

Harnessing molecular technology to inform our understanding of HIV and STI epidemics

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No competing interests

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Outline

- What is molecular epidemiology?
- Case study #1: gonorrhoea outbreak investigation
- Case study #2: HIV sexual networks
- Limitations
- Future projections

How do we investigate and control HIV & STI epidemics?

- Time
- Person
- Place



- Identify risk factors
- Identify people at risk
- Develop and target public health interventions



Molecular typing data

- DNA
- RNA
- Proteins

Molecular epidemiology

Principles

- Molecular changes over time due to mutations
- Pathogens with similar molecular data are likely to be related

Application

- Look at the similarities and differences of the molecular data between samples under investigation
- Use this information to group and compare samples

Public health application

Systematic review:

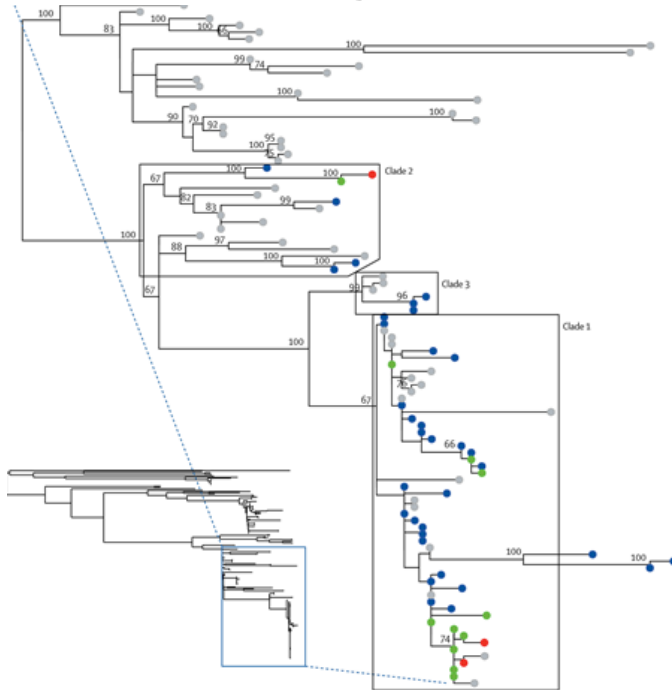
How have *Neisseria gonorrhoeae* molecular typing data have been used to understand sexual networks?

Town *et al.* 2018 Journal of Infection (*in press*)

- Outbreak investigation
- Sexual partner tracing
- Describe the composition of sexual networks
- Targeted health promotion/behavioural interventions
- Antibiotic selection for patient management

Outbreak investigation

Sustained transmission of high-level azithromycin resistant *Neisseria gonorrhoeae* in England



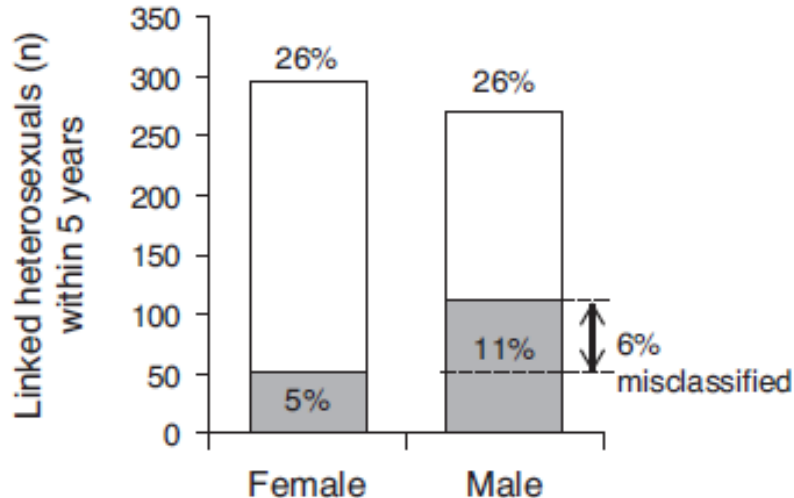
- Confirmation of outbreak as all isolates genetically closely related

Fifer *et al.* Lancet ID. 2018

Composition of sexual networks

Phylogenetic analyses reveal HIV-1 infections between men misclassified as heterosexual transmissions

- Identified HIV transmission clusters
- Described patients in these clusters by sexual orientation and gender



- 5% of heterosexual women clustered only with MSM
- 11% of heterosexual men clustered only with MSM
- 6% possible misclassification of heterosexual men

Limitations

- Sample
- Clustering techniques & thresholds

Future projections

- Cheaper and faster techniques
- More data, more pathogens

Summary

- Molecular typing data support, not replace, traditional epidemiological data
- Can provide more detail about dynamics of the transmission network
- Future focus should be on evaluating the use of these data in public health interventions

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