

Development of consensus-based standards for a National Clinical Audit of Perioperative Care: protocol for a modified Delphi consensus study

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BMJ Open Development of consensus-based standards for a National Clinical Audit of Perioperative Care: protocol for a modified Delphi consensus study

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ABSTRACT

Introduction Variation in perioperative care delivery and outcomes persists across healthcare systems, contributing to differences in patient experience, efficiency and outcomes. National clinical audits play a central role in benchmarking practice and supporting quality improvement. However, there is currently no unified, consensus-derived set of standards to underpin a comprehensive national audit of perioperative care across specialties in the UK. This proposed modified Delphi will develop a core set of standards to support benchmarking for the newly commissioned National Clinical Audit of Perioperative Care (NCAPC), aiming to reduce unwarranted variation and inform system-wide improvement in perioperative care.

Methods and analyses A rapid literature review has been undertaken to inform the identification of existing frameworks, standards and areas of variation from academic and grey literature, including National Health Service (NHS) and policy guidelines. Candidate standards have been refined through a quality standard mapping exercise by a multidisciplinary expert Clinical Reference Group, including patient representatives. Derived quality standards will be put forward for a multiround, national, web-based modified Delphi process that will be used to develop consensus-based perioperative audit standards. The Delphi will be conducted with two stakeholder panels: healthcare professionals involved in perioperative care and patients with lived experience of major surgery. Participants will rate standards using a 9-point Likert scale across at least two rounds. Predefined consensus criteria will determine progression and inclusion. A subsequent consensus meeting and expert Clinical Reference Group panel will refine and operationalise the final standards.

Quantitative data will be summarised descriptively, with consensus defined using a priori thresholds applied separately to stakeholder groups. Standards meeting consensus criteria will be prioritised based on high-importance ratings and aggregated across panels. Qualitative data will undergo inductive thematic analysis to inform iterative refinement. The final output will be a stakeholder-informed, consensus-derived set of

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study uses a structured rapid literature review and Delphi methodology to develop consensus-based perioperative quality standards informed by both academic and grey literature.
- ⇒ The Delphi incorporates multidisciplinary stakeholder engagement, including patient and public contributors, to enhance the relevance, face validity and applicability of the proposed framework across perioperative settings.
- ⇒ Inclusion of grey literature and professional guidance documents enables consideration of operational, organisational and policy perspectives that may not be fully represented in peer-reviewed literature.
- ⇒ As a rapid review, the search strategy is limited to English-language publications, selected UK guidelines and databases, which may have resulted in omission of relevant international literature or unpublished evidence.
- ⇒ The Delphi panel and stakeholder consultation are UK-based, which may limit transferability of findings to healthcare systems with different organisational, cultural or perioperative care structures.

measurable perioperative audit standards for national implementation within the English NHS.

Ethics and dissemination This study has been approved by the Faculty Research Ethics Committee at the University of Southampton (ERG0110645). Findings will be disseminated through peer-reviewed publications and presentations at national and international conferences. The final consensus-derived standards will be shared with key stakeholders, including the Royal Colleges and NHS England, to support implementation of the NCAPC that will impact NHS-wide perioperative medicine practice. Lay summaries will be developed with patient representatives to ensure accessible communication to the public.

Trial registration number This study has been prospectively registered with the Core Outcome Measures in Effectiveness trials (COMET) Initiative (registration number 3886—<https://www.comet-initiative.org/Studies/Details/3886>).

INTRODUCTION

High-quality perioperative care is fundamental to improving patient outcomes, reducing complications and optimising resource utilisation across surgical pathways.¹ Healthcare inequalities are a major and persistent challenge, with substantial variation in access to care, quality of treatment and clinical outcomes across populations defined by socio-economic status, geography and ethnicity.² National clinical audits play a central role in benchmarking practice, identifying and reducing unwarranted variation, and supporting quality improvement initiatives.^{3 4} Evidence from established national perioperative audits and quality improvement programmes, notably the National Emergency Laparotomy Audit (NELA) and the Perioperative Quality Improvement Programme (PQIP), have highlighted substantial variation in perioperative processes and outcomes between providers.^{5 6} These initiatives have also shown that national benchmarking, transparent reporting and structured quality improvement support can contribute to measurable improvements in care delivery and patient outcomes.

While existing programmes focus on specific surgical populations or clinical contexts, there is currently no unified national framework encompassing perioperative standards across specialties and care settings. The National Clinical Audit of Perioperative Care (NCAPC) has been established to provide a comprehensive, cross-pathway evaluation of perioperative practice across England and Jersey, supporting key improvement efforts across diverse surgical contexts. NCAPC will focus on major elective surgery, supporting benchmarking and identifying variation in provision of care in order to inform system-wide quality improvement intended to reduce unwarranted variation with the ultimate aim of improving patient outcomes and deliver high-quality perioperative care. NCAPC is a mandatory National Health Service England (NHSE) audit. The NCAPC is commissioned by the Healthcare Quality Improvement Partnership (HQIP) and funded by NHSE and the Governments of Jersey as part of the National Clinical Audit and Patient Outcomes Programme.

To fulfil these objectives, a clearly defined core set of audit quality standards is required. These standards should be clinically meaningful, measurable at scale within an audit infrastructure and acceptable to key stakeholders especially patients. For the purposes of this study, a quality standard is defined as a concise statement describing an aspect of perioperative care that represents high-quality practice and can be used as a benchmark for assessment and quality improvement. Quality standards should reflect multidisciplinary perspectives and align with contemporary perioperative care priorities to enable meaningful quality improvement nationally and locally. They may relate to structures, processes or outcomes of care. Candidate quality standards were derived from multiple sources through the rapid literature review detailed below. This included clinical

guidelines, consensus recommendations, quality indicators and quality-improvement frameworks. Recommendations and indicators identified from these sources were reviewed, consolidated and adapted into standardised candidate quality standards for prioritisation through the proposed Delphi process.

Consensus methodology, particularly the Delphi technique, is widely used in healthcare research to develop standards and core outcome sets.⁷ The Delphi process is intended to complement the existing evidence base and national recommendations by identifying priorities for measurement and quality improvement within the NHS, akin to the methodology used by the Standards in Perioperative Care (SAFEST) European consensus study.⁸ The Delphi approach proposed facilitates structured, iterative input from geographically dispersed and diverse stakeholder groups while maintaining anonymity, and promoting balanced multidisciplinary engagement.⁹ Stakeholder engagement in identifying priority areas improves subsequent engagement in using national clinical audit data for improvement activities, therefore a consensus process is a key step in overall collaborator engagement.¹⁰

This protocol describes the methodology for developing a consensus-derived core set of perioperative audit quality standards using a multi-round modified Delphi process. The resulting highest ranked standards will underpin the NCAPC framework and inform future quality improvement NHSE initiatives.

METHODS AND ANALYSES

Study design

This study has been designed and will be reported in accordance with Conducting, REporting DELphi Studies (CREDES) guidance,¹¹ the Core Outcome Measures in Effectiveness trials (COMET) handbook,⁷ Core Outcome Set-STandardised Protocol (COS-STAP) statement¹² and Core Outcome Set-STAndards for Development (COS-STAD) recommendations.¹³ This study has been prospectively registered with the COMET Initiative (registration number 3886—<https://www.comet-initiative.org/Studies/Details/3886>). This study was approved by the Faculty Research Ethics Committee at the University of Southampton (ERGO110645). Planned Delphi first round start date is May 2026, with projected data analyses end date of February 2027.

Stakeholders

Steering committee

A multidisciplinary steering committee comprising representation from surgery, anaesthesia, perioperative medicine, quality improvement, audit project management, research methodology and patient representation will oversee the design, conduct and reporting of the Delphi, ensuring methodological rigour and alignment with the objectives and governance requirements of the NCAPC.

The steering committee will be composed of nine members (acknowledged) and will be responsible for:

- ▶ Confirming the scope of the standards to be developed.
- ▶ Undertaking a rapid review to identify current standards and unmet needs.
- ▶ Developing and approving the initial list of candidate standards.
- ▶ Ensuring appropriate multidisciplinary and patient representation.
- ▶ Overseeing adherence to the predefined Delphi methodology.
- ▶ Reviewing Delphi findings and applying the a priori consensus criteria.
- ▶ Ratifying and finalising the agreed set of audit standards.
- ▶ Ensuring alignment with national audit and quality improvement priorities.

Stakeholders participating in the Delphi

Two distinct stakeholder panels will participate in the Delphi process: healthcare professionals and patient representatives. Healthcare professionals will be eligible if they are currently practising in roles relevant to perioperative care. Eligible professional disciplines include surgeons, anaesthetists, geriatricians/physicians, intensivists, nurses, pharmacists, physiotherapists, dietitians, exercise physiologists and psychologists. Patient representatives will be eligible if they have undergone major surgery and have direct lived experience of perioperative care within a surgical pathway. Participants must be able to review and respond to survey materials in English.

Sampling and recruitment

A pragmatic, multichannel recruitment strategy will be used to achieve broad multidisciplinary representation across UK perioperative services. The study will have a target sample of 50 participants per stakeholder panel. Recognising that no agreement on optimal sample size for Delphi studies exists, this target aligns with a meta-analysis of 31 Delphi studies, which reported a median panel size of 50.¹⁴

Healthcare professionals will be recruited through established national networks and professional bodies. The NCAPC team has existing professional relationships with the Royal College of Anaesthetists (RCoA), the Royal College of Surgeons England (RCSEng) and the Centre for Perioperative Care (CPOC), who have granted permission to distribute study invitations via relevant contact lists. Additional professional organisations (eg, surgical, nursing and allied health societies) will be asked to circulate electronic invitations containing a survey link.

Patients will be identified and approached via national professional and research organisations with established patient involvement networks, including the RCoA, CPOC, RCSEng and patient and public involvement and engagement networks within National Institute for Health and Care Research Biomedical Research Centres.

These organisations maintain databases of individuals who have expressed willingness to contribute to service development and research activities.

Information sources

A rapid review was undertaken to identify literature relevant to the conceptualisation of quality in perioperative care and to inform development of domains for the Delphi consensus procedures. This is currently unpublished. The rapid review methodology was informed by guidance from the Cochrane Rapid Reviews Methods Group and conceptual framework development methods.¹⁵ Search strategies were developed iteratively by the steering committee and have been adapted for each database using the appropriate controlled vocabulary (Medical Subject Headings (MeSH), CINAHL Headings and APA Thesaurus terms) and free-text keywords. Searches were limited to English-language publications published between 1 November 2010 and 30 November 2025. Electronic searches were conducted in MEDLINE (Ovid), CINAHL (EBSCOhost) and PsycINFO (Ovid) and can be found in online supplemental appendix 1. Searches combined controlled vocabulary terms and free-text keywords relating to perioperative care, surgical care, healthcare quality, patient safety, quality improvement, governance, communication, multidisciplinary working, organisational culture and shared decision-making.

An initial list of candidate perioperative quality standards was derived from a structured synthesis of multiple complementary information sources to ensure clinical relevance, policy alignment and feasibility for national audit implementation. Grey literature searches were undertaken to identify existing National Institute of Health and Care Excellence (NICE) perioperative standards in adults,¹⁶ quality frameworks indicators¹⁵ and guideline-recommended processes of care.¹⁷ Information sources (see online supplemental appendix 1) included published clinical guidelines, consensus statements, policy documents and national programme reports relevant to adult perioperative care using websites of relevant UK organisations, including NICE,¹⁶ CPOC,¹⁷ RCoA,¹⁸ RCSEng,¹⁹ NHSE,^{20 21} The Healthcare Improvement Studies (THIS) Institute^{15 22} and Getting It Right First Time.²³ Outputs from established PQIPs were used.²⁴ The authors supplemented the rapid review by having multiple conversations with the leadership from THIS Institute, PQIP, NELA and CPOC to refine this search and focus quality standards pertaining to perioperative care in England and Jersey. Publications focusing exclusively on clinical outcomes; isolated quality standards without broader conceptual framing, or care outside the NHSE perioperative pathway were excluded. Editorials, letters, protocols and non-English publications were also excluded.

Search results were exported into reference management software and duplicates removed prior to screening. Titles and abstracts were screened against predefined eligibility criteria, followed by full-text review of potentially

eligible records. Eligibility criteria were iteratively refined during screening to manage the breadth of literature identified, consistent with rapid review methodology.

406 candidate standards and indicators were identified from the rapid review, guideline review and website searches as meeting the inclusion criteria (after removal of exclusions and duplicates). Inclusion criteria were: (1) relevance to perioperative care for major elective surgery; (2) applicability to NHSE practice; (3) potential to inform quality assurance or quality improvement; and (4) suitability for translation into a national audit standard. Exclusion criteria were: (1) duplication of existing concepts; (2) indicators relating exclusively to emergency surgery, highly specialised clinical pathways or local operational processes; (3) organisational measures not directly relevant to perioperative care delivery; and (4) indicators considered insufficiently relevant to a national perioperative audit.

Standards and indicators from the rapid review were extracted and tabulated in online supplemental appendix 2, tables 1 and 3 (n=406). Online supplemental appendix 2, table 2 shows the process of exclusion to arrive at 44 candidate quality standards that were included. Overall, included sources were prioritised if explicit standards and measurable process indicators were already reported in national guidance, and if the standard is in an area of recognised variation or unmet need across the perioperative pathway. These findings were then integrated with a detailed metric-mapping exercise against the THIS Institute long-list of perioperative standards and quality indicators to ensure comprehensive coverage of perioperative quality domains and consistency with internationally recognised quality frameworks.¹⁵ Candidate standards were merged when they addressed the same underlying construct. Where multiple indicators reflected a shared domain, they were consolidated into a single audit-oriented quality standard. Standards were also excluded after being considered out of scope for the NCAPC, by the multidisciplinary expert Clinical Reference Group. Disagreements were resolved through discussion within the expert Clinical Reference Group.

Online supplemental appendix 2, table 3 details the full longlist of quality standards that were excluded. No artificial intelligence tools were used. Online supplemental appendix 2, table 1 displays the final included quality standards after the process of refining, merging and consolidating. It also provides the final candidate standard wording being put forward for consideration in Round 1 of the Delphi for healthcare professional and lay members, their supporting guideline sources and the underlying standards and indicators from which they were derived. Healthcare professional-facing and lay translated standards were assessed for clarity and feasibility within routine audit infrastructure. Oversight and expert input was provided throughout by the NCAPC expert Clinical Reference Group (23 members), comprising multidisciplinary clinicians and patient representatives, to ensure the resulting standards were clinically meaningful, patient

centred, lay standards did not contain any medical jargon and that all selected standards aligned with national audit and quality improvement priorities (see Acknowledgments section).

The Delphi consensus process was designed to complement, rather than replace, the evidence-based identification and adaptation of existing standards. Because the strength and nature of the supporting evidence varied across standards, the evidence base alone could not determine which standards should be prioritised for inclusion in a national perioperative audit. The Delphi will therefore provide a transparent mechanism for integrating existing evidence with multidisciplinary stakeholder judgement, with particular emphasis on patients' perspectives, to identify the standards considered most important for national measurement and quality improvement.

Consensus process

A national, web-based modified Delphi survey will be conducted. A minimum of two Delphi rounds will be undertaken. Rounds 1 and 2 focus on importance scoring and consensus formation, while Round 3, if required, will focus exclusively on prioritisation. The top 10 highest-ranked standards following the consensus process will constitute the proposed NCAPC core standard set. A 10 standard restriction was mandated by the NCAPC tender and funding processes. Up to five additional standards will be retained as a reserve list for potential inclusion in future audit cycles, subject to steering committee ratification. All rounds of the Delphi will be administered electronically using Qualtrics (Qualtrics, Utah, USA). Participants will be emailed invitations to participate in the Delphi with study information and link to survey. Electronic informed consent will be obtained prior to survey access.

The Delphi process will be structured around distinct objectives for each round. Round 1 aims to establish initial importance ratings for all candidate standards, to gather qualitative feedback to refine wording and identify any missing standards. Round 2 aims to rerate standards with structured feedback from Round 1, identify standards achieving consensus for inclusion and begin prioritisation toward the final core standards set. Round 2, if required, aims to achieve final prioritisation and rank ordering of the top 10 standards if Round 2 did not yield sufficient delineation.

In Round 1, participants will provide demographic information, including age, sex, primary UK region of practice/residence, professional discipline and years of clinical experience (where applicable). Participants will rate all candidate standards using a 9-point Likert scale, consistent with the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach.⁷ Scores of 1–3 representing 'not important', 4–6 representing 'important but not critical' and 7–9 representing 'critical for inclusion'. Standards will be presented in random order to minimise ordering effects. Free-text fields will allow participants to suggest modifications to

existing standards and propose additional candidate standards. These free-text replies generated during the Delphi process will be analysed using an inductive thematic analysis approach to identify recurrent themes, ambiguities in wording, overlapping concepts and perceived gaps, with themes used to refine, merge or clarify candidate standards across iterative Delphi rounds.

Participants who complete Round 1 will be invited to Round 2. Following Round 1, the list of standards will be refined and only standards that meet Round 1 consensus criteria will be carried forward to Round 2. In Round 2, participants will receive structured feedback from Round 1 including the summary and distribution of scores and their individual prior rating for each standard. Feedback will be presented with each standard within the survey to support reflection and rerating, and convergence toward consensus.⁷

Round 3 will be undertaken if, following Round 2, prioritisation of the final top 10 standards remains unclear. The primary objective of Round 3 is to achieve definitive prioritisation and rank ordering of the final core standards set. The standards list will be further refined based on standards that met Round 2 consensus criteria. In Round 3, participants will be asked to rank order the remaining candidate standards from highest to lowest priority based on their perceived importance for inclusion in the NCAPC core standards set. Rank ordering will be conducted using a forced-ranking approach to support clear discrimination between standards.

Consensus definition

There is no universally accepted empirical standard for defining consensus in Delphi studies. Consensus criteria for this study will therefore be defined a priori, informed by previous surgical Delphi studies and established methodological guidance.^{7 25–27}

Consensus criteria will be applied to each stakeholder panel separately to ensure that the perspectives of patients and healthcare professionals are considered independently and equitably, acknowledging that priorities may differ between groups. Consensus thresholds will become progressively more stringent across Delphi rounds to promote convergence while reducing the risk of prematurely excluding standards that may gain support following structured feedback.

Progression criteria

A quality standard will progress from Round 1 to Round 2 if either stakeholder panel meets the predefined criterion of 60% or more of participants rating the item 7–9 ('critical for inclusion') and 15% or fewer rating it 1–3 ('not important'). In Round 2, a standard will be considered to have achieved consensus for inclusion only if both stakeholder panels meet a more stringent threshold of 70% or more of participants rating the item 7–9 and 15% or fewer rating it 1–3. Standards meeting these criteria will be retained for prioritisation towards the final NCAPC core quality standards. Standards not meeting these

criteria will be classified as 'no consensus' and excluded from further consideration.

Consensus meeting

Completion of the Delphi survey rounds will be expected to produce a clearly delineated list of the top 10 quality standards and an additional five reserve standards. A consensus meeting will then be held following the Delphi survey rounds to validate, refine and operationalise these standards for inclusion within the NCAPC audit framework.

Prior to the proposed meeting, the steering committee will review the top standards and develop proposed revised formulations, with a specific focus on improving measurability within a digital-first national audit. The consensus meeting will aim to ensure that each revised standard is clearly defined, measurable and feasible for data collection within the NCAPC infrastructure, while preserving the underlying construct of the original standard as identified through the Delphi survey rounds.

Patients and healthcare professionals who complete at least two Delphi rounds will be invited to indicate whether they wish to be considered for participation in the consensus meeting. Participants will then be purposively sampled based on demographic characteristics including age, sex, primary UK region of practice/residence, professional discipline and years of clinical experience (where applicable) to ensure broad and balanced representation across stakeholder groups. A minimum of 10% of participants who completed Delphi Round 2 will be invited to attend the consensus meeting.

The meeting will be conducted virtually and facilitated by a member of the steering committee with experience in consensus methodology. Additional steering committee members will attend in an advisory capacity. During the meeting, each revised standard will be presented alongside its original Delphi formulation. Discussion will focus on whether the revised standard accurately represents the intent and meaning of the original standard, while being suitably specified for measurement within a national digital-first audit context. Consideration will include clarity of wording, feasibility of digital data capture and potential overlap with other standards.

Following structured discussion, participants will vote anonymously on each revised standard using a binary response ('agree'/'do not agree') to indicate whether they consider the revised version to be an appropriate representation of the original Delphi-prioritised standard. Consensus for acceptance will be defined as $\geq 70\%$ of participants voting 'agree'. Standards meeting this threshold will be accepted, with minor refinements permitted where required for clarity or operationalisation purposes alone. Standards with $< 70\%$ agreement will be considered not to have reached consensus and will undergo further discussion and revision, followed by repeat voting where necessary. The outcome of the consensus meeting will be a finalised set of clearly defined, measurable quality standards that accurately reflect the

priorities identified through the Delphi process and are suitable for implementation within the NCAPC.

Expert clinical reference group panel meeting

Following the consensus meeting, the expert Clinical Reference Group will be reconvened to finalise the operational specifications of the NCAPC core quality standard set. The meeting will comprise members of the steering committee together with invited national perioperative clinical leaders with membership from the RCoA, CPOC and other organisations (acknowledged). A focus on diversity and equity in representation from various professional backgrounds and patient voices to ensure diversity of opinions will be emphasised.

The purpose of the expert Clinical Reference Group after the consensus meeting will be to refine the technical and operationalisation details required to support implementation of the agreed standards within the NCAPC audit framework, to discuss standard definitions, data sources, timing of measurement, digital availability from electronic healthcare records, need for bespoke data collection, clinician collection burden and opportunities for digital-first national data collection. Discussions will focus on optimising the specification and implementation of each quality standard while preserving the intent and meaning agreed during earlier stages. The meeting will follow a structured and facilitated agenda. Where questions of feasibility or operationalisation arise, these will be addressed through discussion. If agreement cannot be reached on specific operational elements, decisions will be made by simple majority vote. We expect modifications that arise from the expert Clinical Reference Group to be around data collection alone as candidate standards have already undergone preliminary screening for relevance to major elective surgery, applicability to NHS practice and potential suitability for national audit as described above.

If a quality standard is unable to meet any of these requirements they will either be addressed as part of an organisational survey or will be placed on a list for future consideration for inclusion in year 2 of the national audit. Clarification of wording or feasibility considerations will be documented and will not alter the relative prioritisation determined through the consensus process. The outcome of the expert Clinical Reference Group meeting will be a fully specified set of standards with defined measurement criteria, suitable for implementation within the first year of digital-first data collection of the NCAPC.

This methodology ensures that the Delphi process assesses clinical importance separately from feasibility, measurability, actionability and data availability, as these dimensions serve distinct purposes within the standards-development pathway. Importance scoring is intended to establish stakeholder priorities, with equal weighting given to healthcare professional and patient perspectives. Simultaneous feasibility scoring will not be undertaken because it may favour standards supported by existing local data systems or service capacity, thereby risking

the exclusion of clinically important or patient-centred areas in which measurement capability requires development. The 10 quality standards reflect the commissioned audit's requirement for a focused and implementable first-cycle dataset, balancing pathway coverage, provider data burden and a clear quality improvement focus. Consensus on importance will therefore not be interpreted as confirmation of feasibility, measurability or suitability for routine data collection; these dimensions will be assessed separately as detailed above.

Analyses of scoring and feedback

Qualitative and quantitative data will be analysed iteratively after each Delphi round. Free-text responses from Round 1 will undergo inductive thematic analysis to identify suggested modifications to standards, clarify wording and highlight any perceived omissions. Themes will be reviewed by the steering committee to determine whether standards should be refined, merged, clarified or whether additional candidate standards fall within the predefined study scope. Newly proposed or substantively revised standards deemed eligible will be incorporated into Round 2. In Round 2, free-text response fields will be restricted to newly introduced standards only.

For each standard, quantitative responses will be summarised descriptively. The proportion of participants rating each item as 1–3 ('not important'), 4–6 ('important but not critical') and 7–9 ('critical for inclusion') will be calculated for each round. Score distributions will be presented graphically using histograms to facilitate feedback and reflection in subsequent rounds. Analyses will be conducted separately for healthcare professionals and patient representatives, and results will be presented by stakeholder panel in all rounds.

Following completion of each round, the steering committee will review results to ensure adherence to the prespecified consensus thresholds and to ratify progression, retention or exclusion of standards in accordance with the consensus criteria. Prespecified subgroup analyses will be undertaken to explore potential differences in priorities across professional groups. Subgroups will be defined as medically trained professionals (surgeons, anaesthetists, geriatricians/physicians, intensivists) and non-medically trained professionals (nurses, pharmacists, physiotherapists, dietitians, exercise physiologists, psychologists). These analyses will be descriptive only and used to inform interpretation of findings and subsequent Delphi rounds, rather than to determine inclusion or exclusion of standards. Divergence will be flagged where one subgroup meets consensus criteria and another clearly does not, and such findings will be reviewed by the steering committee during interpretation of results.

Following application of the consensus criteria after two Delphi rounds, standards meeting thresholds for inclusion will be prioritised to determine the final NCAPC core standards set. Where consensus and sufficient prioritisation are achieved after two Delphi rounds, standards will be rank-ordered based on the proportion

of participants rating each standard 7–9 ('critical for inclusion'). To ensure balanced consideration of both stakeholder perspectives, final rankings will be calculated using the mean percentage of 7–9 ratings across healthcare professionals and patient representatives. Standards will be ordered from highest to lowest ranked score, and the top 10 will be selected for inclusion in the final core standards set. In the event of tied scores, prioritisation will be determined by the lower proportion of 1–3 ratings ('not important').

If a third Delphi round is required due to insufficient delineation after Round 2, participants will be asked to rank-order the remaining candidate standards. Rankings will be analysed separately for healthcare professionals and patient representatives, and aggregated rankings will be calculated using the mean rank across both stakeholder panels. Final prioritisation will be based on this aggregated rank order, with the 10 highest-ranked quality standards selected for inclusion into the final NCAPC core standards set.

Missing data

Participants will be required to complete all scoring of standards within a Delphi round before being able to submit their response, thereby preventing missing data within rounds. Participant attrition between rounds will be monitored separately for each stakeholder panel. Retention rates will be calculated as the proportion of participants completing the subsequent round among those who completed the preceding round. If retention falls below 70% between rounds for either stakeholder panel, the steering committee will review the feasibility and methodological integrity of continuing the Delphi process. Where retention is deemed insufficient to ensure robust consensus, the Delphi process will be discontinued.²⁸

PATIENT AND PUBLIC INVOLVEMENT STATEMENT

Patient and public involvement has been embedded throughout this study to ensure that the development of NCAPC standards reflects patient priorities and is accessible, transparent and meaningful to those receiving care. Patients are an integral part of undertaking this Delphi. We have specifically involved patient members in our steering group, as this was viewed as essential in guiding this methodology, reviewing lay standards and advising what is important to them. Public contributors were recruited through established patient engagement networks at the RCoA and the CPOC. They brought a wealth of experience in coproduction, healthcare quality improvement and patient advocacy activities. They were involved in the early development of the study protocol and reviewed all patient-facing documentation, including participant information sheets and survey materials. Their input ensured that language was clear, accessible and appropriate for a lay audience. Where necessary, technical terminology was revised and lay summaries of

candidate standards were developed to support informed participation.

Public contributors with lived experience as surgical patients and carers were involved alongside clinical and academic stakeholders in shaping the conceptual framework and informing the prioritisation and interpretation of perioperative quality domains. Our patient representatives have extensive lived experiences of major surgery and perioperative pathways. Patient contributors participated in an online consultation and consensus refinement exercise, including reviewing preliminary standards, rating relevance and coherence, and providing qualitative feedback on terminology, conceptual organisation and patient-centredness. Their input contributed to refinement of framework terminology and structure, particularly in relation to communication, shared decision-making, partnership in care and the role of carers across the perioperative pathway. Patient and public contributors were not involved in conducting the database searches or data extraction. However, their perspectives informed interpretation of findings and refinement of the final framework to ensure relevance to patient experience and care priorities. Finally, we wanted to ensure patients have an equal voice to healthcare professionals, so a dedicated patient panel of the Delphi will be set up to ensure patients can represent their views and what is important to them within perioperative care.

ETHICS AND DISSEMINATION

Ethical approval for this study was obtained prospectively from the Faculty Research Ethics Committee at the University of Southampton (ERGO110645). All participants will be provided with a plain language summary of the study, outlining its purpose, procedures and their rights as participants. Participants will be required to confirm their consent before gaining access to the survey.

Findings will be disseminated through peer-reviewed publication and presentation at national and international meetings. Outputs will be embedded within the NCAPC, a mandated national audit programme, ensuring direct translation into practice through collaboration with the RCoA, NHSE and HQIP. The consensus-derived standards will inform national benchmarking and quality improvement across perioperative pathways. Lay summaries co-developed with patient representatives will support public dissemination.

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REFERENCES

- 1 NICE guideline NG180. Perioperative care in adults - evidence review for information and support needs. 2020.
- 2 Milam AJ, Burton BN, Bradley AS, *et al*. Marginal Inequities in Perioperative Medicine. *Anesthesia & Analgesia* 2022;18:10–213.
- 3 Oliver CM, Hare S. What do perioperative national clinical audits tell us? The evolving role of national audits in changing practice and improving outcomes. *BJA Educ* 2019;19:334–41.
- 4 Wagstaff D, Warnakulasuriya S, Singleton G, *et al*. A scoping review of local quality improvement using data from UK perioperative National Clinical Audits. *Perioper Med (Lond)* 2022;11:43.
- 5 Martin P, PQIP Project Team. Perioperative quality improvement programme report 3. 2021.
- 6 NELA Project Team. Seventh patient report of the national emergency laparotomy audit. 2019.
- 7 Williamson PR, Altman DG, Bagley H, *et al*. The COMET Handbook: version 1.0. *Trials* 2017;18:280.
- 8 Arnal-Velasco D, Martinez-Nicolas I, Fabregas N, *et al*. Multidisciplinary, evidence-based, patient-centred perioperative patient safety recommendations: a European consensus study*. *Br J Anaesth* 2025;135:723–36.
- 9 Keeney S, Hasson F, McKenna HP. A critical review of the Delphi technique as a research methodology for nursing. *Int J Nurs Stud* 2001;38:195–200.
- 10 Dixon-Woods M, McNicol S, Martin G. Overcoming challenges to improving quality. Lessons from the Health Foundation's improvement programme evaluations and relevant literature. 2012.
- 11 Jünger S, Payne SA, Brine J, *et al*. Guidance on Conducting and Reporting DELphi Studies (CREDES) in palliative care: Recommendations based on a methodological systematic review. *Palliat Med* 2017;31:684–706.
- 12 Kirkham JJ, Gorst S, Altman DG, *et al*. Core Outcome Set-STandardised Protocol Items: the COS-STAP Statement. *Trials* 2019;20:116.
- 13 Kirkham JJ, Davis K, Altman DG, *et al*. Core Outcome Set-STandards for Development: The COS-STAD recommendations. *PLoS Med* 2017;14:e1002447.
- 14 Gargon E, Crew R, Burnside G, *et al*. Higher number of items associated with significantly lower response rates in COS Delphi surveys. *J Clin Epidemiol* 2019;108:110–20.
- 15 Wanyonyi-Kay K, Martin GP, Ball S, *et al*. Quality framework for perioperative care: rapid review and participatory exercise. *BMJ Qual Saf* 2026.
- 16 NICE guideline. Perioperative care in adults NG180. 2020.
- 17 Centre for Perioperative Care (CPOC). Preoperative assessment and optimisation for adult surgery including consideration of covid-19 and its implications. 2021.
- 18 Beecroft C, Connor D, Gooneratne M, *et al*. Chapter 2 guidelines for the provision of anaesthesia services for the perioperative care of elective and urgent care patients. 2025.
- 19 Bamber J. Quality improvement in surgery – basic principles. 2021.
- 20 NHS England. Early screening, triaging, risk assessment and health optimisation in perioperative pathways: guide for providers and integrated care boards. 2025.
- 21 NHS England. Theatres, surgery and perioperative care. 2024.
- 22 Wanyonyi-Kay K, Dixon-Woods M, Leong C, *et al*. Developing a framework and core indicators for measuring good quality perioperative care. *This Institute*; 2025.
- 23 GRIFT. Operational implementation and support guide for early screening, risk assessment and optimisation for adult patients. 2023.
- 24 Boney O, Moonesinghe SR, Myles PS, *et al*. Core Outcome Measures for Perioperative and Anaesthetic Care (COMPAC): a modified Delphi process to develop a core outcome set for trials in perioperative care and anaesthesia. *Br J Anaesth* 2022;128:174–85.
- 25 West CT, West MA, Mirnezami AH. Corrigendum: The empty pelvis syndrome: a core data set from the PelvEx collaborative. *Br J Surg* 2024;111:znae042.
- 26 Blazeby JM, Macefield R, Blencowe NS, *et al*. Core information set for oesophageal cancer surgery. *Br J Surg* 2015;102:936–43.
- 27 Parkington T, Humphreys LJ, West M, *et al*. Development of a core screening, assessment and outcome set for cancer prehabilitation: an international Delphi consensus study protocol. *BMJ Open* 2026;16:e116442.
- 28 Harman NL, Bruce IA, Kirkham JJ, *et al*. The Importance of Integration of Stakeholder Views in Core Outcome Set Development: Otitis Media with Effusion in Children with Cleft Palate. *PLoS One* 2015;10:e0129514.