Literature search

I searched the Cochrane Database of Systematic Reviews (www.update-software.com/cochrane/default.htm) and the DARE, HTA, and NHSEED databases of the NHS Centre for Reviews and Dissemination (CRD) (nhscrd.york.ac.uk) and found no existing systematic review that had addressed the review question.

I constructed a wide (sensitive) scoping search in Medline (1966–2002) using expanded medical subject headings (MeSH headings) and text words. I then refined the search iteratively, as recommended by CRD,[8] using various combinations of terms to define the population (children), the condition (acute illness), and the intervention (acute assessment service). I carried out identical searches using appropriate synonyms in the Cochrane Controlled Trials Register (2002/4), Embase (1980–2002), and Cinahl (1982–2002). The final search strategy is shown in the box.

I also searched HSTAT and the RCPCH website (www.rcpch.ac.uk), hand searched the titles of articles in *Archives of Disease in Childhood*, *Archives of Pediatrics & Adolescent Medicine*, and *Pediatric Emergency Care* (1997–2002), wrote to authors of relevant projects in the National Research Register (www.update-software.com/national/), and posted queries to electronic mail lists. I screened the titles and abstracts of all identified studies and selected those that appeared to meet the inclusion criteria for full appraisal.

Some older studies described clinical practice which is now out of date. I therefore excluded studies published more than 20 years ago. I had no access to translation facilities and therefore excluded studies not written in English.

Box
Search syntax for principal electronic databases

Cochrane Database of Systematic Reviews, DARE, HTA and NHSEED

(child$ OR infant$) AND (paediatric$ OR pediatric$) AND (emergenc$ OR acute) AND hospital$

Medline

(*child/ OR *infant/ OR *pediatrics/ OR *child health services/) AND (acute disease/ OR emergency service, hospital/ OR emergencies/ OR acute$ OR emergenc$ OR medical$) AND (ambulatory care/ OR day care/ OR ambulatory care facilities/ OR (short ADJ stay) OR short-stay OR assessment OR satellite OR admit$ OR admission$ OR observation OR ambulatory)

Embase

(*child/ OR *infant/ OR *pediatrics/ OR *child health care/) AND (acute disease/ OR emergency health service/ OR emergency/ OR acute$ OR emergenc$ OR medical$) AND ((short ADJ stay) OR short-stay OR assessment OR satellite OR admit$ OR admission$ OR observation OR ambulatory OR ambulatory care/ OR outpatient department/ OR day care/)

Cinahl

(*child/ OR *infant/ OR *pediatrics/ OR *child health services/) AND (acute$ OR emergenc$ OR medical$ OR acute disease/ OR emergency service/ OR emergencies/) AND ((short ADJ stay) OR short-stay OR assessment OR satellite OR admit$ OR admission$ OR observation OR ambulatory OR ambulatory care/ OR day care/ OR ambulatory care facilities/)

Cochrane Controlled Trials Register

(child$ OR infant$ OR pediatric$ OR paediatric$) AND (hospital$ OR acute$ OR emergenc$ OR medical$) AND (day care OR (short adj stay) OR short-stay OR assessment OR satellite OR admit$ OR admission$ OR observation OR ambulatory)

/ subject heading
* focus of article
$ truncation wildcard

Inclusion and exclusion criteria

I included all available reports of evaluation or audit studies, of any design including experimental studies, observational studies, cross-sectional surveys and qualitative studies, that:

- reported on children with acute medical problems that would normally have resulted in immediate hospital admission, and

- reported on one or more alternatives to admission, provided in a hospital, and
- reported data on a relevant impact of the alternative service(s), as outlined in the introduction.

I excluded reports that:

- evaluated clinical procedures or prognostic factors rather than service organisation
- evaluated services provided outside hospital, such as a hospital at home service
- evaluated services wholly or mainly for adults
- were based on the opinions of senior staff without other supporting data.

Nature of the interventions

Paediatric assessment units

These studies were carried out in the UK or New Zealand. The units they describe:

- were mostly in, or adjacent to, existing paediatric wards
- were mostly staffed by junior or middle-grade paediatricians, with cover from a consultant paediatrician
- tended not to be open overnight or at weekends
- accepted referrals from general practitioners (GPs) (always), A&E (mostly), and occasionally other sources, but usually not directly from parents
- saw an average of 5–15 patients per day, with an average length of stay (where stated) of 2–4.5 hours.

Three studies dealt with satellite units on hospital sites with no paediatric inpatient services. One unit was in inner London and offered a 24-hour service.[5, 18] The other two were in rural areas, more than twenty miles from the nearest paediatric inpatient unit.[5, 18, 26]

A&E assessment units

These studies were mostly carried out in Australia or North America. The units they describe:

- were mostly in, or adjacent to, paediatric A&E departments in tertiary referral hospitals
- were mostly staffed by A&E doctors and nurses
- were open all the time (where opening times were stated)
- were only open to patients who had been seen in the A&E department
- saw an average of 2–8 patients per day, with an average length of stay (where stated) of 5–20 hours
- saw children with injuries as well as medical problems.

Acute assessment clinics

The studies in this section were all carried out in the UK. They describe urgent outpatient clinics:

- staffed by middle-grade or consultant paediatricians
- accepting referrals from GPs, and sometimes from other health professionals
- sometimes including a telephone hotline for discussing urgent cases
- seeing an average of four or fewer patients per day.

Quality assessment

Observational and cross-sectional studies

Most studies fell into this category, and most were considered to fall into grade four of the CRD hierarchy of evidence, as they could not be considered an adequately controlled study with respect to the research question posed in this review. Ten studies involved comparing groups of patients or hospital activity at different times (controlled, quasi-controlled or before-and-after studies). The others involved single cross-sectional surveys or the follow-up of a single cohort of patients (uncontrolled studies). More detailed quality assessment is summarised in table 2. In some cases,

even where studies are shown in the table as having addressed certain criteria, only scant detail was provided. A higher standard of reporting was required in order to meet the validity criteria for comparative studies.

Other studies

There was one grade one study: the randomised controlled trial by Willert *et al*.[32] This study used clear eligibility criteria, appeared to follow appropriate procedures for randomisation and allocation concealment, and confirmed that the groups were comparable at baseline. However, there was no indication that outcome assessment was blinded and no possibility of blinding clinicians or patients. Data were not shown for sixty-three eligible patients who were not randomised.

Turner's qualitative paper included an adequate description of the study's theoretical basis, context, fieldwork and analytical framework. The eleven participants were selected from among parents of children who happened to attend for acute assessment at a particular time.[30]

Table 1
Overview of included studies

Reference	Setting	Time period	Cases included	Study size	Study design (see footnote)					
					B	C	E	Q	R	S
Paediatric assessment units										
Dawson *et al* 1991 [19]	Christchurch, NZ	1984-90	Acute medical	1308	+	+				
Graham *et al* 1991 [21]	Christchurch, NZ	Not stated	Acute medical	60						+
Smith *et al* 1993 [29]	Newcastle	1984-91	Acute medical, some day cases and reviews	27527		+				
Beverley *et al* 1997 [11]	York	1994-96	Acute medical; head injuries, burns, some day cases, preoperative assessments and chronic illness included in parts of the analysis	3666	+	+	+			
Carter 1997 [15]	Leicester	1994-95	Acute medical	3855		+				
Meates 1997, 1998 [3 27]	London	1994-97	Acute medical, some day cases	Approx 4000 (B); 505 (C)	+	+				
Turner 1998 [30]	Not stated	Not stated	Acute medical	11				+		
Lal & Kibirige 1999 [23]	Middlesbrough	1995-97	Acute medical	7328	+	+				
Bothwell *et al* 2001 [12]	Ulster	Not stated	Acute medical	30 (C); 84 (S)		+				+
Macleod *et al*, 2002 [26]	Mid-Ulster	1995-99	Acute medical	3825 (B); 50 and 57 (S)	+					+
Cresswell 2002 [5 18]	London	2000-01	Acute medical	2896		+				
Cresswell 2002 [5 18]	Grantham	1999-2000	Acute medical	1149		+				
Kibirige *et al* 2003 [22]	Middlesbrough	1994-2001	Acute medical	43496 (B, C); 1033 (S)	+	+				+

Table 1 continued

Reference	Setting	Time period	Cases included	Study size	Study design (see footnote)					
					B	C	E	Q	R	S
A&E assessment units										
Beattie & Moir 1993 [10]	Aberdeen	1990-91	A&E attenders aged >1	829		+				
Willert *et al* 1985 [32]	Chicago	1981	Children with asthma, aged >1	99			+		+	
Browne & Penna 1996 [13]	Sydney	1990-95	A&E attenders	1300	+	+	+			
Gouin *et al* 1997 [20]	Toronto	1991-94	Children with asthma, aged 1-18	4227	+	+				
Wiley *et al* 1998 [31]	Connecticut	1996-97	A&E attenders	805	+					
Lamireau *et al* 2000 [24]	Bordeaux	1987-96	Acute medical	644	+	+				
Browne 2000 [14]	Sydney	1994-99	A&E attenders	6248	+	+	+			
Scribano *et al* 2001 [28]	Connecticut	1996-98	Acute medical (selected diagnoses)	5039		+				
Leduc *et al* 2002 [25]	Denver	1998-2000	A&E attenders	686		+				+
Acute assessment clinics										
Coleman & Finlay 1996, 1997 [16 17]	Southampton	Not stated	Acute medical	451		+				
Baildam & Ewing 1997 [9]	Manchester	Not stated	Acute medical	220		+				
Meates 1997, 1998 [3 27]	London	Not stated	Acute medical, some day cases	118		+				

Study designs: **B**: before-and-after comparison of pattern of admissions; **C**: follow-up of outcomes for a cohort of patients; **E**: assessment of the economic impact of an intervention; **Q**: qualitative study of parents' experiences; **R**: randomised controlled trial; **S**: survey of the views of parents, GPs or hospital staff

Table 2
Quality assessment of observational and cross-sectional studies

Study	Baildam [9]	Beattie [10]	Beverley [11]	Bothwell [12]	Browne [13]	Browne [14]	Carter [15]	Cresswell [5 18]	Coleman [16 17]	Dawson [19]	Gouin [20]	Graham [21]	Kibirige [22]	Lal [23]	Lamireau [24]	Leduc [25]	Macleod [26]	Meates [3 27]	Scribano [28]	Smith [29]	Wiley [31]
Description of group(s) of patients/participants	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Description of when or to whom the intervention was applied	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Appropriate sampling method, adequate response rate or sufficiently complete data (as appropriate, depending on study)	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1
Adequate and unbiased ascertainment of impacts	1	1	1	0	1	1	1	1	1	1	1	0	0	1	1	0	0	1	1	1	1
Sufficient follow-up to detect impacts	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
Groups being compared had similar socio-demographic characteristics	-	-	0	-	0	0	-	-	-	0	1	-	0	0	0	-	0	0	-	-	-
Groups being compared had similar case mix	-	-	0	-	0	0	-	-	-	0	1	-	0	0	0	-	0	1	-	-	-
Adjustment for confounders or secular trends	-	-	0	-	1	0	-	-	-	0	0	-	0	1	1	-	1	0	-	-	-

Key: **1** addressed **0** inadequately addressed or not clear **-** not applicable (study made no comparisons)

Table 3
Discharge of patients attending paediatric assessment units

Reference	Denominator	Proportion discharged
Kibirige [22]	43496 attendances	34%
Beverley [11]	1731 emergency attendances (included some trauma)	38%
Carter [15]	3855 attendances	40%
Dawson [19]	1308 attendances	41%
Lal [23]	7328 attendances	43%
Smith [29]	12753 emergency attendances	44%
Meates [3 27]	121 attendances staying more than four hours	48%
Bothwell [12]	84 attendances, excluding the very unwell	64%
Cresswell [5 18]	Grantham satellite unit 1149 attendances	89%
Cresswell [5 18]	London satellite unit 2896 attendances	91%

Table 4
Unscheduled returns of patients attending paediatric assessment units

Reference	Denominator	Outcome	Frequency
Kibirige [22]	351 discharges	Return within 3 days	0.4%
Lal [23]	3131 discharges	Unscheduled returns (within unspecified period)	2%
Lal [23]	65 unscheduled returns	Admission	31%
Dawson [19]	530 discharges	Return within 7 days Admission	6% 4%
Bothwell [12]	30 discharges	Admission within 3 weeks	7%
Beverley [11]	Six months' attendances, excluding those for a chronic relapsing illness	Unplanned return within 28 days Re-admission	11* 4*

*absolute numbers, not proportions (denominator not quantified)

Table 5
Discharge of patients attending A&E assessment units

Reference	Denominator	Proportion discharged
Gouin [20]	545 attendances with asthma	62%
Leduc [25]	686 attendances	65-78%*
Lamireau [24]	644 medical attendances not already waiting for an inpatient bed	79%
Wiley [31]	805 attendances	88%
Scribano [28]	796 attendances with selected medical diagnoses	90%
Browne [13]	4948 attendances (46% medical)	94%
Browne [14]	1300 attendances (56% medical)	96%
Beattie [10]	829 attendances	99%

*month-to-month variation; exact data not shown