Meeting standards of inpatient care for children and young people with diabetes

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Article points

1. Little has been known about the inpatient care of children and young people with diabetes; an audit funded by the Healthcare Quality Improvement Partnership examined the standard of inpatient care for this group of patients.
2. Although many care standards had been met, there were still significant areas of deficiency in inpatient care.
3. Insulin errors remain a problem and require ongoing attention to improve practice; other areas highlighted for improvement include care of insulin pumps and monitoring diabetes in children and young people requiring surgery.

Key words

– Best practice tariff
– Care standards
– Inpatient services
– National paediatric diabetes audit

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Inpatient care of children and young people (CYP) with diabetes is a rather neglected area of management. Recent improvements in organisation of services have been focused on outpatient care and diagnosis, although these are yet to deliver improved outcomes. Inpatient standards of care were developed by a working group of paediatric diabetes professionals, but it is unclear as to whether they are being adhered to or are realistic in their aims. A recent audit funded by the Healthcare Quality Improvement Partnership in the South of England showed that CYP are more frequently admitted to hospital than expected. Although services generally meet the standards, and the child and parent perspectives are largely favourable, there are still areas needing improvement. These are, in particular, around the care of insulin pumps, CYP requiring surgery and insulin errors.

Approximately 29 000 children and young people (CYP) under the age of 18 years have diabetes in the UK, of whom around 26 500 have type 1 diabetes (Diabetes UK, 2012). Much of the focus on improving outcomes has been around outpatient care and initial diagnosis of CYP with diabetes, rather than inpatient care. NHS Diabetes has focused on improving paediatric diabetes services as one of its aims, but only three of the subsequently developed Best Practice Tariff criteria relate to inpatient care, and none are specific to inpatients (NHS Diabetes, 2012; *Box 1*).

Current knowledge of inpatient care

Inpatient diabetes care in adults has been highlighted to be highly variable and occasionally poor, as results from the *National Diabetes Inpatient Audit (NaDIA)* over the past few years have shown. Highlighted problems from the *NaDIA 2012* (Health and Social Care Information Centre, 2013) included almost 40% of patients experiencing at least one medication error while in hospital. While there had been an improvement in staffing levels, a quarter of sites still had no inpatient diabetes specialist nurses, and 70% had no specialist inpatient dietetic provision (Health and Social Care Information Centre, 2013).

As the *NaDIA* excludes paediatric patients, little has been known about the current status of inpatient care of children with diabetes until recently. Standard 8 of the *National Service Framework for Diabetes* (Department of Health, 2006) states:

> *"All children, young people and adults with diabetes admitted to hospital, for whatever reason, will receive effective care of their diabetes."*

Therefore, standards on inpatient care were produced by the Children and Young People Diabetes Implementation Support Group (CYPDISG) in conjunction with the Department of Health (Edge et al, 2012; *Box 2*). Some of these standards are already recognised standards for

inpatient general paediatric care (Royal College of Nursing, 2004), some have been addressed in NICE (2004) and Royal College of Nursing (2006) guidelines, and others were developed in an attempt to address deficiencies in service provision for CYP with diabetes. However, it was not clear whether they were being adhered to nationally, or practically in a clinical setting.

Good inpatient management is of great importance in diabetes to provide a good model of care for CYP and parents, to improve diabetic control, reduce HbA_{1c} and hopefully reduce complications in later life. Poor and inefficient diabetes inpatient care can have potentially adverse consequences for patients and increases the financial burden on the NHS, both in the short and long term. As noted in the NHS Diabetes (2008) report on *Improving Emergency and Inpatient Care for People with Diabetes*:

> *"Being in hospital has a significant impact on people with diabetes…they are often very unhappy about the management of their diabetes in hospital."*

This dissatisfaction is often related to a loss of control over their diabetes while in hospital.

In 2008, Diabetes UK reported on a series of responses from patients about inpatient care including, several from parents, such as:

> *"I still, however, had problems with the other hospital staff and ended up arguing with a registrar [who had not seen me or my son before], who wanted to give my son a sizeable insulin dose before breakfast time, even though at that time my son had not eaten any proper food since the operation" (Diabetes UK, 2008).*

Audit of inpatient care of CYP with diabetes

The authors performed an audit to assess the inpatient care for CYP with diabetes (funded by the Healthcare Quality Improvement Partnership [HQIP]). The focus of this audit was not only to compare inpatient care delivered to current standards, but also to quantify the experiences of CYP and their families while in hospital (Edge et al, 2012, 2013).

The inpatient care of CYP with diabetes in three regional networks of Southern England (Oxford, Wessex and the South West) was audited against those developed by the CYPDISG. The area covered 27 diabetes services, with a population of 3500 CYP under the age of 16 years with diabetes. Any admission of a child with diabetes over 4 hours in length was audited, whether it was for a diabetes-related condition or not; CYP presenting at the time of diagnosis were excluded.

There were two parts to the audit:

- Part 1 was a general questionnaire to each service, in order to audit each against the standards of care.
- Part 2 consisted of two questionnaires collected for all admissions over a 6-month period (November 2010 to April 2011) – one questionnaire was completed by the diabetes team, and the other by the parent/carer and child about their experience, either at the end of their stay or following discharge.

Box 1. *Best Practice Tariff for Paediatric Diabetes* (NHS Diabetes, 2012): Summary of criteria, with those relevant to inpatient care italicised

- *Young person with a new diagnosis of diabetes has to be discussed with a senior member of the paediatric diabetes team within 24 hours of presentation.*
- *All new patients must be seen by a member of the paediatric diabetes team on the next working day.*
- Each provider unit must provide evidence that each patient and family has received a structured, tailored education programme, both at time of diagnosis and during their attendance at the paediatric diabetes clinic.
- Each patient is offered a minimum of four clinic appointments per year with a multidisciplinary team.
- Each patient is offered additional contacts by the paediatric diabetes team as required, with a recommendation of eight contacts a year as minimum.
- Each patient is offered at least one additional appointment per year with a paediatric dietitian.
- Each patient is offered four HbA_{1c} measurements per year.
- All eligible patients should be offered annual screening, as recommended by current NICE (2004) guidance.
- Each patient should have an annual assessment by their multidisciplinary team with regards to the need for psychological input and access to support.
- Each provider must participate in the National Paediatric Diabetes Audit.
- Each provider must actively participate in their local Paediatric Diabetes Network.
- *Each provider unit must provide patients and their families with 24-hour access to advice on diabetes management, which also includes 24-hour advice for healthcare professionals on the management of patients admitted acutely.*
- Each provider must have a clear policy for transition to adult services.
- Each unit must have an operational policy.

Box 2. Standards of inpatient care for children and young people with diabetes*

- Families have copies of their clinic letters to show emergency services.
- The emergency department has a children's trained nurse on every shift.
- The emergency department has protocols and guidelines for diabetes in children.
- Emergency department staff have education sessions on management of children with diabetes.
- Each paediatric department has a consultant responsible for liaison with the emergency department.
- All units should have protocols for diabetes in children and young people, including diabetic ketoacidosis, diabetes during surgery, hypoglycaemia and management of the newly diagnosed child.
- Parents are enabled to manage their child's diabetes on the ward where appropriate.
- Each ward admitting children with diabetes has a link nurse.
- Paediatric specialist nurses have a role in inpatient care.
- There is adequate dietetic support for ward staff.
- There are children's nurses in all areas where children are cared for.
- Admissions of children with diabetes are made to the same ward when possible.
- Regular education sessions for ward staff on diabetes are provided.
- There is a 24-hour access to the paediatric diabetes team by ward staff.
- All children with diabetes admitted for any reason are discussed with the paediatric diabetes team within 2 hours of admission.

*Developed by the Children and Young People Diabetes Implementation Support Group for the Department of Health (Edge et al, 2012)

Paediatric inpatient audit findings

There were 401 admissions over a 6-month period, which could account for up to 12.3% of all CYP with diabetes over the regional networks. However, this was likely to be an overestimate, as a result of the anonymous nature of the audit making identification of repeat admissions difficult. The 12–15-year-old age group had the highest rate of admissions; 83% of admissions were emergency admissions, with a substantial proportion of these for diabetic ketoacidosis (DKA) or hyperglycaemia. The rate of DKA admissions were approximately 8.8% per year, similar to recent *National Paediatric Diabetes Audit (NPDA)* results (NPDA Project Board, 2012).

Standards that were shown to have been met included:

- All hospitals have protocols for DKA. Protocols were also present for hypoglycaemia, newly diagnosed diabetes and surgery in individuals with diabetes, but these were locally derived and variable; 70% of services had all four protocols.
- Emergency departments had named consultants responsible for liaison, and also education sessions were provided for staff training.
- Diabetes specialist nurse involvement in inpatient care was within the remit of their working role. Diabetes link nurses were identified in at least two-thirds of wards, including high dependency.
- Other than in the emergency department, children's nurses were present in all areas where children are cared for.
- Education for ward staff was present, with 93% of services providing at least once-yearly education.

Areas of significant deficiency in inpatient care include:

- Only one-third of shifts in the emergency department have a trained paediatric nurse present.
- Less good dietetic support was available, with only one-third of services having access to dietetic services on the ward.
- Only 30% of hospitals have 24-hour access to paediatric diabetes teams, with the remainder having various arrangements for cover; as this is a requirement to meet the *Best Practice Tariff for Paediatric Diabetes* (NHS Diabetes, 2012), units may have to work together to cross-cover several units at once. All services provided in-hours access to the diabetes team.
- Insulin drug errors remain a problem; almost half of services reported insulin errors over the previous 6 months (16 errors reported from 13 hospitals; *Box 3* gives further details of the types of error).
- Adverse events were noted in 7% of emergency admissions and 5% of elective admissions.
- Thirty per cent of individuals had at least one episode of mild hypoglycaemia while in hospital, which can be unavoidable when attempts to improve control are being made.

Parents' experiences were assessed using an anonymous questionnaire (response rate 40%):

- In two-thirds of cases, parents generally felt care was good, even when they had specified problems in care.
- 83% would recommend their hospital to others.
- Parents and CYP usually felt involved in their management, with 77% of parents noting their child's diabetic control in hospital was as good as at home.

- In 85% of cases, parents reported seeing a member of the diabetes team during their admissions. However, this occurred much less frequently in surgical emergency cases (57%) compared with elective medical cases. There were more negative comments from parents regarding surgical admissions, with more adverse incidents reported.
- Specific parental concerns included management of out-of-range blood glucose levels and the understanding of insulin pumps among ward staff.

Discussion

The standards as developed by CYPDISG (Edge et al, 2012) provide a framework for the provision of inpatient care for children and young people with diabetes. The HQIP (2012) audit found the care of CYP with diabetes is on the whole better than the adult inpatient experience, as outlined above. This may be because of the smaller number of CYP with diabetes compared with adults, and the closer nature of working between the general admitting team and specialist teams within hospitals.

However, improvements within inpatient care are still needed. Insulin pumps are currently used in around 20% of CYP and are likely to become increasingly common; improving nursing and junior medical staffs' knowledge of insulin pumps is, therefore, essential. Parents are often present to manage the pump itself, but staff must understand the principles behind management and know how to troubleshoot, as parents sometimes are unfamiliar with managing "unwell" situations. This also applies to telephone advice, as it is often the on-call medical registrar taking calls from parents overnight. The development of protocols to guide staff unfamiliar with pump equipment will also help.

Ward staff education does appear to take place, at least on an annual basis in most services, and knowledge can be improved by reducing the number of ward areas to which CYP with diabetes are admitted and using link nurses to maintain knowledge and expertise in the ward setting. Worryingly, there is still a lack of trained paediatric nursing staff present in the emergency department, which is a recognised national standard for the care of CYP in hospital and, therefore, has effects outwith the sphere of diabetes.

Box 3. Insulin errors reported over the past 6 months from all services*

- Child sent home with wrong insulin.
- Hypoglycaemia caused by a delay in intravenous dextrose.
- Patients given a 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.
- Incorrect intravenous 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, for example Mixtard 30 (Novo Nordisk, Denmark) rather than Novomix 30 (Novo Nordisk, Denmark).
- Miscalculation of the insulin dose.
- Doses given late.
- Two patients administered insulin from same single-patient use pen.
- Wrong insulin pen dispensed by pharmacy.

*From Edge et al (2012)

Individuals with diabetes admitted with a surgical problem, whether as an emergency or electively, are another area of concern, with issues raised including problems relating to fasting, insulin doses and blood glucose monitoring. Diabetes teams were less likely to be involved in their care, although many hospitals had a protocol for managing surgical patients with diabetes. Surgical and anaesthetic staff may be less familiar with the management of pumps in particular.

There is most variation in the extent to which the diabetes team is informed of a patient's admission. Only 30% of teams had 24-hour contact, although this will change with the introduction of the *Best Practice Tariff for Paediatric Diabetes* (NHS Diabetes, 2012). The suggestion of discussing diabetic admissions with the specialist team within 2 hours of admission is unlikely to be practically workable, and not necessarily appropriate for all admissions; therefore, the authors would recommend that this standard is changed.

Insulin errors remain common and need to be reduced. A study from the USA (Desalvo et al, 2012) showed a reduction in resident-related errors from 19.4% to 6.6% over a 10-month period following an 8-week learner-centred diabetic

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1. Of all errors, insulin errors (related to dosing, timings and omission) were found to be highest throughout the study, followed by miscommunication then intravenous fluid errors.
2. Empowering children and young people with diabetes and their parents to manage their diabetes where appropriate while an inpatient is important. Staff need to work with families on this issue, especially with regards to allowing carbohydrate counting and variable insulin dosing for those on intensive insulin regimens and insulin pumps.
3. The criteria requiring a child with new diabetes to be discussed with a senior member of the diabetes team within 24 hours and to be seen on the next working day should also extend to any inpatient with diabetes, irrespective of the reason for admission.

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NHS Diabetes has developed an e-learning module on the *Safe Use of Insulin* (NHS Diabetes, 2010), which has been freely available to all NHS staff from June 2010, following demonstration by the NaDIA of large-scale errors related to inpatient insulin use. A 3-month follow-up evaluation of this module (Eyres et al, 2012) has shown it to be well received by healthcare professionals, with 87.5% of respondents indicating it to be recommended to a colleague, although the response rate via online survey was only 15.3%. Results show an increased confidence in prescribing, preparing or administering insulin with change in working practices. A further module on the safe use of *Intravenous Insulin Infusion* (NHS Diabetes, 2013) is also now available. The e-learning module is an excellent resource, and highlights common mistakes that can be easily reduced. This needs to be made a compulsory part of staff induction for all members prescribing or working with patients taking insulin.

Finally, empowering CYP with diabetes and their parents to manage their diabetes where appropriate while an inpatient is important. Staff need to work with families on this issue, especially with regards to allowing carbohydrate counting and variable insulin dosing for those on intensive insulin regimens and insulin pumps. Diabetes specialist nurses are generally widely involved in inpatient care, but dietetic support on the wards is lacking. This is of concern as significant numbers of CYP are on variable-dose insulin, both in the form of insulin pumps and basal bolus regimens; therefore, they need to know the carbohydrate content of food. This is not a familiar or regularly used concept for most ward-based nurses, so parents are often responsible for calculating insulin doses while on the ward.

Conclusion

Inpatient services for CYP with diabetes is a neglected area. The *Inpatient Audit of Children with Diabetes* (HQIP, 2012) is the first to study the provision of inpatient services for CYP with diabetes, and highlights some inadequacies in services in comparison with published standards. Insulin errors remain a problem that requires particular mention and ongoing attention to improve practice. Although the *Best Practice Tariff for Paediatric Diabetes* (NHS Diabetes, 2012) has three criteria related to inpatients, two of these specifically cover patients at diagnosis, rather than known patients. The criteria requiring a child with new diabetes to be discussed with a senior member of the diabetes team within 24 hours and to be seen on the next working day should also extend to any inpatient with diabetes, irrespective of the reason for admission. ■

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