

# ENHANCED SURVEILLANCE FOR GONORRHOEA IN TWO DIVERSE SETTINGS IN QUEENSLAND IN THE 2000s: COMPARATIVE EPIDEMIOLOGY AND SELECTED MANAGEMENT OUTCOMES

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## Abstract

Gonorrhoea is an important sexually transmitted notifiable condition. This paper describes findings from two gonorrhoea enhanced surveillance programs operating during the 2000s in Queensland: one in the remote Torres and Northern Peninsula Area (T&NPA); the other in an urban region. The overall response rate in the T&NPA (2006–2011) was 82% (723 of 879), and in Brisbane Southside and West Moreton (BSWM) (2003–2011), it was 62% (1,494 of 2,401 notifications). In the T&NPA, cases were young (80% <25 years), Indigenous (97%) and 44% were male. In the BSWM, cases were predominantly male (76%), non-Indigenous (92%) and 42% were aged less than 25 years. Co-infection with chlamydia was found in 54% of males and 60% of females in the Torres, and in 18% of males and 35% of females in the BSWM. In the BSWM 35% of the men without a syphilis test recorded had reported sexual contact with men; similarly 34% of the men without an HIV test recorded had reported sexual contact with men. Compliance with recommended treatment (ceftriaxone) was greater than 90% in all years except 2008 (84%) in the T&NPA. Treatment compliance increased significantly, from 40% in 2003 to 84.4% in 2011 ( $P < 0.0001$ ) in the BSWM cohort. The proportion of contacts with a documented treatment date increased significantly in the T&NPA from 56% in 2009 to 76% in 2011 ( $P = 0.019$ ), after a system for follow-up with the clinician became routine. Gonorrhoea epidemiology and management challenges vary across Queensland populations. Enhanced surveillance allows public health authorities to monitor epidemiology and reminds clinicians to prioritise effective sexually transmitted infection treatment for their clients. *Commun Dis Intell* 2013;37(3):E253–E259.

**Keywords:** Aboriginal and Torres Strait Islander, sexually transmitted infection, gonorrhoea, enhanced surveillance programs, epidemiology, management

## Introduction

Genital gonorrhoea (*Neisseria gonorrhoeae*) is an important bacterial sexually transmitted infection

(STI). It can cause acute illness and long-term morbidity (infertility, adverse pregnancy outcomes and chronic pelvic pain).<sup>1–4</sup> In addition, the presence of gonorrhoea (as with other STIs) increases the risk of the acquisition and transmission of HIV.<sup>5</sup>

Notification of gonococcal infection in Queensland rose from 1,567 cases (37.3 per 100,000 population) in 2006 to 2,697 (58.9 per 100,000 population) in 2012.<sup>6</sup> The burden of gonococcal infection amongst Aboriginal and Torres Strait Islander people is disproportionately high compared with other populations. In 2011, the age standardised rate of gonococcal notifications in the Queensland Aboriginal and Torres Strait Islander population was 673 per 100,000 compared with 22 per 100,000 in the non-Indigenous population.<sup>7</sup> In the Torres and Northern Peninsula Area (T&NPA) region of north Queensland, 176 cases of gonococcal infection were notified in 2011 (1,608 per 100,000 population).<sup>8</sup> In the broader Australian population notifications are concentrated among men who have sex with men while in the Aboriginal and Torres Strait Islander population cases are concentrated among youth (both males and females).

The Queensland surveillance system for *N. gonorrhoeae* infection consists of the passive notification of all laboratory confirmed cases in accordance with the (Queensland) *Public Health Act 2005*.

Quinolone resistance in gonorrhoea isolates from most regions in Australia is common. The Australian Gonococcal Surveillance Programme has reported that in 2011, 27% of all isolates nationally, and 18% of those from Queensland, demonstrated quinolone resistance.<sup>9</sup> Consequently, ceftriaxone rather than ciprofloxacin has been recommended as first line treatment for gonorrhoea in Australia since 2003. Co-treatment for chlamydia, testing for other STIs and treatment of sexual partners are also recommended.<sup>10</sup>

The T&NPA region is remote and has a population of 10,949. Of these, 83% are Torres Strait Islander and Aboriginal people<sup>11</sup> living in a cluster of five villages near the tip of Cape York and on 15 islands in the Torres Strait. The T&NPA

stands at the most northern tip of Queensland and borders the Western Province of Papua New Guinea (PNG) where an HIV/AIDS epidemic is established.<sup>12</sup> In recognition of close family ties and cultural activities across the region, the Torres Strait Treaty between Australia and PNG allows free movement for local residents to conduct traditional activities across this international border.<sup>13</sup> Brisbane Southside and West Moreton (BSWM) Public Health Unit (PHU) region has a largely urban population numbering 1,275,703 of whom 28,552 or 2.2% identify as Aboriginal and/or Torres Strait Islander.<sup>11</sup>

The objective of this paper is to describe and highlight the differences between the epidemiological and clinical management findings of gonorrhoea enhanced surveillance in these two diverse settings in Queensland. The paper illustrates how gonorrhoea enhanced surveillance may be utilised as a public health measure to monitor disease epidemiology and, potentially, to inform improvements in case management.

## Methods

In the T&NPA, cases of gonorrhoea are managed in the primary care setting by nurses, medical officers and sometimes health workers. The recommended clinical management is described in the Primary Clinical Care Manual (PCCM).<sup>14</sup> In the BSWM, cases are managed in general practice, specialist sexual health units and public hospitals. Clinical management information is sourced from the Therapeutic Guidelines – Antibiotic,<sup>15</sup> or from local sexual health physicians. Enhanced surveillance for gonorrhoea notifications has been functioning in the BSWM PHU region since 2002, and in the T&NPA district of the Tropical Public Health Unit (TPHU) region from late 2005. The T&NPA enhanced surveillance program was reviewed in 2008 and refinements directed at improving contact tracing outcomes, were subsequently implemented.

In the T&NPA district, all notifications of oropharyngeal and anogenital *N. gonorrhoeae* between 1 January 2006 and 31 December 2011 were included. Clinicians were requested to complete a one page case report when treating those with a positive pathology result, and on presentation for symptomatic cases and contacts of gonorrhoea, and then to fax the report to the TPHU in Cairns. On receipt of a gonorrhoea notification, TPHU staff forwarded a case report form to the treating clinician, if one had not already been received. In the absence of a response, the treating clinician was reminded by email or telephone after 1 and 2 months. TPHU staff checked case reports for data completeness, confirmed the pathology

diagnosis of gonorrhoea, checked results of other tests and (from early 2009) contacted the treating clinician after 3 to 4 weeks to document the outcomes of contact tracing.

In the BSWM PHU region, all notifications of oropharyngeal and anogenital *N. gonorrhoeae* infection between 1 January 2003 and 31 December 2011 were included. On receipt of a gonorrhoea notification, BSWM PHU staff forwarded a pack to the treating clinician containing treatment recommendations, a fact sheet for clinicians, a contact tracing letter for partners and a case report form, with a request that the latter be completed and returned to the PHU. In the absence of a response, the treating clinician was telephoned once, one month later.

The enhanced surveillance programs for the T&NPA District and the BSWM PHU region collected similar data covering case demographics and clinical presentation, sexual contact history, tests collected, treatment provided and arrangements for tracing sexual contacts. Data collected for the T&NPA cases included more detail regarding gonorrhoea culture, time to treatment and (from 2009) treatment of contacts.

This enhanced surveillance was conducted under the provisions of the (Queensland) *Public Health Act 2005*. Human research ethics committee approval was not required.

The enhanced data analysed for this report included only laboratory confirmed cases. In the TPHU, data from the case report forms of pathology positive gonorrhoea cases were entered into a Microsoft Access database. Analysis was conducted using Microsoft Excel and EpiInfo V3.3.2. In the BSWM PHU, de-identified data were stored in a Structured Query Language server database and collated for analysis using Crystal Reports. The chi-square test was used to assess the statistical significance of differences in proportions and trends at the  $P < 0.05$  level.<sup>16</sup>

## Results

### Response rate

There were 879 gonorrhoea notifications in the T&NPA Health Service District between 1 January 2006 and 31 December 2011. Seven hundred and twenty-three case reports were received giving a response rate of 82%. There were 2,401 gonorrhoea notifications in the BSWM PHU area between 1 January 2003 and 31 December 2011. Fourteen hundred and ninety-four case reports were received giving a response rate of 62%. The case report dataset did not differ significantly

from the total notification dataset by age group ( $P=0.60$ ), gender ( $P=0.39$ ) or ethnicity ( $P=0.99$ ) for the T&NPA cohort, nor by age group ( $P=0.13$ ) or gender ( $P=0.75$ ) for the BSWM cohort.

## Demographics and epidemiology

### Cases

Aboriginal and Torres Strait Islander people were over-represented in both case cohorts, constituting 97% of the cases and 83% of the population in the T&NPA and 7.9% of the cases and 2.2% of the population in the BSWM. The median age of a case in the T&NPA cohort was 20 years, and in the BSWM cohort it was 26 years. In the T&NPA, the burden of diagnosed infection mainly affected young Aboriginal and Torres Strait Islander men and women compared with that in BSWM where the affected population was largely male, older and non-Indigenous (Table). Of the 23 non-Indigenous cases in the T&NPA between 2006 and 2011, 18 were Australians of PNG ethnicity living in the Torres Strait and the remainder were non-Indigenous caucasians or PNG national visitors from PNG. There was no significant change in the annual proportion of cases from PNG over the enhanced surveillance period ( $P=0.23$ ).

### Sexual contacts

Of the 583 contacts with stated ethnicity identified by the T&NPA cases, 556 (95%) were Aboriginal and/or Torres Strait Islander, 17 (3%) were from PNG and 10 (2%) were non-Indigenous. Between 2006 and 2011, only 10 cases identified PNG national visitor contacts. There was no change in the annual proportion of cases identifying PNG National contacts over the enhanced surveillance period ( $P=0.36$ ). Prior to 2008, fewer than 10% of contacts (for whom residence was reported) came from outside remote Far North Queensland. This proportion increased significantly (approximately doubling) in each of the years 2009–11 ( $P<0.001$ ). Of the 1,198 contacts identified by the

BSWM cohort, the majority were non-Indigenous (947, 79%), 108 (9%) were Aboriginal and Torres Strait Islander and 143 (11.9%) were of unknown ethnicity.

## Clinical presentation

In the T&NPA, being symptomatic was the most frequently reported reason for testing among males (58%, 185) while females were most likely to be tested as a screen (49%, 198). In the BSWM being symptomatic was the most frequently reported reason for testing for both males (72%, 812) and females (39%, 141). Among males, reported same sex partners were uncommon in the T&NPA region: 3% (9 cases) compared with 44% (498 cases) in the BSWM cohort.

## Management

### Sexually transmitted infection testing

Chlamydia tests were recorded for 720 of the 723 T&NPA cases (99.6%). Of the 316 males and 404 females tested, 171 (54%) and 244 (60%) respectively returned positive chlamydia results. This compared with 1,271 (85%) chlamydia tests being recorded for the BSWM cohort, of which 178 (18.4%) males and 106 (35%) females returned a positive chlamydia result.

The proportion of cases tested for HIV in the T&NPA region in 2006 was low at 31%, but had increased significantly to 83% in 2011 ( $P<0.001$ ). Over the same period, the proportion tested for syphilis also significantly increased (from 64% to 83%) ( $P<0.001$ ). There was no significant difference in testing for syphilis or HIV by gender in the T&NPA cohort.

In the BSWM cohort, 50.7% and 52.4% of males were reported to have had tests for syphilis and HIV, respectively, while among females, 48% and 46% were reported to have had tests for syphilis and HIV, respectively. Many males who did not

**Table: Characteristics of enhanced surveillance cases of *Neisseria gonorrhoeae* infection in the Torres and Northern Peninsular Area (2006–2011) and the Brisbane Southside and West Moreton region (2003–2011), Queensland**

	Number of enhanced surveillance cases	% total notifications	% male	Number <25 years of age	% <25 years of age	Number Indigenous	% Indigenous
T&NPA	723	82.0	44.0	579	80.0	700	97.0
BSWM PHU	1,494	62.0	76.0	633	42.0	116	7.9

T&NPA Torres and Northern Peninsular Area

BSWM PHU Brisbane Southside and West Moreton region

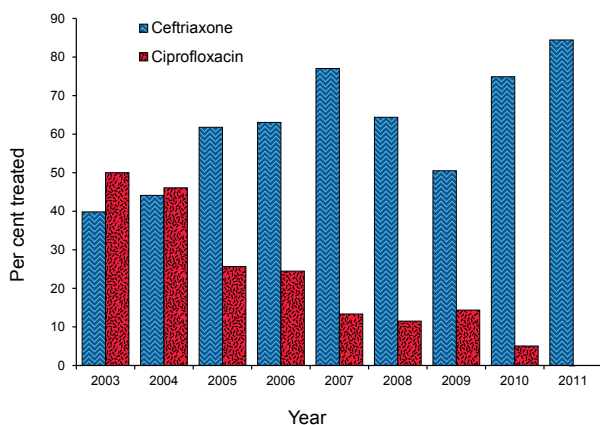
have a syphilis test recorded reported male sexual contact (195, 35%). Similarly, 184 (34%) males who did not have an HIV test recorded reported male sexual contact.

In the T&NPA cohort, 29% of males and 50% of females had a swab collected for microscopy, culture and sensitivity. Of these 296 specimens, 130 (44%) recorded *N. gonorrhoeae* growth. Isolates from only 2 cases were resistant to ciprofloxacin. One was sensitive to ceftriaxone, the other (in 2011, from a non-Indigenous male with contacts from outside the T&NPA), was also the only isolate documented as being less than fully sensitive to ceftriaxone. Data on the findings of culture from specimens from the BSWM cohort are not available.

#### Antibiotic treatment

Documented treatment with the recommended first line treatment (ceftriaxone) in the T&NPA region was greater than 90% in all years other than 2008 (84%). Reported co-treatment for chlamydia was greater than 90% in all years other than 2006 (84%). For the BSWM cohort, there was a significant increase in the proportion of cases treated with ceftriaxone during the study period, from 40% in 2003 to 84.4% in 2011 ( $P < 0.0001$ ), while at the same time ciprofloxacin (quinolone) use decreased from 50% (54 of 108 cases) in 2003 to zero of 199 cases in 2011 ( $P < 0.0001$ ) (Figure). In the BSWM, females were slightly more likely to receive ceftriaxone (RR 1.1, 95% CI 1.01–1.18,  $P = 0.05$ ) and ceftriaxone use did not vary by Indigenous status (RR 1.08; 95% CI 0.97–1.3).

**Figure: Treatment for genital gonorrhoea over time for the Brisbane Southside and West Moreton Public Health Unit gonorrhoea enhanced surveillance cohort**



#### Time to treatment

Of the 247 T&NPA screening cases (i.e. were not symptomatic or a contact of a case), 159 (64%) were treated within 14 days and 211 (85%) within a month of testing. The proportion of T&NPA cases presenting as a contact or with symptoms, and treated for both gonorrhoea and chlamydia at presentation in accordance with the regional recommendation,<sup>14</sup> was greater than 70% in all years other than 2006 (60%, range 60%–85%). Within this group, symptomatic women were the least likely to be treated correctly at presentation. Time to treatment data was not collected for the BSWM cohort.

#### Contact tracing

Contact tracing in the T&NPA cohort was almost universally initiated by the treating clinician. The annual proportion of T&NPA cases who identified zero contacts ranged from 5% to 11% with no significant trend. Treatment dates for contacts of T&NPA cases were recorded from 2009. Documented treatment of at least 1 contact for each case increased from 56% in 2009, and 60% in 2010, to 76% in 2011 ( $P = 0.019$ ). In contrast, in the BSWM PHU region, contact tracing was predominantly initiated by the case (1,024; 72.6%) with contact tracing being undertaken by the treating clinician in only 43 (2.9%) cases overall. The annual proportion of contact tracing initiated by either case (range: 65%–81%) or clinician (range: 1.5%–5.5%) did not change over the study period ( $P = 0.53$ ).

#### Discussion

These findings highlight the diverse epidemiology of gonorrhoea across these two Queensland populations, and illustrate the role that enhanced surveillance programs can play in monitoring epidemiological and management challenges. In remote areas to the north, gonorrhoea (often in combination with chlamydia) is common and largely affects Indigenous youth, while in the south it is more frequently diagnosed in older non-Indigenous males. Aboriginal and Torres Strait Islander people were over-represented in the enhanced surveillance cohorts in both the T&NPA and BSWM regions. This is consistent with findings from across Australia<sup>7</sup> and reflects the global disadvantage experienced by Indigenous youth in this area. In north Queensland, this disadvantage is evidenced in low levels of knowledge and awareness of personal risk,<sup>17</sup> poor access to condoms,<sup>18</sup> and inadequate implementation of school based sexuality and relationships education in Indigenous majority schools.<sup>19</sup>



The enhanced surveillance findings reiterate the importance of early detection and high quality clinical management of STI in the primary care setting for remote-living Australian youth. The findings for the BSWM cohort suggest that despite the clinical recommendation to test for co-infection (with syphilis or HIV), many men who have sex with men who are at increased risk are not being tested. The extent to which the enhanced surveillance process contributed to observed management improvements in either the T&NPA or BSWM regions is arguable. However, the process itself regularly reminded clinicians of the correct management for gonorrhoea and of the importance of following through on contact tracing processes. It also sent a message that public health services prioritised effective management of the common STI.

Given the high prevalence of quinolone resistance nationally, it is noteworthy that the strain of *N. gonorrhoea* circulating in remote Far North Queensland where ciprofloxacin has not been widely used to treat gonorrhoea over the last decade, remained largely sensitive to quinolones, suggesting fairly closed sexual networks. There was however, a significant increase in the proportion of contacts from further south on the Australian mainland in the last few years of the enhanced surveillance period. This increasing mobility of remote area youth within Australia increases the likelihood of quinolone (and other antibiotic) resistant strains, as indeed it also increases the risk of HIV entering the T&NPA population from mainland Australian sexual contact. The movement of local residents across the border with PNG presents further potential for spread of communicable diseases across the Torres Strait. In this context, monitoring the epidemiology of STIs, especially in an era when PNG is enduring a significant epidemic of HIV/AIDS,<sup>12</sup> is important. In this period of enhanced surveillance, there was no significant change in the proportion of cases of gonorrhoea that were diagnosed in PNG national visitors each year, a finding that may reflect no change in local sexual network behaviours or varying testing practices over time. Over the same period, there was no significant change in the annual proportion of cases naming PNG national visitor contacts.

Gonorrhoea is a common clinical presentation in the T&NPA and since the early 2000s, regional treatment guidelines (the PCCM) have recommended (both) ceftriaxone as first line treatment, and co-treatment for chlamydia. This is likely to explain the high level of adherence to the recommended antibiotic regime. On the other hand, the proportion of gonorrhoea cases tested for syphilis and for HIV improved significantly, as did reported contact tracing outcomes. There was a

significant increase in the proportion of cases with a documented treatment date for at least 1 contact once the public health nurses established the system for a follow-up telephone call to request a contact treatment date. In the BSWM region there was a highly significant improvement in adherence to the antibiotic recommendations for the treatment of gonorrhoea infections. However, in the BSWM, key areas for targeted education and improvement remain, most particularly in relation to co-treatment for chlamydia and testing for concurrent infection, especially for HIV and syphilis, and contact tracing.

### Limitations

While noting that ethnicity could not be assessed in the BSWM, the response rates and demographic similarities between the T&NPA and the BSWM enhanced surveillance cohorts and all gonorrhoea notifications, are satisfactory. This suggests that the findings are likely to be representative of gonorrhoea notifications in each region during the study period – a view supported for the T&NPA by the similarity of our findings with those of a recent analysis of the epidemiology of gonorrhoea notifications in Indigenous Australians nationally for 2000–2009.<sup>20</sup> The extent to which either cohort was representative of gonorrhoea infection in each population is unknown. In the T&NPA, testing and treatment information was usually verifiable, but data about contacts relied on the information provided by the case and recorded by the treating clinician, and is likely to be of variable quality. For example, same sex partnerships may have been under-estimated for the T&NPA cohort.

The levels of recorded testing for other STI (chlamydia, syphilis and HIV) in the T&NPA and BSWM regions were likely to have been influenced by differences in data collection methods. For example, staff in the TPHU complemented the case report data by checking the single pathology database in use in the region for any test results. The presence of multiple pathology providers in the BSWM suggests that this would not have been possible for BSWM staff and is likely to have resulted in lower estimates for the latter region.

### Conclusion

This analysis illustrates the different epidemiology and management challenges posed by genital gonorrhoea across two diverse populations in Queensland. The required health system responses can be informed by the enhanced surveillance data. It also demonstrates that despite its remoteness, the T&NPA district was able to achieve substantial

improvements and ultimately a high standard of clinical management for gonorrhoea by the end of the surveillance period.

In addition to continuing efforts to reduce the morbidity caused by chlamydia and gonorrhoea, Far North Queensland is now confronting an era of increasing vulnerability to more serious STIs, both syphilis<sup>21</sup> and HIV. In the face of economic constraints affecting health expenditure at the regional, state and national levels, renewing efforts in surveillance, and enhancing prevention and treatment services in remote areas should remain a high priority.

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## Conflicts of interest

None declared.

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