



# PUBLIC HEALTH NOTES

JUNE 2022

## Lyme Disease

Renfrew County and District Health Unit (RCDHU) continues to report confirmed Lyme disease cases each year.

### Risk Areas in Renfrew County and District

The [Ontario Lyme Disease Risk Area Map](#), which is updated annually through Public Health Ontario, illustrates where black-legged ticks have been identified during spring and fall active surveillance operations. As of 2022, the identified risk areas within Renfrew County and District (RCD) are: Arnprior, Beachburg, Braeside, Burnstown, Calabogie, Cobden, Douglas, Foresters Falls, Haley Station, Renfrew, and White Lake.

### Health Care Providers (HCP) Role

The Centre for Effective Practice has developed the [Early Lyme Disease Management in Primary Care Tool](#) to help HCP diagnose and treat early localized Lyme disease. A patient resource provides information for patients who have been bitten by a tick or diagnosed with early Lyme disease.

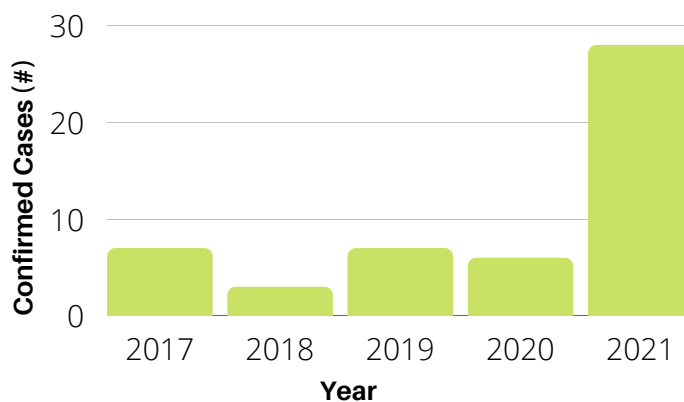
Early diagnosis should be based on a combination of:

- clinical symptoms, especially the appearance of an
- erythema migrans rash,
- known exposure to ticks in an endemic or risk area,
- living in or visits to known endemic or risk areas, and
- two Tier Serological tests, for patients who exhibit only non-specific symptoms.

#### IMPORTANT:

Serological tests are insufficient on their own, as they are insensitive in early stages (< 30 days) and may yield a large number of false negatives.

### Confirmed Cases of Lyme Disease Over the Past Five Years



### RCDHU's Role

RCDHU performs active and passive surveillance to monitor for black-legged ticks and the prevalence of Lyme disease.

**Active surveillance:** tick dragging in areas where black-legged ticks are suspected or have been previously identified.

**Passive surveillance:** submission of ticks by health care providers and members of the public for identification. This process can take several days to weeks so it should not be used to diagnose Lyme disease cases.



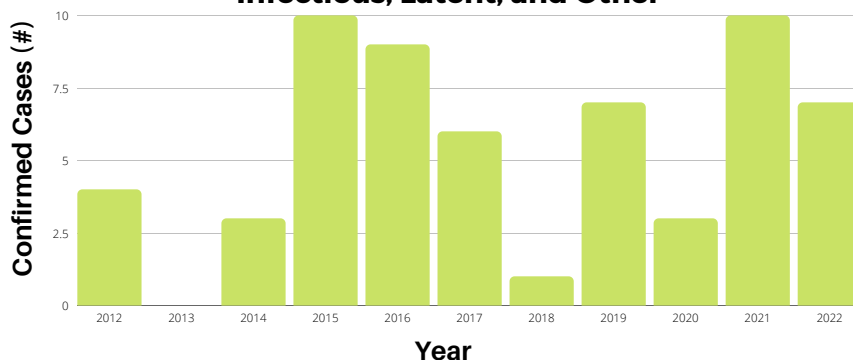
## Syphilis

Syphilis has been a reportable infection in Canada since 1924. The rate of infectious syphilis was very high in the 1940s and started to decline steadily after that period. It continued to decline in the 1980s and was very low by the mid-1990s. However, the rate began to climb again in the early 2000s and has risen dramatically in recent years. The reasons for this dramatic increase are not fully known. The rise in syphilis cases coincides with the introduction of highly effective HIV treatment in the late 1990s, which may have contributed to a decrease in condom use. Since the early 2000s, dating apps have become more popular, which facilitates meeting more potential sexual partners. The increase in syphilis also coincides with an increase in the use of drugs while having sex, called party and play (PnP).

The resurgence of syphilis and congenital syphilis is a public health concern nationally and in the USA. It will be important moving forward to look for opportunities to address the risk factors associated with infection and to ensure that patients who are at risk are counselled on testing and effective treatment options. Primary care practitioners are very well positioned to reduce the burden of disease of Syphilis through testing, treatment and primary prevention at the patient level, in parallel with public health officials who offer case and contact management and population health level interventions.

N.B. RCDHU maintains a stock of parenteral penicillin G benzathine and can assist primary care with treatment delivery.

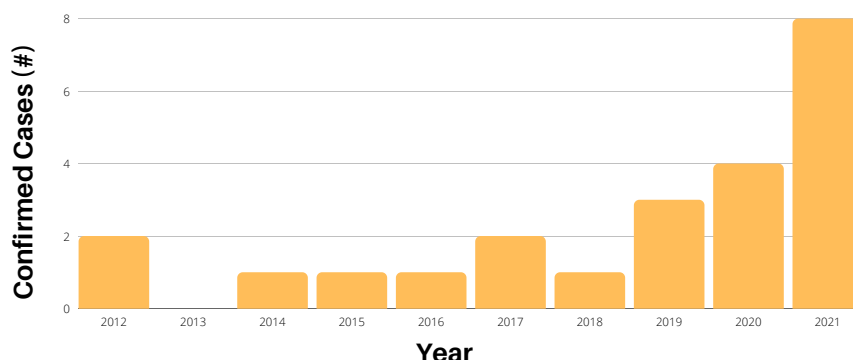
**RCD Syphilis All Types\* 2012-2022**  
**\*Infectious, Latent, and Other**



\*Data for the year 2022 includes January 1 to May 11.

Infectious and congenital syphilis rates have seen a sharp growth in Canada since 2016. The COVID-19 pandemic impact on syphilis rates is undetermined: some studies have shown that there are observed decreases in syphilis rates, possibly due to reduced sexual activity due to lockdowns, while others have indicated that COVID-19 has had a limited impact on syphilis rates.

**Congenital Syphilis Cases in Ontario 2012-2021**



### Resources for primary care providers:

<http://sieccan.org/sexual-health-education/>

<https://www.canada.ca/en/public-health/services/infectious-diseases/sexual-health-sexually-transmitted-infections/canadian-guidelines/sexually-transmitted-infections.html>



# APPENDIX



# Interventions and best practices to address increasing rates of syphilis transmission

## Question

What are the effective interventions and best practices to reduce syphilis transmission among various population groups?

## Key Take-Home Messages

- Infectious and congenital syphilis rates have seen a sharp growth in Canada since 2016 (1). The COVID-19 pandemic impact on syphilis rates is undetermined: some studies have shown that there are observed decreases in syphilis rates, possibly due to reduced sexual activity due to lockdowns (2, 3), while others have indicated that COVID-19 has had a limited impact on syphilis rates (4).
- Enhancing screening for syphilis with opt-out (5, 6), emergency department (7), and routine screening (8) has shown to increase testing rates, especially among men who have sex with men (9). Partner notification services and the use of disease intervention specialists has shown to be effective in minimizing syphilis transmission (10, 11), though the number of reported anonymous partners continues to be a challenge in contacting exposed partners (12, 13).
- Ceftriaxone, doxycycline/tetracycline (14), and azithromycin (15) are alternative treatments that have shown to be effective substitutes for penicillin (16).
- Repeat prenatal screening has shown to reduce both maternal and congenital syphilis rates (17, 18). Most congenital syphilis cases are detected and treated during screening in the first two trimesters (18). Among high-risk women, third trimester testing is recommended to reduce mother-to-child syphilis transmission (19).

## Rapid Response: Evidence into Action

The OHTN Rapid Response Service offers quick access to research evidence to help inform decision making, service delivery, and advocacy. In response to a question, the Rapid Response Team reviews the scientific and grey literature, consults with experts if required, and prepares a review summarizing the current evidence and its implications for policy and practice.

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## The Issue and Why it's Important

Syphilis cases have been increasing since the early 2000s in many high-income countries (20–22). In recent years, countries, including Canada and the U.S., have seen a surge in syphilis infections (1, 23, 24). In Canada, infectious syphilis rates increased by 124% from 2016 to 2020 (1). In 2020, 9,126 infectious syphilis cases were reported nation-wide, representing 24 new cases per 100,000 individuals (1). In Ontario, 2,316 infectious syphilis cases were recorded in 2020, representing 15.7 new cases per 100,000 individuals, compared to the 1,444 cases in 2016, or 10.4 cases per 100,000 individuals (25). Similarly, in 2019, the U.S. Centers for Disease Control and Prevention (CDC) reported 129,813 cases of all stages of syphilis representing 39.7 cases per 100,000 individuals, compared to 74,709 cases in 2015, or 23.2 cases per 100,000 individuals (24).

Congenital syphilis, the transmission of syphilis to a baby during pregnancy or childbirth, has also become increasingly more prevalent in recent years (20). In Canada, from 2016 to 2020, congenital syphilis cases increased from 4 to 50, respectively, among women aged 15 to 39 (1). Cases in the U.S. jumped from 494 in 2015 to 1,870 in 2019, representing an increase from 12.4 new congenital syphilis cases per 100,000 live births to 48.5 new congenital syphilis cases per 100,000 live births, respectively (26).

Males account for a majority of syphilis cases (1, 22), with gay, bisexual, and other men who have sex with men disproportionately burdened (27, 28). Some studies conducted in the U.S. among men who have sex with men identified that racial minorities—including Black, Hispanic, and Asian and Pacific Islander men—are increasingly affected by syphilis (29–31). Similarly, in Canada, it has been recognized that while ethnic minorities comprise a fraction of men who have sex with men, these individuals are also impacted disproportionately by syphilis compared to White men who have sex with men (20, 32). The 32,402 men who have sex with men, together with men who have sex with men and women, made up 56.7% of cases of primary and secondary syphilis in males in the U.S. in 2019 (22). However, the proportion of infectious syphilis cases has also increased among women of reproductive age (15–49 years) (20); in Canada in 2020, the rate of congenital syphilis infections was 39.7 per 100,000 women aged 15–39, the highest rate in five years (1). In the U.S., primary and secondary syphilis in women increased by 178.6% between 2015 to 2019 (22). The observed increase in congenital syphilis cases has been attributed to the rise in syphilis cases among women in their reproductive years (20, 33).

The influence that the COVID-19 pandemic has had on syphilis rates is being investigated. One study conducted at the Melbourne Sexual Health Centre in Australia found no significant changes in the number of consultations for infectious syphilis cases, despite an overall reduction of sexually transmitted infection (STI) consultations during lockdown and post-lockdown compared to

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pre-lockdown (34). In a 2021 study conducted in Catalonia, Spain, a reduction in STI cases was observed since the beginning of the COVID-19 pandemic, and the number of overall reported syphilis cases during this time decreased by 22% (2). At the STI/HIV Unit of the San Gallicano Dermatological Institute in Rome, Italy, there was an increase of syphilis diagnoses from January 1 to March 9 2020 (n=68), prior to the COVID-19 lockdown, compared to reported cases in the first 4 months of 2019 (n=25) (35); however, there was a decline in overall cases in 2020 (n=81) compared to the yearly average of reported cases in 2017 to 2019 (n=106) (3). Additionally, the U.S. Morbidity and Mortality Weekly Report (MMWR) identified a 0.9% reduction of syphilis diagnoses in the U.S. in 2020 compared to 2019 (36). Another U.S. study found that syphilis cases increased from 1.2% in the pre-pandemic period (June 2019 to March 2020) of all patients screened for syphilis through universal screening in a large, urban emergency department in Chicago to 1.9% in the observed pandemic period (April 2020 to June 2020); syphilis screening rates stayed relatively similar (4). Studies suggest that a reduction in high-risk sexual activities throughout the COVID-19 pandemic could partially explain decreases in syphilis cases (2, 3). Generally, there appears to be limited consensus on the impact that COVID-19 has had on syphilis rates.

The ongoing increase in syphilis rates highlights the need for interventions to address its spread (20, 37). This review explores interventions and best practices that have been tested to reduce syphilis transmission in various communities.

## What We Found

### Interventions related to infectious syphilis

#### **Enhanced screening**

In Canada, it is recommended that anyone who has risk factors for syphilis should get tested, and that healthcare providers should adhere to public health guidelines and protocols during an outbreak (38). Risk factors for syphilis include: unprotected sexual activity (especially in men who have sex with men), sexual contact with an identified case of syphilis, sexual contact with an individual from a jurisdiction with an elevated prevalence of syphilis, previously tested positive for syphilis, HIV, or other sexually transmitted bloodborne infection, born to an individual who tested positive for syphilis during pregnancy, and being classified as a member of a vulnerable population (39). The CDC also recommends that sexually active men who have sex with men should screen for STIs at least once a year or every 3 to 6 months if they are at an increased risk of exposure to HIV (40, 41).

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## Enhanced screening: Opt-out screening

A randomized controlled trial was conducted in Toronto and Ottawa, Ontario from February 2015 to July 2017 in four urban HIV clinics to assess an opt-out screening intervention for syphilis that was paired with HIV viral load testing for men living with HIV (5). Those who had risk factors for syphilis were used as the control (5). Among the 3,895 men followed for the duration of the study period, 217 cases of syphilis were detected: 81 in the control population, 136 in the study population (5). Of the study population, 63% (n=86) were diagnosed with early syphilis cases, compared to 75% (n=61) of the control patients that were diagnosed with early syphilis (5). A 25% increase in diagnoses of early syphilis was observed with the implementation of syphilis screening with HIV viral load testing; though this was statistically non-significant (adjusted odds ratio [time-aOR]=1.25, 95% CI 0.71–2.20) (5).

One retrospective study in a tertiary care hospital in Chicago using a universal, routine opt-out screening method identified 25,167 patients as eligible for syphilis screening; of these, 36% (n=9,198) were tested between June to December 2019 (6). Of those screened for syphilis, 1.1% (n=97) tested positive; of these, 33% (n=32) of cases were in women (6), higher than 14% reported nationally in the U.S. (6, 33). Additionally, 18.6% (n=18) of individuals with presumed active syphilis infection had reported STI-related complaints that would qualify them for syphilis screening (6). Asymptomatic and symptomatic prevalence of presumed active syphilis was similar: 1.0% and 1.4%, respectively (6).

Generally, it appears that opt-out testing yields increased rates of screening for syphilis (5, 6). Additional literature has shown that opt-out screening for HIV/STIs also has higher testing rates compared to opt-in testing (42).

## Enhanced screening: Emergency department screening

A 2022 study in the U.S. explored barriers around syphilis and HIV testing in an emergency department using a multidisciplinary team comprised of emergency medicine and infectious disease providers from November 2018 to November 2019 (7). Interventions to overcome these barriers were implemented, including distribution of education materials to emergency care providers and collaborative efforts analyzing automated syphilis and HIV testing reports conducted in the emergency department to ensure proper follow up and linkage to care was obtained (7). Overall, screening increased after the interventions were implemented to 108 tests per month, compared to 4 tests per month before intervention implementation (7).

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## Enhanced screening: Routine screening and the use of mobile and computer-based alerts

A 2016 systematic review (updated from 2004) was conducted to explore routine screening intervals for syphilis among asymptomatic adolescents and adults who were not pregnant (8). Four observational studies, all conducted in high-income settings outside of the U.S., were included (8). Authors concluded that the detection of syphilis improved when men who have sex with men, and/or men living with HIV, were screened every three months, rather than every six to 12 months (8). Details from these four studies—three of which took place in Australia at the Melbourne Sexual Health Clinic—are described below (8).

- From January 2007 to June 2008, the Melbourne Sexual Health Centre in Australia implemented an intervention to determine if including syphilis serology alongside routine HIV monitoring serology increased the detection of early asymptomatic syphilis among men who have sex with men living with HIV (8, 43). After completing HIV and syphilis serology for 587 individuals, 8.1% (n=48) of participants were diagnosed with syphilis compared to 3.1% (n=14) of 444 screened before intervention implementation (8, 43). Of those who received a positive syphilis diagnosis, 85% (n=41) were asymptomatic post-intervention versus 21% (n=3) asymptomatic pre-intervention (8, 43).
- At the Melbourne Sexual Health Clinic, 3,132 men who have sex with men were provided with the opportunity to receive automated email and/or text message reminders to get tested for syphilis every three, six, or 12 months (reminder group) between February 2009 and August 2010 (8, 44). The concurrent control group (n=1,382) attended the clinic after the reminder service was implemented (8, 44). The number of participants who agreed to receive the alerts was 997; 65.8% (n=656) chose three-month alerts, 30.2% (n=301) chose six-month alerts, and 4.0% (n=40) chose 12-month alerts (8, 44). Higher rates of early syphilis detection and early latent syphilis were found among participants who chose to receive 3-month reminders (3.2% and 1.7%, respectively) compared to the concurrent control population (1.5% and 0.4%, respectively) (8, 44).
- A third study from the Melbourne Sexual Health Clinic assessed the impact of implementing an automated alert system to remind clinicians to test high risk men who have sex with men for syphilis (8, 45). Introduced in October of 2008, men who have sex with men were classified as higher risk when they reported more than ten sexual contacts within the last 12 months; this triggered an alert that read: “3 month syphilis testing is recommended for higher risk MSM” (8, 45). Twelve months after the implementation of

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the alert there were 8,036 consultations; 18% (n=1,445) of individuals were classified as higher risk, 30% (n=2,448) as lower risk, while the remainder of cases did not provide risk data (52%) (8, 45). The higher risk participants were compared to a historical control (i.e. a pre-intervention group) of 2,017 men who were also identified as higher risk (8, 45). Authors found that the proportion of higher risk asymptomatic men who tested positive for syphilis pre-intervention was 16%; this increased to 53% after the alert system was implemented, highlighting that increased syphilis screening rates resulted in more asymptomatic diagnoses among higher risk men who have sex with men (8, 45).

- A prospective cohort study at the Kobler Clinic in the Chelsea and Westminster Hospital, London, UK assessed if regular serological screening for syphilis, alongside routine follow-up HIV care, was an effective and necessary strategy to detect early asymptomatic syphilis (8, 46). From May 2002 to April 2003, 2,389 individuals had syphilis serology taken when a CD4 count was performed, for a total of 6,081 tests; this was compared with those who screened every six months or less in the prior year (8, 46). Overall, 7.3 cases per 1,000 person-years were detected with routine syphilis screening, compared to 2.8 cases per 1,000 person-years performed in the preceding year (8, 46). Authors concluded that routine screening (i.e. once every three months) is effective in detecting early asymptomatic syphilis in HIV outpatients compared to screening every six months or less (8, 46).

Other studies echo the findings from the aforementioned systematic review. Between October 2017 to August 2018, the Homestead Hospital in Miami, Florida, implemented an algorithm that automatically ordered a syphilis test for a broad category of symptoms or risk listed in the hospital's screening system, such as previous positive STI result or acute symptoms (17). From April–August 2019, the algorithm triggered 4,806 syphilis tests, of which 2.5% (n=122) were positive when tested on a syphilis *Treponema pallidum* enzyme immunoassay screen (17). Of these individuals, 59 tested positive for syphilis via reactive reflex confirmatory tests and required linkage to care (17).

The U.S. PrEP Demonstration Project examined data from 557 men who have sex with men and transgender women on pre-exposure prophylaxis (PrEP) attending STI clinics in San Francisco and Miami, and a community health centre located in Washington, D.C. to determine how many individuals with STIs would receive delayed treatment if screening was not conducted every three months (47, 48). After screening every three months, it was determined that if testing had instead been conducted twice a year, or when a patient was exhibiting STI-like symptoms, 20.4% (n=11) of 54 syphilis

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diagnoses would have been delayed (47). One study at a hospital in Barcelona, Spain, tested men who have sex with men living with HIV for asymptomatic STIs from December 2014 to December 2017 (9). Of the 301 individuals included in the study, the most common STI was syphilis (n=30; 11%), further highlighting the importance of routine screening for men who have sex with men living with HIV (9).

### **Partner notification services**

Some studies have identified that partner notification services can be an effective public health intervention to reduce STI transmission by notifying partners of a potential STI exposure and encouraging these individuals to get tested (10–12, 49). Partner notification typically involves disease intervention specialists locating, interviewing, and notifying individuals of a potential exposure to an HIV/STI case (50, 51) and then providing these individuals with information on how to obtain screening, counseling, and additional public health services (11). The Rhode Island STD Clinic implemented an on-site disease intervention specialist for partner notification of STIs from August 2014 to December 2015 to assess the on-site disease intervention specialist's delivery of partner notification services, evaluating their effectiveness through index patient interviews and based on the number of exposed partners that were notified, screened, and tested for STIs (10). At this clinic, 92% (n=80) of all patients initially diagnosed with gonorrhea, infectious syphilis, or co-infected with both (n=87) (i.e. index patients) were interviewed by the disease intervention specialist, compared to 76% (n=44) of all new diagnoses prior to the implementation of this service (n=58) (10). Overall, the integration of a disease intervention specialist in this clinic allowed for a greater proportion of all index patients with a newly identified gonorrhea or syphilis diagnosis to be contacted on the day of their diagnosis (10). Additionally, the specialist was successful in communicating with index patients to further enhance partner notification services; 64% (n=51) of all interviews conducted by the disease intervention specialist were completed in-person versus 11% (n=5) conducted in-person before the intervention (76%, n=44) (10). However, on-site disease intervention specialist integration had no significant impact on the number of partners that were notified, screened, and treated for gonorrhea or infectious syphilis (10). However, one U.S. study did find that chain-referral sampling, a technique that relies on participants who match the inclusion criteria to refer others who may also fit the criteria to be included in the study population (52), proved to be effective in enabling disease intervention specialists to support and provide public health resources to marginalized communities of men who have sex with men and transgender women that are disproportionately affected by syphilis (53). In this study, the recruitment of participants by disease intervention specialists assisted in the development of social and sexual networks to identify contacts that could benefit from the HIV/STI prevention and screening services, which allowed disease intervention specialists to provide marginalized contacts/

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populations with medical and social support (53). The previous study examining the implementation of an on-site disease intervention specialist did not observe a similar outreach, and instead observed no significant differences in the number of exposed partners notified and treated for STIs (10).

One study explored partner notification engagement and outcomes among men who have sex with men diagnosed with syphilis in 2016 in British Columbia (12). In 2016, there were 759 diagnoses of syphilis, 648 (89.9%) were among men who have sex with men. Of these, 87.7% (n=568) discussed partner notification services with public health nurses, and 49.9% of those individuals (n=281) named a minimum of one notifiable partner; 34.5% (n=196) of study participants provided a minimum of one anonymous partner (12). Overall, 2,165 anonymous and 1,094 notifiable partners were identified, and 1,076 of all notifiable partners resided in British Columbia (12). During the study period, 75% (n=804) of all notifiable partners living in British Columbia were contacted, 89.1% (n=716) of the contacted partners were tested and/or treated, and of those, 13.5% (n=97) were diagnosed with syphilis (12). Overall, 90% of patient-notified partners were notified compared to 70% of partners notified by public health nurses (12).

Conversely, a 2020 study assessing syphilis diagnoses from 2015 to 2017 in seven states across the U.S. (Florida, Louisiana, Michigan, New York City, North Carolina, San Francisco, and Virginia) identified 29,719 syphilis patients and found that 75% (n=63,371) of 84,224 partners were unnamed, therefore unable to be contacted through partner notification services (13). Since 11,138 individuals with syphilis were not interviewed, it was predicted that an estimated 54,521 partners were unreported (13). Men who have sex with men had the highest number of anonymous partners; 75% had a minimum of one (13); 73% of women that were interviewed provided a name for a partner, which is a higher percentage compared with men who have sex with men (48%) and men who have sex with women (58%) (13).

The number of anonymous partners has been, and continues to be, a challenge for partner notification services (12, 54, 55). In the 2021 study conducted in British Columbia analyzing syphilis diagnoses in men who have sex with men, despite a high number of partners that were notified, 34.5% patients reported a minimum of one anonymous partner, and the total number of anonymous partners (n=2,165) was almost double the number of notifiable partners (n=1,094) (12). Similarly, a 2012 study from the Netherlands reported that 105 men who have sex with men with HIV/STIs, including infectious syphilis, identified 612 partners, of which 64% (n=391) were unable to be identified (55). Partner notification services become more ineffective at interrupting and reducing transmission when patients are not interviewed, are interviewed and do not report sexual partners, and when patients are interviewed and they only report anonymous partners (13).

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## Treatment

Parenteral penicillin G benzathine is effective in treating syphilis (15, 16, 41, 56), but populations that have penicillin allergies or limited access to health resources require alternative treatment (15, 41, 57). The World Health Organization (WHO) highlighted that doxycycline is a recommended alternative treatment to penicillin, and that azithromycin may be an effective candidate for treating early syphilis (16).

A 2017 systematic review and meta-analysis explored the efficacy of doxycycline/tetracycline and ceftriaxone on early syphilis compared to penicillin (14). It was determined that, while statistically non-significant, the efficacy of penicillin was higher than doxycycline/tetracycline and ceftriaxone six months after treatment (14). All nine studies included in the meta-analysis found that all treatments produced similar response rates after 12 months (14). Seven studies in the meta-analysis reported that penicillin had a failure rate that was lower than doxycycline/tetracycline 12 months after treatment and it was statistically significant (14). However, there was no statistically significant difference between the failure rate for penicillin and ceftriaxone (14). The systematic review and meta-analysis proposed that ceftriaxone could be an effective alternative to penicillin for the treatment of early syphilis, though randomized controlled trials are required to confirm this treatment method (14).

A meta-analysis of randomized controlled trials comparing the response rates of azithromycin and penicillin treatments after three, six, and 12 months found no significant differences in treating primary, secondary, and early latent syphilis, highlighting that azithromycin may be an alternative treatment to penicillin (15).

## Outreach and education

Outreach clinics set up by the John Hunter Clinic for Sexual Health, Chelsea and Westminster Hospital, London, UK, at two adult lifestyle events (>10,000 attendees per event) in 2013 and 2015 promoted sexual health awareness and offered asymptomatic STI testing and advice to eventgoers (58). Of the 381 individuals that received STI testing, 0.8% (n=3) were positive for syphilis (58). Overall, the authors concluded these outreach clinics were helpful in providing sexual health awareness, advice, and testing services (58).

A 2019 study examined the implementation of an educational intervention for urgent care providers on appropriate syphilis screening for men who have sex with men at the New York Presbyterian Hospital in New York City from November to December 2015 (59). A survey that highlighted STI screening barriers was given to patients with the intention to provide urgent care medical and nursing providers with information regarding men who have sex with men sexual behaviours/activities (59). Urgent care staff reviewed screening barriers, discussed gaps and areas where STI

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testing could improve, and were provided with updates on the study and educational materials on syphilis after 12 weeks (59). Data from the surveys assisted urgent care providers in understanding when to order a syphilis test for the patient (59). Overall, 72 men who have sex with men took the survey, and 63.9% (n=46) communicated that they wanted to be screened for syphilis (59). Out of 51% (n=37) of men who have sex with men were tested for syphilis, 13.5% (n=5) tested receiving a positive diagnosis (59).

A scoping review on Web 2.0 tools to prevent STI transmission found that Facebook, Twitter, Instagram, and YouTube were able to connect youth/young adults with resources for STI prevention (60). Web 2.0 is the second generation of web development that allows users to communicate expansive amounts of knowledge with each other online at high speeds, and tools that used this new web development were assessed in this scoping review (60). Of the six articles identified by this scoping review, only two addressed syphilis specifically (61, 62). One study was a youth-driven, social media-based campaign focused on improving knowledge about and increasing screening for HIV/STI among 13–17 years old in Philadelphia (61), and the second, creation of a Facebook page was used to raise awareness of infectious syphilis, promote the significance of screening, and highlight where individuals can get tested in Christchurch, New Zealand (62). The authors communicated that Web 2.0 tools have had a positive impact on the promotion of STI prevention strategies that can aid in attracting and linking youth to sexual health-related campaigns (60). Combined with other interventions, these Web 2.0 tools have the potential to become essential for public health (60).

## Interventions related to congenital syphilis

### Prenatal screening

Congenital syphilis cases in Louisiana and Florida were examined from January 2013 to December 2014 to identify the number of syphilis cases in pregnant women that were linked to congenital syphilis cases (18). Among the 3,497 syphilis cases detected in women, pregnancy status was reported for 75% (n=2,621) of those infections (18). Of these, 710 syphilis cases were found during pregnancy, 22% (n=155) of which were linked to congenital syphilis infections (18). Seventy-two percent of syphilis cases among pregnant women that resulted in congenital syphilis infections were detected in Black non-Hispanic women, while White non-Hispanic and Hispanic women accounted for 17% and 8% of congenital syphilis cases, respectively (18). In the first two trimesters, screening was conducted for 83% (n=589) of the 710 syphilis cases among pregnant women, while screening in the third trimester was completed for 123 women who either received a negative diagnosis in the first two trimesters (33%, n=41) or did not undergo syphilis testing in the first two trimesters at all (67%, n=82) (18). Almost 50% of congenital syphilis cases were due to a lack of prenatal screening for syphilis or a lack of screening early

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in the third trimester after receiving negative syphilis diagnoses in the first two trimesters (18). Of maternal syphilis cases, 82% (n=579) received treatment at least once throughout their pregnancy, 96% (n=555) of which did not result in congenital syphilis (18). Authors concluded that testing for syphilis among pregnant women in the first two trimesters and treating positive diagnoses prevented congenital syphilis (18). Additionally, syphilis screening in the third trimester was less effective, although it may be beneficial in areas with high rates of maternal syphilis (18).

Missing pregnancy status may impact the reporting of congenital syphilis cases (18, 63). From October 2017 to June 2018, the Florida Department of Health created an email alert to determine the unknown pregnancy status of women with syphilis (63). Overall, 83% (n=63) of the 76 women diagnosed with syphilis with an unknown pregnancy status were contacted via the email notification system, three of whom were pregnant (63). Of the three pregnant women, only one had a positive syphilis diagnosis that was treated and was not passed on to her baby (63). The email notification tool assisted filling in information regarding missing pregnancy status among women diagnosed with syphilis (63).

As previously discussed in earlier sections, the Homestead Hospital in Miami, Florida developed an algorithm to order a syphilis test for patients with potential syphilis symptoms (17). Of the 59 patients that were diagnosed with syphilis via the reactive reflex confirmatory test, 46% (n=27) were pregnant women (17). Nine cases of congenital syphilis were reported to have been avoided due to timely screening (17). The system was created to trigger a test for pregnant women based on guidelines from the U.S. Preventive Services Task Force (17, 19). Implementing this system aids in detecting maternal syphilis, which can prevent congenital syphilis infection (17).

### **Prenatal & natal treatment**

The current recommended treatment for pregnant women with syphilis is penicillin G (19, 41).

For newborn babies, a 2019 Cochrane review of randomized controlled trials examined treatments for newborns with congenital syphilis was conducted (64). Two articles were included in the analysis (65, 66). Authors found that, compared with no treatment, penicillin G does not appear to reduce the rate of newborn death, though it increased the serological cure at the third month and may reduce the clinical manifestations caused by congenital syphilis (64). Additionally, benzathine penicillin compared to procaine benzylpenicillin resulted in no significant differences regarding the reduction of clinical manifestations and serological cure of congenital syphilis (64).

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## Factors That May Impact Local Applicability

A majority of the studies were conducted outside of Canada (primarily in the U.S.), and the breakdown of syphilis rates among population groups are different in Ontario and Canada compared to other high-income jurisdictions. The variation in reporting and limited number of studies for various interventions may cause interpretation challenges when extrapolating results to Ontario populations. Additionally, screening intervention techniques may need to be catered according to the population as there are different transmission routes for syphilis.

## What We Did

We searched Medline (including Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE® Daily and Ovid MEDLINE®) using a combination of term syphilis in titles or abstracts AND terms (eliminat\* or intervention\* or prevent\* or incidence or prevalence or rate\*) in titles or abstracts. Searches were conducted on January 17, 2022 and results limited to English articles published from 2016 to present. Studies from low- and middle-income countries were excluded. Reference lists of identified articles were also searched. Google (grey literature) searches using different combinations of these terms were also conducted. The searches yielded 1,295 references from which 66 were included.

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