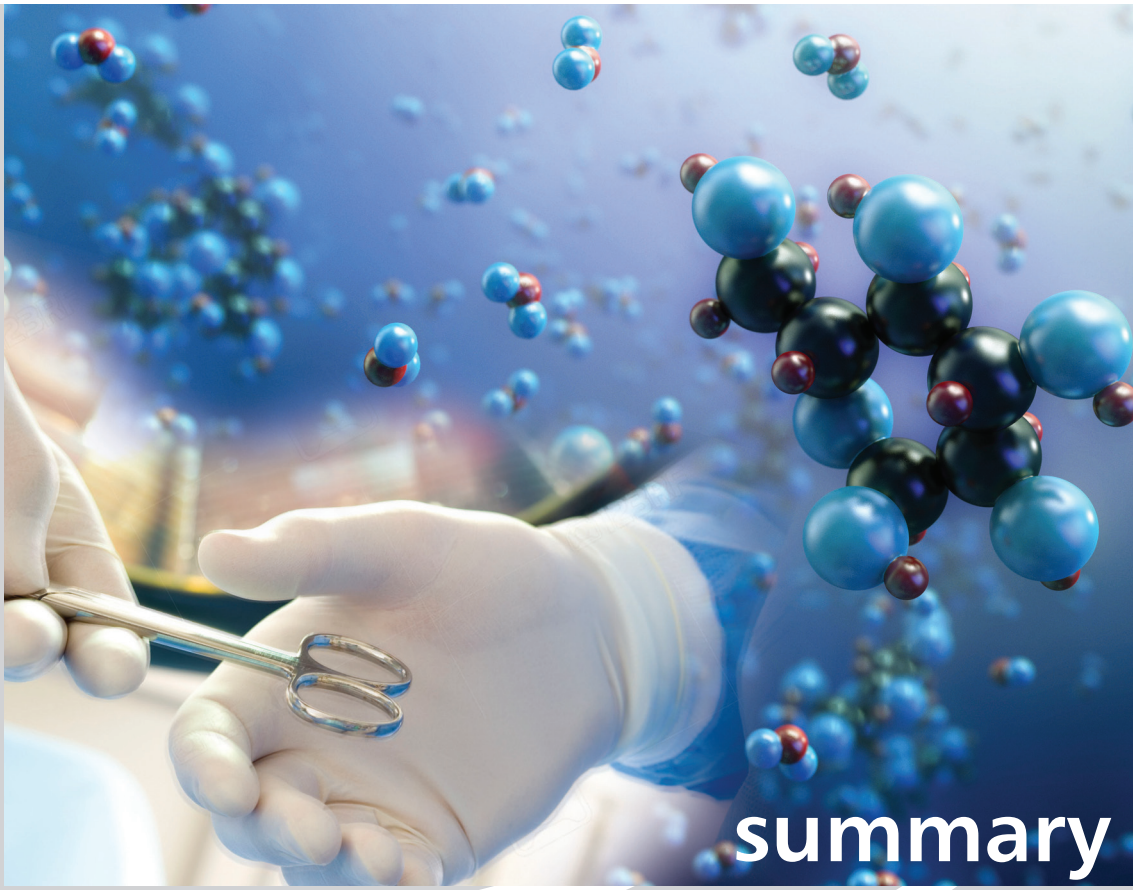
Highs and Lows

A review of the quality of care provided to patients over the age of 16 who had diabetes and underwent a surgical procedure



summary

NCEPOD

Improving the quality of healthcare

Highs and Lows

A review of the quality of care provided to patients over the age of 16 who had diabetes and underwent a surgical procedure

A report published by the National Confidential Enquiry into Patient Outcome and Death (2018)

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The National Confidential Enquiry into Patient Outcome and Death (NCEPOD) is an independent body to which a corporate commitment has been made by the Medical and Surgical Royal Colleges, Associations and Faculties related to its area of activity.

The Medical and Surgical Clinical Outcome Review Programme is commissioned by the Healthcare Quality Improvement Partnership (HQIP) which is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices. HQIP's aim is to promote quality improvement in patient outcomes, and in particular, to increase the impact that clinical audit, outcome review programmes and registries have on healthcare quality in England and Wales. HQIP holds the contract to commission, manage and develop the National Clinical Audit and Patient Outcomes Programme (NCAPOP), comprising around 40 projects covering care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual projects, other devolved administrations and crown dependencies. www.hqip.org.uk/national-programmes

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Introduction

Diabetes is a serious, lifelong condition where blood glucose levels are too high. There are two main types; type 1 caused by the body not being able to produce any insulin, and therefore not able break down the glucose and type 2 where the body does not make enough insulin, or it is not good enough.[1]

The care of patients with diabetes is complex and this is particularly true of those undergoing surgery. The care can cross numerous specialties which can compound the issue of diabetes not being managed consistently. The recent National Diabetes Inpatient Audit (NaDIA) showed that 18% of inpatients have diabetes,[2] and previous work has shown that more than 15% of patients undergoing surgical procedures are known to have diabetes,[3] therefore it is essential that all staff are familiar with diabetes management to ensure care of the patient's glycaemic control, along with the clinical reason for their admission and surgery is coordinated and appropriate.

There are many national guidelines to aid clinicians in managing perioperative diabetes, published by the Association of Surgeons of Great Britain and Ireland (ASGBI),[4] Association of Anaesthetists of Great Britain and Ireland (AAGBI),[5] Joint British Diabetes Society (JBDS)[6] and the British Association of Day Surgery (BADS).[7] Despite their availability, this study was proposed as clinicians involved with this vulnerable patient group were aware that the guidelines were not always followed and that they do not encourage joint specialty working.

Good control of diabetes in surgical patients can improve outcomes. One study found that perioperative mortality in patients with diabetes undergoing coronary artery bypass grafting decreased by 50% when continuous insulin protocols were instituted (4.5% v 1.9% mortality).[8] In another study, perioperative hyperglycaemia was associated with increased length of stay, hospital complications, and mortality after non-cardiac general surgery.[9]

This NCEPOD study was developed with wide, multidisciplinary input and a number of areas for review were identified relating to the interactions that occur with and around the patient, and the quality of care provided to them. Particular areas included insulin administration errors and the monitoring of blood glucose to detect hyperglycaemia and hypoglycaemia - all of which can be serious and life-threatening complications. Another key area was the assessment of the patient prior to surgery. This process starts long before the patient reaches the operating theatre. The patient's own control of their diabetes is important and this involves their GP and local diabetes team. Equitable access to and the appropriateness of day surgery in patients with diabetes was also raised as an area for review to assess whether any hospitals are inappropriately excluding patients with diabetes from day surgery treatment.

This review includes an assessment of service structure at an organisational level and patient care at a clinical level. Recommendations are formed from data provided by clinicians at the hospital caring for patients and from external peer review of a sample of cases.

The areas for improvements in care raised by this report, and the recommendations made, have the potential to impact a large portion of surgical patients, providing quality improvement goals for hospitals to measure their practice against.

Executive summary

Aim

The aim of this study was to highlight where care could be improved in patients with diabetes undergoing surgery.

Method

A retrospective case note and questionnaire review was undertaken in 509 patients aged 16 and over who had diabetes (type 1 or type 2) and who underwent a surgical procedure.

Key findings

The overarching theme of the findings was that that was a lack of clinical continuity of diabetes management across the different specialties in the perioperative pathway. Absence of joint ownership of the diabetes management and multiple guidelines targeted at specific specialties, rather than a joint multidisciplinary approach, meant that the diabetes management of the patient was falling between gaps in the surgical pathway.

Diabetologists, anaesthetists and surgeons were commonly involved in the patient's care, however there was under involvement of key diabetes team members such as diabetes specialist nurses, dietitians and pharmacists. Nutritional assessments and medicine reconciliations were frequently not undertaken, only 55.4% (221/399) of patients, had a MUST score calculated on admission to hospital and adequate medicines reconciliation by medical staff occurred in 84.4% (320/379) of patients but only by a pharmacist in 75.3% (192/255). This was particularly noticeable for elective surgery where pre-operative assessment clinics should have provided opportunity for such reviews to be undertaken and a management plan developed and explained to the patient.

The management plan for a patient with diabetes undergoing surgery should include their prioritisation on the operating list. This study found that 19.4% (42/439) of patients were not prioritised appropriately, which subjected them to prolonged fasting, putting them at increased risk of complications.

Regular monitoring of blood glucose was under-utilised pre- intra- and post-operatively. It was the opinion of the reviewers that better monitoring would have helped facilitate the assessment of patient status.

Overall the report highlighted that there was room for improvement in the clinical care of 35.8% (182/509) of patients in the study. This percentage was similar to that of good practice which was found in 34.8% (177/509) of patients. Organisational systems of care were deemed to require improvement in 9.2% (47/509) of cases reviewed and a further 14.1% (72/509) of cases indicated improvements both in clinical and organisational systems of care.

Recommendations

These recommendations have been formed by a consensus exercise including all those listed in the acknowledgements

*Recommendations **1 to 5** have been highlighted as being the primary focus for action.*

	Principal recommendations 1 to 5	**Study key findings**
1	Write and implement a national joint standard and policy for the multidisciplinary management of patients with diabetes who require surgery. Information should include responsibilities for diabetes management across all specialties during routine care and in high-risk patients. ***(AoMRC to lead at an organisational level, and the Clinical Lead for Perioperative Diabetes Management to lead at a local level)***	Numerous diabetes guidelines are in existence, but are specialty specific: • Association of Surgeons of Great Britain and Ireland (ASGBI) • Association of Anaesthetists of Great Britain and Ireland (AAGBI) • Joint British Diabetes Society (JBDS) British Association of Day Surgery (BADS).
2	Appoint a clinical lead for perioperative diabetes care in hospitals where surgical services are provided. This person will be responsible for developing policies and processes to: a. Ensure diabetes management is optimised for surgery b. Ensure patients with diabetes are prioritised on the operating list, including the co-ordination of emergency surgery* c. Identify when involvement of the diabetes multidisciplinary team, including diabetes specialist nurse, is required d. Ensure high-risk patients are identified, such as those with type 1 diabetes e. Identify patients with poor diabetes control who may need pre-operative optimisation or VRIII f. Audit cases of prolonged starvation g. Ensure high quality discharge planning. ***(Medical Directors, Directors of Nursing)*** * *This supports the recommendation from the National Emergency Laparotomy Audit*	• 28.0% (87/311) of hospitals had a named clinical lead for perioperative diabetes • 83.8% (160/191) of hospitals where emergency surgery was performed, had a co-ordinator for emergency theatre bookings • 21.8% (41/188) of hospitals where emergency surgery was performed had no system for confirming that relevant investigations and resuscitation had been completed and that the patient was fit for surgery • 20.6% (40/194) of hospitals where emergency surgery was performed had no system for determining the clinical priority of emergency cases • 90.9% (288/317) of hospitals had a hospital policy or guideline on managing operating lists of which 258/282 (91.5%) stated patients with diabetes should be prioritised early on the morning or afternoon theatre list.

3	Use a standardised referral process for elective surgery to ensure appropriate assessment and optimisation of diabetes. This should include: a. Satisfactory HbA1c levels within 3 months of referral b. Control of co-morbidities c. A list of all current medications d. The patient's body mass index (BMI) e. Estimated glomerular filtration rate (eGFR) f. Perioperative risk rating. ***(Primary Care Providers, Commissioners, Clinical Lead for Perioperative Diabetes Management, Lead anaesthetist for pre-operative assessment)***	• The majority (144/253; 57%) of elective referrals in this study were made from general practitioners • In 41% (83/202) of referrals there was no information provided on the management of the patient's diabetes in the community • HbA1c within last 3 months was provided in only 50/118 (42%) • The recording of co-morbidities (90/118; 76%) and current medication (98/118; 84%) were frequently provided but not fully and evidence of regular blood glucose was only available in 22.0% (26/118) blood pressure measurement n 35.6% (42/118), urgency of referral in 21.2% (25/118), eGFR in 19.5% (23/118) and body mass index (BMI) in 37.3% (44/118).
4	Ensure that patients with diabetes undergoing surgery are closely monitored and their glucose levels managed accordingly. Glucose monitoring should be included: a. at sign-in and sign-out stages of the surgical safety checklist (e.g. WHO safety checklist) b. in anaesthetic charts c. in theatre recovery d. in early warning scoring systems System markers and alerts should be used to raise awareness of glucose levels, e.g. tagging of electronic medical records, use of a patient passport or unique stickers in paper based case notes. ***(Clinical Lead for Perioperative Diabetes Management, Lead Anaesthetist for Pre-Operative Assessment, Clinical Directors, Medical Directors, Directors of Nursing)***	• 46.9% (212/452) of patients did not have capillary blood glucose recorded intra-operatively • 13.8% (59/426) patients did not have their capillary blood glucose levels measured in the theatre recovery area • 21.2% (86/406) of patients did not have their blood glucose managed appropriately in the post-operative period, in the opinion of the case reviewers • A surgical safety checklist was used for 97.1% (432/444) of patients but diabetes management was not included in 30.2% (114/378) • If diabetes was mentioned on the surgical safety checklist then capillary blood glucose measurements were more likely to be undertaken (141/240; 58.8% vs 54/109; 49.5%) during the operation • Including diabetes in the surgical safety checklist was associated with more appropriate management of diabetes in the theatre recovery area 182/216 (84.3%) vs 65/102 (63.7%) in the view of the case reviewers.

5	Ensure a safe handover of patients with diabetes from theatre recovery to ward, this should be documented in the case notes and include: a. Medications given in theatre b. Glucose level on leaving the recovery area c. Glucose level on arriving into the ward d. Ongoing management of diabetes, especially VRIII e. Criteria for contacting the diabetes team. ***(Clinical Lead for Perioperative Diabetes Management, Clinical Directors, Medical Directors, Directors of Nursing)***	• 59.8% (274/458) of patients did not have a clear plan for the management of the patient's diabetes on the day of surgery recorded • 12.4% (55/445) of patients did not have diabetes medications documented on the day of surgery • 46.9% (212/452) of patients did not have capillary blood glucose recorded intra-operatively • 13.8% (59/426) patients did not have their capillary blood glucose levels measured in the theatre recovery area • 21.2% (86/406) of patients did not have their blood glucose managed appropriately in the post-operative period, in the opinion of the case reviewers • The post-operative clinical area was inappropriate in 19/503 (3.8%) of cases in the opinion of the case reviewers • Diabetes was not managed by all the appropriate staff in 77/464 (16.6%) patients, in the opinion of the case reviewers. Early involvement of a diabetes specialist nurse would have been beneficial in a majority of these patients (44) in the opinion of the case reviewers • Adequate discharge arrangements were not made for the patient's diabetes care in 78/390 (20.0%) patients, in the opinion of the case reviewers.
	Additional recommendations	**Study key findings**
6	Develop a pre-operative assessment clinic policy and standards for the management of patients with diabetes. These should be developed by the lead anaesthetist* and the clinical lead for perioperative diabetes management, and include: a. Identification of high-risk patients, such as those with poorly controlled or type 1 diabetes b. Optimisation for surgery c. Criteria for involvement of the diabetes multidisciplinary team These policies should be audited locally and the results acted upon. ***(Lead Anaesthetist for Pre-operative Assessment, Clinical Lead for Perioperative Diabetes Management, Clinical Directors)*** * *This supports the recommendation by the AAGBI guidelines in recommending that all hospitals should have a lead anaesthetist for pre-operative assessment.*	• 43.4% (132/304) of pre-operative assessment clinics did not have a specific policy for management of diabetes patients undergoing surgery. Those that did, varied with regards to the involvement of wider multidisciplinary team members.

7	Ensure that patients with diabetes attending a pre-operative assessment clinic prior to elective surgery have: a. Access to the diabetes multidisciplinary team, including diabetes specialist nurse input b. Written instructions regarding their diabetes management plan prior to surgery. ***(Lead Anaesthetist for Pre-operative Assessment, Clinical Lead for Perioperative Diabetes Management)***	• 86.7% (228/263) of elective patients attended a pre-operative assessment clinic • 9.9% (20/203) of patients were not seen by all appropriate staff at the pre-operative assessment clinic. Most commonly this was diabetes specialist nurses • 47.1% (88/187) of patients had no documented specific instructions on management of their diabetes prior to surgery • 70.2% (120/171) of cases had no documented evidence that the patient was included in their diabetes plan.
8	A clinical lead for day surgery* should be in place in all hospitals providing day surgery services. This lead, along with the clinical lead for perioperative diabetes management should be responsible for ensuring that patients with diabetes are considered for day surgery, where appropriate. Policies should be developed to ensure patients with diabetes have equity of access to day surgery. ***(Clinical Lead for Day Surgery, Clinical Lead for Perioperative Diabetes Management, Clinical Directors)*** * *This supports guidelines from the British Association of Day Surgery, the AAGBI and the RCoA*	• 60.2% (142/236) of hospitals with a day surgery unit had a clinical lead or director of the day surgery unit • Only 28.0% (87/311) of hospitals had a named clinical lead for perioperative diabetes.
9	Cancellation of elective surgery in patients with diabetes should be avoided, particularly for known clinical reasons. Cancellation rates should be audited locally and the results acted upon. ***(Clinical Lead for Perioperative Diabetes Management, Lead Anaesthetist for Pre-operative Assessment, Clinical Directors)***	• 12.9% (34/229) of elective patients had their surgery cancelled on a previous occasion • 5/20 patients had their operation cancelled due to poor glycaemic control and a further 5 due to avoidable comorbidity • There were more type 1 than type 2 patients (9/113; 8% vs 9/359; 2.5%) admitted non-electively who were already on the elective waiting list.
10	Develop and implement referral criteria for surgical inpatients with diabetes to: a. Diabetes specialist nurses b. Dietitians c. Pharmacists d. Other diabetes multidisciplinary team members as required. ***(Clinical Lead for Perioperative Diabetes Management, Clinical Directors)***	• Reviewers felt 75 patients should have been seen by a diabetes specialist nurse and 23 by a consultant diabetologist but were not • 18.1% (66/364) of patients had an inadequate nutritional assessment • Case reviewers felt that inadequate medicines reconciliation by medical staff occurred in 59/379 (15.6%) patients and by a pharmacist in 163/255 (24.7%).

11	Record and monitor the time at which a patient begins fasting (for surgery or clinical reasons). If a patient misses more than one meal, their care should be escalated to the responsible medical team as this indicates prolonged starvation. ***(Clinical Lead for Perioperative Diabetes Management, Directors of Nursing)***	• Prolonged starvation resulted in a change in diabetes management in 9.6% (42/439) of patients, including the use of a VRIII in 35 patients of which reviewers felt 23 were avoidable.
12	Prioritise patients with diabetes on the operating list to avoid prolonged starvation.* Prioritisation of patients with diabetes on operating lists should be subject to local clinical audit and the results acted upon. ***(Lead Anaesthetist for Pre-operative Assessment, Clinical Lead for Perioperative Diabetes Management, Clinical Directors)*** ** This supports the Joint British Diabetes Society Guidelines*	• 19.4% (90/465) of patients were not scheduled appropriately for their surgery in the opinion of the case reviewers.
13	Provide patients with diabetes with education and information about their diabetes management at discharge from hospital as part of the discharge planning process. ***(Diabetes Specialist Nurses, Clinical Lead for Perioperative Diabetes Management)***	• Adequate discharge arrangements were not made for the patient's diabetes care in 78/390 (20.0%) patients, in the opinion of the case reviewers.

Method and Data Returns

Study advisory group

A multidisciplinary group of clinicians comprising consultants from surgery, anaesthesia, diabetology, critical care, medicine for the elderly, diabetes specialist nursing, operating department practitioner, medicine, dietetics, pharmacy and lay representatives.

Aim

The aim of this study was to look at the process of care in the perioperative management of surgical patients with diabetes across the patient pathway from referral for surgery to discharge.

Objectives

Based on the issues raised by the Study Advisory Group, the objectives of the study were to collect information on the following aspects of care:

- Primary care for patients admitted electively, including timing, assessment, and referral procedures
- The pre-operative, intra-operative and post-operative management of diabetes including the assessment of blood glucose and HbA1c, medication and nutrition management, multidisciplinary review, risk assessment, delays in the process, recovery and discharge planning
- Organisational services

Study population and case ascertainment

Patients aged 16 and over were included who were admitted to hospital either as an emergency or for an elective procedure with an ICD10 code for diabetes mellitus (E10.0-E11.9) and who had a major surgical procedure with a minimum one night stay post-surgery between 1st February 2017 and 31st March 2017.

Exclusions

Patients undergoing day surgery without an overnight stay and patients who had a minor procedure were excluded.

Hospital participation

Hospitals within Acute Trusts/Health Boards including Independent Hospitals and Day Surgery Units in England, Wales, Northern Ireland and Scotland that provided surgical services to patients with diabetes, were expected to participate, as well as public hospitals in the Isle of Man, Guernsey and Jersey. Within each hospital, a named contact, referred to as the NCEPOD Local Reporter, acted as a link between NCEPOD and the hospital staff, facilitating case identification, dissemination of questionnaires and data collation.

Case identification

Using a pre-defined spreadsheet, NCEPOD Local Reporters were asked to retrospectively identify all patients meeting the study inclusion criteria. A list of OPCS codes for minor procedures was provided so that these patients could be removed from the data collection spreadsheet.

The spreadsheet was then imported into a database and up to 8 cases per hospital were selected using a ratio of 4 emergency to 4 elective cases with each of the 4 comprising of 2 patients with type 1 diabetes and 2 patients with type 2 diabetes. This bias was to ensure that type 1 diabetes patients were not under-represented in the sample, as national datasets indicate that approximately 90% of patients with diabetes have type 2 diabetes, and only 10% have type 1 diabetes.[10]

Questionnaires

Three questionnaires were disseminated to collect clinical and organisational data.

Surgical questionnaire
This questionnaire was sent to the consultant surgeon who was responsible for the patient's care at the time of their procedure. Information was collected relating to the care of the patient from referral (if an elective patient), the perioperative pathway through to discharge.

Anaesthetic questionnaire
This questionnaire was sent to the anaesthetist who was responsible for the patient at the time of their surgery to collect data on the pre-assessment, anaesthetic care and post-operative diabetes management.

Organisational questionnaire
An organisational questionnaire was sent to hospitals in which surgical services were provided to patients with diabetes. This included acute district general hospitals, independent hospitals, tertiary specialist hospitals and university teaching hospitals. Community hospitals and mental health hospitals were not required to take part in this study. The data requested in the organisational questionnaire included information on the services, facilities and staff training available, as well as policies and procedures in place for the management of patients with diabetes. For the purposes of this study, 'organisation' was defined as a hospital rather than a Trust/Health Board/ Healthcare service as a whole.

Case notes

Photocopied case note extracts for each case for peer review were requested covering the whole admission. The following documents were requested:

- GP related notes and referral letters
- Outpatient clinic notes
- Medical notes from admission to discharge/30 days post-surgery if discharge was more than 30 days after surgery
- Notes from multidisciplinary team meetings
- Imaging reports
- Consent forms
- Pre-anaesthetic assessment records including any previous assessments relating to this procedure
- Pre-assessment clinic notes/proforma
- Operation notes
- Anaesthetic charts
- Drug charts
- Fluid balance charts
- Bloods, HbA1c for the entire index admission
- Haematology and biochemistry including data on the perioperative blood glucose
- Critical care charts and notes and blood gas charts
- Insulin/glucose charts
- Recovery room records
- Integrated care pathways
- Nursing notes
- Do Not Attempt Cardiopulmonary Resuscitation (DNACPR) documentation (if applicable)
- Autopsy report (if applicable)
- End of life care pathway (if applicable)
- Discharge summaries

Peer review of the case notes and data

A multidisciplinary group of case reviewers was recruited for the peer review process. This group comprised clinicians from the following specialties: surgeons, anaesthetists, intensivists, diabetologists, acute physicians, diabetes specialist nurses, pre-operative assessment nurses, dietitians, pharmacists and perioperative physicians. All questionnaires and case notes were anonymised by the non-clinical staff at NCEPOD. All patient identifiers were removed so neither Clinical Co-ordinators at NCEPOD, nor the reviewers, had access to patient identifiable information.

Once each case was anonymised it was reviewed by one reviewer as part of a multidisciplinary group. At regular intervals throughout the meeting, the Clinical Co-ordinator chairing the meeting allowed a period of discussion for each reviewer to summarise their case and ask for opinion from other specialties or raise aspects of the case for discussion. Using a semi-structured assessment form, case reviewers provided both quantitative and qualitative responses on the case that had been provided.

Throughout the reviewer assessment form, where the reviewers felt that there was insufficient information available in the case note extracts present to make a judgment decision, there was the option to select 'insufficient data'.

The grading system below was used by the reviewers to evaluate the overall care that each patient received:

Good practice – a standard that you would accept for yourself, your trainees and your institution
Room for improvement – aspects of **clinical** care that could have been better
Room for improvement – aspects of **organisational** care that could have been better
Room for improvement – aspects of both **clinical and organisational** care that could have been better
Less than satisfactory – several aspects of clinical and/or organisational care that were well below satisfactory
Insufficient information – too few case notes submitted to assess the quality of care

Information governance

All data received and handled by NCEPOD complies with all relevant national requirements, including the Data Protection Act (DPA) 1998 at the time of collection, and now the General Data Protection Regulation 2016 (Z5442652), the NHS Act 2006 (PIAG 4-08(b)/2003, App No 077) and the NHS Code of Practice.

Quality and confidentiality

Each case reviewed was given a unique NCEPOD number so that cases could not easily be linked to a hospital.

Prior to any analysis, the data were cleaned to ensure that there were no duplicate records and that erroneous data had not been entered during scanning.

Data analysis

Following cleaning of the quantitative data, descriptive data summaries were produced. The qualitative data collected from the Reviewers' opinions and free text answers in the clinician questionnaires were coded, where applicable, according to content to allow quantitative analysis. The data were reviewed by NCEPOD Clinical Co-ordinators, a Clinical Researcher and a Researcher to identify the nature and frequency of recurring themes.

Case studies have been used to illustrate particular themes and are developed from multiple similar cases.

All data were analysed using Microsoft Access and Excel by the research staff at NCEPOD.

The findings of the report were reviewed by the Study Advisory Group, Reviewers, NCEPOD Steering Group including Clinical Co-ordinators, Trustees and Lay Representatives prior to publication.

Where guidelines were in place, that care could be assessed against, these have been highlighted in boxes throughout the report.

Data returns

In total 12,104 patients were identified as meeting the study inclusion criteria (Figure 1.1). When the sampling criteria of up to 8 cases per hospital and the ratio of 4 emergency and 4 elective cases, comprising 2 type 1 diabetes, and 2 type 2 diabetes cases was applied, 1,724 cases were identified randomly from each subgroup for inclusion in the main data collection. A large number of cases (466) were subsequently excluded for not meeting the inclusion criteria. A total of 821/1,278 (64.2%) of surgical questionnaires, 860/1,278 (67.3%) of anaesthetic questionnaires and 509 sets of case notes were returned to NCEPOD.

Within this study the denominator will change for each chapter and occasionally within each chapter. This is because data have been taken from different sources depending on the analysis required. For example, in some cases the data presented will be a total from a question taken from a clinician questionnaire only, whereas some analysis may have required a clinician questionnaire and the case reviewer's view taken from the case notes. The term 'clinician' is used to refer to data obtained from the clinicians responsible for that patient's care and the term 'reviewer' used to refer to data obtained from the multidisciplinary group who undertook the peer review of case notes.

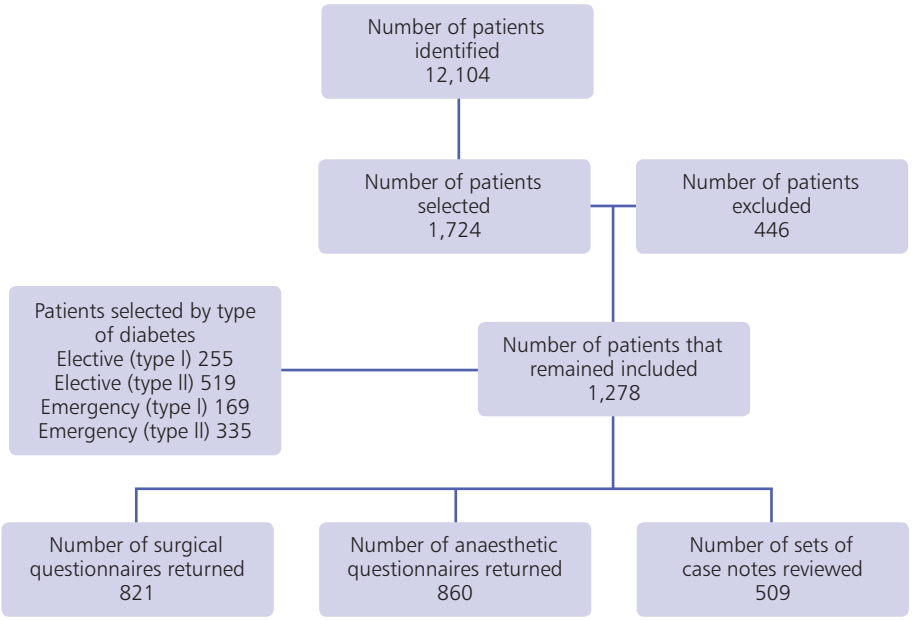

Figure 1.1 Data returns

Key findings

Organisation of services

1. 21.3% (69/324) of hospitals did not have a day surgery unit or standalone day surgery unit
2. 60.2% (142/236) of hospitals with a day surgery unit had a clinical lead or director of the day surgery unit
3. 57.5% (134/233) of hospitals with a day surgery unit had a dedicated pre-operative assessment clinic
4. 54.6% (166/304) of hospitals had a policy stating that all investigations should be performed during a single pre-operative assessment clinic visit
5. 43.4% (132/304) of pre-operative assessment clinics did not have a specific policy for management of diabetes patients undergoing surgery. Those that did varied with regards to the involvement of wider multidisciplinary team members
6. 83.8% (160/191) of hospitals where emergency surgery was performed, had a co-ordinator for emergency theatre bookings
7. 21.8% (41/188) of hospitals where emergency surgery was performed had no system for confirming that relevant investigations and resuscitation had been completed and that the patient was fit for surgery
8. 20.6% (40/194) of hospitals where emergency surgery was performed had no system for determining the clinical priority of emergency patients
9. 90.9% (288/317) of hospitals had a hospital policy or guideline on managing operating lists of which 258/282 (91.5%) stated patients with diabetes should be prioritised early on the morning or afternoon theatre list
10. 16.1% (38/236) of hospitals had no policy for selecting patients for day surgery
11. 9.1% (18/198) of hospitals with a selection policy for day surgery excluded patients with diabetes from day surgery treatment
12. 93.6% (295/315) of hospitals had protocols for recognition and management of hypoglycaemia and hyperglycaemia
13. 9.3% (30/321) of hospitals did not have a protocol for the perioperative management of diabetes patients
14. 33.2% (102/307) of hospitals where elective surgery was performed and 16.1% (31/193) of hospitals where emergency surgery was performed had no routine use of risk scoring systems prior to surgery
15. 28.0% (87/311) of hospitals had a named clinical lead for perioperative diabetes
16. 63.3% (200/316) of hospitals used a proforma for the management of patients with diabetes undergoing surgery
17. 69.6% (224/322) of hospitals used paper-based systems to prescribe insulin
18. 8.7% (28/321) of hospitals did not have a protocol or guideline for the use of VRIII and there was variability in protocols in those who did
19. Follow-up arrangements following changes to medication for patients with diabetes undergoing surgery were extremely variable
20. 24.8% (76/306) of hospitals reported conducting an audit of perioperative diabetes management
21. 76% (239/313) of hospitals took part in enhanced recovery programmes, 50% (113/225) of these had no guidance for patients with diabetes.

Study population

22. Patients in the study had mean age of 69 with equal ratio of male and female patients
23. 23% (114/491) of patients in this study had type 1 diabetes and 75% (370/491) had type 2 diabetes
24. The median age of patients in the study with type 1 diabetes was 54 years and type 2 was 72 years
25. 41% (199/483) of all patient in the study were taking insulin of which 24% (85/354) were patients with type 2 diabetes
26. 70% (249/354) of type 2 patients were taking a form of oral diabetes medication
27. 38.6% (194/502) patients in the study were vulnerable or frail at admission
28. 56% (280/498) of admissions were elective while 44% (218/498) were non-elective
29. There were more type 1 than type 2 patients (9/113; 8% vs 9/359; 2.5%) admitted non-electively who were already on the elective waiting list.

Pre-operative referral and assessment

30. 41% (83/202) of referral letters had no information provided on the management of the patient's diabetes in the community
31. 57% (144/253) of elective referrals in this study were made from general practitioners
32. The recording of co-morbidities (90/118; 76%) and current medication (98/118; 84%) were frequently provided, although evidence of regular blood sugar was only available in 22.0% (26/118) blood pressure measurement in 35.6% (42/118), urgency of referral in 21.2% (25/118) and body mass index (BMI) in 37.3% (44/118)
33. 8.3% (18/218) of patients admitted non-electively were on an elective list for surgery
34. 52.3% (227/434) of referral letters had no information on the management of the patient's diabetes in the community
35. Where information was provided in the referral letter, HbA1c within the previous three months was provided in only 50/118 (42%)
36. 86.7% (228/263) of elective patients attended a pre-operative assessment clinic
37. 9.9% (20/203) of patients were not seen by all appropriate staff, most commonly diabetes specialist nurse, in the opinion of the reviewers
38. 47.1% (88/187) of patients had no documented specific instructions on management of their diabetes prior to surgery
39. 70.2% (120/171) of case notes had no documented evidence that the patient was included in their diabetes plan
40. 65% (128/198) of patients had an HbA1c within 3 months prior to surgery
41. 16.1% (38/236) of patients whose HbA1c was checked were outside of the accepted range for elective surgery
42. 12.9% (34/229) of elective patients had their surgery cancelled on a previous occasion.

Inpatient care

43. There was a delay to consultant review in only 30/411 (7.3%) of patients
44. Case reviewers felt that inadequate medicines reconciliation by medical staff occurred in 59/379 (15.6%) patients and by a pharmacist in 163/255 (24.7%)
45. 9.9% (26/262) of elective surgical patients were commenced on a VRIII on admission
46. Prolonged starvation resulted in a change in diabetes management in 9.6% (42/439) of patients, including the use of a VRIII in 35 patients of which reviewers felt 2/3 were avoidable
47. Diabetes team were consulted pre-operatively in 15/265 (5.7%) of elective and 38/211 (18.0%) of non-elective patients
48. 13.6% (54/398) of patients who were not reviewed by diabetes team should have been
49. 55.5% (221/399) of patients had a MUST score on hospital admission
50. 18.1% (66/364) of patients had an inadequate nutritional assessment
51. Reviewers felt 75 patients should have been seen by a diabetes specialist nurse and 23 by a consultant diabetologist but were not
52. 6.4% (30/472) patients did not have a pre-operative assessment of risk
53. 96.6% (420/435) of patients were assessed using an ASA score
54. 15.5% (76/491) of patients experiences a delay in their surgery. Theatre availability and co-morbid conditions were the most common cause whilst poor glycaemic control was the least common factor for delays
55. 98.2% (466/475) of patients were assessed by an anaesthetist on the day of surgery
56. 14.5% (64/440) of patients did not have an adequate anaesthetic assessment on the day of surgery in the opinion of case reviewers. The most common reason for this opinion was the lack of a documented diabetes management plan (51/64 patients).

Intraoperative care

57. 59.8% (274/458) of patients did not have a clear plan for the management of the patient's diabetes on the day of surgery recorded
58. 12.4% (55/445) of patients did not have diabetes medications documented on the day of surgery
59. 14.7% (51/348) of case reviewers were of the opinion that diabetes medicines were not managed appropriately
60. A surgical safety checklist was used for 432/445 (97.1%) patients. Diabetes management was not included in 114/378 (30.2%) cases
61. If diabetes was mentioned on the surgical safety checklist then capillary blood glucose measurements were more likely to be undertaken (141/240; 58.8% vs 54/109; 49.5%) during the operation
62. Including diabetes in the surgical safety checklist was associated with more appropriate management of diabetes in the theatre recovery area 182/216 (84.3%) vs 65/102 (63.7%)
63. Case reviewers found that methods to reduce post-operative nausea and vomiting were not appropriate in 66/438 (15.1%) cases
64. 24.1% (114/473) patients had VRIII was started intra-operatively
65. Case reviewers were of the opinion that VRIII was used inappropriately in 18.5% (20/108) of patients
66. 46.9% (212/452) of patients did not have capillary blood glucose recorded intra-operatively
67. In the intra-operative period, hypoglycaemia occurred in 19 and hyperglycaemia in 6 patients. No cases of DKA or HHS were recorded
68. Of the 19 patients who developed intra-operative hypoglycaemia 11 were on a VRIII
69. 19.4% (90/465) of patients were not scheduled appropriately for their surgery in the opinion of the case reviewers.

Post-operative care

70. 13.8% (59/426) of patients did not have their capillary blood glucose levels measured in the theatre recovery area
71. 21.2% (86/406) of patients did not have their blood glucose managed appropriately in the post-operative period, in the opinion of the case reviewers
72. The post-operative clinical area was inappropriate in 19/503 (3.8%) of cases reviewed in the opinion of the case reviewers
73. Diabetes was not managed by all the appropriate staff in 77/464 (16.6%) patients, in the opinion of the case reviewers. Early involvement of a diabetes specialist nurse would have been beneficial in a majority of these patients (44) in the opinion of the case reviewers
74. Adequate discharge arrangements were not made for the patient's diabetes care in 78/390 (20.0%) patients, in the opinion of the case reviewers.

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