

# An Outbreak of Syphilis in Alabama Prisons: Correctional Health Policy and Communicable Disease Control

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Syphilis rates in the United States are currently the lowest ever reported, setting the stage for possible elimination of syphilis in this country.<sup>1</sup> Despite this overall decline, some urban areas and the southeastern United States contain persistent foci of endemic syphilis.<sup>2–4</sup> High syphilis rates have been found at entry into jails and prisons.<sup>5–10</sup> These high rates have been attributed mainly to the aggregation of persons at high risk for sexually transmitted diseases (STDs) in correctional institutions—socially and economically disadvantaged and medically indigent persons—and to the fact that many persons have been previously incarcerated, with continued high-risk behavior during incarceration.<sup>5,7,10–12</sup>

Most states conduct syphilis screening to prevent introduction of syphilis into prisons (Bureau of Justice Statistics, oral communication, July 1999). Once syphilis is introduced into prisons, the prohibition of sex among inmates should limit syphilis transmission within the prison system. Outbreaks of STDs in prisons have rarely been described<sup>13</sup>; published reports of outbreaks of HIV and hepatitis B have been attributed mainly to injection drug use.<sup>10,12,14–16</sup>

Disease control in incarcerated persons is of great public health importance. The United States has the second highest reported incarceration rate in the world, behind the former Soviet Union<sup>17</sup>; at the end of 1998, approximately 1 in every 149 US residents, or 1 825 400 persons, was incarcerated in state or federal prisons or in local jails.<sup>18</sup> The incarceration rate has increased 46% since 1990.<sup>18</sup> In 1998, Alabama had the seventh highest rate of primary and secondary syphilis in the United States (6.3 per 100 000 population)<sup>19</sup> and the eighth highest prison incarceration rate in the United States (519 sentenced prisoners per 100 000 state residents), with prisons operating at 100% of capacity.<sup>18</sup> Prison A, a low- to medium-security

**Objectives.** After syphilis outbreaks were reported at 3 Alabama State men’s prisons in early 1999, we conducted an investigation to evaluate risk factors for syphilis infection and describe patterns of syphilis transmission.

**Methods.** We reviewed medical, patient interview, and prison transfer records and documented sexual networks. Presumptive source cases were identified. Odds of exposure to unscreened jail populations and transfer from other prisons were calculated for case patients at 1 prison.

**Results.** Thirty-nine case patients with early syphilis were identified from 3 prisons. Recent jail exposure (odds ratio [OR] = 8.0, 95% confidence interval [CI] = 0.3, 158.7,  $P = .14$ ) and prison transfer (OR = 32.0, 95% CI = 1.6, 1668.1,  $P < .01$ ) were associated with being a source case patient.

**Conclusions.** Probable sources of syphilis introduction into and transmission within prisons included mixing of prisoners with unscreened jail populations, transfer of infected inmates between prisons, and multiple concurrent sexual partnerships. Reducing sexual transmission of disease in correctional settings is a public health priority and will require innovative prevention strategies. (*Am J Public Health.* 2001;91:1220–1225)

prison for male inmates located in southeastern Alabama, normally reports fewer than 5 cases of syphilis per year. Prison A experienced an outbreak of syphilis between October 1998 and January 1999. Coinciding with this outbreak, smaller outbreaks of syphilis were reported at 2 other men’s prisons in Alabama: Prison B and Prison C-HIV (which houses only male prisoners who are HIV infected). We conducted an epidemiologic investigation to identify potential methods of syphilis entry into and transmission within prisons and to investigate links between the outbreaks in different prisons.

## METHODS

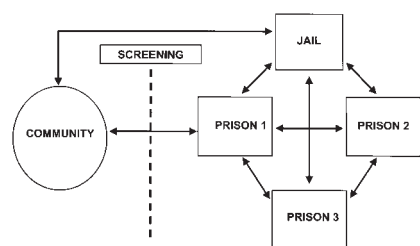
### Syphilis and Corrections in Alabama

Prisons are federal or state facilities that house only persons who are sentenced, usually for terms longer than 1 year. In contrast, jails are locally operated and house persons awaiting trial, conviction, and sentencing; the average length of incarceration is less than 48 hours.<sup>18</sup> Jails release their inmates directly to the community and rarely perform syphilis screening. The Alabama State prison system’s

routine syphilis control includes screening on entry and within 30 days of release, screening every 3 years while incarcerated (annually for those who are infected with HIV), performing an annual physical examination, and testing for syphilis when indicated by history or symptoms at sick call. Prisoners are screened for antibody to HIV-1 on prison entry, within 30 days of release, and at physician discretion (Figure 1). They are frequently transferred between Alabama State prisons and are not screened for syphilis on transfer; they are also transferred to local jails for brief stays (usually less than 1 month) for court appearances and parole hearings. While in jail, they are housed with the general jail population, and they are not screened for syphilis before being transferred back to prison.

### Epidemiologic Investigation

Baseline numbers of syphilis cases at Prisons A, B, and C-HIV were obtained through review of Alabama Department of Public Health and prison surveillance records from 1995 to 1998. Outbreak case patients were identified through review of Alabama Department of Public Health records of all in-



**FIGURE 1—Schematic representation of syphilis screening in the Alabama State correctional system (see text for details).**

mates at Prisons A, B, and C—HIV who had a reactive treponemal and nontreponemal test between March 1, 1998, and February 28, 1999 (the outbreak period). All case patients had an initial nontreponemal rapid plasma reagin (RPR) titer (RPR card test, Micro-vue J; Becton-Dickinson, Cockeysville, Md) performed at the central Alabama prison laboratory. Reactive sera were retested with a nontreponemal titer (RPR or VDRL test; Difco Laboratories, Detroit, Mich) and confirmed with a treponemal test (either fluorescent treponemal antibody absorption [FTA-ABS] [Zeus Scientific, Inc, Raritan, NJ] or Microhemagglutination—*Treponema pallidum* [MHA-TP] [Fujirebio America, Inc, Fairfield, NJ]). A case patient was defined as an inmate of Prison A, B, or C—HIV who was classified as having early (primary, secondary, or early latent) syphilis during the outbreak period. Disease stage was classified on the basis of the Centers for Disease Control and Prevention (CDC) surveillance case definition for syphilis.<sup>20</sup> We collected case information by abstracting prisoner interview records, prison medical records, and Alabama Department of Public Health records of reactive syphilis tests.

All syphilis case patients were interviewed by Alabama Department of Public Health fieldworkers, who elicited the names of sexual contacts (defined as persons with whom the case patients had oral or anal sex) for the period (the “interview period”) during which they were presumed to be infected or infectious as determined by disease stage: 3 months for primary syphilis, 6 months for secondary syphilis, and 1 year for early latent

syphilis.<sup>21</sup> Data collected on interview included demographic characteristics, number and names of sex partners and the frequency of sexual contact with these partners, symptom history, laboratory results, treatment history, and HIV status.

We classified case patients at Prison A as either “source” or “nonsource” on the basis of nontreponemal titer at diagnosis and dates and number of instances of sexual contact with named infected sex partners. A case patient was defined as a *source* if (a) he had likely infected another person but (b) we did not identify a person who had infected him.

### Analysis

*Syphilis introduction into prisons.* To examine potential methods for syphilis introduction into the prison system, we evaluated prisoner screening at entry and opportunities for contact with unscreened persons outside of the prison system, including exposure to persons in jails, to visitors, and to nonincarcerated persons in the community during work release.

*Syphilis transmission within and between prisons.* To investigate syphilis transmission within prisons, we described sexual partnerships and measured behavioral risk factors associated with syphilis that were derived from interviews with case patients, their sexual partners, and, in some cases, members of case patients’ social networks. We also examined opportunities for treatment. To investi-

gate syphilis transmission between prisons, we reviewed records of prison-to-prison transfer for case patients at all prisons and compared transfers for source case patients with those for nonsource case patients at Prison A.

*Outbreak-associated HIV transmission.* All outbreak case patients were tested for antibody to HIV-1 to determine whether HIV transmission occurred in this outbreak.

*Statistical analysis.* We used the  $\chi^2$  statistic to compare various characteristics in source and nonsource case patients. We used odds ratios (ORs), 95% confidence intervals (CIs), and 2-tailed Fisher exact tests to evaluate associations between exposure to jail and transfer from another prison among source and nonsource case patients. Data were analyzed with Epi Info, Version 6.04c, software.<sup>22</sup>

## RESULTS

### Epidemiologic Characteristics of the Outbreak

*Baseline data.* From 1995 to 1997, a mean of 3.7 cases of early syphilis was reported annually at the 3 outbreak prisons. This outbreak resulted in an annualized incidence rate that was 8.9 times higher than the previous 3-year average incidence rate for early syphilis at the outbreak prisons.

*Prison characteristics.* Prisons A and B each house approximately 1000 to 1200 in-

**TABLE 1—Early Syphilis Case Patients in Prisons A, B, and C: Alabama Prison Syphilis Outbreak, March 1998–February 1999**

	Prison A (n = 27)	Prison B (n = 5)	Prison C (n = 7)	Total (n = 39)
Stage, no. (%)				
Primary	3 (11)	0	1 (14)	4 (10)
Secondary	6 (22)	1 (20)	0	7 (18)
Early latent	18 (67)	4 (80)	6 (86)	28 (72)
Race/ethnicity, no. (%)				
White	4 (15)	0	0	4 (10)
Black	23 (85)	5 (100)	7 (100)	35 (90)
Median age, y	32	32	32	32
Method of case detection, no. (%)				
Partner notification	8 (30)	4 (80)	2 (29)	14 (36)
Institutional screen	7 (26)	0	3 (43)	10 (26)
Mass screening	8 (30)	0	2 (29)	10 (26)
Volunteer	4 (15)	1 (20)	0	5 (13)



**FIGURE 2—Early syphilis cases, by prison and month of diagnosis: Alabama prison syphilis outbreak, March 1998–March 1999 (N = 39).**

mates who live in dormitory-style rooms; each room contains approximately 100 bunk beds. Prison C-HIV houses approximately 275 inmates who sleep mainly in bunk beds in dormitory-style rooms. Inmates in jails usually are housed in cells of 1 to 3 persons but have many opportunities during the day and night to interact with a larger jail population.

**Case patient characteristics.** A total of 39 persons with early syphilis were identified at the 3 prisons during the outbreak period (Figure 2). The median age of case patients at all prisons was 32 years (range=25–59). At the time of the outbreak, the mean length of incarceration for case patients was 66 months. Mass screening and treatment of all inmates were performed on a single day in January 1999 at Prison A and over approximately 1 month, from January to February, at Prison C-HIV. (At Prison B, no mass screening or mass treatment was performed.) Nearly one third (28%) of the case patients were classified as having primary or secondary syphilis (Table 1). Thirty-six percent of the cases were detected through partner notification, 26% through routine triennial or annual screening, and 26% through mass screening. The annualized incidence rate for early syphilis at all 3 prisons during the outbreak was 1337 per 100 000 prisoners, compared with 1998 early-syphilis rates of 16.5 (per 100 000 popu-

lation) in Alabama and 7.3 in the United States.<sup>19</sup>

No single index case could be identified. Eight source case patients were identified at Prison A: 4 who had transferred from another prison, 2 who had transferred to jail and returned to prison, and 2 who had no exposure to jail or to another prison during the

interview period. There were no significant differences between the 8 source and the 19 nonsource case patients at Prison A with respect to race/ethnicity, age, or stage at diagnosis (Table 2).

### Syphilis Introduction Into Prisons

**Exposure to jail.** Thirteen percent (5 of 39) of the case patients, 2 of whom were from Prison A, were transferred to a local jail and then back to prison during the time they were likely infectious with syphilis (the interview period). At Prison A, source case patients were 8 times more likely than nonsource case patients to have been transferred to jail during the interview period (OR=8.0, 95% CI=0.3, 158.7; *P*=.14) (Table 2).

**Other exposures.** Investigation of other possible means of syphilis introduction into the prison system found no definite routes of transmission. No prison employees were named as sex partners, no instances were identified in which a prisoner was not screened for syphilis on entry into the prison system, and no infected visitors were named as sex partners by case patients.

### Syphilis Transmission Between Prisons

**Transfers.** Case patients had a median of 2 transfers (range=0–5) between Alabama

**TABLE 2—Comparison of Source and Nonsource Case Patients From Syphilis Outbreak at Prison A: Alabama Prison Syphilis Outbreak, March 1998–February 1999**

	Source (n = 8)	Nonsource (n = 19)	OR (95% CI)	<i>P</i> <sup>a</sup>
Race/ethnicity				
Black	8	15		
White	0	4	Undefined	.29
Median age, y	33	32		
Stage				
Primary and secondary	2	7		
Early latent	6	12	0.6 (0.1, 4.6)	.68
Exposure to jail				
Yes	2	2		
No	2	16	8.0 (0.3, 158.7)	.14
Transfer <sup>b</sup>				
Yes	4	1		
No	2	16	32.0 (1.6, 1668.1)	<.01

Note. OR = odds ratio; CI = confidence interval.

<sup>a</sup>Fisher exact test.

<sup>b</sup>Transfer is defined as transfer from another Alabama State prison into Prison A during the potential interval of syphilis infection, based on stage of disease, as described in the Centers for Disease Control and Prevention treatment guidelines for syphilis.<sup>21</sup>

State prisons every 3 years. Twenty-one percent (8 of 39) of the case patients were transferred from another Alabama State prison into 1 of the 3 outbreak prisons within the previous year; 4 source case patients were transferred into Prison A any time during the period they were presumed to be infected or infectious. Source case patients were 32 times more likely than nonsource case patients to have been transferred while infectious (OR=32.0, 95% CI=1.6, 1668.1,  $P<.01$ ) (Table 2). Furthermore, the outbreaks at Prisons A and B appear to be linked by a case patient with syphilis who was transferred from Prison A to Prison B during the time he was likely infectious.

**Treatment delays.** We identified 3 instances of 4- to 6-week delays of syphilis treatment for persons with signs and symptoms of syphilis, each of whom was determined to be a source case patient at Prison A. In each instance, appropriate laboratory tests (RPR) were performed, but follow-up or receipt of laboratory results was delayed. In one instance, a case patient presented in September 1998 with a 3-cm open penile lesion and had an RPR test performed, but laboratory results from this test were never returned; the case

patient did not receive treatment until 6 weeks after the initial visit. Another source case patient presented in April 1998 with penile lesions and had tests for syphilis (RPR) and chancroid performed; he did not receive follow-up for 3 months, at which time he was treated.

### Syphilis Transmission Within Prisons

**Sexual partnerships.** Case patients named a median of 2 sex partners (range=0–18) during their interview period; concurrent partnerships were common. Only 1 case patient named no sex partners during his interview period. At Prison A, 81% (22 of 27) of the case patients named another outbreak case patient at Prison A as a sex partner. The remaining 19% (5 of 27) named only uninfected partners but were themselves named as partners of other case patients.

The sexual network for cases and contacts at Prison A was complex (Figure 3). From interview data we determined that the 3 main constellations of partnerships involved 10, 7, and 4 case patients. In the group of 10, the case patient with the most contacts was a source case patient, and he likely infected at least 7 case patients. In the group of 4, the

case patient with the most contacts was a source case patient, and he likely infected 2 case patients. However, the case patient with the most contacts in the group of 7 was not a source but probably transmitted the infection to others in the group.

### Outbreak-Associated HIV Transmission

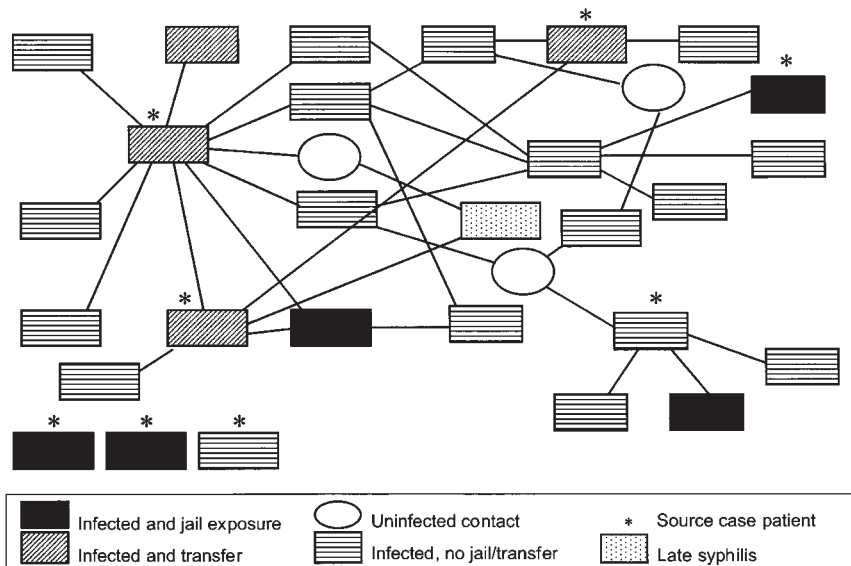
All outbreak case patients at Prisons A and B had negative test results for antibody to HIV-1 approximately 4 to 6 months after initial syphilis testing.

## DISCUSSION

This investigation found that jails could be an important source of syphilis exposure for detainees. Syphilis prevalence rates in jails are much higher than those in the general population; male jail detainees have rates of reactive syphilis serology between 2.5% and 10%, compared with the general population rate of 0.8%.<sup>23–25</sup> High syphilis prevalence and multiple sexual partnerships result in the potential for extensive syphilis transmission. Condoms are not likely used.

Despite national guidelines requiring STD testing for all detainees within 14 calendar days of arrival,<sup>26</sup> fewer than one half of all jails (47%) routinely screen their populations for syphilis.<sup>27</sup> In jails that provide routine screening, fewer than one half of the detainees actually receive screening, because the average jail stay is less than 48 hours.<sup>24</sup> Therefore, jail screening may miss populations at highest risk for syphilis infection (i.e., commercial sex workers, drug dealers), who are often released soon after arrest and then may transmit disease to the community. To improve community syphilis control, jails in areas of high syphilis prevalence should screen all entering detainees with rapid RPR, which has been shown to be useful for rapid screening in correctional facilities,<sup>28–30</sup> and immediately treat all persons with reactive serology.

The incidence of early syphilis during this outbreak, the nature of the sexual networks that were identified in this investigation, and the frequency of prison-to-prison transfer illustrate the tremendous potential for the spread of STDs. In fact, at least 4 outbreaks of syphilis occurred in Alabama prisons from



Note. The 3 boxes in the lower left corner represent case patients for whom no case contact was named, but who were part of the sexual network.

**FIGURE 3—Prison A sexual network, syphilis case patients, and selected uninfected contacts: Alabama prison syphilis outbreak, March 1998–February 1999.**



1991 to 1996 (Alabama Department of Public Health, unpublished data, March 1999). Measures that could improve the detection of syphilis and help to identify syphilis earlier in the course of infection in this population include annual screening of all inmates, screening on transfer between prisons and on transfer from local jails, voluntary mass screening of all inmates at prisons with outbreaks, and screening of prison employees in systems in which syphilis transmission has occurred.

It appears that transmission of HIV did not occur in this outbreak in conjunction with the transmission of syphilis, a fact perhaps attributable in part to the confinement of HIV-infected inmates at only 1 prison facility. Given exposure to an unscreened jail population and extensive sexual activity, however, conditions were favorable for STD and HIV transmission. An HIV outbreak in the prison system could easily go undetected because of the lack of routine HIV screening. Given the sexual mixing of prisoners who are HIV infected and uninfected in most prisons and jails, the transmission of HIV in prisons could be a much larger problem than is currently appreciated. HIV testing should be performed in every case of newly diagnosed syphilis, with the understanding that recent seroconverters may go undetected and require follow-up testing.

Partner notification appears to be a rather insensitive method of identifying cases. Although the percentage of case patients (80%) who named infected case patients as sex partners was higher than other investigations have reported,<sup>31,32</sup> neither partner notification nor routine triennial screening was sufficient to prevent or control this outbreak, as evidenced by the large percentage of cases (26%) that were detected by mass screening. These results suggest that in the correctional setting, voluntary mass screening may be a useful tool to control syphilis outbreaks.

Condom distribution should be used for STD control in correctional facilities, because sexual contact between inmates occurs in many settings. It has been shown that inmates with no access to condoms make ersatz condoms with latex from rubber gloves and used plastic wrap.<sup>14</sup> Like most state prison systems, the Alabama Department of Corrections prohibits the distribution of condoms in prisons.

In 1996, only 2 state prison systems and 4 local jail systems made condoms available to inmates.<sup>5,8,33</sup> Reasons given by prisons for not providing condoms include the conflict with policies forbidding sexual intercourse (or sodomy) in prisons<sup>5,8,34</sup> and the potential for condoms to be used as weapons or to smuggle contraband.<sup>5</sup> In contrast, condoms are available to inmates in all Canadian federal prisons and some provincial prisons. Few problems related to the perceived risk of condom distribution have been reported from these systems.<sup>5</sup> Condom provision to prisoners may yield additional public health advantages beyond the prison walls, if exposure to and experience with condoms in this setting translate into greater use after release from prison.

Improved health care provider and prisoner education about STDs could greatly fortify correctional STD control. This investigation found that some prisoners presenting with signs of syphilis did not receive proper testing and that reports to the health department were not made in a timely manner or at all. STD education for providers that stresses aggressive diagnosis and treatment is an important component of correctional STD control efforts. Because many prison systems contract for medical care, and because staff turnover rates are high, annual education should be implemented. Standing treatment protocols for nursing staff and education for staff who screen sick calls are critical. We recommend that all prison health care staff and inmates receive STD education incorporating methods that maximize understanding of prevention, detection, and treatment of STDs and compliance with treatment guidelines.

In recent years, greater emphasis has been placed on the collaboration of public health and correctional health agencies. Various projects have been initiated to increase public health awareness and prevention of communicable diseases in correctional settings.<sup>35,36</sup> Collaborative prevention programs are common, with most states reporting collaboration between public health and correctional agencies for STD, HIV, or tuberculosis prevention and control.<sup>36</sup> For example, some states have implemented prisoner peer education in an attempt to improve knowledge, practice, and attitudes of inmates in relation to STDs and behavior. Continued strengthening of these

relationships is essential for improved disease control in correctional settings.

The findings of this study are subject to certain limitations. First, we had incomplete information about sexual partnerships. Sex partner names may have been intentionally underreported by case patients, and poor recall may have been an issue because the interview period can be up to 1 year, and sexual partnerships were numerous and concurrent. Nevertheless, at Prison A, we were able to identify likely sources for most of the case patients. Second, our definition of source case patients had some subjective elements. However, the available information did provide plausible transmission patterns, and source case patients tended to have more named partners than did nonsource case patients. Third, because we did not have information on uninfected prisoners, we were unable to estimate the association of risk factors between infected and uninfected prisoners. Finally, the lack of statistical significance for the odds of exposure to jail among source case patients was probably the result of low power due to small sample size; this study had 25% power to detect the odds ratio found for jail exposure.

In the United States, and perhaps in other parts of the world, correctional STD control affects the health of the nonincarcerated population. Inmates in correctional facilities are not isolated but are “inescapably part of the American community.”<sup>37</sup> There are high rates of syphilis infection among jail detainees; transmission is inevitable as detainees move between jail, prison, and the community. We were able to detect and observe this outbreak because the population was subject to routine screening, mass screening, and partner notification in a setting where partner identification was relatively easy. We were able to trace syphilis exposure back to the period of confinement in jail because these state prisoners had few other opportunities for contact with unscreened populations. In the community, outbreaks with similar characteristics of high-risk exposure and multiple concurrent sexual partnerships likely occur, but it is more difficult to characterize sources of exposure because of the relative difficulty of conducting partner notification in the community compared with prison. Most inmates eventu-

ally return to the community, bringing with them infectious diseases harbored or acquired within correctional facilities. Society in general benefits from improving correctional STD control. ■

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### Contributors

M.I. Wolfe was lead investigator, analyzed the data, and wrote the paper. M.I. Wolfe, F. Xu and P. Patel were coinvestigators for the fieldwork portion of the study and assisted with data management and interpretation. M. O' Cain, J.A. Schillinger, M.E. St. Louis, and L. Finelli were supervisors for the outbreak investigation and assisted with fieldwork, directing all stages of the investigation, and interpretation of the data. All authors contributed to the writing of the paper.

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