Suggested Reference


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Methods

Retrospective analysis was undertaken of all cases with clinical, radiological, and microbiological evidence of empyema thoracis at Starship Children’s Hospital between June 2009 and March 2013 (3.8 years).

Case finding was via hospital discharge coding data with search terms including key clinical diagnoses and associated surgical procedures.

Ethics approval was sought from Health and Disabilities Ethics Committees but was deemed unnecessary (Ref 14/STH/124).

Results

150 children were treated for empyema at Starship Children’s Hospital between June 2009 and March 2013. 145 cases were due to community-acquired infection with the remaining 5 secondary to surgical or malignant complications.

Mode of infection

- Of the 145 community-acquired cases, pneumonia was the most common mode of infection (92%), followed by disseminated sepsis (6%), lung abscess (1%), and pulmonary tuberculosis (1%).

Seasonal trends

- The incidence of empyema fluctuated over the course of the year, waning in the winter months and waning in the summer.

Demographics

- 63% of cases came from greater Auckland (32% Counties-Manukau, 19% Waitemata, 12% Auckland) and 93% from the North Island.
- The majority of cases occurred in those under 5 years of age with the most cases occurring in children aged less than 1 year.

Age at presentation with community-acquired empyema at Starship Children’s Hospital between June 2009 and March 2013

Diagnosis

- Blood cultures were taken in 99% of patients. At least one blood culture was positive in 25% of patients. Of new positive cultures, 82% (27/33) were considered clinically relevant.

- Streptococcus pneumoniae pleural antigen testing was performed in 31% of patients who had pleural samples taken (40/127). Antigen was positive in 2 of 2 culture-proven pneumococcal cases and confirmed an additional 14 cases where all other sterile site cultures were negative.

Microbiology

- Of 145 community-acquired cases, 37 (26%) had no organism isolated from sterile sites.
- Of the 123 organisms isolated from sterile sites, S. aureus was the most common organism isolated, followed by Streptococcus pneumoniae, then Streptococcus pyogenes.
- Serology confirmed 3 further cases (2 Mycoplasma pneumoniae, 1 Chlamydophila pneumoniae).

Diagnosis

- Of the 56 S. aureus isolated, 45 (80%) were methicillin-sensitive while 11 (20%) were methicillin-resistant.
- Overall, MRSA was isolated in 7.6% of patients and comprised 8.7% of all organisms detected.

- Cefuroxime covered 77% of pathogens. Using amoxycillin/clavulanic acid gave additional cover for anaerobes, increasing coverage to 81%.

Discussion

- S. aureus was the most common organism implicated in community-onset empyema managed at Starship – this is consistent with national data showing NZ rate of S. aureus sepsis to be amongst the highest in the world.

- A 2003-2008 review of surgically-managed empyema at Starship (Wright et al.) showed similar rates of S. aureus (24/46 positive cultures (52%) vs our data 56/126 (44%)). However, the total proportion of MRSA has doubled (2/46 (4.3%) vs our data 11/126 (8.7%).This contrasts national data showing MRSA rates have remained stable at around 12% of all S. aureus infection.

- Māori and Pacific ethnic groups were both over-represented (each 32% of cases). New Zealand 2013 census data showed Māori and Pacific ethnic groups were both over-represented (each 32% of cases). This is consistent with previous data showing Māori and Pacific ethnic groups were both over-represented (each 32% of cases). However, the total proportion of MRSA has doubled (2/46 (4.3%) vs our data 11/126 (8.7%).

- Our results support the use of S. pneumoniae antigen testing on pleural fluid; others have previously shown this test to have >80% sensitivity and specificity for diagnosis of pneumococcal empyema.

- Current antibiotic recommendations are appropriate for 77% of cases; this improves to 85% coverage if organisms of doubtful significance or those grown after multiple procedures are excluded.

- Missed organisms were predominantly MRSA (9% of cases). MRSA empiric therapy may need to be added in children known to have disseminated infection or culture positive for S. aureus.

- Identification of causative organisms is important in determining the nature and duration of treatment. No organism was found in 26% of cases.

- Blood culture was valuable in diagnosis, in contrast to unaccompanied pneumonia where yield is poor.

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