight is thus most often dimly absent inside the cells. Ideally, prisons should have a system which, while ensuring security (Figure 3), allows for windows to be opened wide for ventilation, and then closed for conserving heat.



Figure 4. Blocked ventilation by the prisoners themselves to keep out the cold.

Segregation of prisoners with tuberculosis

Segregation of contagious TB patients could be kept at a minimum—just for the first 3–4 weeks of treatment, if the clinical evolution is satisfactory. In practice, most prison systems where TB is a serious problem separate prisoners, at least for the full initial phase of DOTS² treatment with first-line drugs.

“Separation” is not synonymous with “isolation”. Separation for sound medical reasons does not mean putting prisoners ill with TB into solitary confinement. Prisons should be able to provide for separate quarters, either in the prison hospital if there is one, or in separate wards, for such prisoners during the initial phase of treatment. This may be difficult in practical terms in prisons that are already very overcrowded. As prisoners will already have been in close contact with each other for often long periods of time, it will be necessary to detect their contacts, who may have also developed the disease and may in turn be contagious.

Family visits vary between prison systems and between countries. It would seem obvious that family members should not come into direct contact with prisoners who may still be contagious with TB, and all the more so with prisoners who are proven “treatment failures”. In prisons in western countries, this may be solved simply by systems which only allow communication which prevents any transmission of bacilli, through a system of screens and telephones for example. Some countries *do*, however, allow visits during any phase of treatment, whether or not the patient is still contagious. At the very least, in such cases where it is impossible to provide for adequate protection, personal masks for both patient and visitor should be provided for. In many prisons around the world, family visits are simply not controlled, and family members can come into direct contact with TB cases, even to MDR-TB wards. This may simply be a fact of prison reality, and health professionals have to know about this and take it into account in their management of TB and MDR-TB.

In conclusion on these points: overcrowding is a main factor for transmission of TB, but building prisons does not solve the problem. Experience has shown that, most often, a new prison is simply filled up with additional new prisoners, and not used to manage overcrowding. To diminish transmission of TB, it is necessary to tackle the problem from all angles. Getting the National TN Programme to work actively together with the prison health staff is the most important factor. Higher authorities should be influenced to do all they can to take measures to diminish the overcrowding, such as speeding up judicial procedures, and introducing alternative punishments instead of prison sentences.

Prisons disseminate tuberculosis

Proximity and intensity of exposure have already been mentioned as major risk factors for TB contagion. International prison rules only require that prisoners spend one hour daily outside their cells, although in balmy climates they may effectively get more. Prisoners thus may spend up to 23 hours a day inside crowded cells.

As prisoners often do not seek medical help immediately, and are not detected as having the disease by medical systems that do not actively look for them, they disseminate the disease to fellow inmates (and staff). Medical services in prisons are often not as good as those for the general population, sometimes dramatically less so. In many countries, often precisely those with high-TB burdens, lack of organization, lack of adequate budgets for prison health, lack of trained staff, or a combination of all these factors result in entry screening being erratic, or not done at all. On weekends, when no trained staff are present,

no screening is done and there may be no enforceable system for having weekend entries called up for screening later in the week.

Prisoners often have difficulties getting access to healthcare. This may be due to various reasons. Sometimes prisoner gangs interfere with access to healthcare. Or prisoners have to pay a “fee” to prison officers or even to medical staff so as to have access—fees which many prisoners may not be able to afford. Access to healthcare may be further compounded by a health service with staff who are not highly motivated, due to poor salaries or lack of any training about tuberculosis, thus not enticing prisoners to attend.

Contracting air-borne TB in prisons is different from contracting HIV, the latter depending on risky behaviour. Prisoners should be considered as a **population at high-risk** for both TB and HIV. While TB screening should be routinely done, for all prisoners entering the establishment, HIV screening is a more complex issue, as it implies informed consent and counselling—a subject in itself . . .

Prisons make tuberculosis worse

Late case detection

These realities of the prison environment often lead to late, sometimes very late, diagnosis of TB among prisoners (Coninx et al., 1999). Prisoners may thus be detected too late for their disease to be cured. Whatever treatment they receive may fail to cure these patients, but still keep them alive, thus prolonging infectiousness, and maintaining contagiousness (Slavukij et al., 2002).

Prisoners often do not trust prison medical staff, and thus do not adhere to prescribed treatments. They sometimes resort to “self-medication”, i.e. taking drugs brought in from the outside by well-meaning families or complacent prison officers. These inadequately and haphazardly treated prisoners may develop resistant strains of *M. tuberculosis* which they can then spread among their fellow inmates. Variations on this theme include taking only part of the prescribed tablets (“saving” the others for sale or trading to other prisoners) thus receiving inadequate doses of medication; or bringing in medicines from the outside, bought by family members from unreliable sources, to take instead of the ones prescribed by the prison medical staff.

In prisons, passive screening for TB (i.e. the usual situation whereby medical staff simply wait for prisoners with TB symptoms to “show up” at the medical consultation) may not be sufficient. The medical staff should, as far as possible, go inside the prison itself, and not just stay in the medical rooms. They should be on the active lookout for prisoners with symptoms that could indicate they may have (contagious) pulmonary TB. All prison medical staff should be trained to identify TB symptoms. In prisons in high-TB burden countries it may be preferable to carry out active case finding for TB. This involves essentially two different procedures: questionnaires and Mass Miniature Radiography or MMR.

Questionnaires filled out by prisoners, together with the medical staff, may help to detect TB cases. These questionnaires inquire about the main symptoms of the disease, their duration and any accompanying factors that might detect anybody suspected of having TB. The problem with questionnaires is that they are only useful if filled out objectively and competently. One “trap” here is that they may be subject to tentative corruption, as prisoners with a desire to get on to a TB programme may bribe the member of staff filling

out the questionnaire. More cunningly, some prisoners attend education sessions and learn which symptoms they have to fake. There may be many reasons for prisoners to want to get onto a TB programme. If the programme is in a special prison hospital near the capital, for example, some prisoners may do anything they can to get sent there.

Elsewhere, Mass Miniature Radiography (MMR) may (still) be used to screen every prisoner. MMR has the disadvantage of needing specifically trained staff for its proper interpretation, and does not detect which patients are contagious. Screening by MMR can, however, avoid the corruption trap of medical staff demanding a fee for access to healthcare. All prisoners with an objectively pathological MMR reading should be referred to the medical service. Pathological images on MMRs should be compared with the clinical exam assessed by a doctor, and the taking of sputum samples for the laboratory *then* be done.

In all cases, sputum microscopy should be the bottom line for diagnosis of contagious TB. In the overcrowded and unhealthy prison environment, it is *these* patients which have high priority for treatment, as they can transmit the disease further to their peers. Chest X-rays will of course be part of the work-up as needed, but in many high-TB burden countries with limited economical resources, may be not feasible.

In high-TB burden countries, prisoners with pulmonary TB symptoms may already have some form of resistant TB, or even MDR-TB. The criteria for Drug Sensitivity Testing (DST) on entry will have to be determined together with the National Tuberculosis Programme (NTP), and according to the capacities of the prison system in trained staff and laboratory facilities. If these criteria are met, and financing is available, DST on entry should ideally be done for all prisoners with symptoms of TB in high-TB burden countries, so as to determine the proper treatment schemes to follow.

Prisons export tuberculosis

When released, those prisoners not having been diagnosed as having TB or who have been insufficiently or inadequately treated for TB may further infect their families and the general community. In many countries, there is still no proper coordination between prisons and the outside NTP to ensure continuity of TB treatments started inside the prisons. Without proper follow-up, TB and resistant forms of TB not dealt with in the prison will disseminate into the general community.

In remand prisons, which often also have unsavory and overcrowded conditions, detainees may be incarcerated just long enough to contract the disease, but not long enough to be effectively treated, even if proper treatment is available. Prison health systems are sometimes reluctant to start treatment of what they see as a chronic disease when detainees may well be released within a short time. This same reasoning also applies to sentenced prisoners who are diagnosed as having TB shortly before their release date.

It is imperative for NTPs to coordinate their work with the prison health systems, providing them with training, supervising their work and also the way they collect and interpret data from the prison TB programme. All TB cases detected should be put on treatment, and continuity ensured if the prisoner is released. Follow-up of prisoners released should be imperatively implemented and coordinated with the NTP.

Tuberculosis is bad for prisons (Reyes & Coninx, 1997)

Treatment for tuberculosis is both long and complicated, involving many drugs with many side effects, some of which need careful supervision of interruptions of treatment and

juggling with different combinations of drugs. Other factors inherent to the disease itself make TB a particularly difficult disease to treat in the prison environment, and particularly so if MDR-TB is the issue, as the treatment is much longer.

TB is bad for prisons because the specific treatment of the disease entails certain conditions and considerations that prisons either do not have, or that do not fit in with the realities of prison life. The issue of patient compliance, a *sine qua non* condition for successful treatment, is a major factor, and very often prisoners have no intention of co-operating, or simply cannot for a variety of reasons.

Four types of problems can be identified in the management of TB and MDR-TB in prisons:

- Problems related to prisons as a closed (and coercive) environment
- Problems related to the prisoners themselves
- Specific medical problems encountered in the prisons
- Social problems regarding (non) allocation of resources for health in prisons

Each of these problem areas will be dealt with separately, with chosen examples from ICRC field experience.

Problems related to prisons as a closed (and coercive) environment

The treatment of tuberculosis, and *a fortiori* of MDR-TB, implies several requirements that are absolutely necessary to ensure adequate and complete treatment. The prison setting, having security as its first and highest priority has many requirements of its own that clash with proper and effective TB management.

As has been mentioned, prisons often have no efficient health screening of prisoners on entry. While prisoners are being assessed for TB disease, and all the more so when they initiate treatment for infectious TB, they should be in a separate place where they cannot infect fellow inmates.

Even if separate premises can be allotted to infectious cases in many prisons this will often not be enforceable. Countries with high rates of TB are very often the same ones having severe difficulties in prison staffing and financing, and thus maintaining their own prison rules. Staff salaries are often low and demotivating. Often prison officers will allow prisoners to circulate, even in normally off-limits infectious TB wards, for a fee or even for a few cigarettes ... This underscores the need to identify TB suspects as early as possible and administer adequate treatment as soon as possible to all infectious cases.

Timely diagnosis

Timely diagnosis is thus a major factor in proper management of TB. The importance of the laboratory has been mentioned above. The need for precise and reliable sputum microscopy and culture results, necessary for TB management, becomes imperative when the issue is MDR-TB. In prisons, quality control for laboratory work should of course be coordinated through the NTP. There should be no question of any outside influence on lab results. Field experience has shown, however, that laboratory technicians and even physicians can be coerced (by higher authorities in the prison ...) into changing sputum results, or even DST results, so as to get a specific prisoner onto a TB programme the

patient would normally not need to enter. This possibility must be kept in the back of the mind so as to ensure strict reliability of the all-important laboratory results for a fruitful programme (Reichmann & Hopkins Tanne, 2002).

Another problem already mentioned, that of self-medication by prisoners with drugs brought in from the outside, often occurs because of delays in getting treatment. This recipe for creating resistant TB could be solved by timely diagnosis and proper management.

Interruptions of treatment

TB treatment, and all the more so MDR-TB treatment, requires continuity of treatment with proper supervision. Prison situations are notorious for bringing about interruptions of treatment. Medication regimes should be adjusted according to antecedents and previous monitoring of patients' reactions to the drugs taken, as well as clinical evolution. In prisons, such continuity of treatment is often not possible. Prison regulations often require prisoners to be transferred—often without warning—for a variety of reasons, such as to avoid any planning of escapes, from one prison to another. Prisoners may also be transferred for judicial reasons (for remand detainees, the necessities of the on-going inquest or for the needs of the actual trial) or for disciplinary reasons (prisoners sent to a different prison with a harsher regime for having violated the rules). Sometimes it is just standard prison policy to transfer (rotate) prisoners from one prison to another as part of security measures, and there may even be transfers without any clear reason evoked at all.

Medical staff, even if attentive to this problem, often have either no say or are simply not informed before a prisoner is taken away. This leads to interruptions of treatment, or, which may be even worse, erratic treatment. Such interruptions may take place at any phase of treatment. Often, only a limited number of prisons within the system provide adequate treatment for TB. More often than not, prisoners' medical files do not follow such transfers.

Medical staff should try to ensure that prisoners receiving TB medication stay in the same place for the duration of the treatment. If this is not possible, they should try to ensure continuity of treatment, and at least have the medical file follow the prisoner to wherever he or she goes next.

Commitment to ensuring completion of treatment should imply special considerations for prisoners transferred between prisons. A TB control programme is less complicated when a TB patient starts and completes treatment at the same prison. Prison authorities should ensure that a prisoner treated for TB completes at least the initial phase of treatment without transfer between prisons. When a tuberculosis patient in the second (continuation) phase of treatment is transferred to another prison, completion of treatment in the other prison should be guaranteed, meaning sufficient drugs and the staff to administer and monitor them correctly (Slavukij et al., 2002; Kimerling, 2000).

Punishment cells

Interruptions of treatment can occur even within the same prison. Prisoners who transgress prison rules may be sent to punishment cells. Field experience has shown that medical treatments are often suspended during the time spent in punishment. Prison authorities should ensure that TB treatment is administered by qualified staff as required even in punishment cells.

When a prisoner's treatment for TB is interrupted, self-medication may further complicate the issue, as has been mentioned. Prisoners often have access to an internal black market of drugs. Such self-medication, apart from being inadequate, may also imply

using low-quality or expired drugs. Erratic treatment and interruptions of treatment are a recipe for selecting drug-resistant bacilli. When initiation of MDR-TB treatment is planned, these loopholes in the system have to be envisaged and eliminated. Strict controls should be enforced to ensure no drugs enter the prison system unless fully authorized and controlled by the medical service.

Finding contacts

Prisons often do not have an adequate system for case-finding of TB contacts. Medical services are often understaffed, and there may be no realistic way of tracking down specific prisoners and making them come to consultation. When there is no adequate control system of prisoner movements within the prison—a not unusual situation in many developing countries, with sometimes huge prisoner populations—it may well be impossible for medical staff to track down a specific patient (be it a contact or someone actually under treatment) if for whatever reason the prisoner in question has no desire to come forward. This has to be taken into account, as finding contacts becomes even more important if one is to tackle resistant forms of TB.

Prisoner hierarchies

Another issue that often plagues TB programmes in prisons is the existence of internal hierarchies among prisoners. Some prisoners may refuse to be accommodated with others they seen as inferior or underdogs. Prisoners from different gangs very often cannot be put together, as violence may ensue. Medical staff may thus find it impossible to segregate patients according to medical criteria, without taking into account these impossible-to-avoid separations. A “Boss” TB patient may thus end up being alone in a cell, while a good number of other, “lower hierarchy”, TB patients may be crowded into a similar sized cell . . .

Medical staff are often not in a position to enforce separation based merely on medical grounds, as the custodial staff will “respect” the internal hierarchy to maintain peace and quiet in the prison . . .

Transfers out—or defaulters?

Prisoners are released after finishing their sentences. If they are still on TB treatment this means they need to be followed up at an outside facility, most preferably under NTP surveillance. This often does not happen. On the one hand, it is often the high-TB burden countries that have the least means for ensuring such follow-up. On the other hand, prisoners released, and this applies everywhere, often have given false names and addresses, or no longer have any real home address. They are often destitute and simply cannot afford to pay for transportation to go and receive treatment or medical supervision at a proper centre for treatment. Released prisoners are therefore very often “defaulters” rather than “transfers out”, as there is effectively no follow-up of their treatment once outside. Merely interrupting treatment (particularly in the second phase) may be less harmful than taking drugs erratically on and off. According to availability of drugs, and the prisoner’s finances, some prisoners may decide to continue “treatment” on their own, with the predictable consequences.

In countries where some TB drugs are freely available on the market, but of dubious quality and often expired, *and* patients have enough money to buy them, this is the recipe for creating resistant strains of TB bacilli.

Various control mechanisms and incentives (such as a free lunch, twice a week, during the continuation phase . . .) have been introduced to try to get all prisoners released to report for follow-up of treatment at adequate NTP supervised centres. This issue, however, is still a major preoccupation in many countries with high prevalences of TB and MDR-TB.

Problems related to prisoners themselves

Prisoners are not like patients physicians are used to treating in the outside world. This is due mainly to the very harsh and violent world inside prisons, which hardens minds and often reverses priorities. Education about TB, for example, a key element in any TB programme, may have little or no impact on many prisoners, no matter how well delivered. Prisoners have their own concerns, such as their families, often in dire need of financial support. Violence in prisons is rampant, and such issues as drug or gambling debts are taken very seriously, as not doing so can be dangerous. In the poorest countries, just survival inside what has been called the “prison jungle” takes may take priority over everything else.

Drug hoarding

Many prisoners are notorious for not taking their prescribed medicines once they have taken the first weeks of treatment and they start feeling better. They may want to hoard their medicines for a variety of reasons. Medicines and particularly medicines with a reputation for being strong, such as Rifampicin, have a market value inside prisons. (In some countries prison officers have been known to be eager to get Rifampicin tablets to cure venereal diseases.) Prisoners may thus decide not to swallow certain tablets so as to sell them, or otherwise use them as currency, bartering them for illicit drugs, for example. Others may want to use the tablets for paying back gambling debts—always a serious issue among prisoners—contracted in prison. Or they may want to smuggle TB drugs out to their family, not realizing that this is the worse possible thing they could do. Some may simply want to have drugs—always a cash value in prisons—saved up for a rainy day.

When prisoners want to hide tablets and hoard them, they devise various tactics to escape cursory observation. Sleight of hand may fool health staff not knowledgeable about such practices. Prisoners also use the old trick of creating a minor disturbance to distract medical staff, thereby allowing them to hide or pass on the desired tablets, while pretending to have swallowed them. Medical staff supervising TB treatments need to be aware of this, and should be attentive at all times. Field experience has shown that it is best to have two members of the health staff to ensure compliance. This may mean, for the most unruly prisoners, observing them carefully, and introducing extra precautions such as directly inspecting the mouth after the tablet is (supposedly) swallowed or making the patient talk after swallowing tablets with a glass of water.

Tablets combining two or more drugs reduce the number of tablets to supervise. Combination tablets are less attractive to many prisoners than single drug ones.

In a different scenario, prisoners may decide to stop treatment for a variety of reasons. It may be that prisoners stop their treatment because it is fraught with secondary or side effects. Rather than openly declare themselves defaulters, they may simply stop taking the

tablets. Others may decide not to complete their treatment, so as not to be cured and therefore not sent back to whatever other place they came from.

Whatever the reason, it is imperative that TB treatments be administered by D.O.T. (directly observed treatment). In prisons, strict and individual monitoring of drug intake is absolutely necessary. Compliance should never be taken for granted in a prison environment.

directly observed treatment in a prison should mean directly observed tablet swallowing ...².

If taking the full treatment regime is imperative for normal tuberculosis, full compliance becomes even more critical when treatment of MDR-TB is the issue. An argument sometimes heard, that prisoners who are dying will be more disciplined and will take their medicines, may be true for some MDR patients, but unfortunately the realities of prison life create situations where this is all but certain. Even an MDR prisoner accustomed to enduring violence and peer coercion may choose to sell or barter his “new” (second-line) drugs for any of the reasons already mentioned.

Finally, many prisoners suffering from MDR-TB may already have undergone several bouts of (first-line) DOTS treatment, and have suffered from side effects of the different drugs. Prisoners have a much higher rate of liver problems, including hepatitis B and C, than the general population. They may therefore find it much more difficult to accept new and possibly more severe side effects from a much longer bout of second-line drugs, and may try to avoid taking them.

“Sputum cheating”

There is another pitfall regarding TB management that occurs in prisons, and has been observed in prisons on all continents, which can be called “sputum cheating”. This term refers to practices intended to substitute someone else’s (generally AFB-positive) sputum for one’s own (negative one). Cheating with someone else’s sputum may be done so as to get on a TB programme, so as to get the perceived “advantages” of the programme for a prisoner who does not have TB. Much more often, cheating is practiced by prisoners who are finishing their treatment and who want to stay on the programme, again with its perceived privileges, at all costs.

To understand this phenomenon it must be appreciated that prisons in developing countries with high-TB burdens are often prisons that have bad living conditions, sometimes extremely bad ones. In such prisons, the attraction of the prison hospital setting, where the TB programme is implemented—although objectively bleak compared to western standards—may be quite strong. Conditions in the prison hospital may be seen as lavish, as prisoners on TB treatment get better food than other prisoners. TB patients in hospital are also not required to work. Security is often lax in prison hospitals. Living conditions are thus better, and patients “even get free drugs” (sic!). Extra family visits may also be an additional “luxury” that are allowed in the prison hospital.

For all these reasons, prisoners on TB treatment may desperately want to stay in the prison hospital after the end of their medication. To this end, such prisoners try to fake their sputum control results. They obtain positive sputum from a prison newcomer, with AFB-positive sputum, and try to give that positive sputum for the control test instead of their own

(most probably negative) sputum. If such sputum cheating is not detected, the prisoner will stay on and continue getting the perceived advantages in the hospital ward, instead of being sent back to his original prison. However, the recorded treatment results will be flawed.

The decision to declare a patient cured (or not) never depends solely on a laboratory test, but also on the clinical development of the case. In prisons, medical supervision is often less rigorous than in a civilian hospital, and thus faked laboratory tests can wrongly influence clinical decisions. “Sputum cheaters” use a variety of deceptions to fake their results. The oldest trick is of course to send a newcomer to deliver the (positive) sputum instead of the prisoner reaching the end of treatment. Another common way of trying to cheat the system is coming in with someone else’s (positive) sputum inside the mouth, hidden under the tongue, and delivering it into the goblet as one’s own. This can be easily thwarted by having prisoners wash not only their hands (another hiding place) but also having them rinse their mouths thoroughly before giving sputum.

Some prisoners “cheat” on their sputum test to **GET IN** to a TB programme, giving “positive” sputum from someone else—whereas they do not have TB—because the TB programme is seen as advantageous . . . Others, who have been cured, “cheat” on their sputum test by giving someone else’s “positive” sputum, so as to **STAY ON** in the programme, for the same perceived (and real) advantages.

Other examples of how prisoners “cheat” on sputum tests

The following examples are taken from TB programmes in Latin America, in countries of the former Soviet Union, Europe and Asia.

- Trying to smuggle positive sputum inside a small syringe, and by sleight of hand injecting it into the sputum cup.
- Hiding positive sputum inside the hollowed out filter of a cigarette, which is innocently smoked (the sputum being sucked out of the filter) before the sputum take (and after having been made to rinse out the mouth . . .).
- One prisoner with a hollow tooth used it to hide positive sputum inside. It was quite easy to stop up the hollow tooth with the tongue so the mouth rinse would be ineffective. He was caught by a very attentive nurse directly observing the sputum take. Other similar cases have been reported.
- Dry positive sputum can even be a source of internal trade inside the prison! (In some prisons producing it can be a minor industry.) Dry sputum is concealed under the nails and deftly put into the cup. Of course dry sputum can often clump up and is detected by the laboratory.

Nutrition

An adequate diet is essential for TB treatment. TB programmes should include high-energy foods and extra protein. A proper food ration also makes it easier for patients to swallow their many tablets. In prisons, food rations are often inadequate and food preparation can be unsatisfactory. Prisoners always complain, rightly or wrongly, about the food. Food can acquire almost a mythical importance. Stealing food inside a prison can lead to severe

violence between prisoners, and has even been the cause of riots causing prisoner deaths. It is thus easy to comprehend why the “attraction” of hospital food can be one of the factors “tempting” some prisoners to try to “stay on” in the TB programme.

TB—health education in prisons

Prison officers play a crucial role in detecting and referring prisoners to medical services and need to understand that the best way of protecting themselves is to help prisoners with TB symptoms obtain early diagnosis and treatment. Prison officers must also be aware about the dangers of self-medication and not allow in non-prescribed TB drugs.

When prisoners first enter the prison system, they often cannot be bothered with health information. They are stressed, want to see their lawyer, have family issues and arguably have many other worries. Providing information on TB has to be an integral part of the medical procedures already in place, such as medical screenings (but not necessarily on entry). It is crucial that medical staff provide correct information to prisoners on TB, and give clear explanations in simple language on early signs and symptoms of the disease. Information on diagnostic and treatment services available in the prison needs to be given and explained. Prisoners should also receive a simple leaflet explaining basic facts about TB and health services available.

Posters with key information on TB transmission, “coughing and spitting hygiene”, importance of ventilation and sunlight and early signs and symptoms of disease should be placed in key communal areas. Information material can be developed and produced with the aid of outside non-governmental organizations (NGOs), thus providing outside credibility on medical issues. Innovative ways of providing information can be developed: theatrical sketches, videos, all preferably in a participatory way. Prisoners with drawing skills can be encouraged to make illustrations for brochures, posters and health education materials. Developing peer education for prisoners is not easy. Due to internal hierarchy systems, not all prisoners are respected by the others. In some contexts, prisoners who behave well and help provide such health peer-education material may even receive credit for early release consideration.

The drawback of any Health Education Programme is that the information can be misused by some of the prisoners. Some may use it to simulate TB symptoms for referral to a TB treatment facility, or to stay on (after treatment) in a TB prison hospital. These facilities, as has been said, often may have better living conditions than their usual prison. TB information for prisoners should not provide detailed information on treatment, medicines and dosages used, as is the case in some countries. Prisoners may also try to obtain drugs, through family visits or by paying off the prison officers, for self-medication.

As has been stated, many prisoners are experts at cheating and fooling prison staff. It becomes a “sport” to develop new ways to cheat the system. Health education should therefore also be very explicit about the dangers of not taking full treatment, “sputum cheating”, and erratic treatments.

In the past, one had only to deal with drug-sensitive TB strains. Today poly- and multi-drug-resistant strains are increasing everywhere. This complicates treatment and the overall management of TB in prisons. Prisoners need to understand why they suddenly have to be accommodated and kept apart from their fellow inmates. An example of themes that need to be explained in simple terms:

- The difference between the first and second phases of the treatment.
- What if sputum examination results are negative, but the prisoner is still ill?
- End of treatment: information on follow up and maintaining a healthy life style
- Information for families and visitors of TB patients concerning contagion, and the dangers of self-medication.



Figure 5. Sputum collecting “cubicle” inside a prison.

Importance of the laboratory

Laboratory tests are crucial in the evaluation of TB programmes. It has been stated how “sputum cheating” can make cohort analysis difficult and erroneous. Regarding resistant forms of TB, extra rigorous supervision should be implemented to prevent this type of trickery. Health staff in prisons should know that prisoners can, do, and should be expected to bend the rules. Vigilance is therefore imperative at all times and for all procedures.

Note that the cubicle (Figure 5) opens toward the exterior by a window, but is closed towards the corridor. This sputum can be taken safely, without having prisoners go outside in very cold weather.

Sputum collection in prisons should ideally always be taken outdoors. This may be impossible in cold climates, but there should at least be a well-ventilated area for the procedure, or some kind of closed cubicle as the one shown above. Prison medical staff need to be constantly told about the need to take individual respiratory precautions so as to avoid getting infected. Prison staff are notorious for misusing or ignoring respiratory protection. Many of them either refuse to use anything at all, even in high-TB burden



Figure 6. Directly observed treatment in a Caucasian prison.

situations, alleging they have been in contact with such patients for years. Others use surgical paper masks which provide insufficient protection (see Figure 6). Inversely, even when correct masks are used, medical staff often wear them in settings where they are irrelevant, such as outdoors in the courtyard.

Remember: **D.O.T.** is absolutely necessary in prisons!

Side effects of medical treatment

The side effects of the drugs used in TB treatment have to be clearly explained to prisoners under treatment, and particularly so in treating MDR-TB with a combination of first and second line drugs, both of which have many side effects.

Prisoners may be discouraged by these side effects and refuse to continue their treatment. Medical staff should explain to them, in terms prisoners understand, the different reactions they will have, and how best to cope with them. Prisoners should understand the need to resume treatment so as to complete a full course. Medical staff should not assume that cursory explanations given just once will necessarily work on patients who are often difficult, and often have a tendency to mistrust prison staff, health or otherwise.

Monitoring and management of drug side effects is essential for proper adherence to treatment. Unruly patients are more likely to be found among prisoners who are disillusioned or even cynical about their treatment, and who often have little in life to look forward to. As mentioned above, education on the public health effects of erratic treatment is often seen as irrelevant by prisoners in the light of their much more immediate prison-related worries.

Some medical complications are much more common among prisoners than in the general community. Concomitant conditions such as liver disease are rampant in prisons, particularly with the high number of intravenous drug users (IVDUs) and with the high

rates of hepatitis (particularly B and C) found in prisoner populations. Drug and alcohol abuse is also widespread among prisoners.

Specific medical problems (MDR and HIV) encountered in prisons

If the terms of “primary” and “acquired” resistance have been abandoned, and replaced by the notions of “new” TB patients and “previously treated patients” in prisons this difference may sometimes be very difficult to determine. This is particularly true in prisons in high-TB burden countries. It is often impossible to determine who is new and who is not. Prisoners come into the prison system most often without any medical records. They may give false answers according to what they perceive at that moment in time to be in their best interests. This means that a prisoner may affirm he is a “new” patient, but this is not necessarily true. In some of these countries, *everyone* should be considered as having taken some form of TB treatment.

The old sense of “acquired” resistance can have a particularly sinister meaning in high-TB burden countries. The administration of a standard short-course first-line regime of treatment to a patient who is already mono- or bi-resistant (even without necessarily being MDR) can lead to amplification of resistance. This has been documented in TB programmes in prisons of the countries of the former Soviet Union, and is a serious on-going concern (Shah et al., 2005).

For these reasons, DST on entry with rapid tests giving results on Rifampicin resistance are now recommended. In the prisons of those countries with high rates of TB and MDR-TB, this is probably the only way to avoid amplification of existing patterns of resistance.

DST for second-line drugs brings the added difficulty of needing extra laboratory equipment and know-how. Many prisons already have trouble training staff for simple sputum tests. With the advent of treatment for MDR-TB, the need for laboratory skills and infrastructure is all the more essential.

Ensuring continuity of treatment

Prisoners with MDR-TB (if they have been identified as such) are usually kept in cells or wards separated from other prisoners. Some countries will not have second-line treatment; others will still be in the initial process of implementing the strategies recommended by WHO for treating MDR-TB. For prisoners, the main issue is to treat the source of resistant strains of *M. tuberculosis*. Watertight segregation of contagious patients in prisons may not be possible, particularly in those very countries where there are most prisoners with MDR-TB, for the many reasons already mentioned. Thus there is a need to treat them as soon as possible, so as to eliminate the source of MDR-TB infection. The best strategy has to be determined together with the NTP.³

In a situation where there is treatment for MDR-TB in prisons, and a prisoner with MDR-TB finishes his sentence before the end of treatment, all arrangements should be made so that the treatment can be continued outside, preferably within NTP-approved settings. There is no clear one-size-fits-all solution for getting ex-prisoners to comply with such external treatment and monitoring. Incentives, such as a warm meal at the NTP may be an option, but there may be no budget for that. Reimbursement of transportation money may also help. It has even been suggested to try to get hold of ex-prisoners at the police

stations or other such places where they have to show up, to “sign in” on a regular basis, as part of their release arrangement or parole.

Whatever the strategy chosen, it should be taken into account that the only way to stop further dissemination of TB and *a fortiori* MDR-TB is to cure those prisoners who have it. The risk that a small number may indeed “default” and never show up for the rest of the treatment may be a risk that has to be taken. Not giving them treatment because they will leave the prison before finishing the full scheme cannot be an option, as they would thus leave the prison un-treated to disseminate MDR-TB. Some ex-prisoners will undeniably default on their follow-up treatment, going back to their respective villages. Arguably, there they will disseminate less (resistant) bacilli than they ever did within the prison, with its overcrowding and its poorly ventilated cells.

The very conditions that lead to high TB rates in prisons may also lead to development of drug-resistant TB and MDR-TB.

Incoming prisoners may also bring in drug-resistance with them, especially if they have been in prison before or in settings with poorly supervised civilian programs. This is a major problem, for example, in many countries of the former Soviet Union and Eastern Europe.

Specific medical challenges posed by the treatment of MDR-TB in prisons:

- Extremely long duration of therapy (24 months! . . .);
- worse side effects with second-line drugs;
- a much more challenging monitoring schedule;
- need for drug sensitivity testing (with the added difficulties if DST is to include second-line drugs); and
- the need for even closer links to the civilian programmes.

(Stern, 1999; Kimerling et al., 1999; Kimerling, 2000).

HIV

The additional burden of the combination of HIV and TB is described in numerous publications by WHO and others. Regarding prison settings, the daily conditions of prison life are often ideal for promoting the transmission of HIV infection (Portaels et al., 1999). The HIV/AIDS situation in prisons varies greatly from country to country. Intravenous drug use (IVDU)—a major factor in HIV infection in western prisons—may be a major factor in some developing countries’ prisons, and then again practically inexistent in others. Sexual practices of men having sex with other men (MSM) are often taboo, illegal, or severely sanctioned in many countries. In some western countries, prisons have syringe and needle exchange programmes and distribution of condoms is taking place.

Prison conditions can promote tuberculosis transmission directly and indirectly through facilitated HIV transmission. A high prevalence of HIV will obviously complicate TB management (Reyes, 1997, 2001). The medical implications and complications of the dual infection are beyond the scope of this paper.

*Sources of HIV in prisons:***Intravenous drug use****Men having sex with men****Tattooing**

In prisons as well as, and perhaps even more so than, outside, all HIV positive prisoners with signs and symptoms of tuberculosis should be screened for TB and possible MDR-TB.

Prisoners symptomatic for respiratory disease, but with consistently negative sputum for TB, could be HIV-positive and should be considered for HIV counselling and testing. In a different light, such prisoners could also be suffering from a different pulmonary disease. Paradoxically, such symptomatic, sputum-negative prisoners are often put on (first-line) TB treatment without a clear diagnosis of TB! They should instead be given a trial treatment with a broad-spectrum antibiotic that is not active against TB. Thus TB drugs would not be squandered on patients with a different pulmonary disease.

The many more extra-pulmonary cases of TB in prisons with the advent of HIV are sometimes difficult to fully document in prisons that have insufficient funds and equipment for a full hospital work-up. This sometimes again leads to the inadequate prescription of TB drugs, or it may inversely lead to misdiagnosis of extra-pulmonary TB.

Any recommendations about the specificities of the prison setting regarding MDR-TB treatment together with antiretroviral (ARV) treatment would be premature, as these dual treatments are not yet widespread in most high-TB burden countries. ARV treatment in prisons is still an exception in most prison systems where both TB and MDR-TB are highly prevalent. However, the many precautions that have been recommended regarding TB and MDR-TB treatment so as to ensure reliability of results and adherence to full-treatment are equally relevant, and perhaps even more so, regarding HIV.

With certain treatment regimes, even short interruptions of HIV treatment can lead to resistant strains of HIV. Many prisoners, as has been stated, can be unruly and undisciplined patients, ready to trick the system for any perceived personal benefit. This same attitude could have disastrous effects with HIV treatments taken nonchalantly. The recommendation here is to carefully consider all factors, and particularly the presence of reliable, fully trained and competent medical staff, knowledgeable about prisons and prisoners, before attempting to combine MDR-TB and HIV treatments in prisons. The already often major difficulties ensuring adherence to treatment, with high numbers of tablets for TB (let alone MDR-TB!) treatment, will be exacerbated by the addition of ARV therapy. Furthermore, side effects of treatment for HIV, added to those from the anti-TB drugs can be a serious problem, and need careful and competent management. Unfortunately, the prison medical staff in many countries receives little or no training on these issues (O'Moore, 2006).

There should certainly be a careful calculation of risks and benefits before initiating appropriate ARV therapy in prisons.

Social problems concerning allocation of resources for health in prisons

Prisons are often on the very bottom of the list for government funding, if indeed they are even on the list. Prisons are very often seen not as priorities for health, but as additional burdens that no one, and often least of all the Health Ministry, wants responsibility for.

In the case of TB and MDR-TB, political commitment is obviously the number one priority, and thus funding should be forthcoming. NTPs previously excluded from, or uninterested in, prisons for many years are finally realizing that they simply cannot neglect the prisons if they are serious about tackling TB (Coninx et al., 2000). Treating MDR-TB in the general population without treating the reservoir of MDR patients in the prisons is no longer considered effective or ethical.

In conclusion:

The pitfalls of TB management in prisons were previously already identified as many. Today, with the spread of MDR-TB, and even worse forms of resistance already on the horizon, it is all the more essential that prison health staff know about these pitfalls, so as to ensure adequate treatment of the disease and prevent development of drug-resistance (Reyes, 2000). Experience has shown that TB specialists who have never worked in prisons simply do not realize the many specific difficulties involved. It is for this reason that this issue of prison specificities for TB management has been revisited.

The basic DOTS strategy and the additional components for dealing with MDR-TB have to be agreed upon by all parties before beginning to treat MDR-TB in prisons. Political will and commitment are as essential for prisons as for the outside world—perhaps even more so. The required training and supervision of medical staff and the rigorous monitoring of all aspects of MDR-TB treatment and case management are particularly challenging in the prison context. In a programme for the treatment of TB and MDR-TB, there is no place for erratic treatments and irregular compliance due to a malfunctioning prison medical system, or to lack of specific knowledge by medical staff.

Close coordination with the civilian National TB Programme, with targeted social support, should help to ensure that all prisoners having left prison before completion of treatment receive proper guidance so as to complete it and post-treatment supervision once outside. This is true for TB in general, but all the more important with the advent of MDR forms of TB. With the even greater menace of “XDR” (MMWR, 2002–2004) TB on the horizon, these pitfalls cannot be ignored, and need to be firmly restated.

Notes

- 1 See: Reichman & Hopkins Tanne (2002).
- 2 The acronym D.O.T.S. (directly observed treatment short-course) is no longer used, as DOTS is now a 5-point strategy for the treatment of TB.
- 3 Treatment for MDR-TB passes through the procedures of the “Green Light Committee”, see: WHO (2006).

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