

Implementing a Syphilis Elimination and Importation Control Strategy in a Low-Incidence Urban Area: San Diego County, California, 1997–1998

ABSTRACT

Objectives. This study assessed a strategy designed to contain imported cases of syphilis and prevent reestablishment of ongoing transmission.

Methods. Reported syphilis cases during an endemic period (1990–1992) and an elimination period (1997–1998) were compared in San Diego, Calif. The elimination strategy, which focuses on rapid reporting of infectious syphilis cases by clinicians, prompt partner and sexual network management, outreach to marginalized populations, and implementation of an outbreak containment plan, was evaluated.

Results. Infectious syphilis incidence rates declined from 18.3 per 100 000 in 1988 to 1.0 per 100 000 in 1998. Of the 46 cases involving probable infection during 1997–1998, 19 (41%) were imported, mostly (79%) from Mexico. Outbreak containment procedures were implemented successfully for 2 small clusters. Outreach workers provided sexually transmitted disease information to a large number of individuals; however, no cases of infectious syphilis were identified, suggesting that syphilis transmission was not occurring among marginalized groups.

Conclusions. This syphilis elimination and importation control strategy will require monitoring and adjustments. Controlling syphilis along the US–Mexico border is a necessary component of syphilis elimination in the United States. (*Am J Public Health.* 2000;90:1540–1544)

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The incidence of infectious syphilis has been declining in many areas of the United States since the epidemic years of 1988 to 1991, with 80% of US counties reporting no primary or secondary cases in 1998.¹ In the western United States, syphilis is at historically low levels, and in some areas it appears to be on the verge of elimination. However, in communities where syphilis has been endemic in the recent past, the potential for importation of infectious cases and reestablishment of endemic transmission is of great concern.^{2,3} Sexually transmitted disease (STD) programs in such communities should have in place enhanced surveillance to identify imported infectious cases, comprehensive partner management services, and an outbreak containment plan.

San Diego County, Calif, a large (population: 2.7 million), multi-ethnic community located on the US–Mexico border, experienced an outbreak of syphilis that peaked in 1988, with 424 cases classified as either primary or secondary (17.9 per 100 000 population). The majority of cases occurred among African Americans residing in the community's urban center, and most were related to crack cocaine use and prostitution.⁴ In 1991, infectious primary and secondary syphilis declined precipitously (by 67%) to 110 cases and then declined to historic lows of 23 and 24 cases (fewer than 1 per 100 000 population) in 1997 and 1998, respectively. To characterize the factors that may have contributed to the decline, we compared characteristics of cases occurring during a period when syphilis was endemic and data were available (1990–92) with characteristics of cases occurring during the later elimination period (1997–1998).

In response to the low levels of syphilis and concern about importation and reestablishment of endemic transmission, a syphilis elimination and importation control strategy was initiated in October 1996. In this article we describe the implementation and preliminary evaluation of the strategy.

Methods

All persons with infectious syphilis were interviewed by field investigator staff and offered partner management services. All case interview and partner management services data for cases reported during the endemic (1990–1992) and elimination (1997–1998) periods were reviewed. For cases reported in the elimination period, importation status was determined as shown in Table 1. For cases reported in 1997–1998 and during the first quarter of 1999, probable month of infection transmission was classified as the month of onset of primary stage symptoms or, if no primary stage symptoms were noted, 3 months before the onset of secondary symptoms. Ongoing endemic transmission among racial groups was defined as consecutive cases occurring among group members within an interval of no more than 2 months.

The elimination strategy followed 4 principles: (1) rapid identification and reporting of suspected infectious syphilis cases by clinicians and other providers, (2) prompt sex partner and sexual network management services, (3) outreach to identify suspected cases among marginalized populations that usually do not access services at established health care facilities, and (4) implementation of an outbreak containment plan. Enhanced case identification and reporting activities included (1) informing community clinicians via countywide

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TABLE 1—Importation Classification Definitions: Syphilis Elimination—Importation Control Strategy, San Diego, Calif, 1997–1998

Classification	Definition
Imported	All potential source partners reside outside jurisdiction
Likely imported	Some potential source partners reside outside and some within the jurisdiction, but source most likely a high-risk partner (e.g., sex worker) from outside jurisdiction
Endemic	All potential source partners reside within jurisdiction
Likely endemic	Some potential source partners reside outside and some within jurisdiction, but source most likely within jurisdiction
Undetermined	Some potential source partners reside outside and some within jurisdiction, and the likely source cannot be determined
Endemic, imported-associated	All potential source partners reside within jurisdiction, but most likely source partner was imported or probably imported (e.g., a female patient's source partner is her husband, whose source partner is a commercial sex worker in Mexico)

mailings, (2) offering direct fluorescent antibody for *Treponema pallidum* in the event of genital ulcer diagnoses, (3) visiting selected clinicians providing care in the high-risk urban center area, (4) conducting active surveillance (biweekly telephone calls to providers) in the high-risk urban center area, and (5) distributing to selected providers a syphilis elimination poster illustrating primary and secondary syphilis physical findings and including diagnostic and treatment guidance (this poster is available from the authors).

All persons with suspected infectious syphilis are given an “emergency” priority for partner management services. The expected response time to interview a suspected case patient has been shortened from 72 hours to 24 hours, and, when additional assistance is needed, more than 1 investigator is assigned to a case to ensure timely treatment of the patient, partners, and sexual network members (who are offered preventive treatment, even in the event of a negative serologic test, to abort incubating syphilis). Similarly investigated cases are those involving patients with early latent syphilis and a history of syphilis symptoms or a negative serologic test during the previous 6 months and persons with syphilis of unknown duration (i.e., individuals younger than 35 years with a serologic titer of 1:32 or higher). Other syphilis cases are investigated less extensively, and some previously routine follow-up and partner management activities have been discontinued.⁵

The outreach approach in the elimination strategy emphasizes collaboration with community-based organization outreach workers, many of whom are carrying out HIV prevention activities, to include education about infectious syphilis in their discussions with persons encountered on the street. Workers are

offered training about syphilis and other STDs and are given photographs of syphilitic lesions to enhance their discussions about syphilis signs and symptoms with clients in the field. As a motivation, we offered a \$50 incentive (store certificate) for workers referring a person to clinical care who was determined, after physical and laboratory examination, to have infectious syphilis (primary or secondary stage). The incentive was raised to \$75 in 1997 and currently is \$100. There is also a \$10 incentive for any person similarly referred to clinical care who is diagnosed with chlamydia or gonorrhea infection.

Finally, an outbreak prevention and containment plan developed in 1998 is activated if 2 related (same sexual network) infectious syphilis cases occur in a high-risk population, such as among persons residing in neighborhoods of San Diego that have experienced high rates of syphilis in the recent past or cases involving trading sex for money or drugs or using crack cocaine. Upon plan activation, a letter, fax, or e-mail about the potential outbreak is sent to area clinicians, and a flyer is sent to outreach workers. STD program field investigators make multiple visits to the area of possible transmission and cast a wide net to inform persons who may be at risk about their need to be evaluated and preventively treated. In some instances, a mobile clinic is used to educate and inquire about symptoms and signs of infectious syphilis and to provide serologic screening and preventive treatment.

Results

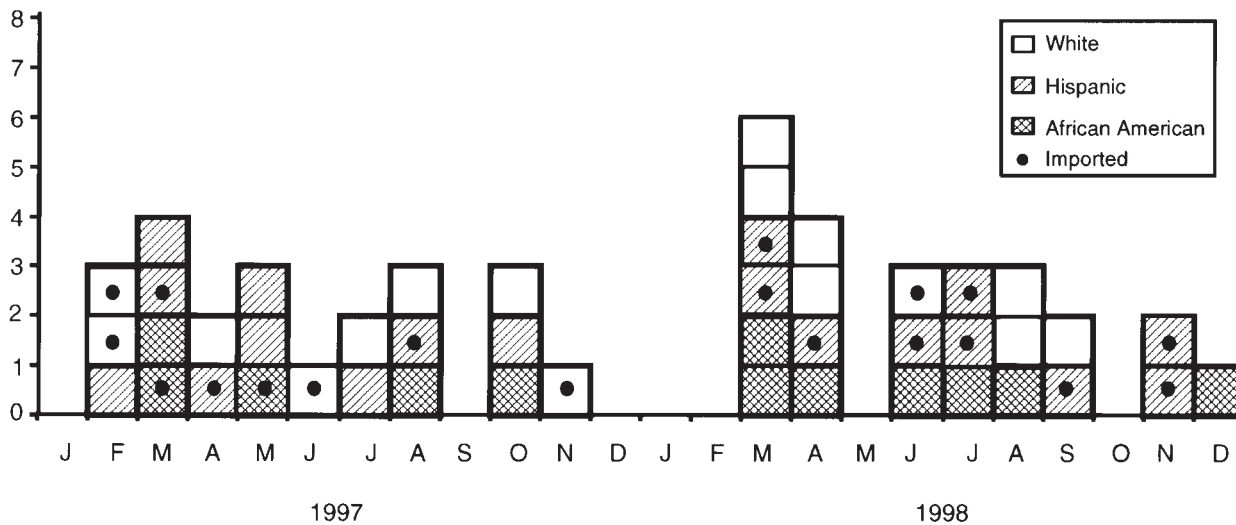
During the increase in syphilis that took place in 1987 to 1991, the highest incidence rates occurred among African Americans and

to a lesser degree, Hispanics. The incidence rates in these 2 racial/ethnic groups have steadily declined and have become similar, but African Americans and Hispanics are still more likely to have syphilis than Whites (incidence ratios: 7.4 and 3.5, respectively). Figure 1 shows infectious syphilis cases by probable month of infection transmission in San Diego in 1997–1998 (n=46). Cases among African Americans occurred sporadically throughout 1997–1998. There were 3 periods involving 3 or 4 months between nonimported cases; 2 clusters of cases occurred during March through April and June through August 1998. Among the 46 persons with infectious syphilis probably acquired during 1997–1998, 19 cases (41%) were classified as imported or probably imported; Mexico was the source of infection for 15 (79%), with the remaining 4 being imported from northern California, Texas, Jamaica, and the Philippines.

The type of medical care provider who suspected the diagnosis of syphilis and/or ordered a serologic test was similar during the endemic period and the elimination period, except that during the elimination period, very few cases were diagnosed by military care or emergency room clinicians; 72% of patients received care at the county STD clinic or a private medical provider. During both periods, the most frequent sources of the first report alerting the STD control program of a suspected case were laboratories and the STD clinic (Table 2). Unfortunately, none of the private clinicians who suspected syphilis or ordered a serologic test for persons who ultimately were diagnosed with infectious syphilis during the elimination period (38% of cases) sent a report to the STD program. Disease investigators identified the cases through follow-up of serology laboratory reports.

During both periods, the percentage of persons with infectious syphilis who reported illegal drug use was about 28%, although the percentage who reported crack cocaine use was lower during the elimination period (8%) than during the endemic period (25%). Conversely, the percentage of cases involved with trading sex for money or drugs was almost 2 times greater during the elimination period than during the endemic period, indicating a greater concentration of cases among higher risk persons. Overall, persons with syphilis reported 50% fewer sex partners during the elimination period (Table 3).

In October 1996, a newsletter was sent to all physicians in San Diego describing the syphilis elimination strategies and informing them of the availability of the direct fluorescent antibody test for *Treponema pallidum* in the public health laboratory. Three direct fluorescent antibody specimens from community clinicians were submitted, and none were positive; how-



Note. Probable month of infection: month of onset of primary chancre, if known, or onset of secondary symptoms minus 3 months.

FIGURE 1—Cases of primary and secondary syphilis, by estimated month of infection: syphilis elimination period, San Diego, Calif, 1997–1998.

TABLE 2—Primary and Secondary Syphilis Cases, by Care Provider and Source of First Report: Endemic and Elimination Periods, San Diego, Calif, 1992 and 1997–1998

	Endemic Period ^a (1992) (n = 112), %	Elimination Period (1997–1998) (n = 47), %
Care provider		
STD clinic	29	34
Private clinician	26	38
Emergency room	5	0
Correctional facility	5	9
Military	21	4
Other/unknown	14	15
Source of first report		
Laboratory (reactor)	39	36
STD clinic	27	28
Private clinician	10	0
Other/unknown	24	36

^aData were not available for 1990 and 1991.

ever, for 1 of these 3 suspected cases, the laboratory submission was the first information received by the STD control program (investigation determined that the ulcerative lesion was not caused by syphilis). The STD clinic has access to dark field microscopic examination.

During 1997–1998, 22 physicians or clinicians were visited, and 62 syphilis posters were distributed. Active surveillance (biweekly telephone calls) was conducted for 6 months in 1997 and then discontinued because no cases were identified and the procedure was time consuming and not well received by clinicians. During 1998, among the 24 patients with reported cases, 58% were interviewed within 24 hours of reporting.

Outreach worker training sessions were provided in October 1997 and January 1999,

with approximately 30 attendees at each session. An average of 21 workers participated in the outreach program during each year; they provided syphilis information to 5296 clients and distributed 543 referral cards, and 24 clients were examined at the STD clinic. No cases of infectious syphilis were identified; however, 2 cases of chlamydia and 1 case of gonorrhea were diagnosed.

The outbreak containment plan was activated on 2 occasions. On the first occasion (in September 1997), the mobile clinic provided service in an area where 2 related infectious cases had occurred. Services were provided to 39 high-risk persons (31% used crack cocaine). Interviews for syphilis symptoms or signs of secondary syphilis (e.g., palmar rash) identified no cases; 17 (44%) persons were treated

preventively, and 1 person had a low-titer positive serologic test for syphilis but could not be located for further evaluation. The second activation (September–October 1998) occurred after the report of primary syphilis in a male heterosexual who had had contact with commercial sex workers in the high-risk STD area. Field work and surveillance activities failed to identify any additional related cases.

Discussion

The rapid decline of infectious syphilis to near-elimination levels in San Diego occurred before the elimination–importation control strategy was implemented, and the reasons for this decline are not clear. Information from case interviews during the endemic and elimination periods failed to shed much light on why the decline had occurred. Most likely, population-level changes in crack cocaine use and sexual behavior (decreasing number of sex partners and increasing condom use) occurred, and this, combined with partner management services, had an impact on all components of the syphilis reproductive rate equation, resulting in a reproductive rate below 1.0.⁶

Nationally, rates of crack cocaine have decreased,⁷ and a similar trend appears to have occurred in San Diego⁸ and other areas.⁹ Sexual behavior trends are difficult to evaluate because there are few longitudinal sexual behavior surveillance data on adults, especially at the local level. Data from the Youth Risk Behavior Survey, a survey of youth attending high school, show that fewer students are having sexual intercourse and that those who are use

TABLE 3—Primary and Secondary Syphilis Cases, by Risk Factors and Sex Partners: Endemic and Elimination Periods, San Diego, Calif, 1990–1992 and 1997–1998

	Endemic Period ^a (1990–1992) (n = 725)	Elimination Period (1997–1998) (n = 47)
Risk factor, %		
Residence in high-risk STD area	56	46
Use of illegal drugs	30	26
Crack use	25	8
Men who have sex with men	17	18
Female sex worker	13	25
Male contact with sex worker	23	43
Sex partners, mean no.		
Recent (interview period) ^a	4.2	2.2
Named	1.5	1.3

^aPast 90 days for primary syphilis and past 180 days for secondary syphilis.

condoms more frequently, a trend that has also occurred among San Diego high school students.¹⁰ Syphilis occurs infrequently in adolescents; however, these behavioral trends in youth may reflect similar trends in adults. HIV counseling and testing services and other prevention programs have been in place in many communities for the past 10 to 15 years, and their efforts have probably contributed to decreases in risky sexual behavior.^{11–13}

Ongoing endemic syphilis transmission among African Americans in San Diego appears to have been interrupted. This conclusion is supported by data showing that more than 2 incubation periods (i.e., more than 2 months) occurred between cases during the 2-year elimination period. We are concerned, however, that ongoing endemic transmission could be reestablished after the importation of infectious syphilis. It is likely that importation of cases from persons having sexual contact or residing in Mexico or other locations will occur until syphilis prevalence rates in these areas have been substantially reduced. Border cities in Mexico will probably need assistance in controlling syphilis, and we recommend that such assistance be incorporated into national and state syphilis elimination plans.

Our efforts in San Diego are modeled somewhat after the later stages of the global smallpox and US measles eradication strategies^{14,15}: rapid case identification and containment through establishment of a “ring of immunity” around each patient, with preventive or presumptive treatment for partners and sexual network members. Treatment with recommended penicillin therapy has limitations (e.g., allergic reactions). However, the success of a recent pilot study of 1-dose oral azithromycin as a preventive treatment¹⁶ suggests that new pharmacologic regimens that would greatly facilitate broader use of preventive treatment may soon become available. It is also important that

STD and HIV prevention programs, as part of a broad national initiative, make sustained efforts to reduce risky sexual behavior.¹⁷ While behavior change efforts are unlikely to be completely effective, the partial “behavioral immunity” they might induce can have a great impact on STD and HIV epidemics over time, similar to a partially efficacious syphilis vaccine.^{18,19}

Surveillance of a disease that occurs infrequently is always difficult. Maintaining the interest and diagnostic skills of clinicians in identifying and reporting suspected infectious syphilis will be an ongoing challenge. Syphilis elimination will require that suspected infectious cases be reported immediately to public health departments, in the manner of a suspected case of meningococcal meningitis or food-borne botulism, to allow rapid case confirmation and follow-up. This transition to viewing syphilis as an important “reemerging disease” in areas where transmission has been interrupted will be an important milestone in STD control in the United States but will require new approaches and partnerships with clinical care providers and laboratories.

In order to initiate and maintain syphilis surveillance among marginalized populations that do not usually access health care, we initiated an outreach worker incentive program modeled after the Smallpox Eradication Program. Despite the relatively high incentive (\$100 per case) and repeated contacts with persons on the street, outreach workers have not identified any infectious syphilis cases, providing additional evidence that syphilis is not being transmitted among these high-risk populations. An added benefit of this incentive program has been the engagement of outreach program administrators in the discussion of the role of STDs in HIV transmission, which has led to more STD training for outreach workers and a renewed interest in incorporating STD education and referral into HIV prevention activities.

The concerns and approaches of communities that have recently eliminated endemic syphilis differ from those of communities that have not recorded cases for several years as well as those of communities that still have considerable endemic syphilis. In San Diego, our syphilis elimination–importation control strategy focuses on symptomatic infectious syphilis and deemphasizes serologic screening and investigation of latent syphilis infection (details are available from the authors). Investigating individuals with latent syphilis and providing partner management services in a low-incidence area will infrequently identify a new infectious case of syphilis.⁵ Providing these services (screening and case investigation with partner management services for latent syphilis) clearly has value; however, efforts in this area must be balanced with other STD prevention and control endeavors such as chlamydia control and infertility prevention.

Overall, the “trade-offs” in syphilis case management and partner services, as well as the extra efforts needed to initiate and maintain other aspects of the elimination–importation control strategy, have been accomplished in San Diego without compromising syphilis control efforts. STD program staff, both clinicians and field investigators, now more clearly appreciate the importance of infectious (symptomatic) syphilis in terms of community transmission and are committed to carrying out the priorities of the elimination strategy. The STD control officer, clinicians, and field investigators discuss each new suspected case at a weekly review meeting, and these discussions keep the focus on elimination–importation priorities, which should be maintainable with the current syphilis incidence.

The foundation of our elimination and importation control strategy is comprehensive, timely delivery of a biomedical plan involving treatment of patients, partners, and sexual network members. We have trained field staff and identified priorities, and so far we have contained imported cases and kept syphilis at a very low level. We will continue to strive for further improvements in the process; however, it is unclear whether this approach will continue to be effective. It is also unclear how effective the approach would be among men who have sex with men. Recently, a resurgence of syphilis has occurred among such individuals in Seattle² and Los Angeles (Centers for Disease Control and Prevention, unpublished data, May 2000). Experience in other communities will be important in providing information that will help mold and fine-tune various elimination and importation control strategies.

Finally, we are concerned that in San Diego we have not made substantial efforts to formally involve the communities at high risk of syphilis in our elimination initiative, and the

communitywide societal issues of poverty, disenfranchisement, and racial/ethnic discrimination remain unchanged. Recent evaluations of syphilis among African Americans in communities in the southern United States have shown that high-risk behaviors and difficulty in accessing health care are common and suggest that community-level intervention activities, as well as individual-level case and partner management services, are needed to control and eliminate syphilis.²⁰

Modifying the mix of skills among STD fieldworkers (disease investigators, outreach workers, persons skilled in building community coalitions, community health workers) and establishing a presence in high-risk communities may be the key to eliminating syphilis and decreasing the incidence of other STDs.^{21,22} Considering the facilitative role that syphilis and other STDs play in HIV transmission²³ and the considerable morbidity and mortality still associated with congenital syphilis,²⁴ the resources spent on STD prevention and control could have considerable societal and financial benefits.

Contributors

R. A. Gunn planned the elimination strategy, analyzed the data, and wrote the paper. S. L. Harper cleaned data and assisted in data analysis. D. E. Borntrager and P. E. Gonzales supervised data collection, assisted in developing the elimination strategy, and carried out the outbreak containment and outreach worker activities. M. E. St. Louis participated in the design of the elimination strategy and contributed to the writing of the paper. All coauthors reviewed the work, made suggestions, and contributed editorially.

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