Human Immunodeficiency Virus in Correctional Facilities: A Review

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It is estimated that up to one-fourth of the people living with human immunodeficiency virus (HIV) infection in the United States pass through a correctional facility each year. The majority of persons who enter a correctional facility today will return home in the near future. Most inmates with HIV infection acquire it in the outside community; prison does not seem to be an amplifying reservoir. How correctional health services deal with the HIV-infected person has important implications to the overall care of HIV-infected people in the community. Routine HIV testing is well accepted. Combination antiretroviral therapy has been associated with a reduction in mortality in prisons. A link between area HIV specialists and correctional health care providers is an important partnership for ensuring that HIV-infected patients have optimal care both inside prison and after release.

HIV hit correctional facilities early and hit them hard. In part because of the concurrent “war on drugs” [1] and the “tough on crime” political climate, the United States currently houses >1.9 million inmates in correctional facilities [2], a rate of incarceration that surpasses those of all other industrialized nations [3]. Coincident with emergence of HIV, the United States was experiencing an increase in the incarcerated population of 5.6% annually, resulting in a near doubling in size of the population behind bars during a dozen years [2]. Each of these 2 “epidemics”—HIV and incarceration—has affected the other.

“Jails” are defined as facilities housing accused persons awaiting trial or, in some jurisdictions, convicted criminals serving short sentences (e.g., sentences of up to 1 year). The majority of the 621,149 inmates of local jails at midyear 2000 [2] stayed for <1 month. “Prisons” are defined as facilities housing convicted inmates for longer sentences. Most of the 1,310,710 inmates of federal and state prisons at midyear 2000 [2] will return to their home community within a few years, although the lengths of sentences have recently been increasing. Because of the high percentage of inmates who have been substance abusers and/or commercial sex workers, the decision to examine jail and prison populations for HIV infection was intuitive for epidemiologists from the start of the HIV epidemic.

Two decades into the HIV epidemic, jails and prisons continue to bear a disproportionate share of the infectious diseases burden in the Unites States, particularly that among minority populations. Twelve percent of all black men in their 20s and early 30s were incarcerated at midyear 2000, compared with 1.7% of similarly aged white men [2]. The minority populations overrepresented in the inmate population are the very ones that are hardest hit by HIV and that tend to have disproportionately less access to health care in the outside community. Herein we will focus on state prison systems and outline how the dynamics of incarceration—“the epidemic of imprisonment”—have affected and been affected by the HIV epidemic in the United States, especially with respect to minority communities.

HIV EPIDEMIOLOGY IN CORRECTIONAL FACILITIES

The first report of AIDS in correctional facilities was published in 1982 [4, 5], only 1 year after the initial reports of oppor-
tunistic illnesses in men who had sex with men [6]. The first comprehensive study of HIV prevalence in prisons and jails was conducted during 1985–1986. Of 766 inmates with AIDS in the study, 322 had already died at the time the study was conducted. The geographic distribution of cases was highly skewed: one-half of the state prison systems had not yet had a recognized case, and 4% of the state and federal systems had 72% of the AIDS cases [7].

Twenty years later, all US state correctional systems have reported prisoners with HIV infection, although the epidemic remains concentrated in the large eastern seaboard states. In 1999, 4 states held 56% of HIV-infected prisoners: New York (7000 prisoners), Florida (2633 prisoners), Texas (2520 prisoners), and California (1570 prisoners) [8]. Nationwide, in 1999, the rate of reported AIDS cases among incarcerated persons was 5 times the rate for the general population in the United States [8] (figure 1).

HIV-infected populations shift frequently in and out of prisons and jails. In 1997, there were >35,000 prison and jail inmates with HIV infection on any given day. In the same year, >150,000 of those released had HIV infection. It is estimated that, in 1997, 20%–26% of all people living with HIV infection in the United States passed through a correctional facility [9]. Having up to one-fourth of the HIV-infected population pass through a single type of institution has enormous implications for a community’s strategic HIV planning. HIV-infected inmates have the potential to infect needle-sharing partners or sex partners once released [10]. One recent study showed that the major risk behavior for newly diagnosed heterosexually acquired HIV infection among African-American women who did not engage in high-risk behavior was having sex with a partner who had a history of incarceration [11]. Effective programs for prevention of primary and secondary infection are needed. Designing programs to educate, counsel, test, and treat this population is daunting.

The burden of HIV infection is not spread evenly among incarcerated people. Although surveys of the nonprison population in the United States have shown that a higher percentage of men than women are infected with HIV, the inverse is true in correctional institutions [8, 12]. Nationwide, the prevalence of HIV infection among inmates is 3.5% among women and 2.2% among men [8]. Racial and ethnic minorities are disproportionately affected: in 1997, 2.8% of black inmates and 2.5% of Hispanic inmates were infected, compared with 1.4% of white inmates [13].

Offenders with a history of injection drug use have a higher risk of acquiring HIV infection, but the crime for which they are incarcerated may not identify them as drug users. Violence, including assault and murder, often accompanies commerce in drugs; property crime may also be linked with drug use. In-

![Figure 1. Current epidemiology of HIV infection in state correctional institutions: known cases of HIV infection as the percentage of the total custody population in state prisons in 1999 [8].](https://example.com/hiv-infection-epidemiology.png)
mates with a host of criminal charges may be HIV infected; these charges may result in sentences of days to decades. In a 1994–1996 survey, 70% of inmates with AIDS reported parenteral drug use as their mode of exposure, compared with 32% of the general US population [14]. At the time of testing, a person may deny these risks. Testing for HIV in a correctional facility should not be based on an inmate’s criminal charges.

Since 1997, among state or federal prisons that self-reported data in 3 successive years, the number of inmates reported to be HIV-positive rose 6.4%, from 23,779 to 25,296, while the total prison population also increased at a similar rate [8]. The prison prevalence of HIV infection in many jurisdictions appears to have hit a plateau, after rising for years, which may be the result of fewer new infections or the result of lower recidivism rates among HIV-infected persons once they are released from prison, which is a potential consequence of more-careful discharge planning [15]. Alternatively, the leveling off may be due to reduction of restrictions on syringe possession and the institution of drug courts that divert drug users from prison to substance abuse rehabilitation programs.

IDENTIFYING THE PATIENT: THE CHALLENGES OF SCREENING

Most inmates with HIV infection arrive at prison having been infected previously through high-risk behavior in the community. Table 1 outlines various circumstances and strategies for HIV testing used by correctional systems to screen inmates. A given correctional system may use one or a combination of strategies. Testing can be mandatory, routine, voluntary but encouraged, or only on demand, with many barriers involved in obtaining a test. The courts have upheld local correctional facility policies on this issue.

Some people have criticized mandatory testing as an abridgment of patient rights. In Rhode Island, intake nurses routinely encourage all new committed inmates to accept HIV testing, but it is not mandatory until after conviction. More than 90% of inmates in Rhode Island agree to routine HIV testing at entry. Postdischarge surveys have shown that, in retrospect, 78% of former inmates welcomed the opportunity to receive testing when that testing was part of a comprehensive HIV management program [16]. Incarceration often awakens a person to acknowledge that the behavior that led him or her to be incarcerated—such as drug use or commercial sex work—may have placed him or her at risk for HIV infection. The commitment process is an occasion when it is feasible to institute routine HIV testing and education, even if an inmate is not ready to admit verbally that he or she is at risk. The majority of inmates tested will have a negative test result; posttest counseling can deliver important health information to the prisoner [17, 18].

![Image]

Table 1. Circumstances and strategies according to which HIV testing is performed in state prisons, Federal Bureau of Prisons facilities, and District of Columbia prisons in 1999.

<table>
<thead>
<tr>
<th>Circumstance or strategy for testing</th>
<th>No. of jurisdictions (n = 52)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inmate request</td>
<td>45</td>
</tr>
<tr>
<td>Clinical indication of need</td>
<td>47</td>
</tr>
<tr>
<td>Inmate’s involvement in a disciplinary incident</td>
<td>39</td>
</tr>
<tr>
<td>Court order</td>
<td>35</td>
</tr>
<tr>
<td>All inmates at entry</td>
<td>19</td>
</tr>
<tr>
<td>Inmates in high-risk groups</td>
<td>16</td>
</tr>
<tr>
<td>All inmates at time of release</td>
<td>3</td>
</tr>
<tr>
<td>All inmates currently in custody</td>
<td>3</td>
</tr>
<tr>
<td>Random sampling</td>
<td>7</td>
</tr>
</tbody>
</table>

NOTE. Correctional systems may test inmates according to multiple circumstances and/or strategies. Data are from Bureau of Justice statistics, US Department of Justice [8].

Linkage of HIV testing with comprehensive HIV-infection care according to standards prevalent in the outside community is essential to encouraging inmates to participate in screening efforts [19]. Prison can be a rare opportunity for those with high-risk behaviors to have access to health care. In 1990, >40% of all newly identified HIV-infected persons in Rhode Island, many of whom were injection drug users, first learned of their infection while incarcerated, and the Rhode Island jail is one of the top sites in the state for HIV testing [17]. AIDS tends to be diagnosed at a younger age and at an earlier stage of disease in prisoners than in nonincarcerated persons in the United States [14]. Some correctional facilities are hesitant to institute routine screening because of fiscal concerns. This is short sighted, because state-of-the-art care with highly active antiretroviral therapy (HAART) costs less than inadequate treatment of HIV [20].

INTRAPRISON SPREAD: PRISONS AS INCUBATORS?

Early in the HIV epidemic, concern arose about the possibility of intraprison spread of the virus [5]. In a report that questioned whether the Florida prison system served as a “social petri dish for amplification of the HIV epidemic” [21, p. 795], the seropositive status of 18 men continuously incarcerated since well before the onset of the AIDS era was reported and offered as presumptive evidence for intraprison transmission [21]. Similar suggestions of intraprison transmission have been reported in Maryland [22]. In these studies, it was unclear whether HIV was spread via sex, tattooing, or parenteral drug use—all behaviors thought to be common in correctional settings. One of the best-documented prison outbreaks linked with injection drug use was in the prison in Glenochil, Scotland. An
outbreak of acute hepatitis B indicated that HIV transmission could also occur. Further investigation linked the sharing of injection equipment with documented HIV transmission [23].

Indeed, prevalence and incidence studies of one type of bloodborne infection can provide insight into risk behavior for other viruses. A Centers for Disease Control and Prevention investigation of an outbreak of acute hepatitis B in a US prison determined that 2% of inmates injected drugs while incarcerated and 4% had sex with another man [24]. Currently, the Rhode Island Department of Corrections Health Services, in conjunction with researchers from Brown University and Johns Hopkins University, is studying the prevalence of hepatitis B virus, hepatitis C virus, HIV, and human T lymphotropic virus type 1 infection among prison entrants who are later sentenced. After a sentenced inmate gives informed consent, a serum sample is obtained yearly and results are compared with those for blood obtained at the time the inmate was committed, a linkage that will then provide seroincidence data. Preliminary results show very low incidences of new viral infections among prisoners and no new HIV infections [25].

Although the possibility of intraprison spread of HIV is a concern, “extraprison spread” is a greater threat, because risky sexual behaviors and parenteral drug use are more common in the community than in prison. Rather than an incubator, the correctional facility may be a relatively safe haven. Rich et al. [26] have demonstrated that time in the community places repeatedly incarcerated women at risk for HIV infection. The rate of HIV acquisition in community-based, high-risk cohorts, such as the ALIVE (AIDS link to intravenous experiences) cohort of injection drug users in Baltimore, in which the incidence of HIV infection was 3.14 cases/100 person-years [27], indicates that the risk of transmission increases, rather than decreases, on release from prison. Risk-reduction programs designed to maintain safe behaviors are important to prevent an inmate from acquiring HIV on release.

Fear regarding transmission continues. Some correctional institutions attempt to segregate known HIV-infected inmates to “contain” the epidemic—correctional staff might know to be “more careful” around certain persons. This approach will miss seroconverting persons who are in the “window” period (i.e., the period after infection and before antibodies can be detected by current testing methods). Correctional-officer unions in several states have lobbied for disclosure of the HIV status of inmates, but ignoring universal precautions when interacting with HIV-negative inmates may increase the risk of occupational exposure to hepatitis B and C as well as primary HIV infection by providing a false sense of security.

Segregating HIV-infected inmates in a South Carolina prison paradoxically contributed to a tuberculosis outbreak, in which 71% of inmates residing in the same housing area either had new tuberculosis skin-test conversion or developed tuberculosis disease. Thirty-one inmates, and 1 medical student in the community’s hospital, subsequently developed active tuberculosis [28]. In 2000, the US Supreme Court let stand a lower court ruling permitting segregation of HIV-infected inmates in Alabama [29], which allowed HIV-infected inmates to be restricted from participation in job training and educational programming.

Some investigators advocate clustering of HIV-infected inmates to allow education efforts to be coordinated and to ensure that all patients have access to expert care. The Florida Department of Corrections has demonstrated excellence in its treatment of inmate patients in its HIV unit [30], and the California Department of Corrections runs a model program at its Vacaville prison hospital.

**TREATMENT AND ADHERENCE ISSUES**

Although prison inmates are one of the few groups of Americans whose access to health care is a right protected by US Supreme Court case law (Estelle v. Gamble, 1976) [31], treatment of HIV-infected prisoners has been criticized for years. In 1995, 34% of all deaths in state prisons were AIDS-related [8]. A study in the pre-HAART era found that the CD4 cell counts of untreated prisoners declined more rapidly than those of untreated persons outside of prison. The study attributed the decline to the stress of incarceration itself [32]. Even with the advent of effective combination therapy, the expansion of prison formularies often lagged.

However, the present widespread availability of HAART in prison systems is responsible for the drastic decrease in AIDS mortality seen therein. For example, nationwide during 1999, 242 state prisoners (20 per 100,000 state prisoners) died from AIDS-related causes, compared with 1010 in 1995. Between 1995 and 1999, the number of AIDS-related deaths in state prisons decreased by >75% [8] (figure 2). The New York State Department of Corrections reported an AIDS-related death rate of 40.7 deaths per 10,000 inmates in 1990; in 1998, the rate had decreased to 6.1 deaths per 10,000 inmates, whereas death rates for other causes were stable [33].

With antiretrovirals accounting for a large portion of prison pharmaceutical budgets, many correctional health services administer antiretrovirals under direct observation (which ensures that each dose dispensed is ingested by the patient) to reduce costs. The high level of adherence to therapy required to maintain virus suppression (>95% of drug doses taken) [34] may justify directly observed therapy (DOT). The alternative to DOT (which is also known as “watch-take medication”) is termed by correctional health workers “keep on person” medication. Although “keep on person” medication...
affords inmates more privacy (because inmates retain control of their pills), encouragement to adhere to a regimen may be lacking.

Fischl et al. [30] have presented data supporting the effectiveness of DOT for HAART in the prison setting. They compared the virologic responses of HIV-infected inmates and noninmates enrolled in the same AIDS Clinical Trials Group trials who were receiving 3- or 4-drug combination regimens. At week 80 of the study, 95% of the inmates who received medication with use of DOT had virus loads of <400 copies/mL, compared with only 75% of the nonincarcerated persons, even though the inmates had lower CD4 cell counts and higher HIV RNA levels at baseline [30]. Although these data are convincing, it is unclear whether DOT accounted for the difference in virologic outcomes in this observational study or whether people in prison have better adherence to drug therapy for other reasons, such as because they are receiving treatment for mental health disorders and their illicit drug use is decreased. In another prison observational study, Wohl et al. [35] showed there was no significant difference in adherence, as measured by electronic memory caps, between self-medication and DOT. Randomized controlled trials of DOT in prison settings are underway and should clarify its role.

Despite the institution of DOT, barriers to antiretroviral therapy still exist in correctional institutions. Waiting in long lines to receive DOT medication may deter some inmates from starting or continuing therapy. Inmates may fear being labeled as HIV-infected if they are seen in line for medications several times a day, and thus use of DOT may result in a break in confidentiality. Inmates’ lack of trust in correctional staff who dispense many of these medications may further decrease adherence. Trust in the prison health care system is strongly correlated with drug adherence [36].

**COMORBID CONDITIONS OF HIV-INFECTED PRISON INMATES**

**Hepatitis.** Approximately 80% of US prison inmates admit to a history of using illegal drugs; ~1 in 4 have used parenteral drugs [37]. Not surprisingly, in the correctional setting, where parenteral drug use is the most common risk factor for HIV infection [38], the prevalence of bloodborne hepatitis viruses is quite high. The California Department of Corrections conducted a comprehensive survey of prison entrants in 1994 and found that 44.3% of HIV-infected inmates had antibodies to the hepatitis B core antigen and 65% had antibodies to hepatitis C virus [39]. HIV infection is not a contraindication for the treatment of viral hepatitis, and antiviral therapy for hepatitis may be necessary before a coinfected inmate can tolerate HAART. The feasibility of offering hepatitis B and C treatment to inmates who will be in the correctional setting long enough to complete antiviral hepatitis therapy is reviewed elsewhere [40]. Vaccination for hepatitis B is an appropriate strategy for inmates [41].

**Tuberculosis.** Many HIV-infected inmates continue to harbor, spread, and acquire tuberculosis. Segregation of inmates based on HIV serostatus can accelerate transmission of tuberculosis in this high-risk population [28]. The frequent movement of inmates between facilities and the rapid turnover of the population make completion of treatment for tuberculosis, including treatment for latent infection, a challenge. Correctional facilities are an ideal location for administration of short-duration combination treatment with pyrazinamide and rifampin, but only if health workers can monitor transaminase levels once every 2 weeks [42, 43].

**Mental illness.** Some experts attribute the high prevalence of mental illness in correctional facilities to the deinstitutionalization of the mentally ill from mental hospitals in the 1970s. The problem is probably more complex than is suggested by the simple explanation of “transinstitutionalization”—that is, that former residents of mental hospitals have simply become the new inmates of prisons [44]. US Bureau of Justice statistics showed that 16% of all inmates met ≥1 criterion for a serious mental illness [45]. The survey did not specify what percentage of inmates with serious mental illness also had HIV infection.

Mentally ill patients have a higher risk for acquiring HIV and, for inmates with mental illness who have acquired HIV, may pose challenges regarding adherence to medical care. A survey of male prisoners in Connecticut showed a 3-fold-higher risk of acquiring HIV among patients with a history of mental illness [46]. A study of prisoners in the Maryland Correctional Institution for Women revealed that 33% of participants met the criteria for posttraumatic stress disorder listed in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* and that posttraum-
mastic stress disorder was associated with engaging in prostitution and receptive anal sex—risk factors for HIV seroconversion [47]. Targeted HIV-infection risk reduction among women inmates might focus on inmates with posttraumatic stress disorder.

Obstetrical and gynecologic issues. Providing adequate obstetrical and gynecologic care is an ongoing challenge for correctional health care services. Many incarcerated women have a history of commercial sex work. Unprotected sex may put the HIV-infected women at risk for ulcerative lesions (chancroid, syphilis, and herpes) and suppurative infections (gonorrhea and chlamydial infection). The latter 2 infections can lead to pelvic inflammatory disease. Trichomonas infection has been found to be highly prevalent among both HIV-seropositive and HIV-seronegative women inmates in Rhode Island (45% and 43%, respectively) [12].

For the HIV-infected woman, an important issue is prompt detection of pregnancy so that HIV treatment to prevent vertical transmission can be initiated. Compliance with the Infectious Diseases Society of America guidelines for Papanicolaou smears, which recommends that they be performed at least twice during the first year after diagnosis of HIV infection and subsequently at a frequency dependent on the results of the smears [48], may be quite challenging for a correctional facility. A study of women inmates in Rhode Island showed that 25% of HIV-seropositive inmates had squamous intraepithelial lesions. Cervical dysplasia was correlated with HIV seropositivity and, among HIV-infected women, with lower CD4 cell counts [12].

PREVENTION: IN THE PRISON AND BEYOND

Coupling education with testing increases the effectiveness of counseling regardless of the HIV test result [49]. Substance abuse treatment works. Diverting addicts into treatment rather than focusing on punitive measures results in both primary and secondary prevention of infection [50]. Antiretroviral treatment that follows identification of infected inmates aids secondary prevention, because infected inmates with lower virus loads are less likely to transmit HIV [51].

Some prison-based HIV prevention programs that go beyond education, counseling, testing, and treatment generate controversy. Programs that are effective in the outside community, such as methadone maintenance and needle exchange programs [52], may not work inside a prison, where custody and control are the prevailing ethos: prisons are institutions with an abstinence philosophy with respect to drugs [50], including methadone maintenance therapy. Similarly, corrections officials do not permit sex between inmates nor between staff and inmates. The belief that sex inside the walls is rarely consensual is pervasive. Policies against condom distribution may reflect security concerns rather than intolerance of sexual relations between men. If it is common that one participant in a sexual encounter is being victimized, providing condoms may condone such victimization [53].

LINKS BACK TO THE COMMUNITY

Because correctional facilities are only way stations for most accused persons, careful prison-discharge planning is key to preserving the health-care advances made in prison, and it requires a comprehensive approach. Attention to such issues as job placement, substance abuse treatment, housing, transportation, and child care enhances the likelihood that medical discharge planning will be effective [15]. A face-to-face meeting with an outside health-care provider before discharge from prison improves follow-up rates. In jurisdictions where a great distance separates the correctional facility and the eventual home community, HIV programs could explore the maintenance of prisoner follow-up by means of “telemedicine” or video conferencing. Creative approaches, such as linking inmates with faith-based communities, methadone maintenance programs, and job programs, need to be implemented and evaluated. Good discharge planning, initiated well before prison release, reduced the rate of recidivism at 12 months among HIV-infected Rhode Island women from 39% to 17% [54] and reduced the rate of recidivism at 2 years for a Massachusetts jail cohort from 72% to 49% [55].

CONCLUSIONS

When HIV-infected patients enter correctional facilities, they may no longer visit their usual clinic waiting room, but they do not disappear from the community. Yet the medical community has for too long ignored these “invisible” patients [56]. The incarcerated are an extremely important component of the community, especially with regard to communicable diseases.

In many jurisdictions, a correctional facility will be receptive to having individual HIV-infection–care providers continue follow-up of patients both while they are in jail and when they return to the community, especially if the providers price their services reasonably. Such providers can also play a role in training staff health providers and developing standardized treatment protocols. Following patients “on both sides of the wall” can build trust between patients and providers. The HIV specialist’s presence in the correctional facility can increase the level of sophistication of medical care there. Links with academic investigators may foster methodical study of incarcerated patients. Much of the approach to correctional medicine is fueled by anecdotes; careful epidemiological investigations should improve understanding of health care in correctional facilities.
RECOMMENDATIONS TO THE INFECTIOUS DISEASES COMMUNITY

1. Prevention, diagnosis, and treatment programs for HIV infection need to focus on correctional institutions, which bear a disproportionate share of the burden of HIV infection.

2. HIV testing should be offered routinely to all inmates, irrespective of their criminal charge or self-identified risk of infection.

3. Linkage to care programs in the community after release is integral to the provision of care within corrections institutions.

4. Members of the community who already lack adequate access to health care are incarcerated at a high rate; therefore, corrections institutions afford an opportunity to optimize care for HIV infection.

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