Response to, and epidemiology of, escalating detections of antimicrobial resistant *Neisseria gonorrhoeae* of public health significance, NSW, 2022 to 2024

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ASRH Session 10D:
Discovery and Translational Science: Abstracts

NSW GOVERNMENT

Disclosure of interest

Nil disclosures

Background

- Antimicrobial gonorrhoea (AMR) is increasing globally and can reduce options for treatment
- WHO Western Pacific region reports high levels of:

World Health Organization Enhanced Gonococcal Antimicrobial Surveillance Programme, Cambodia, 2023

Vichea Ouk, Heng Lon Say, Mot Virak, Serakea Deng, Rebekah Frankson, Robert McDonald, Ellen N. Kersh, Teodora Wi, Ismael Maatouk, Sebastiaan van Hal, Monica M. Lahra; for the EGASP Cambodia working group[1]

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Ceftriaxone resistance in *Neisseria gonorrhoeae* associated with the *penA-60.001* allele in Hanoi, Viet Nam

*Paul C Adamson, Vu N Hieu, Pham H Nhung, DM Whiley, *TM Chau

www.thelancet.com/infection Vol 24 June 2024

Morbidity and Mortality Weekly Report

Ceftriaxone-Resistant Gonorrhea — China, 2022

Xiaoyu Zhu[1,2,*]; Yue Xi[1,2,*]; Xiangdong Gong, MD[1,2]; Shaochun Chen, PhD[1,2,3]

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https://www.facebook.com/WHO/posts/antimicrobial-resistance-is-making-gonorrhoea-much-harder-to-treat-gonorrhoea-ca/5291690560876284/

AMR gonorrhoea of public health significance

Critically resistant gonococcal infection

- Meets CDNA surveillance case definition; AND
- Isolate found on culture-based susceptibility testing from NSW Health Pathology-Randwick to have
  - high-level resistance to azithromycin (MIC ≥256mg/L) **OR**
  - decreased susceptibility to ceftriaxone (MIC ≥0.125 mg/L)

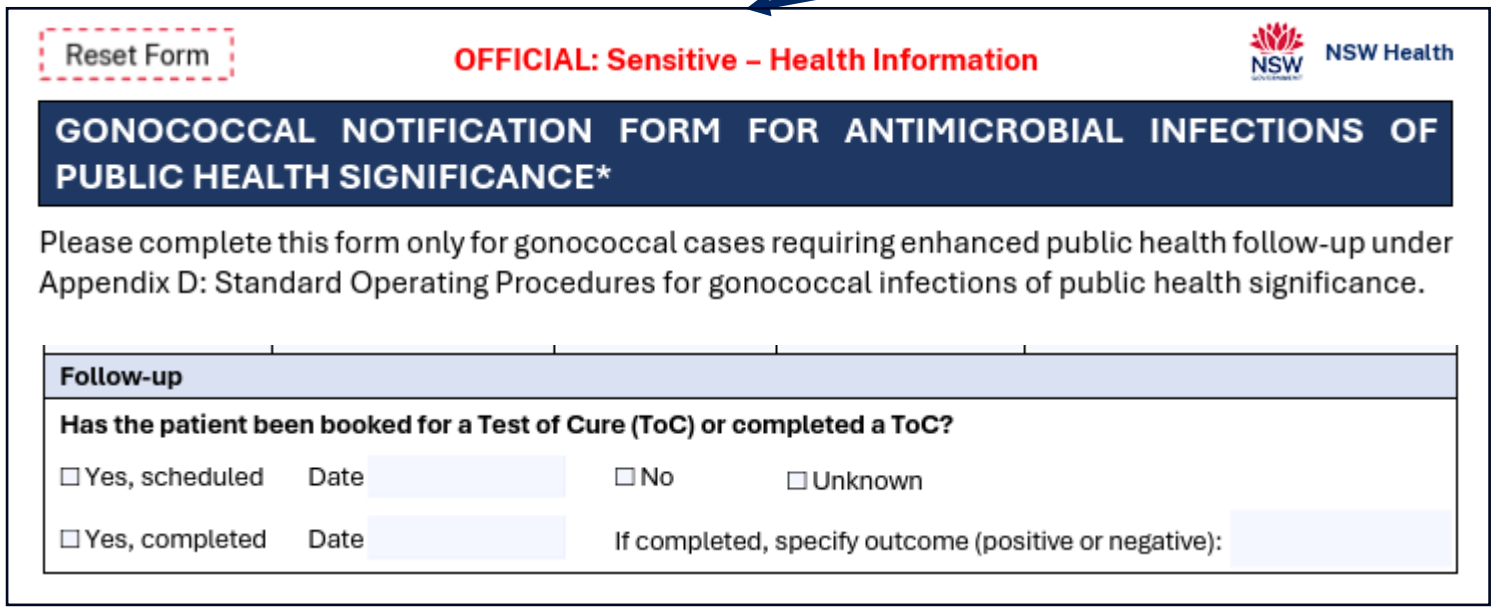
Extensively drug resistant (XDR) gonococcal infection

- As above, but
  - high-level resistance to azithromycin (MIC ≥256mg/L) **AND**
  - decreased susceptibility to ceftriaxone (MIC ≥0.125 mg/L)

All AMR gonorrhoea of public health significance are followed-up by Public Health Units in NSW

Antimicrobial susceptibility testing (AST) and NSW response process

Site(s) swabbed for culture before treatment → Culture positive at NSW lab → Sample forwarded to NSW HP → NSW HP undertakes AST → AMR of PHS identified & WGS performed → NSW HP notify PHU who notify managing clinician → PHU passively follow case until evidence of negative ToC



Reset Form

OFFICIAL: Sensitive – Health Information

NSW Health

GONOCOCCAL NOTIFICATION FORM FOR ANTIMICROBIAL INFECTIONS OF PUBLIC HEALTH SIGNIFICANCE*

Please complete this form only for gonococcal cases requiring enhanced public health follow-up under Appendix D: Standard Operating Procedures for gonococcal infections of public health significance.

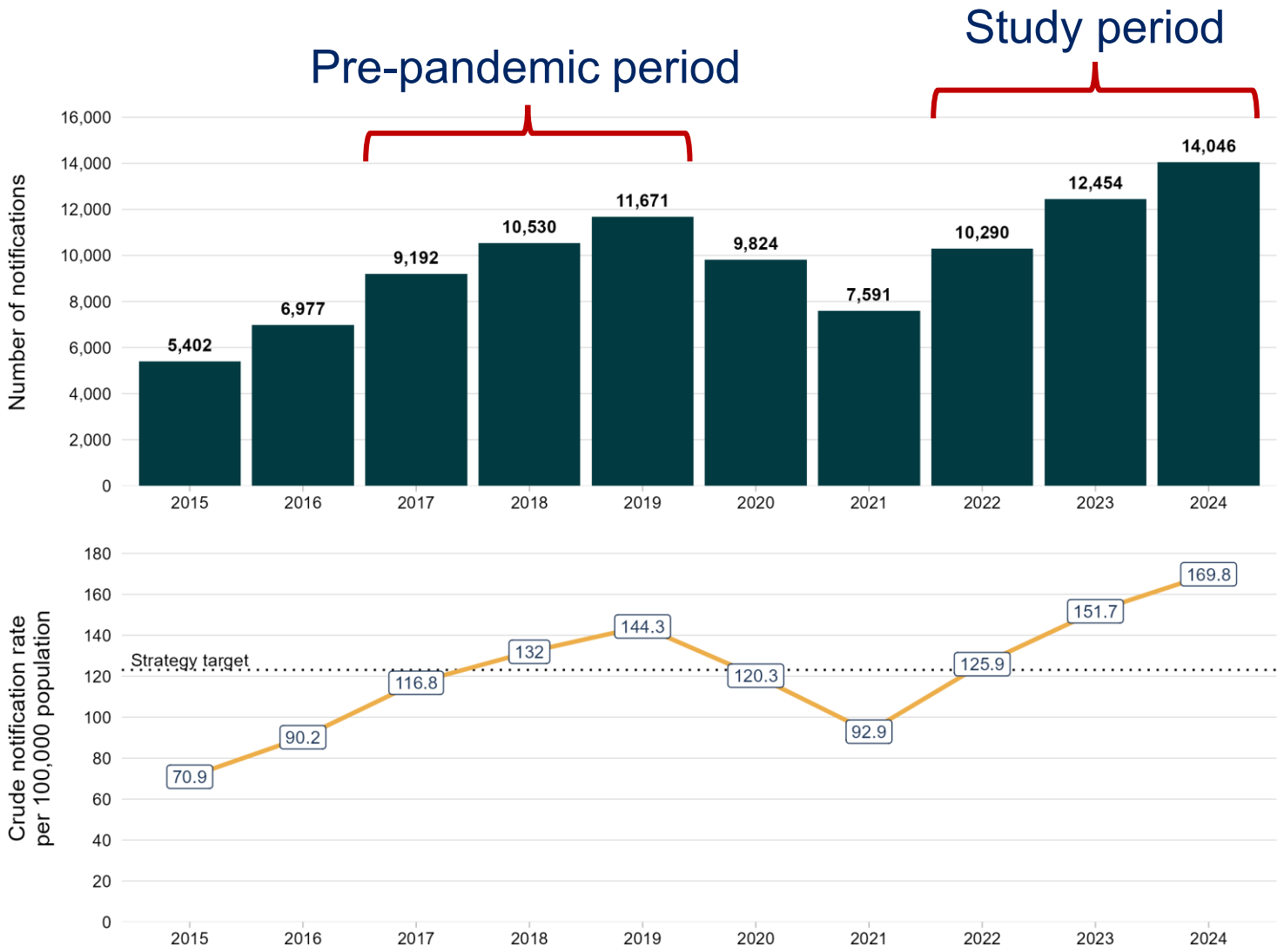
Follow-up

Has the patient been booked for a Test of Cure (ToC) or completed a ToC?

☐ Yes, scheduled Date ☐ No ☐ Unknown

☐ Yes, completed Date If completed, specify outcome (positive or negative):

Gonorrhoea notifications, NSW, 2015 to 2024



Data source: NCIMS, NSW Health and population projections, Department of Planning, Housing and Infrastructure (via SAPHaRI). Data extracted 8 April 2025. Note: Excludes non-NSW residents. Year of onset is based on calculated onset date.
The horizontal line represents the gonorrhoea target rate from the NSW Sexually Transmissible Infections Strategy 2022 – 2026 and represent a 5% decrease from the 2016-2019 peak rate.

Gonorrhoea notifications → culture positive → AMR of PHS, NSW

	Pre-pandemic 2017-2019		Study period 2022-2024	
	Total, n	**%**	**Total, n**	**%**
All NG notifications*	31,392	100.0	36,786	100.0
Female notifications	5,813	18.5	7,506	20.4
Male notifications	25,464	81.1	29,169	79.3
NG notifications with positive culture††*	9,700	31.5	9,941	27.0
Female notifications	1,427	24.5	1,695	22.6
Male notifications	8,433	33.1	8,209	28.1
NG AMR notifications of PHS†††	11	0.1	94	0.9
Female notifications	1	0.1	18	1.1
Male notifications	10	0.1	76	0.9

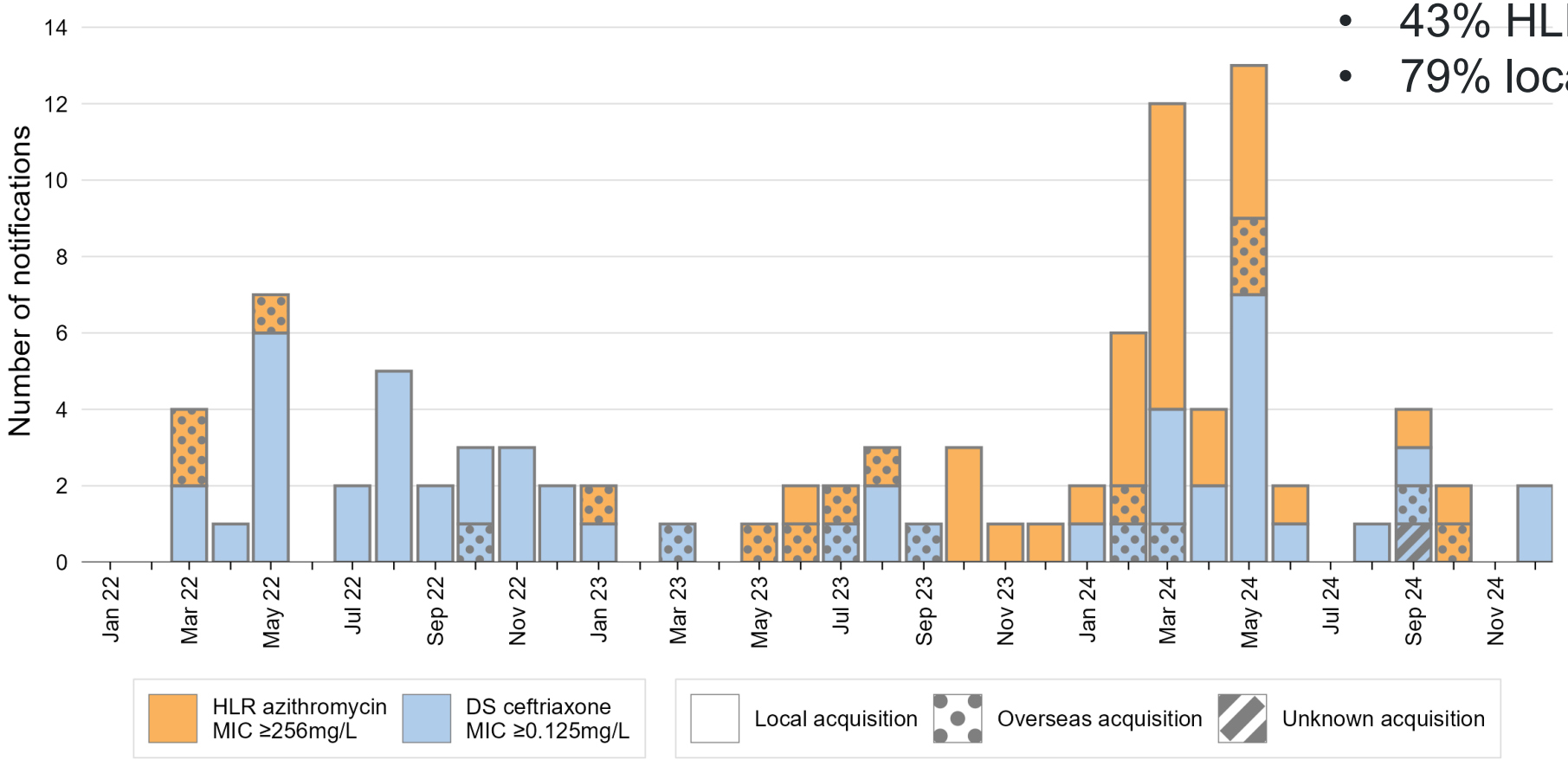
* includes persons whose sex was not reported, †† percentage calculated for all NG notifications, ††† percentage calculated from positive culture

Higher likelihood culture-positive notifications in study period meeting AMR of PHS case definition compared to pre-pandemic

OR=8.58, 95% CI 4.81-17.0

AMR gonorrhoea notifications of PHS, NSW, 1 January 2022 to 31 December 2024

- 94 notifications
- 57% DS ceftriaxone (blue)
- 43% HLR azithromycin (orange)
- 79% locally acquired

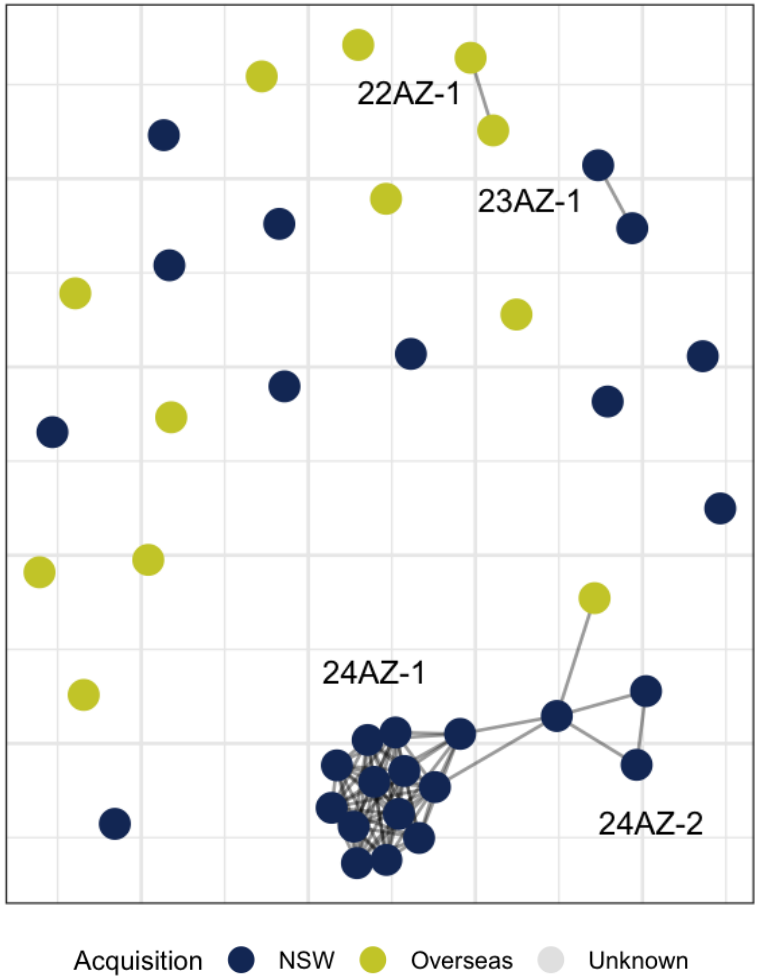


Data source: NCIMS (via SAPHaRI), NSW Health; data extracted 19 March 2025. Note: Excludes non-NSW residents. Year is based on earliest specimen date. Antimicrobial resistance is reported from antimicrobial susceptibility testing on culture conducted by Health Pathology-Randwick).

Case characteristics of AMR gonorrhoea of PHS, NSW, 1 January 2022 to 31 December 2024

Characteristic	Overall N = 94	DS ceftriaxone (MIC ≥ 0.125mg/L) N = 54	HLR azithromycin (MIC ≥ 256mg/L) N = 40	p-value
Age in years at diagnosis, median (Q1, Q3)	33 (25, 42)	36 (24, 43)	30 (27, 36)	0.12
Sex at birth				**<0.001**
Female	18 (19.1%)	17 (31.5%)	1 (2.5%)	
Male	76 (80.9%)	37 (68.5%)	39 (97.5%)	
Sexual risk group				**<0.001**
Heterosexual	41 (43.6%)	39 (72.2%)	2 (5.0%)	
MSM	49 (52.1%)	14 (25.9%)	35 (87.5%)	
Bisexual	4 (4.3%)	1 (1.9%)	3 (7.5%)	

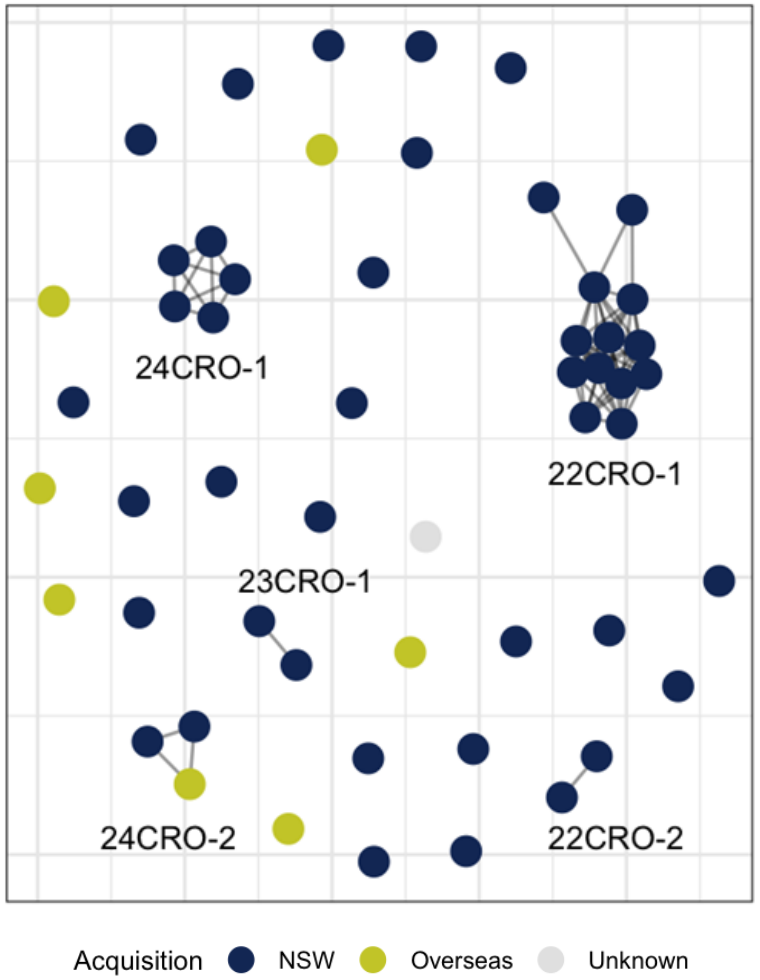
High level resistant (HLR) azithromycin



- Four clusters, ranging 2-13 isolates
- Largest cluster 24AZ-1, 13 isolates. Connected to 24AZ-2. 100% male, 100% GBMSM, three links to sex work/SOPVs, one overseas acquisition in China
- 22AZ-1, all MSM, overseas acquisition in South America
- 23AZ-1, all MSM

Characteristic	HLR azithromycin (MIC ≥ 256mg/L) N = 40
Source of infection (WHO regions)	
Australia	28 (70.0%)
Africa	1 (2.5%)
Americas	6 (15.0%)
Europe	3 (7.5%)
Western Pacific	2 (5.0%)

Decreased susceptibility (DS) to ceftriaxone



- Five clusters, ranging 2-13 isolates
- Largest cluster 22CRO-1*, 13 isolates – 92% heterosexual, five links to sex work
- 22CRO-1 & 23CRO-1, all MSM
- Two clusters in 2024, both *penA*60.001:
  - 24CRO-1 all heterosexuals, two links to sex work
  - 24CRO-2 all MSM, one overseas acquisition in Cambodia.

Characteristic	DS ceftriaxone (MIC ≥ 0.125mg/L) N = 54
Source of infection (WHO regions)	
Australia	46 (85.2%)
Western Pacific	7 (13.0%)
Unknown	1 (1.9%)

*van Hal SJ, Whiley DM, Le T, Ray S, Kundu RL, Kerr E, et al. Rapid expansion of Neisseria gonorrhoeae ST7827 clone in Australia, with variable ceftriaxone phenotype unexplained by genotype. J Antimicrob Chemother. 2023;78(9):2203-8. Epub 2023/07/15 21:05. doi: 10.1093/jac/dkad221. PubMed PMID: 37452731.

Follow-up, reinfection & treatment failure

Characteristic	Overall N = 94	DS ceftriaxone (MIC ≥ 0.125mg/L) N = 54	HLR azithromycin (MIC ≥ 256mg/L) N = 40	p-value
Outcome of initial ToC				0.14
Negative	81 (86.2%)	44 (81.5%)	37 (92.5%)	
Positive	4 (4.3%)	2 (3.7%)	2 (5.0%)	
Lost to follow-up	9 (9.6%)	8 (14.8%)	1 (2.5%)	

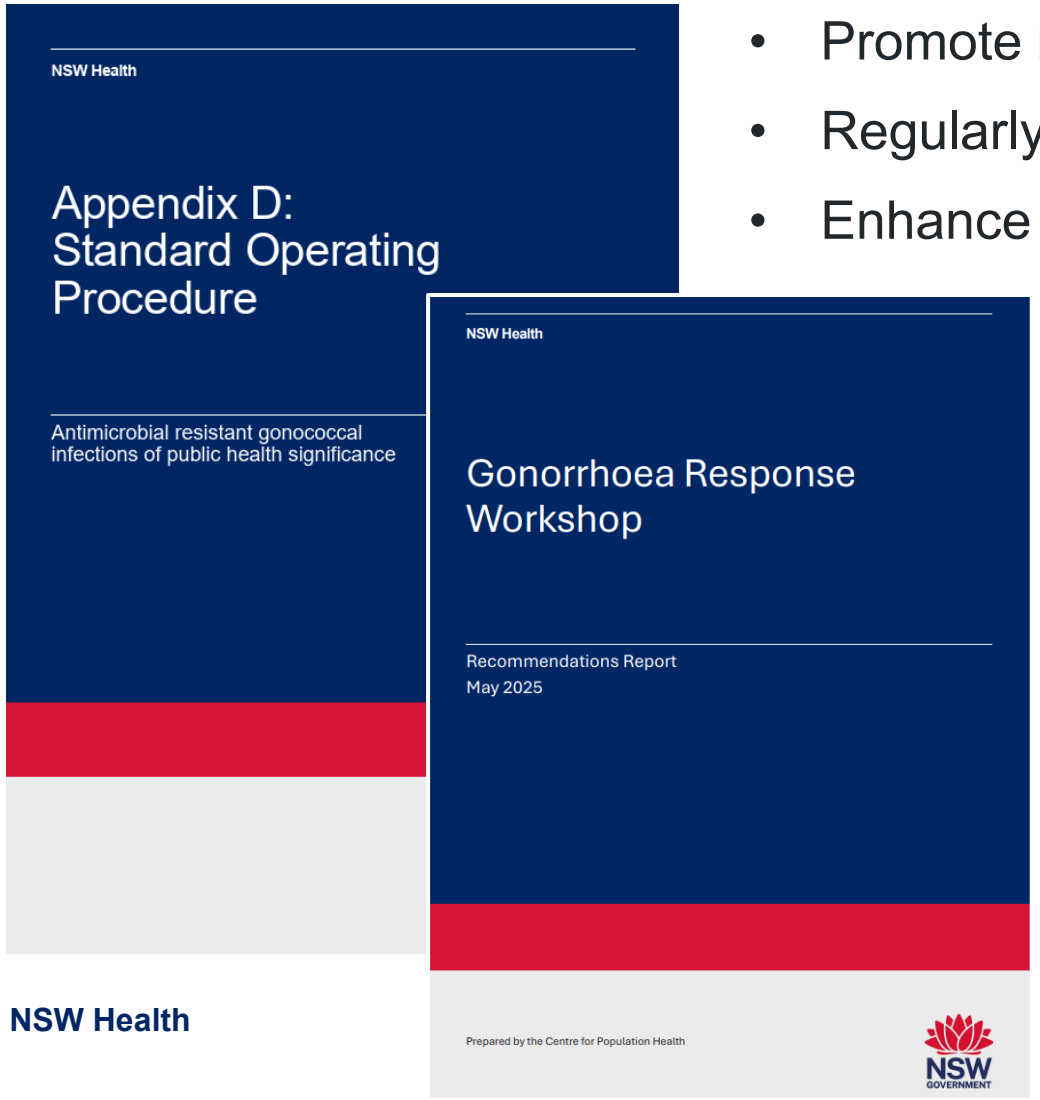
Findings

- Increasing numbers of AMR gonorrhoea of public health significance detected
- Almost 80% locally acquired
- HLR azithromycin cases:
  - 95% GBMSM
  - 70% local acquisition, overseas acquisition diverse
- DS ceftriaxone cases:
  - 30% female
  - 70% heterosexual
  - 85% local, overseas acquisition exclusively from Western Pacific (Cambodia, Vietnam, China)
- Genomics highlighted rapid expansion of clones, 22CRO-1 & 22AZ-1/2
- Cases lost to follow-up and treatment failure a concern
- Lack of public health procedure following positive ToC

Limitations

- No background isolates available to understand broader gonorrhoea transmission dynamics and persistence over time in NSW community
- Lack of data on contact tracing data inhibited understanding of contact tracing outcomes and subsequent tranmission

Gonorrhoea detection, management and AMR surveillance review



- Promote multi-site testing for all cases of AMR of PHS at ToC
- Regularly review AST processes – timeliness (private → ref lab)
- Enhance real-time communication between SHCs and PHUs

- Review methods to improve case follow-up
- Improve timeliness of genomic data
- Improve sharing of epidemiologic and genomic data, including with SHCs
- Improve documentation of treatment failure, with isolates followed-up for WGS
- Culture-based surveillance with robust case management protocols remains the best approach to detect and minimise transmission