NATIONWIDE SURVEILLANCE OF PAEDIATRIC EMPYEMA 2014 - 2016 – preliminary results

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BACKGROUND

- Empyema is a rare yet serious complication of childhood pneumonia involving the accumulation of infected fluid in the pleural space
- Mortality in children is low but significant morbidity and cost are associated with potential for surgical intervention, prolonged hospital stay and intensive care
- Incidence of paediatric empyema appears to be increasing worldwide and is occurring despite reductions in pneumonia and invasive pneumococcal disease associated with conjugate pneumococcal vaccine (PCV)[1]
- *Streptococcus pneumoniae* is the most common causative organism in developed countries worldwide although *Staphylococcus aureus* plays an important role in New Zealand.[2,3]

AIMS

- To document the burden of empyema in children aged <15 years in New Zealand including infectious aetiology, demographic and underlying conditions
- To describe surgical and medical management, complications and short term outcomes

METHODS

- Cases of empyema in children aged 0-14 years admitted to hospital were notified to the New Zealand Paediatric Surveillance Unit (NZPSU) 1st May 2014 through to 1st June 2016.
- Clinician questionnaires were used to collect demographics, underlying conditions, management, laboratory results, complications and short term outcomes.

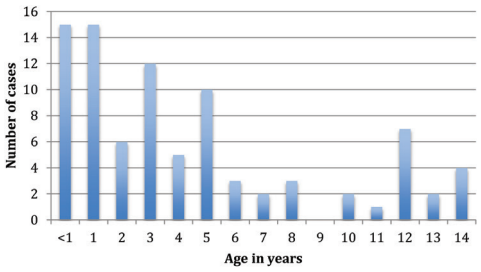
RESULTS

- **117 notifications were received with 99 fulfilling the case definition and complete data available for 87 cases (88%)**
- **Annual incidence of empyema related hospitalisations was 5.2/100,000 in children <15 years**

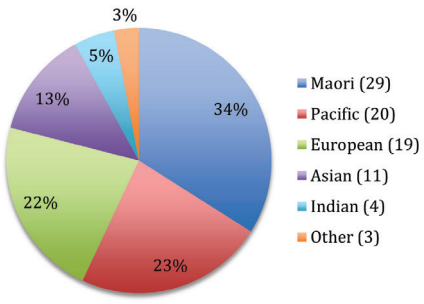
Demographics:

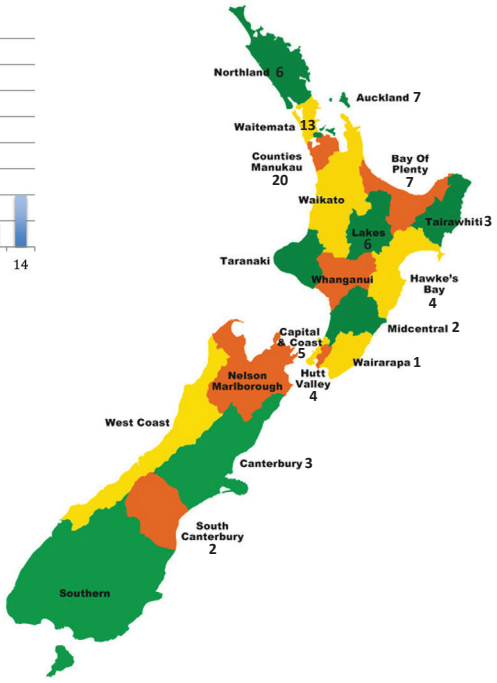
- Even gender distribution (55% male)
- Median age at hospitalization 3.8 years (range 2 months to 14.9 years)
- 61% aged < 5yrs
- 46% of cases lived in the greater Auckland area (50% CMDHB, 32.5% WDHB, 17.5% ADHB) (map of NZ with numbers)
- Immunisation status for Hib was 98% for the 80 in whom data was available. 52/87 (60%) children had received ≥3 doses of PCV. Influenza vaccination uptake was low (<1%)
- 22% of children were identified as having another medical condition ranging from mild asthma or eczema to immune-compromising conditions (such as Type 1 DM, neuroblastoma or polyarticular JIA on etanercept)

Age at presentation with empyema (N=87)



Prioritised ethnicity of empyema cases (N=87)





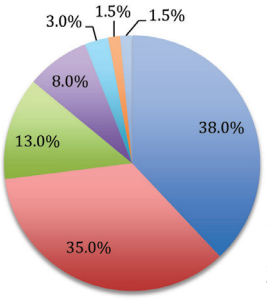
Management:

- 72/87 (83)% required surgical intervention including pleural aspirate alone, pleural drain, pleural drain+fibrinolytic, Video Assisted Thoracoscopic Surgery (VATS) or open thoracotomy
- 15/87 (17%) were managed conservatively with IV antibiotics alone
- At diagnosis 76/87 (87%) of cases were treated with empiric antibiotics in line with clinical guidelines[4,5]

Microbiology:

- Causative organism was detected from a sterile site in 72% of cases
- Of the 63 organisms detected (via culture, PCR, antigen detection), *S. pneumoniae* was the most common organism followed by *S. aureus* and *S. pyogenes*

Organisms detected in sterile sites in hospitalised empyema cases (N=63)



(a) 4/22 (18%) S.aureus isolates were methicillin resistant (MRSA)
(b) Oral streptococci (n=5) consisted of S. constellatus (3), S. oralis (1), S.intermedius (1)

- *Streptococcus pneumoniae (24)*
- *Haemophilus influenzae (2)*
- *Staphylococcus aureus (22) (a)*
- Group B Streptococcus (1)
- *Streptococcus pyogenes (8)*
- *Fusobacterium nucleatum (1)*
- Oral Streptococcus species (5) (b)

Hospital Stay:

- Mean length of hospital stay: 19 days (range 6 to 56 days)
- 33% of cases required intensive care unit admission
- Mean length of ICU stay: 9 days (range 1 to 36 days)
- No deaths attributed to empyema

DISCUSSION

- Paediatric empyema rates in NZ appear higher than the UK (2.7/100,000 and Australia (<1/100,000) at 5.2/100,000 over the 25 month period of this study
- Maori and Pacific groups were both over-represented (32% and 23% of cases respectively).
- Nearly ¾ of empyema cases had a causative bacterial pathogen identified
- *S. pneumoniae* was the most common organism implicated (38%) followed closely by S. aureus (35%) of which 18% were MRSA
- Study period incorporated different eras of pneumococcal vaccination (PCV10 and PCV13) and serotype data for pneumococcus is awaited
- Increasing incidence of MSSA infection has been reported in NZ although MRSA rates in New Zealand have been reported as relatively stable since 2001
- Empyema cases reflect a significant morbidity burden with a majority requiring surgical intervention, 1/3 requiring ICU and prolonged hospitalization (19 days).

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