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Surgical quality indicators in low-resource settings: A new evidence-based tool☆

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ABSTRACT

Background: Worldwide efforts to improve access to surgical care must be accompanied by improvements in the quality of surgical care; however, these efforts are contingent on the ability to measure quality. This report describes a novel, evidence-based tool to measure quality of surgical care in low-resource settings.
Methods: We defined a widely applicable, multidimensional conceptual framework for quality. The suitability of currently available quality metrics to low-resource settings was evaluated. Then we developed new indicators with sufficient supportive evidence to complete the framework. The complete set of metrics was condensed into four collection sources and tools.
Results: The following 15 final evidence-based indicators were defined: (1) Safe structure: morbidity and mortality conference; (2) safe process: use of the safe surgery checklist; (3) (4) safe outcomes: perioperative mortality rate and proportion of cases with complications graded >2 on the Clavien-Dindo scale; (5) effective structure: provider density; (6) effective process: procedure rate; (7) effective outcome: rate of caesarean sections; (8) patient-centered process: use of informed consent; (9) patient-centered outcome: patient hospital satisfaction questionnaire; (10) timely structure: travel time to hospital; (11) timely process: time from emergency department presentation to non-elective abdominal surgery; (12) timely outcome: patient follow-up plan; (13) efficient process: daily operating room usage; (14) equitable outcome: comparative income of patients compared with population; and (15) proportion of patients facing catastrophic expenditure because of surgical care.
Conclusion: This tool provides an evidence-based conceptual tool to assess the quality of surgical care in diverse low-resource settings.

Introduction

At present, two thirds of adverse health care events occur in low- and middle-income countries (LMICs), where only 6.3% of the world's surgery occurs.[1,2] The report of the Lancet Commission on Global Surgery (LCoGS) and resolution 68.15 of the World Health Assembly called for the inclusion of essential and emergency surgery as part of universal health coverage, and, as a result, there has been a worldwide movement to expand access to surgery in low-resource settings.[2,3] To achieve the LCoGS target of 5,000 surgical procedures per 100,000 people, an additional 143 million surgical procedures will be required annually.[2] But, if this push for access is not accompanied by an improvement in the quality of the surgery performed, there will be a concomitant increase in the number of adverse events, resulting in needless disability and lives lost. To avoid this, the scale-up of access to surgical care must include quality improvement as well.

Improving the quality of health care requires the ability to measure quality. However, quality is multifaceted and notoriously

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difficult to define and capture.[4] Currently, the definition of "surgical quality" is heterogeneous, and many diverse metrics exist to attempt to qualify and quantify it. In addition, few if any quality metrics have been designed specifically for surgery in a low-resource environment. A number of quality improvement programs and their associated metrics have been developed for use in high-income settings—for example, the National Surgical Quality Improvement Program (NSQIP), the Agency for Healthcare Research and Quality (AHRQ) programs, the Surgical Care Improvement Project (SCIP), and the Value Based Purchasing (VBP) set of the Centre for Medicare Services (Appendix 1).[5–8] Unfortunately, many of the metrics of these programs are resource-intensive to collect, require advanced health information systems, and rely on a prolonged period of patient follow-up—requirements that are particularly challenging to achieve in LMICs (Appendix 1). To avoid these pitfalls, some investigators in LMICs have chosen to examine particular measures, such as post-operative mortality rate, surgical site infection rate, or functional outcomes, including pain, but many of these studies have been of variable quality.[9] Additionally, these studies have focused on very specific sets of outcomes, and they have not provided a comprehensive approach to measuring quality of care.[10–12] A more comprehensive approach to measuring quality of surgical care in LMICs is needed.

The aim of this report is to develop a minimal set of evidence-based indicators that can be used to measure the quality of surgical care at the facility level in low-resource environments. We recognize that supportive evidence for this approach is scarce and that future revisions may occur. For this reason, we have emphasized its conceptual consistency.

Methods

The surgical quality-of-care indicator tool was developed in four distinct phases.

1. We defined a conceptual framework for quality of care that would be both widely applicable and able to capture the breadth of quality in surgery.
2. We evaluated currently available quality metrics and their suitability for use in low-resource environments.
3. We applied the existing quality indicators deemed appropriate to the conceptual framework, and in areas in which indicators were unavailable, new indicators meeting the criteria set forth in phase 2 were developed to complete the framework.
4. We then condensed the complete set of metrics into four easy-to-apply data collection sources and tools.

Phase 1: Creation of a quality framework

To identify appropriate metrics, we developed a conceptual framework for quality of care by combining two, well-known, quality-of-care frameworks: the Donabedian and the Institute of Medicine (IOM) frameworks. The Donabedian framework captures the breadth of quality health of care in three dimensions. The first dimension is *Structure*—the appropriate setting for delivery of care in terms of physical structures, but it also applies to administrative and personnel infrastructure. The second dimension is *Process*—a measure that the best medical care available is being applied to each patient irrespective of whether this results in a positive outcome. The third dimension is *Outcome*—the patient-related results of receiving care, such as mortality and morbidity, quality of life, and financial impact.[12]

The dimensions of the IOM mandate that high quality of care should be safe, effective, patient-centered, timely, efficient, and equitable (Appendix 3) and follow closely those used by the World Health Organizations (WHO) (ie, safe, effective, acceptable/patient centered, accessible, efficient, and equitable).[13]

By overlaying the IOM and Donabedian quality paradigms, an 18-dimension framework was devised. This framework covers the breadth of quality while minimizing redundancy and ensuring that the tool is not purposefully biased, by focusing on a particular metric at the expense of others (Fig. 2). Furthermore, applying the Donabedian framework to the IOM definition of surgical care quality increases the likelihood that we will sample a variety of indicator data sources and that this broad sample will validate the quality of data collected across the indicators.

Phase 2: Evaluation of current quality indicators

The aim of the second phase of tool development was to assess existing indicators of quality of care for their suitability for use in low-resource environments. To a great extent, we focused on inpatient, quality-of-care measures because of the well-recognized barriers to outpatient follow-up in low-resource settings. A literature review was performed and was supported by expert opinion. Seven commonly used tools were identified: (1) AHRQ, (2) Inpatient Quality Indicators (IQI), (3) The Patient Safety and Adverse Events Composite (PSI90), (4) Surgical Care Improvement Project (SCIP), (5) National Surgical Quality Improvement Program (NSQIP), (6) WHO checklist, and (7) the Value Based Purchasing (VBP) program (Appendix 1).

To evaluate their applicability in a universal setting, individual metrics from these tools were extracted ($n = 58$) and scored against indicator criteria set by the National Quality Forum (NQF) (Appendix 2).[14] For each of the NQF criteria, the indicator was scored on a 5-point Likert scale from "strongly agree" to "strongly disagree" in blinded rounds by three independent surgeons with surgical experience working across Latin America, Africa, and South Asia. At the end of each round, the rater made a judgment regarding whether the indicator should be included or excluded, based on the responses to each of the questions. Reconciliation was accomplished between the panel members; if consensus could not be achieved, the indicator was included into the subsequent evaluation round (Fig. 1). Most of the metrics were excluded based on their low clinical impact, because they were specific to procedures not performed commonly in the majority of Low Income Country (LICs) (eg, esophagectomy, joint replacement, central venous access placement). The second most common reasons for exclusion was because of data availability and because of the difficulty of data collection. These metrics are related to complications in which definitive diagnosis would be unavailable (eg, pulmonary embolism, metabolic disturbances). Some metrics were also excluded because of their expected diagnostic difficulty in an environment in which dedicated, trained staff were unlikely to be available to enter the data (eg, sepsis, urinary tract infection, surgical site infection). At the end of Phase 2, 17 indicators remained: 1 SCIP indicator, 15 metrics from the WHO checklist, and 1 metric from the VBP set.

The remaining indicators had been devised initially as components of composite metric tools to ensure that the breadth of quality of care would be assessed. In breaking apart existing indicator sets into their individual components and then keeping only those that met our inclusion criteria, the remaining metrics did not evaluate adequately the breadth of quality of care defined in our framework. Therefore, it was concluded that additional metrics would be required. This need was particularly true, because the remaining metrics were notably biased toward quality process measures.

Phase 3: Proposing additional metrics

The metrics that remained from our Phase 2 of development were mapped on the 18-dimension, quality-of-care framework to

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