

# Limited Spending: An Analysis of Correctional Expenditures on Antiretrovirals for HIV-Infected Prisoners

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## SYNOPSIS

**Objective.** Correctional facilities provide a critical opportunity to treat and manage human immunodeficiency virus (HIV) and HIV-related complications among inmates. Inmates bear a higher HIV burden than the general population, and many have never received HIV care prior to incarceration. The standard of care in the community and in corrections for the treatment of HIV is highly active antiretroviral therapy (HAART). This study evaluated U.S. correctional expenditures for antiretrovirals (ARVs) and compared them to the estimated need for ARVs among HIV-infected prisoners in the U.S. to treat this population successfully.

**Methods.** The total number of HIV-infected prisoners in the United States was estimated using Bureau of Justice Statistics data. The *National Sales Perspectives Audit, Combined Retail and Nonretail, July 1999 to December 2004* was used to estimate correctional ARV expenditures in 2004. Both measures were used to calculate treatment costs for ARV therapy.

**Results.** The analysis demonstrates that, in 2004, total ARV sales represented only 29% of the total necessary to treat all HAART eligible inmates with known HIV infection.

**Conclusion.** There is a substantial unmet need for ARVs in correctional health care. Although many barriers exist to treating all eligible HIV-infected prisoners, treatment reduces costs associated with HIV-related complications and may encourage linkage to HIV care in the community. Treatment of all eligible HIV-infected inmates should be a public health priority.

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At the end of 2004, more than 2.3 million U.S. citizens were incarcerated, an increase of 2.4% since 2003.<sup>1</sup> The Bureau of Justice Statistics (BJS) reported that not only did 16% of jail inmates report committing their offense to get money for drugs, but also that 25% of federal and state prisoners were sentenced for drug offenses.<sup>1,2</sup> In addition, nearly one-quarter of individuals incarcerated in the United States are serving time for a nonviolent drug-defined or drug-related offense. Over the past decade, yearly increases in the number of individuals convicted for nonviolent drug offenses (including drug-related offenses) have resulted in severe overcrowding and a general strain on the resources of the U.S. correctional system. If these yearly percent increases remain stable, in five years the total number of individuals held in U.S. prisons and jails will reach upwards of 2.5 million people.

In addition to substance dependence and abuse, incarcerated populations also frequently have higher rates of infectious disease and lack access to basic health care in their communities. It is not surprising, then, to discover that incarcerated populations bear a disproportionately heavy burden of disease-related risk compared to the general public. At the end of 2003, the rate of confirmed AIDS cases in prisons was still three times that of the general population in the United States.<sup>3</sup> With regard to HIV, BJS reports show that about 1.9% of federal and state prisoners are known to be infected with HIV.<sup>3</sup> Many of these prisoners are diagnosed while they are incarcerated, either through routine testing by state correctional facilities, testing upon inmate request, or upon discovery of HIV-related symptoms.<sup>3</sup> Through the Corrections Demonstration Project (CDP), funded by the Centers for Disease Control and Prevention (CDC) and the Health Resources and Services Administration (HRSA), Arriola and colleagues found that among 1,020 inmates tested in sites in seven states from July 1, 2000, to December 21, 2000, 171 (17%) were confirmed HIV-positive.<sup>4</sup> HIV testing of inmates ideally involves pre- and post-test counseling that provides information about the test results, risk assessment, partner notification, and treatment options.<sup>5</sup> Despite a reputation for being a reservoir of infectious disease, several studies among incarcerated individuals have shown that a majority of HIV infections identified through HIV testing in correctional facilities are actually acquired in the community. Low levels of intra-prison transmission have been documented, however, with incidence rates ranging from 0 to four infections per 1,000 person-years.<sup>6-10</sup>

Combination antiretroviral (ARV) therapy has been shown to be cost-effective and is currently the standard of care for the treatment and management of HIV.<sup>11</sup>

As HIV care in incarcerated settings approaches the standard of care in the community, health outcomes among HIV-infected inmates improves significantly.<sup>12</sup> In fact, the availability of HAART in prisons and jails is largely responsible for the recent reduction in AIDS-related deaths among inmates.<sup>3</sup> The structured environment of a correctional facility is a setting where inmates on ARVs can adhere to complex treatment regimens, decreasing the risk of further HIV/AIDS-related complications.<sup>13</sup> The average annual cost of ARV treatment in the United States is from \$20,000 to \$24,000,<sup>14,15</sup> with an average cost per inmate of \$1,863 per month.<sup>12</sup> Although costs of HIV treatment are relatively high compared with the treatment of other infectious diseases, effective treatment reduces the total cost of HIV-associated morbidity.<sup>12</sup>

We performed a cost analysis of HIV treatment among inmates in the United States. The purpose of this analysis was to determine the unmet need for treatment among inmates infected with HIV so that we could compare the resources currently dedicated to HIV treatment in correctional settings with the resources that are needed to successfully treat this population.

## METHODS

This study used known prevalence estimates of HIV infection among prison and jail inmates based on the most recent data from the BJS at the end of 2003.<sup>3</sup> We estimated the average cost of treatment per inmate based on price estimates for each drug utilized in HAART, the standard of care for HIV in all prisons. We then used average HIV treatment costs per inmate to determine the overall cost of HIV care for all HIV-infected inmates. Finally, we collected national data on pharmaceutical sales to correctional institutions to approximate total expenditures on HIV care among inmates. We present real expenditures as a percentage of estimated expenditures to illustrate the unmet needs of this population.

### Study population

The BJS conducts surveys to obtain national correctional statistics on June 30th and December 31st of a given year. In collaboration with the U.S. Census Bureau, the BJS obtains counts of prisoners from departments of corrections in all 50 states and the Federal Bureau of Prisons. Respondents (each correctional department) indicate the circumstances under which inmates are tested for HIV and provide the number of known HIV-infected inmates in their custody. Jurisdictions in Kentucky, Maine, Alaska, and Oregon were

not included due to incomplete data. Jurisdictions that did not report data were also excluded. Only prisoners with reported HIV infection were included in the cost analysis.

### Data sources

Data used in the analysis were obtained from national estimates of pharmacy sales for highly antiretroviral therapy by correctional departments in the U.S.<sup>16</sup> In addition, prevalence estimates for HIV among prisoners were obtained from recent BJS data on known HIV infections in prison.<sup>3</sup> To determine estimates of the proportion of inmates eligible for ARV, we utilized data from the Centers for Disease Control and Prevention HIV/AIDS Surveillance Supplemental Report 2003.<sup>17</sup>

### Expenditures

A study by Wong calculated the average cost per inmate of HIV care in the Virginia Department of Corrections.<sup>12</sup> This estimate, along with 1998 actual costs from Michigan, New York, and Rhode Island Departments of Corrections (MDOC 1998, NYDOC 1998, RIDOC 2005) were used to create a national estimate of the cost of HIV care per inmate. Data on proportion of costs attributable to HIV medications were taken from Bozzette et al., who randomly surveyed 3,072 HIV-infected patients throughout the United States.<sup>14</sup>

## RESULTS

According to the BJS, at the end of 2003, 23,659 state and federal prison inmates were known to be HIV-positive.<sup>3</sup> Based on the number of inmates included in the Bureau of Justice Statistics, the prevalence of known HIV in the U.S. prison system is 1.9%.

The average treatment costs for HIV treatment are shown in the Table. The estimated cost per inmate per month is \$1,863. A study by Bozzette et al. separated total HIV care spending by the categories shown in the Figure.<sup>14</sup> Based on these results, 40% of the total

costs for HIV treatment of inmates are attributable to pharmaceuticals. It should be noted that Bozzette and colleagues did not differentiate between ARV and non-ARV pharmaceuticals in their estimate. However, since the bulk of pharmaceutical costs to treat HIV-infected individuals is for ARV medications, we feel that the 40% estimate is a reasonable approximation. In fact, in one recent study by Chen and colleagues among patients receiving primary care at the University Alabama Birmingham HIV clinic, ARV medication comprised 56% of the total HIV patient treatment costs.<sup>18</sup>

To estimate the number of HIV-infected inmates eligible for ARV, we used data from the Centers for Disease Control and Prevention HIV/AIDS Surveillance Supplemental Report 2003, which samples HIV-positive patients from five sites in the United States.<sup>5</sup> The average percentage of HIV-positive patients on ARV across the five sites in this sample was 86%. We applied this percentage to the total number of HIV-infected inmates at year-end 2003 to get an estimated total of 20,347 inmates who are medically eligible for ARV therapy. All of this data translates into a total of \$181,951,013 for HIV pharmaceutical costs for this population.

Over the course of one year, U.S. correctional facilities spend about \$22,356 on HIV care per inmate. For the total number of inmates under the jurisdiction of the U.S. criminal justice system, this translates into a yearly expenditure of \$454,877,532 in 2003 dollars for those who are eligible for ARV therapy. In contrast to the estimated cost, prison systems spent only a total of \$52,544,070 in 2004 on antiretroviral medication, accounting for only 29% of the estimated need.

## DISCUSSION

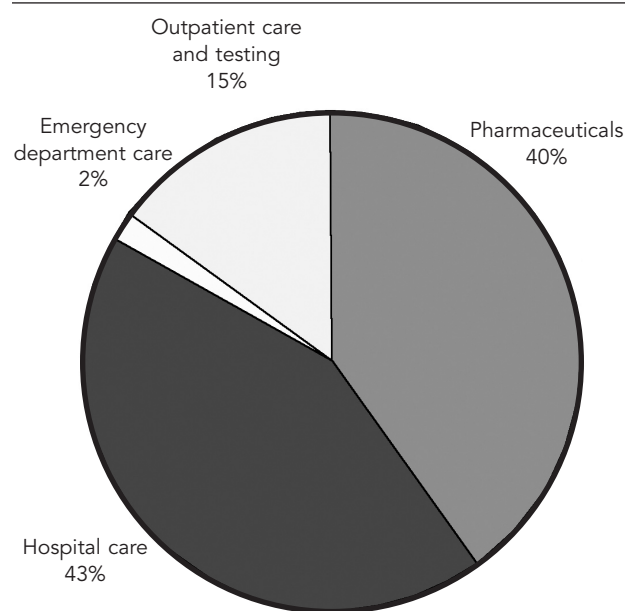
Our analysis suggests that, based on the total amount spent on ARVs per year in correctional facilities, there is a substantial unmet need for HIV treatment in state and federal facilities. The total cost of HIV medication for

**Table. HIV treatment costs and ARV expenditures in prisons**

<i>Estimated cost per inmate per month</i>	<i>Estimated cost per inmate per year</i>	<i>Estimated total cost per year for HIV care<sup>a</sup></i>	<i>Estimated total cost of per year for HIV medications<sup>b</sup></i>	<i>Total prison pharmaceutical spending (2004)</i>	<i>Percentage pharmaceutical spending out of total pharmaceutical costs</i>
\$1,863	\$22,356	\$454,877,532	\$181,951,013	\$52,544,070	29

<sup>a</sup>Based on estimate of 86% of total number of inmates being eligible for ARV. Data obtained from the Centers for Disease Prevention and Control.

<sup>b</sup>Based on estimate of 40% of cost of total HIV is for HIV medications. Data from Bozzette SA, Berry SH, Duan N, Frankel MR, Leibowitz AA, Lefkowitz D, et al. The care of HIV-infected adults in the United States. *N Engl J Med* 1998;339:1897-904.

**Figure. HIV care expenditures in prison**

SOURCE: Adapted from Bozzette SA, Berry SH, Duan N, Frankel MR, Leibowitz AA, Lefkowitz D, et al. The care of HIV-infected adults in the United States. *N Engl J Med* 1998;339:1897-904.

inmates known to be infected and eligible for HAART is estimated to be \$181,951,013, while current expenditures equal only about a third of that amount. In 2001, healthcare expenditures for state prison inmates totaled \$3.3 billion, or 12% of total operating expenditures.<sup>19</sup> We estimated the cost of HIV care for inmates eligible for ARV therapy at \$454,877,532 in 2003, which represents a 14% increase in total expenditures. Many correctional administrators may believe that treatment of HIV-positive inmates is financially unfeasible, which may serve as a disincentive to providing appropriate treatment for these individuals.<sup>20</sup> However, treatment of HIV with ARV therapy reduces costs of HIV-associated morbidity. For example, a study in the Virginia Department of Corrections documented that 87.5% of inpatient costs were attributed to 11% of inmates, none of whom were taking ARV agents before hospitalization.<sup>12</sup> In addition, Freedburg and colleagues estimate that the cost-effectiveness ratio for ARV therapy compared with no therapy ranges from \$13,000 to \$23,000 per quality adjusted year of life gained.<sup>11</sup> It is also estimated that lifetime costs associated with HIV treatment increase 70% when HIV-infected individuals receive no treatment compared with ARV treatment.<sup>11</sup>

Incarcerated populations affected by HIV achieve similar clinical outcomes compared with populations in the community when ARV therapy is available.<sup>21</sup> Nevertheless, numerous barriers to HIV treatment for

inmates still exist. High costs, difficulties in maintaining confidentiality, lack of trust in correctional staff as well as the social dynamics of correctional facilities have all been implicated as barriers to ARV therapy in correctional settings.<sup>22</sup> This highlights the need to integrate HIV prevention and treatment services within correctional institutions.<sup>23,24</sup> Furthermore, integration of care must include discharge planning for HIV-infected inmates. Discharge planning needs to address continuity of care as inmates are released back into the community.<sup>19</sup>

The lack of a comprehensive surveillance system makes it difficult to definitively determine the total number of HIV-infected individuals in the entire U.S. correctional system. However, prison systems do document the number of known infections, and several researchers have determined estimates of HIV infections in state prisons. Vlahov et al. documented HIV prevalence in 10 state prison systems, ranging from 2.1% to 7.6% for men and 2.5% to 14.7% for women entrants.<sup>24</sup> Solomon et al. (2004) estimated that among entrants to the Maryland Department of Corrections and Baltimore City detention facilities, 6.6% were infected with HIV.<sup>25</sup> Macalino et al. (2004) estimated that among entrants to the Rhode Island Department of Corrections, 1.8% were infected with HIV.<sup>8</sup>

Approximately one-third of HIV-infected inmates are being treated for HIV in prison; however, this does not account for the unmet needs of infected prisoners who are asymptomatic and have not been identified. Our estimate, based on the number of inmates *known* to have HIV, may severely underestimate the real cost of HIV care for the total number of inmates in the U.S. infected with HIV. Hammett et al. (2002) demonstrated the relationship between HIV infection and incarceration in a way that best expresses the true burden of disease in the U.S. correctional population.<sup>26</sup> The study estimated the total number of people who were infected with HIV passing through the correctional system in 1997, including city/county jail inmates, and used this estimate to calculate the percentage of people living with HIV in the U.S. passing through the correctional system in 1997. Hammett et al. calculated that from 20% to 26% of U.S. residents living with HIV passed through the correctional system in that year.<sup>26</sup> Our estimates are limited by the fact that they account for prison inmates only, and not the entire population of individuals passing through prisons and jails in 2003. We also excluded states with incomplete or missing data, which may also have led to an underestimation of HIV prevalence in prison inmates.

Correctional facilities have a profound effect on urban communities.<sup>27</sup> Human traffic between jails

and prisons and the community increases the opportunity for infections to be passed between community members and offenders (and vice versa, of course). In addition, recidivists may not have an opportunity to access health care between the time they are in the community and the time they are rearrested, and for those living with HIV infection it is clear that adequate health care is necessary to prevent complications arising from advanced HIV infection. In jail populations, where the number of offenders passing through and returning to the community is high, this is especially true.<sup>28</sup> Many jail inmates detained for periods of less than three months are either not tested or not treated for HIV. Correctional settings offer an important public health opportunity to provide critical treatment to HIV-infected inmates through the removal of barriers often faced by these individuals in the community.<sup>13,25</sup>

Correctional facilities are not only an opportunity to provide much-needed access to adequate treatment and care, they may also encourage linkage to community-based health care once inmates are released. Project BRIDGE, a study conducted in the Adult Correctional Institute in Rhode Island, clearly demonstrated that inmates receiving HIV care can successfully adhere to treatment regimens and be linked to HIV care services in the community upon release.<sup>29</sup> These findings are also supported by Lincoln et al. in a study in which they linked Connecticut inmates to general health care services in the community upon release.<sup>28</sup> Knowledge of HIV status and access to HIV care inside prison may encourage ex-offenders to access care in the community by acting as a catalyst for an individual to seek medical help to continue HIV treatment.

### Limitations

These results should be interpreted and generalized with the following limitations in mind. This analysis utilized BJS estimates of the number of state and federal prison inmates known to have HIV. Unfortunately, only 19 prison facilities and no jail facilities routinely test for HIV infection upon entry into the facility. Instead, a majority of facilities rely on voluntary or on-request testing, which completely underestimates the number of inmates infected. Additionally, BJS reports identify only inmates with *known* HIV infection, which obviously excludes inmates who are asymptomatic or who have not consented to or been offered HIV testing. Estimating the number of HIV-positive inmates who are eligible for ARV is also challenging. Different prison facilities have different protocols for initiating ARV therapy, and the estimated percentage of cost that pharmaceuticals represent most likely includes drugs other than ARVs. As a result, our estimates, based on

HIV-positive individuals in the community eligible for ART, may not be accurate. However, there is no data nationally on the proportion of HIV-infected inmates who are eligible for ARV. Our estimates of the proportion of expenditures for HIV medications are for patients in the community and not in incarcerated settings. There may be significant price differences in pharmaceutical pricing schemes between correctional institutions and community-based HIV clinics. Another limitation of this study is that our estimate of annual ARV treatment costs does not account for the fact that some HIV-positive inmates who receive ARV treatment are sentenced to less than one year. Finally, it should be noted our estimate, based on CDC data, of 86% of HIV-infected inmates who are medically eligible for ARV treatment does not account for the fact that many medically eligible HIV-infected inmates may refuse treatment.

### CONCLUSIONS

Treating HIV in prisons not only benefits inmates and their families and partners, it benefits the public health of the communities inmates are from and to which they will return.<sup>25</sup> Individuals in correctional settings face a much higher HIV burden than the general public and many have never received treatment prior to their incarceration. Prisons have an obligation under United States law to provide the community standard of care for the treatment of disease. Within the context of HIV care, this means providing ARV therapy to all inmates who are medically eligible.

Clearly, treating HIV-infected inmates poses significant challenges. Many prisons may be wary of prescribing complicated treatment regimens, which often have adverse side effects, to high-risk populations such as injection drug users. In addition, lack of prison infrastructure is a significant barrier to implementing comprehensive HIV care in incarcerated settings. There are also issues with noncompliance and medical contraindications. Finally, total costs of treating HIV-infected inmates are high. However, the costs of not treating this population are significantly higher. Prisons and jails are an integral part of strategies to slow the HIV epidemic in the United States through the successful treatment of infected inmates. Ignoring the opportunity to treat HIV-infected inmates will have severe repercussions, not only to incarcerated populations, but to society as well.

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