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Multistate Syphilis Outbreak Among American Indians, 2013 to 2015

Virginia B. Bowen, PhD^{*,†},
Thomas A. Peterman, MD[†],
Dinorah L. Calles, PhD^{*,‡},
Antoine R. Thompson, MPA[†],
Robert D. Kirkcaldy, MD[†],
Melanie M. Taylor, MD[†]

^{*}Epidemic Intelligence Service, Centers for Disease Control and Prevention, Atlanta, GA

[†]Divisions of STD Prevention, Centers for Disease Control and Prevention, Atlanta, GA

[‡]Global Health Protection, Centers for Disease Control and Prevention, Atlanta, GA

Abstract

This article summarizes a multistate outbreak of heterosexual syphilis, including 134 cases of syphilis in adults and adolescents and at least 2 cases of congenital syphilis, which occurred on an American Indian reservation in the United States during 2013–2015. In addition to providing salient details about the outbreak, the article seeks to document the case-finding and treatment activities undertaken, their relative success or failure, and the lessons learned from a coordinated, multiagency response. Of 134 adult cases of syphilis, 40% were identified by enhanced, interagency contact tracing and partner services, 26% through symptomatic testing, and 16% through screening of asymptomatic individuals as the result of an electronic medical record screening prompt. A smaller proportion of cases were identified by community screening events in high-morbidity communities; high-risk venue-based screening events; other screening, including screening upon request; and prenatal screening at first trimester, third trimester, and day of delivery. Future heterosexual syphilis outbreak responders should act quickly to coordinate a package of high-yield case-finding and treatment activities—potentially including activities that seek to do the following: (1) increase prenatal screening, (2) improve community awareness and symptomatic test seeking, (3) educate providers and improve general screening for syphilis, (4) implement electronic medical record reminders for providers, (5) screen high-morbidity communities and at high-risk venues, and (6) form novel partnerships to accomplish partner services work when the context does not allow for traditional, disease intervention specialist–only partner services.

Correspondence: Virginia B. Bowen, PhD, 1600 Clifton Rd, NE, MS E-02, Atlanta, GA 30329. vbowen@cdc.gov.

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Syphilis has been increasing throughout the United States since 2001.¹ In 2016, a total of 27,814 cases of primary and secondary (P&S) syphilis (8.7 cases per 100,000 persons) were reported to the US Centers for Disease Control and Prevention (CDC), the highest rate reported since 1993. The overall 2016 P&S syphilis rate reflected a 17.6% increase over 2015 (7.4 cases per 100,000 persons), with rate increases among women (35.7%) greater than those among men (14.7%). Racial disparities exist for P&S syphilis; American Indians/Alaska Natives experience 1.6 times the rate of P&S syphilis relative to non-Hispanic whites (8.0 vs. 4.9 cases per 100,000 persons).

Although most reported cases (58%) of P&S syphilis in 2016 were among gay, bisexual, and other men who have sex with men,¹ localized heterosexual syphilis outbreaks continue to occur in some health jurisdictions.^{2–8} Syphilis among women is particularly concerning given the ability of *Treponema pallidum* to cross the placenta, infecting the unborn infants of pregnant women with syphilis and leading to physical deformities, cognitive delays, spontaneous abortion, stillbirth, and early infant death. Mirroring increases in P&S syphilis among women, rates of congenital syphilis among infants also increased during 2012–2016 (from 8.4 to 15.7 cases per 100,000 live births).^{1,9}

This article summarizes an outbreak of heterosexual syphilis, including at least 2 cases of congenital syphilis, which occurred on an American Indian reservation in the United States during 2013–2015. Sexually transmitted disease (STD) outbreaks have been documented on American Indian reservations throughout the past decade and have proven challenging given the overlap of public health jurisdictions with similar case-finding and treatment responsibilities.⁶ In addition to providing salient details about the outbreak, the aim of this summary is to document the case-finding and treatment activities undertaken, their relative success or failure, and the lessons learned from a coordinated, multiagency response.

OUTBREAK

On March 1, 2013, the State A health department received a case report of primary syphilis (with chancre) occurring in a member of an American Indian Nation who resided on a reservation whose territory crosses State A and State B. This was the first case of early syphilis reported on this reservation in at least 20 years. By the end of July 2013, 5 additional cases of syphilis (including secondary cases with rash and asymptomatic latent cases) had been identified among persons residing on the State A side of the reservation. On September 12, 2013, State B reported its first case of syphilis on the State B side of the same reservation. Five weeks later, with 5 cases of syphilis in State B, State B notified State A of an increase in cases along the border, at which time each state learned of the other's reported cases. On January 28, 2014, with 24 reported cases of syphilis on the reservation, including cases from both states, the tribe requested public health assistance from state and federal agencies to augment the ongoing public health investigation performed by State A and B health departments.

In February 2014, an enhanced, coordinated multiagency outbreak response began, involving the Tribal Health Agency, local and regional Indian Health Service (IHS) units, both State A and State B Departments of Health, and CDC; this included an onsite response from April

6 to 11, 2014, with technical assistance provided by partners through August 2015. A total of 136 cases of syphilis with onset from February 2013 to August 2015 were identified, including 2 cases of congenital syphilis that met the Council of State and Territorial Epidemiologists (CSTE) congenital syphilis case definition. Two additional cases of *missed* congenital syphilis (both stillbirths) were also identified. The stillbirth cases are considered “missed” because mothers were not tested for syphilis until 2 to 5 months after delivering a stillborn infant, at which time they were both found to be infected; fetal syphilis testing was not performed. These 2 missed cases do not meet the official CSTE congenital syphilis case definition and are not included in the outbreak case count.

A reported case of syphilis (any stage) was deemed outbreak-associated if it was diagnosed during February 2013–August 2015 in a person living on the reservation or in a person epidemiologically linked to a case from the reservation. Of the 136 outbreak-associated cases identified, 134 cases were among adults or adolescents, only 2 of whom identified as men who have sex with men. The outbreak was characterized as a primarily high-risk heterosexual outbreak with females representing more than half of all adult and adolescent (“adult”) cases (57%); of the 76 adult females, 13 (17%) were pregnant or had recently been pregnant at the time of their syphilis diagnosis. Adult cases ranged in age from 15 to 60 years and 99% of all cases were classified racially as American Indian/Alaska Native. One case was of unknown race. Adult cases represented all stages of disease, including 54 (40.3%) primary, 24 (17.9%) secondary, 42 (31.3%) early latent, and 14 (10.4%) late latent cases. Two congenital syphilis cases were identified and reported after the late detection and treatment of syphilis in their mothers (treatment initiated <30 days before delivery). Case reports peaked in April 2014 (n = 23), with a second, smaller peak in January 2015 (n = 6; Fig. 1.).

RESPONSE ACTIVITIES

All 136 cases were identified through 1 of 8 case-finding activities: (1) first-trimester prenatal screening; (2) expanded third-trimester and day-of-delivery prenatal screening; (3) the implementation of electronic medical record (EMR) screening prompts in IHS facilities; (4) community screening events; (5) high-risk venue-based screening events; (6) collaborative interagency case-interviewing and partner services work, including clustering and social contact interviews; (7) testing of symptomatic patients; and (8) screening at non-IHS facilities. Other investigation and response activities included a review of state stillbirth records, which yielded no additional cases of congenital syphilis; community education activities to raise awareness of syphilis signs and symptoms among the general population; provider education activities to reeducate providers about syphilis testing and treatment; provision of field treatment for 18 persons who were either known cases or sexual partners of known cases with potentially incubating syphilis.

Routine Prenatal Screening

Before the first outbreak-associated case on the reservation in early 2013, the only regular syphilis testing occurring among the tribal population was the routine screening of pregnant

women at their first prenatal visit. The continuation of first trimester (or first visit) screening identified 5 of 134 adult cases of syphilis (5/76 female cases; Table 1).

Expanded Prenatal Screening

In response to the outbreak, screening was expanded to include third-trimester and day-of-delivery screening, a recommendation supported by CDC's STD Treatment Guidelines in geographic areas of high morbidity.¹⁰ Expanded screening detected 1 of 134 adult cases of syphilis (1/76 female cases) and 1 of the 2 cases of congenital syphilis (Table 1). Messages about the need for expanded prenatal screening were disseminated using Health Alerts, provider memos, education sessions, and public health detailing, wherein state disease intervention specialists (DIS) visited prenatal care providers and shared new guidance and educational materials in a face-to-face format. In-person retrainings on signs of syphilis, tests and algorithms used in syphilis diagnosis, and the treatment for pregnant women and nonpregnant persons were targeted to providers serving the reservation. Web-based trainings were also used to reach geographically remote nurses and midlevel providers who provide much of the routine care for this population.

EMR Screening Prompt

A syphilis screening prompt was inserted in the IHS EMR system at both facilities serving the reservation; the prompt appeared for all inpatient and outpatient visits with persons aged 12 to 65 years who had not been tested for syphilis in the preceding 3 months. The prompt linked providers to the laboratory ordering screen of the EMR system, allowing them to select a rapid plasma reagin (RPR) syphilis screening test, which automatically reflexed to the *T. pallidum* particle agglutination confirmatory test if the screening test was positive. When providers acknowledged the screening prompt, notes documenting screening and counseling for syphilis were automatically logged in the patient's record. Between January 2014, when the prompt was introduced, and February 2015, when preliminary data were analyzed, a total of 1933 RPR tests were ordered by the IHS service unit with a test positivity of 3.1%. Rapid plasma reagin testing across the IHS Service Area increased by more than 2-fold in 2014 relative to 2013. During the course of the outbreak, the EMR screening prompt identified 21 (15.7%) of 134 adult cases of syphilis.

Community Screening Events

Two community screening events were performed in districts where cases were clustered. The expedited stand-up of these events was facilitated by rapid field deployment of State A's Department Operations Center, which mobilized medical supplies and equipment from the Center's central cache to the field in less than 36 hours. Approximately 18 interagency work group members staffed the largest of the 2 events. Disease intervention specialists from both states provided one-on-one education sessions, performed risk screening assessments, and triaged community members for clinical follow-up when necessary. Community Health Representatives from the Tribal Health Agency recruited attendees and supplemented the event with additional health screenings. Staff members of IHS performed phlebotomy and conducted risk screening, and CDC staff performed examinations and administered treatment, when necessary, in addition to coordinating planning and logistics. Gift cards and a meal incentivized attendance for the groups at highest risk for having syphilis. The 2

community events screened a total of 94 participants (64 at the initial event and 30 at the second event) and identified 5 (3.7%) of 134 adult cases of syphilis. The first event also led to the provision of field treatment for 11 individuals, most of whom were known to the health departments as cases or contacts before the event, as well as the identification of 2 cases of gonorrhea, 7 cases of chlamydia, 2 new cases of hepatitis C, and no new cases of HIV.

Venue-based Screening Events

The reservation's tribal jail was identified as a priority area for screening events, because the state DIS had located the sexual partners of several outbreak-associated cases there in the course of routine partner services investigations. In total, the working group performed 5 jail-based screening events between April 2014 and July 2014. Much like the community-wide screening events, the jail screenings included phlebotomy, DIS-mediated risk assessments, and physical examinations and treatment when warranted. The initial jail screening event in April 2014 consented and screened 38 inmates (71.6% of total incarcerated) for syphilis, gonorrhea, chlamydia, HIV, and hepatitis C; 1 inmate (1.9%) declined syphilis screening but elected to participate in the DIS-led risk assessment interview; and 14 inmates (26.4%) were excluded from screening either because their IHS medical records indicated that they had been tested during the previous 3 months or because they were not on the premises at the time of the screening event (e.g., work release or judicial hearing). The initial jail screening identified 2 new cases of syphilis (5.2% newly positive) and one case known to be infected but who had not yet been located for treatment. In addition, the screening detected 11 cases of hepatitis C (most but not all of which were new cases), 2 cases of chlamydia, 1 case of gonorrhea, and no new cases of HIV.

Additional jail screenings were initially conducted every 4 to 6 weeks but were discontinued after 4 follow-up screenings yielded only one new case of syphilis. Coordination with jail administrators also led to the daily release of the jail roster, which was reviewed by the IHS service unit infection control officer who identified known cases or partners in need of interviewing, testing, or treatment. In total, the 5 jail screenings identified 3 (2.2%) of the 134 adult cases of syphilis.

Interagency Partner Services

Before the enhanced response in early 2014, state DIS traveled between 60 and 150 miles each way to perform routine in-person interviews with syphilis cases. Locating cases and their sexual partners was challenging. Through regular interagency working group interactions, it became clear that members of the group could contribute different strengths to case investigation and partner services work. A novel partnership was formed between IHS's infection control officer and public health nurses, the Tribal Health Agency's community health representatives, and the state DIS to enhance traditional partner services. Community health representatives and public health nurses were trained on the use of the syphilis case report form, were taught basic investigation techniques, and were invited to shadow trained DIS at screening events and in the course of field work. Depending on whether cases were diagnosed at IHS or private facilities, an initial interview was either performed immediately via telephone by a state DIS or performed in-person within

48 hours by a public health nurse. Because initial interviews were completed using these alternative methods, DIS were then able to “batch” much of their remaining work, including secondary interviews and locating patients for treatment, into weekly visits; this decreased the frequency with which they needed to travel to interview cases. State DIS entering the reservation for in-person partner services work paired with a public health nurse or community health representative who was better able to assist them with finding cases, sexual partners, or social contacts. The local knowledge of the community health representatives was invaluable in locating difficult-to-reach persons, and they also had tribal “ambulance responsibilities,” permitting them to bring cases and partners in for testing and treatment when needed. Alternate methods of providing partner services were discussed by the work group, including the use of mobile technology, but mobile phone ownership and cellular coverage were deemed too limited on the reservation to make this a viable option.

Because cases and sexual contacts often resided on different sides of the state line, a memorandum of understanding was initiated to allow for data sharing between the states and a work flow was established whereby both states learned of relevant cases and contacts. Weekly “chalk talks” brought together interagency partners to discuss difficult-to-locate persons and complicated cases. Enhanced partner services remained the highest-yielding case-finding activity throughout the course of the outbreak, identifying 53 (39.6%) of 134 adult syphilis cases.

Screening and Symptomatic Testing of General Population

The increased screening of asymptomatic patients—unrelated to the EMR prompt in IHS facilities— and the increased testing of symptomatic patients were the 2 primary goals of all communication messages disseminated by the working group. Community education activities were undertaken in the area, informing community members about the signs and symptoms of syphilis so that they might recognize these signs on themselves or their partners and present for testing as needed. Other community-oriented messages focused on the general need for screening for sexually active persons living in the affected area. Public health nurses hosted “town hall”-style information sessions across all districts of the reservation to increase syphilis knowledge and outbreak awareness. Attendance at these sessions varied by district. The Tribal Health Agency designed and purchased a full-page advertisement in the local weekly newspaper which ran for several months, and CDC helped write and record a Public Service Announcement for use on the local radio station. Public health detailing was conducted in several waves to reeducate providers about the need for continued syphilis screening in conjunction with other STD screening and to raise the clinical index of suspicion when encountering patients with common syphilis symptoms. Increased screening in private facilities and symptomatic testing as a result of community and provider awareness led to the identification of 46 (34.3%) of 134 adult cases of syphilis and led to the reporting of one case of congenital syphilis.

Stillbirth Record Review

All stillbirths occurring within States A and B are registered as fetal deaths. In April 2014, State B provided the working group with all available stillbirth certificates for deliveries occurring between September 2013 and April 2014 (n = 24). Three certificates (12.5%)

indicated mothers of American Indian race, but a clinical review of these cases did not attribute syphilis as the likely cause of fetal demise. Local practitioners noted a 2- to 3-month backlog in the completion and issuance of fetal death certificates. Although 2 cases of likely (missed) congenital syphilis—both stillbirths—were identified through other case-finding efforts, no cases of congenital syphilis were identified by the review of stillbirth certificates.

Field Treatment

Providing treatment for untreated cases and contacts was prioritized during April 2014 on-site field activities. The affected IHS service unit drafted protocols that would permit field treatment for cases and contacts with injectable penicillin. The interagency working group identified all persons needing to be located, tested, or treated and a clinician and public health nurse worked to locate these persons and treat them with 2.4 million units of benzathine penicillin G (provided by the IHS pharmacy). Where possible, these persons were identified in IHS medical records before being treated to check for documented drug allergies. The IHS EMR was also updated for each person after field treatment. In total, 18 persons were treated outside a clinic setting within 1 week's time—11 in conjunction with the community screening event, 5 in jail, and 2 in their homes.

DISCUSSION

This heterosexual, reservation-based outbreak of syphilis, which included 134 adult cases and 2 congenital cases, was reduced in intensity as a result of an ongoing, coordinated set of case-finding and treatment activities. In the initial planning phase, the working group reviewed the outbreak-control literature for recommended syphilis outbreak interventions, but found that much of it was outdated or specific to commercial sex work and the crack cocaine epidemic of the 1990s.^{11–25} Although we were informed by this literature, we primarily used the current outbreak epidemiology and local knowledge to craft the package of intervention activities used here. By presenting our results, we hope that others might be able to identify new syphilis outbreak control activities or better prioritize currently planned activities based on our documentation of efforts and case-finding results.

The single activity that identified the most cases was partner services and contact tracing, which led to the diagnosis of almost 40% of all outbreak cases. Although a high-yield activity from a case-finding perspective, partner services was one of the most labor-intensive components of this outbreak response, requiring daily effort from state DIS, IHS public health nurses, IHS infection control, and tribal community health representatives. Given the duration of the outbreak, it makes sense that a long-term activity like partner services, which was carried out over the entirety of the outbreak, contributed so greatly to case-finding relative to punctuated screening events in the community or at high-risk venues like the local jail. The novel enhanced partner services used in this outbreak, integrating federal, state, and tribal partners, may have played a role in finding more cases and bringing more persons to treatment than would have been found through traditional DIS-only partner services.

Other fruitful activities included symptomatic testing and the implementation of an EMR screening prompt. The volume of symptomatic testing in this population directly reflects

the high levels of P&S syphilis seen during this outbreak. Nurse-led education sessions for the general reservation population as well as local media campaigns to raise awareness of syphilis signs and symptoms may have led to improved symptom identification and increased care seeking. The EMR prompt required initial programming by IHS staff but required little to no day-to-day oversight once implemented in the electronic record system. The workgroup assisted with provider training related to use of the prompt. After several weeks of screening with the prompt, IHS identified gaps in the system (i.e., not all positive RPR test results were automatically reflexing to *T. pallidum* particle agglutination testing) and worked quickly with their servicing laboratory to adjust the laboratory requisition.

Activities that attempted to screen a large number of people, both infected and uninfected, often required concentrated effort but for a significantly shorter period; the proportion of persons testing positive was relatively high at these punctuated events—with the initial jail screening finding that 5.2% of those screened were new cases of syphilis and the initial community event in a high-morbidity district finding that 6.3% of those screened were new cases of syphilis. The high prevalence of syphilis at these 2 events supports the idea that screening at venues frequented by high-risk individuals and targeted screening within high-morbidity communities may be valuable as one-time efforts. Although these efforts identified fewer cases (8/134 adult cases) than partner services, they also required less long-term commitment and were likely more valuable in slowing the spread of infection on the reservation by rapidly decreasing the number of infectious persons in the population. However, the reincarceration rates in this community were high enough that subsequent screenings at the same venue yielded diminishing returns.

Although significant energy was invested in provider education—passively through Health Alerts and actively through public health detailing with education messages—the expanded prenatal screening was not as high yield as the working group anticipated (finding only 1/134 adult cases of syphilis). That said, expanding screening to third trimester and day-of-delivery testing did contribute an additional 20% to case-finding efforts above and beyond the 5 cases detected through routine, first-visit prenatal screening. From a relative perspective, this may still be valuable, particularly if the primary goal is to prevent cases of congenital syphilis or to prevent long-term sequelae by identifying and treating infants known to be infected. Efforts to expand prenatal screening were somewhat hindered by the slow adoption of new recommendations at the individual provider level. Several instances were noted where providers refused to perform day-of-delivery testing despite receiving educational materials and Health Alerts asking them to do so. Although expanded prenatal screening did not produce significant case finding in and of itself, obstetricians did note (anecdotally) that they identified signs and symptoms of syphilis more readily after the educational sessions conducted by the working group. This may explain why an additional 3 pregnant women were categorized as “symptomatic testing” in the course of receiving prenatal care from an obstetrician. These women are not included in case counts of prenatal screening, because they had symptomatic infection during pregnancy (e.g., labial chancres) and are thus categorized as symptomatic testing.

Some of the challenges of syphilis outbreak control have already been noted, but a few others merit discussion. The unique context of the reservation—a remote geographic area in

which multiple agencies serve in a public health capacity—creates a difficult environment for outbreak identification and response coordination. For similar outbreaks where multiple public health jurisdictions play a role in outbreak response, swift efforts to form interagency collaborations and undertake high-yield case-finding and treatment activities have been shown to speed outbreak containment.⁶ Our experience with an interagency working group also supports this notion, and we attribute much of our success in containing this outbreak to the coordination efforts of the IHS Regional Office and the willingness of all group members to communicate openly and act quickly. The challenges of outbreak identification and response were compounded here because the reservation spanned 2 states. This highlights the continued need for state and local health jurisdictions to establish agreements of understanding and work flows that allow communicable disease case and contact information to be shared when disease is identified near jurisdictional borders.

In this outbreak setting, it was initially unclear whether the state health departments had public health jurisdiction to investigate cases on the reservation. Although the states *did* have the jurisdiction to perform partner services work on reservation land, their presence on the reservation was alarming for tribal members, increasing reluctance and refusal among those needing to be interviewed, tested, or treated. After the problem was identified by the interagency working group, a hybrid model of enhanced partner services was established that involved the accompaniment of state investigators by community health representatives and public health nurses and the training of public health nurses in DIS-style interviewing to expedite partner services follow-up. This hybrid model was both culturally cognizant and effective, contributing to the location of additional cases and the willingness with which cases and partners agreed to testing and treatment. Community health representatives are well trained to perform community education around chronic disease and a variety of rapid diagnostic tests, but syphilis is a challenging disease, and extensive training would have been necessary for community health representatives to independently perform disease investigation on the reservation. For this reason, we feel that the hybrid model that included community health representatives, public health nurses, and fully trained state DIS was essential.

In small populations that are geographically isolated, heterosexual networks may be dense, which means that a disease introduced from outside has the ability to spread quickly. Congenital syphilis can emerge quickly if prenatal screening, rescreening, and treatment are not already in place. In this small reservation population, congenital syphilis emerged relatively quickly and was a large problem; although only 2 infants met the CSTE case definition for congenital syphilis, at least 2 other stillborn infants were likely “missed” cases of congenital syphilis. In a context where heterosexual syphilis seems to be emerging quickly and levels of prenatal care may be less than ideal, prevention of congenital syphilis through increased prenatal screening should be a high priority.

A coordinated multiagency response to a heterosexual syphilis outbreak on a US reservation, which included a series of case-finding and treatment activities, identified 136 cases of syphilis, including 2 cases of congenital syphilis. Although the case count on the reservation has not returned to zero (9 adult cases and 2 congenital cases were reported in 2016), transmission is believed to be relatively contained in large part due to the efforts of

the response group, which were sustained by both health departments and the affected IHS service unit. Future heterosexual syphilis outbreak responders should act quickly to coordinate a package of high-yield case-finding and treatment activities—potentially including activities that seek to do the following: (1) increase prenatal screening, (2) improve community awareness and symptomatic test seeking, (3) educate providers and improve general screening for syphilis, (4) implement EMR reminders for providers, (5) screen high-morbidity communities and at high-risk venues, and (6) form novel partnerships to accomplish partner services work when the context does not allow for traditional, DIS-only partner services.

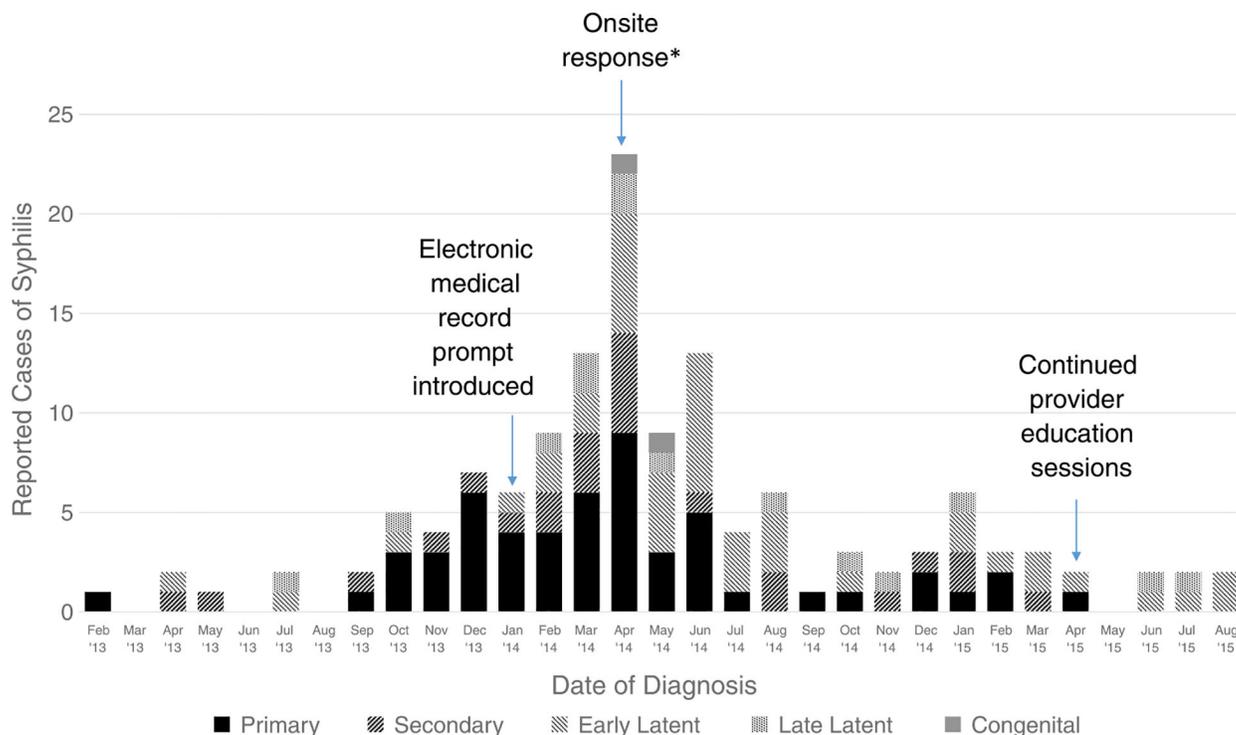
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*Onsite response included first and largest community screening and venue-based screening events as well as 3 provider education sessions

Figure 1. Reported cases of outbreak-associated syphilis by date of diagnosis and stage of infection, 2013 to 2015 (please see attached PPT slide for an updated version of the graphic, which includes text boxes).

TABLE 1.
 Number and Proportion of Adult and Adolescent Cases Identified by Primary Activity Resulting in Case Identification, 2013 to 2015

Primary Activity Resulting in Case Identification	No. Adult/Adolescent Cases Identified, n	Proportion of Adult/Adolescent Cases Identified, %
Routine prenatal screening (first visit)	5	3.7
Expanded prenatal screening (3rd trimester and day-of-delivery)	1	0.7
EMR screening prompt	21	15.7
Community screening events	5	3.7
Venue-based screening events	3	2.2
Interagency partner services (contact tracing)	53	39.6
Symptomatic testing	35	26.1
Screening (other)	11	8.2
Stillbirth record review	0	0.0
Total	134	100.0