

Perioperative structure and process quality and safety indicators: a systematic review

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Abstract

Background: Clinical indicators assess healthcare structures, processes, and outcomes. While used widely, the exact number and level of scientific evidence of these indicators remains unclear. The aim of this study was to evaluate the number, type, and evidence base of clinical process and structure indicators currently available for quality and safety measurement in perioperative care.

Methods: We performed a systematic review searching Medline, Embase, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane, Google Scholar, and System for Information in Grey Literature in Europe databases for English language human studies in adults (age >18) published in the past 10 years (January 2005–January 2016). We also included professional and governmental body publications and guidelines describing the development, validation, and use of structure and process indicators in perioperative care.

Results: We identified 43 860 journal articles and 43 relevant indicator program publications. From these, we identified a total of 1282 clinical indicators, split into structure (36%, $n=463$) and process indicators (64%, $n=819$). The dimensions of quality most frequently addressed were effectiveness (38%, $n=475$) and patient safety (29%, $n=363$). The majority of indicators (53%, $n=675$) did not have a level of evidence ascribed in their literature. Patient-centred metrics accounted for the fewest published clinical indicators.

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Conclusions: Despite widespread use, the majority of clinical indicators are not based on a strong level of scientific evidence. There may be scope in setting standards for the development and validation process of clinical indicators. Most indicators focus on the effectiveness, safety, and efficiency of care.

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Keywords: healthcare; perioperative period; quality indicators; review; systematic

Editor's key points

- This systematic review investigates and summarizes process and structure clinical indicators currently available for quality and safety measurement in perioperative care.
- Despite widespread use, the majority of indicators are not supported by a high grade of scientific evidence.
- Most indicators focus on the effectiveness, safety, and efficiency of care, with patient-centred metrics found less frequently in the literature.

Clinical indicators assess healthcare structures, processes, and outcomes, and can provide a quantitative basis for quality improvement.⁴ Variation in practices, outcomes, and costs of care is substantial.^{1,2} Variability in postoperative outcomes may not be attributable to patient risk factors alone; some variation will be due to differing processes and structures of care within medical centres and some variation will simply be random or unattributable.⁵

Indicators are typically classified into specific areas of care using the conceptual model of quality assessment developed by Donabedian.⁶ Here, patients and antecedent conditions enter an organization's structure (how care is organized) to undergo processes of care (what is done), leading to healthcare outcomes (the achieved results). Process indicators examine all the steps and activities taken in implementing a treatment or care episode. Structure indicators assess the settings in which healthcare occurs. These include physical resources (such as facilities and equipment), human resources (such as number, qualifications, and availability of personnel), and the administrative structure.

A previous systematic review⁷ of the literature until 2005 described 108 anaesthetic quality and safety indicators. With many new initiatives and further developments since the study was published, we hypothesized that it was likely that new quality indicators will have been developed. With substantial parallel work in the outcomes domain^{8,9} already underway, we decided to limit our investigation to structure and process indicators.

The aim of this systematic review was to investigate the process and structure clinical indicators currently available for quality and safety measurement in perioperative care, and their level of scientific evidence.

Methods

Definitions for the purposes of this review

Quality of care

The Institute of Medicine (IOM) defines healthcare quality as 'the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge'.¹⁰ It

further subdivides healthcare quality into the six dimensions of: effectiveness, safety, patient-centredness, timeliness, efficiency, and equity.¹⁰

Clinical indicators

An indicator is a measurable aspect of care for which there is evidence that it represents quality.¹¹

Level of evidence

The levels of evidence for papers were ranked using the Oxford Centre for Evidence-based Medicine scale.¹²

Search strategy and selection criteria

This systematic review was registered with the International prospective register of systematic reviews (PROSPERO) database (CRD42015017277). Methods and reporting conform to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses, BMC and Cochrane guidelines,^{13–15} and the BJA guidelines.

We searched Ovid Medline, Ovid Embase, and the Cochrane Database of Abstracts of Reviews of Effects (DARE) library for all articles relating to the development and use of structure and process clinical indicators in general perioperative care. We additionally searched grey literature databases: Google Scholar,¹⁶ and the System for Information in Grey Literature in Europe. We also included professional, governmental, and quality standard initiative publications and guidelines (Table 1). We limited the search to English language human studies in adults (age >18), published in the past 10 years (1 January, 2005–1 January, 2016). The detailed search strategy is presented in Appendix 1.

Data extraction

We screened titles and abstracts for relevance. We included national audit projects, clinical practice guidelines, literature reviews, surveys, service evaluations, and validation studies. Conference abstracts and letters were excluded. Indicators had to be generalizable to all surgical specialities, but their use may have been described for a specific surgical population. We excluded indicators relating only to intensive care, paediatrics, neurosurgery, cardiothoracics, and obstetrics. We searched the citations and the references (snow-balling) of the short-listed publications for relevant literature. The final shortlisted publications are presented in Table 1.

The full text of all shortlisted articles was reviewed and the data extracted using a data extraction form (Appendix 2). The indicators were tabulated and classified into structure or process indicators. We added the timing of use of the perioperative indicator defined as: preoperative (from the decision to operate to entry into the theatre suite), intraoperative (from entry into the theatre suite to leaving the recovery area),

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