

Standard 14

People with diabetes admitted to hospital as a result of uncontrolled diabetes or with diabetic ketoacidosis should receive educational support before discharge and follow-up arranged by their GP and/or a specialist diabetes team.

Key practice points

- All hospitals should have a dedicated diabetes inpatient specialist nurse service at a minimum level of 1.0 whole-time equivalent per 300 beds (adjusted for diabetes prevalence).
- All hospitals should have an expert multidisciplinary diabetes team in place.
- Increased costs associated with resourcing inpatient specialist teams are offset by cost savings seen in reduced lengths of stay and reduced rates of complications.
- Clear guidelines should be in place to indicate when a specialist inpatient team should become involved in the person with diabetes' care.
- Education should include self-managing diabetes to prevent uncontrolled diabetes through effective self-monitoring, appropriate insulin dose adjusting, and sick day management.
- Access to structured education offered within three months of discharge for uncontrolled diabetes may reduce readmission rates.

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 admitted to hospital with uncontrolled diabetes, diabetic ketoacidosis or hyperosmolar hyperglycaemic nonketotic syndrome receive educational support prior to discharge with follow-up after discharge by a specialist diabetes team.

Health care professionals ensure they know how to access a specialist diabetes team for all patients admitted to hospital with uncontrolled diabetes, diabetic ketoacidosis or hyperosmolar hyperglycaemic nonketotic syndrome that provides educational and support prior to discharge.

Planners and funders ensure they commission and adequately resource secondary services, at a level according to national specifications, to provide specialist care and appropriate follow-up for people with diabetes admitted for uncontrolled diabetes, diabetic ketoacidosis or hyperosmolar hyperglycaemic nonketotic syndrome.

People with diabetes admitted to hospital with uncontrolled diabetes, diabetic ketoacidosis or hyperosmolar hyperglycaemic nonketotic syndrome receive information and/or psychological support from a specialist diabetes team before and after they leave hospital.

Definitions

Uncontrolled diabetes

Glycaemic control not meeting targets or severe hyperglycaemia requiring hospital admission.

Diabetic ketoacidosis and hyperosmolar hyperglycaemic nonketotic syndrome (HHNS)

Diabetic ketoacidosis (DKA) is a life-threatening complication of type 1 diabetes that progresses rapidly and requires immediate medical attention (Mills and Stamper 2014). DKA consists of the biochemical triad of ketonaemia (ketosis), hyperglycaemia, and acidaemia (JBS 2013). HHNS is different from DKA in that there is marked hyperglycaemia without significant hyperketonaemia or acidosis. There is characteristic hypovolaemia, and hyperosmolarity and requires a different management approach to DKA (Joint British Diabetes Societies for Inpatient Care Group 2012).

Specialist diabetes team

‘Specialist diabetes teams will be multidisciplinary, usually comprising physicians, nurses, podiatrists, dietitians, pharmacists and clinical psychologists, all of whom should have received extensive training accredited at a national level. The roles of specialist diabetes teams include direct delivery of clinical outpatient and inpatient care, leadership and coordination across whole system diabetes care, provision of education and training, and research and innovation’ (Goenka et al 2011, p 1495).

Follow-up

Follow-up for people admitted to hospital with diabetic ketoacidosis should take place within 30 days of discharge by a specialist diabetes team (National Institute for Health and Care Excellence [NICE] 2011a).



Introduction

The **Joint British Societies for Inpatient Care Group** (JBSICG) (2013) has published a comprehensive guideline for the management of diabetic ketoacidosis. It highlights the need for diabetes expertise in the inpatient setting and states the following:

‘Diabetic ketoacidosis (DKA), though preventable, remains a frequent and life threatening complication of type 1 diabetes. Unfortunately, errors in its management are not uncommon and importantly are associated with significant morbidity and mortality. Most acute hospitals have guidelines for the management of DKA but it is not unusual to find these out of date and at variance to those of other hospitals. Even when specific hospital guidelines are available audits have shown that adherence to and indeed the use of these is variable among the admitting teams. These teams infrequently refer early to the diabetes specialist team and it is not uncommon for the most junior member of the admitting team, who is least likely to be aware of the hospital guidance, to be given responsibility for the initial management of this complex and challenging condition’ (p 6).

'Diabetic ketoacidosis is associated with increased mortality and morbidity. An improved understanding of the pathophysiology of DKA together with close monitoring and correction of electrolytes has resulted in a significant reduction in the overall mortality rate from this life-threatening condition. Mortality rates have fallen significantly in the last 20 years from 7.96% to 0.67%' (p 8).

According to the JBSICG, the diabetes specialist team must always be involved in the care of those admitted to hospital with uncontrolled diabetes and in the assessment of precipitating factors, management, discharge and follow-up (Mills et al 2014). Their involvement shortens patient stays and improves safety (Cavan et al 2001; Davies et al 2001; Leveta et al 1995 [Koproski et al 1997]), leads to intensification of treatment during in-hospital stay, and reduces readmissions and post-discharge HbA1c levels (Wei et al 2013).

For patients admitted with DKA or HHNS, review by the specialist diabetes team should occur within 24 hours of admission. For these patients and those admitted with uncontrolled diabetes, specialist diabetes team input is important to allow re-education, to reduce the chance of recurrence, and to facilitate appropriate follow-up. There is good evidence of improvement in care and of reduced readmissions, with use of diabetes inpatient specialist nurses; however, few New Zealand district health boards provide adequate dedicated diabetes nurse specialist inpatient diabetes services (Diabetes Care Workforce Service Review Team 2011).



Guidelines

Inpatient management

The NICE Guideline CG15 Type 1 diabetes: Diagnosis and management of type 1 diabetes in children, young people and adults has specific guidance for management of diabetic ketoacidosis inpatient setting (refer section 1.12.2): www.nice.org.uk/guidance/cg15/resources/guidance-type-1-diabetes-pdf.

The NICE 'Managing diabetic ketoacidosis' interactive pathway can be found here: <http://pathways.nice.org.uk/pathways/diabetes#path=view%3A/pathways/diabetes/managing-type-1-diabetes-in-adults.xml&content=view-node%3Anodes-managing-diabetic-ketoacidosis>

The Joint British Diabetes Societies Inpatient Care Group (2013) has the following guidelines for diabetic ketoacidosis in adults: http://diabetologists-abcd.org.uk/JBDS/JBDS_IP_DKA_Adults_Revised.pdf.

The Joint British Diabetes Societies Inpatient Care Group (2012) has the following guideline for the management of the hyperosmolar hyperglycaemic state (HHS) in adults with diabetes: www.diabetologists-abcd.org.uk/JBDS/JBDS_IP_HHS_Adults.pdf.

Craig et al (2011) for the Australian Type 1 Diabetes Expert Advisory Group: The Australian national evidence-based clinical care guidelines for type 1 diabetes in children, adolescents and adults suggest most DKA cases occur in people with an existing diagnosis of diabetes; therefore, they should be generally preventable through frequent monitoring of blood glucose levels, early detection of ketones and by adequate replacement of insulin. The guidelines recommend education of patients, health care professionals and the general public to reduce the frequency of hospitalisations for DKA. Improved follow-up care and access to timely medical advice will further reduce readmission rates.



Implementation advice

Uncontrolled diabetes should be recognised and appropriate management and follow-up arranged by a specialist diabetes team. In the majority of cases, people with uncontrolled diabetes should be managed in hospital by specialist care.

Diabetic ketoacidosis or hyperosmolar hyperglycaemic nonketotic syndrome is a recognised common medical emergency and must be treated appropriately. Review by the specialist diabetes team should occur within 24 hours of admission. Health economics must address this in the context of provision of expert medical and nursing input within secondary care.

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).

Diabetes UK recommends that hospitals should:

- have a ‘clinical lead’ for the management of the adult patient admitted with uncontrolled diabetes, diabetic ketoacidosis or hyperosmolar hyperglycaemic nonketotic syndrome with responsibility for implementation of the hospital guidelines
- collect data about the outcomes for patients admitted with diabetic ketoacidosis or hyperosmolar hyperglycaemic nonketotic syndrome
- have the services of a dedicated Diabetes Inpatient Specialist Nurse (DISN) at staffing levels most recently recommended by Diabetes UK (1.0 full-time equivalent [FTE] per 300 beds) (NICE 2011b)
- have a Quality Assurance Scheme in place to ensure accuracy of blood glucose and ketone 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 admitted to hospital with diabetic ketoacidosis, uncontrolled diabetes or hyperosmolar hyperglycaemic nonketotic syndrome (NICE 2011c).

Education should include:

- self-managing diabetes in order to prevent DKA or HHNS through effective self-monitoring and regular insulin doses according to need to prevent recurrence (Mills et al 2014)
- discussion of sick day advice
- assessment of the need for home ketone testing (blood or urinary) with education to enable this
- provision of contact telephone numbers for the diabetes specialist team and their primary health care providers.

People admitted to hospital with uncontrolled diabetes should be discharged with a written care plan: a process that allows the person with diabetes to have active involvement in deciding, agreeing and owning how their diabetes is managed (see Standard 3). This should be copied to the primary health care team who will be involved in ongoing follow-up. Further access to structured education (see Standard 1) offered within three months of discharge may decrease readmission rates further (Joint British Diabetes Societies for Inpatient Care Group 2013).

Regarding discharge planning:

- discharge planning should start at hospital admission and clear diabetes management instructions should be provided at discharge
- discharge summaries should be transmitted to the primary health care professional as soon as possible after emergency department attendance or discharge
- information on medication changes, pending tests and studies and follow-up needs should be communicated clearly to the primary health professional, particularly those with uncontrolled diabetes
- using a template for discharge summaries is helpful to ensure inclusion of relevant information.



Implementation examples / innovations



Diabetes Treatment Unit

This study investigated whether a specialised intervention programme could improve diabetes-related health outcomes in indigent patients with type 1 diabetes who were prone to occurrence of diabetic ketoacidosis (DKA). Patients (n=115) with type 1 diabetes mellitus admitted because of DKA during a 24-month period were invited to receive outpatient care in a diabetes treatment unit (DTU). DKA-related readmission rates, change in haemoglobin A1c (HbA1c) values, and diabetes-related medical costs were compared in patients who participated in the DTU programme (+DTU) and in those who did not (-DTU). They concluded that this relatively low-cost intervention by a dedicated outpatient diabetes treatment unit resulted in significant decreases in DKA-associated readmissions, in HbA1c values, and in costs of diabetes care in a multiethnic, indigent, ketosis-prone patient population (Maldonado et al 2003).



The Adjust Programme

Many nurses combine discharge planning and patient education. One model that formalised this function for people with diabetes demonstrated decreased lengths of stay, costs, and readmissions. A study was undertaken in Columbus Regional Medical Center in Columbus, GA (413 bed tertiary centre). The admission rate for this centre in 1998 was 16,799 (2% diabetes primary, 9.8% diabetes secondary). ALOS 7.5 days in 1996, reduced to 4.2 days in 2001, readmission rate 82 in 1996, reduced to 22 in 2001. Due to formalising the combination of discharge planning with patient education, a reduction in LOS, associated costs and readmissions were seen. All inpatients with diabetes received the intervention. Diabetes education and patient support moved to a discharge-planning department. The number of personnel expanded from 1/3 FTE diabetes nurse specialist to 2 fulltime diabetes nurse specialists and a part-time secretary. The service provided incorporated a mixture of patient education and discharge planning functions. The diabetes nurse specialists worked within a Discharge Planning Department allowing for provision of interfaces with community services. Financial advantages, through reduced lengths of stay and a reduction in recidivistic admissions, were yielded despite the initial investment in service required (Leichter et al 2003).



Assessment tools

Structure

Every district health board (DHB) should have a local diabetes inpatient team and up-to-date guidelines to support hospital staff to manage uncontrolled diabetes or diabetic ketoacidosis in place.

Process

- (a) The proportion of people admitted to hospital with diabetic ketoacidosis who receive educational and psychological support by a specialist diabetes team prior to discharge.

Numerator	The number of people in the denominator receiving educational and psychological support by a specialist diabetes team prior to discharge
Denominator	The number of people admitted to hospital with diabetic ketoacidosis

- (b) The proportion of people admitted to hospital with diabetic ketoacidosis who receive follow-up within 30 days after discharge by a specialist diabetes team.

Numerator	The number of people in the denominator receiving follow-up within 30 days after discharge by a specialist diabetes team
Denominator	The number of people discharged from hospital following an admission for diabetic ketoacidosis

Outcomes

- Reduced lengths of stay for people with diabetes admitted for uncontrolled diabetes.
- Reduction in readmission rates within 12 months for people admitted with diabetic ketoacidosis.
- Reduction in readmission rates within 12 months for people admitted with hyperosmolar hyperglycaemic nonketotic syndrome.
- Increased percentage of staff who feel that they have sufficient levels of appropriate and timely support from the Diabetes Inpatient Specialist Team.
- Psychosocial outcome: Increased percentage of patients who express satisfaction with their patient journey, using validated tools such as the Diabetes Treatment Satisfaction Questionnaire (DTSQ) and the Diabetes Treatment Satisfaction Questionnaire for inpatients (DTSQ-IP).



Resources

Paediatric and Adolescent Diabetic Ketoacidosis (DKA) Management Guidelines

New Zealand National clinical network for child and youth diabetes, 2014

www.starship.org.nz/media/273118/starship_dka_guideline_2014_v.2yellowhighlightsremovetextboxes.pdf



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