Gonorrhoea

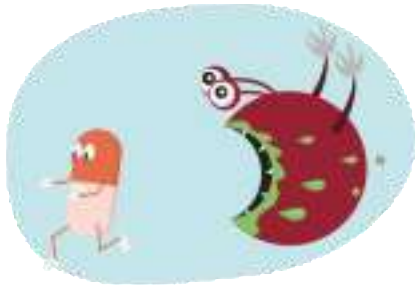
Introduction

Methods

Results

Conclusions

* CDC/ Dr. Norman Jacobs



Epidemiology

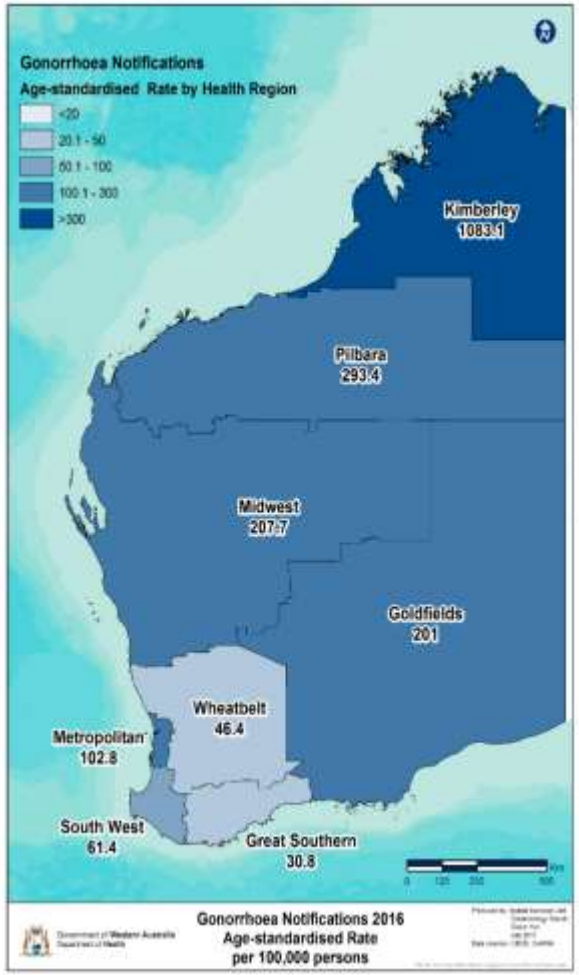
Introduction

Methods

Results

Conclusions

- Estimated to cause 78 million new infections worldwide.
- The highest estimates were in Western Pacific Region including Australia at 32 million.
- 2016, notification rate 31% higher in Western Australia compared to the national rate. [1]
- The notification rate higher in the Kimberley region than in other parts of WA. [1]



Gonorrhoea notifications by health region, WA, 2016 [1]

1. Mitchell K, et al. (2017), Department of Health WA.
2. Lahra MM, Enriquez RP (2017), Communicable Diseases Intelligence E60-67.

Antimicrobial resistance (AMR)

THE UNIVERSITY OF WESTERN AUSTRALIA

Introduction

Methods

Results

Conclusions

- The rates of antimicrobial resistance (AMR) is very high in major population centers.
- The remote community isolates have low rates of AMR.
- Identifying introduction of AMR strains to remote regions is crucial.
- Recent introduction of two completely resistance strains into Australia.

Proportion of AMR in gonococcal isolates, Australia, 2015. [2]

State or territory	Decreased susceptibility %	Resistance %	
	Ceftriaxone	Azithromycin	Penicillin
ACT	0.0	0.0	33.3
NSW	2.7	2.3	30.9
QLD	1.0	5.8	27.6
SA	3.6	2.8	20.7
TAS	0.0	4.3	8.7
VIC	1.5	1.8	15.2
NT/ Urban	0.0	0.0	14.5
NT/ Remote & Rural	0.0	0.0	2.2
WA/Urban & Rural	1.3	3.8	19.5
WA/Remote	0.0	0.0	2.3
Australia	1.8	2.6	22.5

2. Lahra MM, Enriquez RP (2017), Communicable Diseases Intelligence E60-67

AMR detection and Surveillance

Introduction

Methods

Results

Conclusions

- Culture is the most reliable method for phenotypic AMR detection in *N. gonorrhoeae.*
- Culture positivity rate is very low.
- Point of care testing increasingly replacing culture in Australia and in remote regions. (GeneXpert CT/NG).
- These tests can detect *N. gonorrhoeae* without indication of AMR.
- There are some molecular test that can predict AMR (without the need of viable isolates) used by the Australian gonococcal surveillance program.
- No point of care tests available to detect AMS.

Hypothesis

- **The circulating strains of *N. gonorrhoeae* in remote areas in WA may have a different genetic profile than those found in the regions with increasing antibiotic resistance.**

- **This could help in developing novel diagnostic tests to detect sensitivity in *N. gonorrhoeae* from remote settings and enhance surveillance program.**

Genomic epidemiology of *Neisseria gonorrhoeae* from **remote highly endemic** Western Australian populations and implications for public health surveillance

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Assoc/Prof Charlene Kahler

Professor Geoff Coombs

Assoc/Prof Michael Wise

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18 May 2018

WA Sexual Health and Blood-borne Virus Applied Research and Evaluation Network

Project Aim

Use WGS data analysis of *N. gonorrhoeae* isolates in Western Australia to investigate differences between isolates circulating in remote WA vs. WA metropolitan areas.

Methodology

59 NG isolates WA (2011-2013)

Whole-genome sequencing

MiSeq (illumina®)

MLST, NG-MAST and NG-STAR

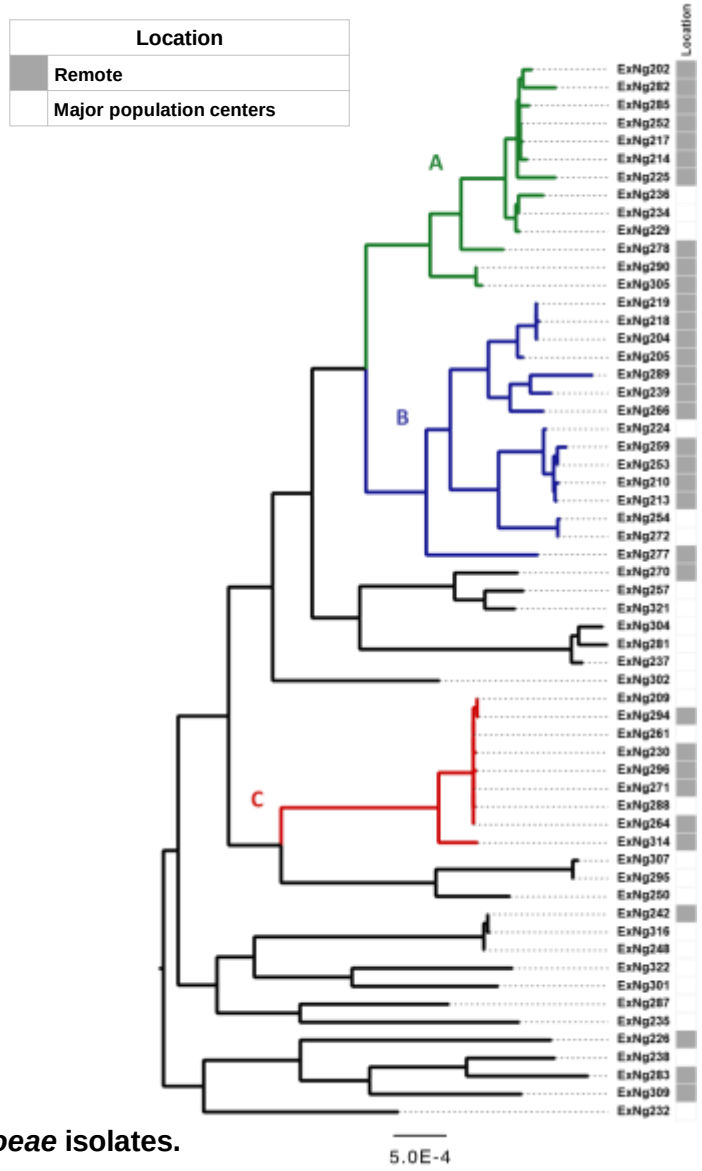
Core genome

Phylogenetic analysis

1000 NG from PubMLST https://pubmlst.org/

Core genome phylogeny

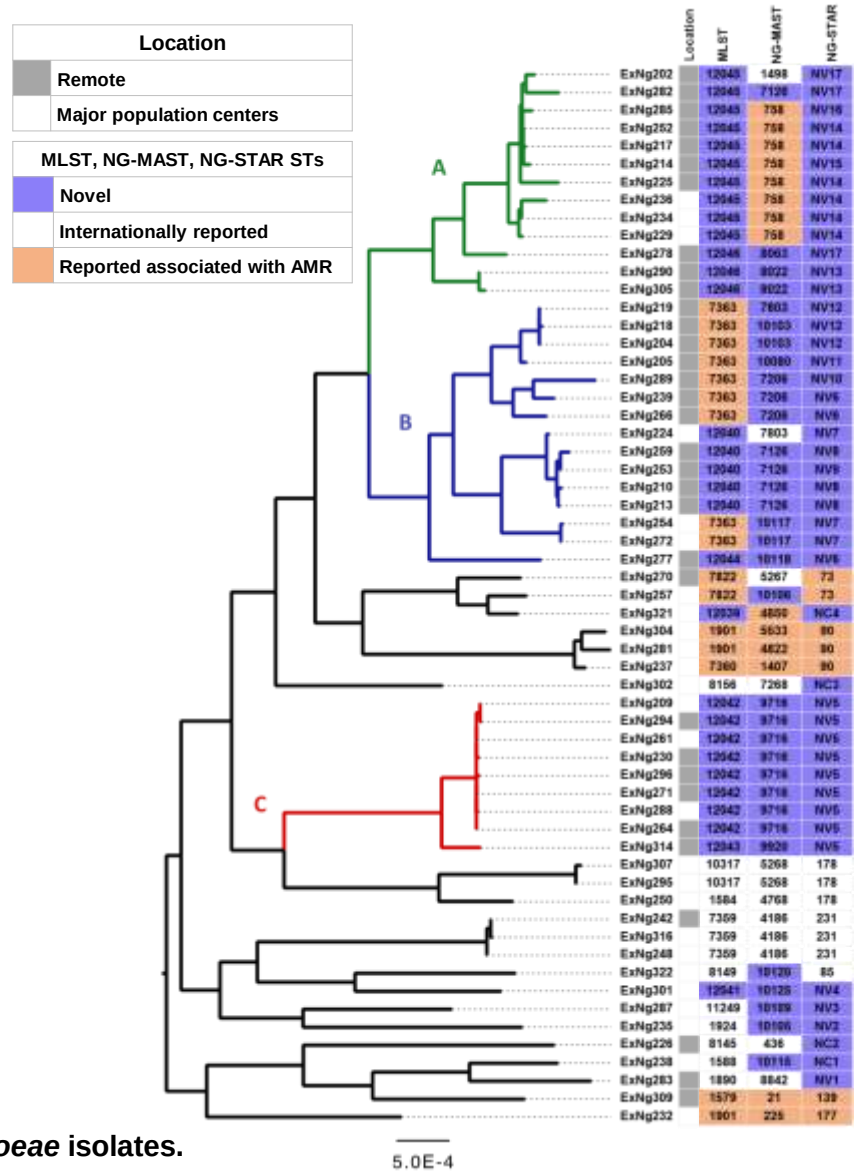
- The core genome phylogeny was constructed using 1427 genes, determined using the genome comparator tool at PubMLST database.
- Three main clusters were identified, A, B and C (associated with remote isolates).



Core genome phylogeny of 59 WA *N. gonorrhoeae* isolates.

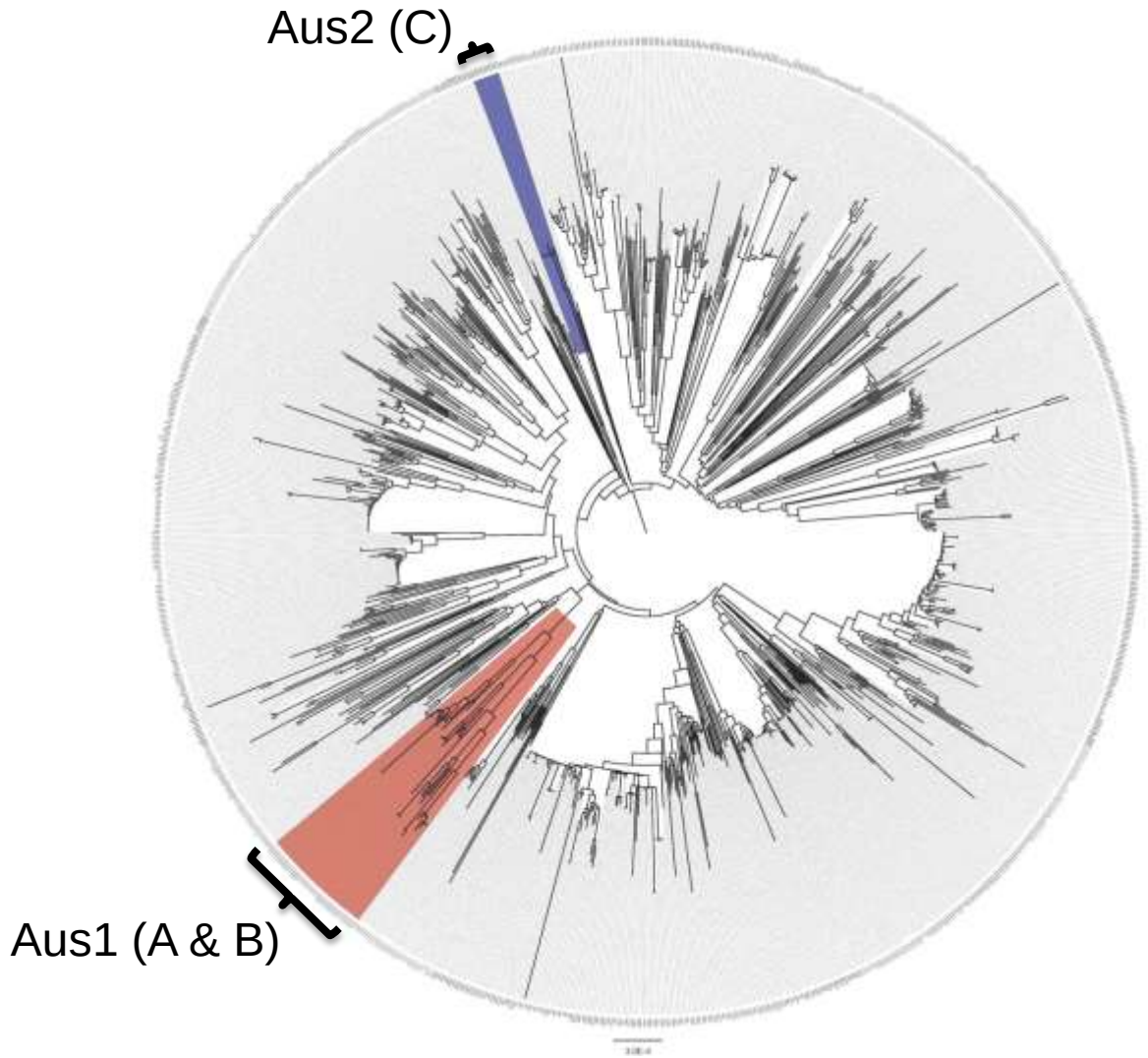
Core genome phylogeny

- The core genome phylogeny was constructed using 1427 genes, determined using the genome comparator tool at PubMLST database.
- Three main clusters were identified, A, B and C (associated with remote isolates).
- Novel sequence types were mostly found in remote areas.



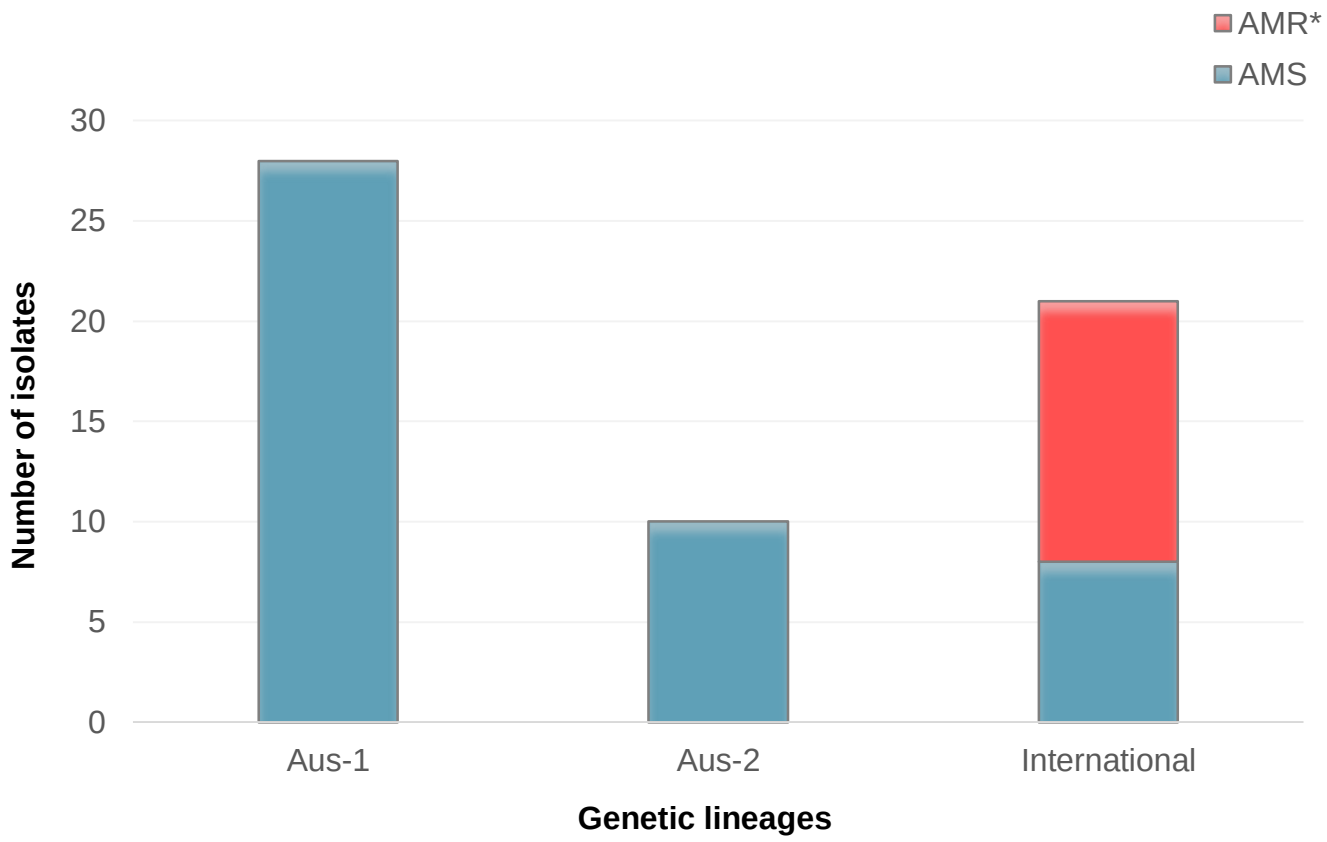
Core genome phylogeny of 59 WA *N. gonorrhoeae* isolates.

Aus1 and Aus2 formed two unique clusters when compared to 1000 *N. gonorrhoeae* isolates.



Core genome phylogeny of 1053 *N. gonorrhoeae* isolates from pubMLST database.

AMR profiles and genetic linages



* Resistant to at least one antimicrobial agent currently used for treating gonorrhoea (penicillin, ceftriaxone, ciprofloxacin or/and azithromycin).

Conclusions

- The notification rate of gonorrhoea is very high in remote regions in WA.
- WGS to analyze genomic diversity of *N. gonorrhoeae* isolates from remote WA vs. Metropolitan Perth.
- The strains circulating in remote regions are unique and not associated with AMR.
- Design point of care test to detect antimicrobial sensitive lineages of *N. gonorrhoeae* in remote settings.
    - Better identification of AMR strains.
    - Personalized treatment.
    - Prevention of treatment failure and further spread of these lineages.
- Ongoing surveillance is essential to ensure the enduring efficacy of the empiric treatment in the remote regions of WA.

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Thank you

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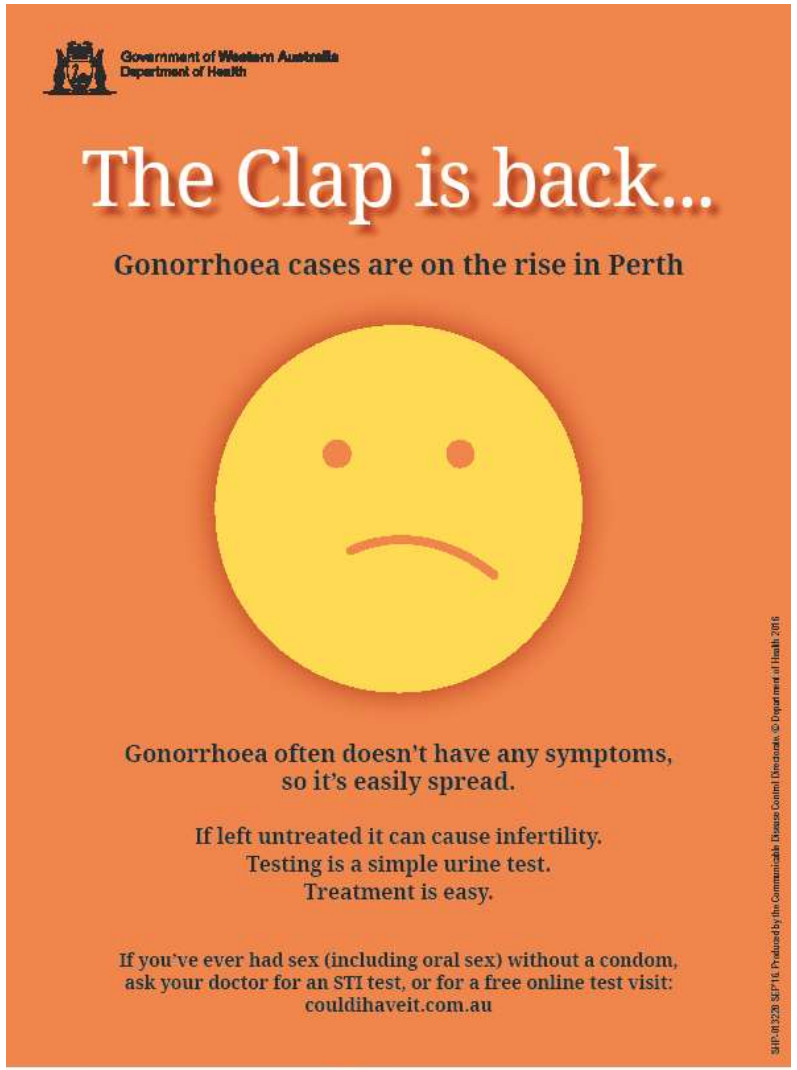
WA Sexual Health and Blood-borne Virus Applied Research and Evaluation Network


Government of Western Australia
Department of Health
The Clap is back...
Gonorrhoea cases are on the rise in Perth
Gonorrhoea often doesn't have any symptoms,
so it's easily spread.
If left untreated it can cause infertility.
Testing is a simple urine test.
Treatment is easy.
If you've ever had sex (including oral sex) without a condom,
ask your doctor for an STI test, or for a free online test visit:
couldihaveit.com.au
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Could I have it.com.au