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Perioperative care

BJS, 2026, znaf291
https://doi.org/10.1093/bjs/znaf291
Young BJS

Perioperative management of people with diabetes undergoing surgery

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Introduction

Diabetes affects around 7% of the UK adult population, but among hospital inpatients, the prevalence is about three times higher. Many of these people are not admitted for a diabetes-related problem but have it as a co-morbidity. Previous work suggests that surgical inpatients with diabetes experience more complications, longer hospital stays, and increased costs compared to those without diabetes. These complications can also impact on mortality rate and long-term quality of life[1].

A 2017 report from the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) analysed perioperative diabetes care in over 1200 patients[1]. They found several factors that contributed to suboptimal outcomes; for example over two-thirds of people who had an elective referral to the surgical outpatient clinic lacked basic diabetes management information, with only 40% having a recent HbA_{1c} recorded. Furthermore, one in four had no co-morbidities listed on their medical record, and one in six had no current medication recorded.

In hospital, more than half of inpatients had no clear diabetes management plan, and many lacked adequate glucose monitoring or specialist review. In total, NCEPOD issued 13 recommendations, emphasizing the need for a perioperative diabetes lead in every hospital, and integrated care pathways with improved documentation and communication across the entire patient journey. *Figure 1* shows the patient pathway.

Importance of good glycaemic control

Recent evidence supports the importance of maintaining good glycaemic control in surgical patients, including clear evidence of a reduction in surgical site infections[2,3]. Meta-analyses suggest reduced mortality rate with good glycaemic control, although definitions of 'tight' control vary and there is a risk of hypoglycaemia with aggressive targets.

How does dysglycaemia cause harm?

There are a number of ways in which dysglycaemia can cause adverse outcomes for people with and without diabetes.

Hypoglycaemia

In 2017, the National Diabetes Inpatient Audit (NaDIA) found that 18% of inpatients with diabetes had at least one hypoglycaemic episode (that is <4.0 mmol/l) and 26% of those with type 1 diabetes had at least one severe episode (that is <3.0 mmol/l or requiring assistance)[4]. Even a single episode of severe hypoglycaemia is linked to an increased risk of in-hospital mortality and morbidity[5].

Hyperglycaemia

Both acute and chronic hyperglycaemia are associated with higher rates of infective and non-infective complications, especially when blood glucose exceeds 10.0 mmol/l[6,7].

Diabetic ketoacidosis and hyperosmolar hyperglycaemic syndrome

NaDIA data suggested that 1 in 25 inpatients with type 1 diabetes developed hospital-acquired diabetic ketoacidosis, a preventable, potentially life-threatening complication.

Consequences of medication and management errors

Human error, a lack of knowledge and planning among healthcare staff, and adverse drug effects can all lead to dysglycaemia. Perioperative use of the drugs used to treat diabetes have been published elsewhere and are outside the remit of this summary[8,9].

Drug errors and insulin infusion

Harm can result from medication errors or inappropriate use of variable-rate intravenous insulin infusions. Most prescribing is done by the most junior members of the team, where the level of knowledge may be less[10].

Steroid use

Dexamethasone, often used for anaesthesia, can increase the risk of hyperglycaemia, especially in those with pre-existing diabetes[11].

Received: December 08, 2025. **Accepted:** December 10, 2025

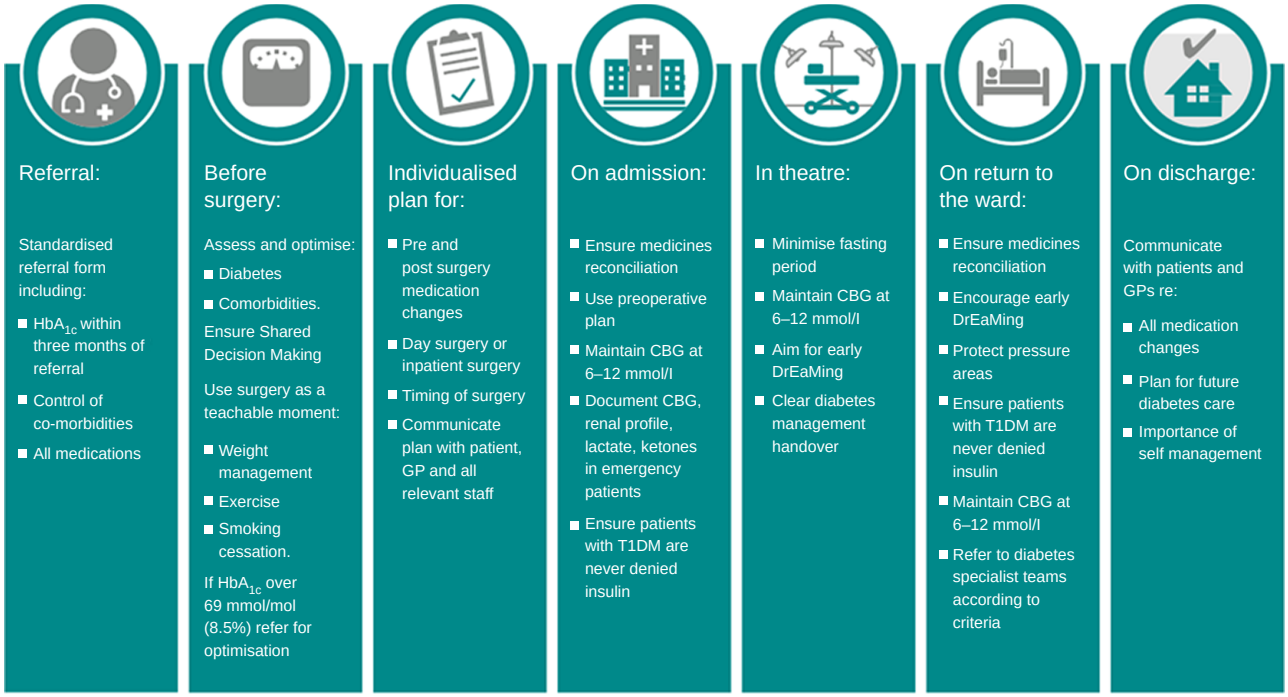

Fig. 1 The perioperative pathway for people with diabetes undergoing elective and emergency surgery

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Preoperative and referral issues

Suboptimal preoperative optimization

National guidelines recommend optimizing HbA_{1c} to below 69 mmol/mol before elective surgery (where it is safe to achieve), but referrals from primary care often lack essential diabetes and co-morbidity information[2].

In addition, many referral letters to surgical outpatients omit crucial details such as diabetes status, medications, and co-morbidities[12]. Similarly, while in hospital many patients lacked a clear diabetes management plan, and many had incomplete documentation of medications and glucose monitoring during surgery and recovery.

Ways to improve outcomes: reducing variation and improving outcomes

Perioperative diabetes lead

In line with the NCEPOD recommendations, any institution that operates on people with diabetes should have a perioperative diabetes lead[1]. Part of their responsibilities should include liaison with preoperative assessment teams. Furthermore, they should ensure smooth integrated care from referral through to discharge, with all efforts made to reduce harm from dysglycaemia, insulin infusion errors, and drug errors. Finally, given the (often inappropriate) denial of day-case surgery for people with diabetes, day of surgery admission should be the standard of care for any condition where that option is offered to those without diabetes.

Standardization of referral and care pathways

Previous work has recommended standardized referral processes and integration with primary care[1,13]. In addition, all hospitals should commission the appointment of surgical diabetes inpatient specialist nurses, who have already been shown to improve outcomes in medical units as a bridge between primary and secondary care, while also collecting audit data and driving quality improvement[14].

National standards and accreditation

The Centre for Perioperative Care and Royal College of Anaesthetists' Guidelines for the Provision of Anaesthetic Services include perioperative diabetes management as a core component[15]. These guidelines are linked to clinical accreditation, with only a minority of UK departments currently accredited.

The use of diabetes technology: insulin pump therapy and surgery

There is ongoing debate about the safety of using diabetes technology during surgery, especially with diathermy equipment. Most manufacturers advise against it due to a lack of safety testing, leading to many patients being switched to intravenous insulin or multiple injections. However, some studies suggest continuous glucose monitors, continuous subcutaneous insulin infusions ('pumps'), and hybrid closed-loop systems can be used safely with appropriate protocols[16,17].

Enhanced recovery after surgery

Enhanced recovery after surgery protocols aim to reduce variation and improve recovery. They often include preoperative carbohydrate drinks to boost insulin secretion and counteract surgical insulin resistance. However, this may not be suitable for people with diabetes, especially those with type 2 diabetes who may already be hyperinsulinaemic.

Summary and future directions

Significant progress has been made in identifying the modifiable risk factors that lead to poor outcomes in surgical patients with diabetes. The challenge now is to implement strategies that improve outcomes and address deficiencies in care. This requires multidisciplinary collaboration and the development of robust, evidence-based guidelines with clear recommendations.

The guideline from the Centre for Perioperative Care provides an opportunity to integrate services and improve management. The potential rewards are substantial, including cost savings for the NHS, and better surgical outcomes for patients with diabetes.

Funding

None.

Acknowledgements

None.

Author contributions

K.D. is the sole author of the manuscript.

Disclosure

K.D. has received speaker fees, travel or taken part in advisory boards for Abbott Diabetes, AstraZeneca, Boehringer-Ingelheim, Eli Lilly. Menarini, Novo Nordisk, Roche, Sanofi Diabetes.

Data availability

Not applicable.

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