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Editor-in-Chief's note

In light of the above points, and the importance of these issues with respect to patient safety, the journal *Anaesthesia* will insist that authors/investigators follow the above consensus on airway research ethics (CARE) when undertaking any airway studies submitted for publication in *Anaesthesia*. This will be added to our Author Guidelines (available at http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-2044/homepage/ForAuthors.html).

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Editorial

Pre-operative testing guidelines: a NICE try but not enough

After a gap of thirteen years, the UK National Institute for Health and Care Excellence (NICE) has recently updated the guidance on pre-operative testing for patients aged over 16 years who are having elective surgery [1]. The issue of what constitutes an 'appropriate' pre-operative test has been the subject of much debate, with two opposing views often championed. On one side is the drive to undertake whatever tests an individual anaesthetist feels are necessary in order to provide the optimal peri-operative care that permits the fastest recovery with the minimum risk. However, the difficulty in identifying the relevant anaesthetist in advance and therefore predicting exactly what this may constitute, resulted in many tests being done as a routine, with the concern that omission of investigations may result in cancellation on the day of surgery. The counter-argument takes the polar opposite view, stating that as a few tests as possible should be done, in order to avoid delays in surgery, to prevent unnecessary invasive procedures for patients and to reduce associated healthcare costs. The latter point is under particular scrutiny in the

current financial climate; by only doing blood tests which are specified indicated (rather than as part of a routine), laboratory costs can be reduced by 90% [2]. With around 10 million procedures being performed annually in the UK, any reduction in the associated costs could have huge financial implications. This lack of consensus, in tandem with inter-individual variation amongst anaesthetists in their requirements for pre-operative investigations [3, 4], has meant that a large number of tests (which have a low probability of altering perioperative management) are still undertaken in low-risk patients [5, 6] despite national guidelines in the UK and USA [3, 7].

There several factors at an individual level which contribute to the requesting of investigations that are not indicated [4, 8, 9]. These include: medicolegal concerns and the fear of litigation in the event of an operative complication; the belief that a clinician other than themselves would require the test(s) with the subsequent risk of cancellation; institutional guidelines that are in conflict with national recommendations; and clinician inexperience. Given this challenge, the update and revision of NICE guidance of the topic is welcomed. There are aspects of the guidelines, however, that warrant some discussion.

Categorisation

The previous NICE guidelines on pre-operative testing were notable in their complexity, especially when it came to the ordering of blood tests such as full blood count or urea and electrolytes. These have been replaced with a simpler algorithm, based on the complexity of intended surgery and ASA physical status classification. However, the correct allocation of patients into these categories actually poses a significant challenge to the pre-operative assessment team. The NICE guideline stratifies the surgical complexity into minor, intermediate or major/complex, but, beyond a limited number of examples, does not provide a reference source for this classification. Many pre-operative clinics may choose to use the Clinical Coding and Schedule Development (CCSD) Group resource, especially as pre-operative assessment is now increasingly led by nurse practitioners [10] or by patient self-completion using electronic programs [11]. This could result in difficulties in accurately classifying the magnitude of the surgery for an individual patient and may lead to procedures such as laparoscopic cholecystectomy, anterior cruciate ligament repair and lumbar microdiscectomy being classified as major procedures. This would necessitate a full blood count and, if the patient is not ASA 1, urea and electrolytes and an ECG; this is despite the fact that all these surgeries are increasing done as a day-case procedure, and often in younger patients.

The difficulty in correctly assigning the surgical complexity is mirrored by the challenge of ASA physical status allocation. Several studies have demonstrated that inter-rater reliability in assignment of ASA class is only moderate at best, with kappa values ranging from 0.21 to 0.53 [12–14]. This is important in the context of the updated NICE guidelines, as a greater number of investigations are recommended with increasing ASA status class. Should the anaesthetist allocate the patient a higher ASA class than that assigned during the pre-operative assessment, then inadequate investigations may have been done, with the potential for delays in surgery or cancellation. Sankar et al. [14] compared the ASA classification assigned during pre-operative assessment with that determined on the day of surgery in a cohort of 10,864 patients. The day of surgery ASA class only agreed with the pre-operative ASA class in 47% of cases, with 44% and 9% of cases changed to ASA 2 and 3, respectively. Similarly, in those patients given a pre-operative ASA class of 2, there was only 62% agreement on the day of surgery with 33% being moved to ASA 3. However, the anaesthetists in this study received financial premiums for anaesthetising ASA 3 and ASA 4 patients, which may have resulted in a tendency for patients to be given a higher ASA classification. In a study of hospitals in France and Canada, 1554 blinded anaesthetic records were re-assessed for ASA classification [12]. In this cohort, there was agreement in 75% and 58% of the ASA 1 and 2 patients respectively, with 25% of the ASA 1 group and 17% of the ASA 2 group subsequently given a higher classification. Computer models are now being developed that are capable of allocating a patient's ASA classification with over 90% accuracy [15]. However, until such programs are routinely used in clinical practice,

there will continue to be a wide variation in ASA assignments by individual anaesthetists, with the knock-on effect of disagreement regarding what pre-operative investigations are necessary.

Diabetes

Another notable revision in the guidelines relates to the management of patients with diabetes. It is now recommended that glycated haemoglobin (HbA1C), which is a measure of glycaemic control over the preceding 3 months, should be 'offered to people with diabetes having surgery if they have not been tested in the last 3 months'. However, in our opinion, this guidance fails to take into account the most up-to-date literature on perioperative outcomes in patients with hyperglycaemia.

When considering pre-operative glycaemic control, it is important that a distinction should be made between patients known to have diabetes and those who have non-diabetic hyperglycaemia. Diabetes can be defined as a fasting glucose value of greater than 7.0 mmol.l^{-1} on one occasion if symptoms of hyperglycaemia are present; or on two occasions if the individual is asymptomatic. Diabetes can also be defined by a glycated haemoglobin (HbA1c) value of > 48 mmol.mol^{-1} (6.5%). Pre-diabetes is defined as an HbA1C of between 42 mmol.mol^{-1} and 47 mmol.mol^{-1} (6.0–6.4%), and glucose levels may also be high. Thus, the vast majority of patients who are not known to have diabetes will not have had a pre-operative HbA1c measured, and if they are asymptomatic, may have only had a single glucose value measured. If they had a random glucose value of > 11.1 mmol.l^{-1}, that is also diagnostic of diabetes. Thus, if an asymptomatic individual had a single high glucose reading either pre- or postoperatively it would be classed as 'non-diabetic hyperglycaemia'. If it is picked up pre-operatively, further investigations should be carried out. These would usually be a fasting glucose and an HbA1c. This is to see if the raised glucose is long standing (the HbA1c will be raised) or if it is more likely to be an acute episode of transient hyperglycaemia (the HbA1c may be normal). If the HbA1c is raised, the decision to proceed with the planned operation depends on the value, if it is > 69 mmol.mol^{-1} (8.5%) then there are data to show that the rate of postoperative complications rises, and thus this is the threshold above which elective operations should be cancelled, where safe to do so, and the diabetes brought under better control either by the primary care team or a secondary care specialist diabetes team [16].

Based on HbA1c data, Public Health England currently estimates that the prevalence of non-diabetic hyperglycaemia in the general population is 10.7% (95% CI 10.2–11.1%); the prevalence of undiagnosed diabetes is 2.3% (95% CI 2.1–2.6%); and the prevalence of diagnosed diabetes is 5.2% (95% CI 4.9–5.5%) [17]. The distinction between diabetes and non-diabetic hyperglycaemia is important because there are a lot of data to show that that high glucose levels pre- and post-operatively are associated with poor outcomes [16], and that a pre-operative diagnosis of diabetes may be protective [18]. There are also data to show that high blood glucose levels are associated with harm [18, 19]. In an observational cohort study of 3184 patients, it was shown that, in individuals who had diabetes, the risk of harm was doubled when glucose levels were high (> 16 mmol.mol^{-1}), but that in people who had non-diabetic hyperglycaemia and were not known to have diabetes, the risk of harm at 30 days postoperatively was 13-fold higher when pre-operative glucose levels were equally high [19]. This risk rose to 45-fold higher when postoperative glucose levels were > 16 mmol.mol^{-1}. These latter data were not statistically significant due to the small numbers of patients in this category, but did show a strong trend. In the data from Kwon et al., which was another large observational study (n = 11,633), patients who had diabetes were at half the risk of poor surgical outcomes when compared to those with normal glucose levels, but those who had high perioperative glucose levels and were not known to have diabetes preoperatively were at twice the risk of having poor outcomes compared to those with normal glucose levels [18]. However, these are observational data from the United States where the healthcare system there is very different and the patient population is also different from other parts of the world. In the study from Frisch et al., a large proportion of these individuals had emergency surgery, and therefore were unlike the vast majority of surgical

patients in the UK where patients are usually seen by their primary care physician (GP) and referred for elective surgery to the secondary care team [19]. Thus, far fewer people in the UK are likely to have the 'stress hyperglycaemia' associated with the physiological trespass of acute illness than maybe seen in an American cohort [20].

Pre-optimisation

There are very few interventional data in this area (other than in cardiac surgery) which show that improving diabetes control makes a difference to outcomes. Indeed, the most recent data looked at those patients who had tight glycaemic control intra-operatively during cardiac surgery [21, 22]. They showed that it was those people who did not have diabetes preoperatively who benefited the most. Indeed, those people who were known to have diabetes, did not benefit at all.

If NICE were to advocate that those at greatest risk of undiagnosed hyperglycaemia should be tested prior to having an operation, where should this be done? Should primary care teams be responsible for identifying the condition and then acting on the result, knowing that otherwise their patients could come to harm should they have hyperglycaemia? This approach would be preferable to the patient getting through surgical outpatients and then having their hyperglycaemia identified in the pre-operative assessment clinic a few days before their procedure which would then need to be postponed until the hyperglycaemia was brought under control. The same is true for other pre-operative blood tests, such as full blood count or urea and electrolytes, which in line with the principles of 'fit for referral' should be checked and, where necessary, abnormalities investigated and managed, prior to referral for surgery.

The need for optimisation before referral for surgery is of particular importance with respect to anaemia. Approximately one-third of patients will be found to be anaemic during pre-operative assessment, and this an independent risk factor for numerous adverse outcomes including increased length of stay, increased incidence of complications and worse overall outcome [23]. These risks may be even greater in patients undergoing cardiac surgery, with anaemia in this cohort being associated with an increase in post-operative mortality [24]. In order to allow adequate time for the investigation and management of anaemia (without the need for transfusion of red cells), it is recommended that anaemia is detected at least 30 days before surgery where significant blood loss is likely [25]. Given that patients often attend pre-operative assessment only a short time before the scheduled date for surgery, the window for optimisation may be somewhat limited. The situation could have been improved had the NICE guidance suggested that the haemoglobin concentration should be checked (and if abnormal, investigation/treatment instituted) in primary care *before* referral for major elective surgery, with the result enclosed with the surgical referral letter. The need for the optimisation of conditions in primary care has been highlighted by the recent guidance on the management of hypertension before elective surgery [26], and this practice is likely to become more commonplace in the future.

Thus, whilst the updated NICE guidelines are a welcome update, they have missed a trick. If the number of people with undiagnosed non-diabetic hyperglycaemia is almost double the number of people known to have diabetes, and if those with non-diabetic hyperglycaemia come to the greatest harm in the peri-operative period, should the guidance not be focused on identifying those for whom the most can be done to potentially prevent harm? The lack of focus to many aspects of the guidelines may result in greater confusion as to who should undertake pre-operative investigations, what investigations are necessary in what patient groups, and at what time should these be done. A greater proportion of pre-operative investigations will be undertaken without direct anaesthetic input, such as in primary care or by nurse-led clinics, which will present a number of challenges in ensuring that patients arrive for surgery fully optimised in order to minimise their peri-operative risks. Unfortunately, the updated NICE guidelines may ultimately heighten, rather than attenuate, the difficulties faced by peri-operative physicians.

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