Epidemiology of Childhood Bone and Joint disease during the COVID-19 pandemic in New Zealand

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INTRODUCTION: It is unknown whether social distancing impacts frequency of presentation and severity of childhood bone and joint infection (BJI). In March 2020 New Zealand responded to the COVID-19 pandemic by initiating one of the strictest lockdowns worldwide. Known as going 'hard' and 'early', the goal was to eliminate community spread of the virus. Community restrictions did not formally lift for more than two and a half years, in September 2022. Examination of this period may provide insight around risk factors for BJI.

METHODS: A retrospective review of all patients <16 years with presumed acute haematogenous osteomyelitis (AHO) or septic arthritis (SA) treated in the Auckland region was performed between 2018-2023. Frequency and severity of presentations has been examined before, during, and after periods of social restriction. Severe cases included those with intensive care admission, recurrent infection, or multiple surgeries. Pre-hospital experience, length of stay, and disease outcomes have also been assessed.

RESULTS: A total of 563 cases met inclusion criteria. Compared to the pre-pandemic period, monthly case averages reduced between April 2020 to September 2022 (10.1 vs 7.9 cases/month, p=0.008). Considering the entire cohort, almost half of children reported a recent viral illness before being diagnosed with BJI (46%). Separating cases by causative microbiology shows a statistically significant drop in culture negative and Kingella kingae mediated BJI cases (4.2 vs 2.9 cases/month, p=0.006) but not for cases secondary to Staphylococcus aureus and Streptococcus pyogenes (4.2 vs. 3.9 cases/month, p=0.6). The frequency of severe disease reduced during this period (5.6 vs 4.1 cases/month, p=0.01).

Median length of stay and number of outpatient clinics were not statistically different. However, the number of children who experienced recurrent or chronic infection reduced significantly from pre-pandemic period (9% vs. 4%, p=0.03). **DISCUSSION AND CONCLUSION:**

We have shown that the COVID-19 management strategy in New Zealand coincided with reduction in frequency and severity of presentations for childhood BJI. The two major strengths of our research include unique study setting and thorough evaluation of individual-level data. Compared to other high-income countries, NZ experienced negative excess mortality. The elimination strategy was austere, effective, and relied on radical changes in social structure.

Improved hygiene and mask wearing may have contributed to the reduction in culture negative cases. Recent studies have hypothesised that the majority of culture negative BJI may be attributable to K. kingae, particularly in younger children. This organism is transmitted via respiratory secretions and saliva. Like other respiratory pathogens, the transmission is effectively lowered by mask wearing.

A reduction in culture-positive disease secondary to S. aureus or S. pyogenes may be in part a direct consequence of reduced skin contact in this period of social isolation. Family gatherings, reduced school and day care attendance, and public social distancing all occurred during the study period. However, another proposed aetiology of infection suggests that GAS or Staphylococcal infections can be concomitant with respiratory viruses. Importantly, this means that a viral infection may play a role in converting colonisation to invasive disease.

Overall, this study provides new insight into risks for transmission and aetiology of childhood BJI. Further research is necessary to develop strategies which reduce incidence and severity of these potentially life and limb threatening infections.









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