

EDITORIALS

Auditing the national audit projects: impact and implementation

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The Royal College of Anaesthetists' National Audit Project (NAP) programme has been running since 2003. The foci of the last four NAP projects have been: major complications of central neuraxial blocks (NAP3)¹; airway management related serious adverse events in the operating theatre, emergency department, or ICU (NAP4)^{2,3}; awareness during intended general anaesthesia (NAP5)⁴; and life-threatening perioperative anaphylaxis (NAP6).^{5–10} An important feature of the NAPs has been the extensive engagement of anaesthetists throughout the UK (and Ireland in the case of NAP5), and the promotion of multidisciplinary and cross-organisational collaborations.¹¹

Towards the end of the last millennium, a strong emphasis emerged in the UK on the conduct of clinical audit projects in medical practice. This focus on audit was occurring concurrently with major structural changes in medical training programs, under the banner of Calman and other reforms.¹² With shorter training duration, decreased work hours, and increased stress on obtaining specific clinical competencies, many trainees chose to demonstrate scholarship by conducting well-circumscribed and modest audit projects rather than more challenging, expensive, and time consuming clinical research. At the time, Wilson and colleagues¹³ suggested that the motivations and the objectives of a project could help to distinguish audit from research. They proposed that 'audit has the objective of directly improving services against a standard; research may include the objective of defining best

practice.'¹³ This assumed that there was a clear dichotomy between audit and research. But it is probably more helpful to view rigorous audit on the spectrum of translational research, which encompasses a continuum from the basic science laboratory to population health (Fig. 1). The processes of audit and feedback span the disciplines of observational research and implementation science, and when successful, assist clinicians in incorporating evidence-based medicine into their practice.¹⁴

Audit is part of a broader quality improvement process seeking to improve patient care and outcomes through scrupulously assessing the existing care against established knowledge and best practice, and then implementing evidence-based changes.¹⁵ To confirm the success of the audit process, it is necessary to close the loop by re-auditing in order to corroborate that the recommended changes have indeed been implemented. The process of audit is a fundamental aspect of the work of the National Institute for Health and Care Excellence (NICE), which was established in the UK in 1999. NICE has as its core mission the improvement of outcomes for people using the NHS and other public health and social care services. This is achieved through: (i) producing evidence-based guidance; (ii) development of quality standards and performance metrics; and (iii) provision of information services.¹⁶

It was within this historical context that the Royal College of Anaesthetists embarked on its groundbreaking NAP

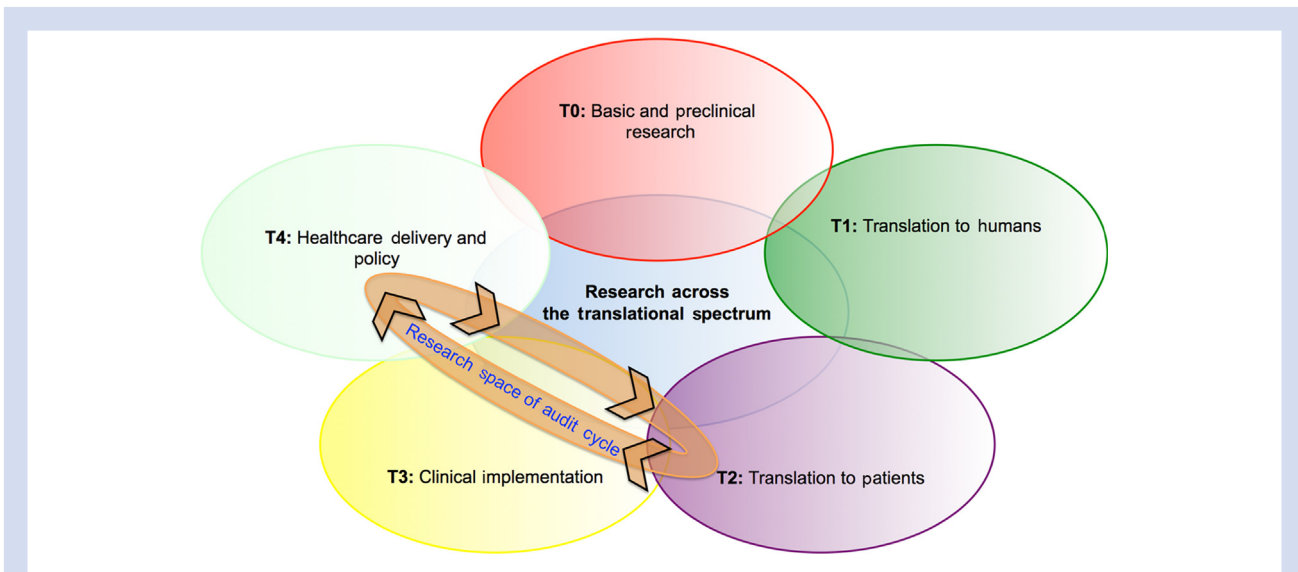


Fig 1. Research across the translational spectrum. There has often been a false conceptual dichotomy between research and audit. Rigorous audit is under the umbrella of research, and falls within T2–T4 translational space. High quality surveys and observational studies reside in T2 space. Dissemination of findings and implementation of recommendations arising from the audit process belong in T3 space. Formulation of national guidelines and establishment of new standards of care occupy territory in T4. Also depicted in the figure is the necessity of closing the loop that should occur in a comprehensive audit process.

programme. These projects have had substantial positive impact on the international anaesthesiology community and are widely regarded as yardsticks of excellence in the auditing process. For the last four NAPs, three general processes were conducted.¹¹ First, a baseline national survey was sent to all anaesthetists in the UK to establish practices and knowledge. This step had an important benchmarking role. The second component was an activity survey, usually conducted over about a week. This process was used to characterise contemporary practice, and also to estimate through extrapolation the number of procedures of interest (e.g. general anaesthetics, central neuraxial blocks) conducted annually in the UK. Finally the NAPs required a high-fidelity procedure for establishing a national registry. Through this process, data regarding rare events were collected, typically over a year. In each of the NAPs there was an analysis of all the reported cases, and recommendations were made based on expert consensus. These recommendations have typically been targeted at individual clinicians, at departments, at hospitals or trusts, and at national bodies and organisations.¹¹

In this issue of the *British Journal of Anaesthesia*, based on the activity survey of NAP6, Kemp and colleagues⁶ report on key features of anaesthetic workload and practices throughout the UK in 2016. Reassuringly, the majority of all cases (88.7%) were under the direct care of a consultant or career grade anaesthetist, with a modest reduction on Saturday (80.5%) and Sunday (65.9%). Some comparisons were made with an earlier activity survey done in 2013.¹⁷ Two interesting findings stand out: (i) the use of ‘depth of anaesthesia’ monitoring increased from 2.8% (2013) to 12.0% (2016); and (ii) neuromuscular monitoring using peripheral nerve stimulators (which only provide subjective assessment of the response to train-of-four stimulation) was effectively unchanged at 38.0% (2013) and 36.7% (2016) for general anaesthesia cases where non-depolarising neuromuscular blocking drugs were administered. A notable discovery in the NAP6 activity survey was that

quantitative neuromuscular monitoring, which measures the train-of-four ratio, was used in a mere 2.8% of these cases.⁶ This is discordant with the recent recommendations of an international panel of experts that quantitative (objective) neuromuscular monitoring should be used in *all* cases where non-depolarising neuromuscular blocking drugs are administered.¹⁸ Why are these findings of such relevance? Based on NAP5, many recommendations were aimed at reducing the risk of accidental awareness during intended general anaesthesia. Although there was no strong guidance to use ‘depth of anaesthesia’ monitoring in all patients who received neuromuscular blocking drugs during general anaesthesia, there was support for such use in patients deemed to be at increased risk of awareness. This included those patients undergoing total i.v. anaesthesia, cardiac surgery, or Caesarean section under general anaesthesia. NAP5 also highlighted the importance of neuromuscular monitoring in order to minimise periods of neuromuscular block and to avoid residual blockade at the end of surgery. However, NAP5 did not stress the need for objective neuromuscular monitoring in all patients who receive a non-depolarising neuromuscular blocking drug, as subsequent consensus guidelines have advocated.¹⁸ Based on the NAP5 proposals and international expert sentiments,¹⁸ current use of these key anaesthesia safety monitors in the UK is disappointing. Why is there a failure of implementation of at least some of the previous NAP recommendations?

There are inherent assumptions and potential limitations associated with the audit process in general (Fig. 2) and NAPs specifically, which can curtail impact and importance. Most germane is that the knowledge generating components of audit are at their core observational studies, often with a before-and-after approach. They are, therefore, intrinsically vulnerable to many of the biases that can affect such research.¹⁹ For example, there are ongoing controversies surrounding risk factors for awareness and best approaches to its prevention.²⁰ Unsurprisingly, there is often limited or

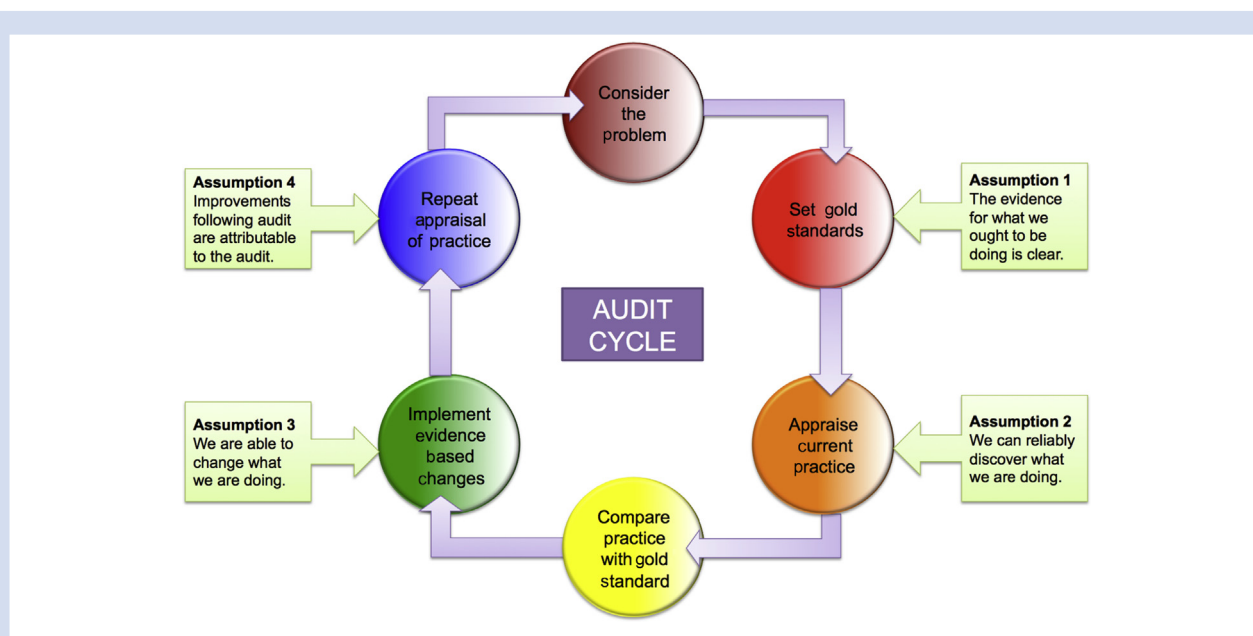


Fig 2. The key components of a rigorous audit process. Some of the assumptions regarding audit are also shown. If these assumptions are not valid in relation to a particular audit project, the impact and importance of the audit could be reduced.

Table 1 Hypothetical approaches to improving the effectiveness of audit and feedback (modified from Colquhoun and colleagues¹⁴)

Themes	Elaboration
A. Related to the recipient (e.g. the clinician, the trust, the department)	
Credibility	Based on high quality evidence
Motivation	Incentives and positive reinforcement
Benchmarking	Comparison with relevant colleagues or organisations
Prioritisation	Targeted at behaviours viewed as professionally important
Constructive message	Reassuring to self-identity
Engaging	Attract and maintain attention
Agency	The recipient (stakeholder) retains control of the intervention
B. Related to the intervention	
Enabling	Remove barriers to implementation
Simplicity	Interventions that do not disrupt established routines
Well-conceived	Designed with an understanding of the implementation process
C. Related to the content of audit and feedback	
Cognitive load	Targeted and parsimonious interventions
Comparisons	Presentations of comparisons relevant to contexts or individuals
Action plans	Provision of information regarding how to change behaviour
Feedback specificity	Provision of feedback specific to clinician, patient, or context
Goal oriented	Setting specific, evaluable, and achievable goals
Justification	Provision of evidence-based material supporting intervention
Cognitive influences	Emphasis on what needs to be achieved
Nature of the data	Effective and accessible graphic representations
Guide reflection	Personal reflection component
Improving memory	Presented in real time and incorporating an emotional message
C. Related to the delivery of audit and feedback	
Timing	Data presented repeatedly and at times of decision making
Social engagement	Engaging stakeholders in discussion regarding the audit
Learning	Promotes education of the stakeholder
User-guided experience	Allow the stakeholder to access information <i>ad lib</i>
In-person	Provided by a human rather than impersonally
Provision for feedback	Encourage feedback regarding (non) compliance with audit
D. Other	
Opportunity costs	No perceived personal costs or downsides to implementation
Environment	The environment is supportive of the process
Stakeholder engagement	Stakeholders are involved in design and implementation
Publicise	Audit and goals are disseminated publically
Multimodal communication	Multiple modes of information transfer are used

contested evidence regarding many clinical practices, which might hamper the ability of an audit to make compelling recommendations. Expert consensus is required, but it could be viewed as a deficient basis for driving healthcare policy when existing evidence is inadequate. As Moppett²¹ has suggested, consideration could be given in future NAPs to providing details regarding the evidential strength upon which expert judgements are based. Pragmatic clinical trials are needed to bolster the evidence on which authoritative opinion and practice guidelines depend.^{22,23} It is essential that experts participating in NAPs have extensive knowledge regarding the topic of each audit, and that they are able to assess and integrate the evidence accurately in clear and concise guidelines.

The reliability of data collection in NAPs depends on the willingness of clinicians to report their complications and possibly errors, albeit anonymously. It is likely that even with the collaborative and 'safe' NAP process, underreporting would occur to some extent.^{21,24–26} Furthermore, even if we can identify rare complications through an extensive audit process, it does not automatically follow that we can intervene to impact incidence or outcome. It is tempting to attribute advances after an audit to the audit process. However, improvements in healthcare and health outcomes are often simply reflective of secular trends. When such changes are coincidentally identified after an audit, crediting the audit with the improvements could represent a *post hoc ergo propter hoc* misattribution fallacy. For example, the incidence of failed tracheal intubation was examined in a large US surgical population between 2002 and 2015, and decreased substantially and consistently over this period.²⁷ It is likely that there would similarly have been progress in successful airway management in the UK over this period of time, regardless of whether or not NAP4 had taken place. Therefore, successes that have occurred in recent years regarding airway management in the UK might, at least partly, be falsely ascribed to NAP4.

The process of audit as a driver of quality improvement has been enthusiastically embraced in the UK, but there has not been similar incorporation of audit into the culture of most other healthcare systems. In part, this might reflect that the NHS environment in the UK is conducive to such collaborative and wide-ranging projects. In contrast, it is often not feasible to conduct similar ambitious and comprehensive audit projects in other countries. Some have questioned whether there is compelling evidence that the audit process actually improves care or patient outcomes.²⁸ Notwithstanding this important reservation, NAPs represent the very best of audit in several respects. It could be argued that an extensive (national) audit process is the only practical approach to conducting research into very rare but relevant complications, and to generate sensible recommendations based on the resulting large numbers of identified cases.¹¹ The involvement of the overwhelming majority of a country's anaesthetists (or any group of clinicians) in an audit project is impressive, and likely unprecedented. This comprehensive penetration and stakeholder engagement increases the probability that recommendations will be adopted.¹⁴ Table 1 summarises a theoretical framework that was developed to suggest how the process of audit and feedback might be systematically improved.¹⁴

We congratulate the architects of the NAPs for their impressive scope, growth, and influence. Going forward, we suggest that there should be ongoing attempts to: (i) conduct

and participate in practical clinical trials, and, where possible, base NAP recommendations on rigorous evidence from such studies; (ii) further enhance the methodological rigour of future audit projects; and (iii) improve dissemination of findings and implementation of recommendations. Closing the loop through regular appraisal will boost the positive impact of the NAPs on patients and healthcare systems.

Authors' contributions

Contributed equally to writing this editorial: M.S.A., P.S.M.

Declaration of interest

M.S.A. and P.S.M. are both editors of the *British Journal of Anaesthesia*.

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Anaesthetic workload in the UK – room for expansion?

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In one of a series of articles in this issue of the *British Journal of Anaesthesia* reporting the 6th National Audit project (NAP6) initiated by the UK Royal College of Anaesthetists (RCOA), Kemp and colleagues¹ describe an observational study of

anaesthetic workload undertaken in National Health Service (NHS) hospitals – the NAP6 Activity Survey. The main purpose of trying to capture a 2-day sample of all episodes of care delivered by an anaesthetist (excluding routine sedation in intensive care) was to extrapolate denominator data for the whole year (2016) that were necessary to calculate the incidence of perioperative anaphylactic reactions. The NAP6