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Australian Gonococcal Surveillance Programme, 1 April to 30 June 2023

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Quarterly report

Australian Gonococcal Surveillance Programme, 1 April to 30 June 2023

Monica M Lahra, Sebastiaan Van Hal, Tiffany R Hogan

Introduction

The National Neisseria Network (NNN), Australia, established in 1979, comprises reference laboratories in each state and territory. Since 1981, the NNN has reported data for the Australian Gonococcal Surveillance Programme (AGSP), on antimicrobial susceptibility profiles for *Neisseria gonorrhoeae* isolated from each jurisdiction for an agreed group of agents. The antibiotics reported represent current or potential agents used for the treatment of gonorrhoea, and include ceftriaxone, azithromycin, ciprofloxacin and penicillin. More recently, gentamicin susceptibilities are included in the AGSP Annual Report.

Ceftriaxone, combined with azithromycin, is the recommended treatment regimen for gonorrhoea in the majority of Australia. However, there are substantial geographic differences in susceptibility patterns across Australia, with certain remote regions of the Northern Territory and Western Australia having low gonococcal antimicrobial resistance rates. In these regions, an oral treatment regimen comprising amoxycillin, probenecid, and azithromycin is recommended for the treatment of gonorrhoea. Additional data on other antibiotics are reported in the AGSP Annual Report. The AGSP has a programme-specific quality assurance process.

Results

Table 1 provides a summary of the proportion of *Neisseria gonorrhoeae* isolates resistant to azithromycin, ciprofloxacin and penicillin for Quarter 2, 2023.

Ceftriaxone

The AGSP has historically reported the category of ceftriaxone decreased susceptibility (DS) at minimum inhibitory concentration (MIC) values ≥ 0.064 mg/L, and has further differentiated those isolates with a MIC ≥ 0.125 mg/L in line with the 2012 World Health Organization criteria.[1] In the second quarter of 2023, the proportion of *N. gonorrhoeae* isolates with ceftriaxone MICs ≥ 0.064 mg/L remains lower than that reported in 2022; while an increase in this proportion was seen from the first quarter of 2023 (3.81%) to the second quarter (4.27%), this increase was mostly attributable to *Neisseria gonorrhoeae* with ceftriaxone MIC values of 0.064 mg/L (4.03%), largely represented by New South Wales (9.2%; 77/833). New South Wales has reported a clonal expansion of multilocus sequence type (MLST) ST-7827 *N. gonorrhoeae* strains in 2021 to 2022 and genomic analysis on these isolates is ongoing.[2]

In quarter two of 2023, six isolates nationally had ceftriaxone MIC values ≥ 0.125 mg/L (0.24%, 6/2454), reported from Queensland (2), Victoria (2) and non-remote Western Australia (2). Of these, the mosaic *penA* 60.001 allele was detected in four isolates, with ceftriaxone MIC values in these four isolates ranging from 0.125 mg/L to 1 mg/L; however, all were from distinct MLST serotypes. Of concern, one of the isolates harbouring the mosaic *penA* 60.001 allele demonstrated extensive drug resistance: ceftriaxone decreased susceptibility (MIC value, 0.25mg/L), high-level azithromycin resistance (MIC value ≥ 256 mg/L), and ciprofloxacin and penicillin resistance. This represents the third isolate with the XDR phenotype to have been reported in Australia in 2023;[3] it also marks an increase in isolates harbouring the mosaic *penA* 60.001 allele associated with ceftriaxone resistance, raising concerns for the spread of these isolates within our population. From genomic analysis this most recent XDR isolate, reported from Victoria, was identified as a ST-16406 strain, the same as reported in Australia, Cambodia, the United Kingdom and Europe.[4–8] Jurisdictional genomic analyses continue as resistant isolates arise.

Table 1: Gonococcal isolates resistant to azithromycin, ciprofloxacin, and penicillin, Australia, 1 April to 30 June 2023, by state or territory

Jurisdiction	Number of isolates tested	Resistance[a]					
		Azithromycin		Ciprofloxacin		Penicillin	
	Q2, 2023	n	%	n	%	n	%
Australian Capital Territory	67	1	1.5	42	62.7	30	44.8
New South Wales	833	36	4.3	596	71.5	281	33.7
Queensland	419	13	3.1	215	51.3	108	25.8
South Australia	144	7	4.9	63	43.8	36	25.0
Tasmania	36	0	0	23	63.9	15	41.7
Victoria	638	33	5.2	435	68.2	222	34.8
Northern Territory non-remote	26	1	3.8	4	15.4	3	11.5
Northern Territory remote	24	0	0	1	4.2	1	4.2
Western Australia non-remote	248	7	2.8	125	50.4	97	39.1
Western Australia remote	19	0	0	5	26.3	3	15.8
Australia	**2,454**	**98**	**4.0**	**1,509**	**61.5**	**796**	**32.4**

a Resistance as defined by jurisdictional reporting criteria.

Azithromycin

The proportion of azithromycin resistant *N. gonorrhoeae* in Australia decreased in the second quarter of 2023, from 4.5% to 4.0% (Table 2), remaining relatively stable since 2019. It should be noted that there is variation in antimicrobial susceptibility testing methodology in the jurisdictions and so resistance is defined accordingly. The AGSP trend data for azithromycin resistance since 2010 is shown in Table 2.

Globally, there have been reports of increased azithromycin resistance in *N. gonorrhoeae*, heightened since dual therapy was introduced.[9] Notable, there were four isolates nationally exhibiting high-level azithromycin resistance (defined as MIC values ≥ 256 mg/L), three from New South Wales and one isolate from Victoria, which also was extensively drug resistant. Travel history is currently unavailable for these isolates. Azithromycin resistance was reported by all jurisdictions in quarter two of 2023, except for Tasmania, and the remote regions of Western Australia and of the Northern Territory.

Dual therapy using ceftriaxone plus azithromycin is the recommended treatment for gonorrhoea as a strategy to temper development of more widespread ceftriaxone resistance. Patients with infections in extragenital sites, where the isolate has decreased susceptibility to ceftriaxone, should have test of cure cultures collected. Continued surveillance to monitor *N. gonorrhoeae* with elevated MIC values, coupled with sentinel site surveillance in high-risk populations, remain essential to inform therapeutic strategies, identify incursion of resistant strains, and detect instances of treatment failure.

Table 2: Proportion of gonococcal isolates with ceftriaxone MIC values 0.064 and ≥ 0.125 mg/L and resistance to azithromycin, Australia, 2010 to 2022 and 1 January to 31 March 2023 and 1 April to 30 June 2023

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023 Q1	2023 Q2
Number of isolates tested nationally	4,100	4,230	4,718	4,897	4,804	5,411	6,378	7,835	9,006	9,668	7,222	6,254	8,199	2,413	2,454
Ceftriaxone MIC 0.064 mg/L	4.80%	3.20%	4.10%	8.20%	4.80%	1.70%	1.65%	1.02%	1.67%	1.19%	0.87%	0.83%	5.05%	3.52%	4.03%
Ceftriaxone MIC ≥ 0.125 mg/L	0.10%	0.10%	0.30%	0.60%	0.60%	0.10%	0.05%	0.04%	0.06%	0.11%	0.07%	0.03%	0.51%	0.29%	0.24%
Total proportion of isolates with ceftriaxone MIC values ≥ 0.064 mg/L	**4.90%**	**3.30%**	**4.40%**	**8.80%**	**5.40%**	**1.80%**	**1.70%**	**1.06%**	**1.73%**	**1.30%**	**0.94%**	**0.86%**	**5.56%**	**3.81%**	**4.27%**
Azithromycin resistance	n/a	1.1%	1.3%	2.1%	2.5%	2.6%	5.0%	9.3%	6.2%	4.6%	3.9%	4.7%	3.9%	4.5%	4.0%

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