

# Characteristics of gonorrhoea cases notified in inner and south-western Sydney, Australia: results of population-based enhanced surveillance

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**Abstract.** *Background:* Gonorrhoea disproportionately affects young people and men who have sex with men (MSM). In Australia, the highest notification rates in urban areas occur in MSM, although characteristics of those infected are poorly described. Enhanced surveillance can provide population-based data to inform service delivery and health promotion activities. *Methods:* An enhanced surveillance and data collection form was sent to the ordering doctor for residents of Sydney and South Western Sydney Local Health Districts with positive gonorrhoea results notified between 1 August 2013 and 28 February 2014. *Results:* Questionnaires were sent for 777 notifications and 698 (89.8%) were returned. Eighty-five per cent ( $n = 594$ ) were male. The majority (55.1%) resided in inner city Sydney. Of these, 91.9% were male, and 70.8% of these identified as MSM. Among females, regular partners were the most likely source of infection (44.1%), while MSM and heterosexual men identified casual partners as the likely source of infection (75.4% and 61.1% respectively). General practitioners diagnosed 60.5% of cases. MSM were more commonly diagnosed by sexual health clinics. Females were most commonly tested for contact tracing (35.6%), heterosexual males because of symptoms (86.3%), and MSM as part of sexually transmissible infection screening (40.6%). *Conclusions:* Our population-based analysis identified differing risk factors and testing characteristics between MSM, heterosexual males and females. Increasing rates of gonorrhoea and concerns over antibiotic resistance highlight the importance of obtaining accurate sexual histories to ensure appropriate testing. Intermittent enhanced surveillance can monitor trends in specific populations and help determine the impact of health promotion strategies.

Received 15 September 2015, accepted 5 April 2016, published online 23 June 2016

## Introduction

Gonorrhoea disproportionately affects young people and men who have sex with men (MSM).<sup>1–4</sup> Regular testing of high-risk populations is recommended for individual and public health benefits.<sup>5,6</sup> In Australia, the highest notification rates in urban areas occur in MSM, although characteristics of those infected are not well described.<sup>1,7</sup> Australian notification rates have risen steadily since 1993, with a substantial increase in New South Wales (NSW),<sup>1</sup> mirroring similar increases observed in Europe and the United States since 2009.<sup>8,9</sup>

In NSW, gonorrhoea is notifiable under the NSW *Public Health Act 2010*.<sup>10</sup> As this is a passive surveillance system, demographic characteristics and risk factor information are not routinely collected. Enhanced surveillance can provide population-based data to inform service delivery and health

promotion activities and, if repeated, to evaluate the impact of these over time.<sup>1,7,11</sup> We report on enhanced surveillance of gonorrhoea notifications in two urban health districts of Sydney over a 7-month period in 2013–14.

## Methods

Enhanced gonorrhoea surveillance was conducted in two Local Health Districts (LHDs), Sydney and South Western Sydney (SWS), between August 2013 and February 2014. NSW comprises 13 LHDs with boundaries based on Local Government Areas (LGAs). Sydney LHD covers seven whole LGAs and one-half LGA comprising a resident population of 580 000.<sup>12</sup> A crude gonorrhoea notification rate of 108.5 per 100 000 was reported for 2011–12.<sup>13</sup> SWS LHD covers seven

LGAs, with a resident population of 820 000<sup>14</sup> and in 2011–12 had a crude gonorrhoea notification rate of 36.1 per 100 000.<sup>13</sup>

The *NSW Public Health Act 2010*<sup>10</sup> requires laboratories to notify the local Public Health Unit (PHU) of positive culture and nucleic acid amplification tests (NAAT) for gonorrhoea. Notification data provided include gender, age, LGA, residential postcode, referring doctor details, specimen site and test type. We followed up each notification, excluding duplicates, for positive results received during the study period of 1 August 2013 to 28 February 2014 using a previously developed enhanced surveillance and data collection form<sup>15</sup> (available from the authors). This form and a reply paid envelope were sent to the doctor who ordered the test, to be completed for each notification. A follow-up form was sent to non-responders after 1 month. We defined a 'case' as a positive result from a Sydney or SWS LHD resident notified during the study period, excluding duplicates.

Data from completed forms were entered into the NSW Notifiable Conditions Information Management System database and analysed using Microsoft Excel 2010 (Microsoft Corporation, Redmond, WA, USA) and Stata 11 (StataCorp, College Station, TX, USA). Differences in counts of categorical response by variables were evaluated using  $\chi^2$  tests. Unknown or blank categories were excluded during comparison analysis. For analysis, 'Inner City Sydney' refers to three LGAs that fall completely or partially within 5 kilometres of the city centre. 'Greater Sydney' comprises other LGAs. Ethics approval was not required as enhanced surveillance was conducted by NSW public health units during this period as part of routine follow up and as such was covered under the Public Health Act.

## Results

Forms were sent for 777 gonorrhoea notifications received during the study period, of which 698 (89.8%) were returned. Cases for which a response was received were similar in age ( $P=0.132$ ), gender ( $P=0.945$ ) and location ( $P=0.540$ ) to cases of non-responding doctors.

### Case demographics

Eighty-five per cent ( $n=594$ ) of cases were male. The median age of cases was 31 years (IQR: 25–32). Female cases were younger (25 years; IQR: 21–33) than heterosexual males (30 years; IQR: 24–40) and MSM (33 years; IQR: 27–41). Most cases (55.1%) resided in inner city Sydney. Of these, 91.9% were male and 70.8% of these identified as MSM. Greater Sydney had a significantly higher proportion of heterosexual males and females than inner city Sydney (heterosexual males:  $\chi^2=105.14$ ,  $P<0.001$ ; females:  $\chi^2=32.96$ ,  $P<0.001$ ).

### Sexual exposures

Among females, regular partners were the most likely source of infection (44.1%), while MSM and heterosexual men identified casual partners as the likely source of infection (75.4% and 61.1% respectively;  $\chi^2=80.70$ ,  $P<0.001$ ) (Table 1). Sex workers accounted for 5.1% of cases, with a higher proportion of females reporting sex work than MSM and heterosexual men ( $\chi^2=31.43$ ,  $P<0.001$ ) (Table 1). The gender of the sexual partner was unknown by the doctor, or not reported,

for 21.2% of cases, and the majority of these notifications (79.7%) were from GPs.

### Care providers and testing

GPs diagnosed 60.5% of notified cases. MSM were more commonly diagnosed by sexual health clinics (SHC) than females and heterosexual men ( $\chi^2=65.78$ ,  $P<0.001$ ) (Table 1). All female sex workers were diagnosed by a SHC.

Females were most commonly tested as part of contact tracing (35.6%), heterosexual males because of symptoms (86.3%) and MSM as part of asymptomatic sexually transmissible infection (STI) testing (40.6%), ( $\chi^2=129.09$ ,  $P<0.001$ ) (Table 1). Overall, 54.3% of cases involved genitourinary tract infection. Extra-genital infection was more commonly reported among MSM compared to heterosexual males and females ( $\chi^2=208.42$ ,  $P<0.001$ ) (Table 1) and from SHCs compared to GPs and other service providers ( $\chi^2=63.45$ ,  $P<0.001$ ) (Table 2). Females reported to be sex workers accounted for 63.2% of all extra-genital infections in females.

## Discussion

This enhanced surveillance identified differences in risk factors, testing characteristics and care provider access between females, MSM and heterosexual males notified with gonorrhoea in Sydney. These differences can assist in understanding increasing notification rates and inform health promotion strategies and program development. We found that the most frequently reported likely sources of gonorrhoea infection were regular partners for females and casual partners for males. Females and heterosexual males were more likely to be diagnosed by a GP, while SHCs diagnosed over half of the notifications among MSM.

In NSW, notifications in females increased substantially between 2008 and 2012,<sup>13,16</sup> which is consistent with global trends.<sup>3,4,8,9</sup> We found that diagnosed females were generally younger than males. In a recent NSW study of young people aged 16–26 years, 70.3% of participants reported unprotected sex with regular partners, while 51.5% of females reported never being tested for STIs.<sup>17</sup> Given the younger age and proportion of females who identified regular partners as the likely source of infection, programs aimed at young women should educate about risks, and the benefits of condom use and regular STI testing. Education for GPs should heighten awareness of these risks and promote STI testing in this population.

While females were more frequently diagnosed by a GP, the exception to this was female sex workers, all of whom were diagnosed by SHCs. STI rates among this group in Australia are low,<sup>18</sup> and previous studies support our finding that sex workers are more likely to attend a SHC for testing.<sup>18,19</sup> SHCs therefore have an important role in continuing to provide regular, accessible and free STI testing for this group.

We found nearly 60% of cases occurred in MSM, mostly living in inner city Sydney and who acquired their infection from a casual partner, which is consistent with global trends.<sup>3,4,20</sup> The NSW MSM population is also experiencing increases in other STIs,<sup>21–23</sup> highlighting the challenge of STI control in this group.<sup>24</sup> With increasing practice of HIV

**Table 1. Sexual behaviours, testing and diagnostic characteristics of gonorrhoea cases in Sydney and South Western Sydney Local Health Districts, from 1 August 2013 to 28 February 2014**  
MSM, men who have sex with men

	Overall <i>n</i> (%) <sup>B</sup>	Female <i>n</i> (%) <sup>B</sup>	MSM <sup>A</sup> <i>n</i> (%) <sup>B</sup>	Heterosexual men <i>n</i> (%) <sup>B</sup>
Likely source of infection				
Casual partner	375 (64.4)	29 (34.5)	257 (75.4)	80 (61.1)
Regular partner	115 (19.8)	37 (44.1)	55 (16.1)	21 (16.0)
Overseas acquired	20 (3.4)	2 (2.4)	2 (0.6)	13 (9.9)
Unable to identify	72 (12.4)	16 (19.1)	27 (7.9)	17 (13.0)
Sex worker				
Yes	26 (5.1)	13 (19.4)	9 (2.9)	4 (3.5)
No	483 (94.9)	54 (80.6)	306 (97.1)	111 (96.5)
Reason for presentation				
Contact tracing	69 (12.1)	37 (35.6)	49 (14.6)	4 (3.1)
Symptoms	294 (51.7)	35 (33.7)	129 (38.5)	113 (86.3)
Asymptomatic test	174 (30.6)	23 (22.1)	136 (40.6)	12 (9.2)
Other	32 (5.6)	9 (8.7)	21 (6.3)	2 (1.5)
Diagnosing facility				
General practice	420 (60.5)	63 (61.2)	153 (44.9)	102 (77.9)
Sexual health clinic	236 (34.0)	26 (25.2)	173 (50.7)	28 (21.4)
Other	38 (5.5)	14 (13.6)	15 (4.4)	1 (0.8)
Test type				
Culture	70 (10.0)	11 (10.6)	29 (8.5)	17 (13.0)
Nucleic acid amplification	506 (72.5)	79 (76.0)	240 (70.4)	95 (72.5)
Both	122 (17.5)	14 (13.5)	72 (21.1)	19 (14.5)
Infection sites <sup>C</sup>				
Anorectal	171 (22.7)	4 (3.7)	135 (35.4)	5 (3.8)
Genitourinary	409 (54.3)	90 (82.6)	115 (30.2)	123 (93.9)
Throat	173 (23.0)	15 (13.8)	131 (34.4)	3 (2.3)
No. of sites				
1	644 (92.4)	99 (95.2)	301 (88.5)	131 (100.0)
2	50 (7.2)	5 (4.8)	37 (10.9)	0
3	3 (0.4)	0	2 (0.6)	0

<sup>A</sup>MSM includes men who have sex with men only and bisexual males.

<sup>B</sup>Total numbers differ slightly due to exclusion of unreported data.

<sup>C</sup>A notified case may have an infection in more than one site.

**Table 2. Characteristics of healthcare provider notifications for gonorrhoea in Sydney and South Western Sydney Local Health Districts, from 1 August 2013 to 28 February 2014**

	General Practitioner <i>n</i> (%)	Sexual Health Clinic <i>n</i> (%)	Other <i>n</i> (%)
Test			
Nucleic Acid Amplification	318 (76.6)	143 (62.7)	45 (81.9)
Culture	39 (9.4)	28 (12.3)	3 (5.5)
Both	58 (14.0)	57 (25.0)	7 (12.7)
Infection site			
Anorectal	75 (16.7)	80 (32.3)	16 (27.6)
Genitourinary	293 (65.4)	85 (34.3)	31 (53.4)
Throat	80 (17.9)	83 (33.5)	11 (19.0)

risk-reduction behaviours,<sup>25,26</sup> rates of condom use with casual partners may continue to decline and be accompanied by further increases in STIs. This underscores the importance of regular and frequent asymptomatic STI testing among MSM, as recommended in national guidelines.<sup>5</sup>

Current guidelines for asymptomatic MSM recommend gonorrhoea testing of pharyngeal and rectal swabs, and a first-void urine specimen.<sup>5</sup> It has been noted that while comprehensive STI testing among MSM has improved, many still do not undergo recommended tests.<sup>27</sup> NAAT is the recommended test for all sites; however, culture is also recommended before treatment to monitor antibiotic resistance.<sup>5,28</sup> The small proportion of culture results notified is concerning, given global concerns about an increase in antibiotic resistance.<sup>29</sup> Our results suggest that clinicians require ongoing education about testing and reminders of the importance of obtaining gonococcal cultures before treatment for ongoing gonococcal surveillance.

Young heterosexual males have also been identified as a risk group for STIs.<sup>4,30</sup> In this population, infection was more likely to be acquired from a casual partner, with a higher proportion reporting overseas acquisition compared with MSM and females. Our data are consistent with previous studies showing that STIs occur among young male travellers,<sup>31,32</sup> highlighting the importance of strengthening STI control messages as part of travel health advice for young men.

While this population-based enhanced surveillance minimises selection bias associated with clinic-based series, recall bias may be a limitation, as questionnaires were completed by the ordering doctor retrospectively based on patient records. As such, misclassification of bisexual men or MSM as heterosexual may have resulted in the small number of heterosexual males being reported as having extra-genital infection, a pattern of infection described among MSM.<sup>5</sup> While a high response rate maximises the internal validity of our findings, it is possible that non-responding doctors may have been less likely to be engaged in risk factor identification, STI screening and treatment.

Our population-based analysis identified differing risk factors and testing characteristics between three groups diagnosed with gonorrhoea: MSM, heterosexual males and females. Increasing notifications of gonorrhoea and other STIs, and concerns over antibiotic resistance highlight the importance of obtaining accurate sexual histories to ensure appropriate testing. In the future, intermittent enhanced surveillance can help to monitor trends in specific populations, thus informing concurrent educational strategies for GPs and clinicians, and determining the impact of health promotion strategies.

## Conflicts of interest

None declared.

## Acknowledgements

We thank South Eastern Sydney Public Health Unit and Health Protection NSW for development of the enhanced surveillance form and Eleanor Thompson, Antoinette Di Leo, and Shamila Phillip for administrative assistance.

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