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Australian Gonococcal Surveillance Programme, 1 January to 31 March 2023

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Communicable Diseases Intelligence

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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 amoxicillin, 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 1, 2023.

Ceftriaxone

The AGSP has historically reported the category of ceftriaxone decreased susceptibility (DS) at minimum inhibitory concentration (MIC) values ≥ 0.06 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 first quarter of 2023, the proportion of *N. gonorrhoeae* isolates with ceftriaxone MICs ≥ 0.06 mg/L has waned to 3.81%, subsequent to a surge of such isolates reported in 2022 (5.56%), which peaked in the third quarter of 2022 (7.75%).^{2,3} The rapid expansion of these isolates (i.e. those with ceftriaxone MIC values 0.06 and 0.125 mg/L) was largely reported from New South Wales and was attributed to multilocus sequence type (MLST) ST-7827 (all resistant to penicillin and ciprofloxacin and susceptible to azithromycin).³ Ongoing jurisdictional genomic analyses continue to monitor for the emergence and expansion of ST-7827 nationally.

In quarter one of 2023, there were seven *N. gonorrhoeae* isolates from New South Wales (4) and Victoria (3) with ceftriaxone MIC values ≥ 0.125 mg/L.¹ Genomic analyses detected the presence of the mosaic *penA* 60.001 allele in five of these isolates, with 2/5 reporting travel to Asia. Increased notifications of *N. gonorrhoeae* isolates harbouring the *penA* 60.001 allele have been reported in the United Kingdom, associated with travel from the Asia-Pacific region and conferring ceftriaxone resistance.⁴ Concerningly, among the five isolates harbouring the mosaic *penA* 60.001 allele, there were two further instances of extensive drug resistance: ceftriaxone decreased susceptibility (MIC value, 0.25mg/L); high-level azithromycin resistance (MIC values, ≥ 256 mg/L); and ciprofloxacin and penicillin resistance.³ Both extensively resistant *N. gonorrhoeae* isolates were reported from Victoria and identified as ST-16406 strains. Comparative genomic analyses continue as resistant isolates arise. Globally, extensively drug-resistant and ceftriaxone decreased susceptibility *N. gonorrhoeae* harbouring the mosaic *penA* 60.001 allele have been sporadic and isolated occurrences.

Table 1: Gonococcal isolates resistant to azithromycin, ciprofloxacin, and penicillin, Australia, 1 January to 31 March 2023, by state or territory

Jurisdiction	Number of isolates tested	Resistance ^a					
	Q1, 2023	Azithromycin		Ciprofloxacin		Penicillin	
		n	%	n	%	n	%
Australian Capital Territory	58	4	6.9	39	67.2	24	41.4
New South Wales	831	44	5.3	584	70.3	281	33.8
Queensland	376	8	2.1	201	53.5	116	30.9
South Australia	155	7	4.5	57	36.8	50	32.3
Tasmania	28	2	7.1	11	39.3	8	28.6
Victoria	700	36	5.1	490	70.0	286	40.9
Northern Territory non-remote	22	0	0	10	45.5	3	13.6
Northern Territory remote	41	0	0	2	4.9	2	4.9
Western Australia non-remote	191	7	3.7	89	46.6	44	23.0
Western Australia remote	11	0	0	6	54.5	4	36.4
Australia	2,413	108	4.5	1,489	61.7	818	33.9

a Resistance as defined by jurisdictional reporting criteria.

Azithromycin

The proportion of isolates resistant to azithromycin in Australia increased in the first quarter of 2023 to 4.5% from 3.9% in 2022 (Table 2), remaining at relatively stable levels 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.⁵ Notably, there were six isolates nationally in quarter one of 2023 reporting high-level azithromycin resistance (defined as MIC values \geq 256 mg/L) from Victoria (2) (also exhibiting extensive drug resistance), non-remote Western Australia (2), Queensland (1) and New South Wales (1). Available information for one isolate has indicated travel to Africa. Azithromycin resistance was reported by all jurisdictions in quarter one of 2023, except for 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 0.06 and ≥ 0.125 mg/L and resistance to azithromycin, Australia, 2010 to 2022 and 1 January to 31 March 2023

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023 Q1
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
Ceftriaxone MIC 0.06 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%
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%
Total proportion of isolates with ceftriaxone MIC values ≥ 0.06 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%
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%

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