A systematic review of capacity assessment tools in pediatric surgery: Global Assessment in Pediatric Surgery (GAPS) Phase I

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Abstract

Background: The Lancet Commission on Global Surgery highlighted global surgical need but offered little insight into the specific surgical challenges of children in low-resource settings. Efforts to strengthen the quality of global pediatric surgical care have resulted in a proliferation of partnerships between low- and middle-income countries (LMICs) and high-income countries (HICs). Standardized tools able to reliably measure gaps in delivery and quality of care are important aids for these partnerships. We undertook a systematic review (SR) of capacity assessment tools (CATs) focused on needs assessment in pediatric surgery.

Methods: A comprehensive search strategy of multiple electronic databases was conducted per PRISMA guidelines without linguistic or temporal restrictions. CATs were selected according to predefined inclusion criteria. Articles were assessed by two independent reviewers. Methodological quality of studies was appraised using the COSMIN checklist with 4-point scale.

Results: The search strategy generated 16,641 original publications, of which three CATs were deemed eligible. Eligible tools were either excessively detailed or oversimplified. None used weighted scores to identify finer granularity between institutions. No CATs comprehensively included measures of resources, outcomes, accessibility/impact and training.

Discussion: The results of this study identify the need for a CAT capable of objectively measuring key aspects of surgical capacity and performance in a weighted tool designed for pediatric surgical centers in LMICs.

Type of Study: Systematic Review.

Level of Evidence: II.

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Global health has traditionally focused on addressing individual communicable and non-communicable (i.e. heart disease, diabetes) diseases in low-and middle-income countries (LMICs), with limited emphasis on the organization and delivery of surgical and anesthesia care [1–4]. The Lancet Commission on Global Surgery together with several other publications, reports and declarations have emphasized the significance of surgical burden of disease within global health and the need to improve the delivery of surgical care [2–6]. However, these reports made little reference to the specific and pressing challenges facing children’s surgery [1]. Considering that children comprise more than 50% of the population in the least developed regions of the world, we can infer that the avertable surgical burden in children in LMICs is colossal [1,7]. Thus, developing strategies to improve the quality of pediatric surgical and trauma care in low-resource settings can significantly decrease child morbidity and mortality and promote economic development [8].

Recent efforts to strengthen capacity of global surgical care of children have resulted in a proliferation of various partnerships models between LMICs and high-income countries (HICs) in almost all sub-specialties of children’s surgery [9–16]. However, the quality of these partnerships is highly variable, and the goals are often unclear or unspecifed [9,12]. In order to guide these partnerships in identifying priorities for capacity improvement, as well as assist in the monitoring of improvements, it is critical to develop standardized capacity assessment tools that can reliably measure existing gaps in care [9].

The objective of this systematic review was to identify and assess all pediatric surgery capacity assessment tools in the aim of identifying one tool best suited to address the needs of centers providing pediatric surgery in LMICs.

1. Methods

We conducted a systematic review (SR) of pediatric surgical capacity assessment tools to ensure that all pediatric literature was evaluated. This SR took place between July 19, 2016 and November 1, 2016. It followed the ‘Preferred reporting items for systematic reviews and meta-analysis (PRISMA)’ guidelines [17] and was prospectively registered in PROSPERO (CRD42016042069).

1.1. Search strategy

The search strategy (Appendix A) was created in collaboration with a clinical librarian (EG) and peer-reviewed by a second independent clinical librarian. The search included no language restrictions but was limited to the pediatric population and human only studies, from inception to June 13, 2016. The following databases were included: Medline (Ovid), Embase (Ovid), Cochrane (Wiley), Africa-Wide Information (Ebsco), Allied & Complementary Medicine (Ovid), Biosis (Ovid), CINAHL (Ebsco), Global Health (Ovid), Latin-American and Caribbean Center on Health Sciences Information, PubMed (NLM) and Web of Science (Thomson Reuters). The systematic literature search identified articles that included variations of the terms “pediatric surgery”, combined with variations of measurement tools and global/international concepts, found as text-words in the Title/Abstract/Keyword fields as well in the Medical Subject Headings (Mesh). See Appendix A for the detailed search strategy (Medline search was extrapolated to all other databases).

1.2. Inclusion criteria

Inclusion criteria were as follows: the tool must have self-identified as a surgical capacity assessment tool, the study must have reported on institutions with surgical capacities treating children up to 18 years of age, the tool must have been comprised of questionnaires or surveys, and the study must have included as one of its objectives the development of a measurement instrument, its evaluation, or its validation. Exclusion criteria included: diagnostic or screening instruments, prognostic studies (i.e. prediction models), instruments evaluating outcomes (i.e. complications, mortality, etc.), and comprehensive surgical capacity assessments not focused on pediatric surgery or trauma.

1.3. Critical appraisal

Two reviewers (YY, ESL), first independently assessed eligibility of studies based on titles and abstracts. A second round of review by YY and ESL analyzed the selected full-text articles and their respective reference lists for eligibility based on the inclusion criteria. Any disagreements between the reviewers regarding a study’s inclusion were evaluated by a senior author (DP).

The methodological quality of the included studies was assessed using the Consensus-based Standards for the selection of health Measurement INstruments (COSMIN) checklist with 4-point scale [18–21]. The COSMIN checklist is a critical appraisal tool for evaluating the methodological quality of studies of health measurement instruments. Assessment of the methodological quality was performed independently by two reviewers (YY, ESL), and consensus was achieved through discussion whenever required.

1.4. Data abstraction

Information was extracted from the included articles by two reviewers in an independent fashion using a formal data extraction tool (Appendix B). If available, the following data items were extracted from all included studies: general characteristics of the instruments (i.e. construct, sub-scales, number of items, version, etc.), characteristics of the institutions in which the measurement properties were assessed, and results of the measurement properties. Items not available were noted. Items were separated into four categories (resources, outcome, accessibility/impact, and training) in order to provide a comprehensive overview of the different types of questions included in each tool.

The data extracted was reviewed by a senior author. Discrepancies in data extraction were reviewed by all three reviewers together and changes were made based on a consensus between the majority (two) of the reviewers. Pilot data extraction of the first 30% of full texts included was performed to standardize the process of extraction.

2. Results

The search strategy of the systematic review identified 19,868 records. After removal of duplicates, 16,641 titles and/or abstracts were retained for eligibility, of which 15 full text articles were reviewed in detail. A total of 12 tools did not fit the inclusion criteria and were excluded: 10 studies were deemed to be prognostic tools or predication models and 2 tools were not specific to children. After final review, 3 capacity assessment tools were included in the systematic review (PRISMA Diagram: Fig. 1). The three tools are the Pediatric Surgery Personnel, Infrastructure, Procedures, Equipment, Supplies (Pedi-PIPES); the Children’s Surgical Center Designations with Scope of Practice (CSCDSP); and the Checklist for a Children’s Trauma Room (CCTR).

Table 1 provides a synopsis of the reference articles and capacity assessment tools included in this SR. Both Pedi-PIPES and CSCDSP’s aims were to assess pediatric surgical capacity. The goal of the CCTR was to provide a list of equipment and supplies to prevent “disastrous” omission when stocking the trauma room. The number of items in each tool varied from 27 in the CSCDSP, 118 in Pedi-PIPES, to 165 in CCTR [22–24]. Unlike the other two tools, Pedi-PIPES focused exclusively on assessment of centers in LMICs [24]. All tools were available exclusively in English [22–24]. Funding for the development of Pedi-PIPES was provided by SurgeonOverSeas (SOSAS) and the Children’s Hospital Association and the American College of Surgeons for CSCDSP [24]. There were no funding details available for the CCTR [22].

All tools were created by groups working in HICs; Pedi-PIPES also had a contribution from pediatric surgeons in LMICs and was first
implemented in several West African countries (i.e. Nigeria, Niger, Benin, Togo, Ghana, Burkina Faso, Côte d’Ivoire, Liberia, Sierra Leone, Guinea, Gambia, and Senegal) [22–24].

All tools were previously based on capacity assessment tools aimed for adult surgical centers [22–24]. For example, the CCTR was based on a similar tool meant for adult trauma rooms at the Parkland Hospital Emergency Department in Dallas, Texas [22]. Pedi-PIPES is a modified version of the SOSAS PIPES [24]. The SOSAS PIPES tool itself was developed by SOSAS in an attempt to simplify the World Health Organization Tool for Situational Analysis to Assess Emergency and Essential Surgical Care (WHO TSA), and enable easy comparison between institutions and over time [25,26]. The SOSAS PIPES modifications were made based on consensus within a small group of pediatric surgeons (four American and five African pediatric surgeons) [24]. Though the Children’s Hospital Association and the American College of Surgeons created the CSCDSP based on a literature review and expert consensus, the WHO TSA factored heavily in its development [23]. The method of creation of the CCTR was not detailed by the authors [22].

Neither the CSCDSP nor the CCTR included any index enabling longitudinal comparison between institutions [22,23]. Pedi-PIPES is divided into four sections (personnel, procedures, equipment and supplies) and has an associated score, calculated as follows [24]: points are allocated in each of the four sections and allotted to each data item equally, depending on whether or not the item is “always available” (1 point) or “not always available” (0 points), to yield a total score for each section [24]. The total scores for all sections are summed to yield a Total Pedi-PIPES score [24]. The PIPES-index is calculated by dividing the Total Pedi-PIPES score by the number of items (118) and then multiplied by 10 [24]. This index does not have a maximum score, and there is no score weighting [24].

Concerning the subjects addressed within each tool, all tools focused disproportionately on resources followed by accessibility [22–24]. Outcome of surgical procedures was only addressed by the CSCDSP [23]. No tool addressed training [22–24]. When comparing pediatric and neonatal specific components of the tools, neonatal items were substantially underrepresented with a maximum of 11% of items referring exclusively to neonates in the CSCDSP tool [22–24]. Moreover, only 17% of questions in Pedi-PIPES were pediatric specific. Further details are presented in Fig. 2. Advantages and limitations of each tool are detailed in Table 2.

To our knowledge, no tools have been interrogated for internal consistency, inter- and intra-rater reliability, or construct validity. All tools scored poorly on all aspects of the COSMIN Checklist with 4-point scale including: internal consistency, reliability, measurement error, structural validity, hypothesis testing, criterion validation, and responsiveness [22–24].

### Table 1

<table>
<thead>
<tr>
<th>Reference article</th>
<th>Year of creation</th>
<th>Cited</th>
<th>Language</th>
<th>Funding</th>
<th>Aim of assessment tool</th>
<th>Classification of economy where tool was created</th>
<th>Based on previously published surgical capacity assessment tools</th>
<th>Method of creation</th>
<th>Weighted index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedi-PIPES</td>
<td>2015</td>
<td>6</td>
<td>English</td>
<td>Surgeon Overseas</td>
<td>Assess capacity to provide Essential and Emergency Surgical Care to children in LMICs</td>
<td>LMIC</td>
<td>SOSAS PIPES (WHO Situational Analysis Tool)</td>
<td>Expert consensus panel</td>
<td>No</td>
</tr>
<tr>
<td>Children’s Surgical Center Designations with Scope of Practice Checklist for a Children’s Trauma Room</td>
<td>2013</td>
<td>16</td>
<td>English</td>
<td>Children’s Hospital Association and the American College of Surgeons</td>
<td>To optimize the delivery of children’s surgical care and develop consensus recommendations</td>
<td>HIC</td>
<td>WHO Situational Analysis Tool</td>
<td>Literature review and expert opinion</td>
<td>No</td>
</tr>
<tr>
<td>Morse, TS, JA Haller, and B. Othersen. “Checklist for a Children’s Trauma Room.”</td>
<td>1976</td>
<td>2</td>
<td>English</td>
<td>Unknown</td>
<td>Prevent disastrous omissions when the trauma room is being stocked</td>
<td>HIC</td>
<td>Parkland Hospital Emergency Department (Dallas)</td>
<td>Unknown</td>
<td>No</td>
</tr>
</tbody>
</table>

3. Discussion

This systematic review identified three capacity assessment tools aimed at evaluating surgical capacity in pediatric centers in both HICs and LMICs (Table 1). There have been no published attempts to date to validate these tools. Moreover, of the three tools only Pedi-PIPES has a quantitative component [24]. However, the Pedi-PIPES index is a non-weighted sum of the tool’s data points based on a dichotomous evaluation of each item, thus missing any granularity between “available” and “not available” [24]. Neither the Pedi-PIPES tool, nor its index, have undergone formal validation [24]. All three tools are disproportionately focused on resource assessment with little reference to impact, accessibility, or outcome [22–24]. The selection of items in these tools were not based on patient outcomes and thus, no association can be drawn between these capacity assessment tools and improved surgical outcomes [22–24]. Furthermore, no tool has addressed training capacity, quality assurance measures (i.e. morbidity and mortality rounds, tumor board meetings, trauma meetings, etc.) or research endeavors [22–24]. Thus, existing pediatric capacity assessment tools all suffer from various shortcomings. Certain capacity assessment tools include an exhaustive list of all possible material resources while other tools include only the most basic resources carried by most primary health-care facilities (i.e. sutures, cautery). To avoid oversimplification or excessive detail data points need to be carefully selected to include a variety of resources covering both basic and complex care. At present, capacity assessment tools are ill-suited for the scope of pediatric surgical practice and poorly adapted to the limitations of LMICs.

Guidelines created by the American College of Surgeons, British Association of Pediatric Surgery, and the Global Initiative for Children’s Surgery have identified resources for pediatric surgical care stratified by the level of care facility [27–29]. However, none of these guidelines provide a quantitative method of evaluating or comparing centers.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Advantages</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedi-PIPES</td>
<td>Developed for LMICs</td>
<td>Available only in English</td>
</tr>
<tr>
<td></td>
<td>Developed for children</td>
<td>Based on tool for adults</td>
</tr>
<tr>
<td></td>
<td>Developed by professionals in LMICs and HICs</td>
<td>Developed using expert consensus only</td>
</tr>
<tr>
<td></td>
<td>Implemented in several west African countries</td>
<td>No weighted index for comparison</td>
</tr>
<tr>
<td></td>
<td>Includes an associated score</td>
<td>Previously based on capacity assessment tools aimed for adult surgical</td>
</tr>
<tr>
<td></td>
<td>Addressed resources and accessibility</td>
<td>centers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Did not address training</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inadequate emphasis on neonatal specific questions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not interrogated for internal consistency, inter- / intra-rater reliability,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or construct validity</td>
</tr>
<tr>
<td>Children’s Surgical Center Designations</td>
<td>Developed for children</td>
<td>Not developed for LMICs</td>
</tr>
<tr>
<td>with Scope of Practice</td>
<td>Based on literature review and expert consensus</td>
<td>Available only in English</td>
</tr>
<tr>
<td></td>
<td>Addressed resources, outcomes, and accessibility</td>
<td>Developed by professionals in HICs only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No weighted index for comparison</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Previously based on capacity assessment tools aimed for adult surgical</td>
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<td></td>
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<td>centers</td>
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<td></td>
<td></td>
<td>Did not address training</td>
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<td></td>
<td>Inadequate emphasis on neonatal specific questions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not interrogated for internal consistency, inter- / intra-rater reliability,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or construct validity</td>
</tr>
<tr>
<td>Checklist for a Children’s Trauma Room</td>
<td>Developed for children</td>
<td>Not developed for LMICs</td>
</tr>
<tr>
<td></td>
<td>Addressed resources only</td>
<td>Available only in English</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Developed by professionals in HICs only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No weighted index for comparison</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Previously based on capacity assessment tools aimed for adult surgical</td>
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<td></td>
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<td>centers</td>
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<td>Did not address training</td>
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<td>No emphasis on neonatal specific questions</td>
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<td></td>
<td>Not interrogated for internal consistency, inter- / intra-rater reliability,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or construct validity</td>
</tr>
</tbody>
</table>

Fig. 2. Number data points in each CAT stratified by subject.
Current literature has focused on the descriptive assessment of surgical capacity in different LMICs [7]. However, literature aimed at developing methods to improve this capacity is lacking, even though investing in surgical care for children is highly cost-effective in several cases and provides societal benefits [30]. The past 10 years have seen an exponential increase in attempts to quantify, analyze, and scale up surgical capacity in LMICs for the general population [1,3,9,31–35]. This is evidenced by the number of tools and guidelines detailing necessary resources for optimal surgical care across pediatric and adult populations. To evaluate recent efforts in determining global surgical capacity, assessment tools in use and potential areas of study, two SRs have been published to examine the different types of adult surgical CATs and their development [36,37].

WHO TSA was the first capacity and quality assessment tool with the aim of identifying and comparing lacunae in surgical capacity [26]. Developed in 2007 by the WHO Global Initiative for Emergency and Essential Surgical Care, the WHO TSA is composed of 256 data items based mostly on resources [25,26,38]. Kwon et al. developed a method to calculate an index based on the WHO TSA tool, however, reliability of the quantitative analysis was poor due to high response variability [25,26,37,39]. The goal of SOSAS PIPES was to create a surgical CAT, simpler than the TSA, with a quantitative analytic dimension allowing comparison between institutions as well as within the same institution over time [25]. SOSAS PIPES, the Lancet Commission on Global Surgery and Humanitarian Assessment Tool, and the Harvard Humanitarian Initiative are all tools, based on the WHO TSA, used to qualitatively assess surgical capacity in LMICs [1,32,37,40–48]. Combined, these tools have been used to assess surgical capacity in over 30 countries [37]. However, none of these tools have been used to evaluate evolution of surgical capacity in an institution or success of capacity building initiatives.

The global burden of surgical disease is heavily skewed towards LMICs [1]. The burden of surgical disease in children in LMICs is difficult to assess due to poor quality epidemiological data [7]. Most of our current assessments are derived from hospital data or national estimates based on under-powered populations [7]. Children below 17 years of age make up 35–48% of the population in LMICs, suggesting that the burden of surgical disease is very significant in this population [1,7,49–51]. Though existing data may not be validated, it is believed to severely underestimate the burden of surgical disease [1,3,7]. Due to this need, partnerships between institutions in HICs and LMICs have been developed to scale up the pediatric surgical workforce. However, there are no methods to adequately assess health systems and follow improvements made from partnerships [7,52].

Current tools are comprised of a checklist-style assessment of material and human resources as well as infrastructure but disregard other important issues such as, accessibility, impact, training and outcome (Table 2). Accessibility to surgical care in LMICs is a complex issue but must be accounted for in any tool aimed at detailing surgical capacity, yet only Pedi-PIPES substantially addresses the issue of accessibility [1,24]. Closely linked to accessibility is impact; referring to the effect the institution has on the population it serves (i.e. averted disability adjusted life years, catchment area, procedures performed, etc.). Education in LMICs has not been a focus of any optimal resource guidelines on children’s surgery [22–24,27–29]. Resident involvement in surgical care has shown to decrease morbidity and mortality as well as serve as a valid method of increasing surgical capacity in LMICs [7,53–57]. The link between improved outcomes and the presence of postgraduate surgical programs supports the addition of training in guidelines and tools that hope to increase surgical capacity. Outcome is arguably the most important indicator of surgical quality. Unfortunately, outcome information of children’s surgery in LMICs is not readily available due to poor epidemiological data and precarious record keeping practices [7]. At present no CATs reflects on or integrates outcomes of surgical care in children. Thus, there is a significant need for a tool that incorporates data points on resources, accessibility/impact, outcome and training, and features a quantitative analytical component capable of generating a weighted score for each variable.

This study serves as the basis for the development of the Global Assessment of Pediatric Surgery (GAPS), an objective, evidence-based CAT specifically designed for pediatric surgical centers in low- and middle-income countries (LMICs). Based on the findings of this systematic review, we will create an evidenced-based CAT that incorporates the advantages of the current tools while consciously addressing their limitations (Table 2). We plan to establish construct validity by proving that the items in GAPS successfully differentiates between level of care and will create a weighted tool based on outcomes. We hope the GAPS will serve as a feasible method for use assessment of health care facilities and in prioritizing and monitoring global surgical capacity development efforts.

4. Conclusion

As partnerships between LMIC and HIC surgical centers continue to multiply, there is a growing need to establish these partnerships on clearly defined and articulated goals, themselves based on the objectively determined needs of the LMIC partners. Thus, to maximize the impact and effectiveness of these partnerships a comprehensive tool is needed to identify the quality of provision of surgical care in host institutions, and identify potential deficiencies. This implementation step will be the aim next phase of our study, the development and validation of The Global Assessment of Pediatric Surgery (GAPS). GAPS, a validated outcomes-based pediatric surgical capacity tool will serve as an objective measure of needs, while simultaneously identifying gaps, providing the framework for increasing care capacity and monitoring improvements made through international partnerships.

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Appendix A. Medline Search Strategy

Medline [Ovid] (June 13, 2016) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) 1946 to Present

<table>
<thead>
<tr>
<th># Searches</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 exp Specialties, Surgical/</td>
<td>180,962</td>
</tr>
<tr>
<td>2 exp Surgical Procedures, Operative/</td>
<td>2,685,912</td>
</tr>
<tr>
<td>3 su.</td>
<td>1,723,842</td>
</tr>
<tr>
<td>4 (surgery OR surgic OR procedure OR operat*) tw.kf.</td>
<td>2,559,409</td>
</tr>
<tr>
<td>5 Surgery Department, Hospital/</td>
<td>4067</td>
</tr>
<tr>
<td>6 perioperative care/</td>
<td>10,168</td>
</tr>
<tr>
<td>7 preoperative period/</td>
<td>3623</td>
</tr>
<tr>
<td>8 Postoperative Complications/ or Postoperative Care/ or exp.</td>
<td>537,781</td>
</tr>
<tr>
<td>9 (preop or pre-op or presurg or pre-surg or perop or periop or peri-op or per- surg or per-surg or intraop or intra-op or postop or post-surg or (post and2 op*) ) tw.kf.</td>
<td>718,951</td>
</tr>
<tr>
<td>10 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9</td>
<td>4,675,635</td>
</tr>
<tr>
<td>11 exp pediatric/ or exp. adolescent/ or exp. child/ or exp. infant/ or exp. neonate/</td>
<td>3,136,125</td>
</tr>
<tr>
<td>12 Adolescent Medicine/</td>
<td></td>
</tr>
<tr>
<td>(newborn or new-born or neonat or neo-nat or infant or child* or adolescent or paediatr or paediatric or baby or babies or toddler* or kid or kids or boy or girl or juvenile or teens or youth* or 2,056,805</td>
<td></td>
</tr>
</tbody>
</table>

(continued on next page)
Appendix B. Data Extraction Sheet

1. Tool Name
2. Article Information
   • Author
   • Title
   • Journal
   • Year Published
   • DOI
3. Tool specifics
   A. Language of tool
   B. Funding agency of tool
   C. Aim of assessment tool
   D. Name of assessment tool
   E. Country of assessment tool
   F. Classification of economy where assessment tool was created/vali dated
   G. Tool based on previously published surgical capacity assessment tool
      1. Original capacity assessment tool
4. Details of Tool
   H. Number of items
      1. Resources
      2. Outcome
      3. Accessibility/Impact
      4. Training
   B. Method of development
   C. Score
      1. Calculation of score
      D. Year of tool created
5. Consistency & Reliability
   E. Cronbach's Alpha
   F. Intraclass correlation coefficient
   G. Percentage of missing items
   H. Handling of missing items
      1. Administered in how many different institutions
      2. Administered in how many tertiary centers
      3. Administered in how many secondary or primary centers
   I. Administered in how many countries
   G. Method with which pilot institutions were chosen
   H. Instrument administered at least twice in the same institutions
   I. Administrators independent
   J. Time interval between administrations
   K. Test conditions similar for both administrations
6. Validity
   L. Reassessment of relevance of all items
   M. Confirmation of face validity
   N. Expertise of the people involved in formulation of tool
   O. Criterion used or employed considered as a reasonable gold standard
7. Hypothesis Testing
   P. Hypotheses regarding correlations formulated a priori
   Q. Expected direction of correlations

Please contact the author for the full Search strategy in all databases.
References


