The effect of surgical training and hospital characteristics on patient outcomes after pediatric surgery: a systematic review

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CRD summary
This review concluded that general paediatric surgery outcomes after appendicectomy and pyloromyotomy were found to be dependent on operative volumes, but the existing evidence was largely observational and subject to selection bias. In view of the lack of details on quality of the included trials and limitations in the review methods, the reliability of these conclusions is uncertain.

Authors’ objectives
To compare patient outcomes after appendicectomy and pyloromyotomy performed by different surgical specialties, surgeons with different annual volumes, and in different hospital types.

Searching
The following databases were searched for English language studies from January 1990 to February 2010: MEDLINE, EMBASE, The Cochrane Library and Health Management Information Consortium. Search terms were reported. Relevant journals were handsearched and reference lists of relevant publications were screened for additional studies. Experts in the field were also contacted to locate additional studies.

Study selection
Studies that compared patient outcomes after appendicectomy and pyloromyotomy performed by different surgical specialties, surgeons with different annual volumes and in different hospital types, in children (defined as up to 20 years) were eligible for inclusion. The eligible outcomes were misdiagnosis rates, length of stay, complication rates or readmission rates.

The patients in half of included studies underwent appendicectomy, while patients in another half of included studies underwent pyloromyotomy. One study was of mixed patients who underwent either appendicectomy or pyloromyotomy. Most of included studies evaluated patient outcomes by comparing surgical specialties (general surgery versus paediatric surgery). A small proportion of studies compared hospital type (general hospital versus tertiary centre) and surgeons with different annual volumes (high annual volumes versus low annual volumes). The included studies were conducted in Canada, Netherlands, USA and UK.

The authors did not state how many reviewers assessed studies for inclusion.

Assessment of study quality
The quality of studies was assessed using a 16-point checklist on the basis of criteria drawn from the Critical Appraisal Skills Programme tools.

The authors did not state how many reviewers performed the quality assessment.

Data extraction
Data were extracted on event rates to enable the calculation of relative risks (RRs) and odds ratios (ORs) with 95% confidence intervals (CIs). When calculating odds ratios, 0.5 was used to substitute for zero.

The authors did not state how many reviewers performed data extraction.

Methods of synthesis
The studies were combined in a narrative synthesis. The relative risks or odds ratios for relevant outcomes of each study were presented in the forest plots.

Results of the review
Seventeen studies were included in the review (196,427 patients). All studies were retrospective, including 13 case-referent studies and four cohort studies. The sample size ranged from 175 to 84,688. The retrospective cohort studies were generally better quality. Most studies used patient administrative data which were not specifically collected for research purposes. No studies performed power calculations to justify the sample size.

Specialist surgeons and high hospital volume centres were associated with lower rates of misdiagnosis of appendicitis, although the differences were small. Two studies reported that, compared with specialist surgeons or centres, general surgeons or centres were significantly associated with an increased risk of misdiagnosis of appendicitis (OR 1.62, 95% CI 1.44 to 1.82 and OR 6.10, 95% CI 2.83 to 13.17). However, one study reported a significantly reduced risk (OR 0.49, 95% CI 0.28 to 0.87) of misdiagnosis of appendicitis with general hospital compared to specialist centres. Two studies reported no significant difference on this outcome between the two groups. One study reported that low volume centres were associated with a significant increase in the risk of misdiagnosis of appendicitis compared with high volume centres (OR 2.0, 95% CI 1.41 to 2.86), whilst another study reported no significant difference in this outcome between the two groups.

The results of differences in length of hospital stay between surgical specialties for appendicectomy or pyloromyotomy were variable. There were no significant differences in the rate of readmission after appendicectomy between general surgeons and specialist surgeons. There were significant increases in the rate of readmission after appendicectomy in general hospitals compared with tertiary centres.

Complication rates differed between surgical specialties, surgeons’ annual operative volumes, hospital type and hospital volume. Further results were reported in the review.

**Authors’ conclusions**
Existing evidence was largely observational and subject to selection bias, but general paediatric surgery outcomes after appendicectomy and pyloromyotomy were found to be dependent on operative volumes.

**CRD commentary**
This review’s inclusion criteria were clear. Relevant databases were searched, but limited attempts were made to find unpublished studies, which may have increased the potential for publication bias. Searches were restricted to English studies, which increased the risk of language bias. It was unclear whether the processes of study selection, quality assessment and data extraction were performed in duplicate, thus introducing the potential for reviewer bias. Study quality was assessed using suitable criteria, but limited details on the quality of individual studies were reported. Given the diversity of included studies, a narrative synthesis was appropriately employed. In view of the lack of details on quality of the included trials and limitations in the review methods, the reliability of the authors’ conclusions is uncertain.

**Implications of the review for practice and research**
**Practice:** The authors stated that paediatric appendicectomy should not be centralised as children could be effectively managed by general surgeons. They also stated that pyloromyotomy need not be centralised but should be performed in children's units by trained surgeons who expect to see over four cases per year.

**Research:** The authors stated that future research should identify reasons behind observed outcome differences. Future studies should explore the impact of different methods of Ramstedt pyloromyotomy, postoperative antibiotic regimes, and other aspects of care pathways on patient outcomes. The effect of top-up training in paediatric care for general surgeons should also be evaluated.

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**Bibliographic details**

**PubMedID**
Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.