Changing Trends in Surgical Research: An Analysis of 30 Years of Collaborative Practices

Rapid increases in the number of remote collaborations over the last 20 years are well documented in many scientific disciplines and nonsurgical medical specialties, but to our knowledge there are no published studies examining trends in remote collaborations in surgery. Both the scientific research among surgeons and the National Institutes of Health funding to academic surgeons relative to their nonsurgical colleagues have declined in recent years. Simultaneously, institutions are requiring surgeons to spend increasing amounts of time in the operating room to bolster revenue. Yet, in this era of evidence-based medicine, surgeons require research conducted at the highest level to support their clinical decisions.

Therefore, it is critical to better understand how surgeons are responding to the competing pressures of reduced time and funding for research and increasing demand for clinical evidence. Using results of an analysis of 30 years of publications in 2 preeminent surgery journals, we assessed the trends in collaboration in surgical research.

Methods | We selected 2 high-impact general surgery journals, the *Annals of Surgery* and *JAMA Surgery* (formerly *Archives of Surgery*). These monthly, general interest surgery journals publish both basic science and clinical research. The study sample comprised 3 randomly selected issues for each year from each journal for the period from 1984 to 2012. The study goal was to identify the prevalence of remote collaboration among authors of original research studies in the selected issues. Remote collaboration was defined as coauthors with listed institutional affiliations in at least 2 different metropolitan areas. The analysis also tracked trends in sole authorship and changes in local collaboration at an interdepartmental and interinstitutional level. Two-sided Cochrane-Armitage trend tests provided significance levels for changing proportions of collaboration over time.

Results | The study sample included 2218 surgical research articles published between 1984 and 2012. There was a highly significant increase in the number of articles with remote collaboration ($P < .001$), from 9.59% of articles in 1984 to 39.87% in 2012 (Figure). The number of articles with local interdepartmental and interinstitutional collaborations also increased significantly, from 33.77% to 38.41% of all articles and from 40.43% to 64.84% of those articles not written by remote collaborators ($P < .001$), mirroring the decreasing number of articles written by 1 author ($P < .001$).

Conclusions | Our results indicate that “knowledge production” in the field of surgery has changed dramatically over the last 30 years. Little surgical research is being published by individual investigators, but there have been significant increases in the number of surgical research teams comprising investigators from different departments, local institutions, and remote institutions. This may reflect the increased need for multicenter collaborations to enroll adequate numbers of participants and to recruit a more generalizable patient population. It likely also indicates the increasing level of complexity seen in surgical research, which increasingly requires collaboration between surgeons and other experts, such as internists, radiologists, anesthesiologists, biostatisticians, engineers, physicists, and economists, to form interdisciplinary teams.

Despite advances in communication technology, collaboration at a distance remains substantially more difficult than collaboration among researchers who are co-located. We believe that surgeon-researchers should be commended for rising to the challenge of providing research aligned with the needs and goals of a new culture of evidence-based medicine. Despite the reduced research funding compared with their nonsurgical counterparts, the increased pressure to spend more time in the operating room, and the difficulties of collaborating at a distance, surgeons are finding ways of responding to the increasing need for new knowledge.

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Author Contributions: Ms Goldsack had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: All authors.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Goldsack.

Critical revision of the manuscript for important intellectual content: Sonnad.

Study supervision: Sonnad.

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Revisional Surgery After Laparoscopic Adjustable Gastric Banding in a National Australian Cohort

A recent systematic review reported wide-ranging long-term revision or reversal rates after laparoscopic adjustable gastric banding (LAGB) of between 8% and 60%. The marked variability is likely due to different definitions of revisional surgery, different follow-up durations, and the different “eras” of the surgical cohorts. The studies reviewed provided little detail regarding the types of revisional procedures performed. Two recent studies have significantly advanced evidence in this area. The Longitudinal Assessment of Bariatric Surgery in the United States reported that of 610 patients undergoing LAGB, the rate of revisional surgery was 17.5 events per 100 patients over 3 years, primarily for band removal, revision to another bariatric procedure, or port revision. O’Brien et al reported that of 1370 patients undergoing LAGB at an Australian bariatric center, the rate of revisional surgery was 15.3 events per 100 patients over 3 years, primarily for repositioning of the gastric band or port revisions. The present study reports revisional surgery rates for the national population of Australians undergoing LAGB between July 1, 2005, and June 30, 2006.

Methods | The population of Australians undergoing LAGB subsidized by Australia’s government tax-funded insurance program (known as Medicare) between July 1, 2005, and June 30, 2006, was identified (N = 6037). Identification was based on utilization of Medicare Benefits Schedule item (ie, billing code) 30511 (gastric reduction or gastroplasty for morbid obesity), which is primarily used for LAGB.

Medical utilization data from the date of LAGB until 3.5 years after surgery was retrieved for each patient from an administrative database maintained by Medicare. Medicare funds approximately 3800 medical services. Selected pre-defined items directly related to bariatric surgery, as specified in the Table, were analyzed. For privacy reasons, de-identified, aggregate data on medical utilization were provided to the research team by Medicare. The earliest and latest dates for data capture were July 1, 2005, and December 30, 2009, respectively.

Observed frequencies over 3.5 years were converted to 3-year rates for each revisional surgery item. The Medicare item relating to LAGB reversal (item 30514) is used when the initial gastric banding procedure is repeated (item 30511) and when a conversion to another bariatric procedure is undertaken (items 30512 and 30518). Therefore, gastric banding reversals performed in association with other procedures were excluded from the data to remove the risk of double counting.

### Table. Data on Revisional Procedures

<table>
<thead>
<tr>
<th>Summary Description</th>
<th>Medicare Item</th>
<th>No. of Observed Events Over 3.5 Years (N = 6037)</th>
<th>Events per 100 Persons Over 3.5 Years</th>
<th>Events per 100 Persons Over 3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeated or revisional LAGB</td>
<td>Gastric reduction or gastroplasty for morbid obesity, by any method</td>
<td>30511</td>
<td>583</td>
<td>9.7</td>
</tr>
<tr>
<td>Conversion to gastric bypass</td>
<td>Gastric bypass for morbid obesity, by any method, including anastomosis</td>
<td>30512</td>
<td>40</td>
<td>0.7</td>
</tr>
<tr>
<td>Conversion to gastrectomy</td>
<td>Partial gastrectomy</td>
<td>30518</td>
<td>46</td>
<td>0.8</td>
</tr>
<tr>
<td>LAGB reversal</td>
<td>Surgical reversal for morbid obesity, by any method</td>
<td>30514</td>
<td>131</td>
<td>2.2</td>
</tr>
<tr>
<td>Subtotal of intra-abdominal surgical procedures</td>
<td></td>
<td>800</td>
<td>13.3</td>
<td>11.4</td>
</tr>
<tr>
<td>Port repair of replacement</td>
<td>Repair, revision, or replacement of long-term implanted reservoir associated with the adjustable gastric band</td>
<td>31441</td>
<td>528</td>
<td>8.7</td>
</tr>
</tbody>
</table>

Total | 1328 | 22.0 | 18.9

Abbreviation: LAGB, laparoscopic adjustable gastric banding.

* The 3.5-year time horizon was the maximum available at the time of data request from Medicare Australia.

* Data are presented over 3 years to enable comparison with 2 recent studies reporting LAGB revisional surgery rates.