

# Community Acquired Bacteremia in a Paediatric Hospital

## Abstract:

Information was collected retrospectively for one year on children presenting with community acquired bacteremia to a paediatric hospital. Between 1st October 1996 and 31st September 1997. Thirty eight children were identified (21 males and 17 females). Twenty nine (76%) patients presented directly to the accident and emergency department. Ages ranged from one week to 14 years (mean 22.8 months, median 8 months). Symptoms occurred for 12 hours to 7 days (mean 2.2 days, median 1 day) prior to presentation and included fever (63%), vomiting (31%), lethargy (31%), poor feeding (28%), irritability (26%), and diarrhoea (8%). A probable source for the bacteremia was identified retrospectively in a total of 17 cases; urinary tract infection (7), skin infection (6), septic arthritis (2), and pneumonia (2). Organisms included *N.meningitides* (29%), *S.pneumococcus* (26%), *E. coli* (18%) and *S.aureus* (21%). No significant resistance patterns were identified. Initial empiric antibiotic therapy included cefotaxime in 23 (61%) cases. Thirty five (90%) patients experienced complete recovery. Three (8%) patients suffered serious sequelae. The introduction of national HiB vaccination appears to have impacted on the incidence of community acquired bacteremia especially in the younger age group. Patient outcome following community acquired bacteremia is generally good. Antibiotic resistance has not yet emerged as a significant problem but current choice of empiric antibiotic therapy may need to be reviewed. Accident and emergency departments are continuing to be used as primary care centres for sick children in Dublin

## Community Acquired Bacteremia in a Paediatric Hospital

Author : Nourse Clare , Butler KM, Chen C

### Abstract

Information was collected retrospectively for one year on children presenting with community acquired bacteremia to a paediatric hospital. Between 1st October 1996 and 31st September 1997. Thirty eight children were identified (21 males and 17 females). Twenty nine (76%) patients presented directly to the accident and emergency department. Ages ranged from one week to 14 years (mean 22.8 months, median 8 months). Symptoms occurred for 12 hours to 7 days (mean 2.2 days, median 1 day) prior to presentation and included fever (63%), vomiting (31%), lethargy (31%), poor feeding (28%), irritability (26%), and diarrhoea (8%). A probable source for the bacteremia was identified retrospectively in a total of 17 cases; urinary tract infection (7), skin infection (6), septic arthritis (2), and pneumonia (2). Organisms included *N.meningitides* (29%), *S.pneumococcus* (26%), *E. coli* (18%) and *S.aureus* (21%). No significant resistance patterns were identified. Initial empiric antibiotic therapy included cefotaxime in 23 (61%) cases. Thirty five (90%) patients experienced complete recovery. Three (8%) patients suffered serious sequelae. The introduction of national HiB vaccination appears to have impacted on the incidence of community acquired bacteremia especially in the younger age group. Patient outcome following community acquired bacteremia is generally good. Antibiotic resistance has not yet emerged as a significant problem but current choice of empiric antibiotic therapy may need to be reviewed. Accident and emergency departments are continuing to be used as primary care centres for sick children in Dublin

## Introduction

Children with community acquired bacteremia continue to present to paediatric hospitals. Nation-wide vaccination against Haemophilus Influenza type B (HiB) has significantly reduced invasive HiB disease in children<sup>1</sup>. The impact of emerging penicillin resistance of pneumococci and the prevalence of occult bacteremia in children is unknown.

There have been no previous systematic reports of community acquired bacteremia in children in the Republic of Ireland. The aims were to establish baseline epidemiological information on children presenting with community acquired bacteremia and to describe mode of presentation, choice and appropriateness of antibiotic treatment and patient outcome and also to identify the organisms responsible for community acquired bacteremia and the prevalence of significant antimicrobial resistance among these organisms.

## Methods

Positive blood cultures were identified retrospectively from the microbiology laboratory records from 1st October 1996 to 31st September 1997.

Patients were included in the study if they fulfilled the following criteria: Blood cultures were taken in the accident and emergency department or within 72 hours of admission; A central line was not present in the patient at the time of blood culture; Coagulase negative Staphylococcus and a haemolytic Streptococcus bacteremia were included only if obtained from two consecutive blood cultures from the same patient.

Patient details were obtained by retrospective chart review. Fever was defined as a temperature of >38.5°C on presentation or a sustained temperature of >38°C for 4 hours.

Significant resistant patterns were investigated for each organism as follows:

*E. coli* and aminoglycoside resistance, *Nisseria meningococcus* and penicillin resistance and *Haemophilus influenzae* and ampicillin resistance.

	neonate (n=6)	infant (n=17)	1-5y (n=11)	5-10 (n=2)	10-15 (n=2)	Male (n=1)	Female (n=17)
<i>N. meningitides</i>	0	4	6	1	0	5	6
<i>S. pneumonia</i>	1	5	4	0	0	5	5
<i>E. coli</i>	3	4	0	0	0	7	0
<i>S. aureus</i>	2	2	1	1	2	2	6
HiB		1				1	
Grp A streptococcus		1				1	

## Results

**Patient details:** Between 1st October 1996 and 31st September 1997, thirty eight patients fulfilled the criteria for community acquired bacteremia and all were admitted to hospital. These represented 0.2% of hospital admissions during this time period. There were 21 (55%) males and 17 (45%) females. Ages ranged from one week to 14 years (mean 22.8 months, median 8 months). Twelve (32%) presented in the autumn, 11 (29%) in the winter, 10 (26%) in the spring and 5 (13%) in the summer months.

Twenty nine patients presented directly to the hospital emergency department and 9 presented first to their general practitioner (GP). Length of symptoms prior to presentation ranged from 12 hours to 7 days (mean 2.2 days, median 1 day). Symptoms included fever (63%), vomiting (31%), lethargy (31%), poor feeding (28%), irritability (26%), and diarrhoea (8%).

A probable source of infection was identified at presentation in 8 cases (skin infection (6), septic arthritis (2)). A probable source for the bacteremia was identified retrospectively in total of 17 cases; sources included urinary tract infection (7, all *E. coli*), skin infection (6, all *S.aureus*), septic arthritis (2, both *S.aureus*) and pneumonia (2, both *S.pneumonia*).

**Microbiology:** The organisms identified as responsible for community acquired bacteremia are as outlined in Figure 1. There were no polymicrobial episodes of bacteremia documented. There were no significant resistance patterns identified. All isolates of *Pneumococcus* were susceptible to ampicillin. The prevalence of different organisms responsible for community acquired bacteremia according to different patients groups is as documented in Fig 1.

**Antibiotic therapy:** Three (8%) patients received antibiotics from a general practitioner prior to presentation to the hospital. Intravenous antibiotics were administered to all cases for a mean of 7.5 days (median 7 days). There was a mean total number of 2.1 (median 2) antibiotics used for each patient. Initial empiric antibiotic therapy is summarised in Figure 2.

**Outcome:** Thirty five (90%) patients experienced complete recovery. Three (8%) patients continue to have clinical sequelae; two with multiple organ failure as a result of *N. meningitidis* infection and one with deafness as a result of *S.pneumococcus* bacteremia and meningitis.

#### Discussion

Community acquired bacteremia represented 0.2% of hospital admissions in a one year period. All patients were admitted to hospital with no patient needing to be recalled following a positive result from the laboratory thus reflecting a low incidence of occult bacteremia. This is in contrast to the United States (US) where occult bacteremia, most often caused by *S.pneumococcus* frequently encountered<sup>2,3</sup>. The most common organisms identified were *N.meningococcus* (29%) *S.pneumococcus* (26%), *E. coli* (18%) and *S. aureus* (21%). This spectrum is different to that which occurs in hospital acquired bacteremia where Gram positive staphylococci and Gram negative organisms tend to predominate<sup>4</sup>. Of note, *Haemophilus. influenza* type B (HiB) was responsible for only one episode of bacteremia. This decline of *H. influenza* type B (HiB) bacteremia has occurred in most industrialized countries following the introduction of childhood HiB vaccination<sup>5</sup>. *E. coli* was the most common organism identified in the neonatal age group (50% of neonatal bacteremia) followed by *S.aureus* and *S. pneumonia*. This, together with the fact that *E. coli* bacteremia occurred only in males, most probably reflects the relatively high incidence of urinary tract infection in males of this age group. In the 1-5 year age group, *N.meningitis* accounted for most episodes of bacteremia (55%).

Only 9(24%) patients presented initially to their GP and only 3(8%) received antibiotic therapy prior to presentation to hospital. In Dublin, accident and emergency departments are frequently the site of initial presentation for sick children.

Cefotaxime is a widely used empiric antibiotic for suspected serious infection in children (used in 71% of reported cases) and is an appropriate choice based on susceptibility patterns<sup>2-6</sup>. Antibiotic resistance has not yet emerged as a significant problem in cases of community acquired bacteremia. Children were treated with IV antibiotics for a mean period of 7.5 days. In many cases, oral antibiotics could have been introduced after a period of defervescence. The use of co-amoxycylav together with cefotaxime (5 cases; 3 with U.T.I., one with pneumonia and one with bacteremia) is probably inappropriate. Current practices may need to be reviewed. There was a generally good outcome following bacteremia in the reported children except for those cases in which meningitis occurred.

In conclusion, community acquired bacteremia accounts for a relatively small proportion of hospital admissions. The introduction of national HiB vaccination appears to have impacted on the incidence of bacteremia especially in the younger age group. Antibiotic resistance has not yet emerged as a significant problem in cases of community acquired bacteremia. Accident and emergency departments are continuing to be used as primary care centres for sick children in Dublin.

#### Correspondence:

**Dr. Clare Nourse,**

Children's Research Centre,  
Our Lady's Hospital for Sick Children,  
Crumlin,  
Dublin 12.

#### References

1. Fogarty, J., Moving towards elimination of HiB disease in Ireland. Forum 1996; 12(Suppl):3-4
2. Baskin, M.N., O'Rourke, E.J., Fleisher, G.R., Outpatient treatment of febrile infants 28 to 89 days of age with intramuscular administration of ceftriaxone. J Pediatr 1992; 120:22-27
3. Harper, M.B., Bachur, R., Fleisher, G.R., Effect of antibiotic therapy on the outcome of outpatients with unsuspected bacteremia. Paed Inf Dis J 1995;14:760-
4. Ashkenazi, S., Leibovici, L., Churi, C., Drucker, M., Konisberger, H.7 Samra, Z., Childhood bacteremia in Israel: causes, age relation, predisposing factors and source. Isr J Med Sci 1994;30:610-616
5. McIntyre, P., Chey, T., Smith, W. The impact of vaccination against Haemophilu influenzae type b disease in the Sydney region. Med J Aust 1995; 162:245-248
6. Jaffe, D.M., Occult bacteremia in children. Adv Pediatr Infect Dis 1994;9:237-260