Australian Gonococcal Surveillance Programme, 1 January to 31 March 2014

Monica M Lahra for the Australian Gonococcal Surveillance Programme

Introduction

The Australian National Neisseria Network (NNN), which comprises reference laboratories in each state and territory, report data quarterly on sensitivity to an agreed group of antimicrobial agents for the Australian Gonococcal Surveillance Programme (AGSP). The antibiotics routinely tested and reported each quarter are penicillin, ceftriaxone, azithromycin and ciprofloxacin, which are current or potential agents used for the treatment of gonorrhoea. Azithromycin testing has been recently introduced by all states and territories as it has a role as part of a dual therapy regimen with ceftriaxone in the treatment of gonorrhoea in the majority of Australia. Because of the substantial geographic differences in susceptibility patterns in Australia, regional as well as aggregated data are presented. In certain remote regions of the Northern Territory and Western Australia antimicrobial resistance rates are low and an oral treatment regimen comprising amoxycillin, probenecid and azithromycin is recommended for use. For this reason, for the Northern Territory, data from Darwin are presented separately as Northern Territory – urban, and Northern Territory rural and remote for the rest of the Northern Territory. In Western Australia, data from regions classified as remote (Kimberley, Pilbara and Goldfields), are separated from urban and rural data. When *in vitro* resistance to a recommended agent is demonstrated in 5% or more of isolates from a general population, it is usual to remove that agent from the list of recommended treatments.[1] Additional data are also provided on other antibiotics from time to time. These data are reported in the AGSP annual report. The AGSP has a program-specific quality assurance process. The AGSP data are presented quarterly in tabulated form (Table 1), as well as in the AGSP annual report.

Results

A summary of the proportion of isolates with decreased susceptibility to ceftriaxone, and proportion resistant to penicillin, ciprofloxacin and azithromycin are shown in Table 1.

Penicillin resistant *Neisseria gonorrhoeae* are defined as those isolates with a minimum inhibitory concentration (MIC) to penicillin equal to or greater than 1.0 mg/L. Total penicillin resistance includes penicillinase producing *N. gonorrhoeae* (PPNG) and *N. gonorrhoeae* that have chromosom-

Table 1: Gonococcal isolates showing decreased susceptibility to ceftriaxone and resistance to ciprofloxacin, azithromycin and penicillin, Australia, 1 January to 31 March 2014, by state or territory

State or territory	Number of isolates tested	Decreased susceptibility		Resistance					
		Ceftriaxone		Ciprofloxacin		Azithromycin		Penicillin	
		n	%	n	%	n	%	n	%
Australian Capital Territory	31	2	6.5	18	58.0	3	9.7	2	6.5
New South Wales	466	41	8.8	208	45.0	13	2.8	234	50.0
Queensland	166	11	6.6	45	27.0	4	2.4	32	19.0
South Australia	76	2	2.6	31	41.0	1	1.3	12	16.0
Tasmania	13	0	0.0	3	23.0	1	7.7	4	31.0
Victoria	446	37	8.3	191	43.0	3	0.7	100	22.0
Northern Territory/urban	28	1	3.6	6	21.0	0	0.0	5	18.0
Northern Territory/rural and remote	40	0	0.0	3	7.5	0	0.0	2	5.0
Western Australia/urban and rural	106	1	0.9	38	35.8	4	3.8	35	33.0
Western Australia/remote	37	1	2.7	4	11.0	0	0.0	4	11.0
Australia	1,409	96	6.8	547	39.0	29	2.1	430	31.0

ally mediated resistance to penicillin (CMRP). In areas classified as remote, in the Northern Territory and Western Australia, a treatment regimen based on oral amoxycillin, probenecid and azithromycin is used. Penicillin resistance in remote Northern Territory was reported in 2 of 40 strains tested and 4 of 37 strains tested from remote areas of Western Australia. A low number of cultures are collected in these remote regions, due in part to increasing use of nucleic acid amplification testing (NAAT). In Western Australia, the introduction of a targeted NAAT, developed by the NNN to detect PPNG, is in use to enhance surveillance.[2,3]

Ciprofloxacin resistance includes isolates with a MIC to ciprofloxacin equal to or greater than 0.06 mg/L.

Azithromycin resistance is defined as a MIC to azithromycin equal to or greater than 1.0 mg/L. In 2013, gonococcal strains with azithromycin high level resistance were reported from Victoria and Queensland.[4] There were no isolates reported in Australia with high level resistance with an azithromycin (MIC value >256 mg/L) in this quarter, 2014.

Ceftriaxone MIC values in the range 0.06–0.125 mg/L have been reported in the category decreased susceptibility since 2005. To date there has not been an isolate reported in Australia with a ceftriaxone MIC value >0.125 mg/L.

In the 1st quarter of 2014 there was a decrease in the proportion of *N. gonorrhoeae* isolates with decreased susceptibility to ceftriaxone, predominantly from New South Wales and Victoria, when compared with the same quarter in 2013; and in the annual data for 2013.[4] When compared with the 1st quarter of 2013, there was a decrease from 9.7% to 6.8% in the proportion of *N. gonorrhoeae* isolates with decreased susceptibility to ceftriaxone nationally, but this is more than double that reported in the 3rd quarters of 2011 and 2012 (2.7%–3.5%).

The highest proportions of isolates with decreased susceptibility to ceftriaxone were reported from the eastern states: Victoria, New South Wales and Queensland. In New South Wales there were 41 strains with decreased susceptibility to ceftriaxone and of those, 40/41 (98%) were multi-drug-resistant (MDR); 33/41 (80%) were from males; and 13/41 (32%) were isolated from extra genital sites (rectal and pharyngeal). In Victoria, there were 37 strains with decreased susceptibility to ceftriaxone and, of those, 31/37 (83%) were MDR strains, 37/37 (100%) were from males, and 23/37 (62%) were isolated from extra genital sites (rectal and pharyngeal). In contrast, there were no gonococci with decreased susceptibility to ceftriaxone reported from the remote Northern Territory, or Tasmania and low numbers were reported from Western Australia.

The proportion of strains with decreased susceptibility to ceftriaxone is of increasing concern in Australia and overseas, as this is phenotypic of the genotype with the key mutations that are the precursor to ceftriaxone resistance.[5] There are recent reports of ceftriaxone 500 mg treatment failures from Victoria and New South Wales. These patients had pharyngeal infections where the gonococcal strains had ceftriaxone MIC values in the range 0.03–0.06 mg/L.[6,7] Until 2014 there had not been an isolate reported in Australia with a ceftriaxone MIC value >0.125 mg/L.[4] In late December 2013 there was a new MDR gonococcal strain with a ceftriaxone MIC of 0.5 mg/L, the highest ever reported in Australia (unpublished data from the NNN). To date there has been no evidence of spread of this strain in the 1st quarter of 2014.

The category of ceftriaxone decreased susceptibility includes the MIC values 0.06 and 0.125 mg/L. The right shift in the distribution of ceftriaxone MIC values over recent years (Table 2), is statistically significant with a sustained increase in the proportion of strains with an MIC value of 0.06 mg/L (2011–2012: [P=0.02, 95% CI: 1.04 –1.62], and 2012–2013 [P<0.0001, 95% CI: 1.70–2.38]). In 2010, the proportion of strains with ceftriaxone decreased susceptibility was higher than that reported in 2011. This proportion has subsequently increased as described. The proportion of strains with a ceftriaxone MIC 0.125 mg/L has also increased from 0.1% in 2010 and 2011, to 0.3% in 2012 to 0.6% in 2013. These differences were not significant which may be attributable to the low number of strains in this MIC category.[4] In the 1st quarter of 2014 there were lower proportions of strains at both 0.06 and 0.125 mg/L.

Table 2: Percentage of gonococcal isolates with decreased susceptibility to ceftriaxone MIC 0.06–0.125 mg/L, Australia, 2010 to 2013, and 1 January to 31 March 2014, by state or territory

Ceftriaxone MIC mg/L	2010	2011	2012	2013	1 January to 31 March 2014
0.06	4.6	3.2	4.1	8.2	6.4
0.125	0.1	0.1	0.3	0.6	0.4

In response to concerns over the increasing proportions of *N. gonorrhoeae* strains with decreased susceptibility to ceftriaxone, dual therapy (ceftriaxone plus azithromycin) is recommended as a strategy to temper development of more widespread resistance.[8] Patients with infections in extra genital sites, where the isolate has decreased susceptibility to ceftriaxone, are recommended to have a test of cure cultures collected.

Continued surveillance to monitor *N. gonorrhoeae* with elevated MIC values coupled with sentinel site surveillance in high risk populations remains critically important to inform our therapeutic strategies and to detect instances of treatment failure.

References

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