Anaesthesia 2026, 81, 1116–1131 https://doi.org/10.1111/anae.70181

Guidelines

Peri-operative management of diabetes mellitus: a multidisciplinary consensus statement from the Association of Anaesthetists and the Joint British Diabetes Societies for Inpatient Care group

Nicholas A. Levy, Kariem El-Boghdadly, Dileep N. Lobo, Daniel J. Stubbs, Parizad Avari, Donal Buggy, Claire Frank, Kim Howson, Jinty Moffett, Emma Morris, Omar G. Mustafa, Glynn Nash, Pádraig Ó Scanaill, Sarah Procter, Gerry Rayman, Kim Russon, Caroline Thomas, Sarah Tinsley, Allan Xu and **Ketan Dhatariya**

Summary

Introduction Surgery in patients with diabetes mellitus is associated with increased morbidity and mortality compared with those who do not have diabetes mellitus. This is likely multifactorial and could be attributed to organisational issues; dysglycaemia; hospital-acquired diabetic ketoacidosis; errors with insulin prescribing and administration; issues with fluids and electrolytes; and systemic and surgical site infections. There was a need to update guidance for the peri-operative management of diabetes mellitus given improvements in our understanding, introduction of novel drugs and development of wearable technologies.

Methods This was a multidisciplinary consensus statement with a diverse authorship group, including diabetologists; anaesthetists; surgeons; pharmacists; surgical diabetes inpatient specialist nurses; and patients with lived experience. We undertook a directed literature search and a three-round Delphi process to develop, refine and agree recommendations.

Results Following three rounds, 38 recommendations were included, spanning all phases of the peri-operative pathway. Recommendations were made for organisations and general principles for the management of patients with diabetes, aiming to improve pathways, implement protocols and support training. We prioritise individualised care plans, encourage clinical judgement regarding proceeding with surgery with out-of-range HbA1c concentrations and recommend ensuring appropriate insulin regimens are prescribed and administered. We also provide guidance for capillary blood glucose and ketone monitoring and management; safe handovers of care; and multidisciplinary care plans for the peri-operative use of wearables.

Discussion This consensus statement provides principles to be applied throughout the entire peri-operative pathway by healthcare professionals, institutions and patients. It is hoped that the implementation of these key recommendations will improve experience and outcomes for patients with diabetes mellitus having surgery.

For full author affiliations, see end of article
Plain Language Summary is available on the Journal website.
Correspondence to: Ketan Dhatariya
Email: ketan.dhatariya@nnuh.nhs.uk
Accepted: 4 February 2026
Keywords: diabetes mellitus; insulin; peri-operative; safety; surgery

This is a consensus document produced by expert members of a Working Party established by the Association of Anaesthetists and the Joint British Diabetes Societies for Inpatient Care (JBDS-IP) group. It has been seen and approved by the Board of Directors of the Association of Anaesthetists and the Council of the JBDS-IP group. It is endorsed by the Centre for Perioperative Care and the British Association of Day Surgery.

X: @nicholasalevy; @elboghdadly; @DL08OMD; @djramsaystubbs; @padoscan; @gasorrun; @ketandhatariya

Recommendations

1 Trusts/hospitals should have a lead for peri-operative management of diabetes, with responsibility to ensure policies are updated and local practice audited.
2 Patients with diabetes being admitted to hospital for elective procedures should have a documented, individualised care plan, including management of out-of-range blood glucose concentrations.
3 If the patient has a glycated haemoglobin (HbA1c) > 69 mmol.mol^{-1}, use clinical judgement about proceeding with elective surgery or referring back to the primary diabetes care provider.
4 Patients with insulin-treated diabetes should always have an appropriate insulin regimen prescribed and administered.
5 Targets for capillary blood glucose concentrations should be 6–10 mmol.l^{-1} for diabetes treated with insulin, sulfonylureas or meglitinides, and 4–10 mmol.l^{-1} for diabetes managed with diet or other drugs.
6 Check a capillary blood glucose every hour for patients who are placed on a variable rate intravenous insulin infusion.
7 Measure capillary ketones if the patient with diabetes becomes unwell or has persistent hyperglycaemia (two or more consecutive blood glucose concentrations > 13 mmol.l^{-1}).
8 Ensure safe handovers between the operating theatre, post-anaesthetic care unit and ward teams. These should include instructions on oral intake; ongoing need for variable rate intravenous insulin infusion; restarting of usual diabetes medicines; and criteria for contacting teams supporting postoperative care.
9 No patient should be excluded from a day-case pathway purely because they have diabetes.
10 Patients with diabetes using wearable technology should have a multidisciplinary care plan agreed before surgery, including (but not limited to) intra-operative use, access to consumables and insulin pumps or the loss of ability to manage their own diabetes.

What other guidelines are available on this topic?

In 2011, the Joint British Diabetes Societies published the first national guidelines for the peri-operative management of patients with diabetes mellitus (hereafter referred to as diabetes) undergoing elective surgery or procedures, which were updated in 2016 [1,2]. These largely consensus-based guidelines conceived the concept of an integrated peri-operative care pathway for the patient with diabetes having surgery. As a result, the concept of managing patients with modification of their usual diabetes medicines, rather than reliance on the intravenous insulin infusion, was introduced to UK practice. Among other benefits, this has enabled patients with diabetes undergoing surgery to benefit from day surgery [3].

In 2015 the Association of Anaesthetists of Great Britain and Ireland published guidelines for anaesthetists [4]. In 2021, the Centre for Peri-operative Care published comprehensive guidelines [5]. These were commissioned following the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report that highlighted the need for institutions to establish a comprehensive guideline for the peri-operative management of patients with diabetes [6]. Other countries and organisations have produced guidelines that promote the concept of an integrated care pathway for the peri-operative management of diabetes, advocating modification of the usual diabetes medicines, when and where possible [7–9]. However, due to a relative lack of robust clinical evidence, there is inevitably variation in recommendations between guidelines.

Why were these guidelines developed?

These current guidelines were developed to support institutions and peri-operative clinicians to have concise and contemporary guidance to manage the patient with diabetes having surgery throughout the peri-operative journey. This includes the roles and responsibilities of: surgical outpatients; pre-operative assessment unit; day surgery units; admission units; operating theatres; post-anaesthetic care units (PACU); and wards.

Postoperative care and discharge planning were also included.

With the advent of new knowledge and controversies around new medicines and therapies, there was a requirement for previous recommendations to be updated. These updates include the peri-operative use of dexamethasone; peri-operative use of wearable diabetes technology; and management of glucagon-like peptide-1 receptor agonist-based treatments (e.g. liraglutide, dulaglutide, semaglutide and tirzepatide) and sodium-glucose cotransporter-2 (SGLT-2) inhibitors (e.g. dapagliflozin, empagliflozin and canagliflozin). Moreover, it was recognised that there was a need for certain recommendations to be prioritised to enable safety-critical information to be made readily available.

How does this statement differ from existing guidelines?

These guidelines were developed to ensure a balanced, patient-centred approach to the management of the patient with diabetes having surgery is readily available and tailored for hospital practitioners. With the rapidly evolving field of wearable diabetes technology, guidance has been updated. Moreover, the Delphi methodology provides robust consensus and permits the identification of high-priority recommendations.

Introduction

Diabetes mellitus is the most common chronic metabolic condition in adulthood. The prevalence varies across the world, but in the UK the disease affects approximately 8% of the adult population, with over 90% having type 2 diabetes [10]. Data from 2017 suggest that the number of patients referred for surgery for any given condition was up to 50% higher if the patient had diabetes [11]. Up to 80% of those undergoing cardiac surgery may have diabetes [12–14], with the prevalence of diabetes or hyperglycaemia on general wards being as high as 40% [15]. There is a wealth of observational data to suggest that having diabetes in the peri-operative period is associated with increased harm including (but not limited to) increased duration of hospital stay; surgical site infection; urinary tract or chest infections; need for admission to ICU; time on a ventilator; myocardial infarction; and death [16–20]. To address these risks, numerous guidelines are available from across the world [5,21–24]. Whilst these have a variety of different recommendations, they also have large areas of commonality [25]. Indeed, what most commentators agree with is that dysglycaemia (hypoglycaemia, hyperglycaemia) should be addressed and that an integrated pathway of care is required [3,6].

This consensus statement considers the institutional requirements and therapeutic interventions necessary at various stages of the peri-operative care pathway, with the aim of improving the patient experience and outcomes by reducing complications and aiding recovery from surgery for adults with diabetes. It is hoped this consensus statement will also improve the overall quality of care for adults with diabetes having surgery.

Methods

We aimed to produce a multidisciplinary consensus statement directed by a multidisciplinary steering committee (NAL, KE, DNL, DS and KD) and included a diverse authorship, purposively invited based on clinical and/or academic expertise. The writing group comprised diabetologists; anaesthetists; surgeons; pharmacists; surgical diabetes inpatient specialist nurses; and patients with lived experience. Recommendations were formulated using a multi-round Delphi process. The initial long list of recommendations was produced by the writing group using its expert knowledge in addition to directed literature reviews and previously published UK and international guidelines for all relevant phases of patient care throughout the elective peri-operative pathway [2,5,23,24,26]. This includes pre-admission; admission; intra-operative; PACU; and the ward. Further recommendations for organisational, generic principles and for those requiring emergency surgery were also formulated.

In the first round (December 2024–January 2025), recommendations were distributed among all working group members who rated each anonymously as `include´, `exclude´ or `revise´, while providing anonymised comments in a Microsoft Excel spreadsheet (Microsoft Inc., Redmond, WA, USA). Recommendations with ≥ 75% of members voting for inclusion proceeded unchanged into the second round; those with 50–74% underwent revision after discussion within the steering group; and those with < 50% inclusion decisions were removed from the recommendations and any further discussion. A second voting round proceeded (February 2025–March 2025), with anonymised comments and full voting results shared. Any recommendation with ≥ 75% agreement for inclusion remained unchanged, and any with 50–74% entered a third round with a virtual round table for discussion and final voting (July 2025). Of all the included recommendations, members then voted on whether each remaining recommendation should be a top 10 recommendation. The final recommendations are included in the Results, grouped

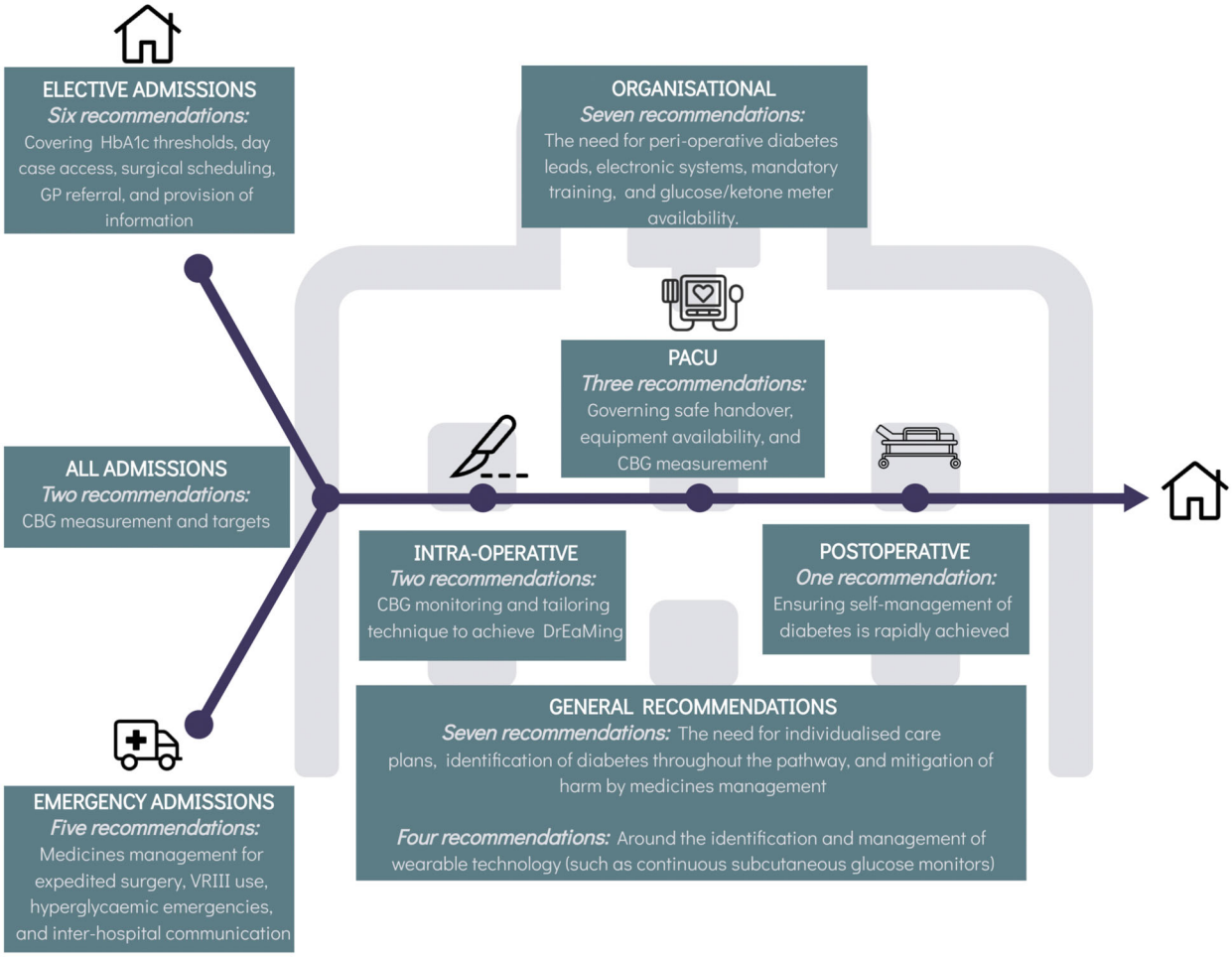

Figure 1 Multidisciplinary Delphi process recommendations for the peri-operative management of diabetes. PACU, post-anaesthesia care unit; CBG, capillary blood glucose; VRIII, variable rate intravenous insulin infusion; DrEaMing, drinking, eating and mobilising.

by phase of journey and stakeholder responsibility. A breakdown of the Delphi process with all the recommendations and outcomes at each stage is shown in online Supporting Information Appendix S1.

Results

There were 92 recommendations made in round one, voted on by 20 respondents, of which 35 were included, 50 revised and 3 new proposals made. In round two, 18 people responded with 50 recommendations made, of which 20 were included, 27 revised and 6 new proposals made. In round three, 14 people responded and 39 recommendations were made, where 38 were included.

Figure 1 summarises the key recommendations throughout the peri-operative management of diabetes. Although there was evidence to grade some of the recommendations, we could not grade all. Therefore, in the interests of consistency, they have not been graded, but the Delphi agreement percentages are shown in online Supporting Information Appendix S1.

Recommendations for organisations

Optimal and safe peri-operative care of patients with diabetes undergoing surgery requires engagement from professionals specialising in diabetes; anaesthesia; pharmacy; surgery; and the Trust (hospital or institution) executive team.

Ideally, care should begin with early identification of patients with diabetes at the time of contemplation of surgery, followed by screening for diabetes-related complications, optimisation of glycaemic control and addressing and optimising existing comorbidities in preparation for elective surgery. These early stages involve collaboration between primary and peri-operative care

teams. Peri-operative diabetes specialist nurses have an important role in supporting patients and primary care teams in optimising glycaemic control both pre-admission and during the hospital stay [27–30]. Anaesthetists and surgeons should communicate plans for eating and drinking, glucose/ketone monitoring and recommencing usual medicines in the immediate postoperative period to the postoperative recovery unit and, in turn, to the ward team. A peri-operative diabetes lead should be identified, whose role is to ensure that policies exist to achieve the above – covering diabetes (and comorbidities) optimisation for surgery; list prioritisation to minimise fasting times; and best practices to establish eating, drinking and early mobilisation in the postoperative period. Organisations should also have policies in place to allow for self-administration or medications, and glucose self-monitoring.

The integrated care surgical pathway for patients with diabetes relies on multiple steps and good communication. Consequently, the system for handing over at each stage should be clear and documented, rather than relying on verbal instructions alone [6].

Digital systems should be adopted to improve outcomes and to reduce harms [27–29], as well as to reduce errors and delayed care [31,32]. Ideally such systems should enable prescribing; referrals from primary care to surgery (including glycated haemoglobin (HbA1c) documentation); referrals to the diabetes team; and networked glucose monitors with practitioner alerts. Such digital systems can assist with data collection for audit and quality improvement.

Prevention of harms from dysglycaemia and medicines is critical to the safe management of patients with diabetes having surgery [31]. Harm prevention strategies include (but are not limited to) instructions on the frequency of blood glucose and ketone monitoring; availability of point-of-care monitoring equipment; life-saving actions to be taken on the occurrence of out-of-range results; guidelines for the ongoing management of diabetes-related medical emergencies; medicine reconciliation; and assurances that all staff are trained appropriately.

- **Trusts/hospitals should have a lead for peri-operative management of diabetes mellitus with responsibility to ensure policies are updated and local practice audited**.
- **Throughout the peri-operative pathway, systems should be in place to ensure comprehensive handover of diabetes management**.
- **Trusts/hospitals should have electronic systems for data collection, identification of at-risk patients and referral to specialist diabetes teams**.
- **Capillary glucose and ketone monitoring should be readily available, ideally network-linked**.
- **Glucose and ketone concentrations should be recorded in a document that spans the patient's hospital stay (ideally in electronic format), with trigger levels for escalation of out-of-range results**.
- **Peri-operative protocols and staff education should specifically include the management of hypoglycaemia; hyperglycaemia; diabetic ketoacidosis; and hyperosmolar hyperglycaemic state**.
- **Training should be in place for all those who prescribe, dispense and administer insulin**.

General principles for peri-operative management of diabetes

Historically, patients with diabetes were admitted 24–48 h before surgery, and glycaemic control was achieved with either intermittent subcutaneous boluses of soluble insulin or an intravenous infusion of soluble insulin; this was associated with poor outcomes [16,33–34]. Contemporary management of diabetes involves modification of the patient's usual medicine regimen and a partnership between them and their healthcare provider. Consequently, patients with diabetes in whom surgery is contemplated should be assessed before admission and have a care pathway tailored to their type of diabetes; medicines; type and urgency of surgery; comorbidities; other medicines; and their preferences and beliefs. Identification of patients with diabetes is vital, as it ensures their diabetes care is proactive. Prior identification of patients with diabetes has been shown to reduce postoperative complications [16,17,29,35–36].

- **Patients with diabetes being admitted to hospital for elective procedures should have a documented, individualised care plan, including management of out-of-range blood glucose concentrations**.
- **The diagnosis of diabetes should be identifiable throughout the peri-operative pathway**.

General principles for the prevention of harm from diabetes and its treatment

Diabetes and diabetes medicines are recognised causes of harm in patients admitted to hospital [37]. The National Diabetes Inpatient Audit project in the UK showed that preventable harms to inpatients with diabetes were

common and the majority of preventable harms were caused by hospital-acquired diabetic ketoacidosis; inadvertent hypoglycaemia; and medicine prescribing and administration errors [31]. Consequently, the recommendations in this section are applicable across the surgical pathway.

Diabetic ketoacidosis in patients with type 1 (and occasionally those with type 2) diabetes is ultimately caused by a lack of sufficient exogenous insulin and a failure to act on rising glucose and ketone concentrations. Therefore, it can be prevented by adequate monitoring and ensuring these patients – particularly those with type 1 diabetes – always have a sufficient source of exogenous insulin. Patients with diabetes are generally experienced in managing their condition and should be allowed to self-monitor and self-administer their insulin whilst in hospital.

Sodium-glucose cotransporter-2 inhibitors are now advocated as a foundational treatment in type 2 diabetes mellitus [38]. This is because they not only improve glycaemic control but also have beneficial effects on the progression of renal disease and heart failure while reducing mortality. However, in the fasted state, their use is associated with euglycaemic diabetic ketoacidosis, a condition characterised by normal glucose concentrations and ketoacidosis [39,40]. It is, therefore, essential that this condition is mitigated and that practitioners are vigilant for its occurrence.

Prevention and treatment of hypoglycaemia is required to prevent harm and death from neuroglycopenia. In the community, where people can eat freely and manage their own diabetes, hypoglycaemia is defined as a blood glucose concentration < 4.0 mmol.l^{-1} (< 72 mg.dl^{-1}). This concentration can also be applied to patients in hospital who have diet-controlled diabetes and are not on medicines that can cause hypoglycaemia. However, for those on glucose-lowering medicines (i.e. insulin, sulfonylureas or meglitinides), glucose concentrations < 6.0 mmol.l^{-1} (< 108 mg.dl^{-1}) require intervention to prevent the glucose concentration from reducing to < 4.0 mmol.l^{-1} (< 72 mg.dl^{-1}). This requires ward staff to administer appropriate rescue medicines as well as the need to monitor the blood sugar at sufficiently frequent intervals. This is especially important peri-operatively, when anaesthesia blunts a patient's ability to self-report hypoglycaemic symptoms. Online Supporting Information Appendix S2 has details of initial rescue medicines for hypoglycaemia.

Hyperglycaemia is defined as a blood glucose concentration > 10 mmol.l^{-1} (> 180 mg.dl^{-1}) and is associated with infective and non-infective harms and complications. Non-infective harms include acute kidney injury; acute myocardial infarction; diabetic ketoacidosis; and hyperosmolar hyperglycaemic state. As such, ward staff should be empowered to administer initial rescue medicines. Online Supporting Information Appendix S2 has details of initial rescue medicines for hyperglycaemia.

Medicines reconciliation at and before hospital admission reduces drug-related critical events and is, therefore, recommended [41]. However, it is a standard of care that should be afforded to all patients, whether they have diabetes or not [42].

- **Patients with insulin-treated diabetes should always have an appropriate insulin regimen prescribed and administered**.
- **Self-management of insulin should be encouraged, when possible, for those patients who normally manage their diabetes in the community**.
- **Targets for capillary blood glucose concentrations should be 6–10 mmol.l^{-1} if on insulin, sulfonylureas or meglitinides and 4–10 mmol.l^{-1} for diabetes managed with diet or other drugs**.
- **Check a capillary blood glucose every hour for those on a variable rate intravenous insulin infusion**.
- **Measure capillary ketones if the patient with diabetes becomes unwell or has persistent hyperglycaemia (two or more consecutive blood glucose concentrations > 13 mmol.l^{-1})**.
- **In patients with diabetes using SGLT-2 inhibitors, capillary blood ketone concentrations should be measured daily until they are eating and drinking normally, even if blood glucose concentrations are normal**.
- **Rescue medicines for hypoglycaemia and hyperglycaemia should be pre-prescribed for those with diabetes**.

The integrated patient pathway

Pre-admission

Optimal control of diabetes and good medicine management are essential to reduce the risk of postoperative complications. Therefore, the degree of diabetes control, other comorbidities and concurrent medicines should be communicated by primary care to secondary care at the point of referral.

Measurement of HbA1c gives an indication of the degree of glycaemic control over the preceding 3 months, with an ideal HbA1c concentration ≤ 48 mmol.mol^{-1} (6.5%). Elevated HbA1c concentrations are associated with worse

surgical outcomes [43,44]. The American Diabetes Association suggests an ideal pre-operative target of HbA1c < 53 mmol.mol^{-1} (7.0%) [45], while the Australian Diabetes Society recommends a threshold of 75 mmol.mol^{-1} (9.0%) [23]. Since 2011, UK bodies have recommended that, where safe and feasible to achieve, the HbA1c should be < 69 mmol.mol^{-1} (< 8.5%) for those requiring an elective procedure [5]. Measurement of HbA1c with interrogation of continuous glucose monitoring devices can provide useful data on chronic glycaemic control in those using such devices. Overly aggressive management of diabetes in those with frailty and other significant comorbidities can inadvertently lead to harm [46]. This necessitates an individual assessment and plan for patients with suboptimal control of diabetes.

Patients identified with suboptimal control of diabetes, that is deemed to be optimisable without causing harm, should have their diabetes optimised. This should be orchestrated either by their usual diabetes care provider, whether that be primary care or secondary care or ideally by dedicated peri-operative diabetes specialist nurses. Recent data suggest that the intervention of a peri-operative diabetes specialist team reduces complications and duration of hospital stay [27–29].

To facilitate safer anaesthesia and surgery, avoidance of unnecessary intravenous insulin infusions and harms from medicines, patient preparation and partnership is advocated. This includes clear patient-centred verbal and written guidance detailing the reasons for optimal peri-operative diabetes control; suggested lifestyle changes; and advice on peri-operative medicines management [4,5,47–49]. Online Supporting Information Appendices S3–S6 have details of peri-operative modification of insulins and non-insulin diabetes medicines; an example of a patient information leaflet; and a peri-operative diabetes passport.

For some patients, a period of prehabilitation may be beneficial [49]. Patients who require a variable rate intravenous insulin infusion should be identified to ensure that it can be established at admission [50]. This is to avoid the risk of them being denied insulin and developing either hyperglycaemia or diabetic ketoacidosis. Online Supporting Information Appendix S7 has details of the safe use of a variable rate intravenous insulin infusion.

Drug errors are one of the major causes of harm to inpatients with diabetes [51]. Medicine reconciliation is vital to reduce these harms and there is some evidence that pharmacy-led pre-admission medicine reconciliation can reduce adverse drug events and complications [52]. Therefore, medicine reconciliation for patients having an elective procedure should occur within the pre-operative assessment, so that it is in place immediately from the time of admission.

Patients with diabetes are more likely to maintain good glycaemic control if they are in their usual environment with their normal diet and medicines, and so day surgery pathways should be utilised wherever possible [5,47].

There are many physiological reasons why carbohydrate loading cannot be recommended routinely for patients with diabetes undergoing surgery. These include the presence of potentially delayed gastric emptying; the fact that those patients with type 1 diabetes cannot mount an insulin response in the face of a carbohydrate load; those patients with type 2 diabetes are already often maximally insulin stimulated; and the potential risk of increased complications due to peri-operative hyperglycaemia [53].

Excessive fasting for those on glucose-lowering medicines (i.e. insulin, sulfonylureas or meglitinides) can predispose to dangerous hypoglycaemia. Consequently, scheduling teams should plan patients first or early on a list to minimise fasting times [4,5].

- **Standardised referral forms from a GP for consideration of surgery should detail: HbA1c within 3 months of referral; control of comorbidities; and all medicines**.
- **If HbA1c > 69 mmol.mol^{-1}, use clinical judgement about proceeding with elective surgery or referring back to the primary diabetes care provider**.
- **The patient with diabetes should be consulted on their pattern of glycaemic control, particularly if receiving insulin or using subcutaneous continuous glucose monitoring technology**.
- **Provide verbal and written information about peri-operative diabetes management (including a medicine management plan and fasting instructions) and document within the patient's surgical care pathway document**.
- **No patient should be excluded from a day-case pathway purely because they have diabetes**.
- **Ensure surgical scheduling minimises fasting in patients with diabetes**.

Recommendations for the admission stage

Hospital admission exposes patients with diabetes with additional risks. This is primarily due to the dangers of medicine-related harms and dysglycaemia (hypoglycaemia, hyperglycaemia and diabetic ketoacidosis). Therefore,

Table 1 Additional considerations for shared decision-making in the use of regional anaesthesia for patients with diabetes (adapted from [55]).

Benefits	**Rationale**
Avoidance of loss of airway	Patients with diabetes might theoretically have a higher incidence of unanticipated difficult tracheal intubation
Avoidance of aspiration	Patients with diabetes are potentially more prone to delayed gastric emptying and aspiration due to diabetic gastroparesis and the effect of medicines, e.g. glucagon-like peptide-1 receptor agonists and gliptins
Reduced risk of postoperative nausea and vomiting	Patients with diabetes require a rapid return to a normal diet as this facilitates a resumption of normal medicines. Resumption of a normal diet with normal medicine reduces the risk of hospital-acquired hypoglycaemia; hyperglycaemia; diabetic ketoacidosis; and the need for intravenous insulin and its associated complications
Promotion of drinking, eating, mobilisation (DrEaMing)	Rapid restoration of function is vital for all patients, but patients with diabetes are particularly susceptible to harms caused by delays in restoration of function and especially delays in drinking, eating and return to normal medicines
Risks	**Rationale**
Risk of physical trauma to nerves with stimulation techniques	More difficult since rheobase is increased, indicating the nerve is less excitable Higher stimulation thresholds are observed
Risk of prolonged block due to increased nerve sensitivity	Nerve blocks last longer in patients with diabetic neuropathy Neuropathic nerves are more susceptible to local anaesthetics Nerve blood flow is reduced in neuropathic nerves, further prolonging nerve block duration
Neurotoxicity	Increased risk when combined with high doses of vasoconstrictor
Infection risk	Potentially increased risk of spinal and epidural abscesses Use of perineural catheters more likely to result in bacterial colonisation of catheters

medicine reconciliation should occur, if not already undertaken and glycaemic control assured.

Anaesthetic pre-operative assessment

Before induction of anaesthesia, the anaesthetist should review the patient and, together with them, agree on a peri-operative management plan [54]. This should consider whether the benefits of regional anaesthesia outweigh the risks of harm (Table 1). For patients with diabetes, regional anaesthesia as the sole anaesthetic technique has theoretical benefits of reducing risks of pulmonary aspiration (e.g. due to the presence of diabetic gastroparesis or glucagon-like peptide-1 receptor agonist based medicines) and the additional benefit of earlier resumption of eating and drinking with less nausea and vomiting. However, this should be weighed against the higher incidence of nerve damage and infection with regional anaesthesia [55].

If general anaesthesia is chosen or required, the airway management technique should consider the risk of gastroparesis, which is more common for patients with diabetes and is compounded by both the use of glucagon-like peptide-1 receptor agonists and any associated obesity [56]. These considerations can be considered as generic for all surgical patients and, thus, the Delphi process did not include these considerations in the final list of recommendations.

Intra-operative

In addition to the usual standards of intra-operative care, it is imperative that patients do not develop harmful dysglycaemia. It is, therefore, essential that point-of-care glucose monitoring is undertaken at a suitable frequency and actions are taken to ensure that the blood glucose concentration is maintained within safe limits. As discussed previously, the frequency of testing and target range is dependent on whether the patient is on glucose-lowering medicines or not. The use of continuous glucose monitoring technology cannot be relied on currently in patient having general anaesthesia for several reasons (Table 2).

As resumption of normal diet and medicines are key to the avoidance of dysglycaemia and unnecessarily prolonged duration of hospital stay, the use of anaesthetic strategies that minimise postoperative nausea and vomiting is crucial. Such strategies include the use of awake techniques; total intravenous anaesthesia; avoidance of nitrous oxide; and the use of intravenous anti-emetics. Dexamethasone use was previously considered a relative contraindication in patients with diabetes due to the fear of hyperglycaemia, but there is increasing evidence that its use

Table 2 Causes of inaccuracies of continuous glucose monitoring.

Major issue	Detail
Measurement differences	• Continuous glucose monitors measure glucose in the interstitial fluid rather than the blood. Thus, there is a lag for the two compartments to equilibrate. • Alterations to tissue perfusion caused by temperature and changes in hydration.
Sensor-related factors	• Compression: lying on the sensor can cause falsely low glucose readings due to compression. • Sensor placement: where the sensor is placed on the body can impact accuracy, with some sites and positions being more disposed to inaccuracies e.g. abdomen in the prone position • Sensor wear time: accuracy can vary throughout the wear time of a sensor, with some systems being less accurate at the beginning or end of their lifespan. • Calibration issues: errors in calibration can lead to inaccuracies. • Issues with specificity of the sensor and some sensors being triggered by non-glucose molecules too, e.g. acetaminophen (i.e. paracetamol); maltose; ascorbic acid; dopamine; mannitol; heparin; uric acid; hydroxyurea; and salicylic acid

reduces opioid requirements, improves pain control and aids recovery [57–59].

- **Perform regular point-of-care capillary blood glucose measurements, even in those wearing a continuous blood glucose monitoring device**.
- **Provide anaesthesia and analgesia that will enable early postoperative drinking and eating, with resumption of the patient's usual diabetes medicines**.

Post-anaesthetic care unit

The key goals of immediate postoperative management of patients with diabetes include the prevention of harm from dysglycaemia and diabetic ketoacidosis. In addition, it is vital to promote early restoration of function, including drinking and eating [60]. Care of the patients following surgery involves handovers between several teams and these should be clear, documented and comprehensive.

Handover information should include medicines given in the operating theatre; current management of blood glucose; instructions on resuming oral intake; and, where applicable, instructions on the criteria for discontinuing the variable rate intravenous insulin infusion. It is imperative that any variable rate intravenous insulin infusion is not disconnected during patient transfers.

Patients undergoing major surgery may need to continue a variable rate intravenous insulin infusion until they are able to resume oral intake. For those with type 1 or insulin-requiring diabetes, an insulin infusion should never be stopped unless basal subcutaneous insulin has been given, the blood glucose is < 10 $mmol.l^{-1}$ and ketones are < 0.6 $mmol.l^{-1}$.

Intravenous glucose-containing fluids need to run concurrently with a variable rate intravenous insulin infusion that fulfils certain criteria. No single fluid and fluid regimen achieves all of these criteria reliably; consequently, dextrose 4% in saline 0.18% with potassium chloride 0.15 (or 0.3)% at a rate of 25–30 $ml.kg^{-1}.day^{-1}$ can be used (online Supporting Information Appendix S7) [2,5]. Serum urea and electrolytes, and fluid balance should be assessed daily and senior advice sought if abnormalities are detected [61].

- **Ensure safe handovers between the operating theatre, PACU and ward teams. These should include instructions on oral intake; ongoing need for variable rate intravenous insulin infusion; the restarting of usual diabetes medicines; and criteria for contacting teams supporting postoperative care**.
- **Perform regular point-of-care capillary glucose measurements (e.g. 1–2 hourly)**.
- **Staff working in recovery areas should have immediate access to a glucose meter; a ketone meter; rapid-acting insulin; insulin syringes; and medicines to treat hypoglycaemia**.

Postoperative ward care

The objectives of ward care for patients with diabetes include preventing harm from dysglycaemia and promoting early return to drinking and eating with self-management of usual diabetes medicines, as this should reduce iatrogenic harm and enable earlier hospital discharge.

For patients that do not resume oral nutrition immediately post-surgery, it is imperative to maintain glycaemic control and ensure sufficient insulin is administered to avoid diabetic ketoacidosis in patients with type 1 diabetes. This will often necessitate the (continued) use of the variable rate intravenous insulin infusion (online Supporting Information Appendix S7 has details of the safe use of a variable rate intravenous insulin infusion).

Because optimal glycaemic control and resumption of normal diet may not occur for a few days following

surgery and discharge, healthcare providers need to remind those with diabetes to apply their `sick day rules´ and `sick day medicine guidance´ to avoid preventable harm from the diabetes or their medicines after hospital discharge. Sick day rules are a set of instructions that patients with certain chronic conditions need to apply when they become unwell in the community, and for patients with diabetes it may mean increasing the frequency of monitoring of their glucose and ketones, coupled with some predefined insulin dose adjustments [62].

- **Enable the patient with diabetes to resume self-management of diabetes as soon as possible**.

Emergency surgery

Emergency surgery may be required for conditions related to a patient's diabetes (e.g. acute limb ischaemia) or for coincidental pathologies. Intercurrent illness, unpredictable fasting and scheduling, disruption of normal medicine routines and the physiological stress of surgery all constitute significant challenges, increasing the likelihood of dysglycaemia.

There exists a subset of procedures that require expedited or urgent surgery, which do not require immediate surgery or hospital admission (for instance, hand trauma and evacuation of retained products of conception). In such cases, when there is an absence of dysglycaemia or other metabolic derangement, then the use of scheduled lists (e.g. a planned plastic trauma or gynaecology list) is to be encouraged. In such circumstances, a patient's insulin and/or diabetes medicines can be manipulated as for elective cases [48].

Alternatively, patients may present with significant physiological instability due to their acute pathology. Hospital admission heightens the risk of medicine errors, which commonly affect insulin and other diabetes medicines. Frequent handovers (for instance, between primary, secondary and tertiary care) may increase this risk and further compound disruption to normal medicine administration before and after surgery [63].

Normal medicines may have been missed, not absorbed or exhibit abnormal pharmacokinetics due to impairment of renal or hepatic metabolism. In parallel, eating and drinking are likely to have been disrupted before admission and on presentation to hospital when fasting occurs in anticipation of surgery. All these factors can conspire to cause significant derangements in blood glucose control. The risk of diabetic ketoacidosis or a hyperosmolar hyperglycaemic state is significant [64]. Given the risk of significant morbidity or mortality from these conditions, ketones and lactate should be measured in patients with capillary blood glucose > 13 mmol.l^{-1} (235 mg.dl^{-1}) [5]. Diabetic ketoacidosis and hyperosmolar hyperglycaemic state should be treated with a fixed rate intravenous insulin infusion with early involvement of the specialist diabetes inpatient team, given the still significant morbidity and mortality associated with the conditions [64].

For patients that undergo prolonged pre-operative fasting (i.e. > 6 h), it is imperative to maintain glycaemic control and ensure sufficient insulin is administered to avoid diabetic ketoacidosis in patients with type 1 diabetes. This may necessitate the use of the variable rate intravenous insulin infusion pre-operatively (online Supporting Information Appendix S7). As there are multiple risks associated with intravenous insulin, modification of usual medicines with a planned date and time of surgery, and avoidance of the variable rate intravenous insulin infusion is preferred when the patient has a functioning gut and is physiologically stable.

Modification and omission of diabetes medicines may be necessary. The use of SGLT-2 inhibitors can lead to euglycaemic diabetic ketoacidosis, with observational studies supporting an association of their use with postoperative episodes of diabetic ketoacidosis [65]. Given this, current national advice in the UK is to withhold SGLT-2 inhibitors the day before and the day of admission, with regular monitoring of blood ketones [66]. In addition, metformin is associated with the development of lactic acidosis (metformin-associated lactic acidosis), a risk that is increased in the presence of renal impairment [66], and it should be omitted in patients admitted for emergency surgery who have renal derangement or those who are due to be given intravenous contrast as part of their management.

As with all patients having elective surgery, poor handover may contribute to harm [67,68]. Consequently, the importance of appropriate handovers on transfers is emphasised. This is important for both intra-hospital (e.g. transfer to and from ICU) and inter-hospital transfers (e.g. those for specialist surgeries such as vascular, cardiothoracic and neurosurgery).

- **Patients with diabetes requiring expedited surgery should have peri-operative diabetes medicines managed the same as those having an elective procedure**.
- **Patients with diabetes should, where possible, be expedited on the emergency list to minimise fasting**

and the need for modification of their normal medicine regimens.

- **A variable rate intravenous insulin infusion should only be considered if there is metabolic derangement or more than one meal will be missed**.
- **Patients with diabetic ketoacidosis or hyperosmolar hyperglycaemic state should be managed with a fixed rate intravenous insulin infusion and surgery deferred unless immediately life, limb or organ-saving**.
- **A clear record of the normal medicine regimen and acute modifications (such as the commencement of a variable rate intravenous insulin infusion) should be communicated between teams following the transfer of patients within and between hospitals**.

Wearable technology

Over the past decade, there has been a significant increase in the use of wearable technology to manage diabetes. As such, teams need to be adept at managing these devices. There are currently three main types: continuous glucose monitors; continuous subcutaneous insulin infusions (or pumps); and hybrid closed-loop technology.

Continuous glucose monitors

Continuous glucose monitors measure interstitial glucose and transmit the readings to an electronic device (e.g. mobile telephone) or a specific glucose meter on which it can be read. Their use in the community is increasing. There are several factors that can affect the accuracy of continuous glucose monitors (Table 2). Consequently, because of potential accuracy and precision issues, reliance on them in

Table 3 Criteria for peri-operative use of subcutaneous insulin infusion technology.

Organisational factors	Patient factors	Additional criteria for continuation of hybrid closed-loop technology
Assurance that the proposed surgery will entail a short starvation period with only one missed meal		
Multidisciplinary and patient agreement that continued use of insulin pumps is appropriate		
Avoidance of magnetic resonance imaging		
Patients should be seen before hospital admission by a registered healthcare practitioner who is knowledgeable about the peri-operative use of insulin pumps	No acute metabolic or physiological derangements	Ability to elevate the blood glucose target zone above that set for outpatients
Documentation of discussions and decisions made with the person with diabetes	Where possible aim for elective or expedited surgery	Ability to ensure the sensor is not compressed and has good perfusion
On the day of surgery patients can be reviewed pre- and postoperatively by a registered healthcare practitioner who is knowledgeable about the peri-operative use of insulin pumps	Person with diabetes/carer happy to have their diabetes managed with continuation of subcutaneous insulin infusion technology	Ability to position sensor away from electromagnetic field
Ability to give rescue medicines for hypo and hyperglycaemia	Person with diabetes/carer able to understand instructions	Ability to monitor capillary blood glucose regularly, i.e. every 30 min
Ability to replace subcutaneous insulin pump with a variable rate intravenous insulin infusion if necessary	Optimal pre-operative HbA1c < 69 mmol.mol^{-1} where safe to achieve Ability for the person with diabetes to self-adjust the subcutaneous infusion rate to keep capillary blood glucose 6–10 mmol.l^{-1} Ability to site pump away from the site of proposed surgery and for it be constantly accessible Ability to avoid positioning the insulin pump between the earthing plate and the diathermy Use of a Teflon® cannula (and not a steel cannula) Ability to monitor capillary blood glucose (i.e. every 30–60 min) and to monitor capillary ketones	

patients admitted to hospital cannot currently be advocated. However, this may change as more data become available [32].

Continuous subcutaneous insulin infusions

A continuous subcutaneous insulin infusion or insulin pump delivers a continuous infusion of rapid-acting insulin and then at mealtimes, the person can administer a bolus of the insulin from the pump based on the carbohydrate content of their meal. These devices are used increasingly for the management of type 1 diabetes. However, their peri-operative use is complicated by electromagnetic interference; issues with insulin absorption; requirement for Teflon® needles rather than steel; and the inability of most healthcare practitioners to adjust the settings on the pump safely [32,69–70]. Despite these issues, their use can be advocated, provided certain criteria are met (see Table 3).

Hybrid closed-loop technology

Hybrid closed-loop technology is an amalgamation of continuous glucose monitors and continuous subcutaneous insulin infusion technology, in that the patient wears a sensor that communicates with the insulin pump. These systems maintain glucose concentrations within a target range using a computerised algorithm to automatically adjust the basal rate of insulin and administer corrective doses, though users should still manually programme insulin boluses for meals.

The options for the peri-operative management of diabetes in patients using a hybrid closed-loop system are: switch to the use of variable rate intravenous insulin infusion and recommence hybrid closed-loop technology in a managed fashion (i.e. when the person is stable, eating and drinking, and able to self-manage the pump); or switch to continuous subcutaneous insulin infusion mode of the hybrid closed-loop technology pump, having ensured all criteria in Table 3 are met; or continue with hybrid closed-loop technology mode, provided point-of-care glucose monitoring can be undertaken at 30-min intervals, the `target range´ has been adjusted appropriately (normally to 6–10 mmol.l^{-1} (72–180 mg.dl^{-1})) and all criteria in Table 3 are met [71].

The peri-operative use of hybrid closed-loop technology is in its infancy and cannot yet be advocated routinely outside experienced clinical teams, despite there being case reports and various guidelines [32,71]. Recommendations for the peri-operative use of hybrid closed-loop technology are in Box 1.

Box 1 Recommendations for the peri-operative use of hybrid closed-loop technology

- For any person with diabetes admitted for surgery, particularly type 1 diabetes or insulin-treated type 2 diabetes, check whether they use any wearable diabetes technology.
- Patients with diabetes using wearables should have a multidisciplinary care plan agreed before surgery, including (but not limited to) intra-operative use; access to consumables and insulin pumps; or the loss of ability to manage their own diabetes.
- If there is disruption of insulin delivery via the insulin pump (e.g. removal of the pump, blocked cannula, unfamiliarity of system by clinical team), ensure an alternative source of insulin is started immediately (intravenous infusion or subcutaneous injections). Any removed devices should be labelled, stored in a safe place and documented.
- Any diabetes wearable technology devices need to be removed for procedures involving magnetic resonance imaging – this is an absolute contraindication.

Discussion

Surgery for patients with diabetes continues to be a threat in terms of experience, recovery and morbidity, as well as posing societal and institutional burdens. This multidisciplinary consensus statement provides principles for peri-operative diabetes management to improve patient experience and outcomes after surgery. The peri-operative management of a person with diabetes is complex, as reflected by our Delphi process initially identifying 92 recommendations that should occur to improve outcomes. Across three rounds, we were able to reduce and improve these to formulate 38 key recommendations (Figure 1). Nearly a fifth of these key recommendations are organisational. This is important because it suggests that hospital management, as well as clinical staff, have responsibilities in ensuring the optimal outcome for patients with diabetes undergoing surgery. In addition, we made seven generic recommendations to improve outcomes and mitigate harm from diabetes and diabetes medicines. Institutions have a vital role in funding, supporting and directing safe peri-operative diabetes management.

This consensus statement has limitations. Our methodology did not include a full systematic review with quantitative or qualitative synthesis nor grading of

recommendations due to the breadth of the topic and heterogeneity of evidence. Many of the recommendations are supported by modest evidence and reflect an expert consensus of available evidence. The recommendations focus on UK practice but the principles are generalisable beyond. Certain crucial recommendations were not included in the final 38 recommendations as they were seen as accepted standards of care that should be afforded to all patients, whether they have diabetes or not. Examples include medicine reconciliation; utilisation of specialist peri-operative diabetes specialist nurses; and anaesthetic assessment with shared decision-making around the use of regional anaesthesia and airway management.

In conclusion, nearly a quarter of patients undergoing surgery have diabetes. Preventable harms are associated with adverse outcomes. This consensus statement provides principles to be applied throughout the entire peri-operative pathway by healthcare professionals, institutions and patients. It is hoped that the implementation of these key recommendations will improve experience and outcomes for patients with diabetes having surgery.

Author affiliations

Nicholas A. Levy,[1] Kariem El-Boghdadly,[2,3] Dileep N. Lobo,[4,5] Daniel J. Stubbs,[6,7] Parizad Avari,[8,9] Donal Buggy,[10] Claire Frank,[11] Kim Howson,[12] Jinty Moffett,[13] Emma Morris,[14] Omar G. Mustafa,[15,16] Glynn Nash,[17] Pádraig Ó Scanaill,[18] Sarah Procter,[19] Gerry Rayman,[20,21] Kim Russon,[22] Caroline Thomas,[23] Sarah Tinsley,[24] Allan Xu,[25] and Ketan Dhatariya[21,26]

1 Consultant, Department of Anaesthesia and Perioperative Medicine, West Suffolk NHS Foundation Trust, Bury St Edmunds, Suffolk, UK

2 Consultant, Department of Anaesthesia and Perioperative Care, Guy's and St Thomas' NHS Foundation Trust, London, UK

3 King's College London, London, UK

4 Professor of Gastrointestinal Surgery, Nottingham Digestive Diseases Centre, Division of Translational Medical Sciences, School of Medicine, University of Nottingham, Queen's Medical Centre, Nottingham, UK

5 Adjunct Professor, Division of Surgery, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA

6 NIHR Advanced Fellow Perioperative Acute Critical, and Emergency Care Section, University of Cambridge, Cambridge, UK

7 Honorary Consultant, Department of Anaesthesia, Cambridge University Hospitals NHS Foundation Trust, Addenbrooke's Hospital, Hills Road, Cambridge, UK

8 Consultant, Department of Diabetes and Endocrinology, Imperial College Healthcare NHS Trust, London, UK.

9 Consultant, Department of Metabolism, Digestion and Reproduction, Imperial College London, London, UK.

10 Professor, Department of Anaesthesia, Mater Misericordiae University Hospital, School of Medicine, University College Dublin, Dublin, Ireland.

11 Pharmacist, Wrexham Maelor Hospital, Betsi Cadwaladr University Health Board, Wrexham, UK

12 Diabetes Perioperative Specialist Nurse, James Paget University Hospital NHS Foundation Trust, Great Yarmouth, UK

13 Patient representative, Kingussie, UK

14 Diabetes Perioperative Specialist Nurse, Stockport NHS Foundation Trust, Stockport, UK

15 Consultant, Department of Diabetes, King's College Hospital, London, UK

16 Centre for Education, Faculty of Life Sciences & Medicine, King's College London, London, UK

17 Patient representative, Teynham, UK

18 Consultant, Department of Anaesthesia, Mater Misericordiae University Hospital, Dublin, Ireland

19 Consultant, Department of Anaesthesia, East Suffolk North Essex NHS Foundation Trust, Ipswich, UK

20 Professor, Department of Diabetes, East Suffolk North Essex NHS Foundation Trust, Ipswich, UK

21 Honorary Professor, University of East Anglia Medical School, Norwich, UK

22 Consultant, Department of Anaesthesia, Rotherham NHS Foundation Trust, Rotherham, UK

23 Consultant, Department of Anaesthesia, St James University Hospital, Leeds Teaching Hospitals NHS Trust, Leeds, UK.

24 Pharmacist, University Hospitals of North Midlands, Stoke on Trent, UK

25 Core Trainee in Anaesthesia, London School of Anaesthesia, London, UK

26 Consultant, Elsie Bertram Diabetes Centre, Norfolk and Norwich University Hospitals NHS Foundation Trust, Norwich, UK

Acknowledgements

KE is an Editor of *Anaesthesia*. He or his institution has received funding from Fisher and Paykel, PAION, GE Healthcare and Edwards Lifesciences. DNL has received a speaker´s honorarium from Baxter Healthcare for unrelated work. DS is funded by the National Institute for Health and Care Research via an advanced fellowship for other studies examining specialist surgical care. The views expressed are those of the author(s) and not necessarily those of the NIHR

or the Department of Health and Social Care. PA is funded by a NIHR grant. She has received equipment from Dexcom for investigator-initiated studies. No data or statistical code were generated. No other external funding or competing interests declared.

References

1. Dhatariya K, Flanagan D, Hilton L, et al. Management of adults with diabetes undergoing surgery and elective procedures: improving standards. 2011. https://abcd.care/sites/default/files/site_uploads/JBDS_Guidelines_Archive/JBDS_03_Perioperatives_Full_Version_April_2007_Archive.pdf (accessed 20th January 2026).
2. Dhatariya K, Levy N, Flanagan D, et al. Management of adults with diabetes undergoing surgery and elective procedures: improving standards. 2016. https://abcd.care/sites/default/files/site_uploads/JBDS_Guidelines_Archive/JBDS_03_Surgical_guidelines_2015_full_FINAL_amended_Mar_2016_Archive.pdf (accessed 20th January 2026).
3. NHS England. Getting it right first time. Diabetes. 2025. https://gettingitrightfirsttime.co.uk/medical_specialties/diabetes-workstream/ (accessed 20th January 2026).
4. Barker P, Creasey PE, Dhatariya K, et al. Peri-operative management of the surgical patient with diabetes 2015. *Anaesthesia* 2015; **70**: 1427–40. https://doi.org/10.1111/anae.13233.
5. Ayman G, Dhatariya K, Dhesi J, et al. Guideline for perioperative care for people with diabetes mellitus undergoing elective and emergency surgery. 2022. https://cpoc.org.uk/sites/cpoc/files/documents/2022-12/CPOC-Diabetes-Guideline-Updated2022.pdf (accessed 20th January 2026).
6. National Confidential Enquiry into Patient Outcome and Death. Perioperative diabetes: highs and lows. 2018. https://www.ncepod.org.uk/2018pd.html (accessed 20th January 2026).
7. Cheisson G, Jacqueminet S, Cosson E, et al. Perioperative management of adult diabetic patients. Review of hyperglycaemia: definitions and pathophysiology. *Anaesth Crit Care Pain Med* 2018; **37**: S5–8. https://doi.org/10.1016/j.accpm.2018.02.019.
8. Moghissi ES, Korytkowski MT, Dinardo MM, et al. American Association of Clinical Endocrinologists and American Diabetes Association consensus statement on inpatient glycemic control. *Diabetes Care* 2009; **32**: 1119–31. https://doi.org/10.2337/dc09-9029.
9. Rajan N, Duggan EW, Abdelmalak BB, Butz S, Rodriguez LV, Vann MA, Joshi GP. Society for Ambulatory Anesthesia updated consensus statement on perioperative blood glucose management in adult patients with diabetes mellitus undergoing ambulatory surgery. *Anesth Analg* 2024; **139**: 459–77. https://doi.org/10.1213/ANE.0000000000006791.
10. International Diabetes Federation. Diabetes atlas. 11th edn. 2025. https://diabetesatlas.org/ (accessed 20th January 2026).
11. Pournaras DJ, Photi ES, Barnett N, et al. Assessing the quality of primary care referrals to surgery of patients with diabetes in the east of England: a multi-centre cross-sectional cohort study. *Int J Clin Pract* 2017; **71**: e12971. https://doi.org/10.1111/ijcp.12971.
12. Swanson C, Potter D, Kongable G, Cook C. Update on inpatient glycemic control in hospitals in the United States. *Endocr Pract* 2017; **17**: 853–61. https://doi.org/10.4158/EP11042.OR.
13. Schmeltz LR, DeSantis AJ, Thiyagarajan V, et al. Reduction of surgical mortality and morbidity in diabetic patients undergoing cardiac surgery with a combined intravenous and subcutaneous insulin glucose management strategy. *Diabetes Care* 2007; **30**: 823–8. https://doi.org/10.2337/dc06-2184.
14. Carpenter DL, Gregg SR, Xu K, Buchman TG, Coopersmith CM. Prevalence and impact of unknown diabetes in the ICU. *Crit Care Med* 2015; **43**: e541–50. https://doi.org/10.1097/CCM.0000000000001353.
15. Umpierrez GE, Isaacs SD, Bazargan N, You X, Thaler LM, Kitabchi AE. Hyperglycemia: an independent marker of in-hospital mortality in patients with undiagnosed diabetes. *J Clin Endocrinol Metab* 2002; **87**: 978–82. https://doi.org/10.1210/jcem.87.3.8341.
16. Frisch A, Chandra P, Smiley D, et al. Prevalence and clinical outcome of hyperglycemia in the perioperative period in noncardiac surgery. *Diabetes Care* 2010; **33**: 1783–8. https://doi.org/10.2337/dc10-0304.
17. Kwon S, Thompson R, Dellinger P, Yanez D, Farrohki E, Flum D. Importance of perioperative glycemic control in general surgery: a report from the surgical care and outcomes assessment program. *Ann Surg* 2013; **257**: 8–14. https://doi.org/10.1097/SLA.0b013e31827b6bbc.
18. Kotagal M, Symons RG, Hirsch IB, et al. Perioperative hyperglycemia and risk of adverse events among patients with and without diabetes. *Ann Surg* 2016; **261**: 97–103. https://doi.org/10.1097/SLA.0000000000000688.
19. Ramos M, Khalpey Z, Lipsitz S, et al. Relationship of perioperative hyperglycemia and postoperative infections in patients who undergo general and vascular surgery. *Ann Surg* 2015; **248**: 585–91. https://doi.org/10.1097/SLA.0b013e31818990d1.
20. Martin ET, Kaye KS, Knott C, et al. Diabetes and risk of surgical site infection: a systematic review and meta-analysis. *Infect Control Hosp Epidemiol* 2016; **37**: 88–99. https://doi.org/10.1017/ice.2015.249.
21. Thompson A, Fleischmann KE, Smilowitz NR, et al. 2024 AHA/ACC/ACS/ASNC/HRS/SCA/SCCT/SCMR/SVM guideline for perioperative cardiovascular management for noncardiac surgery: a report of the American College of Cardiology/American Heart Association joint committee on clinical practice guidelines. *J Am Coll Cardiol* 2024; **84**: 1869–969. https://doi.org/10.1016/j.jacc.2024.06.013.
22. Jinjing W, Kang C, Yaolong C, et al. Chinese clinical practice guidelines for perioperative blood glucose management. *Diabetes Metab Res Rev* 2021; **37**: e3439. https://doi.org/10.1002/dmrr.3439.
23. Australian Diabetes Society. ADS-ANZCA perioperative diabetes and hyperglycaemia guidelines (adults). 2022. https://www.diabetessociety.com.au/ads-anzca-perioperative-hyperglycaemia-guidelines-adults/ (accessed 20th January 2026).
24. Halperin I, Malcolm J, Moore S, Houlden RL. Suggested canadian standards for perioperative/periprocedure glycemic management in patients with type 1 and type 2 diabetes. *Can J Diabetes* 2022; **46**: 99–107. https://doi.org/10.1016/j.jcjd.2021.04.009.
25. Song X, Wang J, Gao Y, et al. Critical appraisal and systematic review of guidelines for perioperative diabetes management: 2011–2017. *Endocrine* 2019; **63**: 204–12. https://doi.org/10.1007/s12020-018-1786-y.
26. Dhatariya K, Levy N, Kilvert A, et al. NHS diabetes guideline for the perioperative management of the adult patient with diabetes. *Diabet Med* 2012; **29**: 420–33.
27. Simó-Servat O, Amigó J, Ortiz-Zúñiga Á, et al. Smart diabetes hospital: clinical impact in complex surgical units of a tertiary hospital. *Acta Diabetol* 2025; **62**: 423–8. https://doi.org/10.1007/s00592-024-02370-6.
28. Barmanray RD, Kyi M, Colman PG, et al. The specialist treatment of inpatients: caring for diabetes in surgery (stoic-d surgery) trial: a randomized controlled trial of early intervention with an

electronic specialist-led model of diabetes care. *Diabetes Care* 2024; **47**: 948–55. https://doi.org/10.2337/dc23-1905.
29. Rayman G, Page E, Hodgson S, Henley W, Briggs T, Gray WK. Improving the outcomes for people with diabetes undergoing surgery: an observational study of the improving the peri-operative pathway of people with diabetes (IP3D) intervention. *Diabetes Res Clin Pract* 2024; **207**: 111062. https://doi.org/10.1016/j.diabres.2023.111062.
30. Yu A, Whitfield K, Hale A, Ballard E, d'Emden M. The positive impact of a multidisciplinary preoperative diabetes clinic on improving glycaemic management in adults undergoing elective noncardiac surgery. *Diabet Med* 2025; **42**: e70131. https://doi.org/10.1111/dme.70131.
31. NHS Digital. National diabetes inpatient audit (NaDIA) – 2017. 2018. https://digital.nhs.uk/data-and-information/publications/statistical/national-diabetes-inpatient-audit/national-diabetes-inpatient-audit-nadia-2017 (accessed 20th January 2026).
32. Avari P, Choudhary P, Lumb A, et al. Using technology to support diabetes care in hospital: guidelines from the Joint British Diabetes Societies for Inpatient Care (JBDS-IP) group and Diabetes Technology Network (DTN) UK. *Diabet Med* 2025; **42**: e15452. https://doi.org/10.1111/dme.15452.
33. Viens NA, Hug KT, Marchant MH, Cook C, Vail TP, Bolognesi MP. Role of diabetes type in perioperative outcomes after hip and knee arthroplasty in the United States. *J Surg Orthop Adv* 2012; **21**: 253–60. https://doi.org/10.3113/jsoa.2012.0253.
34. Furnary AP, Wu Y, Bookin SO. Effect of hyperglycemia and continuous intravenous insulin infusions on outcomes of cardiac surgical procedures: the Portland Diabetic Project. *Endocr Pract* 2004; **10**: 21–33. https://doi.org/10.4158/EP.10.S2.21.
35. Jones CE, Graham LA, Morris MS, et al. Association between preoperative hemoglobin A1c levels, postoperative hyperglycemia, and readmissions following gastrointestinal surgery. *JAMA Surg* 2017; **152**: 1031–8. https://doi.org/10.1001/jamasurg.2017.2350.
36. Adie SK, Ketcham SW, Marshall VD, Farina N, Sukul D. The association of glucose control on in-hospital mortality in the cardiac intensive care unit. *J Diabetes Complicat* 2023; **37**: 108453. https://doi.org/10.1016/j.jdiacomp.2023.108453.
37. Lamont T, Cousins D, Hillson R, Bischler A, Terblanche M. Safer administration of insulin: summary of a safety report from the national patient safety agency. *BMJ* 2010; **341**: 882–3. https://doi.org/10.1136/bmj.c5269.
38. National Institute for Health and Care Excellence. Type 2 diabetes in adults: management. [NG28]. 2022. https://www.nice.org.uk/guidance/ng28 (accessed 20th January 2026).
39. Peters AL, Buschur EO, Buse JB, Cohan P, Diner JC, Hirsch IB. Euglycemic diabetic ketoacidosis: a potential complication of treatment with sodium-glucose cotransporter 2 inhibition. *Diabetes Care* 2015; **38**: 1687–93. https://doi.org/10.2337/dc15-0843.
40. Tinsley S, Frank C, Stubbs D, Dhatariya K, Knaggs RD, Levy NA. Non-insulin diabetes medicines: a narrative review for anaesthetists and intensivists. *Br J Anaesth* 2025; **135**: 898–911. https://doi.org/10.1016/j.bja.2025.05.050.
41. Qi QY, Kyi M, Pemberton E, Colman PG, Fourlanos S. The pro-Diab Melbourne perioperative study: a structured pre-admission perioperative diabetes management plan to improve medication usage in elective surgery. *Diabet Med* 2022; **39**: e14838. https://doi.org/10.1111/dme.14838.
42. National Institute for Health and Care Excellence. Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes. [NG5]. 2015. https://www.nice.org.uk/guidance/ng5/ (accessed20th January 2026).
43. Dhatariya K, Levy N. Perioperative diabetes care. *Clin Med* 2019; **19**: 437–40. https://doi.org/10.7861/clinmed.2019.0226.
44. Buggy DJ, Columb MO, Hermanides J, Hollmann MW, Coburn M, Zarbock A. Management and outcomes of perioperative care of people with diabetes across Europe (MOPED): a prospective, observational study. *Lancet Reg Health Eur* 2026; **61**: 101535. https://doi.org/10.1016/j.lanepe.2025.101535.
45. American Diabetes Association Professional Practice Committee. 16. Diabetes care in the hospital: standards of care in diabetes—2025. *Diabetes Care* 2025; **48**: S321–34. https://doi.org/10.2337/dc25-S016.
46. Sampson M, Bailey M, Clark J, et al. A new integrated care pathway for ambulance attended severe hypoglycaemia in the east of England: the Eastern Academic Health Science Network (EAHSN) model. *Diabetes Res Clin Pract* 2017; **133**: 50–9. https://doi.org/10.1016/j.diabres.2017.08.017.
47. NHS England, Centre for Perioperative Care, British Association of Day Surgery. Day case first: national day surgery delivery pack. 2024. https://www.gettingitrightfirsttime.co.uk/wp-content/uploads/2024/09/National-Day-Surgery-Delivery-Pack-V2.0-September-2024.pdf (accessed 20th January 2026).
48. NHS England. Getting it right first time. Diabetes emergency surgery pathway. 2023. https://gettingitrightfirsttime.co.uk/wp-content/uploads/2023/12/Diabetes-Emergency-Surgery-Pathway-FINAL-V1-December-2023.html (accessed 20th January 2026).
49. Polderman JA, Hermanides J, Hulst AH. Update on the perioperative management of diabetes mellitus. *BJA Educ* 2024; **24**: 261–9. https://doi.org/10.1016/j.bjae.2024.04.007.
50. George S, Dale J, Stanisstreet D. A guideline for the use of variable rate intravenous insulin infusion in medical inpatients. *Diabet Med* 2015; **32**: 706–13.
51. NHS Digital. National diabetes inpatient audit - harms, 2019. 2020. https://digital.nhs.uk/data-and-information/publications/statistical/national-diabetes-inpatient-audit---harms/national-diabetes-inpatient-audit---harms-2019/2019 (accessed 20th January 2026).
52. Burgess LH, Kramer J, Casteline C, et al. Pharmacy-led medication reconciliation program reduces adverse drug events and improves satisfaction in a community hospital. *HCA Healthc J Med* 2021; **2**: 411–21. https://doi.org/10.36518/2689-0216.1295.
53. Lobo DN, Gianotti L, Adiamah A, et al. Perioperative nutrition: recommendations from the espen expert group. *Clin Nutr* 2020; **39**: 3211–27. https://doi.org/10.1016/j.clnu.2020.03.038.
54. Royal College of Anaesthetists. Guidelines for the provision of anaesthetic services. 2025. https://rcoa.ac.uk/safety-standards-quality/guidance-resources/guidelines-provision-anaesthetic-services (accessed 20th January 2026).
55. Levy N, Lirk P. Regional anaesthesia in patients with diabetes. *Anaesthesia* 2021; **76**: 127–35. https://doi.org/10.1111/anae.15258.
56. El-Boghdadly K, Dhesi J, Fabb P, et al. Elective peri-operative management of adults taking glucagon-like peptide-1 receptor agonists, glucose-dependent insulinotropic peptide agonists and sodium-glucose cotransporter-2 inhibitors: a multi disciplinary consensus statement. *Anaesthesia* 2025; **80**: 412–24. https://doi.org/10.1111/anae.16541.
57. Katerenchuk V, Ribeiro EM, Batista AC. Impact of intraoperative dexamethasone on perioperative blood glucose levels: systematic review and meta-analysis of randomized trials. *Anesth Analg* 2024; **139**: 490–508. https://doi.org/10.1213/ane.0000000000006933.
58. Sanders JC, Russell PK, Tubog TD. Use of single-dose dexamethasone in patients with diabetes undergoing surgery: a systematic review and meta-analysis. *AANA J* 2023; **91**: 185–93.
59. Cihoric M, Kehlet H, Lauritsen ML, Højlund J, Kanstrup K, Kärnsund S, Foss NB. Preoperative high dose of

dexamethasone in emergency laparotomy: randomized clinical trial. *Br J Surg* 2024; **111**: znae130. https://doi.org/10.1093/bjs/znae130.
60. Levy N, Mills P, Mythen M. Is the pursuit of dreaming (drinking, eating and mobilising) the ultimate goal of anaesthesia? *Anaesthesia* 2016; **71**: 1008–12. https://doi.org/10.1111/anae.13495.
61. National Institute of Health and Care Excellence. Intravenous fluid therapy in adults in hospital. Clinical guideline CG174. 2017. https://www.nice.org.uk/guidance/cg174 (accessed 20th January 2026).
62. Levy NA, Frank C, El-Boghdadly K. Sick-day rules for the peri-operative clinician. *Anaesthesia* 2025; **80**: 458–9. https://doi.org/10.1111/anae.16510.
63. Bain A, Silcock J, Kavanagh S, Quinn G, Fonseca I. Improving the quality of insulin prescribing for people with diabetes being discharged from hospital. *BMJ Open Quality* 2019; **8**: e000655. https://doi.org/10.1136/bmjoq-2019-000655.
64. Umpierrez GE, Davis GM, ElSayed NA, et al. Hyperglycaemic crises in adults with diabetes: a consensus report. *Diabetologia* 2024; **67**: 1455–79. https://doi.org/10.1007/s00125-024-06183-8.
65. Seki H, Ideno S, Shiga T, et al. Sodium-glucose cotransporter 2 inhibitor-associated perioperative ketoacidosis: a systematic review of case reports. *J Anesth* 2023; **37**: 465–73. https://doi.org/10.1007/s00540-023-03174-8.
66. Medicines and Healthcare Products Regulatory Agency. SGLT2 inhibitors: monitor ketones in blood during treatment interruption for surgical procedures or acute serious medical illness. 2020. https://www.gov.uk/drug-safety-update/sglt2-inhibitors-monitor-ketones-in-blood-during-treatment-interruption-for-surgical-procedures-or-acute-serious-medical-illness (accessed 20th January 2026).
67. Jones PM, Cherry RA, Allen BN, et al. Association between handover of anesthesia care and adverse postoperative outcomes among patients undergoing major surgery. *JAMA* 2018; **319**: 143–53. https://doi.org/10.1001/jama.2017.20040.
68. Abraham J, Pfeifer E, Doering M, Avidan MS, Kannampallil T. Systematic review of intraoperative anesthesia handoffs and handoff tools. *Anesth Analg* 2021; **132**: 1563–75. https://doi.org/10.1213/ane.0000000000005367.
69. Cruz P, McKee AM, Chiang H-H, McGill J, Hirsch IB, Ringenberg K, Wildes TS. Perioperative care of patients using wearable diabetes devices. *Anesth Analg* 2025; **140**: 2–12. https://doi.org/10.1213/ane.0000000000007115.
70. Oprea AD, Kalra SK, Duggan EW, et al. Perioperative management of adult patients with diabetes wearing devices: a society for perioperative assessment and quality improvement (SPAQI) expert consensus statement. *J Clin Anesth* 2024; **99**: 111627. https://doi.org/10.1016/j.jclinane.2024.111627.
71. Afridi H, Olsen P, Levy N, Dhatariya K. Hybrid closed loop technology in emergency surgery in a person with type 1 diabetes. *Anaesth Rep* 2025; **13**: e70003. https://doi.org/10.1002/anr3.70003.

Supporting Information

Additional supporting information may be found online via the journal website.

Appendix S1. Breakdown of the Delphi process with all the recommendations and outcomes at each stage.

Appendix S2. Initial rescue medicines for dysglycaemia.

Appendix S3. Guidance for peri-operative modification of insulin.

Appendix S4. Guidance for peri-operative modification of non-insulin diabetes medicines.

Appendix S5. Example of an information leaflet for patients on diabetes medicines.

Appendix S6. Peri-operative passport.

Appendix S7. Guidance for safe use of a variable rate intravenous insulin infusion.