Medical and social factors associated with the admission and discharge of acutely ill children

M Stewart, U Werneke, R MacFaul, J Taylor-Meek, H E Smith, I J Smith

Abstract

***Aim*—To examine medical and socio-demographic factors involved in acute paediatric admission. To compare outcome of admission with factors present at time of admission.**

***Methods*—Prospective questionnaire based study of 887 consecutive emergency general paediatric admissions to five Yorkshire hospitals during two separate three week periods in summer and winter.**

***Main outcome measures*—Discharge diagnosis, length of stay.**

***Results*—Most admissions (53%) occurred "out of hours" with a peak during the evening. Two thirds (64%) of patients were under 3 years of age and clinical problems varied with age. Self referral via an accident and emergency department occurred in one third and was more likely after a fit in older children and in more socioeconomically deprived children. The most frequent presenting problems were breathing difficulty (24%), fit (16%), and feverish illness (15%). One quarter (24%) were discharged within 24 hours and 61% spent, at most, one night in hospital. Length of stay was shorter for night admissions and longer for children with a discharge diagnosis of asthma. Although most children had mild, self limiting illnesses, serious illness was subsequently found in 13% and could not be predicted from the presenting problems.**

***Conclusions*—Current demand on emergency paediatric admission is mainly from young children with mild self limiting illnesses who spend one night or less in hospital. Changes in delivery of care to acutely ill children must take account of the pattern and nature of presenting problems and be rigorously audited to ensure that improvements in the health of children continue.**

(*Arch Dis Child* 1998;**79**:219–224)

Keywords: admissions; appropriateness; emergency admissions

Nuffield Department of Child Health, Queen's University of Belfast, Belfast, UK
M Stewart

London Health Economics Consortium, London School of Hygiene and Tropical Medicine, London, UK
U Werneke

Health Service Committee, Royal College of Paediatrics and Child Health, London, UK
R MacFaul
J Taylor-Meek

Wessex Primary Care Research Network, Southampton, UK
H E Smith

Nuffield Institute of Health, Leeds, UK
I J Smith

Correspondence to:
Dr R MacFaul, Royal College of Paediatrics and Child Health, 50 Hallam Street, London W1N 6DE, UK.

Accepted 10 February 1998

Today children are healthier and have a greater life expectancy than ever before.[1] At the same time the demand on inpatient services is increasing with more children being admitted to hospital.[2] It is unclear whether increased hospital admissions reflect increasing morbidity in a population for whom mortality rates are falling or reflect previously unmet need, increased parental demand, or a rise in inappropriate use of inpatient resources. In 1993, the British Paediatric Association was awarded Department of Health audit funds to review paediatric medical admissions. The overall aims of the study were to describe the current pattern of paediatric emergency admissions (including factors present on admission and outcome after admission), and to examine appropriateness of admission and how it may be measured, which in turn can inform health service planning for management of acutely ill children.

This article analyses medical and social factors associated with admission and discharge of acutely ill children.

Methods

All emergency general paediatric admissions (n = 887) within two separate three week periods (one in summer and one in winter) were studied in five hospitals in Yorkshire. Surgical and traumatic conditions were excluded. The study was done between September 1993 and January 1995. The sites were chosen to include a large teaching hospital providing secondary and tertiary services, a large district general hospital (DGH) serving a deprived and isolated population, a medium DGH serving a mixed rural and urban population, and a small DGH serving an affluent, mainly rural population. One large DGH in which data collection proved difficult was replaced by a medium DGH for the summer study period.

Questionnaires were completed by parents and admitting doctors at the time of admission, and by consultants after the child had left hospital. Data collected on admission included age, sex, postcode, time and route of admission, nature and duration of presenting problem, previous admission, and parental recall of previous serious illness. Data collected on discharge included discharge diagnosis, length of stay, and associated medical problems.

CODING

Age

Age was divided into three strata: ⩽ 1 year; > 1 year but ⩽ 3 years; and > 3 years. This selection was based on two factors: in babies under 12 months, discrimination of more serious from minor illness is more difficult; and, in children under 3 years of age bacterial illness is more common.

Time of admission

Time of admission was divided into day (08:00–17:59), evening (18:00–21:59), and night (22:00–07:59).

Length of stay

Length of stay was coded into > 24 hours and ⩽ 24 hours to gain information about potential need and demand for a 24 hour short stay unit. Length of stay ⩽ 24 hours was defined as all children discharged on the same day as they were admitted as well as patients who were admitted after 21:00 and were discharged the next day. It was assumed that children admitted the previous evening were unlikely to be discharged after 21:00 on the next day. (Time of discharge was recorded in 477 admissions and only two were discharged after 21:00.)

Socioeconomic status of the area of residence of the family

Socioeconomic status of patients was determined from their postcode using the Carstairs index, which is based on four factors from the 1991 census data (male unemployment, car ownership, overcrowded housing, and social class).[3] Three strata were used in this study; a score of ⩽ −3 (affluent), > −3 and ⩽ +3 (representing 60% of the population who are neither affluent nor deprived), and more than +3 (deprived). This index avoids over reliance on elderly or ethnic minority populations, which is a limitation of the Jarman index when used for paediatric studies.[4]

Presenting problems were recorded by the admitting doctor; however, as there were many presenting problems recorded (369 combinations of 130 presenting problems recorded in 846 admissions), they were subdivided for analysis into the following eight categories: (1) fit (including apnoeic attack); (2) breathing difficulty; (3) diarrhoea with or without vomiting; (4) feverish illness (without above symptoms); (5) vomiting (without diarrhoea) or feeding difficulty or failure to thrive, or both; (6) abdominal pain; (7) ingestion with or without poisoning; (8) other.

These categories were hierarchical; if more than one presenting problem was reported, only the most serious one was considered. For example, fit took priority over breathing difficulty and breathing difficulty over diarrhoea. Fourteen per cent of the 846 admissions with a recorded presenting problem did not match the above categories and were coded as "other."

Discharge diagnosis was recorded by the consultant. Again, many diagnoses were recorded (240 combinations of 168 diagnoses). A separate coding exercise for the purpose of analysis was conducted and the diagnoses were categorised into 18 groups.

ANALYSIS

Firstly, the data were described using frequency distributions and cross tabulations. Missing data were excluded from the analysis. Secondly, the factors influencing time of admission, route of admission, and length of stay, respectively were examined using univariate and multivariate analysis (logistic regression). Although the missing data might have compromised the independence of the model variables, logistic regression was conducted to adjust the findings for confounders. For the chosen outcomes that took place at different points in time, only those variables were considered that could be determined at the actual time when the outcome occurred. Variables reaching a p value of 0.1 in the univariate analysis were entered into the model. Stepwise backward logistic regression was performed. The decision to halt the regression was partly based on significance ($p < 0.05$) and partly on goodness of fit. Significance was determined using log likelihood χ^2. The relations between presenting problems and discharge diagnoses were analysed, calculating positive predictive value, sensitivity, and specificity. The analysis was done using SPSS for Windows, version 6.1.3.

Table 1 Description of sample (n = 887)

	Total (%)
Age (n = 882)	
⩽ 1 year	37.0
> 1 year and ⩽ 3 years	27.0
> 3 years	36.1
Carstairs score (n = 800)	
⩽ −3 (affluent)	10.1
−3 to ⩽ 3	55.2
> 3 (deprived)	34.7
Time of admission (n = 736)	
Day (08:00–17:59)	46.8 (34 admissions/hour)
Evening (18:00–21:59)	29.2 (54 admissions/hour)
Night (22:00–07:59)	24.0 (18 admissions/hour)
Route of admission (n = 845)	
GP and other (other 5.2%)	67.2
Accident and emergency	32.8
Time ill before presentation (n = 761)	
⩽ 6 hours	26.4
> 6 hours and ⩽ 24 hours	18.4
> 24 hours	55.2
Associated medical problem (n = 728)	
No	87.6
Yes	12.4
Past illness (n = 780)	
No	68.5
Yes	31.5
Length of stay (n = 777)	
⩽ 24 hours	24.1
> 24 hours	75.9
Presenting problem (n = 842)	
Breathing difficulty	24.5
Fit	16.1
Fever	15.2
Other	14.1
Feeding difficulty	12.1
Diarrhoea	8.9
Ingestion	6.4
Abdominal pain	2.8

Varying totals result from data collection deficits.

Results

DATA LOSSES

Data on variables were recorded for all 887 patients presenting to the five hospitals in the two sampling periods. For most items, data were missing to a variable extent on individual children (table 1).

PRESENTING PROBLEMS

Presenting problems were recorded in 842 admissions. Fifty six per cent of children presented with one of three problems: breathing difficulty (25%), fit (16%), or feverish illness (15%). Feeding problems and diarrhoea together accounted for a further 21%.

Table 2 Variables associated with admission in the evening or at night compared with day

	Univariate analysis		*Logistic regression*	
	Odds ratio	*95% CI*	*Odds ratio*	*95% CI*
Time ill before presentation				
⩽ 6 hours	Baseline		Baseline	
> 6 hours and ⩽ 24 hours	0.88	0.55 to 1.44	0.75	0.42 to 1.36
> 24 hours	0.62*	0.42 to 0.90	0.56*	0.36 to 0.88
Breathing difficulty as presenting problem	1.45*	1.02 to 2.05	1.64*	1.05 to 2.57
Diagnosis of croup	2.25*	1.02 to 4.97	NS	–
Diagnosis of viral infection	2.32*	1.1 to 4.91	NS	–
Associated problem	0.55*	0.34 to 0.88	0.50*	0.26 to 0.93

Logistic regression is adjusted for variables measurable at time of admission with $p < 0.1$ in univariate analysis (age, Carstairs score, duration of illness, presenting problem, and hospital).
*$p \leqslant 0.05$.

Table 3 Variables associated with admission via accident and emergency department

	Univariate analysis		*Logistic regression*	
	Odds ratio	*95% CI*	*Odds ratio*	*95% CI*
Age				
⩽ 1 year	Baseline		Baseline	
> 1 year to ⩽ 3 years	2.32**	1.60 to 3.37	1.77*	1.14 to 2.77
> 3 years	1.70**	1.20 to 2.41	1.13	0.72 to 1.76
Carstairs score				
⩽ −3 (affluent)	Baseline		Baseline	
−3 to ⩽ 3	2.29**	1.22 to 4.30	1.44	0.70 to 3.00
> 3 (deprived)	3.03	1.59 to 5.77	2.25*	1.05 to 4.83
Time ill before presentation				
⩽ 6 hours	Baseline		Baseline	
> 6 hours and ⩽ 24 hours	0.54**	0.34 to 0.84	0.57*	0.34 to 0.94
> 24 hours	0.38**	0.26 to 0.54	0.43**	0.29 to 0.66
Presenting problem				
Fit	2.02**	1.38 to 2.96	1.88**	1.19 to 2.95
Feeding difficulty	0.52*	0.31 to 0.87	0.49*	0.24 to 0.97
Length of stay				
> 24 compared with ⩽ 24 hours	0.69*	0.49 to 0.98	NS	—

Logistic regression is adjusted for variables measurable at time of admission with $p < 0.1$ in univariate analysis (age, Carstairs score, duration of illness, presenting problem, and hospital).
*$p \leqslant 0.05$; **$p \leqslant 0.01$.

AGE OF CHILDREN

Age of child was recorded for 882 admissions. The mean (SD) age was 3.5 (4.11) years with a median of 1.9 years. A total of 25% of the children were < 6 months of age. Compared with children < 1 year of age, children > 1 year were significantly less likely to present with feeding problems ($p < 0.001$) or diarrhoea ($p < 0.001$), but were more likely to present with ingestion ($p < 0.001$), fit ($p < 0.008$) or abdominal pain ($p < 0.005$).

TIME OF ADMISSION

Time of admission was recorded for 736 patients. More than half (53%) of admissions occurred during the evening or at night with a peak hourly rate during the evening. Time of admission was not significantly associated with age, route of referral, or social class. Children who were admitted outside normal working hours (18:00 to 08:00) were less likely to have been unwell for more than 24 hours or to suffer from an associated problem. They were more likely to present with breathing difficulty and to have a diagnosis of viral infection or croup (table 2). Also children admitted at night were more likely to be admitted for less than 24 hours.

ROUTE OF ADMISSION

Route of admission was recorded for 845 patients. Referral by general practitioner accounted for 62% of admissions, 33% were admitted after self referral to an accident and emergency department and 5% were admitted by others—for example, a health visitor or midwife. The route of admission did not differ significantly among the hospitals after adjusting for deprivation. On univariate analysis and also after adjustment for potential confounders, admission after self referral to an accident and emergency department was significantly more likely after a fit or in older children, and in children from an area with a high deprivation score. It was inversely associated with preadmission illness of more than six hours duration and after presentation with feeding difficulties (table 3). Children admitted via an accident and emergency department were significantly less likely to have a length of stay > 24 hours ($p < 0.05$). However, significance was lost on logistic regression.

PAST ILLNESS AND ASSOCIATED MEDICAL PROBLEMS

Past illness was recorded for 780 patients, associated medical problems for 728, and data for both in 695. Parents recorded previous serious illness in 228 children (27%); however, in 26% these were only minor illnesses such as viral infection, gastroenteritis, vomiting, upper respiratory tract infections, feeding difficulty, fever, cough, or ingestion. Eighty six (12%) children for whom this information was available (n = 695) had an associated medical problem recorded by the consultant, most frequently neurodevelopmental problems (cerebral palsy, mental handicap, and/or epilepsy—usually combined) (39%) or congenital heart disease (14%). Parents recorded many more problems (n = 228) than consultants (n = 86), most commonly asthma and febrile convulsions, but under reported social problems and failure to thrive. In only 58 of the 228 (25%) children for whom parents recorded previous serious illness were associated problems recorded by the consultant.

DISCHARGE DIAGNOSIS

Discharge diagnosis was recorded in 732 children. The most common diagnoses were upper respiratory tract infection (15%), gastroenteritis (10%), asthma (8%), febrile convulsion (8%), and ingestion (7%), which included accidental and deliberate ingestion. Viral infection accounted for 6%. Severe illness such as lower respiratory tract infection (3%) and meningitis (1%) were diagnosed in only a few children. Infections, of which more than half were respiratory, contributed to illness in 48% of admissions.

DISCHARGE DIAGNOSES BY AGE

Diagnosis varied significantly with age (table 4). Children up to 1 year of age were more likely to have bronchiolitis, gastroenteritis, or "gut" disorder (this category included gastro-oesophageal reflux, unspecified vomiting, chronic diarrhoea, and failure to thrive). Children > 1 year were more likely to have asthma or be admitted with ingestion whereas patients aged between 1 and 3 years were more likely to have croup or febrile convulsion.

Table 4 Association between age bands and discharge diagnosis

	> 1 year and ⩽ 3 years compared with ⩽ 1 year		> 3 years compared with ⩽ 1 year	
Discharge diagnosis	*OR*	*95% CI*	*OR*	*95% CI*
Asthma	2.79*	1.78 to 4.37	6.55**	4.39 to 9.77
Bronchiolitis	0.60**	0.03 to 0.12	0.001	0.00 to > 100
Croup	2.45*	1.65 to 3.63	1.09	0.45 to 2.61
Febrile convulsion	5.39**	3.71 to 7.84	1.98	0.88 to 4.44
Gastroenteritis	0.33**	0.24 to 0.47	0.34	0.17 to 0.66
Gut disorder	0.29*	0.18 to 0.48	0.45*	0.30 to 0.67
Ingestion	6.59*	4.14 to 10.49	4.02**	2.50 to 6.47
Other	0.52	0.27 to 1.03	1.77*	1.38 to 2.27

*p ⩽ 0.05; **p ⩽ 0.01.

DISCHARGE DIAGNOSIS BY PRESENTING PROBLEM

The relation between discharge diagnosis and the three most common presenting problems (breathing difficulty, fit, or feverish illness) was examined (table 5). Of those with breathing difficulty, 30% had asthma and 20% had croup, and of those with a feverish illness, 37% had upper respiratory tract infection, 11% had lower respiratory infection, and 2% had meningitis. The sensitivity of the presenting problems for the discharge diagnoses varied considerably between conditions. Of all those who were discharged with asthma 85% had presented with breathing difficulty, but only 50% of patients with meningitis had presented with feverish illness. Feverish illness as a presenting problem had a sensitivity of only 50% for meningitis or lower respiratory tract infection although children who presented with a feverish illness had an increased likelihood of having one of these diagnoses (meningitis OR = 5.9 (CI 1.2 to 129.6; p < 0.01); lower respiratory tract infection OR = 6.4 (CI 2.8 to 14.5; p < 0.05)). However, these calculations are based on few cases as reflected in the width of the confidence intervals. Predictive values were even lower owing to the low prevalence of any diagnosis and to the fact that only the leading presenting problem was considered for each patient. Specificity of around 80% was found indicating that the absence of a cardinal presenting problem may not safely exclude a serious diagnosis such as meningitis.

Table 5 Selected discharge diagnoses in children presenting with breathing difficulty, fever or fit

	PPV (%)	*Sensitivity of PP (%)*	*Specificity of PP (%)*
Presenting problem: breathing difficulty (n = 172)			
Asthma	30	85	81
Croup	20	90	80
Bronchiolitis	17	71	79
URTI	16	24	76
LRTI	5	38	76
Presenting problem: fever (n = 106)			
URTI	37	35	88
Viral infection	15	41	87
LRTI	11	50	86
Specific infections	21	21	85
Meningitis	2	50	85
Presenting problem: fit (n = 123)			
Fit	26	91	87
Febrile convulsion	43	90	89
Associated problem*	21	30	84
Viral infection	2	7	82
Meningitis	1	17	83

*For example, cerebral palsy, epilepsy.
PP, presenting problem; PPV, positive predictive value; URTI, upper respiratory tract infection; LRTI, lower respiratory tract infection.

Table 6 Variables associated with length of stay ⩾ 24 hours

	Univariate analysis		*Logistic regression*	
	Odds ratio	*95% CI*	*Odds ratio*	*95% CI*
Admission time				
Day	Baseline		Baseline	
Evening	0.82	0.51 to 1.33	0.66	0.35 to 1.25
Night	0.16**	0.11 to 0.25	0.10*	0.05 to 0.19
Time ill before presentation				
⩽ 6 hours	Baseline		Baseline	
> 6 and ⩽ 24 hours	0.58**	0.44 to 0.75	1.87	0.83 to 4.20
> 24 hours	1.09	0.80 to 1.50	2.13*	1.16 to 3.91
Route of admission				
GP and other	Baseline		Baseline	
A&E department	0.69*	0.49 to 0.98	NS	–
Discharge diagnoses				
Asthma	2.93*	1.24 to 6.93	4.62*	1.20 to 17.77
Ingestion	0.37**	0.20 to 0.66	0.23*	0.07 to 0.72

Logistic regression is adjusted for variables on which information was available at discharge with p < 0.1 in univariate analysis.
*p ⩽ 0.05; **p ⩽ 0.01.

LENGTH OF STAY

Length of stay was recorded in 777 patients and the mean length of stay was 1.8 days with a median of one day. One quarter (24%) were discharged within 24 hours and 61% spent one night or less in hospital. After the second day, 75% of the patients had been discharged. Neither age nor socioeconomic status had an effect on length of stay. In the final model, length of stay > 24 hours was found to be more likely with asthma and less likely after admission at night. Ingestion was the only presenting problem confidently to predict a length of stay of ⩽ 24 hours. In univariate analysis, children admitted via an accident and emergency department were less likely to stay for > 24 hours (p < 0.05), but this effect disappeared on logistic regression (table 6).

DIFFERENCES BETWEEN HOSPITALS

A significant difference was observed between hospitals for age profile and for deprivation indices of their patients (p < 0.0001) mainly resulting from a more affluent population distribution in one hospital. The frequency of diagnoses differed significantly between hospitals—for example, gastroenteritis varied between 6.2% and 16.2% (p < 0.01) and febrile convulsion between 1.5% and 14% (p < 0.001). Numbers were too small to relate these to age or socioeconomic indices by hospital.

Discussion

Most children admitted during the study were very young: nearly half were < 2 years of age. Many children (53%) were admitted in the evening and at night, with most (61%) staying for one night or less. Most had minor illnesses, but more serious illness was found in a significant number (13%) and, importantly, could not be predicted from the presenting problems. Admission after self referral to accident and emergency departments occurred in one third of cases and was more often seen in children over 12 months of age for illnesses of short duration and for fits. The spectrum of illness, age distribution, and the time of presentation were similar in children with different deprivation scores, but children with a high deprivation score were more likely to use

accident and emergency departments as a source of health care, and this is consistent with findings of other studies.[5–7] Social disadvantage has adverse effects on mortality and morbidity rates, prevalence, and severity of illnesses. It also influences the way in which health services are used by parents and professionals.[5 8–11]

Routinely collected data cannot capture the complex interaction of factors that lead to a child being admitted to hospital. This study used a combination of data collection methods to test a variety of questionnaires to gather information from parents and doctors about paediatric admissions, but there were practical difficulties in obtaining complete and accurate information. Despite loss of data, we were able to examine the nature and severity of illnesses in children admitted acutely to general paediatric departments. The association between the presenting problem and coexisting factors such as route, time of admission, age, and social factors could be explored and related to additional information gathered at discharge. The missing data may have particularly affected the validity of the multivariate analysis, which was none the less conducted to adjust for potential confounders. Although the effects on results from univariate analysis were reduced by up to 30% in logistic regression models, the results were largely confirmed.

A wide range of similar diagnoses were managed in each of the hospitals. Infections contributed to 48% of admissions, findings similar to those in a study done 20 years ago,[12] and were severe in 4%. Of those presenting with a fit, 1% had meningitis. One in 10 children presenting with feverish illness had a severe infection. On the other hand, most children had mild illnesses, and upper respiratory tract infection or viral infection accounted for more than half of the children who presented with fever. Outcomes could not be reliably predicted by the nature of the presenting problem, the low specificity of which means that serious illness cannot be safely excluded from the presenting problem at the time of admission. More information is needed on diagnoses for children presenting with similar symptoms but who are not admitted before the significance of these findings is clear because only a minority of acute contacts with children in general practice lead to hospital admission—about 4 % in a study in Belfast.[13]

A hospital facility offers closer observation and specialist assessment and provides for rapid interventions if required. About 15% of paediatric admissions receive high dependency,[14] and 1–2% require intensive care.[15] The traditional view of hospitals as providing diagnosis and treatment is changing to include prevention and reduction of risk through a level of observation not usually available outside of hospital.[16] In young children, who made up half the admissions in this study, assessment of illness is especially difficult despite attempts to structure the process.[17] Parents and general practitioners are increasingly aware of possible seriousness of illness and they appear to welcome admission to reduce risk to the lowest possible level.[18] Over the period of rise in admissions in the UK there has been a steady fall in infant and child mortality to which improved access to hospital care must contribute, although this is rarely acknowledged in the wish to emphasise the need to avoid unnecessary hospital admission.

The role of the hospital in providing observation over the course of an acute illness is evident from the short length of stay, and it is unlikely that symptoms had completely resolved by the time they were discharged.

Our results also show that length of stay data, often used to compare performance among hospitals, must be interpreted in the light of differences in age profiles, diagnostic case mix, and the use of accident and emergency departments by parents, all of which significantly affected length of stay.

Our findings suggest that changes made in the delivery of care to acutely ill children such as increased observation facilities, improved "out of hours" cover by experienced staff, and better understanding of all the factors influencing admission, could potentially decrease the number of children admitted. The current situation is that most departments continue to concentrate resources during the day, covering out of hours at a much lower level despite the peak evening admission rate. If alternative measures are implemented there would be an obligation to audit rigorously their impact on the health of children, both immediately and in the future. A decrease in hospital admissions accompanied by an increase in adverse outcomes is obviously unacceptable. Any shift towards community based services must be safe and have clearly established benefits for children and their families.

This study was funded by the Department of Health. We express our thanks to the consultants and the staff of the paediatric departments in Grimsby, Harrogate, Huddersfield, Hull, and Leeds General Infirmary for all their work in completion of this study. We also thank Dr T Cole for his statistical advice and Professor P Pharoah for his work on the steering committee.

1 Platt MJ, Pharoah POD. Child health statistical review. *Arch Dis Child* 1996;**75**:534–6.
2 MacFaul R, Glass EJ, Jones S. Appropriateness of paediatric admission. *Arch Dis Child* 1994;**71**:50–8.
3 Carstairs V, Morris R. Deprivation: explaining differences in mortality between Scotland and England and Wales. *BMJ* 1989;**299**:886–9.
4 Ben-Shlomo Y, White I, McKeigue PM. Prediction of general practice workload from census based social deprivation scores. *J Epidemiol Community Health* 1992;**46**:532–6.
5 While A. Early childhood morbidity in three contrasting urban districts. *Public Health* 1988;**102**:135–9.
6 Prince M, Worth C. A study of inappropriate attendances to a paediatric accident and emergency department. *J Public Health Med* 1992;**14**:177–82.
7 Stewart MC, Savage JM, Scott MJ, McClure BG. Primary medical care in a paediatric accident and emergency department. *Ulster Med J* 1989;**58**:29–35.
8 Spencer N, Logan S, Scholey S, Gentle S. Deprivation and bronchiolitis. *Arch Dis Child* 1996;**74**:50–2.
9 Spencer NJ, Lewis MA, Logan S. Multiple admission and deprivation. *Arch Dis Child* 1993;**68**:760–2.
10 Maclure A, Stewart GT. Admission of children to hospitals in Glasgow: relation to unemployment and other deprivation variables. *Lancet* 1984;ii:682–5.
11 Golding J, Haslum M. Hospital admissions. Butler NR, Golding J, eds. *From birth to 5*. Oxford: Pergamon Press, 1986.
12 Lloyd B, Pursall E, Emery J L. Hospital morbidity pattern in children under 1 year of age born in Sheffield 1975–1976. *Arch Dis Child* 1981;**56**:36–9.

13 Bradley T, McCann B, Glasgow J FT, Patterson CC. Paediatric consultation patterns in general practice and the accident and emergency department. *Ulster Med J* 1995;**64**:51–7.
14 Fairfield G. Yorkshire paediatric intensive and high dependency care study. Leeds: Nuffield Institute for Health, 1997.
15 Haines L, Pollock J, Scrivener R. *Report on a prospective study on intensive care utilisation in the North West region*. London: Royal College of Paediatrics and Child Health, 1997.
16 Forfar J. Trends in paediatric medical admissions. *BMJ* 1989;**298**:1711.
17 Teach SJ, Fleisher GR. Efficacy of an observation scale in detecting bacteremia in febrile children three to thirty-six months of age, treated as outpatients. Occult bacteremia study group. *J Pediatr* 1995;**126**:877–81.
18 MacFaul R, Stewart M, Werneke U, Taylor-Meek J, Smith HE, Smith IJ. Parental and professional perceptions of need for emergency admissions to hospital: a prospective questionnaire based study. *Arch Dis Child* 1998;**79**:213–18.

Commentary

The number of acutely ill children admitted to hospital in the United Kingdom has increased against a background of a reduction in serious morbidity and mortality in childhood. The two preceding papers provide helpful data on a large number of paediatric emergency admissions. Most children admitted were young, had common ailments, and were discharged home the following day. Parents, who generally perceived their children to be more unwell than did the doctor, did not contest the opinions of referring and admitting doctors that their child needed admission to hospital. None of these findings should come as a surprise to paediatricians. Nor is it surprising that the presenting complaint correlated poorly with diagnosis, a finding that underlies the need for a thorough clinical assessment of every acutely ill child.

Some of the possible reasons for the rise in acute admissions to hospital are discussed. No doubt many paediatricians will wish to explore the situation in their own hospital. It is unlikely that they will be informed simply by looking in isolation at their own inpatient work. There needs to be joint enterprises with colleagues working in primary care, where the majority of paediatrics is practised without recourse to hospital paediatricians.

Stewart *et al* suggest strategies for coping with the increasing numbers of admissions, in particular increasing observation facilities and improving "out of hours" cover by experienced staff. This suggests that the present trend will continue, and indeed one concern is that such developments will result in further unnecessary referrals and admissions. Other options need to be considered. Experience at my hospital shows that professional home care nursing in certain defined situations can safely avoid the need for hospital admission. Other strategies include the opportunistic provision of better education for parents during inpatient contacts; "out of hours" telephone access by parents to the paediatric department; and exploring the creation of career grade paediatricians who link between the paediatric department and primary care services.

It is of course much easier to assess whether a hospital admission was truly necessary after discharge, rather than shortly before admission. In theory virtually all acutely sick children could be cared for at home rather than admitted to hospital if one were prepared in some cases to go to extraordinary and nonsensical lengths to make this happen. We have little information to help us probe and define the boundaries of home care nursing in terms of its safety, efficacy, and cost benefits. There will always be judgments to be made because the circumstances surrounding poverty and deprivation within certain families might preclude safe and effective home care nursing. Allowing for this, we need to be able to define at a national level the "limits" of home care nursing because this should help to determine the balance of resources between the hospital sector and the provision of home care support in its widest sense.

IAN DOUGHTY
Consultant Paediatrician, Department of Paediatrics, Central Manchester Healthcare Trust, St Mary's Hospital, Manchester M13 0JH, UK