




ORIGINAL ARTICLE

A review of gynaecological surgical practices for trainees and certified specialists in Australia by volume using MBS and AIHW databases

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Background: There is a finite volume of surgery performed annually by trainees and certified specialists alike. The detailed assessment of this surgical substrate is important, since it guides true exposure in gynaecological surgical training and practice after fellowship.

Aims: This study quantifies the volume and profile of major gynaecological surgical procedures performed in Australia within a specified five-year period and discusses the implications for training and practice.

Materials and Methods: Australian Institute of Health and Welfare data were examined to quantify the total number of major gynaecological procedures performed between 2013 and 2018. Medicare data were analysed to quantify the number of billed procedures. These data were compared with published Australian RANZCOG trainees and operative gynaecologists, to estimate the potential annual average exposure for each procedure.

Results: Major open, laparoscopic and vaginal surgeries constitute less than 27% of the 600 000 gynaecological procedures performed annually in Australia. Most major gynaecological surgeries are performed at rates lower than 12 cases per year for both trainees and specialists. Over the study period, laparotomies, vaginal hysterectomies and continence procedures decreased, and operative laparoscopies and laparoscopic hysterectomies increased.

Conclusions: The volume of available major gynaecological procedures in Australia may not allow sufficient exposure for optimal training and practice for all trainees and specialists in operative gynaecology. This shortfall may compromise the ability to obtain and maintain proficiency in some core gynaecological operative procedures.

KEYWORDS

gynaecology, gynaecological surgical training, operative

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INTRODUCTION

Surgical training and practice require adequate exposure to surgical cases.^{1–3} About 95% of surgical trainees and supervisors judge sufficient volume and case mix to be key indicators of quality in a surgical training program.⁴ It is a reasonable expectation that sufficient exposure is a prerequisite for quality gynaecological surgical training. Challenges to this exposure include increased number of trainees, reduction in working hours and lower volume of some major gynaecological surgeries partly due to increased medical management.^{5,6}

Trainees in the RANZCOG specialist training program are required to achieve proficiency in a range of core gynaecological surgical procedures, determined by Assessment of Procedural and Surgical Skills (APSS).⁷ Quantifying surgical types and volumes in the public sector, where the majority of training occurs, is imperative to understanding true gynaecological surgical exposure and training opportunities.

Also imperative is an understanding of surgical types and volumes that are available to RANZCOG specialists working in the private sector. All operative gynaecologists are required to maintain a minimum proficiency in surgical practice. Surgical volume has been demonstrated to be inversely associated with morbidity.^{8–10}

Currently, we do not have aggregate data on the volume and profile of gynaecological surgical procedures available at a training and fellowship level, and therefore do not have an indication of whether this volume is sufficient to acquire surgical proficiency. This study aims to determine the volume and profile of major gynaecological surgical procedures available at a training and fellowship level in Australia.

MATERIALS AND METHODS

Ethics submission (2020/ETH01332, SESLHD HREC) determined this study to be a quality improvement activity, not requiring additional ethics review. Australian Institute of Health and Welfare (AIHW) Procedure and Healthcare Interventions data cubes for separate financial years July 2013–June 2018 were accessed via the AIHW web portal. Data, as coded per the Australian Classification of Health Interventions (ACHI) classification,¹¹ were analysed to determine the nature and number of all gynaecological surgeries performed across public and private Australian hospitals during the five-year study period. ACHI codes are applied by specific hospital departments, provide an overview of healthcare service provision and determine hospital funding. The following procedures were excluded from the analysis: cervical and vulval procedures; vaginal procedures unrelated to prolapse or continence; diagnostic laparoscopy, tubal dye studies/ligation; diagnostic hysteroscopy; uterine curettage procedures; highly specialised procedures and low incidence procedures (defined here as fewer than 365 cases each year). Where possible, procedures performed for malignancy were excluded from the study.

We selected 41 procedure codes, as these represent the most commonly performed major gynaecological procedures by volume and are included in the RANZCOG training curriculum. Medicare data were accessed from the MBS database¹² to determine the proportion of the 41 specific surgical procedures where billing was submitted. We assumed that the majority of billed cases constituted 'private' procedures undertaken by a certified specialist and not by college trainees. The Medicare data were subtracted from the AIHW data to determine the 'public' cases. These were the cases that were not billed to an individual clinician, but performed in the public health sector as part of Australia's universally available healthcare system (Medicare) and assumed to be available for training.

The procedure codes were grouped together in broad categories to provide an overview of surgical activity. These categories were operative hysteroscopies, prolapse and continence procedures, operative laparoscopies, non-hysterectomy laparotomy and hysterectomies.

Twelve key gynaecological surgical procedure types were selected for specific analysis because these were the most commonly performed and represented a range of laparoscopic, vaginal and abdominal surgeries within the scope of practice of a benign gynaecologist. These were complex laparoscopy, laparoscopic management of ectopic pregnancy, hysteroscopic myomectomy, endometrial ablation, vaginal pelvic floor surgery for prolapse (variety of procedures considered as one group), vaginal stress incontinence surgery, abdominal pelvic floor surgery for prolapse, vaginal hysterectomy, abdominal adnexal surgery, abdominal myomectomy, abdominal hysterectomy and laparoscopic hysterectomy.

Data from RANZCOG Annual Reports and National Health Workforce Data Set 2016 (NHWDS 2016) were used to estimate the number of RANZCOG trainees practising in Australia. The number of public cases was divided by the number of RANZCOG trainees, to estimate the potential number of these specified procedures that trainees are exposed to each year with assumptions being made regarding equal distribution of cases among trainees.

It is more likely that there is an unequal distribution of cases across trainees, and that trainees who are in gynaecological surgical programs will perform more procedures than those trainees who are not. Logbooks are not within the public domain, and therefore it was not possible to determine the exact volume of procedures undertaken within the gynaecological surgical programs. We undertook sensitivity analyses based on assumptions related to urogynaecology subspecialty (CU) training and Australasian Gynaecological Endoscopy and Surgery (AGES) training requirements. These analyses recalculated the number of specific procedures per RANZCOG trainee, if AGES and CU trainees performed a range of numbers of certain procedures each year. The 12 RANZCOG urogynaecology subspecialty trainees are required to perform a minimum of 100 prolapse and 100 continence procedures over three years. The 24 AGES

fellowship trainees are required to undertake 80 complex laparoscopies, 20 laparoscopic hysterectomies and 10 laparoscopic myomectomies over two years. A sensitivity analysis for 100%, 150% and 200% of these minimum procedure numbers was conducted, to assess the impact of different CU and AGES surgical volumes on the numbers of these procedures for other trainees/year. Gynaecology oncology trainees were excluded from sensitivity analyses because gynaecology oncology procedures were not part of the study.

Data from the NHWDS 2016 were used to determine the number of practising O&G specialists in Australia with data from the RANZCOG Practice Profile Survey (2016) used to estimate the number of RANZCOG specialists who perform operative gynaecological procedures. The number of private cases was divided by the number of RANZCOG specialists to estimate the potential number of these specified procedures available to each specialist per year with an assumption regarding an equal distribution of cases among specialists.

RESULTS

During the study period, more than three million gynaecological procedures were performed in Australia. [Figure 1](#) illustrates the exclusion of surgical procedures to arrive at the 825 852 procedures included in the study. These procedures represent 26.7% of the total gynaecological surgical volume.

About 57% of major gynaecological procedures are performed privately, and 43% are performed publicly. [Figure 2](#) provides a breakdown of each procedure category performed in the private and public sectors over the study period.

Although over 85% of complex laparoscopies are performed in the private sector, only 10% of laparoscopies for ectopic pregnancy are performed there. Laparoscopy was the most common approach for hysterectomy, and is increasing in both the public and private sectors. Vaginal hysterectomy was the least common approach, and reduced by 24% overall, and by 32% in the private sector. Fewer than 15% of endometrial ablations were performed privately. Public sector laparotomies in gynaecological surgery have decreased, because abdominal hysterectomy and abdominal adnexal procedures have reduced and abdominal myomectomies are low-incidence procedures and unchanged. Vaginal procedures for pelvic organ prolapse remained the same over the study period. Stress incontinence procedures substantially decreased in both the public and private sectors. Abdominal pelvic floor surgeries for prolapse are low-incidence procedures, particularly in the public sector, but did increase by over 30% in the private sector over the study period.

There are approximately 580 RANZCOG trainees in Australia. [Table 1](#) provides the number of specific procedures performed per year in the public sector and the number per trainee, assuming an equal distribution of procedures between trainees.

This sensitivity analysis showed no meaningful difference in the average rate of procedure per general RANZCOG trainee for prolapse procedures or laparoscopic hysterectomy. Stress incontinence procedures and hysteroscopic myomectomy, already low-incidence procedures, declined further after sensitivity analysis. Complex laparoscopy changed from a high incidence to intermediate procedure, with a rate between 7.7 and 9.4 per year for other RANZCOG trainees, after adjustment for a range of AGES trainees' logbook requirements.

There are 2066 fellows in Australia, and 1698 of these (82.2%) perform operative gynaecology. [Table 2](#) outlines the number of specific procedures per year in the private sector and the number per specialist.

DISCUSSION

This study confirms a reduction in volume of laparotomies, vaginal hysterectomies and vaginal stress incontinence procedures but an increasing number of complex laparoscopies and laparoscopic hysterectomies over the last five years. While surgical volume is reported, there are a number of factors that lead to surgical proficiency and maintenance of competence.^{13,14} However, studies report that low-volume surgeons, with fewer than 12 procedures per year, have increased rates of patient morbidity and mortality for major procedures such as hysterectomy.⁸ From this study, only endometrial ablation and combined vaginal prolapse procedures met this threshold in the public sector and only complex laparoscopy met this threshold in the private sector. The issue that so few gynaecological procedures meet the minimum threshold to allow for optimal patient outcomes raises ethical issues regarding patient safety. We must critically consider the balance between access to specialists across the country and patient outcomes when major gynaecological surgery is performed.¹⁵ These are not easy issues to rationalise; however, these data suggest that the current volume is not adequate for maintenance of proficiency by all specialists who identify as operative gynaecologists.

RANZCOG training requires evidence of proficiency in several surgical procedures which are decreasing by volume, including basic and intermediate laparotomy and vaginal hysterectomy.⁷ Surgical proficiency among trainees requires not only volume but also knowledge, dry-lab skill acquisition and mental practice.¹⁶⁻¹⁸ However, surgical simulation has its challenges¹⁹ and cannot replace clinical exposure. Concerns about the impact of reduced surgical volume and its impact on surgical education are neither new nor unique to Australia.³ A US study reported that the most frequent concern around O&G training was surgical volume, with 72% of respondents prioritising this concern.²⁰ The reduction in volume and exposure to open surgery and vaginal hysterectomy is likely to impact gynaecological training and trainees. There is an opportunity for this impact to be addressed at the RANZCOG level to optimise training.

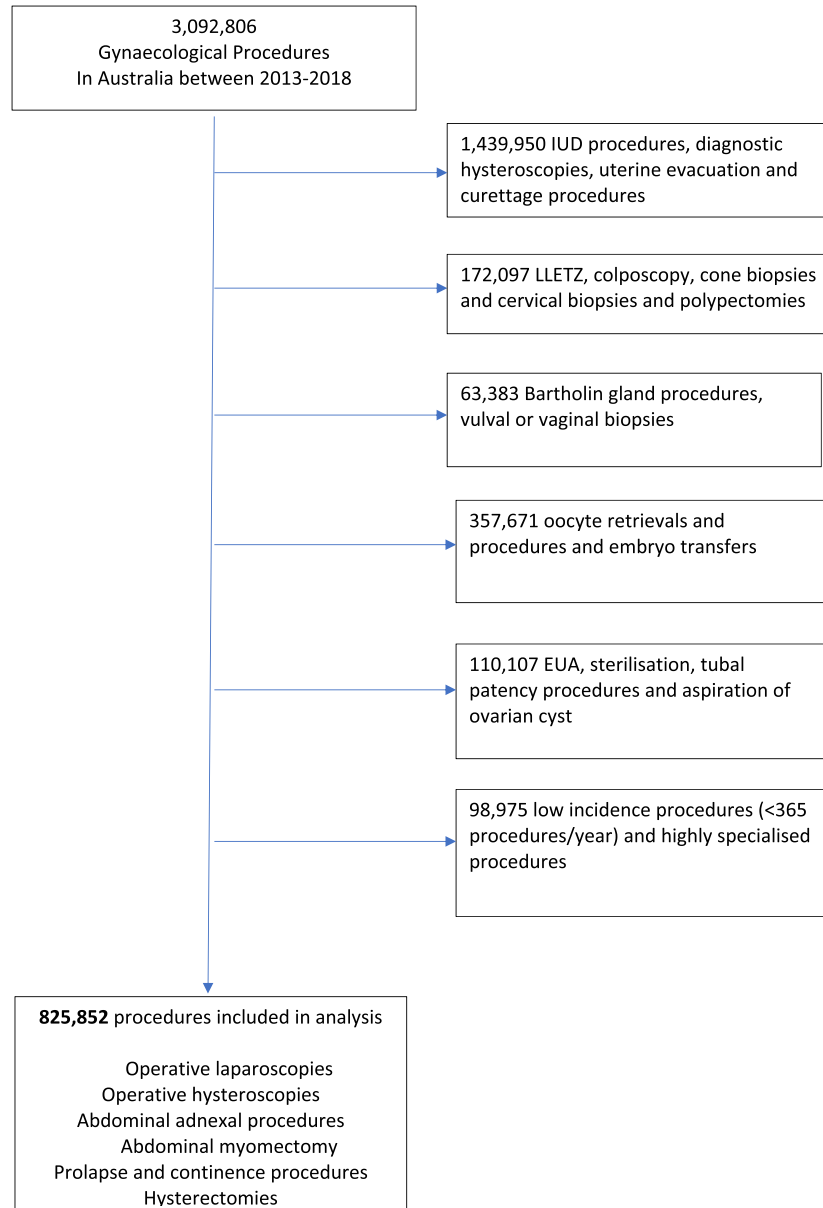


FIGURE 1 Flow of excluded and selected procedures.

These data demonstrate a substantial decline in continence procedures in both the public and private sector – a likely consequence of complications related to vaginal mesh.²¹ This decline means that trainees outside of urogynaecology subspecialty training are unlikely to gain sufficient exposure to gain proficiency in these specific procedures.⁷ RANZCOG's position statement recommends that mid-urethral sling surgery (MUS) be performed only by those who do so regularly and supports the ACSQHC recommendation that a surgeon performing fewer than 10 continence cases per year requires another period of supervision by a more experienced surgeon.^{22,23} It may be prudent that such low-incidence procedures are only performed alongside an outcomes assessment such as the UGSA database.²⁴ Other procedures, such as hysteroscopic treatment of advanced intrauterine adhesions, are similarly complicated procedures. When even 'high-volume'

cases are fewer than 20/year in a concentrated clinical practice, referral to specialised centres are entirely appropriate.²⁵ Changes to practice distribution have implications for service delivery, and the balance of access and patient safety must be considered.

The increasing number of complex laparoscopies and laparoscopic hysterectomies is in keeping with findings from other studies.^{26,27} Currently, RANZCOG advises that the acquisition of a minimum AGES level 4 skill level as optional for a generalist gynaecologist. Focused laparoscopic training has been shown to be beneficial in surgical education, and further requirements during training are likely to better prepare trainees for specialist practice.²⁸

Addressing these issues is complex. What is clear is that we cannot increase the surgical substrate. We can, however, consider changes in training and credentialing to help optimise ability to

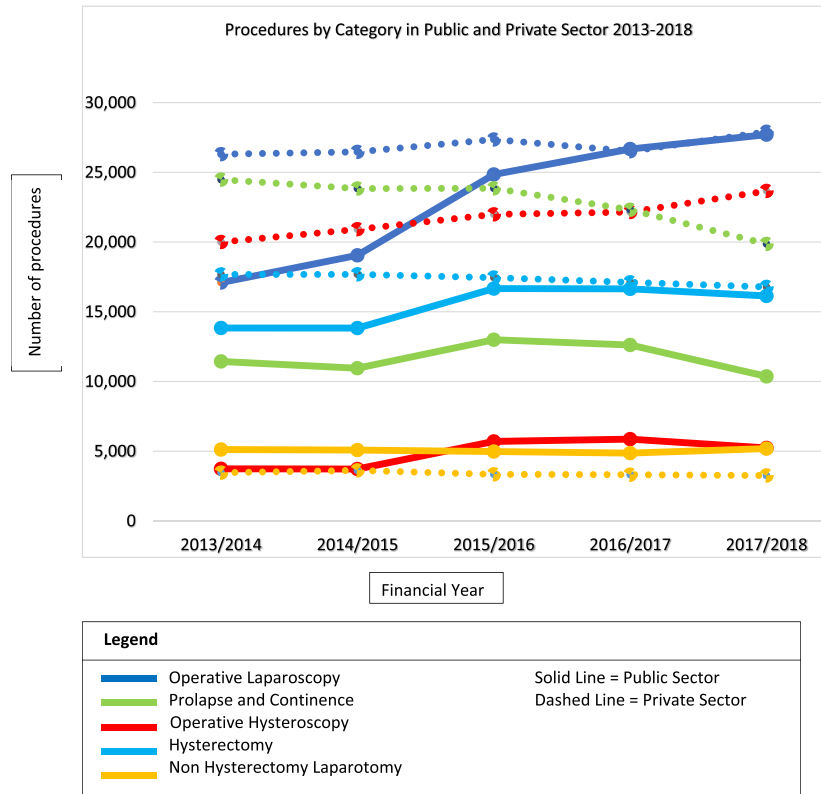


FIGURE 2 Major gynaecological procedures by category performed between 2013 and 2018.

obtain and maintain adequate exposure for best practice. It would be possible to limit the number of trainees who seek to achieve proficiency in operative gynaecology and continue to provide service for women across the country and maintain high standards of care. This could be achieved by separate training pathways for obstetrics and gynaecology training, or by introducing earlier streaming in operative gynaecology with service delivery in training units altered accordingly to accommodate these changes.

Laparoscopic hysterectomy could become a core procedure for trainees, given it is now the most commonly performed approach for uterine removal.

There is already geographical variation in the provision of surgical services, and certain gynaecological surgeries are performed more commonly in regional centres than major cities.²⁹ Hospital administrations could work within or alongside other health services, to ensure the provision of a range of patient services.

TABLE 1 Specific procedures in the public sector and no. per trainee per year

	13/14	14/15	15/16	16/17	17/18	% Change over 5 years	Number/trainee/year
Endometrial ablation	8270	8849	10 446	11 083	11 184	+35%	17.2
Vaginal prolapse surgery	7576	7399	8877	8879	7975	+5%	14.0
Laparoscopic hysterectomy	4488	4988	6651	7337	7696	+72%	10.7
Complex lap	2532	3538	5358	6117	6277	+148%	8.2
Abdominal hysterectomy	5999	5540	5899	5428	4996	-17%	9.6
Vaginal hysterectomy	3676	3541	3916	3766	3224	-12%	6.2
Lap ectopic	2644	2748	2866	2932	2854	+8%	4.8
Vaginal stress incontinence procedures	3530	3226	3818	3465	2418	-32%	5.7
Abdominal adnexal procedures	1979	2059	1826	1850	1790	-10%	3.3
Abdominal myomectomy	808	843	769	794	826	+2%	1.4
Hysteroscopic myomectomy	580	597	917	950	792	+37%	1.3
Abdominal pelvic floor surgery	285	236	297	193	7	-98%	0.4

TABLE 2 Specific procedures in private sector and no. per specialist per year

	13/14	14/15	15/16	16/17	17/18	% Change over 5 years	Number/specialist/ year
Complex lap	17 766	18 233	19 296	19 168	20 763	+17%	11.2
Vaginal prolapse surgery	17 187	16 632	16 736	15 578	14 536	-14%	9.5
Laparoscopic hysterectomy	6276	7033	7387	7862	8321	+33%	4.3
Abdominal adnexal procedures	4764	4719	4596	4534	4871	+2%	2.8
Vaginal hysterectomy	5090	4545	4405	3887	3432	-33%	2.5
Vaginal stress incontinence procedures	5598	5234	5088	4587	3173	-43%	2.8
Abdominal hysterectomy	4723	4445	3972	3680	3285	-30%	2.4
Hysteroscopic myomectomy	1872	2048	2116	2212	2325	-24%	1.2
Abdominal pelvic floor surgery	1682	2025	2025	2149	2209	+31%	1.2
Endometrial ablation	1491	1432	1562	1595	1617	+8%	0.9
Abdominal myomectomy	327	359	444	404	365	+11.6%	0.2
Lap ectopic	301	291	271	265	234	-22.2%	0.2

Recruitment within obstetrics and gynaecology departments could be adapted to employ specialists with complementary skills, without an expectation that all operative gynaecologists can perform the full range of gynaecological surgical procedures. It is imperative to note that skill-mix in maternity units should include capacity for emergency peri-partum hysterectomy, where surgical intervention is life-saving.³⁰

Limitations of our study include the reliance on the correct application of ACHI procedure codes. The calculation of 'private' cases relies on the assumption that there will be an MBS item number and bill applied; that the MBS item number is an accurate reflection of the surgery performed and that these MBS codes are not used by surgeons in other specialties. Since the MBS codes are statutory and billing may be audited, these are reasonable assumptions. While these item numbers may be used by non-gynaecologists occasionally, they are more likely to be predominantly billed by gynaecologists. All 'public' cases are assumed to be available to trainees. In practice, specialists may perform a proportion of these cases, and therefore the derived average trainee volume may be overestimated. However, we have provided low estimates of procedures per trainee. If these have been overestimated, then the actual gynaecology surgical volume available for training is even lower. All 'private' cases are assumed to be performed by specialists. Some specialists work only in the public sector and therefore, this study may underestimate the average specialist volume of private cases. However, national data indicate that in the gynaecology scope of practice, the number of specialists who practice in the public and private sectors is almost equal.³¹ There may be a number of fee-for-service public cases performed by gynaecologists that appear in the 'private' category, and trainees may undertake surgical training within the private system. The exact number of each of these variances is unknown, but their impact is likely to be low given that our sensitivity analysis showed that variations in volume of even 20% may result in a change of only 2–3 cases/year for individuals. Future research

that seeks to more accurately quantify surgical volume for gynaecology trainees and specialists may be possible only if data are prospectively collected for this specific purpose and there is no capacity within the current AIHW data sets to determine granularity to this level.

The number of laparotomies, vaginal hysterectomies and vaginal stress incontinence procedures is decreasing. In contrast, the number of complex laparoscopies and laparoscopic hysterectomies is increasing. This change in profile and exposure is likely to have downstream effects on trainees, gynaecologists and patients. We can address this by introducing changes to training and practice to optimise patient care.

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