

Toward healthy prisons: the TECH model and its applications

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Abstract

Purpose – This paper aims to explore how the TECH Model (testing for and treating infectious diseases and vaccination; environmental modification to prevent disease transmission; chronic disease identification and treatment; and health maintenance and education) can be used for assessing and achieving healthy prisons.

Design/methodology/approach – This paper explores the concepts of “health in prison” and “healthy prisons” in the context of recent research and guidance. The paper then considers the TECH Model as an approach to achieving healthy prisons.

Findings – Under each of the four TECH Model domains are tasks to achieve a healthy prison. For prisons with poor or no resources, each domain contains steps that will improve prison health and move towards a healthy prison for both prisoners and staff. Implementation can thus be “low-TECH” or “high-TECH” depending on the setting and the available resources and the model is specifically designed to provide options for resource-poor as well as resource-rich correctional settings.

Originality/value – The TECH Model is a first step in characterizing the components of a healthy prison and the processes to achieve this. This Model could be implemented in all levels of prisons internationally.

Keywords Public health, Prisons, Jail, Application, Risk reduction, Infectious disease, Environment, Chronic disease, Prevention, Health services, Diseases, Risk management

Paper type Conceptual paper

Ensuring health in prison and achieving healthy prisons: the TECH model

In 1995, the World Health Organization (WHO)/Europe first launched the “Health in Prisons Project” (Møller *et al.*, 2007). More recently, the WHO published “Health in Prisons”, a document that summarizes the philosophy and practice of a “whole prison approach” toward achieving health in prisons. “Health in prison” is the process of providing comprehensive health services and education in prison. “Achieving a healthy prison” (Møller *et al.*, 2007, p. 2) is the long-term goal of achieving a sustainable, health promoting prison. “Health in prison” represents and results from the provision of comprehensive health services and education to prisoners. A “healthy prison” extends this concept and is understood as the achievement and long-term maintenance of a prison that promotes the health of both inmates and correctional staff while in prison and as they interface with the community.

The concept of the “healthy prison” represents a complete transformation of the “total prison” concept. In a total prison, the organization, the regime and the physical prison structure are dedicated to punishment, to making prison a profoundly negative experience that would serve as a deterrent to crime. The healthy prison, on the other hand, is the product of an environment that, within the confines of the law and the penal system, promotes and maintains health. Møller *et al.* (2007, p. 1) use the terms “health promoting prison”, and “whole-prison approach” to describe such a system, and note that “sustainability” is the characteristic of achieving a healthy prison. The health of the whole prison must be considered – that of both staff and inmates as well as the environment (including occupational health and safety).

The process of achieving a healthy prison, however, particularly in resource-poor areas, has not been clearly addressed, and this paper attempts to provide an appropriate and simple process model based on risk reduction models. We extend Møller *et al.*'s point that countries with basic or rudimentary services will need support to introduce the changes that are described in "Health in Prisons". That is, we argue that even in settings with minimal or no economic resources, there are still actions that can be taken that can reduce health risks and improve health. There are, however, no good process models to guide prison administrators and staff through such a course of action, and this paper attempts to provide such a model.

Health in prison: the WHO model

The WHO Health in Prisons Project (Møller *et al.*, 2007, p. xvi) introduced the concept of health in prisons or health-promoting prisons. This latter phrase covers prisons in which:

The risks to health are reduced to a minimum; essential prison duties such as maintenance of security are undertaken in a caring atmosphere that recognizes the inherent dignity of every prisoner and their human rights; health services are provided to the level and in a professional manner equivalent to what is provided in the country as a whole; and a whole-prison approach to promoting health and welfare is the norm.

Møller *et al.* (2007) list the essential steps in setting up health in prisons. First, all staff must be involved, including the senior management who determine the prison climate. Second, it must be sustainable, which will involve creating strong links between prison health care services and the health services of the local community. These essential components thus involve buy-in at a political level, by management, by staff, by prisoners, and by the local community health system.

The emphasis on a healthy prison arises from the recognition that "prison service is a public service" (Møller *et al.*, 2007, p. 2). Møller *et al.* emphasize that good prison health is essential to good public health. From the community perspective, in turn, there needs to be a recognition that the opportunities presented by a prison are substantial and potentially cost-effective, by allowing access to people who are at high medical risk and high socioeconomic disadvantage, and who are often very difficult to reach in terms of locating them and in terms of expense and staff time while out in the community. The movement of people already infected, or at high disease risk, into correctional environments and back into society without effective treatment or follow-up, or indeed preventive education, gives rise to the spread of diseases inside the system and beyond it. Finally, they emphasize that the physical conditions in many prisons are unhealthy. This will largely depend on the living conditions in prisons, which are usually better in most developed countries, and usually worse in less-developed, resource-poor settings. While in the latter case these may be beyond the control of management and staff or require political buy-in, issues may include overcrowding, violence, lack of fresh air, lack of light, poor food and water quality, poor sanitation, and infection-spreading activities such as tattooing, use (including injecting) of drugs, and sexual activity (sometimes coerced) without the availability of protection from sexually transmissible infections (STIs) and HIV. Møller *et al.* (2007) thus provide a crucial philosophical and practical starting point for thinking about health in prisons.

Healthy settings

The WHO has also pioneered the concept of "healthy settings" – perhaps best known by the "Healthy cities" movement (Harpham *et al.*, 2001). Such setting-based approaches are characterized by "a holistic and multi-disciplinary method which integrates action across risk factors". The goal is to maximize disease prevention via a "whole system approach, which has its roots in the Ottawa charter of 1986" (WHO, n.d.). Using this model, we believe that prisons can also benefit from being seen as a potentially "healthy setting": healthy prisons, which integrate actions from multiple health processes into a setting approach, and move beyond healthy individuals.

From health in prisons to achieving healthy prisons

This conceptual transformation to a "Healthy Prison" as a setting can only come about by rethinking or reshaping to some degree the concept of the prison and the prisoner.

First, it requires that we see the prison not as an environment totally closed to the outside world, but almost completely open. It is open in the temporal sense, in that most prisoners will move in and out – and given recidivism rates, possibly several times – for time-limited stays. It becomes, in modern usage, a place of behavioral quarantine (to remove the prisoner from endangering the free world) as well as punishment by the deprivation of liberty. It is open in the sense of the transmission of infectious organisms between prisoners and prison staff, prisoners and visitors, and prisoners and the community – both in terms of what they bring in, and what they take out on release. In health terms, then, it may be less of a quarantine – and may be more akin to an incubator and/or a vector of disease, where overcrowding and risky practices may multiply risk.

Second, the healthy prison requires that the prisoner be seen as more than a space-occupying body, but as a functioning body, in both the physical and mental sense. The prisoner moves from being an object of detention to a body with medical and mental health care needs: that is, they move from the simple legal status of a body legally detained and subject to judicial control, to a body to be treated and health maintained or improved. In some ways, this parallels the move from prison as a place of incarceration to a place of correction – which is the intention behind the reference to the prison system as a “correctional system”, even if there is often little formal attention to rehabilitation or “correction”.

Third, to extend this idea further, a healthy prison recognizes that there has been a shift from “total prisoner” toward the “total patient” where the focus is on the inmate as a potentially healthy body rather than just a correctional entity. The total patient prisoner, as opposed to the penal prisoner, exists with risk behaviors and in an environment that may often promote poor health. This is a conundrum: in an environment which is often physically drab and intellectually boring, illicit behaviors like smoking, drug use and alcohol consumption become adaptations for stimulation and entertainment. Here, the conflict between prisoner and patient becomes most salient, where the punitive and the curative or preventive aspects of prison may collide. The concept of the healthy prison is an attempt to integrate the penal and the medical in the persons of the prisoners and the custodial staff, both of whom have a right to a healthy and safe prison environment.

Healthy prisons as restorative justice

However, there need not be a tension between the two. Indeed, the criminological concept of restorative justice might be extended to prison health care. Restorative justice involves, in addition to making amends, a broader function of the restoration into safe communities of offenders (Duff, 2003). If we see the concept of restorative justice in the sense of the wider community, then part of the correctional process is to return the released inmate restored in whatever sense can benefit the community – possessing work-related skills, with substance abuse treated and mental health problems stabilized, and with health issues that might cost the community directly or indirectly treated or prevented. In this sense of restorative justice, the restoration is to the community and not specifically just to the victim. We must also consider the simultaneous provision of appropriate occupational health care to prison staff, as part of a “restoration” by recompense for the difficult and sometimes dangerous working conditions that exist in prisons. A healthy prison, therefore, should be seen as an integral part of the concept of restorative justice as much as an integral part of the concept of public health. Viewed through the lens of restorative justice, the healthy prison is one where the aims of criminal justice and public health intersect.

Finally, classically, prisons have been institutions developed not only for punishment but also for the protection of the community. As Møller *et al.* (2007) argue, healthy prisons are completely consistent with this aspect of criminology: the risks they protect the community from include infectious diseases, the effects of drug and alcohol use, and violence, plus the longer term costs of preventable disease. Protection involves several distinct aspects of medicine. Initially, prisoners who have missed important routine vaccinations previously should receive those vaccinations where medically appropriate, in a process of making good any deficits that may have occurred in population coverage. In addition, they should/ can be vaccinated against conditions which are prevalent in prisons, such as Hepatitis B,

and Pneumococcal infections, for protection both of the free world and of the prison communities. For juvenile offenders, Human Papillomavirus (HPV) vaccinations might also be considered given their high level of sexual risk behavior. Then, existing symptomatic problems need to be treated according to standard medical practice. In resource-limited settings, non-urgent and elective conditions may need to be scheduled as conditions and resources permit. Lastly, bearing in mind that the great majority of inmates will return to the community, communities need to be protected against future dangers that released inmates may present. This includes not only specific risks of infections associated with drug and sexual risk behaviors (e.g. HIV, STIs, Hepatitis B and C, and HPV) and violence, but also so-called “victimless” health behavior deficits that do indeed have victims (the individual) but more importantly pose health costs to the community, such as smoking, obesity, diabetes, and other chronic conditions linked to lifestyle (Elliott, 2007; Binswanger *et al.*, 2009; Harzke *et al.*, 2010). Put simply, prison health programs may not only be restorative in reducing the inmate’s risk to the community, but they also play an important role in reducing the health-related cost to the community of the returning inmate as regards both infectious and longer term chronic diseases. The community is protected through the implementation of behavioral risk-reduction interventions to decrease the probability of drug-related and violent crime that result from addiction to drugs and alcohol and problems with anger and impulse management – treatable mental and physical health-related issues. It is a logical extension to move one small step further to protect the community from other preventable health-related conditions.

Achieving healthy prisons: the TECH model

Achieving healthy prisons may be easier in more developed countries and penal systems than in resource-poor settings and in less-developed countries. It is important for us to develop a model that is equally applicable in systems with relatively high and low or no resources for health, rather than simply in better-resourced areas. We present the TECH model as one approach to achieving healthy prisons which describes health-promoting activities in four domains, and from immediate acute conditions to longer term maintenance. It is designed to be applicable to low- as well as high-resource settings, and is based on a risk reduction model: that is, in any setting, there will still be some risk-reducing activities or interventions that are possible.

Faced with scarce financial resources and often political disinterest, how can correctional facilities move toward healthy prisons? The TECH model provides a series of steps to develop healthy prisons. While the TECH model (TECH is the acronym referring (Table I) to the four domains: T (test and treat infectious diseases and provide vaccinations, if available); E (environmental modification to reduce risks); C (control of chronic diseases); and H (health maintenance and health education) is presented sequentially, these steps do not necessarily

Table I Domains of the TECH Model for Healthy Prisons

Test and treat infectious diseases

- Identify and treat infectious diseases
- Vaccinate if any childhood or routine vaccines were missed
- Vaccinate for high-risk prison diseases where possible (e.g. Hepatitis A and B, pneumococcus)

Environmental modification to prevent disease transmission

- Identify and remove vectors (e.g. insects, sanitary arrangements)
- Identify inmate-to-inmate and inmate-staff transmission possibilities and attempt to control these
- Identify unhealthy environmental factors (e.g. smoking, lack of exercise, food) and modify as much as possible

Chronic disease identification and treatment

- Screen for chronic diseases
- Treat where possible (e.g. blood pressure, diabetes, asthma)
- Consider prevention programs

Health maintenance and education

- Screen and treat incoming inmates and staff
- Educate inmates and staff about health, safety and self-maintenance of health
- Maintain inmate health and staff health peer-education systems if possible

need to be followed in order, although it starts with the more urgent health needs and moves to the maintenance of health. It can be “high TECH” in that it is implemented in some detail across all domains, or “low TECH” where it is implemented on an as-possible basis or where only the low- or no-cost domains are implemented.

In some cases, political and employee pressures will make the development of a healthy environment for staff an easier place to start than with inmate treatment. In others, legal decisions, such as *Coleman/Plata v. Schwarzenegger* (2011) in California, will prioritize and mandate improving inmate health and treatment. In *Coleman/Plata v. Schwarzenegger*, the state of California was ordered to release over 34,000 prisoners of the state total of nearly 150,000 because health conditions in the state prisons were considered unacceptable. The magnitude and impact of this remedy underscores the fact that health issues in prisons are taken very seriously by the courts in many jurisdictions. However, given the interactions between inmate and staff health, it makes no sense to limit health issues to just inmates or just staff: both groups should be screened and treated within the same time frame to avoid cross-infection or cross-impact of negative environmental conditions between groups (Ross, 2010).

Treat infectious diseases

First, existing infectious diseases need to be identified and treated. These will usually include, but are not limited to, tuberculosis, STIs such as syphilis, gonorrhea and chlamydia, HIV, Hepatitis B and C, particularly where injecting drug users make up a significant part of the prison population. Rates of infection can vary enormously between jurisdictions. Rodríguez *et al.* (2002) report Hepatitis C rates in the city of Ciudad Juárez, Mexico at 100 percent of prisoners, while over the border in Texas, Baillargeon *et al.* (2003) report male rates as being 27 percent and female rates as 35 percent (state jails) to 48 percent (state prisons). Tuberculosis rates can vary from about half the country’s new cases occurring in prison in Russia (Coninx *et al.*, 2000), to being a rare event in Scandinavian countries.

In tropical areas and where prevalent, Hansen’s disease (leprosy), malaria, and other parasitic diseases such as schistosomiasis, lymphatic filariasis, and onchocerciasis (which are easily treatable) should also be identified and treated. Second, inmates are often at risk of having missed routine childhood vaccinations, and where medically appropriate, these should be given. However, for some childhood vaccinations, the individual subsequently may have become immune by exposure to the disease (e.g. Hepatitis A and B) and not need vaccination. State requirements for vaccinations vary from state to state and country to country and local recommendations must be checked. State, county and city public health departments can advise on the most important local requirements. However, common vaccinations in childhood may include diphtheria, tetanus, pertussis (whooping cough), measles, mumps, rubella, varicella (chickenpox), meningococcus, and Hepatitis A. While these may not seem important to adults, we need to bear in mind that transmission to visitors (including children), and from prison staff to their families, may have serious or fatal consequences to people outside the prison (particularly the young and the old), and that vaccination is part of community protection for diseases that are no respecters of walls or segregation. For vaccination and the consequences of lack of vaccination, prisons must be recognized as an integral part of the community.

Third, there are diseases that are likely to be prevalent in prison populations and which, if untreated, may be associated with increased transmission in prison, and where vaccination as a preventive measure may need to be considered. Those most likely to impact prison populations and workers include Hepatitis B and pneumococcus (bacteria causing pneumococcal pneumonia, and possibly blood, lung, middle ear, and nervous system infection). In areas with high levels of tuberculosis transmission, BCG vaccination may also need to be considered if people have not already been vaccinated. Tuberculosis in prison populations may be ten to 100 times the rate in local populations and exacerbated by overcrowding, heavy smoking, poor nutrition, and HIV infection (Møller *et al.*, 2007).

In all these cases, an understanding of local population rates of disease, and specifically infection and susceptibility rates among inmates and staff who have direct prisoner contact, must be considered before making any recommendations. Finally, any vaccination program

should be carried out in close collaboration with a national or local health department to ensure the vaccinations are appropriate to local risk and need. Because vaccination costs are covered by the government in many countries, this should also reduce cost to the prison.

Environmental modification to prevent disease transmission

First, identify vectors of transmission from disease reservoir to host. These may include insect vectors, such as mosquitoes which may transmit malaria or other infectious diseases. Simple precautions such as spraying or removing standing water which may be breeding areas for mosquitoes in the prison surrounds can be effective. In Central and South America, Chagas disease is a serious and sometimes fatal condition transmitted by the reduviid insect. Spider or other insect bites may cause discomfort and provide an opportunity for infection by *Staphylococci* or other bacteria. What are commonly referred to as “spider bites” in North American prisons are usually Staphylococcal infections rather than arachnid bites. Proper ventilation and sunlight can reduce the transmission of tuberculosis (Madhukar *et al.*, 2006).

Second, survey transmission possibilities and see which can be easily modified in the prison environment. Many of these will already be subject to investigation, such as identifying and removing illegal tattooing equipment, and illegal needles and syringes for injecting drugs. Paradoxically, sometimes removing injecting equipment may mean that undetected injecting equipment is spread among even more inmates, increasing rather than decreasing the risk. Some countries (including Switzerland, Germany, Spain, Moldova, Kyrgyzstan, Belarus, and Armenia) have already successfully introduced needle and syringe exchange programs in their prisons (Elliott, 2007). As an alternative, providing bleach to clean previously used injection or tattoo equipment is a cheap and viable risk reduction. Such programs will have benefits for staff by decreasing the potential for infection through needlestick injury during searches (or other incidents).

Because both consensual and non-consensual sexual behavior occurs in prisons at varying levels, condom provision and use is another successful environmental intervention (Dolan *et al.*, 2004; WHO, 2007). Rape prevention programs in prisons also make use of environmental modifications including segregation of juvenile and first time offenders from more experienced or violent inmates, removing prisoners from dorms to rooms, and moving from the row to the pod design to enable better supervision of inmates as well as changes in prison culture (NIJ, 2008).

Third, other environmental interventions will have significant impacts on health. Banning smoking on prison units can have a major immediate and longer term impact on health. Improvement of food and nutrition can also improve inmate health and is not necessarily more expensive. It may require specific retraining for catering management and staff, but if this occurs as job training, it can be considered an occupational benefit rather than a burden. For inmates who are responsible for food preparation, such additional training may have occupational benefits for them post-release. Depending on space and security availability, provision of more exercise time or equipment may have significant physical health benefits as well as mental health benefits.

Environmental modifications that are related to changes or extensions in the prison structure will prove much more expensive but should be considered in longer term planning. Overcrowding has both direct and indirect health consequences and may be considered a violation of human or constitutional rights, as suggested by the recent Californian decision in *Coleman/Plata v. Schwarzenegger* by the US Judiciary. Sanitation is a second area that has potential health consequences. Use of “slopping out” (in-cell bucket sanitation and its regular emptying) has very high potential for disease transmission for transmission of Hepatitis A and other infectious diseases, particularly dysentery caused by *Giardia*, *Shigella*, and *Clostridium*. While very rare, fatal epidemics such as typhoid and cholera are also spread by this route. Bear in mind that some people may be carriers of these diseases without showing symptoms, such that absence of disease symptoms does not necessarily indicate that the disease is not being transmitted. Partial minimization of risk in “slopping out” might include reducing the distance (and chance of spillage) that waste is carried, limiting the number of people potentially exposed to waste, and promoting cheap and simple but very effective precautions such as thorough hand-washing

after stopping-out. While “stopping out” is increasingly rare in Western Europe and the USA and Canada, it is still common in much of the less developed world.

Chronic disease identification and treatment

The prevalence of several non-infectious chronic diseases in prison populations, especially those with significant proportions of inmates over the age of 30 years, appears to be similar to or exceed that of the local non-incarcerated population in the USA (Harzke *et al.*, 2010; Wilper *et al.*, 2009; Binswanger *et al.*, 2009). These conditions include but are not limited to hypertension, diabetes, asthma, cardiovascular disease, and liver disease. The prevalence and progression of these conditions are associated with ageing, and all require regular clinical monitoring and/or daily pharmacologic management. However, for most of these conditions, treatments are generic and relatively low cost, and all of these conditions may also be improved through proper nutrition, increased exercise, decreased body mass index, and/or improved environmental conditions in the prison context (e.g. improved air quality). Non-medical interventions such as exercise and weight loss programs are low-cost and effective in reducing disease progression or development of disease. An exception may be alcoholic liver disease, which often co-occurs with and is exacerbated by Hepatitis B or C, the treatment of which may be outside the range of economic possibilities for many prisons where health budgets are limited, even in more developed countries.

Psychiatric disorders and chronic mental health issues are highly prevalent in prison populations. In a systematic review of 62 studies of serious mental disorders in prison populations from 12 countries, Fazel and Danesh (2002) estimated that 3.7 percent of incarcerated or detained men had a psychotic illness, 10 percent had major depression, and 65 percent had a personality disorder; women showed similar prevalence of depression (12 percent) and psychotic disorders (4 percent) and lower estimated prevalence of personality disorder (42 percent). On the basis of this study, the prevalence of serious mental disorders appears to vary considerably across countries, both overall and by gender, but is consistently higher in prison populations than in the local, non-incarcerated population. Mental health problems may be exacerbated by detention, especially if undiagnosed and untreated or under-treated. Prisoners with major psychiatric disorders (e.g. major depressive disorder, bipolar disorder, schizophrenia, or other psychotic disorder) demonstrate higher rates of suicide in prison (Baillargeon *et al.*, 2009b; Fazel *et al.*, 2008). Prisoners with major psychiatric disorders have substantially increased risk of multiple incarcerations (Baillargeon *et al.*, 2009a), suggesting that, even when treated in the prison setting, many prisoners are not receiving adequate mental health care in the community after release. Although mental health care of prisoners varies widely across countries and across jurisdictions, recommendations from developed countries suggest that mental health screening by qualified professionals and treatment with appropriate psychotropic medications should be provided when possible (NCCHC, 2008). That is, as with any chronic disease, initial screening and on-going treatment are necessary.

Although prevalence estimates of substance abuse and dependence vary widely across prison populations, this special subset of psychiatric disorders is also highly prevalent in prison populations, typically many orders of magnitude higher than the local general population. In a systematic review of 13 studies representing four developed countries (England, Ireland, New Zealand, and the USA) prevalence estimates of alcohol abuse or dependence ranged from 18 to 40 percent in male prisoners and from 10 to 24 percent in female prisoners. In this same review, prevalence estimates of substance use or dependence (excluding alcohol) ranged from 10 to 48 percent in male prisoners and from 30 to 60 percent in female prisoners. Offenders with substance use issues are more likely to be re-arrested and re-incarcerated (National Center on Addiction and Substance Abuse (CASA) at Columbia University, 2010). Moreover, offenders who have substance use disorders co-occurring with other psychiatric disorders are substantially more likely to be re-incarcerated than those with substance use disorders or psychiatric disorders alone (Baillargeon *et al.*, 2010). As with other chronic conditions, it is recommended that prisoners are screened and treated for substance abuse and dependence. Treatment plans should be comprehensive, individualized, and evidence based. For example, prison-based therapeutic communities

combined with aftercare (post-release) has been consistently shown as effective in reducing relapse and recidivism (Mullen *et al.*, 2001; Wexler *et al.*, 1999; Martin *et al.*, 1999). Treatment may also include pharmacologic intervention. Provision of methadone maintenance for opiate addicts in prisons pre-release has been routine in some prison systems for several decades. Dolan *et al.* (1996) evaluated the methadone maintenance program in New South Wales (Australia) prisons, where it was introduced in 1987, and found that volunteer methadone maintenance is associated with reduced injecting in prisons. More recently, Kinlock *et al.* (2008) conducted a randomized trial in the USA and found that compared with counseling alone, or counseling with the chance of commencing methadone maintenance on release, starting methadone maintenance in prison lead to participants being more likely to attend drug treatment, less likely to report heroin or cocaine use or criminal activity post-release, and less likely to be re-incarcerated. Methadone maintenance in prisons has been widely accepted in a number of jurisdictions and its benefits in reducing injecting in prison, relapse on release, and re-offending has been clearly demonstrated.

Health maintenance and health education

Health maintenance seeks to continue the state of health that has been achieved through the precious (T, E, C) stages of developing healthy prisons. This requires continuing to screen and treat inmates on admission for chronic health conditions and infectious diseases, to maintain the health of the prison. It requires maintenance of health promotion efforts in the prison, whether the peer education programs, or the interventions such as diet, exercise, weight loss, smoking or drug cessation, and maintaining hand-washing, and reducing environmental risks (including for infectious diseases, and disease vectors such as mosquitoes and other insects). It also includes considering modifications to the fabric or structure of the prison in the light of health-related concerns.

Treatment is important but the number of cases will continue to grow if maintenance of chronic and prevention of acute conditions does not occur. If there is no maintenance of health, re-treatment will be required, which is more costly than maintenance or prevention. Maintenance also has the function of education and training peer educators (both inmates and staff) to maintain accurate health information transmission both inside and outside the prison (Ross, 2011).

Finally, education of inmates and staff needs to occur on a regular basis. The frequency of this will to a large extent depend on the rate of inmate and staff turnover in a prison. With shorter sentences and faster turnover, education needs to be repeated more often. In systems with peer education programs, the frequency of peer educator training must be frequent enough to maintain a critical mass of peer educators. Peer education is crucial in translating the health education from a prison to a community context, since inmate peer educators will on release become informal community peer educators. They also have the advantage of providing education within the appropriate cultural and language limitations. In addition, much prison health education takes place in informal settings and in social interaction, and here peer educators are particularly valuable (Ross *et al.*, 2006). In resource-poor settings, training trainers as peer educators may be an excellent way of widely disseminating health education.

Conclusions

Focusing on health in prisons is a process that leads to development of healthy prisons. The cornerstone for health in prisons is the United Nations Health in Prisons guide (Møller *et al.*, 2007) which has as its goal a health in prisons. The concept of a “healthy prison” goes beyond this, to describe a prison as a setting where the health of inmates and staff is a recognized, and implemented, goal of the institution. However, there are no good process models which provide an indication of how to achieve a healthy prison. Further, most research on health in prisons refers to institutions in the developed world. Nor are there good criteria for judging prison health outcomes. It is important to provide a model which is realistic to implement in part or in whole in prisons in less developed countries, and in very resource-poor settings. While it will be difficult to provide good health in prisons in such settings, there are nevertheless a number of steps that can be taken at low or no cost, and in collaboration with local health efforts, which can improve prison health for both inmates and staff.

It is important to locate health in prisons as part of a restorative justice approach, where inmates returning to the community come back relatively healthy and not as a drain on community resources. It is further important to recognize that a healthy prison workplace for prison staff can only be achieved if it is also healthy for inmates. The role of prison staff in promoting healthy prisons rests on their buy-in to the concept and recognition that a healthy prison is a benefit for themselves and their families as well. Without staff support, attempts to create healthy prisons are unlikely to succeed.

Thus, we have designed the TECH model to describe the steps that can be taken to promote health in prisons and lead to healthy prisons. TECH is the acronym referring (Table I) to the four domains: T (test and treat infectious diseases and provide vaccinations, if available); E (environmental modification to reduce risks); C (control of chronic diseases); and H (health maintenance and health education). It can be “high TECH” or “low TECH”, depending on settings and resources. “High TECH” implementation will involve greater cost and outlay of resources, whereas “low TECH” may cover only a few domains, involve some staff time and energy, but can be achieved at minimal cost. There is, we hope, some provision for the TECH model to be implemented in all levels of prisons, from the institution which provides comprehensive medical and health services, to the institution which has no health services and relies on referral to a local hospital for serious cases. Taking a comprehensive approach to achieving healthy prisons that is applicable internationally and across levels of available resources by providing this four-domain model is a first step in characterizing the components of a healthy prison and the processes to achieve this.

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