

Inpatient Audit of Children with Diabetes



AUDIT REPORT

FEBRUARY 2012

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1. Key messages

1.1 Key Messages

- Admissions in children with diabetes are more frequent than expected
- Services generally meet standards in protocol availability, having children's nurses on the wards, and availability of paediatric diabetes specialist nursing advice to the ward staff.
- Standards less well met are related to education of ward staff, children's nursing availability and training on diabetes in the Emergency Department (ED), availability of dietetic advice to the wards, and contacting the diabetes team out of hours about admissions.
- Most parents think that care is generally good.
- Most parents feel able to contribute to their child's diabetes management on the wards
- There was a lack of knowledge of diabetes on the wards reported by some parents, particularly around the use of insulin pumps
- The management of out of range blood glucose levels was a cause for concern for some parents
- Diabetes Teams were not always informed about either elective or emergency admissions
- Surgical admissions highlighted occasional lack of communication about and understanding of insulin regimens and pumps
- Insulin errors are still occurring in around half of the hospitals surveyed

1.2 Summary of Key findings

- There were 401 admissions over the 6 month period from a total of 3247 patients with diabetes (12.3%). 334 (83%) were emergency admissions and 59 (15%) were elective, reason unknown in 8 (2%). 143 (36%) were emergency admissions with DKA/hyperglycaemia. The highest percentage of admissions by age was in the 12-15 year old age group. This age band accounted for 44% of all emergency admissions and 66% of elective admissions.
- Protocols for diabetic ketoacidosis (DKA), surgery, new diagnosis and hypoglycaemia were generally available on wards (70% had all 4 protocols) but less available in the Emergency Department (ED) (52% had all 4).
- Children's-trained nurses worked on every shift in children's wards (100%) but not necessarily in ED (33%).
- Diabetes link nurses were identified on 74% wards and 61% HDUs. Diabetes specialist nurses generally have in-patient liaison in their job description (89%) and working role (93%).
- Only 10 services (37%) have access to dietary advice (including carbohydrate counting) on the wards and 17 services (63%) do not. In 25 of the 27 services (93%) there is a paediatric diabetes dietitian.
- 25 services (93%) educate ward staff at least once a year, 13 services (48%) at least twice a year, 5 services (19%) at least 3 times a year and 2 services (7%) never educate ward staff on diabetes.
- In only 8 services (30%), there is 24 hour access by the ward staff to a member of the diabetes team if required. All services (100%) have access during the working day (9-5 Monday to Friday).
- Only 7 services (26%) stated that they would contact the paediatric diabetes specialist nurse within two hours of an admission during the day and only 4 services (15%) said they would contact the diabetes consultant within two hours during the day. If a child were in DKA 3 services (11%) stated they would contact the diabetes consultant during the night
- Nearly half (48%) of the services reported insulin errors retrospectively over the previous 6 months. In the prospective part of the study 42% services reported problems with insulin administration, in 6% of the patients.
- Parents generally feel that care is good (67% of overall comments were positive).
- Despite adverse comments most families would recommend their hospital service (83% would definitely recommend their hospital).

- Lack of knowledge of ward staff, particularly in the use of insulin pumps, is of concern. 21 of the 33 comments about the use of pumps on the ward were negative (64%) and most were about the lack of knowledge.
- Surgical admissions are another area of concern. 7 of the 18 (39%) adverse incidents reported on the clinical questionnaires were for surgical admissions and 5 of the 9 comments from parents about surgical admissions were negative. The main problem was controlling blood glucose while fasting, especially when operations were delayed.
- Over half of the comments (63%) from parents about the Emergency Department were positive, and described excellent prompt and appropriate care.
- Less than half the parents (49%) reported that they had access to the right kind of food to manage their child's diabetes when they needed it.
- Parents and children generally felt they were involved in managing their diabetes while on the ward. 82% of parents and 84% of children said they were involved at least some of the time.
- Parents reported that their child's blood glucose levels were generally as well controlled as they are at home. 77 % of parents said they were as well controlled (54% most of the time, and 22% some of the time)
- Most families (85%) were seen by a member of the diabetes team during their stay, and nearly all (96%) of those that were not seen by a member of the team were admitted out-of-hours (overnight or at the weekend).

1.3 Messages for Parents

The page overleaf can be printed out and given to parents.

Inpatient Audit of Children with Diabetes



Key Messages – February 2012

Your hospital participated in this audit, looking at the inpatient care of children with diabetes, in 2010/2011. The project was funded by Healthcare Quality Improvement Partnership (HQIP) and over 30 hospitals in 3 regional networks were involved. Parents/carers and older children were asked to give feedback if they stayed in hospital during the audit period. Thank you very much to the families that completed questionnaires.

The data has been analysed and we thought you would be interested to see the following Key Messages from the project. NB These are general messages looking at all the hospitals overall, not specifically for your hospital.

- **Overall comments were positive and most children and families were very grateful for their care, and commended the caring, helpful and supportive staff. Even those who described difficult experiences would still recommend their hospital to other families.**
- **12% of all children with diabetes in the regions were admitted during the 6 month audit period. Nearly half of emergency admissions were for diabetic ketoacidosis (DKA). The highest percentage of admissions overall were for 12-15 year olds.**
- **Parents had a number of concerns about care, particularly with regard to the management of out of range blood sugars, and the understanding of insulin pumps amongst ward staff.**
- **Problems with surgical admissions were also highlighted mainly related to fasting before the surgery, insulin doses and blood glucose monitoring, and again unfamiliarity of surgical staff with insulin pumps. The diabetes team were also much less likely to be informed about a surgical admission, especially if it was an elective admission.**
- **Over half of parents (62%) were involved in the diabetes care most of the time while in hospital and most (87%) were able to give insulin.**
- **There were fewer comments than expected about food on the wards, although carbohydrate counting does need to be improved as does the availability of gluten-free food.**
- **Communication needs to be improved especially in the Emergency Departments with the additional stress of waiting.**

The issues raised by the audit are being addressed, including producing a guidance leaflet for parents if your child is admitted to hospital, which will be available from your diabetes team soon.

2. Introduction

2.1 Aim and Objectives

The aim of the audit was to improve the standard of inpatient care of children with diabetes, with regard to the management of their diabetes, with the following three objectives;

- i. To determine the processes that are currently in place and measure against the standards. (**Part 1**)
- ii. To determine the level of care that is currently experienced (**Part 2**)
- iii. To take action to improve the standard of care (**Part 3**)

2.2 Background

The audit was proposed by Dr Julie Edge and Dr Fran Ackland, in response to the concern frequently mentioned by parents that hospital inpatient care is unsatisfactory for children with diabetes, and funding obtained from the Healthcare Quality Improvement Partnership (HQIP). The audit took place during 2010/2011 and was co-ordinated by Sue Payne with the Steering Group listed on page 1.

The care of children under the age of 16 years was audited against the standards given in Table 1 in three regions of southern England. This first set of standards has been produced by The Children and Young People's Diabetes Implementation Support Group (CYPDISG), a group convened by the Department of Health chaired by the National Clinical Director for Children, Young People and Maternity Services, to facilitate the guidance in "Making Every Young Person with Diabetes Matter" [1], which has recently started to examine inpatient care.

Table 1. Standards for Inpatient care of children with diabetes, developed by the CYPDISG of the Department of Health. Some of these are national standards and are referenced.

- | | |
|----|--|
| 1 | Families have copies of their clinic letters to show to emergency services |
| 2 | ED (Emergency Department) has a children's trained nurse on every shift [2] |
| 3 | ED has protocols and guidelines for diabetes in children |
| 4 | ED staff have education sessions on management of children with diabetes |
| 5 | Each paediatric department has a consultant responsible for liaison with ED [3] |
| 6 | All units should have protocols for diabetes in children including DKA [4], diabetes during surgery [4], hypoglycaemia and management of the newly diagnosed child |
| 7 | Parents are enabled to manage their child's diabetes on the ward where appropriate |
| 8 | Each ward admitting children with diabetes has a link nurse [5] |
| 9 | Paediatric Diabetes Specialist Nurses have a role in inpatient care [6] |
| 10 | There is adequate dietetic support for ward staff |
| 11 | There are children's nurses in all areas where children are cared for [2] |
| 12 | Admissions of children with diabetes are made to same ward where possible |
| 13 | Regular education sessions for ward staff on diabetes are provided |
| 14 | There is 24 hour access to the Paediatric Diabetes Team by ward staff |
| 15 | All children with diabetes admitted for any reason are discussed with the paediatric diabetes team within 2 hours of admission |

3. Methodology

Three regional networks - Oxford, Wessex and the South West - comprising 27 diabetes services, including 34 hospitals, looking after around 3,500 children and young people under the age of 16 with diabetes, were involved in the audit. The participating services are listed in Appendix A and the audit standards, developed by the Childhood Implementation Support Group of Department of Health, are given in Table 1 (see previous page).

The audit applied to all children, under 16 years of age, with previously diagnosed Type 1 diabetes admitted to hospital for diabetes related conditions (including diabetic ketoacidosis (DKA) and hypoglycaemia) and non-diabetes related conditions (including elective or emergency surgery), for any period of longer than 4 hours in hospital. Children presenting at time of diagnosis were excluded.

The Medical Directors and Audit Managers in each service were informed about the audit. The Caldicott Guardians were not informed as anonymous data was collected.

3.1 Part 1

Questionnaires, designed by the Steering Group, were distributed to all the services in June 2010 asking general questions about their service, in order to audit it against the standards given in Table 1. Copies of the protocols used for DKA, hypoglycaemia, surgery and newly diagnosed were also requested, in order for them to be analysed and reviewed. All questionnaires and protocols were returned to the Audit Co-ordinator.

3.2 Part 2

Data was collected for all admissions, which satisfied the criteria given above, during the **six-month period November 2010 to April 2011** inclusive. For each admission a clinical questionnaire was completed by the clinical diabetes team, and the parents/carers and the child themselves (aged 8 years and over) were asked to complete a questionnaire asking about their experience. The parent and child questionnaires, together with a covering letter, were either sent to the family by post after their admission, or given to them at the end of their stay in hospital.

All questionnaires were returned to the Audit Co-ordinator. The completed parent and child questionnaires were sent directly to the Audit Co-ordinator and not seen by their diabetes team. All questionnaires were coded with the hospital name and a two digit

patient code – the parent and child questionnaires could then be linked to the clinical questionnaire.

Patients included in the audit were recorded by each hospital on an Inpatient Record Sheet and a monthly return with anonymous information was sent to the Audit Coordinator.

After 3 months and 6 months the clinical audit departments in each hospital were asked to provide the clinical lead with a list of admissions which satisfied the criteria of the audit, to ensure that all appropriate patients had been included. Any patients that had been missed by the teams were then included in the audit.

The audit looked at the number of admissions, not the number of patients, the same patient could have been admitted more than once.

4. Results

4.1 Part 1

27 diabetes services were identified in the three regional networks. All 27 services provided responses to the initial questionnaire. The diabetes “service” may include more than one inpatient hospital, outpatient clinic locations and Emergency Department (ED) locations. Figures given for the ‘number of services’ apply to all the hospitals or locations within the service. Figures given for the ‘number of hospitals’ apply only to the 27 main inpatient hospitals where the service is based. Any exceptions to this are noted where relevant.

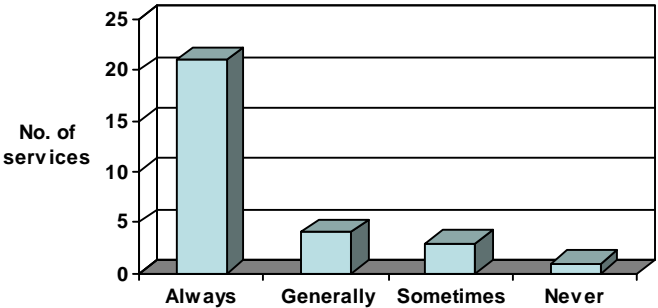
NB Percentages may not add up to 100% due to rounding.

4.1.1 Standards

1. Families have copies of their clinic letters to show to emergency services:

Of 29 locations which provide out-patient services, 21 (73%) always and 4 (14%) generally send copies of their clinic letters to the families. Three locations sometimes do and one never does.

Figure 1 - Clinic letters



2. ED has a children’s trained nurse on every shift:

Only 9 services (33%) have a children’s trained nurse on every shift. Sixteen services (59%) do not and in two the situation was unknown.

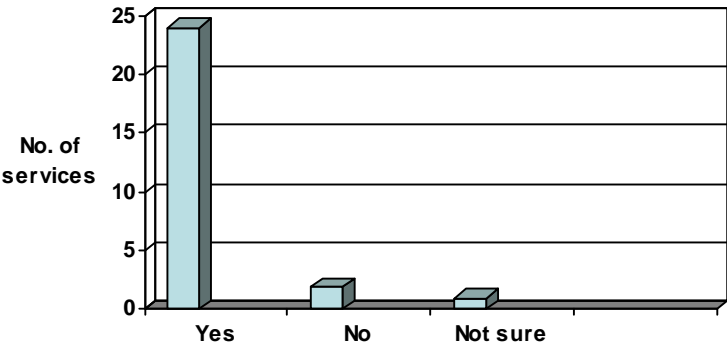
3. ED has protocols and guidelines for diabetes in children:

The protocols specifically requested were those for the management of DKA, hypoglycaemia (this could be mild and/or severe), newly diagnosed diabetes and for surgery in patients with diabetes. The question was only assessed for the EDs and assessment units in those hospitals which have inpatients and included protocols that are available via the hospital intranet. The results of this are shown in Table 2.

4. ED staff have education sessions on management of children with diabetes:

24 services (89%) do provide education sessions, 2 do not and 1 respondent was not sure. The frequency of these sessions varies from one to four times per year and includes on an 'ad hoc' basis.

Figure 2 – Education sessions in EDs



5. Each paediatric department has a consultant responsible for liaison with ED:

24 services (89%) have a consultant responsible for liaising with ED and 3 do not.

6. All units should have protocols for diabetes in children including DKA, diabetes during surgery, hypoglycaemia and management of the newly diagnosed child:

Diabetes units were also asked about availability of the same guidelines as in Standard 3, but specifically for inpatient care locations, which included all areas where children under 16 years may be admitted, including adult wards. These are also shown in Table 2 for comparison.

Table 2. Availability of protocols in Emergency Departments and Paediatric Diabetes Inpatient Units

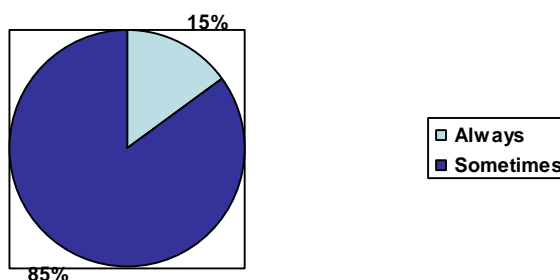
	Emergency Department		Children's wards (Medical, Surgical, General)		Other inpatient locations (incl. HDU, PICU and adult wards) NB Only applies to 20 services		Intranet	
	No. of services	%	No. of services	%	No. of services	%	No. of services	%
DKA protocol	25	92.6	26	96.3*	18	90.0	23	85.2
Newly Diagnosed protocol	19	70.4	24	88.9	15	75.0	17	63.0
Hypo protocol	19	70.4	22	81.5	14	70.0	17	63.0
Surgery Protocol	18	66.7	23	85.2	16	80.0	18	66.7
All 4 protocols	14	51.9	19	70.4	13	65.0	13	48.2

* although 100% of services had a DKA guideline available, it was not present on all the wards to which children were admitted, in one service.

7. Parents are enabled to manage their child's diabetes on the ward where appropriate:

4 services (15%) say that they always and 23 services (85%) sometimes enable parents to manage their child's diabetes on the ward.

Figure 3 - Parents manage diabetes on ward



8. Each ward admitting children with diabetes has a link nurse:

20 services (74%) have diabetes link nurses on all children's wards (medical, surgical and general), 11 of 18 applicable services (61%) on HDU/PICU and 14 of 20 applicable services (70%) on assessment units.

9. Paediatric Diabetes Specialist Nurses (PDSNs) have a role in inpatient care:

In 25 services (93%), PDSNs are involved in inpatient care within their working role, but for 3 of these services it is not included in their job description. In 24 services, this role is included in their job description although in 2 of these services it is not included in the working role.

10 There is adequate dietetic support for ward staff:

10 services (37%) have access to advice and 17 services (63%) do not. In 25 of the 27 services (93%) there is a paediatric diabetes dietitian, including general paediatric dietitians who have dedicated time for diabetes. In 13 services (48%) the dietitian does liaise with the wards (but 3 of these do not help with carbohydrate counting), and in addition there are 7 further services where the only patients seen on the ward are the newly-diagnosed. In 10 services (37%) the dietitian is able to help with carbohydrate counting on the wards.

11. There are children’s nurses in all areas where children are cared for:

100% of services stated that there are children’s nurses in all areas where children are cared for; this applied to all 115 inpatient wards in the 27 services where children are admitted (ED figures are addressed separately in standard 2). There were 6 services which did sometimes admit children to adult (endoscopy/ITU) wards, but these wards also had children’s nurses.

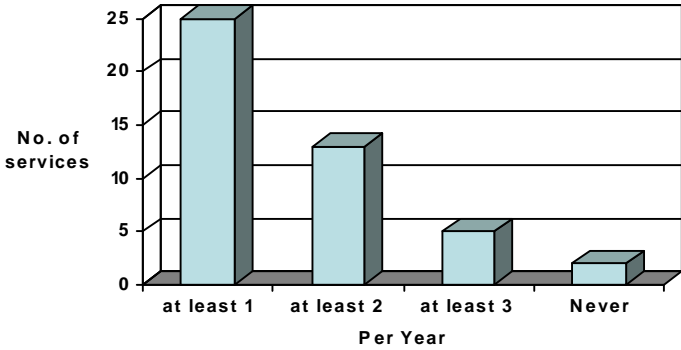
12. Admissions of children with diabetes are made to same ward where possible:

In 25 services (93%) children are admitted to the same ward where possible, thereby aiming to focus throughput to a reduced number of wards, while in 2 services (7%) they are not.

13. Regular education sessions for ward staff on diabetes are provided:

25 services (93%) educate ward staff at least once a year, 13 services (48%) at least twice a year, 5 services (19%) at least 3 times a year and 2 services (7%) never educate ward staff on diabetes.

Figure 4 – Education sessions for ward staff



14. There is 24 hour access to the Paediatric Diabetes Team by ward staff:

In 8 services (30%), there is 24 hour access by the ward staff to a member of the diabetes team if required. In 11 services without 24 hour access, there is access during Monday to Friday 9am to 5pm only, and in the remaining 8 services, there are variable arrangements for weekends and evenings in addition. It is assumed that general paediatric registrars or consultants firstly have recourse to the available local diabetes guidelines and would contact the consultant with an interest in diabetes if necessary, although this audit cannot establish how often the latter occurs in practice.

15. All children with diabetes admitted for any reason are discussed with the paediatric diabetes team within 2 hours of admission:

Only 7 services (26%) stated that they would contact the paediatric diabetes specialist nurse within two hours during the day and only 4 services (15%) said they would contact the diabetes consultant within two hours during the day. However, if a child was in diabetic ketoacidosis and was admitted to PICU/ICU/HDU, 3 services (11%) stated that they would contact the diabetes consultant during the night. 25 services (93%) stated that they would expect that the consultant on-call would be called within four hours during the night.

4.1.2 Other Results

1. Insulin Errors

There were 16 errors reported from 13 hospitals. These are described in Table 3.

Table 3 Insulin errors reported over the past 6 months from all services

- child sent home with incorrect insulin
- hypo caused by delay in IV dextrose
- patients give different dose of insulin to that intended by medical staff
- double dose of insulin
- wrong insulin dispensed
- insulin overdose taken, deliberately, as insulin not locked away
- patient not properly supervised leading to poor compliance
- incorrect IV insulin rate
- incorrect insulin name prescribed
- pump not prescribed
- dose adjustments too little or too much written up by junior medical staff
- wrong type of insulin e.g. Mixtard 30 rather than Novomix 30
- miscalculation of insulin dose
- doses given late
- 2 patients administered insulin from same single patient use pen
- wrong insulin pen dispensed by pharmacy

2. Number of patients per PDSN (WTE)

The following table shows the number of patients that PDSNs care for

Table 4– No. of patients per PDSN

No.of patients per PDSN WTE	No. of services	%
Less than or equal to 70	6	22.2
71-100	13	48.2
Over 100	8	29.6
Total	27	100.0

NB Applies to all children cared for, including children aged 16 and over

The range was 56 to 160 patients, the mode 93 patients, and the median 87 patients

4.2 Part 2

24 of the 27 diabetes services participated in Part 2 of the audit (listed in Appendix A). The total number of children under 16 years of age with Type 1 diabetes cared for by the 24 participating services was 3,247, and there were **401 admissions** as defined above **during the 6 months**. 393 clinical questionnaires were returned, and a **parent/carer and/or child questionnaire was received from 162 (40%) admissions**. The total number of parent/carer questionnaires was 151 and the total number of child questionnaires was 103.

4.2.1 Breakdown of Admissions and Demographics

a. Breakdown of Admissions

Figure 5 – Breakdown of admissions

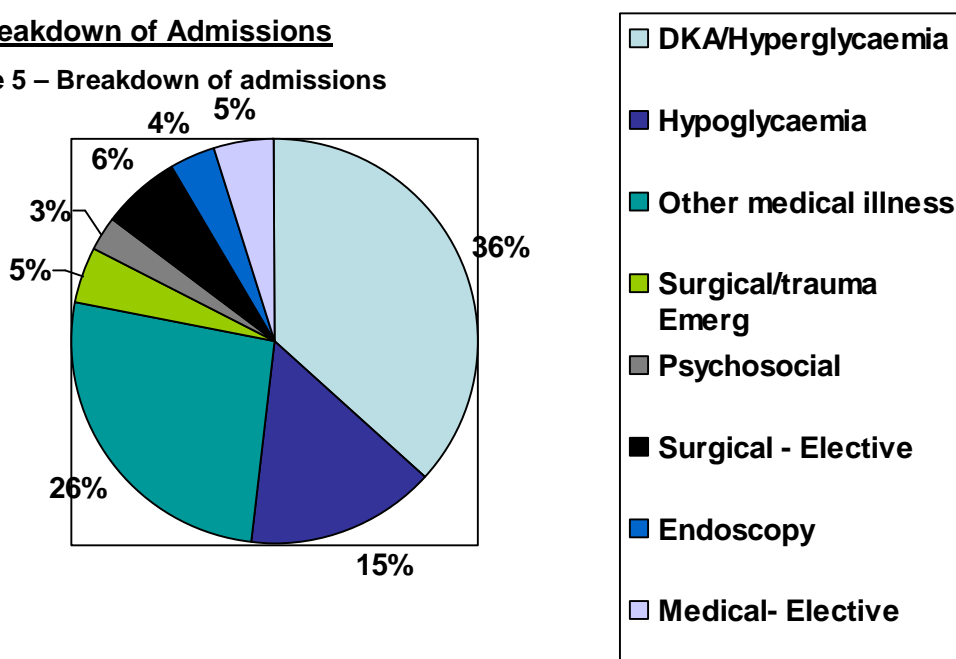
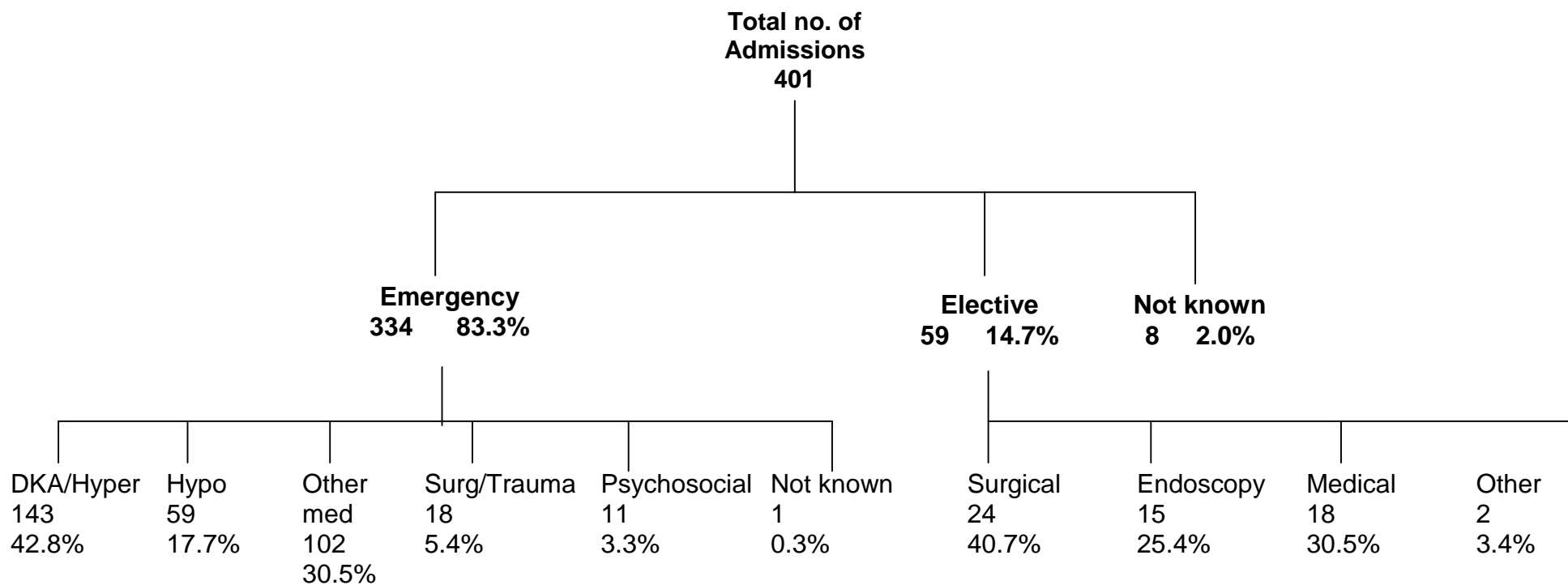


Table 5 – Breakdown of admissions

	No.	% of total no. of admissions	% of total no. of children cared for	% of total admissions on pumps	% of total admissions diagnosed for 1 year or less	Length of Stay (No. of nights) <i>Median, Range</i>
DKA/Hyperglycaemia	143	35.7	4.4	23.1	9.8	1, 0-5
Hypoglycaemia	59	14.7	1.8	15.3	28.8	1, 0-7
Other medical illness	102	25.4	3.1	22.5	40.2	1, 0-55
Surgical/Trauma	18	4.5	0.6	11.1	11.1	1, 0-4
Psychosocial (incl. self-harm)	11	2.7	0.3	9.1	0	1, 0-3
Not known	1	0.3	0.03	100.0	0	
Total Emergency	334	83.3	10.3	20.7	22.2	
Surgical	24	6.0	0.7	8.3	20.8	0, 0-2
Endoscopy	15	3.7	0.5	13.3	20.0	0, 0-2
Medical (incl. stabilisation)	18	4.5	0.6	0	33.3	3, 0-22
Other	2	0.5	0.06	100.0	0	
Total Elective	59	14.7	1.8	10.2	23.7	
Other Not known	8	2.0	0.3			
Total Admissions	401	100.0	12.4	18.7	22.0	

Figure 6. Breakdown of Reasons for Admission.



b. Age Breakdown and Duration of Diabetes

Median Age - 11 years (range <1 to 15 years)

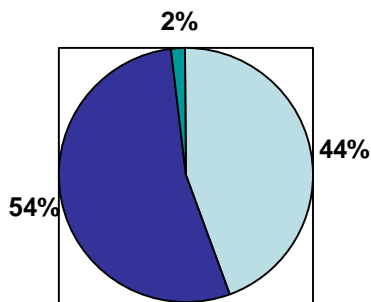
Median Duration of Diabetes – 3 years (range <1 to 15 years)

Table 6 – Age Breakdown

		No.	1 and under	2-5 years	6-11 years	12-15 years
Emergency	DKA/Hyperglycaemia	143	0	14 (9.8%)	48 (33.6%)	81 (56.6%)
	Hypoglycaemia	59	4 (6.8%)	23 (39.0%)	17 (28.8%)	15 (25.4%)
	Other medical illness	102	4 (3.9%)	26 (25.5%)	41 (40.2%)	31 (30.4%)
	Surgical/Trauma	18	0	0	10 (55.6%)	8 (44.4%)
	Psychosocial (incl. self-harm)	11	0	0	0	11 (100%)
	Not known	1				
	Total Emergency		334	8 (2.4%)	63 (18.9%)	116 (34.7%)
Elective	Surgical	24	0	0	7 (29.2%)	17 (70.8%)
	Endoscopy	15	0	1 (6.7%)	6 (40.0%)	8 (53.3%)
	Medical (incl. stabilisation)	18	2 (11.1%)	0	2 (11.1%)	14 (77.8%)
	Other	2	0	1	1	0
	Total Elective	59	2 (3.4%)	2 (3.4%)	16 (27.2%)	39 (66.1%)

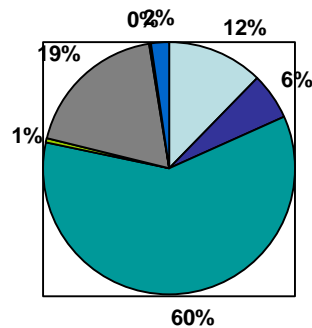
c. Gender and Insulin Regimen

Figure 7 – Gender



□ Male ■ Female ■ Not known

Figure 8 – Insulin Regimen

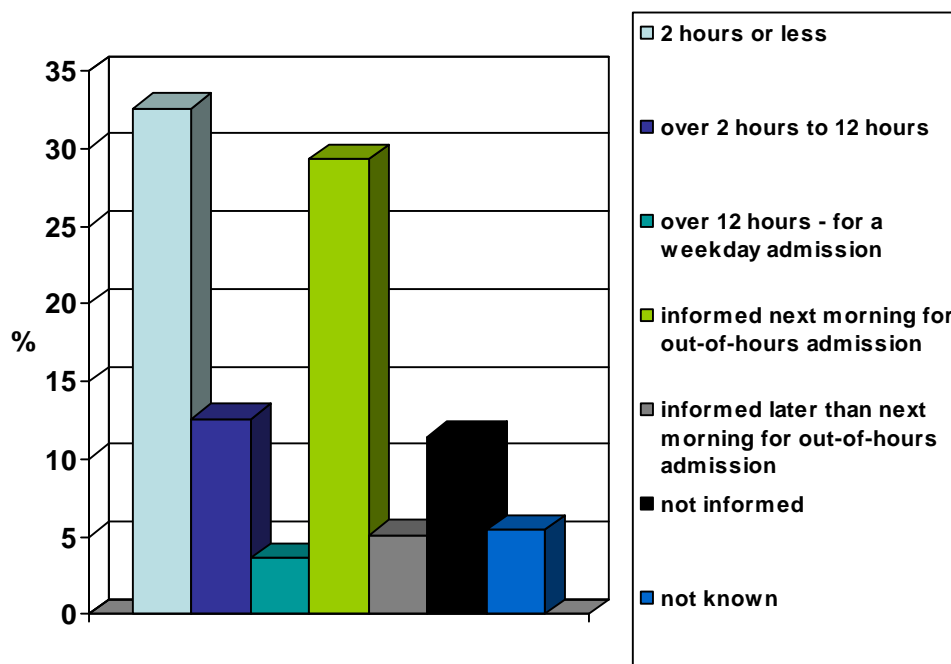


□ Twice daily
 ■ Three times daily
 ■ Basal Bolus
 ■ Once Daily
 ■ Pump
 ■ Not on insulin
 ■ Not known

4.2.2 Results from Clinical Questionnaires

a. Length of time for diabetes team to be informed of admission

Figure 9 – Length of time to be informed – Emergency Admissions



This chart shows the times for **Emergency Admissions**. NB Out of hours - after 5.00pm on weekdays and all weekend.

The diabetes team were informed prior to an **Elective Admission** for 45 of the 59 (**76%**) elective admissions.

b. Type of ward admitted to

Table 7- Type of ward

	No.	%
Children's assess/observation/ambulatory/short stay	63	15.7
Children's general/medical	223	55.6
Children's surgical	21	5.2
Adolescent/Young People	15	3.7
Children's HDU	34	8.5
PICU	1	0.3
Day Case	3	0.8
Adult	2	0.5
Two wards	25	6.2
Other	5	1.3
Not known	9	2.2
Total	401	100.0

c. Protocols used where applicable

Table 8 – Protocols used

	No. of applicable admissions	No. of admissions where protocol used	% of applicable admissions
DKA	99	96 (1 not known)	97.0
Hypo	46	33 (5 not known, 3 no protocol)	71.7
Surgery	31	18 (3 not known)	58.1
Total	176	147	83.5

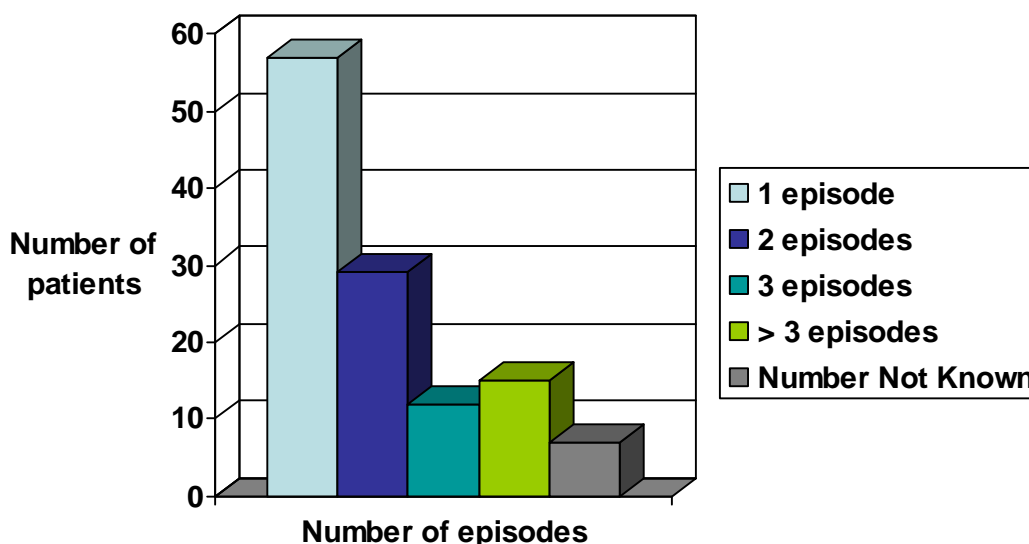
d. Problems with insulin administration

There were **25 problems with insulin administration** (from 10 services) during the admission (**6% of total number of admissions**); 22 during emergency admissions (7% of emergency admissions) and 3 during elective admissions (5% of elective admissions). Two of these occurred in short-stay wards (8%), 12 in children's/adolescent medical wards (48%), 6 in children who had stays on two wards (24%), 2 on children's surgical (8%), 2 on children's HDU (8%), and 1 on another ward. The **types of insulin problems** (see Appendix B) were; 9 deviations from insulin infusion protocols, 7 prescription errors, 4 administration errors, 3 dose calculation errors or disagreements about doses, and 2 because of unfamiliarity with insulin pumps.

e. Problems with Blood Glucose (BG) monitoring and hypoglycaemia

The medical teams felt that the frequency of BG monitoring during the admission was **appropriate in 361 episodes (90%)**, too frequent in 7 (2%) and not often enough in 17 (4%). In 16 (4%), the question was not answered. **120 patients had at least one episode of hypoglycaemia** during the admission (**% of admissions** - NB for patients admitted with hypoglycaemia, the episode on admission was not included). The number of episodes each patient had during their admission is shown in the following chart;

Figure 10 – Hypos during admission



f. Problems with food

There were **14 (4% of admissions)** recorded problems with food. These were related to fasting for surgery in 2 cases, being given the wrong type or timing of food for diabetes in 5 cases, lack of gluten-free food in 1 case, poor intake owing to medical problems or refusal to eat in 6 cases.

g. Other Adverse Incidents

There were **18 other adverse incidents (5% of admissions)**. These could be divided into 7 incidents related to elective surgery (for example communication problems between anaesthetist and medical team over responsibility for insulin prescription), 7 incidents related to insulin pumps, and 4 others including lack of documentation.

4.2.3 Results from Parent/Carer and Child Questionnaires

The parents/carers and children were asked the following questions and their responses are shown in the corresponding charts and tables.

a. Were you seen by a member of the diabetes team?

Figure 11 - Seen by team- Medical Admissions Figure12–Seen by team–Surgical Admissions

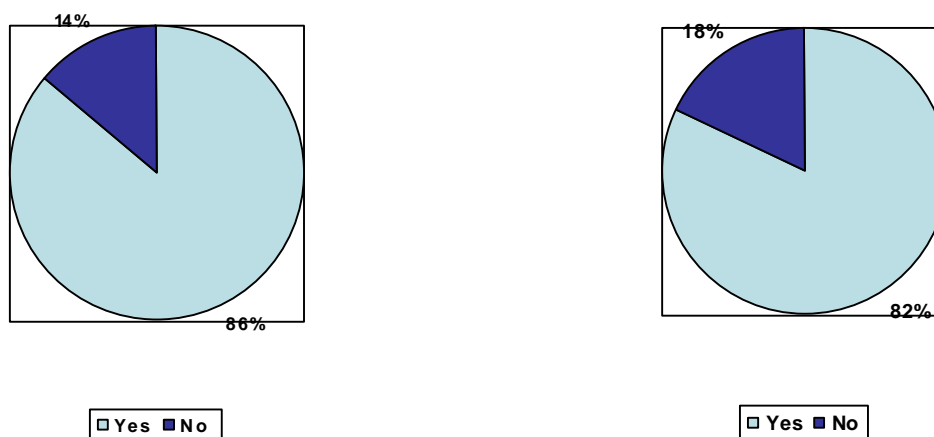


Table 9 – seen by a member of diabetes team

	Parent		Child	
	No.	%	No.	%
Yes	128	84.8	90	87.4
Medical – Emerg & Elective	105	82.0	67	74.4
Surgical* – Emerg & Elective	18	14.1	15	16.7
Other/Not known	5	3.9	8	8.9
Doctor	91	71.1	57	63.3
Nurse	90	70.3	65	72.2
Dietitian	20	15.6	17	18.9
No	22	14.6	8	7.8
Medical – Emerg & Elective	17	77.3	6	75.0
Surgical* – Emerg & Elective	4	18.2	1	12.5
Not known	1	4.5	1	12.5
Weekend / o/n admission	21 (1 not known)	95.5	5 (1 not known)	62.5
Not sure	1	0.6	5	4.9
Total	151	100.0	103	100.1

*Includes endoscopy

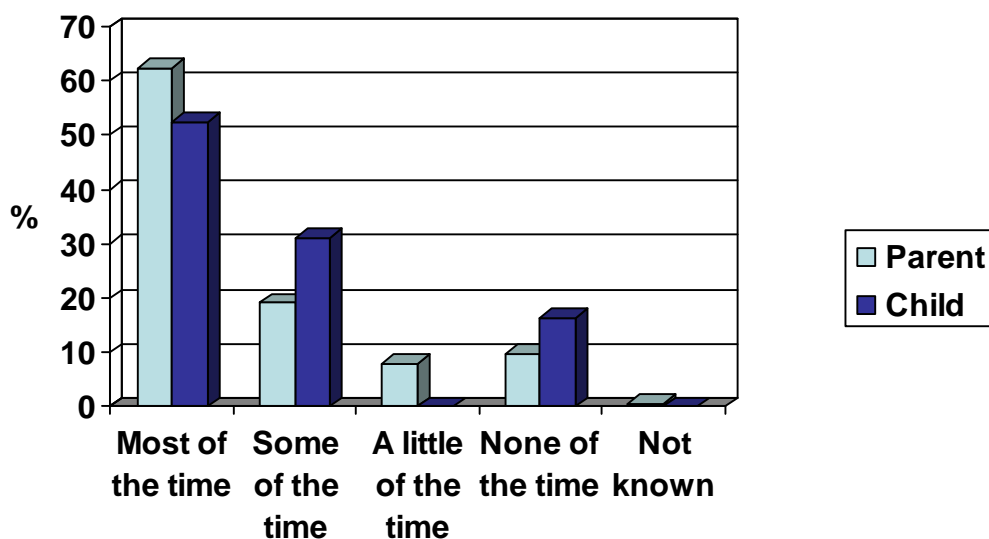
NB 21 of the 22 families that were not seen by the diabetes team were admitted overnight or at the weekend.

Table 10 – Seen by team – medical & surgical – Emergency/Elective breakdown

Parent questionnaires only		Yes		No		Total
		No.	%	No.	%	
Medical	Total	105	86.1	17	13.9	122
	Emergency	99	85.3	17	14.7	116
	Elective	6	100.0	0	0	6
Surgical	Total	18	81.8	4	18.2	22
	Emergency	4	57.1	3	42.9	7
	Elective	14	93.3	1	6.7	15

b. Were you involved in managing your child's/your diabetes?

Figure 13 – involved in managing diabetes



Most of the parents' comments on how they were involved said that they took blood glucose and gave insulin.

Those that answered 'Some of the time', 'A little of the time' and 'None of the time' above were asked if they would have liked to be more involved and the results are shown in Table 11 below.

Table 11 – Liked to have been more involved with managing the diabetes

	Parent		Child	
	No.	%	No.	%
Yes, definitely	7	12.5	4	8.2
Yes, sort of	13	23.2	18	36.7
No	36	64.3	27	55.1
Total applicable	56	100.0	49	100.0

c. Were you able to give insulin to your child/yourself while in hospital?

Table 12 – Able to give insulin

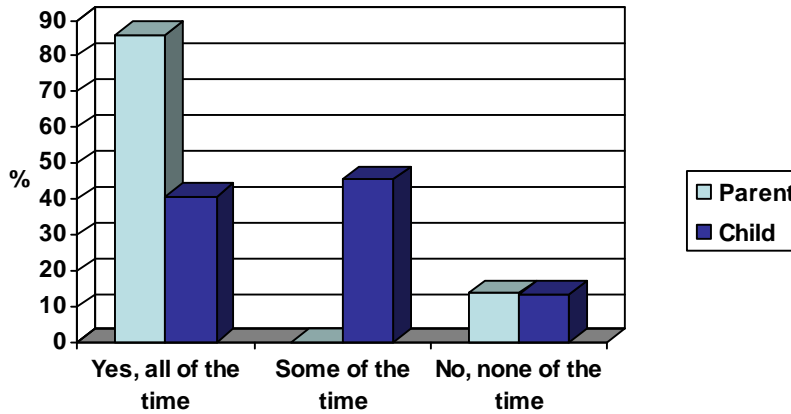
	Parent		Child	
	No.	%	No.	%
Yes	131	86.8	72	70.0
No, but I would have liked to	5	3.3	6	5.8
No, but I did not want to	10	6.6	19	18.5
Not sure	0	0	4	3.9
Not known	2	1.3	2	1.9
Not applicable	3	2.0	0	0
Total	151	100.0	103	100.1

87% (13 out of 15) of the parents that answered 'No' above said that their child was given the right dose of insulin at the right time.

d. Were you/your child able to use their insulin pump while in hospital?

36 of the parents that responded had children that are pump users, and 22 of the children that responded were pump users.

Figure 14 – Able to use pump in hospital



Parents made in total 32 comments about the use of pumps in hospital; 12 of these were positive, and reflected largely that they were empowered to use the pump themselves while their child was in hospital, and 20 were negative comments, 17 of which were about the lack of knowledge amongst ward staff about insulin pumps.

e. Were you able to test your child's/your blood sugars?

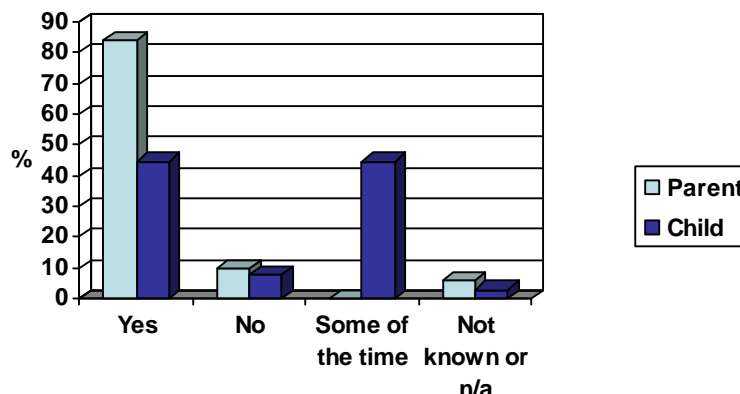
Table 13 – Able to test blood sugars

	Parent		Child	
	No.	%	No.	%
Yes	129	85.4	83	80.6
No, but I would have liked to	7	4.6	4	3.9
No, but I did not want to	14	9.3	16	15.5
Not known	1	0.7		
Total	151	100.0	103	100.0

All 21 (100%) of the parents that answered 'no' above said that the ward staff tested their child's blood glucose.

The following chart shows how many were able to use their own testing machines and lancets.

Figure 15 – Able to use own machines and lancets



f. Do you think the ward team looking after your child/you understood diabetes?

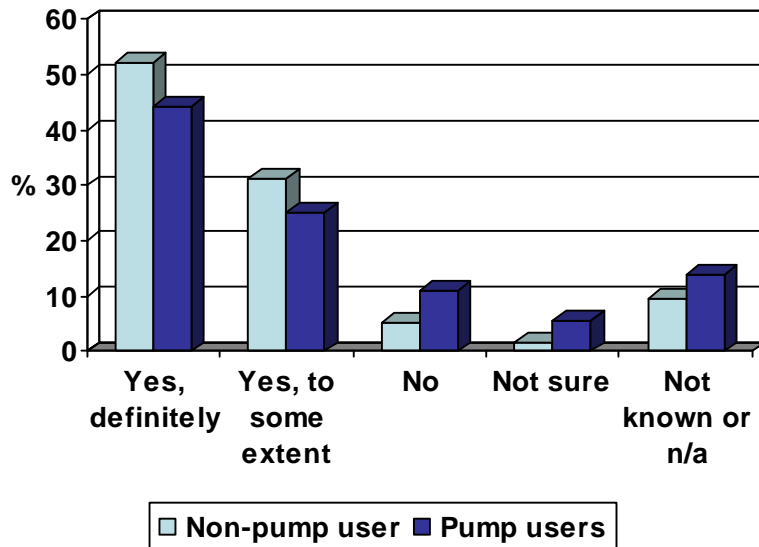
Table 14 – Ward team understanding of diabetes

	Parent				Child			
	Non-pump users	%	Pump users	%	Non-pump users	%	Pump users	%
Yes, all or most staff did	76	66.1	15	41.7	53	65.4	12	54.5
Yes, some staff did	29	25.2	15	41.7	24	29.6	7	31.8
No	9	7.8	6	16.7	3	3.7	2	9.1
Not sure	n/a*	n/a*			1	1.2	1	4.5
Not known	1	0.9			0	0	0	0
Total	115	100.0	36	100.1	81	99.9	22	99.9

* Parents were not given the option of 'not sure' in answer to this question

Parents were asked if the ward staff were able to answer questions in a way they could understand, with the following replies

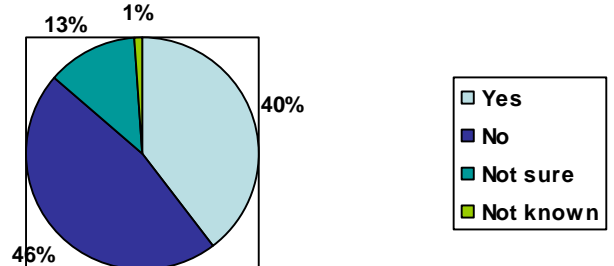
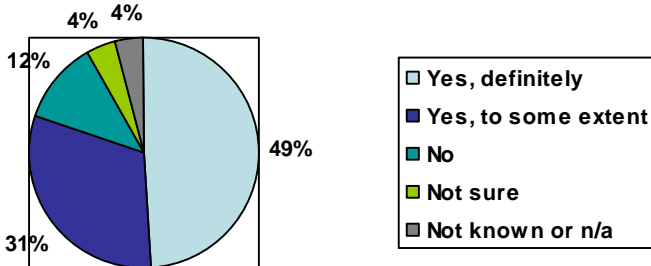
Figure 16 – Staff able to answer questions on diabetes



g. Did you have access to the right kind of food to manage your child's diabetes?

Figure 17 – Parents – Access to right food

Figure 18 – Children – Help with choosing food



In the 13 children with coeliac disease as well as diabetes, 7 parents (54%) reported that the diet was catered for, 4 (31%) that it was not catered for, and 2 did not reply to this question.

There were 9 overall comments from parents about the food; 4 about lack of help with and

lack of staff knowledge about carbohydrate counting, 2 about lack of choice regarding specific requirements (eg halal) and the remainder about poor menu choice and quality of food.

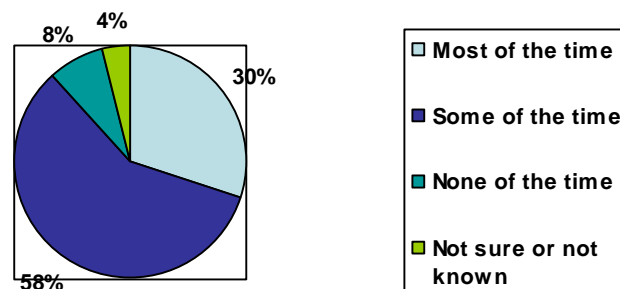
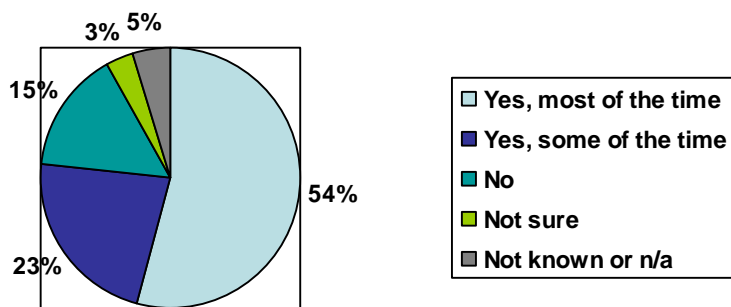
h. Control of blood glucose (BG)

Parents were asked ‘Were your child’s blood sugars as well controlled as at home, while you were in hospital?’

Children were asked ‘Did you have any high or low blood sugars while staying in hospital?’

Figure 19 Parents
Parents – BG as well controlled as home

Figure 20 Children
Children – Any high or low BGs

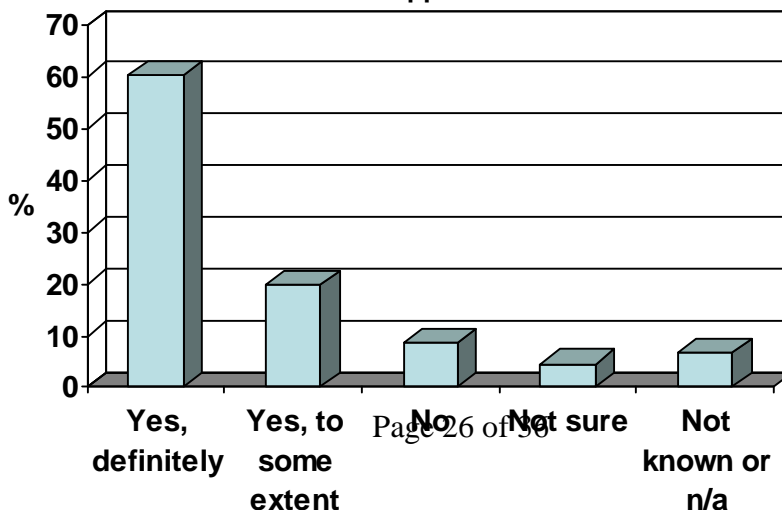


Where the BG levels were not as well controlled as at home (62 admissions) staff responded in the correct way in 36 (58%), to some extent in 18 (29%) and not in the correct way in 6 (10%). 2 did not reply to this question.

There were 34 comments about staff responses to variations in BG levels; 10 were positive, and 24 were negative comments. The themes were mostly about responses to low BG levels, parents not being allowed to give extra insulin when their child’s BG level was high, staff being unsure of the insulin doses needed, and staff not understanding the need to check ketone levels.

i. Did you feel that you received enough emotional support from staff to manage your child’s diabetes?

Figure 21 – Parents -Received emotional support

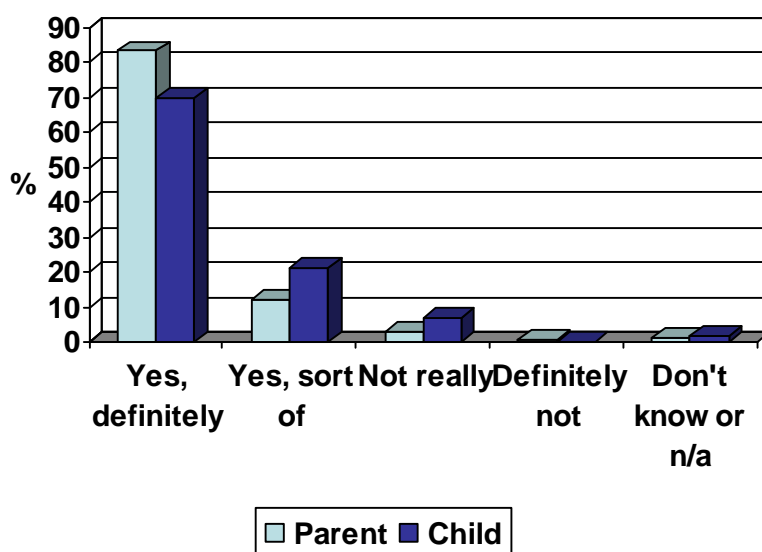


i. If your child was admitted via Emergency Department please comment on care

There were no questions specifically about the Emergency Department experience, but parents were asked to comment if they would like to. In total there were 54 comments. 34 of these were positive, and described excellent prompt and appropriate care. 19 were negative comments; 11 were about the length of time they waited with high or low BG levels, 6 were about communication, attitude and care and 2 about lack of knowledge about diabetes in Emergency Department staff.

k. Would you recommend this hospital to other families who have children with diabetes?

Figure 22 – Recommend the hospital



l. Do you receive copies of clinic letters?

136 parents (90%) stated that they usually receive copies of the out-patient clinic letters, 8 (5%) that they sometimes do, 2 that they never do and the remaining 5 had not yet had a clinic appointment.

m. Parents - Other comments – What was done well? Any specific problems?

The parent’s overall comments were positive and most families were very grateful for their care, and commended the caring, helpful and supportive staff.

There were 118 parent comments in total - 79 positive and 39 negative comments which could be broken down as follows;

Table 15 – Parent’s Overall Comments

	Positive	Negative	Total
General Management	28	3	31
Staff	43	14	57
Surgery	4	5	9
IV problems	-	3	3
Other	4	14	18
Totals	79	39	118

n. Children – Is there anything else that you would like to tell us?

The children's overall comments were positive and most of them were very happy with their stay and wanted to say thank you to the staff.

There were 26 children's comments in total – 12 positive, 10 negative and 4 other comments.

4.2.4 Coding Results

Of the 24 participating services, the audit list of patients created by the diabetes team matched the list received from the coders in 9 services, the lists did not match in 13 services, 1 service did not receive a list from the coders, and 1 service did not reply.

Overall, 11 admissions had been missed by the coders and 49 patients had been missed by the teams. The patients that had been missed were then included in the audit.

5. Conclusions

- The audit demonstrates that some standards can be achieved, but others, such as having children's nurses on every shift in ED, lack of dietetic advice to ward staff and liaison with the diabetes team quickly out of hours are more challenging.
- The number of admissions is high (12.3% of children with diabetes were admitted during the 6 months of the study), and the majority are emergencies.
- Large numbers of errors/incidents from clinical questionnaires, but none resulting in major morbidity or mortality. (43 errors in total (10.7% of admissions) -25 insulin errors and 18 other adverse incidents)
- Parents generally feel that care is good but had a number of concerns as follows
 - management of out of range BG levels
 - surgical admissions – problems with fasting and delayed surgery
 - insulin pumps – lack of ward staff knowledge
- Despite many adverse comments most families would recommend their local hospital service.

6. Actions

- **The Standards for Inpatient Care for Children with Diabetes Admitted to Hospital** have been re-defined (see Appendix C), and these will be discussed with the National Clinical Lead for Diabetes, with a request to present them at the next NHS Diabetes National Children's Networks meeting.
- The lack of knowledge of ward staff about out of range blood glucose levels, and insulin infusion pumps will be highlighted to the National Children's Diabetes Networks meetings, and a plan made as to how to address this.
- **National hypoglycaemia guidelines**, for the management of children with diabetes admitted with hypoglycaemia will be prepared.
- An analysis of the variation in the **Diabetic Ketoacidosis guidelines** in the regions was carried out.
- An analysis of the variation in the **Diabetes Surgical guidelines** will be carried out with the possible objective of developing national surgical guidelines, for the management of children with diabetes admitted for surgery.
- **Information leaflets** for parents and children, entitled 'Children with Diabetes being admitted to hospital' are being written. These will include information for surgery, and will be available for families prior to admission.

7. Publications

- A poster presentation entitled '**Continuing Variation in DKA Guidelines**', looking at the protocols received from the audit, was displayed at the British Society for Paediatric Endocrinology and Diabetes (BSPED) conference, November 2011.
- A paper entitled '**Inpatient Care for Children with Diabetes – are standards being met?**', using the data from Part 1 of the audit, has been accepted by Archives of Disease in Childhood and will be published in 2012.
- A paper entitled '**Care of Children with Diabetes as Inpatients; frequency of admissions, clinical care and patient experience**', using the data from Part 2 of the audit, has been submitted to Archives of Disease in Childhood, and is awaiting review.
- A poster entitled "**Standards for Inpatient Care for Children and Young People with Diabetes – are they being achieved?**" publishing results from Part 1 of the audit will be presented at the Diabetes UK Annual Professional Conference, March 2012.
- A paper, using data from both parts of the audit, is being drafted and will be submitted to the Paediatric Nurses Journal.
- **Variations of Newly Diagnosed Protocols** – a presentation for conferences will be prepared and submitted to BSPED and the Royal College of Paediatrics and Child Health (RCPCH)

8. Acknowledgements

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We would also like to acknowledge the support from Diabetes UK who helped with the parent/child questionnaires and the Information Leaflets.

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Appendix A Participating Services

Basingstoke – Basingstoke and North Hampshire NHS Foundation Trust

Winchester – Royal Hampshire County Hospital

Portsmouth – Queen Alexandra Hospital

Salisbury – Salisbury District Hospital

East Dorset – Poole Hospital NHS Foundation Trust

Southampton – Southampton General Hospital

Isle of Wight – St Mary's Hospital

West Dorset – Dorset County Hospital

Chichester – St Richard's Hospital

Oxfordshire – Oxford Children's Hospital and Horton Hospital, Banbury

Buckinghamshire – Stoke Mandeville Hospital and Wycombe General Hospital

Slough* – Wexham Park Hospital

Kettering* – Kettering General Hospital NHS Foundation Trust

Reading – Royal Berkshire NHS Foundation Trust

Milton Keynes* – Milton Keynes Hospital NHS Foundation Trust

Northampton – Northampton General Hospital NHS Trust

Bristol – Bristol Royal Hospital for Children and Weston General Hospital

Bath – Royal United Hospital

Swindon – The Great Western Hospital

North Devon – North Devon Hospital

Cheltenham & Gloucester – Gloucestershire Royal Hospital and Cheltenham General Hospital

Exeter – Royal Devon and Exeter NHS Foundation Trust

Plymouth – Derriford Hospital

Taunton – Musgrove Park Hospital

Torbay – Torbay Hospital

Truro – Royal Cornwall Hospital

Yeovil – Yeovil District Hospital NHS Foundation Trust

* Participated in Part 1 of the audit only

Appendix B Insulin errors (from clinical questionnaires)

25 problems recorded

Patient had not followed illness management education/advice and although reportedly giving usual prescribed insulin, had not monitored glucose levels and had not administered any additional rapid acting insulin, resulting in hyperglycaemia and DKA. During admission, deviation from protocol in that IV insulin was discontinued at midnight on medical advice, without any subcutaneous insulin cover being administered.
Sliding scale insulin commenced without clear clinical indication. However sugars maintained within normal ranges and safe decision.
Registrar advised against protocol, to cease IV fluids, continue IV insulin and give breakfast but not to administer subcutaneous insulin with meal (acidosis had resolved at this time). Action corrected by Paediatrician on call at lunchtime same day.
The incorrect insulin was given in pm (Humalog instead of Humalog Mix 25) , not detected until 9.00am the following morning by PDSN
Team unable to unlock pump so injected with insulin using pen. Child had just moved to area and team not familiar with type of pump. Uncle & aunt not familiar with pump either. Mother not available (referred to social services)
Insulin dose given correctly in evening with PDSN advice, but not the following morning
Started on intravenous insulin via sliding scale with no clinical indication for this.
Insulin not written in drug chart correctly by anaesthetist (insulin regime as per paediatric diabetic protocol)
No IV insulin given while nil by mouth (had normal morning dose subcut). Hypoglycaemia required IV dextrose bolus while fluids being changed to 10% dextrose
Extra units advised by PDSN at 10.20 which weren't given - development of ketones then occurred- extra insulin then given at teatime with good effect
Cannula tissued whilst on DKA protocol/ multiple attempts at recannulation so patient had no insulin or fluid for 5 hours/given s/c lantus after 3 hours/this led to deterioration back into DKA so DKA protocol started again
Patient pulled out cannula whilst insulin and fluids infusing. Mis communication about when IV insulin should be stopped following s/c starting (between ward nurse and pdsn)
Rapid acting insulin not given until 3.5 hours after admission with hyperglycaemia.
Sliding scale S/C insulin commenced whilst still hypoglycaemic
Not written on drug chart
Novorapid not prescribed
Mum was told by nurses on surgical ward (what she says) not to give insulin (boluses whilst on pump) when clearly, as BGL and ketones were rising that's what she should have done at home.
When switched back to s/c insulin should have followed protocol and given half long acting insulin dose to cover patient until evening, but none given. No s/c insulin prescribed until after patient had been given breakfast and lunch doses.
Insulin dose written as '1unit per 15 mmoll' should be ' per 15 gms carbohydrate'
Unsure if morning insulin given by patient or not
Not changed to sliding scale insulin when acidosis corrected but patient not tolerating diet & fluids. Low BS not treated correctly whilst on IV insulin. Drs instructed nurses to stop insulin
DATIX (risk management) of Actrapid insulin use by clinical staff during hypoglycaemic treatment. Novonordisk insulin cartridge sent from mum's supply sent for assay due to prolonged hypo
The correct dose of Humalog insulin was given with parents own supply, but the drug chart was prescribed incorrectly. Prescribing Humalog
Novorapid given when not eaten any food.
Admitted to medical ward? Should have been HDU due to observation but improving. Wrong insulin in insulin pen. Pens brought in from home - not a staff/nurse error

Appendix C Re-defined Standards

1. Families are provided with copies of their clinic letters
2. ED (Emergency Department) has a children's trained nurse on every shift [2]
3. There are children's nurses in all areas where children are cared for [2]
4. Both ED and ward staff receive regular education sessions on management of children with diabetes
5. Staff working in all areas caring for children have access to protocols for diabetes in children including DKA [4], diabetes during surgery [4], hypoglycaemia and management of the newly diagnosed child
6. Each paediatric department has a consultant responsible for liaison with ED [3]
7. Each ward admitting children with diabetes has a link nurse [5]
8. Children with diabetes are always nursed on the same ward where possible
9. Parents are enabled to manage their child's diabetes on the ward where appropriate
10. Paediatric Diabetes Specialist Nurses have a role in inpatient care [6]
11. Ward staff have access to adequate dietetic support (including carbohydrate counting) and access to appropriate food
12. Ward staff have 24 hour access to a Paediatric Diabetes Team
13. All children with diabetes admitted for any reason are discussed with a senior member of a paediatric diabetes team, within 2 hours for emergencies or on the next working day for less urgent cases
14. All staff prescribing or administering insulin should have completed the National Patient Safety Agency (NPSA) e-learning module