# Effective management of patients undergoing gastrointestinal endoscopy

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## ARTICLE POINTS

1 Fasting for procedures is problematic for people with diabetes on insulin therapy.

2 There can be an assumption that no food or drink equals no insulin, leading to poor management and inaccurate advice.

3 No standard guidelines were in operation.

4 This study resulted in the development of guidelines to standardise the information given to people undergoing gastrointestinal endoscopy.

5 These guidelines have helped to ensure safe practice and have improved management of this group of people.

6 The guidelines have now been adopted in other departments, such as respiratory care and X-ray.

**KEY WORDS**
- **Insulin**
- **Gastrointestinal endoscopy**
- **Hypoglycaemia**
- **Guidelines**

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## Introduction

**A number of procedures require patients to fast or to reduce their calorie intake, including carbohydrates. This is clearly problematic for people with diabetes on insulin therapy and requires careful management by healthcare professionals. This article will outline a small audit where we looked at the metabolic effects of fasting followed by gastrointestinal endoscopy on people with diabetes treated with insulin. Following the audit, we developed guidelines for insulin adjustment for these procedures.**

People with diabetes are educated and supported to manage their condition and, hopefully, achieve stable glycaemic control and prevent complications (Diabetes Control and Complications Trial, 1993; United Kingdom Prospective Diabetes Study Group, 1998). In addition, those treated with insulin therapy are advised to have regular carbohydrate intake and never to omit insulin. The importance of this is emphasised during times of illness or stress.

There can be an assumption from patients and healthcare providers that no food or drink equals no insulin, leading to poor management and inaccurate advice. People with type 1 diabetes are clearly more at risk, as insulin deficiency in the presence of catabolic counter-regulatory stress hormones leads to hepatic overproduction of glucose and ketones (Williams and Pickup, 2004). Although ketoacidosis will not occur in all circumstances, the inevitable hyperglycaemia will result in osmotic symptoms and the optimal state for undergoing any medical or surgical procedure will not be attained.

## Background to the audit

The diabetes team (consultant physicians and diabetes specialist nurses [DSNs]) was concerned that the recommendation from the gastroenterology department was for patients to omit their insulin on the morning of the procedure. Further investigation revealed that this advice was also given to patients attending for other procedures, such as barium enema and bronchoscopy. These concerns were due to the risks associated with insulin deficiency and the likely counter-regulatory hormone response in these patients. An additional concern was that if a DSN was contacted for advice, the advice varied depending on the individual DSN as there were no standard guidelines in operation.

## Literature review

A literature search was undertaken in the medical library and the keywords used as search criteria were 'diabetes', 'endoscopic procedures', 'endoscopy' and 'fasting for procedures'. Only two papers fulfilled the search criteria. It is likely that many departments/diabetes teams have management guidelines for these procedures; however, these do not appear to have been published.

Hermann (1997) reviews the preparation and follow-up for people with diabetes undergoing endoscopic procedures. This provides a holistic review of diabetes, discussing types, treatment and management of diabetes and problems related to these procedures. It also offers guidance on blood glucose monitoring once preparation for a procedure has commenced, e.g. colonoscopy, advice on

insulin and oral therapy adjustment. However, no rationale for the latter was offered and the reference list did not identify further relevant literature or research.

Metcalfe (1998) highlights many of the concerns and problems discussed above. This resulted in a review of local guidelines and protocols and the production of a reference document for all wards and departments. An example within the article recommended a glucose, potassium, insulin (GKI) regimen. This regimen is not utilised within the University Hospital of North Staffordshire (UHNS) and unless there are specific problems for the patient, an insulin infusion regimen is not normal practice. Although it would be possible to adapt the current insulin infusion regimen for this, it would create additional workload for the departments carrying out the procedures and expose the patient to increased risk, especially infection of the intravenous cannula.

## Method

Procedures take place within a number of departments within the UHNS. However, as the majority occur within the gastroenterology department, this area was targeted initially. The diabetes team reviewed current practice including patient literature regarding medication, dietary advice and advice given by each DSN. Taking into consideration the reduced carbohydrate content or fasting period and the stress response, the first

### PAGE POINTS

1 The diabetes team reviewed current practice including patient literature regarding medication, dietary advice and advice given by each DSN.

2 The team devised a first draft of guidelines and then consulted the gastroenterology department.

*Figure 1. A form was devised for recording information on pre-meal blood glucose levels before and after undergoing gastrointestinal endoscopy.*

Patient's name | Unit number

Telephone number

Type of procedure | Date of procedure

Type & duration of diabetes

Normal regimen: Type of insulin

Doses

Normal control

Advice given, including doses

| | | | | |
|---|---|---|---|---|
| Day before | | | | |
| Day of | | | | |
| Day 1 | | | | |
| Day 2 | | | | |

Date form completed

Signed

**PAGE POINTS**

1 Patients taking part in the audit were asked to monitor pre-meal blood glucose levels four times per day for four days, starting the day before the procedure.

2 Over 12 months, data were collected from 37 patients and the audit was repeated in another 25 patients over six months.

draft guidelines were devised. The gastroenterology department were consulted and the literature sent to patients was changed requesting patients on insulin to telephone the DSNs at least three days before undergoing a barium enema, gastroscopy, colonoscopy or sigmoidoscopy. When contacting DSNs, the patient was informed of the audit and verbal consent was obtained to collect the data.

Patients were asked to monitor pre-meal blood glucose levels four times per day, for four days, starting the day before the procedure. A form was devised to record relevant information (*Figure 1*). The DSN then contacted the patient to obtain the blood glucose levels, to determine if the guidelines had been followed and to identify any problems.

Data were collected from 37 patients over a period of 12 months for audit one. Following analysis of these results the guidance issued to patients was adjusted (*Table 1*) and the audit repeated. Data were collected from 25 patients over a period of six months for audit two.

## Results

### Audit one

Of the 37 patients included, two patients omitted their insulin and four patients did not monitor regularly, and so were excluded. Therefore, the number of people completing the audit was 31 (*Table 2*).

**Table 1. Information to be given by the DSN to insulin treated patients undergoing procedures.**

The DSN will establish normal:
- monitoring pattern and current control
- insulin dose
- dietary intake (for those having bowel prep).

| | |
|---|---|
| **Day before colonoscopy/sigmoidoscopy (requiring bowel prep)** | |
| Carbohydrate intake is likely to be less than normal | Reduce normal insulin doses to two-thirds |
| **Day of procedure (colonoscopy, sigmoidoscopy and gastroscopy)** | |
| Patients on twice-daily soluble and isophane insulin | Reduce normal morning insulin dose to half and give all as isophane insulin |
| Patients on twice-daily pre-mixed insulin | Reduce normal morning insulin dose to half |
| Patients on twice-daily isophane insulin | Reduce normal morning insulin dose to half |
| Patients on a basal bolus regimen | Give the morning insulin as isophane (the same number of units as the normal morning soluble dose)<br>Give the normal insulin dose at lunchtime |
| Patients on lente insulin | Reduce normal insulin dose to half |
| Patients on insulin glargine | Same dose whether taking evening before or morning of the procedure<br>No soluble insulin morning of the procedure |

**Table 2. Results of blood glucose level tests taken by patients (n=31) in the first audit (where insulin was reduced by two-thirds normal level)**

| Number of patients | Percentage | Blood glucose levels |
|---|---|---|
| 12 | 39% | 1 or 2 >15 mmol/l |
| 25 | 81% | majority 11–15 mmol/l |
| 6 | 19% | majority <11 mmol/l |
| 6 | 19% | at least 1 hypo |

### Audit two

Of the 25 patients included, one patient omitted insulin and three patients did not monitor regularly. Therefore, 21 people completed the second audit (*Table 3*).

## Discussion of results

The two audits generated a vast array of blood glucose levels and it was necessary to categorise these to interpret the results effectively. Within the diabetes team it was agreed that blood glucose levels >15 mmol/l were unacceptable for people undergoing procedures. The guidelines currently in use within UHNS (West Mercia Guidelines Partnership, 2002), e.g. pre- and post-surgery, state that blood glucose levels <11 mmol/l are desirable. This formed the basis for the categories within the results, with the aim being for the majority of blood glucose levels to be <11mmol/l with a minimal number of hypoglycaemic (<4 mmol/l) episodes.

In the first audit where insulin was reduced by two-thirds of the normal dose during both bowel preparations, if applicable, and the morning of the procedure, 81% experienced blood glucose levels >11 mmol/l and only 19% achieved target blood glucose levels of between 4 and 11 mmol/l.

Overall blood glucose levels were deemed too high and as the incidence of hypoglycaemia was reasonable (19%, see *Table 2*) it was felt that blood glucose control could be improved. Patients were advised to monitor their blood glucose levels regularly and were made aware of this possibility and were advised on how to deal with it. The hypoglycaemic episodes experienced by patients were minor and self-treated and no-one required help from a third party.

For the second audit the guidelines were adjusted and insulin doses reduced by only half, rather than two-thirds, of the normal dose. This resulted in improved overall control, with only 38% experiencing blood glucose levels >11 mmol/l and 62% achieving target control. However, the incidence of hypoglycaemia started to increase, with 33% experiencing at least one episode. The diabetes team therefore felt that glycaemic control could not be improved further without leading to unacceptable episodes of hypoglycaemia and the audit was discontinued. Interestingly, the recommended insulin doses reflect those stated by Hermann (1997) although, as discussed previously, it is unclear how these levels were calculated.

## Implications for practice

This audit has allowed our department to standardise the information given to patients who are to undergo gastrointestinal endoscopy. This has

**Table 3. Results of blood glucose level tests taken by patients (n=21) in the second audit (where insulin was reduced to half normal level)**

| Number of patients | Percentage | Blood glucose levels |
|---|---|---|
| 8 | 38% | 1 or 2 >15 mmol/l |
| 8 | 38% | majority 11–15 mmol/l |
| 13 | 62% | majority <11 mmol/l |
| 7 | 33% | at least 1 hypo |

### PAGE POINTS

1 The aim was for most blood glucose levels to be <11 mmol/l with a minimal number of hypoglycaemic episodes (<4 mmol/l).

2 Eighty-one per cent of people experienced blood glucose <11 mmol/l after reducing insulin to a third of the normal level and only 19% achieved target levels between 4 and 11 mmol/l.

3 Sixty-two per cent of people achieved target insulin levels when insulin was halved, with only 38% experiencing glucose levels >11 mmol/l.

4 The diabetes team felt glycaemic control could not be improved further without leading to unacceptable episodes of hypoglycaemia.

5 The audit allowed the department to standardise information and help ensure safe practice.

**PAGE POINTS**

1 Since introducing the guidelines and standardising patient literature, there have been fewer episodes of hypoglycaemia and less variation in insulin therapy management.

2 Other departments have now changed their literature and have started to use the guidelines.

3 Care and management have been enhanced through collaboration between the diabetes team and gastroenterology department.

4 The next step will be to introduce the guidelines to select wards and monitor their use as part of an ongoing audit.

5 There are other areas where patients are required to fast and the guidelines may be effective, e.g. angiography.

helped to ensure safe practice as all DSNs now give standard advice to all patients regarding insulin adjustment. Patients are no longer advised to omit insulin prior to procedure, which is known to be poor practice. Standardisation of DSN advice is particularly useful and important, as not all patients will be under the care of the hospital diabetes service.

The audit has also served to enhance practice as seen by the results. Optimum blood glucose levels are now being achieved prior to and following the procedure. Positive verbal feedback from the gastroenterology department reflects this enhanced practice. Since the introduction of these guidelines and the change to patient information – i.e. the patient to contact the DSN prior to the procedure – the gastroenterology department has reported fewer episodes of hypoglycaemia and less variation in the management of insulin therapy by individual patients.

The DSNs were initially anxious that this would create increased work as all patients were requested to contact the DSN. This would seem to be justified as UHNS covers a population of nearly 500 000 people. This has not proved problematic, however, as all contacts are via the telephone and numbers are relatively small: approximately four to six calls per week, between three full-time equivalent DSNs. It could also be argued that many of these patients would have contacted the DSN for advice even without the change in patient literature. Other departments within UHNS have now changed their patient literature and use of the guidelines has increased, e.g. patients undergoing bronchoscopy. As the gastroenterology department undertakes the majority of endoscopic procedures, the DSNs felt that this would be appropriate and the number of contacts has remained manageable.

## Conclusion

Undertaking this small audit has proved extremely worthwhile and has led to a change in practice. The value of this has been to enhance care through collaboration between the diabetes team and gastroenterology department and has resulted in improved management of this group of patients. It has also had implications for other departments, such as respiratory care and X-ray, where it has been successfully adopted. There are clearly other areas where procedures may require the patient to fast, for example angiography, where the guidelines may prove effective. This is currently being investigated.

This audit has focused on outpatients but it would seem reasonable to assume that these guidelines could be adopted for patients attending for endoscopy as an inpatient. Although not yet thoroughly investigated, practice does vary between wards and departments, e.g. insulin omitted or insulin infusion regimens utilised. The next step will be to introduce these guidelines to select wards and to monitor their use as part of an ongoing audit. It is hoped that these guidelines will be included within the next issue of the *UHNS Medical and Surgical Guidelines*. ■

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