

# Glycaemic control and referral to the inpatient DSN: An audit

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## Article points

1. Optimal inpatient glycaemic control is known to improve clinical outcomes.
2. The role of the inpatient diabetes specialist nurse (IDSN) has been introduced to improve inpatient diabetes care.
3. Inpatients are more likely to be referred to the IDSN for diabetes review following hypoglycaemic episodes rather than hyperglycaemia.

## Key words

- Hyperglycaemia
- Inpatient DSN
- Referral rates

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At any one time, a large proportion of hospital patients will have diabetes. This has implications both for prognosis and glycaemic control of these patients. As a result, the role of inpatient diabetes specialist nurse (IDSN) was developed to care for the diabetes-related needs of this population. To understand how diabetes care can be improved for hospitalised individuals in their Trust, the authors undertook an audit into glycaemic control and why patients in their unit are referred to the IDSN.

The prevalence of diabetes in hospital patients can be as high as 38% (Umpierrez et al, 2007), with uncontrolled diabetes in inpatients being associated with a worse prognosis in several clinical settings (Donner and Flammer, 2008).

Inpatient glycaemic control is often suboptimal (Donner and Flammer, 2008), yet studies have shown a decreased length of stay for patients with diabetes following the appointment of inpatient diabetes specialist nurses (IDSNs) (Davies et al, 2001; Sampson et al, 2006; Flanagan et al, 2008). Very little information, however, is available regarding the pattern of referral to the IDSN or whether advice received from an IDSN is acted on by the medical team.

This article describes an audit undertaken in a district general hospital (Poole Hospital NHS Foundation Trust), which aimed to assess the quality of glycaemic control of inpatients with diabetes, and to study the patterns of referral to the IDSN.

## Methods

Approval for the audit was obtained from the local audit committee. Medical notes from random people with diabetes aged 16–80 years admitted under non-diabetes-specialist medical teams to a district general hospital between May 2007 and June 2008 were examined. Individuals with acute conditions secondary to diabetes, such as diabetic ketoacidosis or hyperosmolar non-

**Table 1. Demographic details of individuals enrolled in the study (n=60).**

Age (years) – (median [range])	72 (31–93)
Length of stay (days) – (median [range])	7 (1–36)
Sex (male:female)	33:27
Number of people with type 1 diabetes	2
Number of people with type 2 diabetes	58
<b>Treatment:</b>	
Diet only	20
Single oral hypoglycaemic agent (OHA)	22
Two or more OHAs	6
Insulin only	9
Insulin plus metformin	3
<b>Reason for admission:</b>	
Gastroenterological disease	11
Acute coronary syndrome	10
Infection	10
Respiratory disease	8
Diabetic foot ulcer	4
Other vascular disease	8
Other reason	9

ketotic coma, and those on a DIGAMI (diabetes insulin-glucose in acute myocardial infarction) protocol for myocardial infarction were excluded because they are

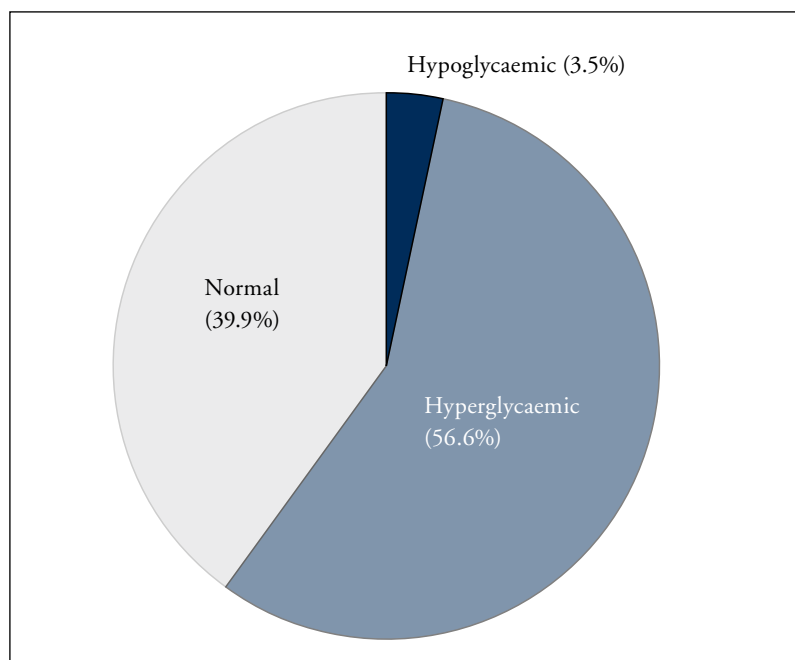


Figure 1. Capillary blood glucose readings.

placed on a special intensive blood glucose monitoring protocol.

The authors recorded the number of capillary blood glucose (CBG) measurements taken, and audited hypo- and hyperglycaemic episodes (normoglycaemia was considered to be 4–8 mmol/L). The authors audited whether referral was made to the IDSN by recording their subsequent documented entry in the notes. Action taken on IDSN recommendations was confirmed by noting suggested changes on drug charts or physician documentation in the notes following IDSN comments.

Most patients with type 1 diabetes were excluded from the study because they were admitted with diabetic ketoacidosis and were therefore placed on an intensive blood glucose monitoring protocol, meaning that the majority of patients in the audit had type 2 diabetes. A statistical comparison was made between the numbers of inpatients with hyper-, normo- and hypoglycaemia using Chi-squared tests.

### Results

Demographic data and reasons for admission are shown in *Table 1*. Of 1064 CBG measurements recorded during the audit period, 37 (3.5%) were in the hypoglycaemic range and 602 (56.6%) were in the hyperglycaemic range (*Figure 1*).

During this period, 26 of the 60 patients (43.3%) enrolled in the study were found to have more than 50% of their blood glucose measurements above 8 mmol/L (the authors' definition for hyperglycaemia), and in nine individuals (15%) over 90% of CBG results were hyperglycaemic.

Twelve patients (20%) remained normoglycaemic throughout their admission, and one person was referred to the IDSN for reasons not related to glycaemia. One individual had no hyperglycaemia and one episode of hypoglycaemia during a 2-day stay, and was not referred to or seen by the IDSN – possibly due to the short duration of stay. Eleven patients (18.3%) had both hyper- and hypoglycaemic episodes during

their admission, with seven of these (63.6%) being referred to the IDSN. Of the 36 patients (60%) who had hyperglycaemic episodes with no hypoglycaemia recorded, 12 (33.3%) were referred to the IDSN (Figure 2).

There was a significant difference between the number of patients referred as a result of hypoglycaemia (7/12) compared with those with hyperglycaemia only or normoglycaemia (13/48;  $P=0.04$ ).

For all patients referred to the IDSN the recommendations made were followed. The IDSN was asked to see 20 (33.3%) of the patients audited, and made a recommendation for change or alteration in therapy in 14 of these cases (70%). For all 14 patients these recommendations were followed.

### Discussion

This audit examined the nature of glycaemic control in a district general hospital, pattern of referral to the IDSN and the subsequent action taken. The study demonstrated that many of the patients have sub-optimal glycaemic control during their episode of care under non-diabetes specialist teams despite the presence of an IDSN. It also showed that patients with diabetes were more likely to be referred to the IDSN following a hypoglycaemic episode than if they were hyperglycaemic. The authors believe that this may be due to the acute, and potentially life-threatening clinical presentation associated with hypoglycaemia.

Hyperglycaemia rarely causes immediate clinical symptoms, and is therefore more easily missed. However, hyperglycaemia in inpatients is detrimental to clinical outcomes, and there is good evidence for improved clinical outcomes with good glycaemic control (van den Berge et al, 2001). The present study revealed that many patients with hyperglycaemia were not referred appropriately for specialist review, and some remained hyperglycaemic throughout their admission without any review of their glycaemic control.

Achieving good glycaemic control appears to be limited by various factors, including

clinical inertia (Knecht et al, 2006; Cook et al, 2007; Trujillo et al, 2008). The results of these studies have demonstrated that although physicians are almost always aware on admission that a patient has diabetes, this tends to be overlooked during the rest of the hospital stay. In these studies, nursing staff have been shown to regularly record blood glucose values, but medical staff fail to notice these values or to act on abnormal glycaemia.

In the authors' hospital, nurses are encouraged to ensure that appropriate referral is made to the IDSN. In addition to this failure by physicians to notice blood glucose measurements, the aforementioned studies have also highlighted poor awareness of the importance of good glycaemic control, lack of knowledge and experience in how and when to change or adjust therapy, and fear of causing hypoglycaemia.

A response to the problem of maintaining good glycaemic control in hospitalised individuals was to develop to role of IDSNs.

### Page points

1. For all patients referred to the inpatient DSN (IDSN) the recommendations made were followed.
2. The study demonstrated that many of the patients have sub-optimal glycaemic control during their episode of care under non-diabetes specialist teams despite the presence of an IDSN.
3. The role of the IDSN in the authors' hospital is multi-faceted, including educating patients and staff, prescribing, and monitoring and maintaining standards of care.

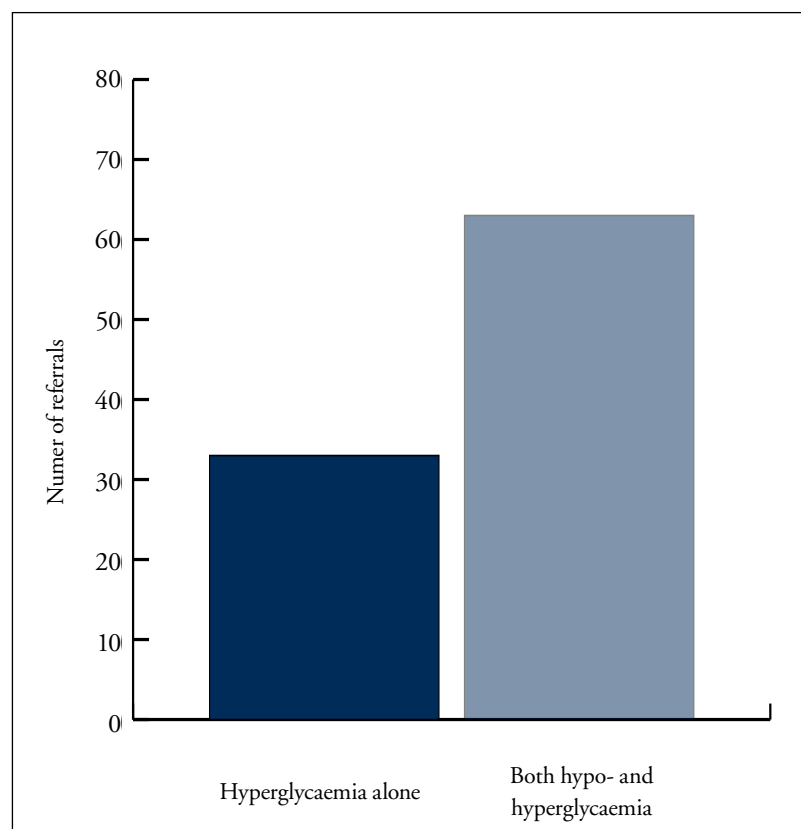


Figure 2. Referrals to the inpatient DSN.

Page points

1. Although inpatient DSN (IDSN) services appear to be under-used, particularly with regard to hyperglycaemia, it was encouraging to see that all recommendations made by the IDSN were followed.
2. Emphasis needs to be placed on increased referral to the IDSN or similar specialist team, particularly for inpatients with hyperglycaemia.
3. As untreated hyperglycaemia is likely to lead to higher mortality in hospitalised patients, new strategies are required to ensure that correct referral to IDSNs is made.

The majority of IDSNs have been appointed since 2002 and their numbers are increasing (Sampson et al, 2007). The role of the IDSN in the authors' hospital is multi-faceted, including educating patients and staff, prescribing, and monitoring and maintaining standards of care.

Prior to the introduction of the IDSN role, inpatient diabetes care was the remit of outpatient DSNs and the diabetes physicians. As only around 6% of inpatients with diabetes are admitted specifically because of a diabetes-related problem, the IDSN at the authors' hospital provides input for patients in all specialties with a range of morbidities. An inpatient stay provides an opportunity to improve diabetes control and the IDSN at the authors' hospital aims to do this through well-monitored medication management and positive reinforcement of basic lifestyle issues.

The poor rate of referral for hyperglycaemia observed in this study may conceal a greater need for the IDSN service, and the authors believe that the potential of IDSN services in managing inpatient hyperglycaemia is far from being fully realised. Although IDSN services appear to be under-used, particularly with regard to hyperglycaemia, it was encouraging to see that all recommendations made by the IDSN were followed.

**Conclusion**

Emphasis needs to be placed on increased referral to the IDSN or similar specialist team, particularly for inpatients with hyperglycaemia. At present, the authors are piloting a new, highly-visible blood glucose monitoring chart that will highlight abnormal glycaemia and give advice on appropriate action.

The authors acknowledge that the audit is of a small sample of inpatients, although they were randomly selected, and believe that they are representative of those admitted under the medical teams at their hospital. There may be differences with patients admitted under other specialties, although much of the work of the IDSN is carried out on non-medical wards, so this is unlikely to be the case.

This audit, which examined why patients with diabetes were referred to the IDSN, showed that patients were more likely to be referred because of hypoglycaemia than hyperglycaemia. As untreated hyperglycaemia is likely to lead to higher mortality in hospitalised patients, new strategies are required to ensure that correct referral to IDSNs is made. The authors have implemented new referral guidelines in their hospital to ensure the right patients are reviewed by the specialist team in a timely fashion, which is the aim of high-quality inpatient diabetes care. ■

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