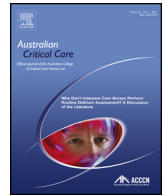




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Research paper

Establishing nursing-sensitive quality indicators for the operating room: A cross-sectional Delphi survey conducted in China

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ABSTRACT

Background: Nursing-sensitive quality indicators comprise principles, procedures, and assessments to quantify the level of nursing quality in hospital departments. Although studies have demonstrated that quality indicators are essential for monitoring nursing practice in the operating room (OR), nursing quality in China is highly subjective and localised OR nursing-sensitive quality indicators are lacking.

Objective: This study aimed to establish scientific, objective and comprehensive nursing-sensitive quality indicators for the OR to evaluate and monitor OR nursing care quality in China.

Methods: Literature search for relevant evidence-based studies was performed using Cochrane, Medline, PubMed, Embase, and other databases, followed by literature review and group discussion by the expert panel. Two successive rounds of Delphi surveys were conducted using questionnaires completed by the expert panel to reach consensus and define nursing-sensitive quality indicators for the OR.

Results: Two rounds of Delphi surveys each had 100% questionnaire retrieval rate, with Kendall *W* coordination coefficients ranging from 0.096 to 0.263 ($P < 0.001$). In round 1 of expert evaluation of 26 indicators, Kendall's *W* was 0.263 for importance, 0.126 for rationality, and 0.125 for feasibility of data collection (all $P < 0.001$). After round 2, 23 items were established as OR nursing-sensitive quality indicators, including rates of work time wastage, surgery start-time delay, OR turnover time between surgeries, same-day surgery cancellation, and number of monthly surgeries in each OR; checking surgical patients, surgery site marking, allergy history, and antibiotics use 60 min before incision; and also assessing expected surgical time, sterilisation indicator results, availability of surgical instruments and materials, and instrument count.

Conclusions: Scientific, practical, and reliable OR nursing-sensitive quality indicators can be established based on evidence-based studies and expert consensus using the Delphi method. The quality indicators developed in this study may provide an objective and quantitative reference for evaluating nursing quality in Chinese ORs.

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1. Introduction

Nursing-sensitive quality indicators comprise a set of principles, procedures, and assessment scales that can be implemented to quantify the level of nursing quality.¹ Quality indicators are essential for assessing nursing quality and can yield nursing-sensitive results that are able to influence clinical nursing practice.²

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In the operating room (OR), nursing-sensitive quality indicators must address three main concerns as identified previously: efficiency, patient safety and crisis event management.^{3–6} Employing nursing-sensitive indicators that measure OR nurses' efficiency, safety practices and crisis event management and that are represented by evidence-based data allows the quantification and monitoring of related data to verify nursing quality in these important areas. Implementing OR nursing-sensitive quality indicators reduced surgery-related deaths by 40% during the perioperative period, and reduced overall incidence of operative complications by one-third.^{7–11} Such results have increased interest in research on OR nursing quality indicators,^{12,13} and on formulating such indicators.¹⁴

Studies have demonstrated the need for quality indicators in the OR and their value in monitoring nursing quality^{3,15,16} and managing surgical complications.^{17–19} The importance of OR efficiency assessment and safety management has also been demonstrated in various countries.^{4,9,12,20,21} From 2007 to 2008, substantial data collected from non-heart surgery intervention studies conducted on adult patients in multiple hospitals in different countries demonstrated the value of safety management indicators.³ "Safety management indicators" refers to indicators of quality that help to avoid transcription-type errors occurring at the time of checking a patient's identity and surgical site. Such indicators of quality can reduce accidental injury to the patient as a result of misidentification, and can decrease the incidence of intraoperative accidents or complications, directly affecting patients' prognosis and life. In addition, crisis event management indicators that serve as nursing-sensitive quality indicators in the perioperative period can provide significant guidance to OR teams when crises arise.^{6,17}

In China, Li et al.²² drafted a preliminary OR nursing process quality assessment indicator system after examining research on domestic nursing quality assessment indicator systems and OR nursing characteristics.²² This assessment indicator system reflected the 1989 "General Hospital Grading Management Standards (Trial Draft)" of the Ministry of Health; "Medical and Nursing Technology Operating Practices"; "National 'Bai Jia' Hospital Assessment standards"; and the 1990 "Military Hospital Nursing Quality Assessment Indicators (Trial)." Chang et al.²³ used traditional practical quality control methods to monitor OR nursing quality, and drafted and applied a set of general OR nursing quality assessment indicators, including failure-mode analysis and root-cause analysis to ensure continued improvement of OR nursing quality.²³ However, these OR nursing quality indicator systems both overlook assessing outcomes of OR nursing service recipients, namely the surgical patients. The OR nursing quality management systems currently used in China are highly subjective, and neglect OR working efficiency, patient safety and correct crisis event management and outcomes. In addition, localised OR nursing-sensitive quality indicators are lacking. In 2011, China's Ministry of Health introduced the "Class III General Hospital Assessment Standard Enforcement Rules," which also lacked quantitative OR nursing quality indicators. No consensus exists concerning the need to develop clinical nursing care quality indicators in China, and experts disagree about the content and key points of such indicators. Therefore, a definitive solution is still needed to direct the performance of scientific, objective and practical quantitative assessment of nursing quality in Chinese ORs.

In China, OR nurses are responsible for intraoperative verification, assisting surgeons during surgery, assisting anaesthesiologists to ensure surgical safety, and transferring patients to the recovery room after surgery. In addition, OR nurses notify PACU nurses of surgery outcomes, including the patient's vital statistics, surgical wound, complications, and OR-recorded patient data. From the moment patients enter the OR, nurses verify a series of safety-related indicators such as preparation of instruments, instrument

count, submission of specimens, intraoperative bleeding status, intraoperative injury or complications, intraoperative crisis event management, etc. Any one of these situations may threaten the patient's prognosis and reflect nursing quality. We hypothesised that relevant studies of OR nursing quality would provide sufficient evidence-based data to develop standard quality indicators for evaluating OR nursing quality. To help achieve consensus on the essential indicators, we decided that the Delphi method, a structured communication technique that uses successive rounds of questionnaires with a panel of experts, would be ideal to help identify evidence-based indicators appropriate for OR nurses in China. Therefore, we employed the Delphi method to obtain expert opinion on the three major aspects of OR nursing quality: efficiency, safety and crisis event management. This study aimed to establish scientific, practical, and nursing-sensitive OR quality indicators appropriate for the conditions and cultural background in China. The development of nursing-sensitive quality indicators will provide a reference for nursing managers to use for assessing nursing care quality and establishing relevant databases.

2. Material and methods

2.1. Literature search strategy

International database sources used to search the literature included Cochrane, Medline, PubMed, Embase, Ovid, EBSCO, CINAHL, CBM, National Guideline Clearinghouse (NGC); and, in China: the Zhiwang, Weipu, and Wanfang databases. The search retrieved studies published from 2004 to 2014, including relevant systematic assessments or meta-analyses. Study titles, abstracts, keywords, subject words, and references were analysed. Subject words were combined with free words, and the number of synonymous search words was expanded as articles were retrieved. The following English search words were confirmed: (operating rooms*) and (quality indicators or health care), (surgery* or perioperative* or surgical* or operation*) and ("quality care" or "quality health care" or "quality measures" or "quality management" or "outcomes assessment" or "composite indicator" or "quality indexes") Chinese search words included: operating room, nursing quality, operating room nursing and safety.

2.2. Literature grade and quality assessment method

Assessment was performed following the Johns Hopkins body of evidence grade and quality assessment standards.²⁴ Articles were classified as grades I–V based on their characteristics, as follows: (1) Level I: experimental or randomised controlled studies based on RCT meta-analysis; (2) Level II: quasi-experimental studies; (3) Level III: non-experimental survey-type studies, qualitative and quantitative studies; (4) Level IV: clinical practice guidelines containing assessment methods based on non-research evidential systems or expert team opinions; and (5) Level V: case reports, community standards (within China only without international publication), clinical physicians' experience, expert opinions, and organisation experience. Grade A studies included high-quality literature with a sample size sufficient to implement the research design, sufficient control, and clear conclusions with consistent views based on full-scale literature searches. Grade B studies included high-quality literature with reasonable consistent results, a sample size sufficient to implement research design, relatively clear conclusions based on full-scale summaries of the literature. Grade C studies presented little evidence, inconsistent results, insufficient sample sizes, and no firm conclusions. Two researchers with standards training performed independent assessment of

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