Inpatient management of diabetes in adults: safety and good practice

Patients with diabetes typically occupy 15–20% of all inpatient hospital beds at any one time. The hospital physician therefore requires a good understanding of the safe and effective management of such patients in both the emergency and ward setting.

Diabetes mellitus is one of the most common long-term conditions in the UK today, with a total population of 3.2 million, giving an estimated prevalence of approximately 4.8% (Health and Social Care Information Centre, 2013a). The cost of diabetes mellitus to the NHS has been estimated to be over £1.5 million per hour or 10% of the NHS budget for England and Wales (Diabetes.co.uk, 2013). Although the majority of diabetes care is delivered in the community, around 15% of all hospital beds for adults are occupied by people with diabetes (Diabetes UK, 2013a). These patients tend to be older, sicker, have a longer length of stay and be admitted to hospital more frequently than the general population.

Data from the National Diabetes In-patient Audit 2012 revealed that hypoglycaemia is frequent, with 22.4% of all diabetes patients experiencing at least one hypoglycaemic episode (blood glucose <4.0 mmol/litre), and 10.5% developing a severe hypoglycaemic episode (blood glucose <3.0 mmol/litre) (Health and Social Care Information Centre, 2013b). Up to 40% of all diabetes inpatients experienced at least one medication error during their stay, which doubled their risk of experiencing a severe hypoglycaemic episode. Other significant management errors included infrequent blood glucose monitoring during intravenous insulin infusions, and fewer than 35% of all inpatients having a formal foot examination.

Owing to variations in practice, the Joint British Diabetes Societies have published a number of guidelines to promote better practice in the management of inpatient diabetes. Key aspects of recent guidelines and recommendations, including safe prescribing of insulin to help improve clinical practice, are discussed in this article. Perioperative management has previously been reviewed in this journal (Dhatariya, 2012), while the management of glucocorticoid-induced hyperglycaemia is discussed in the current issue (Dhatariya, 2014).

Dr Ahmad Abou-Saleh *is Specialist Registrar in Diabetes and Endocrinology,* **Dr Masud Haq** *is Consultant Physician in Diabetes and Endocrinology and* **Dr Dennis Barnes** *is Consultant Physician in Diabetes and Endocrinology in the Diabetes and Endocrinology Department, The Tunbridge Wells Hospital, Pembury, Kent TN2 4QJ*

Correspondence to: Dr D Barnes (dbarnes2@nhs.net)

Diabetic ketoacidosis

Diabetic ketoacidosis is a life-threatening complication of type 1 diabetes characterized by the biochemical triad of hyperglycaemia, ketonaemia and acidaemia. It is generally precipitated by infection, or may be caused by inadequate insulin intake or insulin omission. Although mortality rates from diabetic ketoacidosis have fallen over the last two decades (Wang et al, 2006), morbidity and mortality are still high in certain at-risk groups. These include young adults, pregnant women, the elderly and patients with coexisting renal or cardiac failure. Diabetic ketoacidosis commonly presents on the acute medical take and guidelines for its management are available in most NHS hospitals. The diabetes specialist team must always be involved in the care of patients admitted to hospital with diabetic ketoacidosis. Their involvement helps reduce the length of stay and improves safety (Cavan et al, 2001; Sampson et al, 2006). Ideally this should occur as soon as possible during the acute admission. Specialists must also be involved in the assessment of the possible precipitating cause of diabetic ketoacidosis, management, discharge, and follow-up in order to achieve the Best Practice Tariff for diabetic ketoacidosis (Price et al, 2013).

The Joint British Diabetes Societies Inpatient Care Group published guidelines for the management of diabetic ketoacidosis in adults in 2010, which were updated in 2013 (Dhatariya and Savage, 2013). The guidelines have incorporated an enhanced understanding of the primary metabolic abnormality of diabetic ketoacidosis, which is ketonaemia, along with key recommendations in diagnosis (*Table 1*) and management (*Table 2*). The use of modern near-patient blood ketone meters is recommended, with a blood ketone level of >3.0 mmol/litre consistent with a diagnosis of diabetic ketoacidosis. Urinary ketone testing has limitations in that ketonuria may be present even though ketone production from the liver may have ceased, and urine samples may not be readily available if the patient is not catheterized. It is vital for staff to be trained in the use of blood glucose and ketone meters, and to understand the implications of blood ketone levels. These meters must be subject to rigorous quality assurance. A meta-analysis comparing the use of blood ketones *vs* urinary ketones in diabetic

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ketoacidosis demonstrated that blood measurements were associated with reduced emergency department assessment, hospitalizations and a shorter time to recovery, thus resulting in financial savings (Klocker et al, 2013).

Another significant change is the replacement of the traditional variable rate intravenous insulin infusion or 'sliding scale' with a fixed-rate intravenous insulin infusion calculated on the basis of the patient's body weight (0.1 units/kg body weight/hr). There is also emphasis on the significant fluid and electrolyte deficit associated with the condition, and the need to correct this with appropriate fluid replacement therapy. The fluid of choice for fluid resuscitation is 0.9% sodium chloride with pre-mixed potassium chloride, which is compliant with National Patient Safety Agency recommendations. Hartmann's solution has not been shown to be superior to 0.9% sodium chloride in terms of clinical outcomes although theoretically the former should reduce the risk of hyperchloraemic metabolic acidosis (Mahler et al, 2011; Van Zyl et al, 2012). When blood glucose levels drop below 14 mmol/litre 10% glucose should be infused in order to prevent hypoglycaemia and allow continuation of fixed-rate intravenous insulin infusion to suppress ketogenesis. Concomitant 0.9% sodium chloride still needs to be infused in order to correct circulatory volume.

The use of venous (rather than arterial) blood gas measurements for monitoring is now recommended, with the difference in pH and bicarbonate levels being negligible. Resolution of diabetic ketoacidosis occurs when pH is greater than 7.3 and ketonaemia is below 0.6 mmol/litre. Long-acting insulin analogues (e.g. Lantus, Levemir, Tresiba) should be continued, mainly to prevent rebound hyperglycaemia or ketosis occurring when intravenous insulin is discontinued.

Hyperglycaemic hyperosmolar state

Hyperglycaemic hyperosmolar state, formerly known as hyperglycaemic hyperosmolar non-ketotic coma, occurs almost exclusively in patients with type 2 diabetes and may be the presenting feature in some patients. While a precise definition does not exist, it can be differentiated from diabetic ketoacidosis in that the degree of hypovolaemia and dehydration is of a greater magnitude, in combination with a greater degree of hyperglycaemia (often greater than 30 mmol/litre) but without significant ketonaemia or acidosis, in combination with a raised serum osmolality greater than 320 mosmol/kg (*Table 1*) (Scott and Claydon, 2012). It also carries a higher morbidity and mortality than diabetic ketoacidosis, often related to acute cardiovascular complications such as stroke, myocardial infarction or peripheral arterial thrombosis. The aim is to correct the metabolic abnormalities gradually, thereby minimizing the risk of precipitating heart failure or cerebral oedema, which can often develop with rapid fluid and electrolyte shifts. However, if fluid replacement is too slow, this may lead to irreversible acute kidney injury. Other key steps in the treatment of hyperglycaemic hyperosmolar state are the prevention of secondary complications, such as arterial or venous thrombosis (by administering prophylactic low molecular weight heparin), or development of foot ulcers.

Initially, fluid therapy alone using 0.9% sodium chloride should be sufficient to reduce plasma glucose levels. Cautious fixed-rate intravenous insulin infusion at lower infusion rates than those for diabetic ketoacidosis (i.e. 0.05 units/kg body weight/hr) should only be started when blood glucose levels first start to plateau. (If there is a mixed picture of hyperglycaemic hyperosmolar state and diabetic ketoacidosis, intravenous insulin must be commenced without delay.)

Serum osmolality should be calculated regularly and helps to guide management. It is calculated by the formula $2Na^+$ + glucose + urea, with the aim of gradually bringing down the osmolality by 3–8 mosmol/kg/hr. Sodium will often rise initially with correction in plasma glucose (as a result of intracellular fluid shifts), but should then begin to fall. With regular adjustments of fluid and insulin infusion rates, glucose, electrolytes and osmolality should gradually return to normal at a safe and steady pace. The rate of fall of plasma sodium should not exceed 10 mmol/litre/24 hours while the rate of fall of plasma glucose should be 5 mmol/litre/hour. A 5% or 10% glucose infusion should be started if plasma glucose falls below 14 mmol/litre simultaneously while continuing concomitant crystalloid fluids, aiming for a level of 10–15 mmol/litre. The expected fluid replacement in hyperglycaemic hyperosmolar state is often substantially

Table 1. Joint British Diabetes Societies diagnostic criteria for diabetic ketoacidosis and hyperosmolar hyperglycaemic state

Criteria	Diabetic ketoacidosis	Hyperosmolar hyperglycaemic state
Blood glucose	>11.0 mmol/litre	>30 mmol/litre
Blood ketones	≥3.0 mmol/litre	<3.0 mmol/litre
Venous pH	<7.3	>7.3
Bicarbonate	<15 mmol/litre	>15 mmol/litre
Blood osmolality	Not applicable	>320 mosmol/kg

From Scott and Claydon (2012), Dhatariya and Savage (2013)

Table 2. Key Joint British Diabetes Societies management recommendations for diabetic ketoacidosis

Use of blood ketone meters in patient bedside monitoring
Preference for crystalloid fluid (with 0.9% saline as fluid of choice) replacement over colloid
Use of venous blood gas monitoring (over arterial) for pH and bicarbonate levels
Cautious fluid replacement in young adults
Subcutaneous long-acting insulin to be continued while on intravenous insulin infusion
Insulin as fixed rate infusion (without priming bolus) calculated from patient's weight
Bicarbonate or phosphate infusions not routinely recommended

From Dhatariya and Savage (2013)

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greater than in diabetic ketoacidosis, and generally has to be replaced more gradually over a 48–72-hour period. There is also a substantial risk of venous thromboembolism given the patient's hyperosmolar state, so thromboprophylaxis using low molecular weight heparin is essential. All patients presenting with hyperglycaemic hyperosmolar state must be referred to the specialist diabetes team.

Hypoglycaemia

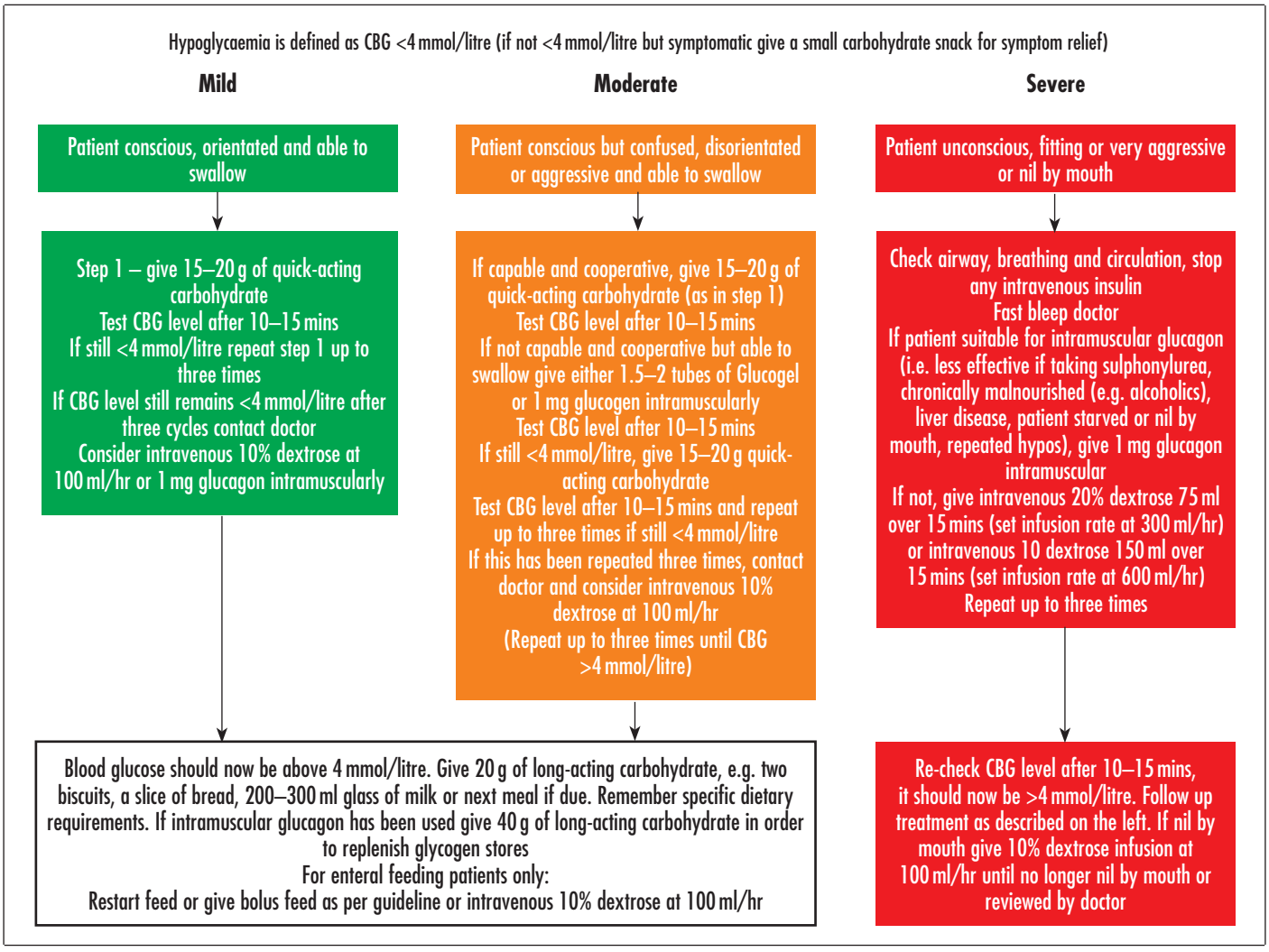
Hypoglycaemia is a common occurrence in diabetes inpatients, so rapid and correct treatment is vitally important. Inappropriate or inadequate treatment of severe hypoglycaemia (i.e. hypoglycaemia requiring third party assistance as the patient is unable to treat him-/herself) may lead to serious complications or even death. Joint British Diabetes Societies have developed a useful traffic light algorithm for the inpatient management of hypoglycaemia in patients with diabetes (*Figure 1*) (Stanisstreet et al, 2013). Appropriate treatment depends on the patient's conscious level, degree of orientation or confusion, and ability to swallow.

Common errors in management include inadequate or incorrect treatment of hypoglycaemia, omitting the next dose of insulin after successful treatment of hypoglycaemia, and not offering a long-acting carbohydrate following successful treatment of hypoglycaemia (unless the next meal is due). The use of intravenous 50% glucose should be avoided because of the potential to cause extravasation injury. The use of smaller aliquots of 10% glucose has been found to result in lower post-treatment blood glucose levels (Moore and Woollard, 2005). Areas of good practice have successfully used standard issue 'hypo boxes' to all hospital wards and emergency departments. These contain all the necessary treatments for hypoglycaemia, including intravenous access equipment. Audit sheets can be added to these boxes in order to monitor the management of hypoglycaemia on the wards.

Diabetic foot disease

Foot disease is the most common cause of hospital admission for diabetes patients, and carries significant morbidity and mortality risk with it. Even in modern cohorts,

Figure 1. Algorithm for the treatment and management of hypoglycaemia in diabetes inpatients. From Stanisstreet et al (2013). CBG = capillary blood glucose.



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the presence of a foot ulcer is associated with death within 5 years in 46% of cases (Morbach et al, 2012). In the National Diabetes In-patient Audit 2012 report, 9.3% of diabetes inpatients had a foot complication on admission (Health and Social Care Information Centre, 2013b).

Every diabetes patient should have a formal foot assessment within the first 24 hours of admission, either by medical or nursing staff. Shoes, socks, bandaging and dressings should all be removed. Peripheral pulses, sensation, deformities (including Charcot arthropathy) and signs of inflammation and/or infection should be assessed. The presence of an active ulcer should trigger an urgent referral to the multidisciplinary foot care team, comprising a diabetes physician, vascular and orthopaedic surgeon, podiatrist and diabetes specialist nurse (National Institute for Health and Clinical Excellence, 2011). If the patient is systemically unwell, is suspected to have a deep-seated infection (e.g. gas in soft tissue on plain X-ray), or has evidence of limb ischaemia, urgent advice from the appropriate specialist needs to be sought. If infection is suspected, swabs should be taken for culture and antibiotics given as per local trust guidelines and/or in consultation with the microbiologist.

The input from the diabetes foot care team helps to reduce length of stay, promote healing of ulcers and ultimately reduces amputation rates. The Putting Feet First campaign has set targets for reducing amputation rates, and this includes a traffic light system for identifying those patients in the community who are at high risk of amputation (Diabetes UK, 2013b).

Enteral feeding of stroke patients with diabetes

Diabetes patients on enteral feeding regimens (e.g. via nasogastric tubes or percutaneous endoscopic gastrostomy) can have erratic blood glucose profiles, with hyperglycaemia occurring during the active feed and hypoglycaemia during rest periods. Hypoglycaemia can be very serious and in those patients who require enteral feeding as a result of a stroke, their ability to either correct it or alert others to it happening may be impaired. Thus the potential risk of further cerebral damage may ensue. A member of the diabetes team (such as a specialist nurse or physician) should be involved early once an enteral feeding regimen has been agreed. Regular reviews will help optimize glycaemic control.

The Joint British Diabetes Societies provides recommended targets of a pre-meal blood glucose of 5–8 mmol/litre and a range of 6–12 mmol/litre during the feed itself (Roberts and Penfold, 2012). Capillary blood glucose levels should be monitored on a 4–6-hourly basis, with more frequent measurements in the event of hypoglycaemia (as per Joint British Diabetes Societies guidelines) (Stanisstreet et al, 2013) or when the feed is stopped prematurely as there will be a higher risk of hypoglycaemia under such circumstances. Indeed capillary blood glucose levels should not be checked only at ward meal times – this should be based on clinical need rather than ward culture. Patients with type 1 diabetes will require insulin at all times delivered either subcutaneously or intravenously. The unexpected interruption of an enteral feed may put the patient at high risk of hypoglycaemia, especially if insulin is being administered. An urgent assessment is required at that time to ensure patient safety and minimize the risk of hypoglycaemia.

End of life care

Despite the common prevalence of diabetes, its care is often neglected in people with terminal conditions who have reached the point of palliation. Insulin requirements will drop with the inevitable loss of appetite, weight loss and organ failure, carrying the risk of hypoglycaemia. Strict control to avoid long-term complications of hyperglycaemia will become irrelevant, with a focus more on prevention of extremes of glycaemia (Diabetes UK, 2013c). Hyperglycaemia can sometimes result from related events such as infection or steroid use.

Blood glucose monitoring should be kept to a minimum; insulin regimens should be simplified with fewer daily injections and oral anti-diabetic agents either reduced in dose or frequency, or stopped altogether.

Safe insulin prescribing

Errors arising from insulin prescriptions in diabetes inpatients are very common. Between 2003 and 2009, the National Reporting and Learning System identified that 16 600 incidents had occurred, including six deaths and 12 resulting in severe harm (Cousins et al, 2011). As a result, a rapid response report was issued in 2010 by the National Patient Safety Agency with a list of points for immediate action to all NHS organizations to address this issue (National Patient Safety Agency, 2010), with a subsequent Patient Safety Alert in 2011 (National Patient Safety Agency, 2011). The most potentially serious error involves abbreviations of insulin 'units' to 'u' or 'iu'. This can lead to very high doses of insulin being administered – for example, '12 u' may be misinterpreted as 120 units of insulin. Some key points relating to the safe administration of insulin are summarized in *Table 3*.

Inappropriate omission or delay in administering insulin can lead to worsening glycaemic control which may extend length of stay, or in some cases, even cause death (Diabetes.co.uk, 2014). To counter this, there is good evidence to suggest widespread training in safe insulin prescribing can reduce errors, improve safety and shorten length of stay (Al-Yassin et al, 2013). NHS Improving Quality has a free on-line module for health professionals on the safe use of insulin (NHS Improving Quality, 2013) and many hospital trusts have adopted this (or a modified version) as part of their mandatory training of relevant health-care professionals. All insulin-treated patients should be issued with a hand-held 'insulin passport' which documents their exact type and dosage of

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insulin in case of admission to hospital (National Patient Safety Agency, 2011). Furthermore, the NHS Institute for Innovation and Improvement developed the Think Glucose programme to help provide resources and support opportunities with the aim of delivering a consistent, effective and proactive approach to the management of inpatient diabetes (NHS Institute for Innovation and Improvement, 2013).

Self-management and other general points

Diabetes inpatients should be encouraged to administer their own insulin so as to reduce some of the errors in insulin use as described above. An assessment needs to be made on admission as to the safety of self-administration in the light of the patient's clinical state. A greater variety of meals should be offered in hospitals to cater for diabetes inpatients, as 'poor' food choices may make glycaemic control more challenging.

Diabetes inpatients with erratic blood glucose levels and other problems pertaining to their condition should be promptly referred to the inpatient diabetes team to optimize their diabetes care.

Table 3. Key points when administering insulin

Always check insulin for:	Right insulin
	Right dose
	Right time
	The word 'units' written in full
Always administer insulin using a pen device, insulin syringe or pump. Never use a standard 1 ml syringe	
Always give regular doses of rapid-acting and mixed insulins with meals	
Always sign to confirm that an insulin dose has been administered	
Always ensure that patients who self-administer have the correct insulin	

KEY POINTS

- Diabetes patients account for a significant proportion of bed occupancy and expenditure in the NHS.
- Knowledge about managing diabetes in the inpatient setting is crucial for both junior and senior doctors, with the on-call general medical team often being called on to help deal with problems on the wards and in the emergency department.
- In an effort to promote good clinical practice with diabetes inpatients, there are several published guidelines by the Joint British Diabetes Societies, including the management of diabetic ketoacidosis, hyperosmolar hyperglycaemic state and hypoglycaemia.
- There is potential for serious harm with errors in insulin prescription and use: efforts to reduce incident rates have come from National Patient Safety Agency recommendations, awareness campaigns and online learning resources.
- The inpatient diabetes team plays an integral role in helping to provide high quality care for diabetes inpatients, which often leads to a reduced length of stay, safer outcomes and improved patient experience.

Conclusions

Diabetes inpatients will be encountered across all specialties throughout the hospital. Some of these patients will be admitted as a direct result of decompensation of their diabetes or as a result of an acute complication (for example, diabetic foot ulceration). Most patients, however, are admitted for some other reason and it is important to ensure that their diabetes is appropriately and safely managed during their inpatient stay. A number of national guidelines have helped to provide best practice. Safe insulin prescribing and administration are of paramount importance, and National Patient Safety Agency alerts and e-learning training modules have helped to highlight these issues. Unfortunately insulin medication errors remain a problem and maladministration of insulin resulting in severe harm or death is an example of a 'never event' (NHS England, 2013). The multidisciplinary inpatient diabetes team plays a pivotal role in educating patients, carers and non-specialist health-care professionals in the safe and effective management of diabetes. Their early involvement in appropriately selected diabetes inpatients reduces length of stay and enhances patient experience. BJHM

Figure 1 *is reproduced by kind permission from Stanisstreet et al (2013). Conflict of interest: none.*

Al-Yassin A, Al-Khaja A, Jichi F, Clarke C, Lisk C, Katz JR (2013) Introducing a diabetes e-learning module: a means of improving junior doctors' confidence and ability in managing inpatients with diabetes. *Pract Diab* **30**(3): 122–7

Cavan DA, Hamilton P, Everett J, Kerr D (2001) Reducing hospital inpatient length of stay for patients with diabetes. *Diabet Med* **18**(2): 162–4

Cousins D, Rosario C, Scarpello J (2011) Insulin, hospitals and harm: a review of patient safety incidents reported to the National Patient Safety Agency. *Clin Med* **11**(1): 28–30

Dhatariya K (2012) Perioperative management of adults with diabetes: why do we need guidance. *Br J Hosp Med* **73**(7): 366–7

Dhatariya K (2014) Inpatient glucocorticoid use: beneficence vs non-maleficence. *Br J Hosp Med* **75**(5): 252–6

Dhatariya K, Savage M (2013) The Management of Diabetic Ketoacidosis in Adults: Second edition. Joint British Diabetes Societies Inpatient Care Group. www.diabetologists-abcd.org.uk/JBDS/JBDS_IP_DKA_Adults_Revised.pdf (accessed 18 March 2014)

Diabetes.co.uk (2013) Cost of Diabetes. www.diabetes.co.uk/cost-of-diabetes.html (accessed 18 March 2014)

Diabetes.co.uk (2014) Basic failings in hospital care of diabetic patient Gillian Astbury revealed. www.diabetes.co.uk/news/2014/Feb/basic-failings-in-hospital-care-of-diabetic-patient-gillian-astbury-revealed-99050980.html (accessed 18 March 2014)

Diabetes UK (2013a) Position Statement: Inpatient care for people with diabetes in England. www.diabetes.org.uk/Documents/Position%20statements/diabetes-uk-position-statement-inpatient-care-0613.pdf (accessed 18 March 2014)

Diabetes UK (2013b) Fast track for a foot attack: Reducing amputations. www.diabetes.org.uk/Documents/Reports/putting-feet-first-foot-attack-report022013.pdf (accessed 18 March 2014)

Diabetes UK (2013c) End of life diabetes care. www.diabetes.org.uk/upload/Position%20statements/End-of-life-Supplement111113.pdf (accessed 18 March 2014)

Health and Social Care Information Centre (2013a) QOF 2012/2013 results. http://qof.hscic.gov.uk/ (accessed 18 March 2014)

Health and Social Care Information Centre (2013b) National Diabetes Inpatient Audit (NaDIA) – 2012. www.hscic.gov.uk/diabetesinpatientaudit (accessed 18 March 2014)

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Klocker AA, Phelan H, Twigg SM, Craig ME (2013) Blood ß-hydroxybutyrate vs urine acetoacetate testing for the prevention and management of ketoacidosis in Type 1 diabetes: a systematic review. *Diabet Med* **30**(7): 818–24

Mahler SA, Conrad SA, Wang H, Arnold TC (2011) Resuscitation with balanced electrolyte solution prevents hyperchloremic metabolic acidosis in patients with diabetic ketoacidosis. *Am J Emerg Med* **29**(6): 670–4

Moore C, Woollard M (2005) Dextrose 10% or 50% in the treatment of hypoglycaemia out of hospital? A randomised controlled trial. *Emerg Med J* **22**(7): 512–15

Morbach S, Furchert H, Gröblinghoff U et al (2012) Long-term prognosis of diabetic foot patients and their limbs: amputation and death over the course of a decade. *Diabetes Care* **35**(10): 2021–7

National Institute for Health and Clinical Excellence (2011) Diabetic foot problems. Inpatient management of diabetic foot problems. www.nice.org.uk/nicemedia/live/13416/53556/53556.pdf (accessed 18 March 2014)

National Patient Safety Agency (2010) Safer administration of insulin. Rapid Response Report 013. www.nrls.npsa.nhs.uk/alerts/?entryid45=74287 (accessed 18 March 2014)

National Patient Safety Agency (2011) The adult patient's passport to safer use of insulin. Patient Safety Alert 003. www.nrls.npsa.nhs.uk/resources/?EntryId45=130397 (accessed 18 March 2014)

NHS England (2013) The never events list; 2013/14 update. www.england.nhs.uk/wp-content/uploads/2013/12/nev-ev-list-1314-clar.pdf (accessed 18 March 2014)

NHS Improving Quality (2013) Insulin Safety Suite. Self registration. http://nhsiqdiabetes.healthcareea.co.uk/england (accessed 18 March 2014)

NHS Institute for Innovation and Improvement (2013) Think Glucose. www.institute.nhs.uk/quality_and_value/think_glucose (accessed 18 March 2014)

Price H, Thomsett K, Newton I, Alderson S, Hillson R (2013) Developing best practice tariffs for diabetic ketoacidosis and hypoglycaemia. *Pract Diab* **30**(1): 6–8

Roberts A, Penfold S (2012) Glycaemic management during the inpatient enteral feeding of stroke patients with diabetes. Joint British Diabetes Societies (JBDS) for inpatient care. www.diabetologists-abcd.org.uk/JBDS/JBDS_IP_Enteral_Feeding_Stroke.pdf (accessed 18 March 2014)

Sampson MJ, Crowle T, Dhatariya K et al (2006) Trends in bed occupancy for inpatients with diabetes before and after the introduction of a diabetes inpatient specialist nurse service. *Diabet Med* **23**(9): 1008–15

Scott A, Claydon A (2012) The management of the Hyperosmolar Hyperglycaemic State (HHS) in adults with diabetes. Joint British Diabetes Societies Inpatient Care Group. www.diabetologists-abcd.org.uk/JBDS/JBDS_IP_HHS_Adults.pdf (accessed 18 March 2014)

Stanisstreet D, Walden E, Jones C et al (2013) The hospital management of hypoglycaemia in adults with diabetes mellitus. www.diabetologists-abcd.org.uk/subsite/JBDS_IP_Hypo_Adults_Revised.pdf (accessed 18 March 2014)

Van Zyl DG, Rheeder P, Delport E (2012) Fluid management in diabetic-acidosis - Ringer's lactate versus normal saline: a randomized controlled trial. *QJM* **105**(4): 337–43

Wang J, Williams DE, Narayan KM, Geiss LS (2006) Declining death rates from hyperglycemic crisis among adults with diabetes, U.S., 1985 - 2002. *Diabetes Care* **29**(9): 2018–22

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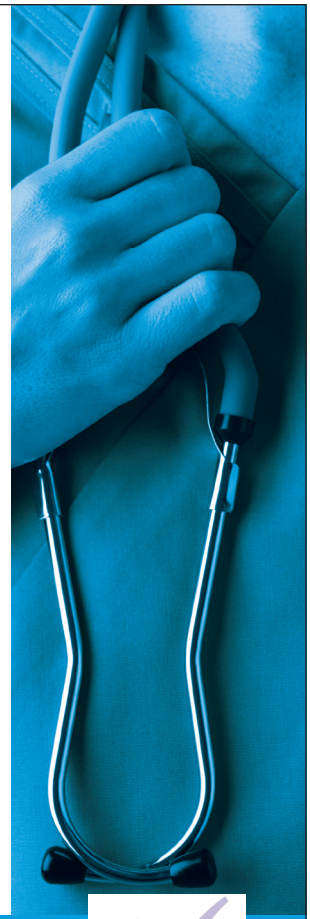

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