*Communicable Diseases Intelligence*, Year 2023, Volume

https://doi.org/10.33321/cdi.2023.47.30

Publication date: 25/05/2023

http://health.gov.au/cdi

Australian Gonococcal Surveillance Programme, 1 October to 31 December 2022

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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 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 4, 2022.

****Table 1: Gonococcal isolates resistant to azithromycin, ciprofloxacin, and penicillin, Australia, 1 October to 31 December 2022, by state or territory****

| Jurisdiction | Number of isolates tested | Resistancea | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Q4, 2022 | Azithromycin | | Ciprofloxacin | | Penicillin | |
| n | % | n | % | n | % |
| Australian Capital Territory | 63 | 4 | 6.3 | 36 | 57.1 | 23 | 36.5 |
| New South Wales | 636 | 43 | 6.8 | 458 | 72.0 | 236 | 37.1 |
| Queensland | 381 | 15 | 3.9 | 208 | 54.6 | 139 | 36.5 |
| South Australia | 126 | 3 | 2.4 | 58 | 46.0 | 49 | 38.9 |
| Tasmania | 17 | 1 | 5.9 | 7 | 41.2 | 6 | 35.3 |
| Victoria | 628 | 41 | 6.5 | 464 | 73.9 | 312 | 49.7 |
| Northern Territory non-remote | 23 | 1 | 4.3 | 3 | 13.0 | 3 | 13.0 |
| Northern Territory remote | 50 | 0 | 0 | 1 | 2.0 | 0 | 0 |
| Western Australia non-remote | 146 | 3 | 2.1 | 60 | 41.1 | 31 | 21.2 |
| Western Australia remote | 14 | 0 | 0 | 1 | 7.1 | 1 | 7.1 |
| **Australia** | **2,084** | **111** | **5.3** | **1,296** | **62.2** | **800** | **38.4** |

a Resistance as defined by jurisdictional reporting criteria.

## 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 The sharp rise in the proportion of N. gonorrhoeae isolates with ceftriaxone MICs ≥ 0.06 mg/L, seen in quarter one, was sustained throughout 2022 and largely attributable to the expansion of multilocus sequence type (ST)-7827 clone circulating in New South Wales (all resistant to penicillin and ciprofloxacin and susceptible to azithromycin).2

In quarter 4 of 2022, five N. gonorrhoeae isolates from New South Wales (3), Victoria (1) and non-remote Western Australia (1) all had ceftriaxone MIC values of 0.5 mg/L. Genomic analysis of these isolates indicated the presence of the mosaic penA 60.001 allele. Increased notifications of such isolates have been reported in the United Kingdom, associated with travel from the Asia-Pacific region and conferring ceftriaxone resistance.3 Critically, the Western Australian isolate additionally demonstrated extensive drug resistance to azithromycin (high level resistance, MIC ≥ 256 mg/L), ciprofloxacin and penicillin, and identified as ST-16406. Comparative genomic analyses continue as resistant isolates arise. Globally, extensively drug-resistant and ceftriaxone decreased susceptible N. gonorrhoeae harbouring the mosaic penA 60.001 allele have been sporadic and isolated occurrences.

## Azithromycin

The proportion of isolates resistant to azithromycin in Australia gradually increased over 2022 and in the fourth quarter reached 5.3% (Table 2), higher than annual proportions reported nationally in 2021 (4.7%) and 2020 (3.9%).4 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 Of note, three isolates from Queensland, Victoria and non-remote Western Australia exhibited high-level resistance to azithromycin (defined as MIC values ≥ 256 mg/L). Azithromycin resistance was reported by all jurisdictions in quarter 4 of 2022, except for the remote regions of Western Australia and 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: Percentage of gonococcal isolates with ceftriaxone MIC values 0.06 and ≥ 0.125 mg/L and resistance to azithromycin, Australia, 2010 to 2021 and 1 January to 31 March 2022, 1 April to 30 June 2022, 1 July to 30 September 2022 and 1 October to 31 December 2022****

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 Q1 | 2022 Q2 | 2022 Q3 | 2022 Q4 |
| 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 | 1,812 | 2,152 | 2,193 | 2,084 |
| 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% | 3.97% | 3.53% | 7.25% | 5.28% |
| 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% | 0.33% | 0.60% | 0.50% | 0.58% |
| **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%** | **4.30%** | **4.13%** | **7.75%** | **5.86%** |
| 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% | 2.2% | 3.8% | 3.7% | 5.3% |

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**Communicable Diseases Intelligence**

ISSN: 2209-6051 Online

**Communicable Diseases Intelligence (CDI) is a peer-reviewed scientific journal published by the Office of Health Protection, Department of Health and Aged Care. The journal aims to disseminate information on the epidemiology, surveillance, prevention and control of communicable diseases of relevance to Australia.**

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This journal is indexed by Index Medicus and Medline.

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