

Standard 15

People with diabetes who have experienced severe hypoglycaemia requiring emergency department attendance or admission should be actively followed up and managed to reduce the risk of recurrence and readmission.

Key practice points

- Hypoglycaemia is the principal problem associated with strict glycaemic control.
- Hypoglycaemia is a common side effect of insulin therapy in diabetes, particularly in people with type 1 diabetes.
- Following an episode of severe hypoglycaemia, follow-up should be carried out by a health professional with specialist knowledge of diabetes.
- The inpatient or emergency department (ED) team should schedule appropriate outpatient follow-up prior to discharge.

Read this standard in conjunction with the equality and diversity section in the Introduction to the Toolkit.

What the quality statement means for each audience

Service providers ensure patients experiencing severe hypoglycaemia requiring ED attendance or admission are actively followed up and managed.

Health care professionals ensure they know how to manage severe hypoglycaemia and have services in place to actively follow-up after an ED attendance or admission to avoid the risk of recurrence or readmission.

Planners and funders ensure they commission and adequately resource services to provide appropriate care and active follow-up for people experiencing hypoglycaemia requiring ED attendance or admission.

People with diabetes who have experienced severe hypoglycaemia requiring ED attendance or admission will be actively followed up and managed to reduce the risk of recurrence and readmission.

Definitions

Severe hypoglycaemia

Severe hypoglycaemia is defined as any episode of hypoglycaemia requiring external help (Leese et al 2003).



Introduction

Achieving glycaemic control as close to normal levels as possible is recommended for most people with diabetes with type 1 or type 2 diabetes to minimise the risk of complications (Diabetes Control and Complications [DCCT] Research Group 1997; United Kingdom Prospective Diabetes Study 1998). The increased treatment costs of achieving this are offset by the reduced cost of treating complications and an improved quality of life (Gray et al 2000). Hypoglycaemia, however, is the principal problem associated with strict glycolic control (DCCT Research Group 1997).

Hypoglycaemia is a common side effect of insulin therapy in diabetes, particularly in people with type 1 diabetes. Episodes of mild hypoglycaemia (self-treated) can occur frequently (1–2 episodes per week) (Pramong et al 1991; Pramong et al 2000) while severe hypoglycaemia affects up to 30% of people with type 1 diabetes annually (EURODIAB IDDM Complications Study Group 1994; ter Braak et al 2000). In the DCCT (1997), overall rates of severe hypoglycaemia were 61.2 per 100 patient-years versus 18.7 per 100 patient-years in the intensive and conventional treatment groups respectively, with a relative risk (RR) of 3.28. The relative risk for coma and/or seizure was 3.02 for intensive therapy. According to Leese et al (2003), most episodes of severe hypoglycaemia are treated effectively at home or at work by friends, relatives, or colleagues and do not require the assistance of the emergency medical services. Therefore, episodes presenting to and treated in the hospital emergency department are recognised as representing the ‘tip of the iceberg’ (Potter et al 1982). In their population-based study of health service resource use, Leese et al reported that nearly 1 in 14 people with insulin-treated diabetes experiences one or more episodes of severe hypoglycaemia annually that requires the urgent therapeutic intervention of health service personnel. Although severe hypoglycaemia is more common in type 1 diabetes, insulin treatment rather than the type of diabetes was the predominant feature.

In type 2 diabetes, the risk of hypoglycaemia with sulfonylurea therapy is often underestimated and prolonged due to the duration of the action of the tablets. People at particular risk are patients with renal impairment or the elderly (Joint British Diabetes Societies for Inpatient Care Group 2010). According to the Joint British Diabetes Societies (2013), hypoglycaemia is associated with increased morbidity and mortality, leading to coma, hemiparesis and seizures. ‘If the hypoglycaemia is prolonged the neurological deficits may become permanent. Acute hypoglycaemia impairs many aspects of cognitive function, particularly those involving planning and multitasking. The long term effect of repeated exposure to severe hypoglycaemia is less clear’ (p 10).

In the DCCT approximately 30% of patients in both the treatment groups experienced a second episode within the four months following the first episode of severe hypoglycaemia. Within each treatment group, the number of prior episodes of hypoglycaemia was the strongest predictor of the risk of future episodes, followed closely by the current HbA_{1c} value. Those found to be more at risk included males, adolescents, and people with no residual C-peptide or with a prior history of hypoglycaemia. Leese et al reports that people who were older, had a longer duration of diabetes, or a higher HbA_{1c} were more at risk. Those with impaired awareness of hypoglycaemic symptoms are at an increased risk of experiencing severe hypoglycaemia. ‘Impaired awareness of hypoglycaemia (IAH) is an acquired syndrome associated with insulin treatment. IAH results in the warning symptoms of hypoglycaemia becoming diminished in intensity, altered in nature or lost altogether. This increases the vulnerability of affected individuals of progression to severe hypoglycaemia (JBDS 2013, p 9).’

IAH prevalence is seen more commonly in type 1 than in type 2 diabetes, with a growing prevalence as the duration of diabetes increases (JBDS 2013).

Hypoglycaemia is the commonest diabetes-related contact with ambulance crew and Accident and Emergency (A&E) in the UK (Joint British Diabetes Societies for Inpatient Care Group 2013). One study investigating hypoglycaemia-related ambulance callouts revealed many people with diabetes did not know how to use glucagon, nor were they aware of the warning signs of hypoglycaemia, and they had not had a specific education session with a doctor or nurse about hypoglycaemia and how to avoid it in the previous year or at any time. The cost to society through ambulance attendance and possible transfer to secondary care, and associated cost through days off work and lost productivity was estimated to be £240,800 per 1000 ambulance attendances. Improved support and enhanced education and understanding of hypoglycaemia would translate into reduced costs and significant savings (Joint British Diabetes Societies for Inpatient Care Group 2013).

Follow-up care after an episode of hypoglycaemia should occur, preferably by a health care professional with specialist knowledge of diabetes. In particular, patients with reduced awareness of hypoglycaemia need intensive input from a specialist diabetes team (Brackenridge et al 2006). Most studies affirm patients that are scheduled or seen for post-hospital follow-up are less likely to be readmitted (Balaban et al 2008). The optimal time interval between discharge and the first follow-up is not known as many factors contribute to the decision, including severity of the disease process, perceived ability of the patient to provide adequate self-care, and psychosocial and logistical factors (Misky et al 2010).



Guidelines

The **New Zealand Primary Care Handbook 2012** recommends seeking specialist advice in situations of recurrent hypoglycaemia: www.health.govt.nz/publication/new-zealand-primary-care-handbook-2012.

The **Scottish Intercollegiate Guidelines Network (SIGN)** guidelines (2010) provide the following recommendations:

- Adults with type 1 diabetes experiencing problems with hypoglycaemia or who fail to achieve glycaemia targets should have access to structured education programmes based upon adult learning theories (see Standard 1).
- Basal insulin analogues are recommended in adults with type 1 diabetes who are experiencing severe or nocturnal hypoglycaemia and who are using an intensified insulin regimen.
- Continuous Subcutaneous Insulin Infusion (CSII) pump therapy should be considered in people who experience recurring episodes of severe hypoglycaemia.
- Individualised advice on avoiding hypoglycaemia when exercising by adjustment of carbohydrate intake, reduction of insulin dose, and choice of injection site, should be given to people taking insulin.
- People with diabetes and health care professionals should make every effort to avoid severe hypoglycaemia, particularly in those who are newly diagnosed.
- Treatment to glycaemia targets increases the incidence of hypoglycaemia. Significantly more episodes were reported in intensive versus conventional therapy groups in most studies, eg, The ACCORD and ADVANCE trial (SIGN, 2010).

The complete guidelines can be found here: www.sign.ac.uk/pdf/sign116.pdf

National Institute of Health and Care Excellence (NICE) guidelines recommend the following:

When hypoglycaemia becomes unusually problematic or of increased frequency, a review should be made of the following possible contributory causes:

- Inappropriate insulin regimens (incorrect dose distributions and insulin types).
- Meal and activity patterns, including alcohol.
- Injection technique and skills, including insulin resuspension.
- Injection site problems.
- Possible organic causes including gastroparesis.
- Changes in insulin sensitivity (the latter including drugs affecting the renin-angiotensin system and renal failure).
- Psychological problems.
- Previous physical activity.
- Lack of appropriate knowledge and skills for self-management (NICE 2004).

The full guidelines can be found here: www.nice.org.uk/guidance/CG15/chapter/1-Guidance.

Craig et al (2011) for the **Australian Type 1 Diabetes Expert Advisory Group** suggest the following for type 1 diabetes in children, adolescents and adults:

- Acute treatment of hypoglycaemia is usually highly effective.
- In all cases of hypoglycaemia, consideration of the cause is paramount.
- Occurrence of severe episodes of hypoglycaemia may be minimised by identifying and managing risk factors.
- Reassessment of the treatment regimen is required to identify precipitating and predisposing factors that have contributed to the severe hypoglycaemia.
- The person with diabetes will need to work closely with the treating multidisciplinary diabetes care team of health professionals to reduce the risk of recurrence of severe hypoglycaemia.
- It is the overall diabetes management package (diet and exercise) and blood glucose targets and monitoring that will help to minimise hypoglycaemia episodes.
- In people with a lack of hypoglycaemia awareness or 'hypoglycaemia unawareness', specific education programmes to help recognise symptoms of hypoglycaemia and to reduce further severe hypoglycaemia may be implemented and should be considered.

The **Joint British Diabetes Societies** Guideline: The Hospital Management of Hypoglycaemia in Adults with Diabetes Mellitus states 'People with diabetes who are admitted to hospital with hypoglycaemia are reviewed by a specialist diabetes physician or nurse prior to discharge' (p 19).



Implementation advice

The **New Zealand Society for the Study of Diabetes** (NZSSD) identifies the following points in their consensus statement on their Inpatient Consensus Statement (2013):

Every person with diabetes who is hospitalised has the right to:

- receive optimum diabetes care based on ‘best practice’
- have a hospital stay free from harm (especially insulin, medication and food errors) and not inappropriately prolonged as a result of their diabetes management
- have access to specialist diabetes advice/care
- where practically possible, be actively involved in their own diabetes management during their hospital stay
- diabetes care following discharge from hospital that is timely, appropriate and well-informed

(www.nzssd.org.nz/documents/misc/13%2007%20NZSSD%20Inpatient%20Consensus%20Statement%20-%20Final%20version.pdf).

Severe hypoglycaemia is a recognised common medical emergency, and must be treated appropriately. In the majority of cases, people with type 1 diabetes should be under specialist care.

The District Health Board (DHB) should:

- have a ‘clinical lead’ for the management of diabetes
- have the services of a dedicated Diabetes Inpatient Specialist Nurse (DISN) at staffing levels most recently recommended by Diabetes UK (1.0 FTE per 300 beds) (NICE 2011)
- collect data about the outcomes for patients admitted with severe hypoglycaemia
- have a Quality Assurance Scheme in place to ensure accuracy of blood glucose meters
- have a training programme in place for all health care staff expected to prescribe, prepare and administer insulin (eg, the safe use of insulin and the safe use of intravenous insulin e-learning packages from National Health Service [NHS] Improving Quality)
- ensure they commission a service providing access to a specialist diabetes team prior to a patient’s discharge with follow-up after discharge for all patients presenting to the Emergency Department or admitted to hospital with severe hypoglycaemia.

Ambulance services

The role of the ambulance service in managing severe hypoglycaemia is now recognised; therefore, determining the local call-out rates to ambulance crews and ensuring appropriate management pathways for treatment and follow-up are in place.

Emergency department

- Implement guidelines and protocols for rapid diabetes assessment and treatment.
- Identification of diabetes patients suitable for ambulatory care using proven pathways.
- Engagement with MDT diabetes inpatient team to optimise diabetes care planning and discharge from ED when appropriate.

Specialist care

- Provide follow-up for referrals relating to hypoglycaemia.
- Provide diabetes In-Reach to ED/wards through a dedicated Diabetes Inpatient Team.
- Access to psychological referral.
- Access to a diabetes specialist nurse helpline during working hours for advice surrounding hypoglycaemia.
- When hypoglycaemia becomes unusually problematic or of increased frequency, review should be made of possibly contributory causes and follow-up put in place.

Hospital services

- Discharge summaries should be transmitted to the primary health care professional as soon as possible after ED attendance or discharge.
- Information on medication changes, pending tests and studies and follow-up needs should be communicated clearly to the primary health professional.
- Using a template for discharge summaries is helpful to ensure inclusion of relevant information.
- The inpatient team should schedule outpatient follow-up with the appropriate professional (GP, endocrinologist, diabetes nurse specialist) prior to discharge.
- Specific education on the detection and management of hypoglycaemia in adults with problems of hypoglycaemia awareness should be offered.
- Discharge planning should start at hospital admission and clear diabetes management instructions should be provided at discharge.
- When feasible, care systems should support team-based care, and embedded decision support tools to meet patient needs.

All information about treatment and care, including advice on avoiding hypoglycaemia, should take into account age and social factors, language, accessibility, physical, sensory or learning difficulties, and should be ethnically and culturally appropriate.



Implementation examples / innovations



Structured programmes for patients who have significant problems with hypoglycaemia

A number of structured education programmes have been developed specifically for patients who have significant problems with hypoglycaemia. These include Hypoglycaemia Anticipation, Awareness and Treatment Training (HAATT) (Cox et al 2004), HyPOS (Hermanns et al 2007) and Blood Glucose Awareness Training (BGAT) (Cox et al 2006). Improvements in hypoglycaemia rates and awareness seen in these programmes are not associated with deterioration in overall glycaemia control.



Joint British Diabetes Societies for Inpatient Care Group, 2013

Many patients with diabetes need advice on high blood glucose levels, ketosis, or hypoglycaemia and this forms a substantial part of the work of many diabetes teams. Access to specialist advice by phone reduces the risk of these problems progressing to emergency call out and/or hospital admission. This service is commonly unavailable out of hours, when patients at risk would contact on-call GP services, call 111, attend ED, or contact untrained junior medical staff in hospitals (Joint British Diabetes Societies for Inpatient Care Group 2013).



Waikato Regional Diabetes Service

Waikato DHB's regional diabetes service provides two on-call services. The first is for patients enrolled in their service who need urgent advice out of clinic hours on things such as managing illness, ketones, and hyper/hypoglycaemia. The on-call service also takes referrals for after hours support under specific circumstances, ie, post hospital discharge and pregnancy monitoring in type 1. The second service is for general practitioners, practice nurses and pharmacists in the region who can email or telephone for advice and information about any patient in their care. The service is staffed by diabetes clinical nurse specialists with access to diabetes physicians, dietitians and podiatrists.



Capital & Coast DHB

Capital & Coast DHB/Wellington Diabetes and Endocrinology Service have an agreement with the local ambulance service. This involves notifying the Diabetes and Endocrinology Service when people with diabetes are frequently seen by the ambulance service for diabetes-related callouts – most often as a result of a hypoglycaemia episode.

- People with a single ambulance attendance are referred back to their GP.
- People with their second or more attendance within one month are referred to the Diabetes and Endocrinology Service.
- A three-monthly report is submitted identifying multiple attendances over this time.
 - These individuals are discussed with the Diabetes Team and seen at an outpatient diabetes clinic if needed (often not previously referred by the Primary Care team).

All children given glucagon in the community are transported to ED for observation, and notification is made to the paediatric team.



Project RED (Re-Engineered Discharge)

A re-engineered hospital discharge programme to decrease rehospitalisation: a randomised trial

The RED programme was developed to minimise hospital utilisation after discharge. A set of mutually reinforcing components that define a high quality hospital discharge were created. Components of the RED:

- educate the patient about diagnosis throughout the hospital stay
- make appointments for follow-up and post-discharge testing, with input from the patient about time and date
- discuss with the patient any tests not completed in the hospital
- organise post-discharge services

- confirm the medication plan
- reconcile the discharge plan with national guidelines and critical pathways
- review with the patient appropriate steps of what to do if a problem arises
- expedite transmission of the discharge summary to clinicians accepting care of the patient
- assess the patient's understanding of this plan
- give the patient a written discharge plan
- call the patient 2–3 days after discharge to reinforce the discharge plan and help with problem solving.

Intervention: A nurse discharge advocate worked with patients during their hospital stay to arrange follow-up appointments, confirm medication reconciliation, and conduct patient education with an individualised instruction booklet that was sent to their primary care provider. A clinical pharmacist called patients two to four days after discharge to reinforce the discharge plan and review medications. Participants and providers were not blinded to treatment assignment. Primary outcomes were emergency department visits and hospitalisations within 30 days of discharge. Secondary outcomes were self-reported preparedness for discharge and frequency of primary care providers' follow-up within 30 days of discharge. Research staff doing follow-up were blinded to study group assignment. Participants in the intervention group (n = 370) had a lower rate of hospital utilization than those receiving usual care. The intervention was most effective among participants with hospital utilisation in the six months before index admission. The authors concluded that a package of discharge services reduced hospital utilisation within 30 days of discharge (Jack et al 2009). Project RED describes the programme in more detail. There are other related publications and the RED tools and nurse training manual available for download at no cost. More information can be found here: www.transitionalcare.info/.



National Transitions of Care Coalition (NTOCC)

On this site there are a number of downloadable tools that aim to improve the patients' understanding of their medications and health care visits. There is also advice on how to perform medication reconciliation and implement a transition of care programme. It is available at: www.ntocc.org/ Click on the tab marked 'Health Care Professionals'.

The most recent resource published on this website is the Transition of Care Compendium. The compendium contains a collection of white papers, journal articles, and websites with resources that both professionals and consumers might find useful in a practice or medical situation. The Compendium is available at: www.ntocc.org/Toolbox



Assessment tools

Structure

Evidence of local arrangements to ensure people with diabetes who experience severe hypoglycaemia requiring ED attendance or admission to hospital are referred to a specialist diabetes team or general practice team for follow-up.

Process

The proportion of people with diabetes who have experienced severe hypoglycaemia who are referred for follow-up to manage their diabetes.

Numerator	The number of people with diabetes in the denominator referred to a specialist diabetes or general practice team
Denominator	The number of people with diabetes who have experienced severe hypoglycaemia requiring ED attendance or admission to hospital

Outcomes

- a) Reduction in the number of people with diabetes requiring ED attendance or admission as a result of a hypoglycaemic episode.
- b) Reduction in the rate of recurrence of an episode of hypoglycaemia requiring medical attention over 12 months.



Resources

Hypoglycaemia Provider Checklist – for use during follow-up

A workgroup of the American Diabetes Association and the Endocrine Society reviewed recent evidence about the impact of hypoglycaemia on people with diabetes. To assist in an efficient assessment of the person at risk of hypoglycaemia, a two-fold process is recommended. To begin with, the person with diabetes completes a questionnaire prior to the consultation detailing how often they experience symptomatic and asymptomatic hypoglycaemia. Secondly, the patient is made aware of how to appropriately treat hypoglycaemia and reminded of the risks associated with driving (Seaquist et al 2013). To ensure that hypoglycaemia is effectively managed, the health provider could use a Hypoglycaemia Provider Checklist.

This ensures the provider:

- reviews the hypoglycaemia patient questionnaire
- discusses circumstances surrounding hypoglycaemic episodes
- discusses strategies to avoid hypoglycaemia
- makes medication changes where appropriate
- recommends carrying treatment and provides instruction on how to take it
- prescribes glucagon if appropriate.

A copy of the questionnaire is available here:

<http://care.diabetesjournals.org/content/36/5/1384.full.pdf+html>.

Health Mentor Online is a self-directed online learning resource for nurses to complete Levels 1 and 2 on the National Diabetes Nursing Knowledge and Skills Framework: <http://pro.healthmentoronline.com>. It also provides consumer information here: www.healthmentoronline.com.



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