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

Molecular typing data
- DNA
- RNA
- Proteins

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

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

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

Huè et al. AIDS. 2014
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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