

# Can chlamydia rectal swab testing be used as a marker for male-to-male sex in STI surveillance where enhanced behavioural data are not available?

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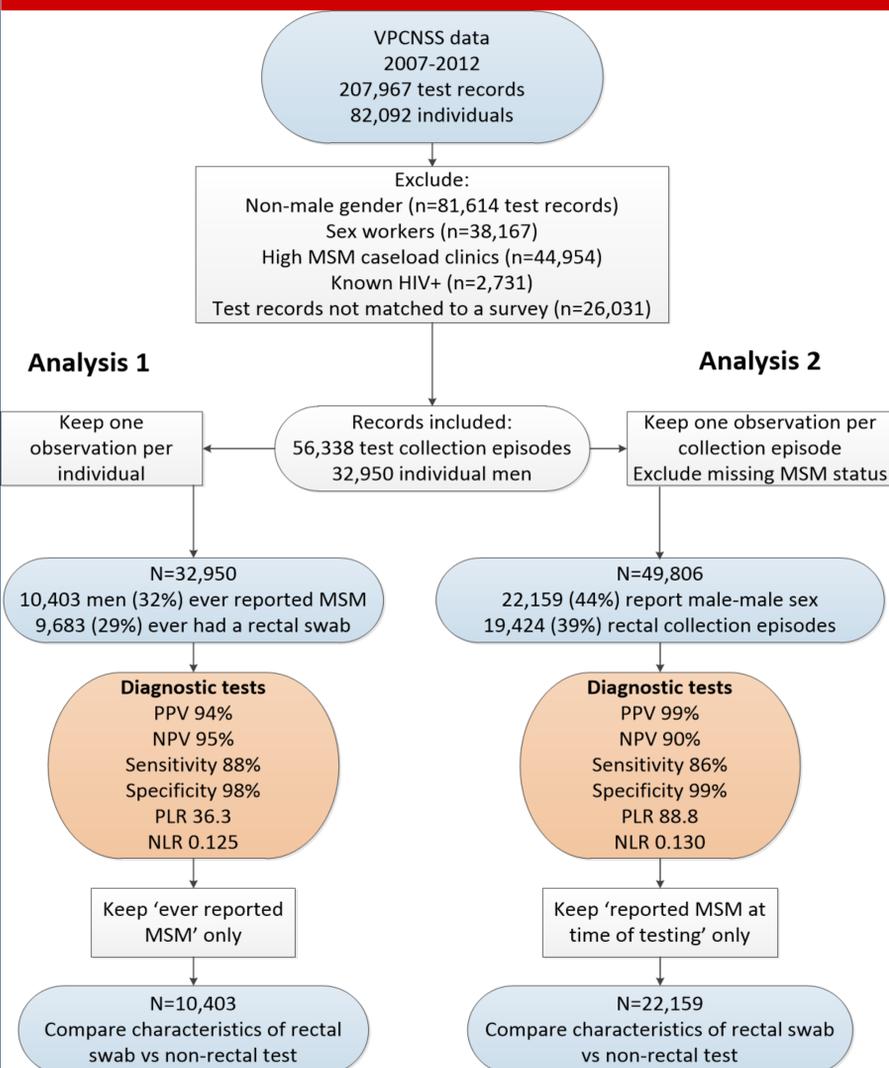
## Background

- Men who have sex with men (MSM) are at increased risk of sexually transmitted infections (STI), making it important to monitor individual sexual exposure within surveillance systems.
- Sexual exposure is not consistently captured in clinical or surveillance records but is required to better understand STI epidemics and target interventions.
- It is resource intensive and impractical to follow up source partner information for every case of common notifiable infections such as chlamydia. Simpler means are required.
- This study investigates whether rectal swab collection can be used to indicate male-to-male sex, and draw inferences about wider MSM populations in STI surveillance programs where exposure data are not collected.

## Methods

- We used chlamydia testing data from the Victorian Primary Care Network for Sentinel Surveillance on BBV and SYI (VPCNSS), 1 January 2007 – 31 December 2012. Test records from men that matched to a survey of self-reported sexual behaviour were included.
- We ran two different analyses of rectal swab site as a marker for male-to-male sexual exposure (self-reported sex with men). Diagnostic statistics were calculated in two analyses. Positive and negative predictive value (PPV & NPV); sensitivity; specificity; positive and negative likelihood ratios (PLR & NLR).
- Analysis 1:** relevant to longitudinal surveillance systems where repeat infections in individuals can be identified. One observation per individual was included. We calculated diagnostic statistics for **ever having had a rectal swab as a marker for ever reporting male-to-male sex**.
- Analysis 2:** relevant to surveillance systems that do not uniquely identify each individual. One observation per testing episode was included (each individual could have multiple testing episodes). A testing episode was one or more chlamydia tests within one week; this may include rectal, urogenital or urine tests. We calculated diagnostic statistics for **rectal swab collection as a marker for having reported male-to-male sex at the time of test**.
- For each analysis, we compared demographic and sexual behaviour characteristics in both groups, testing for statistical differences using t-tests and chi-square tests to assess the representativeness of MSM who had rectal swabs compared to those who had not.
- In the second analysis, we adjusted for the non-independence of observations (multiple cases per individual).
- To minimise selection bias, we excluded records from sex workers, clinics with a high caseload of gay men, and men previously known to be HIV positive.

## Data workflow



## Results

- Analysis 1:** The sensitivity of ever having had a rectal swab for ever having reported sex with men was 87.8% (95% CI 87.2 – 88.5) and specificity 97.6% (95% CI 97.4 – 97.8). The PPV of ever having had a rectal swab for predicting MSM status was 94.4% (95% CI 93.9 – 94.8), and NPV 94.6% (95% CI 94.3 – 94.9). The positive and negative likelihood ratios were 36.3 (95% CI 33.4 – 39.5) and 0.125 (95% CI 0.118 – 0.131) respectively.
- Analysis 2:** Of the 19,424 test collections including rectal swab, 19,155 were in men reporting sex with men, representing a PPV of 98.6% (95% CI 98.4 – 98.8). The NPV was 90.1 (95% CI 89.7 – 90.6). The sensitivity of rectal swab collection as a marker for MSM status was 86.4% (95% CI 85.9–87.0) and specificity was 99.0% (95% CI 98.9 – 99.1). The PLR was 88.8 (95% CI 78.7 – 100.2), and NLR 0.130 (95% CI 0.124 – 0.136). All 95% CIs in analysis 2 were cluster-adjusted.

### Comparison of MSM by rectal swab status

- In both analyses, there were significant demographic and behavioural differences between MSM who had rectal swabs and MSM who did not. A significantly higher proportion exhibited risky behaviour (sex with more than 10 men in the last year), and were positive for chlamydia, than those who had not had rectal swabs.
- The differences between the two groups appeared more pronounced for analysis 1, as shown in the tables. For example, chlamydia positivity rates in the two groups were 16% and 5% in analysis 1, compared to 8% and 4% in analysis 2.

### Analysis 1 contingency table: Ever had rectal swab by MSM status

Ever had rectal swab	Ever reported male-to-male sex	Never reported male-to-male sex	Total
Rectal swab ever	9,138 88%	545 2%	9,683 29%
Never had rectal swab	1,265 12%	22,002 98%	23,267 71%
Total	10,403 100%	22,547 100%	32,950 100%

### Analysis 2 contingency table: Rectal swab collection by MSM status

Rectal swab done at collection episode	Reported male-to-male sex in last 12 months	No report of male-to-male sex in last 12 months	Total
Rectal collection	19,155 86%	269 1%	19,424 39%
Non-rectal collection	3,004 14%	27,378 99%	30,382 61%
Total	22,159 100%	27,647 100%	49,806 100%

### Characteristics of individual men who have ever had sex with men, by 'ever rectal swab' status (analysis 1)

MSM (n=10,403)	Mean age at test (yrs)	Australian born (n=9,512)	Ever reported >10 male partners	Ever reported female partners (n=10,342)	Always use condom (n=9,847)	Ever chlamydia positive
Ever had rectal swab; n=9,138 (%; 95% CI)	Mean 32.7 (32.5 – 32.9)	63.0 (62.0 – 64.0)	34.5 (33.6 – 35.5)	15.0 (14.3 – 15.7)	32.7 (31.7 – 33.7)	15.6 (14.8 – 16.3)
Never had rectal swab; n=1,265 (%; 95% CI)	Mean 35.9 (35.1 – 36.6)*	66.6 (63.8 – 69.3)	15.8 (13.8 – 17.8)*	44.3 (41.5 – 47.0)*	31.3 (28.5 – 34.1)	5.3 (4.0 – 6.5)*

### Characteristics of men reporting MSM at time of test collection, by rectal/non-rectal collection (analysis 2)

Test collection episodes in MSM (n=22,159)	Mean age at test (yrs)	Australian born (n=20,363)	>10 male partners in last 12 mths	Reported female partners in last 12 mths (n=21,851)	Always use condom (n=20,127)	Chlamydia positive at test collection (n=22,099)
Rectal collection; n=19,155 (%; 95% CI) <sup>1</sup>	Mean 32.7 (32.4 – 33.0)	64.2 (62.8 – 65.5)	30.3 (29.3 – 31.3)	9.7 (9.1 – 10.4)	46.3 (45.3 – 47.3)	8.1 (7.6 – 8.5)
Non-rectal collection; n=3,004 (%; 95% CI)	Mean 35.9 (35.2 – 36.5)*	65.6 (63.2 – 68.0)	20.3 (18.6 – 22.1)*	31.3 (29.3 – 33.4)*	39.2 (37.0 – 41.4)*	3.7 (3.1 – 4.5)*

<sup>1</sup> 95% confidence intervals adjusted for clustering by individual; \*statistically significant difference to the 5% level

## Discussion

- Rectal chlamydia testing is highly predictive, and a highly specific marker, of self-reported male-male sexual exposure.**
- Rectal swab collection appears to better predict MSM status at the time of test than ever having had a rectal swab predicts ever having reported sex with men. Therefore, men who have a rectal swab can be assumed to have male-to-male sexual exposure, regardless of whether multiple tests can be linked to individuals over time in the surveillance system.
- However, men who have rectal swabs are different to MSM overall. They exhibit higher risk sexual behaviour than MSM who don't have rectal swabs.** In addition, one clinic accounted for the a large proportion of the data. Therefore, rectal testing cannot be used to extrapolate findings to the wider MSM population.
- However, our findings suggest that **rectal swab site can be used as a marker for high risk self-reported male-to-male sexual behaviour.** There were greater differences in risk behaviour between the rectal swab and non-rectal swab groups in the analysis by individual men (analysis 1) than the analysis by testing episode (analysis 2).
- This indicates that *'ever having had a rectal swab'* may be a particularly useful marker for high-risk sexual behaviour among MSM, and can be adopted by surveillance systems that use unique identifiers to link individuals over time.

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