An audit of inpatient hypoglycaemia management

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Diabetes is an increasingly prevalent condition with potentially devastating acute and chronic sequelae. A significant proportion of inpatients at a typical district general hospital (DGH) will, at any one time, have diabetes, many of whom develop hypoglycaemia. This increases morbidity for these individuals as well as the length of hospital admission. To counteract this, a hypoglycaemia management initiative was launched in an Essex DGH in the form of a "Hypo Box" and algorithm. This article presents the results of an audit that aimed to investigated whether this initiative was compliant with Trust algorithm recommendations, and to assess whether nurses feel better equipped to manage inpatient hypoglycaemia since its launch.

Article points

1. Suboptimal management of inpatient glycaemic extremes increases morbidity and hospital length of stay.
2. In secondary healthcare settings, nurses are on the front-line for recognition and initial management of hypoglycaemia.
3. Hospital staff need to be educated adequately about optimal management of glycaemic extremes, if good standards of care are to be maintained.

Key words

- Audit
- Hypoglycaemia
- Inpatient care

An estimated 45 000 people in Essex have been diagnosed with diabetes (Essex County Council et al, 2006), and these figures are rising with the increasing problem of obesity.

At any one time, a significant proportion of individuals admitted to a typical district general hospital (DGH) will have diabetes. Many of these people develop hypoglycaemia, which increases morbidity (Fonseca, 2006; Wintergerst et al, 2006) and the length of hospital admission (Turchin et al, 2009).

To mark World Diabetes Day on 14 November 2008, the Hypo Box (BBI Healthcare, Swansea) was introduced in Basildon University Hospital, Essex, as part of a hypoglycaemia management initiative, as there was no objective method of assessing the effectiveness of inpatient hypoglycaemia management within the hospital at that time. The hypoglycaemia initiative was introduced under the leadership of the lead consultant diabetologist and the DSN team. One Hypo Box was placed in every ward, and nurse representatives from different wards were briefed about the intended use of the box.

Hypo Box

The Hypo Box was created to provide healthcare settings with easily identifiable and accessible glucose products for the management of hypoglycaemia. The box costs an average of £1.33 per treatment, and may prevent serious hypoglycaemia, which, if prolonged can cause impaired consciousness and brain damage, and is associated with financial and healthcare costs such as increases in the length of hospital bed stays (Turchin et al, 2009).

Each box is provided with a treatment pathway plan (developed within the Trust) and a record book to ensure accurate documentation of all hypoglycaemic episodes.

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Page points

1. The hypoglycaemia algorithm is a summary of Trust policy, and outlines a three-step method of hypoglycaemia management.
2. One hundred documented cases of hypoglycaemia management were audited following 3 months' use of the Hypo Box and algorithm.
3. Management methods in 44% of the audited cases were compliant with algorithm recommendations (i.e. all three steps were followed), while 56% were not.

Aims

This audit was undertaken to determine whether hypoglycaemia management in the author's institution is compliant with Trust algorithm recommendations. In addition, it was also felt important to assess whether the nurses at the hospital feel that they are now better equipped to manage inpatient hypoglycaemia since the introduction of the Hypo Box and algorithm.

Standards

The hypoglycaemia algorithm is a summary of Trust policy, and outlines a three-step method of hypoglycaemia management. The algorithm is tailored towards varying clinical degrees of hypoglycaemia, so that the management provided is both evidence-based and patient-centred. These algorithm recommendations have been used as audit standards (see *Box 1*).

No exclusion criteria were applied, and the target for all standards was 100%.

Methods

One hundred documented cases of hypoglycaemia management were audited following 3 months' use of the Hypo Box and algorithm. The first five entries in the record books of 20 randomly selected wards were reviewed, and the management adopted for these cases was recorded. The following questions were asked of two nurses (one sister and one staff nurse) on 10 of the wards:

1. Do you find the Hypo Box and algorithm useful for hypoglycaemia management on your ward?
2. Do you think hypoglycaemia management on your ward has improved since the Hypo Box and algorithm were introduced?

Results

Management methods in 44% of the audited cases were compliant with algorithm recommendations (i.e. all three steps were followed), while 56% of cases were not. The step-by-step breakdown of the management

Box 1. Hypoglycaemia management algorithm developed by the author (algorithm definition of hypoglycaemia is a blood glucose level below 4 mmol/L).

Mild hypoglycaemia (the person is conscious and able to swallow, and is not confused or disorientated)	**Step 1:** Administer fast-acting oral glucose (four glucose tablets or one bottle of glucose liquid). **Step 2:** Wait 15 minutes, recheck glucose levels and record. If reading is sill below 4 mmol/L, or if no physical improvement, repeat Step 1. **Step 3:** Follow-up with a slowly digested/starchy carbohydrate.
Moderate hypoglycaemia (the person is disorientated but able to follow commands and able to swallow, but in need of assistance)	**Step 1:** Administer one to two tubes of glucose gel. **Step 2:** Wait 15 minutes, recheck glucose levels and record. If reading is sill below 4 mmol/L, or if no physical improvement, repeat Step 1. **Step 3:** Follow-up with a slowly digested/starchy carbohydrate.
Severe hypoglycaemia (the person is unconscious and unable to swallow, or is fitting)	**Step 1:** Check airway. Give intramuscular injection of glucagon 1 mg or 50% dextrose intravenously. **Step 2:** Wait 15 minutes, recheck glucose levels and record. If reading is sill below 4 mmol/L, or if no physical improvement, repeat Step 1. **Step 3:** Follow-up with a slowly digested or starchy carbohydrate.

Page points

1. Of the nurses surveyed, 25% thought the Hypo Box and algorithm were useful and made a difference to hypoglycaemia management on their ward; 10% did not think they were useful or made a difference; and 65% of those surveyed thought the box and algorithm were neither useful nor made a difference
2. The primary aim of this audit was to investigate whether hypoglycaemia management within a typical district general hospital is compliant with Trust algorithm recommendations.
3. The secondary aim of this audit was to assess whether nurses felt better equipped to manage inpatient hypoglycaemia since the Hypo Box and algorithm introduction.

methods adopted is shown in *Table 1*. Of the nurses surveyed, 25% thought the Hypo Box and algorithm were useful and made a difference to management on their ward; 10% did not think they were useful or made a difference; and 65% of those surveyed thought the box and algorithm were neither useful nor made a difference.

Furthermore, 20% of the nurses surveyed thought inpatient hypoglycaemia management on their ward had improved since the introduction of the initiative; 5% of respondents did not think hypoglycaemia management had improved; and 75% thought the management had neither improved nor worsened.

Discussion

The primary aim of this audit was to investigate whether hypoglycaemia management within the author's DGH is compliant with Trust algorithm recommendations.

Hypoglycaemia management methods in the majority of cases (56%) were not compliant with the recommendations – an interesting finding considering that the Hypo Box and algorithm were introduced with the specific aim of simplifying and improving inpatient hypoglycaemia management.

Documentation in the record book revealed the reasons for non-compliance with Step 1 of the algorithm. These included:

- The wrong pathway was followed. For example, symptoms consistent with moderate hypoglycaemia were treated with medication for mild hypoglycaemia.
- Hypoglycaemic episodes were treated with alternative sources of glucose (such as sugar water, orange juice and milk) instead of the options outlined in the recommendations.

Step 2 of the algorithm was followed in the majority of cases (88%), but in 12% of cases no action was taken, i.e. there was no check at a later point to ascertain whether the initial treatment was sufficient or not.

Step 3 in the algorithm was the least likely of all the steps to be followed. In 49% of cases, treatment in previous steps was not followed-up with a carbohydrate, despite this being indicated in the algorithm. The reasons for poor compliance with Step 3 remain unknown as there was no documentation regarding completion of the step or its outcome.

Inpatient management

The secondary aim of this audit was to assess whether nurses now felt better equipped to manage inpatient hypoglycaemia since the introduction of the Hypo Box and algorithm.

While interviewing the nurses, the author noted a lack of enthusiasm toward the box and algorithm. Reasons that the nurses cited for them being less likely to follow the algorithm recommendations included:

- Giving glucose alternatives are legitimate first steps for hypoglycaemia management if the patient is clinically capable of cooperating, but this constitutes non-compliance when judged according to the recommendations.
- Some patients refuse to take the Hypo Box contents because of their palatability.
- Lack of confidence in the glucose tablets. It was found that they take too long to dissolve, or do not dissolve properly.
- Lack of products in the boxes on occasions.

The quantitative results from this audit highlight the insufficient education given to users by the coordinators of the hypoglycaemia management initiative prior to it being

Table 1. Compliance with algorithm by nursing staff based on 100 cases of hypoglycaemia.

	Algorithm followed	Algorithm not followed, alternative glucose used	Algorithm not followed, nothing given
Step 1	80	88	51
Step 2	20	0	0
Step 3	0	12	49

implemented, while the qualitative results portray a lack of enthusiasm for the initiative by the nurses who use it. Attitudes such as indifference or an "if it ain't broke, don't fix it" mentality make users less likely to follow the algorithm recommendations correctly.

Before the introduction of the initiative, there was no objective method of assessing the effectiveness of inpatient hypoglycaemia management at the author's the hospital; however, such a system, as part of the wider aim of optimal glycaemic control for inpatients with diabetes, can contribute to maintaining good standards of care.

In light of the audit results, the author went on to suggest that improvements in standards of care could be achieved with regular comprehensive training courses, for all users, regarding diabetes, associated complications and methods of diabetes management, along with practical workshops on the use of the Hypo Box and algorithm within the hospital.

Both the diabetes and clinical effectiveness teams within the hospital, including the lead diabetologist and the diabetes nursing team, are in the process of organising educational sessions for users, and are reviewing the current algorithm recommendations to increase their flexibility in practice.

Conclusion

Nurses in the secondary care setting are on the front-line for recognising glycaemic extremes and providing initial treatment to people with diabetes. Owing to the key role that they play, all nurses should have a basic knowledge of diabetes, the importance of correct management and the specific part their hospital initiative plays in this. An understanding of the evidence base underpinning glycaemic control initiatives by people with diabetes is also more likely to improve their compliance to management recommendations.

It is key that all hospitals provide adequate education for intended users of glycaemic control initiatives before they are introduced so that good standards of care are not compromised during the transition period. Furthermore, standards can only be maintained by continued education of users and regular audit of the system in place. ■

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Page points

1. Improvements in standards of care could be achieved with regular comprehensive training courses, for all users, regarding diabetes, associated complications and methods of diabetes management, along with practical workshops on the use of the Hypo Box and algorithm within the hospital.
2. In the secondary care setting, nurses are on the front line for recognising glycaemic extremes and providing initial treatment.