

## Multiple admissions under 2 years of age

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### Abstract

Hospital admission rates before 2 years of age are reported for two complete birth cohorts born within a geographically defined area five years apart in 1980 and 1985. Admission rates for individual children in the cohort before 2 years of age showed an increase between 1980 and 1985 from 209 to 247 children/1000. The most significant increase took place in those children admitted three or more times (multiple admissions). Children admitted once only increased significantly but there was no significant change in the number of children admitted twice. A total of 2.3% of the total cohort in 1980 and 3.6% in 1985 were admitted three or more times and accounted for over 30% of all admissions. Age specific rates are reported for the 1985 cohort; 36% of those admitted had their first admission before 3 months of age and 76% before their first birthday.

The disproportionate contribution of children with multiple admissions to the admissions total renders admission data from Hospital Activities Analysis invalid unless linked to individual children. Cohort data based on a geographically defined population provide the most reliable admission rates and permit an accurate analysis of trends. The significance of and reasons for the upward trend in early childhood admissions are discussed.

An apparent increase in hospital admissions in childhood has been noted recently.<sup>1-3</sup> Various explanations have been advanced including a changing pattern of diagnosis and admission policy for childhood asthma,<sup>4,5</sup> the admission of children for primarily social reasons,<sup>6</sup> and the increased availability of children's beds resulting from shorter hospital stays.<sup>1</sup>

Hospital admission is disruptive to the family and expensive to the service. The emphasis in the Court report<sup>7</sup> and since<sup>8</sup> has been on child health services outside the hospital particularly the improvement of primary care for children. The apparent trend in admission of children to hospital suggests that hospital paediatric units continue to have a central role in the health care of children.

Hospital admission data are mainly derived from hospital activity data. These are of limited value as they do not relate to a definable child population and account only partially for those children admitted repeatedly.<sup>2</sup> Cohort data enable accurate rates to be calculated relevant to definable child populations and for different age groups. In addition children admitted fre-

quently can be identified and their characteristics studied.

We report hospital admission rates in children under the age of 2 years for the whole population cohorts of Sheffield children born in 1980 and 1985. The trend in hospital admission for this age group is discussed.

### Methods

Details of all births at addresses within the Sheffield city boundary are routinely collected as part of the Sheffield Child Development Study (SCDS).<sup>9</sup> Daily contact is made with the three Sheffield paediatric units and admissions and admission diagnosis are recorded for all children under 2 years of age. No attempt is made to obtain admission details for those children leaving the Sheffield city area before the age of 2 or those living in Sheffield and admitted to hospital units outside the city.

The SCDS birth forms, onto which admission details are routinely entered, were examined for 6062 children born in 1980 (MAL) and 6179 born in 1985 (NJS). Children dying or moving out of the city before the age of 2 years were excluded from the study.

Admissions diagnoses, frequency of admission, and age at first admission were extracted for all children in the 1985 cohort; frequency of admission only was extracted for all children in the 1980 cohort.

Data were analysed to compare admission rates between the cohorts. Rates for all admissions, one admission only, two admissions, and three or more admissions (multiple admissions) were compared. Rates for all admissions by month of birth were calculated and compared between cohorts. Age specific admission rates were calculated for the 1985 cohort only. The  $\chi^2$  test was used to measure the significance of changes in admission rates between 1980 and 1985.

### Results

Altogether 1269 Sheffield children born in 1980 and 1525 born in 1985 were admitted at least once before the age of 2 years. A total of 230 of the 1980 cohort were admitted twice in their first two years compared with 272 of the 1985 cohort; for multiple admissions (three or more) the respective figures were 142 and 221. Overall admission rates under 2 years and readmission rates for individual cohort children before 2 years of age are compared between cohorts in table 1.

There was a highly significant increase in the

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Table 1 Comparison of overall admission rates of individual cohort children under 2 years of age for 1980 and 1985

	1980 cohort (n=6062)		1985 cohort (n=6179)		p Value ( $\chi^2$ )
	No of admissions	Rate/1000	No of admissions	Rate/1000	
Total admissions of cohort children aged <2 years	1959	323	2483	402	<0.001
Children admitted once or more	1269	209	1525	247	<0.001
Children admitted once only	897	148	1032	167	<0.005
Children admitted twice only	230	39	272	44	0.10
Children admitted three or more times	142	23	221	36	<0.001

Table 2 Comparison between cohorts of number of admissions in multiple admission groups and those in groups with fewer than three admissions

	1980 cohort (n=1959)	1985 cohort (n=2483)
Group with multiple admissions	602	907
Group with fewer than three admissions	1357	1576

The difference between the two cohorts was significant:  $p < 0.001$ .

overall admission rate and in the rate of admissions for individual cohort children between 1980 and 1985. The most significant change occurred in those children admitted three or more times. Those admitted only once showed a significant increase but not those admitted twice.

Of a total of 1959 admissions in the 1980 cohort, 602 (30.8%) were accounted for by the 2.3% of all cohort children admitted three or more times. For the 1985 cohort, 3.6% of children accounted for 36.5% of the 2483 admissions.

In both cohorts a small number of children contributed disproportionately to the total admissions. Table 2 shows an increase in the multiple admission group between 1980 and 1985 and a significant increase in their contribution to the total admissions.

Admission rates were calculated for each month of both cohorts. There was month by month variation in admission rates most noticeable in the 1980 cohort. No consistent pattern, however, was evident within or between cohorts and no significant differences emerged.

Altogether 548 children in the 1985 cohort were admitted before 3 months of age: 36% of those admitted and 8.9% of the whole cohort. A total of 813 children had their first admission before 6 months of age and 1171 before 1 year. Thus 77% of the children admitted had experienced their first hospital admission by their first birthday. Age specific admission rates/1000 for the 1985 cohort were 89 at <3 months of age, 132 at <6 months, 190 at <1 year, and 60 at 1-2 years.

### Discussion

In a study, based on hospital activity data and the Oxford Record Linkage Study data, Hill reported an increase in hospital admissions between 1975 and 1985 of 88%.<sup>1</sup> The national cohort studies have shown an increase in admissions of children under 5 years of age: 18.5% in the 1946 cohort to 25.5% in the 1970 cohort.<sup>10</sup> A follow up study of the children of the 1946 cohort reported that 199.9/1000 second genera-

tion children were admitted at least once between ages 0-4 compared with 139.1/1000 first generation 1946 cohort children.<sup>3</sup>

Bax *et al*, from a study of two London inner city areas, found 18% of Camden children and 10% of Westminster children had been admitted at least once in the first year of life.<sup>11</sup> By 4.5 years more than a third of all children had been admitted at least once and 6% three or more times. While reported admission rates of 220/1000 for children under 2 years from cohorts in contrasting London boroughs derived from health visitor records.<sup>12</sup> From a retrospective study of Glasgow children under 11 months of age, using computerised discharge documents (SMR1), Gilchrist *et al* reported 19% of children experiencing at least one admission.<sup>13</sup> These results correlate well with the rates reported here.

The results of this study provide accurate recent admission rates for two cohorts of children under 2 years of age who were born five years apart in a geographically well defined area with a relatively stable population. We have shown a highly significant increase over the five year period in both the number of children admitted and the total number of admissions. The finding of 11% of children admitted before the age of 1 year from a comparable cohort of Sheffield children born between August 1975 and July 1976<sup>14</sup> suggest that the increase has been a continuous trend over at least 10 years. The sharpest increase was seen in the rate for children admitted three or more times rising by over 50% between the two cohorts. By 1985 almost a quarter of all children born that year in Sheffield had been admitted to hospital at least once. Though we have shown a noticeable month by month variation in admission rates, there is no discernible pattern over either year studied or between years.

In both cohorts, the small group of children having three or more admissions contributed almost a third of all the admissions and their contributions to total admissions increases significantly in 1985 compared with 1980. Hospital Activity Analysis data are unable to identify the multiple admission group and thus cannot accurately reflect admission rates and changes over time.

Our results suggest that, whatever the specific causes, changes in paediatric practice since the Court report,<sup>7</sup> with its emphasis on community based child health care, have failed to prevent large numbers of children being admitted to hospital. Hospital based practice continues to have a major role. This could be construed as a failure with negative consequences given the family and service problems

associated with hospital admission or as resulting primarily from the increased availability of beds due to shorter lengths of stay.<sup>1</sup> Equally it could reflect changes in primary care and community child health services, which have produced a greater awareness of illness in infancy, improved liaison of primary and secondary services, and a consequent increased willingness to admit children.<sup>15 16</sup>

It is also possible that hospital admission is used as a means of temporarily removing children from home circumstances where social and family stresses are high. Further studies are necessary to clarify the causes of the upward trend in paediatric hospital admissions and to examine the characteristics of children experiencing multiple admissions.

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### Gallstones

In a 10 year period (1979-89) 50 children and young adults aged less than 20 years were shown to have gallstones at the Children's Hospital of Buffalo, New York State (S Reif, DG Sloven, E Lebenthal, *American Journal of Diseases of Children* 1991; 145: 105-8). There were 21 males and 29 females but boys outnumbered girls before puberty.

Eighteen patients had chronic haemolytic disease, eight had received parenteral nutrition, and seven developed gallstones during pregnancy. In 10 the gallstones were labelled idiopathic and the remaining seven had a wide variety of associated conditions.

Eight children were less than 6 years old at diagnosis, one of whom had the diagnosis made in utero by maternal ultrasound examination and four of the other seven had no symptoms of gallstones. The diagnosis was often made by ultrasound examination done for another reason such as urinary infection. As might be expected symptoms when present in younger children were less specific and pain was less well localised than at older ages. Four children had pancreatitis complicating their gallstones.

Thirty six patients underwent cholecystectomy but non-surgical management was preferred for gallstones after parenteral nutrition.

The authors do not discuss what to do about asymptomatic gallstones, a subject they describe as controversial.

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