Inpatient audit of hypoglycaemia in older people with type 2 diabetes

Biju Jose, Michele Colloby, Urmila Griffiths, Susan Nyika, Ming Ming Teh

Hypoglycaemia counter-regulatory responses in older people with diabetes are not as robust as in younger adults. Moreover, intensive treatment of diabetes and tight glycaemic targets increases the risk of severe hypoglycaemia. To evaluate the prevalence of hypoglycaemia in older people (aged >70 years) and to analyse the characteristics of this group, the authors audited all referrals to an inpatient diabetes team during 1 month. Twelve (34%) referrals were for hypoglycaemia management in older people with type 2 diabetes. Eight of these 12 people were admitted for diabetes-related problems; five had an HbA_{1c} level <7.0% (<53 mmol/mol); eight had multiple comorbidities; and eight required changes to their pharmacotherapy. Older people with type 2 diabetes with tight glycaemic control are at high risk of developing severe hypoglycaemia. Glycaemic control in older people with type 2 diabetes should therefore be individualised and not driven by more general targets.

Glycaemic management of diabetes is limited to a great extent by the development of hypoglycaemia. This is true in type 2 diabetes as much as in type 1 diabetes. Older people (aged ≥70 years), who represent the majority of people with type 2 diabetes, are at a high risk of severe hypoglycaemia for various reasons.

Perception of hypoglycaemia symptoms is impaired in this group when compared with younger individuals. In the young individuals with diabetes, as the blood glucose level falls progressively, there is a clearly delineated sequence of events, starting from autonomic responses to a hierarchical central nervous response, eventually resulting in cognitive dysfunction and coma if untreated (Zammitt and Frier, 2005). In these people, the development of cognitive dysfunction is usually avoided by timely behavioural changes. Whereas, these gradual stages of central nervous responses seem to be absent or diminished in the older individual with cognitive dysfunction, causing blunting or absence of hypoglycaemic symptoms.

Article points

1. Older people (aged ≥70 years) with type 2 diabetes are at a high risk of severe hypoglycaemia.
2. In this article, the authors report the findings from an audit they carried out to assess inpatient hypoglycaemia management among older people with type 2 diabetes.
3. Of 35 referrals to an inpatient diabetes team within 1 month, 14 were for hypoglycaemia management, and 12 of these were aged >70 years.
4. Five individuals had an HbA_{1c} level <7.0% (<53 mmol/mol) and eight had multiple comorbidities.

Key words

- Hypoglycaemia
- Older people
- Type 2 diabetes

Authors' details can be found at the end of this article.

Table 1. HbA_{1c} levels for older people referred with hypoglycaemia.

	HbA_{1c} level	
Patient	%	mmol/mol
1	6.4	46
2	6.5	48
3	6.6	49
4	6.6	49
5	6.8	51
6	7.3	56
7	7.6	60
8	8.2	66
9	9.0	75
10	10.2	88
11	11.9	107

HbA_{1c} values were available for 11 of the 12 cases.

Page points

1. The purpose of the study was to analyse the characteristics of individuals referred to the inpatient diabetes team at the authors' district general hospital.
2. Thirty-five referrals (18 men, 17 women; mean age, 67 years) were received during 1-month study period.
3. Fourteen of the 35 referrals were for hypoglycaemia management. Twelve of these (34% of the total referrals) were aged >70 years (range, 71–96 years).
4. HbA_{1c} values were available for 11 individuals, ranging from 6.4 to 11.9% (46 to 107 mmol/mol). The mean HbA_{1c} level was 7.9% (63 mmol/mol).

This results in inadequate behavioural responses. Moreover, cognitive dysfunction in the older person is likely to result in inability to self-treat early hypoglycaemia (Bremer et al, 2009).

In this article, the authors report the findings from an audit they carried out to assess inpatient hypoglycaemia management among older people with type 2 diabetes.

The audit

Aims

The purpose of the study was to analyse the characteristics of individuals referred to the inpatient diabetes team at the authors' district general hospital. On reviewing the diabetes referrals prior to the study, hypoglycaemia was identified as one of the most common reasons for referral. With a significant proportion of current admissions being older people (aged ≥70 years), the aim was to look at the prevalence of hypoglycaemia in this group, and to determine the timings and reasons for referrals, among various other parameters.

Methods

The inpatient diabetes team consisted of the diabetes physician and the diabetes specialist nurses. Referrals were generally from medical, surgical, intensive care and obstetrics/gynaecology teams.

A period of 1 month (1–31 July 2010) was chosen as the audit period. All referrals received during this time-frame were recorded and the data collected were transferred to a pre-approved audit form. The data included demographic details, duration of hospital stay, reason for admission, reason for referral to the diabetes team, the management action recommended or instituted by the diabetes team and the appropriateness of management prior to the referral. The collected data were further assessed using univariate analysis.

Results

Thirty-five referrals (18 men, 17 women; mean age, 67 years) were received during the month. Twenty-six of these were from medical wards, five from surgical, two from gynaecology and two from intensive care wards.

Fourteen of the 35 referrals were for hypoglycaemia management. Twelve of these (34% of the total referrals) were aged >70 years (range, 71–96 years). The mean age was 81±6 years. There were three men and nine women, and all had type 2 diabetes. Eight of the 12 referrals (two men, six women) were admitted for diabetes-related problems, and four (one man, three women) for non-diabetes-related problems. Eight individuals had multiple comorbidities including previous falls, heart failure, angina, Parkinson's disease and malignancy. Three referrals required a change in diabetes therapy and five required insulin-dose adjustments to avoid further hypoglycaemia.

HbA_{1c} values were available for 11 individuals (see *Table 1*), ranging from 6.4 to 11.9% (46 to 107 mmol/mol). The mean HbA_{1c} level was 7.9% (63 mmol/mol). Five of the 11 (45%) had an HbA_{1c} level <7.0% (<53 mmol/mol).

Discussion

Hypoglycaemia in older people was the main referral reason in this audit (34%). Older people with diabetes are more likely to have impaired renal and hepatic mechanisms, and poor food intake than younger adults and are, therefore, more prone to hypoglycaemia. Age-related changes in pharmacokinetics as well as polypharmacy increase the risk of drug–drug interactions and adverse effects, especially

drug-induced hypoglycaemia. In addition, age-associated changes in cognitive, visual and physical function, dentition, and taste perception can reduce a person's ability to carry out self-treatment. Frequent hospitalisations also disrupt outpatient regimens. Risk factors for hypoglycaemia in the older people with diabetes are (Hornick and Aron, 2008):

- Alcohol intake.
- Autonomic neuropathy and adrenergic-blocking agents.
- Cognitive impairment.
- Complex regimens.
- Hepatic dysfunction.
- Polypharmacy.
- Poor nutrition.
- Recent hospitalisation.
- Renal insufficiency.
- Sedative agents.
- Therapy with sulphonylureas or insulin.
- Tight glycaemic control.

However, the presence of comorbidities (e.g. dementia, depression and stroke) may mask symptoms of hypoglycaemia. Assessing for cognitive decline or depression is necessary to differentiate these disorders from symptoms related to hypoglycaemia. In this study, two-thirds of the older people (aged >70 years) referred for hypoglycaemia management had multiple comorbidities.

Of note, five of 11 (45%) of the older people with hypoglycaemia had tight glycaemic control, as determined by an HbA_{1c} level <7% (<53 mmol/mol; this target level is recommended by the British Geriatric Society [Aspray et al, 2009]). HbA_{1c} levels were available for 11 of the 12 referrals.

Diabetes self-management and history of hypoglycaemic events should be addressed when setting glycaemic targets in older people with diabetes. Intensification of diabetes control increases the risk of severe hypoglycaemia (DCCT [Diabetes Control and Complications Trial] Research Group, 1993). Intensive glycaemic control using insulin therapy may be appropriate for many healthy older adults to reduce premature mortality and morbidity, improve quality of life and reduce healthcare costs. However, the risk of tight glycaemic control may exceed the benefit in older people, in whom hypoglycaemia may trigger secondary events such as increased risk of falls leading to physical injury and other neuroglycopenic manifestations. Although most hypoglycaemic episodes are mild and self-managed, more severe hypoglycaemia can require hospitalisation and may even result in hypoglycaemic coma, brain damage or both as older people with diabetes have reduced hypoglycaemia counter-regulatory responses.

Hypoglycaemia, particularly in the presence of cardiac disease, creates multiple changes that are pro-arrhythmic. Diabetes and cardiovascular complications increase the likelihood of pre-existent QT prolongation and Ca^{2+} overload, thereby increasing the risk of development of arrhythmia (Brown et al, 2001; Heller, 2002).

Glycaemic targets, including HbA_{1c} level, in this population should be individualised and not driven by more general targets (Ismael-Beigi et al, 2011). Physically fit older people with a life-expectancy of >10 years should have HbA_{1c} level targets similar to that for younger adults, whereas in frail, older people with multiple comorbidities the HbA_{1c} goal should be somewhat higher at 7.5–8.0% (58–64 mmol/mol) (European Diabetes Working Party for Older People, 2004). It is recommended that the targets should be individualised and less stringent for people who have limited life-expectancy, hypoglycaemia unawareness, seizures, dementia, psychiatric illness or alcoholism (Hornick and Aron, 2008).

Conclusion

Older people with diabetes have more frequent and severe cardiovascular risk factors. Their therapeutic goals must take into account not only the diabetes itself but also these consequences of aging. This clinical assessment, which is crucial for individually tailored treatment, must be undertaken by a multidisciplinary team. ■

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