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GAS exposure & progression to ARF and RHD

Jane Oliver, Sally Thomas, Susan Jack, Jane Zhang, Michael Baker

University of Otago

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Outline

- GAS infection across ethnic groups
 - Throat
 - Skin
- Risk of progression GAS \rightarrow ARF
 - Throat
 - Skin
- Effect of oral antibiotics on GAS \rightarrow ARF

• Risk of progression:

ARF hosp \rightarrow ARF recurrence, RHD, circulatory death

Progression / Pathophysiology



GAS skin infection eg Impetigo

Methods

• GAS exposure data sources

- Laboratory throat swab and skin swab culture data, community labs (Labtests), Auckland Region (pop= 1.5 million), 2010-2017
- Disease outcome data sources
 - Hospitalisation data on initial admissions for ARF (ICD-9: 309-392, ICD-10: 100, 101, 102)
 - RHD hosp (ICD-9: 393-398, ICD-10: I05-I08)
 - Circulatory disease mortality data (ICD-9: 390-459, ICD-10: 100-1052)
 - Linked using unique patient number (encrypted NHI)

GAS infection - Throat



Similar proportion of GAS+ throat swabs for Māori and Pacific and European/Other, lower for Asian



GAS infection - Skin



Markedly higher proportion GAS+ skin swabs for Māori and Pacific compared with European/Other and Asian



Age in years by ethnicity

Progression GAS +ve throat swab to ARF

Children 10-19 years, ARF risk 8-90 days after GAS+ve throat swab compared with Strep-ve swab:

- Māori + Pacific: **RR Significantly increased**
- Māori 10-19yrs, 8-90 days: **RR Significantly increased**
- Pacific 10-19yrs, 8-90 days: RR Significantly increased

ARF per 100,000 throat swabs by days from collection to ARF, children **10-19 years, Māori & Pacific** ethnicity, Auckland 2010-17





Progression GAS +ve skin swab to ARF



Children 10-19 years, ARF risk 8-90 days after GAS+ve skin swab compared with Strep-ve swabs:

- Māori + Pacific: **RR Significantly increased**
- Māori 10-19yrs, 8-90 days: RR not calculable
- Pacific 10-19yrs, 8-90 days: RR increased, but not significant



Effect of oral antibiotics on GAS \rightarrow ARF

Link swab data to antibiotic dispensing event (PHARMS dataset) within 7 days of swab collection, Primary health care

Māori + Pacific aged 5-19 years, ARF risk 8-90 days after

GAS <u>throat</u> detection, compared with Strep –ve swabs:

- No antibiotic dispensing event: RR Significantly increased
- Linked antibiotic dispensing event: RR Significantly increased

GAS <u>skin</u> detection, compared with Strep –ve swabs:

- No linked antibiotic dispensing event: RR not significantly increased
- Linked antibiotic dispensing event: RR not significantly increased







Progression ARF to RHD, etc.

- 2,182 initial ARF hospitalisations 1989-2012 for people born >1984, Auckland (ICD coding, NMDS)
- Identified ARF recurrence hosp, RHD hosp. & circulatory deaths up to end 2015
- 36% probability of poor health outcome within 9,791 days



Progression ARF to RHD, etc.

Progression risk

- 7.9% experienced ARF recurrence
- 8.2% developed RHD, 8 cases died of cardiovascular causes
- Most (84.9%) of 2,182 cases survived & not hospitalised with recurrence/ RHD by end 2015

Note 15% cases progressing is not same as 36% probability of progression in last slide (which considers a hypothetical 9,791 days of follow-up for everyone)

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Progression ARF to RHD, etc.

Progression risk by population group

- Female significantly higher risk disease progression, and shorter time
- Māori and Pacific both had a significantly higher risk of disease progression and shorter time compared with European/Others



Summary

- GAS prevalence shows marked ethnic differences for skin infections (Māori & Pacific >> European/Other) but not throat
- GAS+ swabs associated with marked 个 ARF risk in following 8-90 days for Māori and Pacific children.
 Progression risk ~ 0.1% per GAS infection
- Oral antibiotic dispensing **not** associated with reduced risk of ARF progression following GAS+ throat swab
- Progression risk following ARF shows higher risk for Māori, Pacific, & women

Implications

1. GAS skin infections may play important role in ARF pathogenesis & drivers of ethnic inequalities

→ Treat GAS skin infections in Māori & Pacific babies and children to reduce ARF risk?

- 2. Investigate effectiveness of oral antibiotic treatment for GAS throat infections & consider injectables
- 3. Address ethnic inequities in secondary prophylaxis & monitoring for Māori & Pacific ARF patients

