# Community onset invasive bacterial infections in infants under three months of age - Auckland experience over 10 years

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## Background

- Serious infections remain the leading cause of death in the first year of life[1]
- Sepsis in neonatal intensive care units is well described but infants with bacterial infections presenting from the community has not previously been described in New Zealand
- Recent studies suggest increasing incidence of *Staphylococcus aureus* and *Streptococcus pyogenes* in New Zealand paediatric populations[2,3]
- It is, therefore, important to understand the unique pattern of infections seen in the infant population in New Zealand as this may impact on empiric management

## Aims

1. To describe the organisms causing community onset invasive bacterial infections in infants in the Auckland region
2. To identify characteristics of infants at highest risk of serious bacterial infections
3. To assess the appropriateness of current empiric antibiotic guidelines in this age group

## Methods

**Inclusion criteria**

- Admitted to Starship Hospital between 2007-2017
- Aged 8-90 days at time of admission
- Invasive infections, defined as positive culture from a sterile site (eg. blood, cerebrospinal fluid, effusions or deep abscesses)

**Exclusion criteria**

- NICU admission
- Hospital admission >48 hours prior to positive sample
- Transfers from other hospitals
- Likely contaminants - defined as known commensals[4] not treated by the managing team

Laboratory databases and hospital discharge coding were extracted. Data collection was performed through electronic patient records

Expedited ethics HDEC 17/NTA/48. Locality approval: ADHB A+7565, CMDHB #568

## Results

**Rates of invasive bacterial infections in infants in Auckland**

| | Number of cases | Rates per 100,000 live births |
|---|---|---|
| Total invasive infections | 192 | 129 |
| Bacteraemias | 178 | 120 |
| CNS infections | 28 | 19 |
| Bone and joint infections | 14 | 9 |

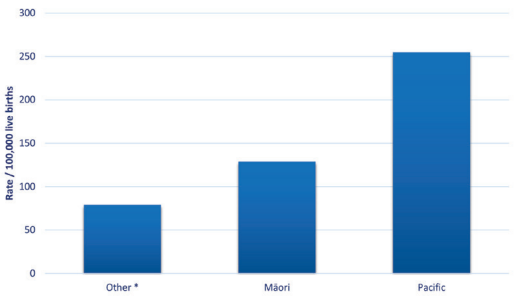
**Other**

- Sub periosteal mastoid abscess
- Pleural empyema
- Peritoneal fluid
- Deep abscesses (liver and abdomen)

**Four antimicrobial resistant organisms (2% of cases) were identified.**

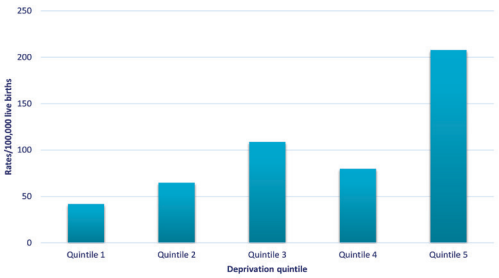
- 3 Methicillin resistant Staphylococcus aureus (MRSA)
- 1 Extended spectrum β-lactamase producer (ESBL)
- These organisms led to a 48 hour delay in instituting effective antibiotic treatment

**Rates of Invasive Bacterial Infections by Ethnicity**

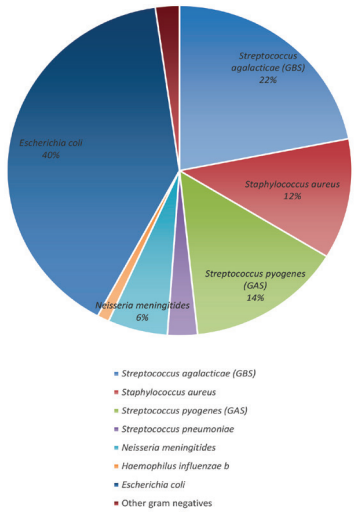



*NZ European, Asian, Indian, Middle Eastern, European, African

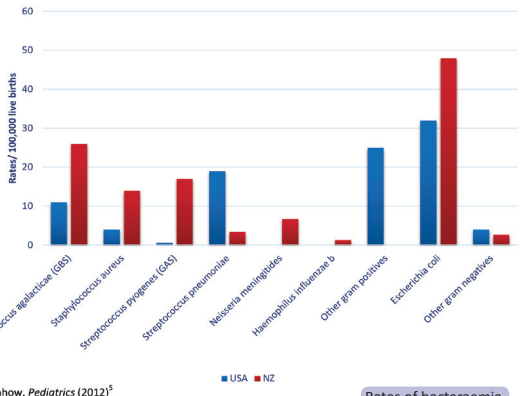
**Rates of Invasive Bacterial Infections by Deprivation Quintile**




**Proportion of Bacteraemias by Organism N = 178**




**Pathogen-specific incidence: NZ vs US***




*Greenhow, *Pediatrics* (2012)[5]

Rates of bacteraemia
USA 57/100,000
NZ 120/100,000

## Conclusions

E. coli and Group B Streptococcus are the commonest causative organisms in community infant sepsis in Auckland.

Rates of invasive bacterial infections in this age group are higher than reported in the USA, with *Staphylococcus aureus* and *Streptococcus pyogenes* being the most disproportionate.

Our study demonstrates the risk of invasive *Staphylococcus aureus* and *Streptococcus pyogenes* in New Zealand even at this early age and this impacts on empiric antibiotic prescribing and management of infant sepsis in New Zealand.

The risk of invasive infection is highest Pacific and Māori infants and those from deprived backgrounds.

Resistant organisms were present in this age group, prior to antibiotic exposure, illustrating that rising rates of community antimicrobial resistance will need to be considered even when prescribing for infants.

**References**

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