Syphilis infection among homosexual men reporting contact with syphilis: a case control study

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Syphilis infection among homosexual men reporting contact with syphilis: a case control study

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Abstract

Objective

High rates of syphilis have been reported among men who have sex with men (MSM) internationally. Guidelines recommend presumptive treatment of sexual contacts of individuals with syphilis at the point of care. The aim of this study was to determine among men reporting contact with a man with syphilis the proportion who are infected with syphilis and the factors predictive of infection.

Design:

Contacts who were syphilis infected (cases) were compared with those who were uninfected (controls).

Setting:

This study was conducted at the main public sexually transmitted diseases clinic in Victoria, Australia.

Participants:

One hundred and seventy two MSM presenting as contacts of syphilis at a sexual health service in Melbourne, Australia, between July 2007 and October 2011 were assessed for syphilis.

Outcome measures:

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Proportion of MSM who are infected with syphilis and factors associated with infection.

Results

Of 172 men who presented reporting contact with syphilis, 26 (15%, 95% CI: 10-20%) had syphilis. One man had primary syphilis, four had secondary syphilis, while the remaining 21 had latent syphilis. Infection was associated with unprotected anal sex over the prior 3 months (odds ratio 5.2, 95% CI 2.0-13.6).

Conclusion

One in seven men presenting as contacts of syphilis had syphilis infection, most of whom were latently infected. Contacts reporting recent unprotected anal sex were more likely to have syphilis.

(1) Article Focus

- Among men reporting contact with a man with syphilis the proportion who were infected with syphilis
- Factors predictive of syphilis infection among men reporting contact with a man with syphilis

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(2) Key Messages

- One in seven homosexual men who presented as contacts of syphilis had syphilis
- Most were latently infected
- Contacts who reported recent unprotected anal sex were more likely to have syphilis

(3) Strengths and Limitations

Strength

- No previous studies have reported on the likelihood of syphilis infection among homosexual men presenting clinically as syphilis contacts

Limitations

- The men included were those who reported that a sexual partner had syphilis. We could not verify if the partner actually had syphilis.

Key words: Syphilis, men who have sex with men, partner notification, contact tracing

Data Sharing Statement: There is no additional data available.

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Introduction

Over the last decade, high rates of infectious syphilis have been reported among men who have sex with men (MSM) internationally, with over-representation of cases occurring among HIV positive MSM. Left untreated, syphilis can result in significant morbidity, including neurosyphilis, and further transmission of infection. Syphilis enhances the sexual transmission of HIV [1]. This is concerning as MSM in many countries are also the primary risk group for HIV.

MSM with infectious syphilis are often asymptomatic or have symptoms or signs that are not recognised as syphilis [2-4]. Contact tracing and partner notification, where sexual contacts are notified that they may have been exposed to an infection to encourage them to access testing and treatment, have been cornerstones in the control of syphilis. Guidelines recommend presumptive treatment of sexual contacts of individuals with syphilis at the point of care because seroconversion - and therefore diagnosis and treatment - can be delayed, potentially resulting in further transmission [5].

While there have been a number of previous studies that have examined the proportion of partners of syphilis infected individuals who are infected, there are no published data on the proportion of MSM [6-9] who present to a clinical service as a syphilis contact who are infected. The aim of this study was to determine among men reporting contact with a man with syphilis the proportion who are infected with syphilis and the factors predictive of infection.

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Methods

Design

Contacts who were syphilis infected (cases) were compared with those who were uninfected (controls)..

Setting

This study was conducted at the main public sexually transmitted diseases clinic in Victoria, Australia.

In June 2007, in order to study syphilis diagnoses among patients presenting as contacts of syphilis, any patient who presented to the clinic reporting contact with a syphilis infected individual was recorded as a syphilis contact on the centre's computer database. We extracted data on these contacts from the clinic database for all homosexually active men from June 2007 to October 2011. Data included age, number of reported male sexual partners in the prior 3 and 12 months, reported condom use with anal intercourse, injecting drug use and HIV status. These data were routinely collected as part of clinical care and entered into the clinic's computer database at each consultation. Clinical information from the medical records and results of laboratory investigations were reviewed.

All men presenting as syphilis contacts were serologically tested for syphilis using the rapid plasma regain (RPR) test, *Treponema pallidum* enzyme immunoassay (EIA) and *T. pallidum* particle agglutination (TPPA). EIA for *T. pallidum* IgM was performed selectively by the testing laboratory. Contacts

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were offered treatment with benzathine penicillin at the initial visit. Men not known to be HIV positive were also tested for HIV.

The sample size calculation was based on the expected difference in the proportion of infected and uninfected men who never used condoms. Assuming 50% of infected men and 20% of uninfected men never used condoms, 22 cases and 110 controls were required for a study with 80% power and significance at 0.05. The Chi-square test was used to compare categorical data and the Mann Whitney U test for non-parametric data using SPSS. Ethical approval for this study was granted by the Alfred Hospital Human Research Ethics Committee.

Results

During the study period 172 MSM presented to the centre reporting contact with syphilis. Twenty six men or 15% (95% CI: 10-20) were syphilis infected. One man had primary syphilis (RPR 256), four had secondary syphilis (RPR range 64-512), while the remaining 21 had latent (asymptomatic) infection (median RPR 4; range: nonreactive-256). All 22 men who had EIA for *T. pallidum* IgM performed had reactive IgM results.

The characteristics of the syphilis infected and uninfected men are compared in Table 1. Infection was associated with unprotected anal sex over the prior 3 months (odds ratio 5.2, 95% CI 2.0-13.6).

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Of the 146 uninfected men, 24 had serological results consistent with their history of past treated syphilis. Twenty of these men had repeat serology performed, with none experiencing an increase in RPR titre suggesting reinfection with syphilis. Of the remaining 122 uninfected men, 56 (46%) had syphilis serology repeated, with the median duration between diagnosis and latest serological follow up being 190 days (range 6-1033). None of these men experienced seroconversion.

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Discussion

In this study, one in seven MSM who presented to a clinic reporting contact with syphilis were syphilis infected. Most men had latent infection and were asymptomatic for syphilis. Recent condom use was a significant predictor of infection with a significantly higher prevalence of syphilis among men who did not use condoms with anal sex.

To our knowledge, there have only been 4 previously published studies which have aimed to determine the proportion of partners of individuals with early syphilis who were syphilis infected [6-9]. Three of these studies, which were performed in the 1940s, did not include MSM. The prevalence of early syphilis in these studies of heterosexual couples ranged between 48.5 and 62.1%.[6-8] In a study published in 1983, the prevalence of early syphilis among male contacts of men with primary or secondary syphilis was 49% [9]. However, no sexual behavioural data were collected in this study, therefore, as in the other 3 studies [6-8], the effect of frequency of sex and types of sexual contact - including condom use - on the prevalence of syphilis among contacts was not examined. Our study differs from these 4 earlier studies because the men included were those who presented to a sexually transmitted diseases clinic, as opposed to individuals who were actively traced as contacts of index cases. Men in our study who reported fewer recent partners were more likely to be infected. It is possible such men had regular partners who were more likely to transmit syphilis because of repeated sexual exposures.

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There are a number of limitations to this study. Firstly, the men included were those who reported that a sexual partner had syphilis. We could not verify if the partner actually had syphilis. It is possible some partners did not have syphilis, or if they did, were not infectious, potentially contributing to the lower rate among contacts in this study compared with the 49% seen by Schober *et al.*, where all male index cases had confirmed primary or secondary syphilis. Secondly, as in the 4 previous studies, we do not know if the men in this study who were syphilis infected were infected by, or transmitted infection to, their syphilis infected contact, or indeed if they were infected by a third individual. Thirdly, while we collected sexual behavioural data on the men in our study, we were not able to specifically capture their sexual interactions with their reported syphilis contact nor could we determine the relative importance of oral sex or insertive versus receptive anal sex. It is possible that differences in frequency and type of sexual practices - including condom use - may have contributed to the difference in prevalence between our study and that seen by Schober *et al*. Fourthly, the proportion of contacts who are infected and stages of infection may differ in other settings, for example, depending on the degree and efficacy of partner notification undertaken for syphilis and on the prevalence of syphilis in the population. Ostensibly, effective partner notification would lead to more individuals with asymptomatic syphilis presenting for care.

Is the policy of routinely treating contacts of syphilis with benzathine penicillin warranted? In part this depends on the cost effectiveness of this strategy, which needs to take into account the morbidity and further transmission that

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would arise from delayed or untreated infection. In our population, six men were treated for syphilis for every man who was infected. Economic modelling would be of interest but would be hampered by the scarcity of data on the likelihood of syphilis transmission between men, a subject that warrants further research.

Competing Interests

The authors declare that they have no competing interests.

Authors' contributions

MC and CKF conceived the study. APW and MC undertook the analysis and drafted the manuscript. All authors contributed data collection or interpretation of data, review of the manuscript and approval of the final manuscript.

Contributorship statement:
All author's contributed to the paper according to the ICMJE guidelines for authorship.

All authors' were

1) substantial contributed to conception and design, acquisition of data, or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published.

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Table 1: Characteristics of syphilis infected and uninfected contacts

	Syphilis infected men (n=26) no. (%)	Uninfected men (n=146) no. (%)	Odds ratio (95% CI)	P valve
Median age	34.5	33		0.8
No. male partners in last 3 months*				
0-2	18[†] (69.2)	70 (47.9)	2.4 (1.0-6.0)	0.045
≥ 3	8 (30.8)	76 (52.1)	1	
Condom use in last 3 months[x]				
Never	10 (38.5)	14 (9.6)	5.2 (2.0-13.6)	<0.001
Ever	16 (61.5)	116 (79.4)	1	
No. male partners in last 12 months*				
1-11	23 (88.5)	110 (75.3)	2.5 (0.7-8.9)	0.14
≥ 12	3 (11.5)	36 (24.7)	1	

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Condom use in last 12 months[x]				
Never	5 (19.2)	10 (6.8)	3.0 (0.9-9.6)	0.058
Ever	21 (80.8)	125 (85.6)	1	
Injecting drug use				
Never	26 (100.0)	134 (91.8)	0.8 (0.7-0.9)	0.15
Ever	0 (0.0)	11 (7.5)	1	
HIV Status				
Positive	2 (7.7)	32 (21.9)	0.3(0.1-1.3)	0.093
Negative	24 (92.3)	114 (78.1)	1	

[†]All 18 infected men had at least one partner in the prior 3 months

[x]Use of condoms ever included men who reported using condoms during anal sex sometimes or always. Anal sex included both insertive and receptive sex. Those who reported no anal sex were excluded from the analysis.

* The median number of male partners reported for the prior 3 and 12 months were 2 and 11 respectively.

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STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*

Checklist for cohort, case-control, and cross-sectional studies (combined)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page2&3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page5
Objectives	3	State specific objectives, including any pre-specified hypotheses	Page5
Methods			
Study design	4	Present key elements of study design early in the paper	Page6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	Page6
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	*Page6*
Bias	9	Describe any efforts to address potential sources of bias	Page10
Study size	10	Explain how the study size was arrived at	Page 7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page7
		(*b*) Describe any methods used to examine subgroups and interactions	
		(*c*) Explain how missing data were addressed	
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed	

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		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page7
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 7 &Table1 – Page14
		(b) Indicate number of participants with missing data for each variable of interest	
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	Page7&8
		Cross-sectional study—Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page7 & 8
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page9
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page10
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page10
Generalisability	21	Discuss the generalisability (external validity) of the study results	
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	NA

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.
Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Abstract

Objective

High rates of syphilis have been reported among men who have sex with men (MSM) internationally. Guidelines recommend presumptive treatment of sexual contacts of individuals with syphilis at the point of care. The aim of this study was to determine among men reporting contact with a man with syphilis the proportion who were~~are~~ infected with syphilis and the factors predictive of infection.

Design:

Contacts who were syphilis infected (cases) were compared with those who were uninfected (controls).

Setting:

This study was conducted at the main public sexually transmitted diseases clinic in Victoria, Australia.

Participants:

One hundred and seventy two MSM presenting as sexual contacts of men with syphilis at a sexual health service in Melbourne, Australia, between July 2007 and October 2011 were assessed for syphilis.

Outcome measures:

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Proportion of MSM who are infected with syphilis and factors associated with infection.

Results

Of 172 men who presented reporting contact with syphilis, 26 (15%, 95% CI: 10-20%) had syphilis. One man had primary syphilis, four had secondary syphilis, while the remaining 21 had early latent syphilis. Infection was associated with unprotected anal sex over the prior 3 months (adjusted odds ratio 6.15~~.2~~, 95% CI 1.4~~2.0~~-26.8~~13.6~~).

Conclusion

One in seven men presenting as contacts of syphilis had syphilis infection, most of whom were latently infected. Contacts reporting recent unprotected anal sex were more likely to have syphilis.

(1) Article Focus

- Among men reporting contact with a man with syphilis the proportion who were infected with syphilis
- Factors predictive of syphilis infection among men reporting contact with a man with syphilis

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(2) Key Messages

- One in seven homosexual men who presented as contacts of syphilis had syphilis
- Most had early latent infection~~were latently infected~~
- Contacts who reported recent unprotected anal sex were more likely to have syphilis

(3) Strengths and Limitations

Strength

- No previous studies have reported on the likelihood of syphilis infection among homosexual men presenting clinically as sexual ~~syphilis~~ contacts of men with syphilis

Limitations

- The men included were those who reported that a sexual partner had syphilis. We could not verify if the partner actually had syphilis.

Key words: Syphilis, men who have sex with men, partner notification, contact tracing

Data Sharing Statement: There is no additional data available.

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Introduction

Over the last decade, high rates of infectious syphilis have been reported among men who have sex with men (MSM) internationally, with over-representation of cases occurring among HIV positive MSM [1]. Left untreated, syphilis can result in significant morbidity, including neurosyphilis, and further transmission of infection [1]. Syphilis enhances the sexual transmission of HIV [2~~1~~]. This is concerning as MSM in many countries are also the primary risk group for HIV [1].

MSM with infectious syphilis are often asymptomatic or have symptoms or signs that are not recognised as syphilis [3-5~~2-4~~]. Contact tracing and partner notification, where sexual contacts are notified that they may have been exposed to an infection to encourage them to access testing and treatment, have been cornerstones in the control of syphilis [6]. Guidelines recommend presumptive treatment of sexual contacts of individuals with syphilis at the point of care because seroconversion - and therefore diagnosis and treatment - can be delayed, potentially resulting in further transmission [7~~5~~].

While there have been a number of previous studies that have examined the proportion of partners of syphilis infected individuals who are infected, there are no published data on the proportion of men~~MSM [6-9]~~ who present to a clinical service as a sexual~~syphilis~~ contact of a man with syphilis who are infected [8-11]. The aim of this study was to determine among men reporting contact with a man with syphilis the proportion who were~~are~~ infected with syphilis and the factors predictive of infection.

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Methods

Design

Contacts who were syphilis infected (cases) were compared with those who were uninfected (controls).

Setting

This study was conducted at the main public sexually transmitted diseases clinic in Victoria, Australia.

In June 2007, in order to study syphilis diagnoses among patients presenting as sexual contacts of syphilis infected partners, any patient who presented as suchto the clinic reporting contact with a syphilis infected individual was recorded as a syphilis contact on the centre's computer database. We extracted data on these contacts from the clinic database for all homosexually active men who reported sex with men in the prior 12 months - from June 2007 to October 2011. Data included age, number of reported male sexual partners in the prior 3 and 12 months, reported condom use with anal intercourse, injecting drug use and HIV status. These data were routinely collected as part of clinical care and entered into the clinic's computer database at each consultation. Clinical information from the medical records and results of laboratory investigations were reviewed.

All men reporting sex with syphilis infected menpresenting as syphilis contacts were serologically tested for syphilis using the rapid plasma reagain (RPR)

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test, *Treponema pallidum* enzyme immunoassay (EIA) and *T. pallidum* particle agglutination (TPPA). EIA for *T. pallidum* IgM was performed selectively by the testing laboratory. Contacts were offered treatment with benzathine penicillin at the initial visit. Men not known to be HIV positive were also tested for HIV.

The sample size calculation was based on the expected difference in the proportion of infected and uninfected men who never used condoms. Assuming 50% of infected men and 20% of uninfected men never used condoms, 22 cases and 110 controls were required for a study with 80% power and significance at 0.05. The Chi-square test was used to compare categorical data and the Mann Whitney U test for non-parametric data using SPSS. Variables with a p value of <0.1 were entered into a logistic regression analysis. Ethical approval for this study was granted by the Alfred Hospital Human Research Ethics Committee.

Results

During the study period 172 MSM presented to the centre reporting sexual contact with a syphilis infected male partner. Twenty six men or 15% (95% CI: 10-20) were syphilis infected. One man had primary syphilis (RPR 256), four had secondary syphilis (RPR range 64-512), while the remaining 21 had ~~latent (~~asymptomatic early latent~~)~~ infection (median RPR 4; range: nonreactive-256). All 22 men who had EIA for *T. pallidum* IgM performed had reactive IgM results.

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The characteristics of the syphilis infected and uninfected men are compared in Table 1. Infection was associated with unprotected anal sex over the prior 3 months (adjusted odds ratio 6.15~~.2~~, 95% CI 1.4~~2.0~~-26.8~~13.6~~).

Of the 146 uninfected men, 24 had serological results consistent with their history of past treated syphilis. Twenty of these men had repeat serology performed, with none experiencing an increase in RPR titre suggesting reinfection with syphilis. Of the remaining 122 uninfected men, 56 (46%) had syphilis serology repeated, with the median duration between diagnosis and latest serological follow up being 190 days (range 6-1033). None of these men experienced syphilis antibody seroconversion.

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Discussion

In this study, one in seven MSM who presented to a clinic reporting sexual contact with a syphilis infected man hadwere syphilis infected. Most men had early latent infection and were asymptomatic for syphilis. Recent condom use was a significant predictor of infection with a A significantly higher prevalence of syphilis was seen among men who did not use condoms with anal sex.

To our knowledge, there have only been 4 previously published studies which have aimed to determine the proportion of partners of individuals with early syphilis who were syphilis infected [8-116 9]. Three of these studies, which were performed in the 1940s, did not include MSM. The prevalence of early syphilis in these studies of heterosexual couples ranged between 48.5 and 62.1%.[6-8] In a study published in 1983, the prevalence of early syphilis among male contacts of men with primary or secondary syphilis was 49% [119]. However, no sexual behavioural data were collected in this study, therefore, as in the other 3 studies [8-106 8], the effect of frequency of sex and types of sexual contact - including condom use - on the prevalence of syphilis among contacts was not examined. Our study differs from these 4 earlier studies because the men included were those who presented to a sexually transmitted diseases clinic, as opposed to individuals who were actively traced as contacts of index cases. Men in our study who reported fewer recent partners were more likely to be infected. It is possible such men had regular partners who were more likely to transmit syphilis because of repeated sexual exposures.

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There are a number of limitations to this study. Firstly, the men included were those who reported that a sexual partner had syphilis. We could not verify if the partner actually had syphilis. It is possible some partners did not have syphilis, or if they did, were not infectious, potentially contributing to the lower rate among contacts in this study compared with the 49% seen by Schober *et al*., where all male index cases had confirmed primary or secondary syphilis. Secondly, as in the 4 previous studies, we do not know if the men in this study who were syphilis infected were infected by, or transmitted infection to, their syphilis infected male partner~~contact~~, or indeed if they were infected by a third individual. Thirdly, while we collected sexual behavioural data on the men in our study, we were not able to specifically capture their sexual interactions with their reported syphilis contact nor could we determine the relative importance of oral sex or insertive versus receptive anal sex. It is possible that differences in frequency and type of sexual practices - including condom use - may have contributed to the difference in prevalence between our study and that seen by Schober *et al*. Fourthly, the proportion of contacts who are infected and stages of infection may differ in other settings, for example, depending on the degree and efficacy of partner notification undertaken for syphilis and on the prevalence of syphilis in the population. Ostensibly, effective partner notification would lead to more individuals with asymptomatic syphilis presenting for care.

Is the policy of routinely treating male partners of syphilis infected men ~~contacts of syphilis~~ with benzathine penicillin warranted? In part this depends on the cost effectiveness of this strategy, which needs to take into account the

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morbidity and further transmission that would arise from delayed or untreated infection [12, 13]. In our population, six men were treated for syphilis for every man who was infected. Economic modelling would be of interest but would be hampered by the scarcity of data on the likelihood of syphilis transmission between men, a subject that warrants further research [14].

Competing Interests

The authors declare that they have no competing interests.

~~**Authors' contributions**~~

~~MC and CKF conceived the study. APW and MC undertook the analysis and drafted the manuscript. All authors contributed data collection or interpretation of data, review of the manuscript and approval of the final manuscript.~~

Contributorship statement

MC and CKF conceived the study. APW and MC undertook the analysis and drafted the first manuscript. ~~All author's contributed to the paper according to the ICMJE guidelines for authorship.~~ All authors ~~were~~ ~~1) substantial~~ contributed ~~to~~ to the study ~~conception and~~ design, acquisition of data, or analysis and interpretation of data; ~~; 2) drafting the article or~~ revised~~ing~~ the manuscript~~it~~ critically; ~~for important intellectual content;~~ and ~~3) final~~ approved~~al~~ of the version to be published.

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Table 1: Characteristics of male sexual partners of men with syphilis: comparison of those with syphilis and those who were uninfected~~syphilis infected and unin~~ ~~contacts~~

	Syphilis infected men (n=26) no. (%)	Uninfected men (n=146) no. (%)	Odds ratio (95% CI)	P valve	Adjusted odds ratio (95% CI)	P valve
Median age	34.5	33		0.8		
No. male partners in last 3 months*						
0-2	18[†] (69.2)	70 (47.9)	2.4 (1.0-6.0)	0.045	1.8 (0.7-5.0)	0.24
≥ 3	8 (30.8)	76 (52.1)	1		1	
Condom use in last 3 months[x]						
Never	10 (38.5)	14 (9.6)	5.2 (2.0-13.6)	<0.001	6.1 (1.4-26.8)	0.016
Ever	16 (61.5)	116 (79.4)	1		1	

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No. male partners in last 12 months*						
1-11	23 (88.5)	110 (75.3)	2.5 (0.7-8.9)	0.14		
≥ 12	3 (11.5)	36 (24.7)	1			
Condom use in last 12 months[x]						
Never	5 (19.2)	10 (6.8)	3.0 (0.9-9.6)	0.058	1.5 (0.3-8.4)	0.67
Ever	21 (80.8)	125 (85.6)	1		1	
Injecting drug use						
Never	26 (100.0)	134 (91.8)	0.8 (0.7-0.9)	0.15		
Ever	0 (0.0)	11 (7.5)	1			
HIV Status						
Positive	2 (7.7)	32 (21.9)	0.3 (0.1-1.3)	0.093	0.2 (0.4-1.1)	0.062
Negative	24 (92.3)	114 (78.1)	1			

[†]All 18 infected men had at least one partner in the prior 3 months

[x]Use of condoms ever included men who reported using condoms during anal sex sometimes or always. Anal sex included both insertive and receptive sex. Those who reported no anal sex were excluded from the analysis.

* The median number of male partners reported for the prior 3 and 12 months were 2 and 11 respectively.

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