

# Changes in antimicrobial resistance and antibiotics consumptions using ceftriaxone monotherapy versus dual therapy with azithromycin for treatment of gonorrhoea in Melbourne, Australia

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## INTRODUCTION



In late 2020s, several countries (e.g. US and UK) have changed gonorrhoea treatment from ceftriaxone/azithromycin-based dual therapy to ceftriaxone monotherapy as per the CDC guidelines.

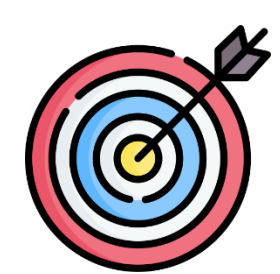


The Australian guidelines recommend ceftriaxone/azithromycin-based dual therapy for gonorrhoea treatment.



In August-2021, the Melbourne Sexual Health Centre (MSHC) in-house gonorrhoea treatment guidelines were changed from ceftriaxone/azithromycin-based dual therapy to ceftriaxone monotherapy.

## AIM

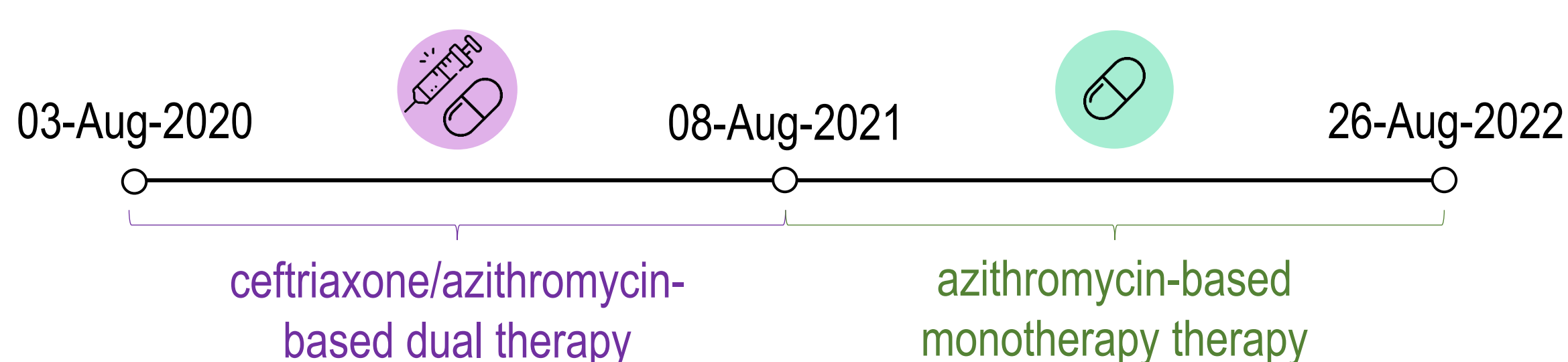


To examine changes in antimicrobial susceptibility and antimicrobial consumption before and after the guideline update.

## METHODS



We compared antimicrobial resistance (i.e. ceftriaxone, azithromycin, ciprofloxacin and tetracycline) and consumption between the dual therapy period (3-Aug-2020 to 08-Aug-2021) and monotherapy period (09-Aug-2021 to 26-Aug-2022) at MSHC.



- Defined daily dose (DDD) refers to the average dose for a drug used for its main indication in adults.
- We extracted the number of prescribed ceftriaxone and azithromycin for gonorrhoea treatment at MSHC from August 2020 to August 2022.
- We calculated the average monthly DDD per 1000 presentations for ceftriaxone and azithromycin.



Multivariable logistic regression was performed to examine the factors associated with azithromycin resistance.

## RESULTS



We included 2,223 *Neisseria gonorrhoeae* isolates (890 in ceftriaxone/azithromycin-based dual therapy period and 1,333 in azithromycin-based monotherapy therapy period).



Cases were predominantly males (92.3%, n=2052).



Monthly use of ceftriaxone increased (mean 24.1 vs 55.5 defined daily doses [DDD]/1000 presentations;  $p < 0.0001$ ) and azithromycin decreased (mean 83.5 vs 24.0 DDD/1000 presentations;  $p < 0.0001$ ) from the dual therapy to monotherapy period (Fig 1).

## RESULTS

Figure 1. Antibiotics consumption by month, expressed as defined daily dose/1000 presentations.

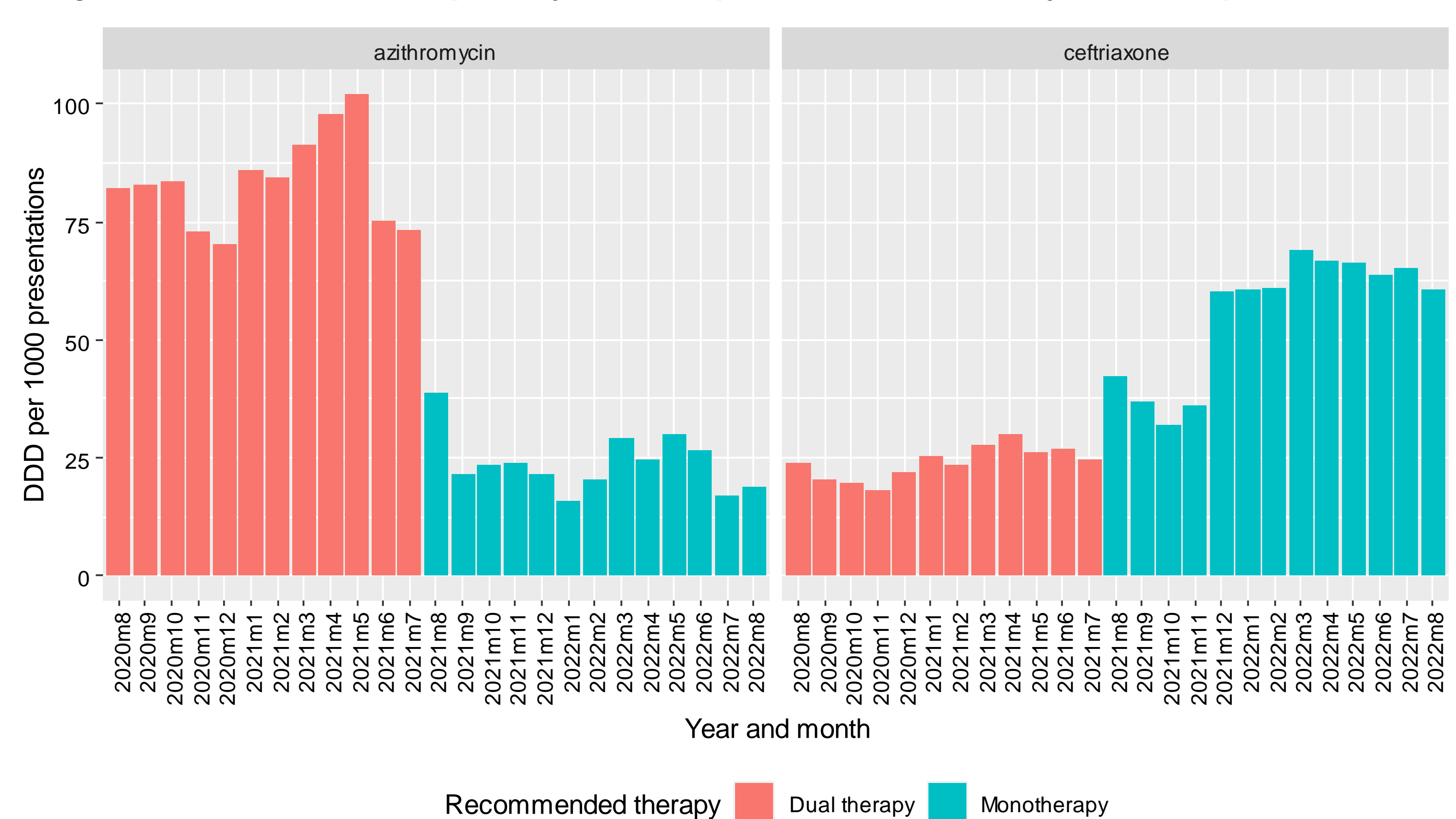


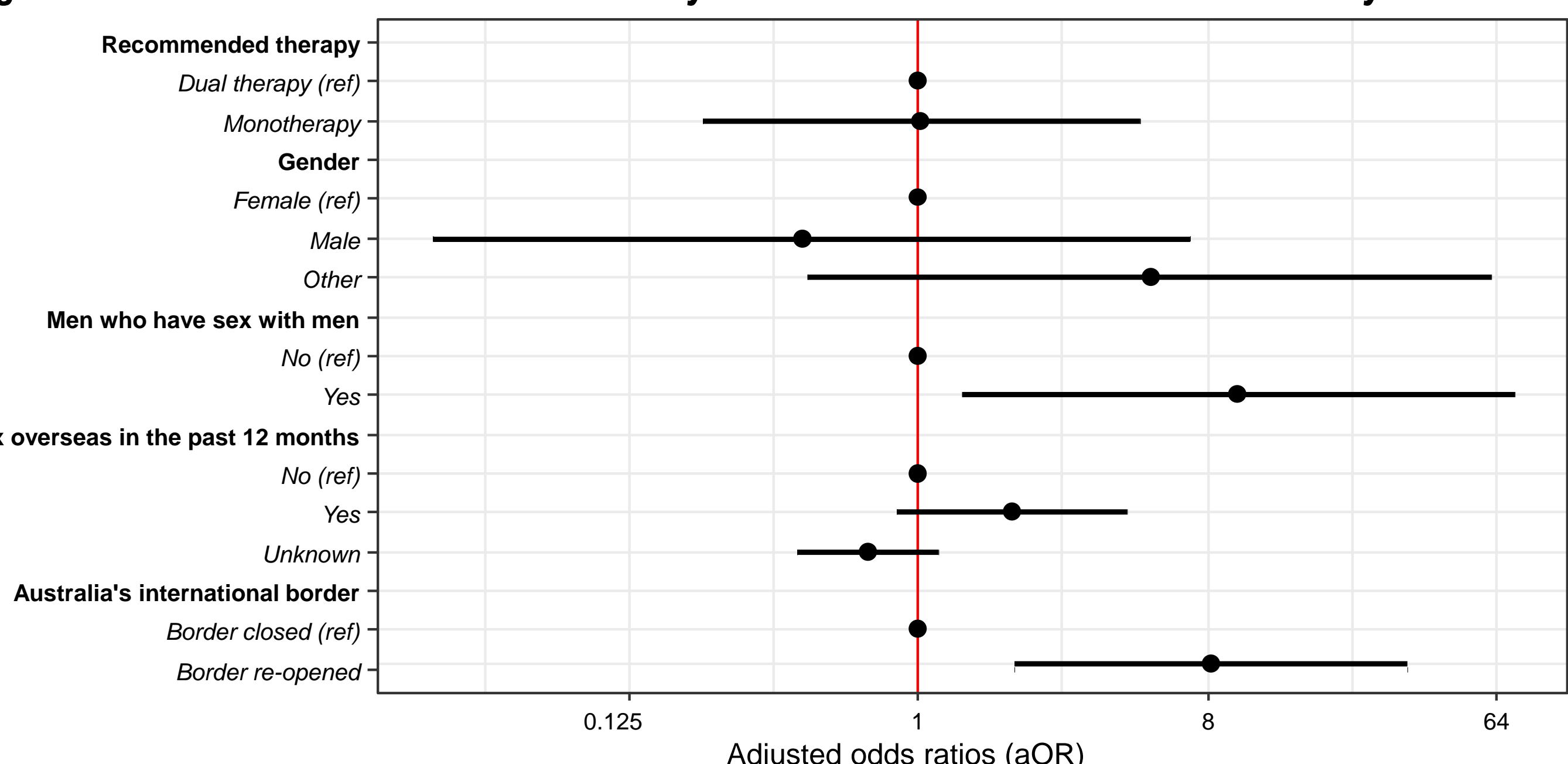
Table 1. The proportion of cases with antimicrobial resistance in *Neisseria gonorrhoeae* between the dual therapy period and monotherapy period.

Antimicrobial	Dual therapy period	Monotherapy period	P value
Azithromycin	7/890 (0.8%)	69/1333 (5.2%)	<0.001
Ceftriaxone	10/890 (1.1%)	0/1333 (0%)	<0.001
Ciprofloxacin	441/890 (49.6%)	978/1333 (73.4%)	<0.001
Tetracycline	424/890 (47.6%)	827/1332 (62.1%)	<0.001



Multivariable analyses showed that while the switch to monotherapy was not significantly associated with azithromycin resistance (aOR=1.02; 95% CI: 0.21-4.97); the re-opening of Australia's international borders (i.e. 15-Dec-2021) was significantly associated with azithromycin resistance (aOR=8.21; 95% CI: 1.99-33.80) (Fig 2).

Figure 2. Factors associated with azithromycin resistance in the multivariable analysis.



## CONCLUSIONS

- Following switching from dual therapy to ceftriaxone monotherapy, we saw a reduction in gonococcal strains with decreased susceptibility to ceftriaxone.
- While there was also a rise in azithromycin resistance, this was significantly associated with the reopening of Australia's borders, possibly reflecting the importation of antimicrobial resistance.
- Future genomic work should assess the lineages of *Neisseria gonorrhoeae* currently circulating in our setting.