# Infective endocarditis in children in Queensland, Australia – risk factors are healthcare exposure, congenital heart disease and Indigenous status

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## Introduction

The reported predominant risk factor for infective endocarditis (IE) in studies of children in high resource countries has transitioned from rheumatic heart disease (RHD) to healthcare exposure[1]. This study reports the epidemiology, clinical features, microorganisms and outcomes of IE in a subgroup of children from Queensland, Australia.

## Method

Queensland children (0-18 years) with IE presenting to Queensland Children's Hospital from the opening of the hospital in November 2014 until December 2017 were identified through searches of the Queensland Paediatric Cardiac Service database.

## Results

- Twenty children with IE were identified: 11 males and 9 females (*Table 1*).
- Mean age was 7.9 years (range 8 months to 16 years).
- Three (15%) were of Aboriginal/Torres Strait Islander ethnicity.
- Thirteen (65%) had healthcare-associated IE.
- Twelve (60%) had underlying cardiac pathology.
- No children had rheumatic heart disease.
- Fever occurred in 17 (85%) and murmurs in 16 (80%) Other clinical features included splenomegaly (1), cutaneous signs (3), heart failure (3) and impaired neurology (4).
- In 19 children (95%) a causative organism was identified (*Figure 1*)
- Only one case was caused by methicillin resistant *Staphylococcus aureus* (*S.aureus*) (MRSA) (12.5% of S. aureus cases) consistent with an MRSA rate of 11.7% in all community associated isolates of *S.aureus* in Queensland[2]. There was no fungal IE.
- Median duration of antibiotics was 46 days (range 28-112 days). For the seven patients with methicillin sensitive *S.aureus* (MSSA), flucloxacillin (6) was the most commonly used antibiotic, with meropenem used for one child who was allergic to penicillin. Adjunctive antibiotics for the children with MSSA-IE included rifampicin, gentamicin and lincomycin.
- Surgery was performed for seven children (35%): vegetation resection and valve repairs (2), right ventricle-pulmonary artery (RV-PA) conduit replacements (2), excision of mitral valve vegetations (1), truncal valve replacement (1) and removal of an implantable cardioverter defibrillator (ICD) (1).
- There were no deaths from IE. There were significant hospital stays, with mean length of hospitalisation being 49 days (range 20-121 days).

***Table 1: Characteristics of infective endocarditis episodes according to cardiac status (n=20).***

| | Total (20) | CHD* (11) | AHD (1) | Normal heart (8) |
|---|---|---|---|---|
| Male | 11 (55%) | 6 (54.5%) | 1 (100%) | 4 (50%) |
| Mean age (years) (range 8 mths–16yrs) | 8 | 6 | 12 | 10 |
| Indigenous status | 3 (15%) | 3 (27.3%) | 0 | 0 |
| Healthcare-associated | 13 (65%) | 9 (81.8%) | 1 (100%) | 3 (37.5%) |
| Previous IE | 1 (5%) | 1 (9.1%) | 0 | 0 |
| S. aureus | 8 (40%) | 2 (18.2%) | 1 (100%) | 5 (62.5%) |
| Unknown pathogen | 1 (5%) | 0 | 0 | 1 (12.5%) |
| Duke definite | 12 (60%) | 6 (54.5%) | 1 (100%) | 5 (62.5%) |
| Surgery for IE | 7 (35%) | 3 (27.2%) | 1 (100%) | 3 (37.5%) |
| Mean hospitalisation (days) | 49 | 52 | 35 | 46 |
| Death | 0 | 0 | 0 | 0 |

**CHD: Congenital heart disease N = 11. Truncus arteriosus (3), Tetralogy of Fallot (2), Pulmonary atresia with ventricular septal defect (2), Single ventricle hypoplastic left heart syndrome (2), Total anomalous pulmonary venous drainage (1), ventricular septal defect (1). AHD: Acquired heart disease*

## Discussion

These results are consistent with reports from other high resource regions, with respect to epidemiology, risk factors, clinical features and causative organisms[1]. An unexpected finding was the absence of RHD as a risk factor given the relatively high RHD incidence in Australia[3].

Indigenous Australians were disproportionately represented; Aboriginal and Torres Strait Islander peoples make up 4% of the Queensland population[4], yet represented 15% of cases.

Only one *S.aureus* case was methicillin resistant (12.5% of *S.aureus* cases), consistent with MRSA rate of 11.7% in Queensland *S.aureus* bacteremia isolates.

There were no deaths among the 20 children studied.

***Figure 1: Causative organisms for infective endocarditis in children (n=20) 2014-2017.***




## Conclusion

IE in this subgroup of Queensland children reflects international trends which include association with CHD and invasive healthcare interventions with *S.aureus* the most common causative organism. Indigenous children are at increased risk despite lack of association with RHD.

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