

# Geographic Variation in Apical Support Procedures for Pelvic Organ Prolapse

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**OBJECTIVE:** To measure geographic variation in rates of apical support procedures for the treatment of pelvic organ prolapse (POP) among female Medicare beneficiaries.

**METHODS:** We conducted a retrospective, cross-sectional study and used 100% Medicare fee-for-service claims to identify a cohort of women aged 65–99 years who had an apical support procedure, defined by Current Procedural Terminology codes, in 2016–2018. We included all vaginal and abdominal approaches (native tissue and mesh colpopexies) and obliterative procedures. We excluded vaginectomies with a diagnosis of gynecologic cancer that did not have a diagnosis for prolapse. We created rates of apical POP procedures by hospital referral region and computed coefficients of variation to measure the degree of geographic variation.

**RESULTS:** An average of 26,005 apical POP procedures were performed annually from 2016 to 2018. The majority of patients were aged 65–74 years (64.3%), and 28.5% had concomitant hysterectomy. From 2016 to 2018, there was a mean of 1.79 apical POP procedures per 1,000 female beneficiaries performed across hospital referral regions (95% CI 1.74–1.84). Rate estimates ranged between 0.87 (95% CI 0.63–1.11) apical POP procedures per 1,000 female beneficiaries (Alexandria, Louisiana) and 3.33 (95% CI 2.91–3.74) per 1,000 beneficiaries (Akron, Ohio), a nearly fourfold difference in rates. Variation between hospital referral regions for abdominal apical prolapse procedures was the greatest (coefficient of variation 0.52). Vaginal and obliterative approaches demonstrated less variation between hospital referral regions (respectively, coefficient of variation 0.36 and 0.40).

**CONCLUSION:** There is wide geographic variation among hospital referral regions for the treatment of POP. Women may be treated differently based on where they live and seek care, which raises questions about possible overuse in some regions and concerns about underuse and lack of access in other regions.

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lapse surgery based on patient preferences regarding risks and outcomes.

Ideally, variation in elective surgical approaches to treat a given pathology would be driven by patient needs and individual values (preference-sensitive care) rather than referral patterns or surgeon preferences (supply-sensitive care).<sup>11,12</sup> Prior studies of other elective surgical procedures have demonstrated wide geographic variation by surgical approaches and conditions. For example, there exists 5- to 13-fold difference among alternative procedures used by region when examining hip replacement, knee-replacement, hysterectomy, radical prostatectomy, and carotid endarterectomy procedures.<sup>13,14</sup> These differences have persisted even after adjusting for patient characteristics and could affect surgical eligibility (eg, age, body mass index, smoking status), or access to treatment (such as gender, race, median household income, dual-eligibility for Medicaid benefits).

These studies have used hospital referral regions, a validated measure of health care referral markets in the United States.<sup>15,16</sup> The 306 hospital referral regions were developed by the Dartmouth Atlas of Health Care to investigate variation in regional health care services. They are defined as regions for tertiary medical care that must contain at least one hospital that performs major cardiovascular procedures and neurosurgery. Regions are pooled if the total population is less than 120,000 or if more than 35% of residents' hospitalizations occur outside of the hospital referral region.<sup>16</sup>

Understanding geographic variation in the treatment of POP is important because few researchers have previously studied this in gynecology and further study may uncover disparities of care and surgical treatment, as well as elucidate potential pathways to increase preference-sensitive care. When specifically considering apical prolapse treatment, we hypothesize that regional variation between the types of surgical procedures performed may be substantial. The objective of this work was to measure the geographic variation in rates of apical POP procedures for the treatment of POP among female Medicare beneficiaries aged 65 years and older.

## METHODS

This retrospective, cross-sectional study analyzed geographic variation of apical POP procedures among Medicare beneficiaries. Medicare fee-for-service carrier claim files, which include professional claims for physician services, were used to identify women aged 65–99 years who underwent apical POP procedures

between January 1, 2016, and December 31, 2018. Using claims in this time period accommodates the transition from the International Classification of Diseases, Ninth Revision, to the International Classification of Diseases, Tenth Revision (ICD-10), coding system in October 2015 and avoids any major U.S. Food and Drug Administration announcements regarding the use of mesh products during the study period. We requested and were granted the ability to use the 100% carrier files from the Centers for Medicare & Medicaid Services owing to the relatively low number of annual POP procedures. Sample size was based on a study by Khan et al, which examined a similar cohort of Medicare beneficiaries and identified a 15.3% rate of any surgical treatment for prolapse in a 5% sample.<sup>17</sup> The study was approved (#02000640) by the Dartmouth-Hitchcock Institutional Review Board and adheres to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines.<sup>18</sup>

For rate calculation, the numerator and denominator were constructed separately for each of the 3 years, then the data were pooled across years. For a given year, the denominator comprised all women who were U.S. residents and enrolled in Medicare fee-for-service Parts A and B without health maintenance organization coverage throughout the entire year. The numerator comprised apical POP procedures performed for these women. Consistent with Centers for Medicare & Medicaid Services guidelines, cells with counts less than 11 are omitted to preserve protected health information.

Apical POP procedures were divided into three categories: abdominal, vaginal, and obliterative, identified by Current Procedural Terminology (CPT), 4<sup>th</sup> Edition, procedure codes. To capture as many apical support procedures as possible, we were inclusive with the CPT codes. Enteroceles have been noted to be attributable to an apical defect; therefore, enterocele repair was included as a possible apical POP procedure. Additionally, vaginal mesh revisions (CPT codes 57,295 and 57,296) were included because in the past some vaginal mesh kits were used with the intention of providing apical support. We excluded women who underwent a vaginectomy when accompanied by an oncologic ICD-10 diagnosis code and without an ICD-10 prolapse diagnosis code. Claims data missing gender or ZIP code were excluded (Appendix 1, available online at <http://links.lww.com/AOG/C626>).

We measured geographic variation of apical POP procedure rates using two standard measures of variation: The coefficient of variation and interdecile ranges. The coefficient of variation allows a



**Table 1. Selected Characteristics for Apical Pelvic Organ Prolapse Procedures, 2016–2018 (N=81,459)**

| Characteristic                         | Women Who Underwent Apical POP Procedures |
|--|---|
| Age (y)                                |   |
| 65–74                                  | 52,351 (64.3)                             |
| 75–84                                  | 25,285 (31.0)                             |
| 85–99                                  | 3,823 (4.7)                               |
| Race                                   |   |
| Asian                                  | 755 (0.9)                                 |
| Black                                  | 2,974 (3.7)                               |
| Hispanic                               | 1,150 (1.4)                               |
| North American Native                  | 396 (0.5)                                 |
| White                                  | 74,403 (91.3)                             |
| None of these                          | 910 (1.1)                                 |
| Unknown                                | 871 (1.1)                                 |
| Eligible for full Medicaid benefits    | 4,447 (5.5)                               |
| Eligible for partial Medicaid benefits | 2,533 (3.1)                               |
| Location of procedure                  |   |
| Ambulatory surgery center              | 1,415 (1.7)                               |
| Hospital (inpatient)                   | 16,025 (19.7)                             |
| Hospital (outpatient)                  | 63,381 (77.8)                             |
| Other                                  | 638 (0.8)                                 |
| Type of apical POP procedure           |   |
| Vaginal prolapse repair                | 39,503 (48.5)                             |
| Sacrospinous ligament fixation         | 20,576 (25.3)                             |
| Uterosacral ligament suspension        | 13,295 (16.3)                             |
| Abdominal prolapse repair              | 27,049 (33.2)                             |
| Obliterative or vaginectomy            | 14,907 (18.3)                             |
| Concurrent procedures                  |   |
| Incontinence procedure                 | 32,041 (39.3)                             |
| Level 2 or 3 support                   | 46,921 (57.6)                             |
| Paravaginal repair                     | 3,647 (4.5)                               |
| Vaginal mesh including revision        | 14,256 (17.5)                             |
| Hysterectomy                           |   |
| Abdominal                              | 791 (1.0)                                 |
| Laparoscopic                           | 6,048 (7.4)                               |
| Vaginal                                | 8,266 (10.2)                              |
| Supracervical                          | 722 (0.9)                                 |
| Laparoscopic-assisted vaginal          | 1,917 (2.4)                               |

(continued)

**Table 1. Selected Characteristics for Apical Pelvic Organ Prolapse Procedures, 2016–2018 (N=81,459) (continued)**

| Characteristic              | Women Who Underwent Apical POP Procedures |
|-----------------------------|---|
| Laparoscopic supracervical  | 5,459 (6.7)                               |
| Diagnosis                   |   |
| Pelvic organ prolapse       | 76,443 (93.8)                             |
| Stress urinary incontinence | 33,290 (40.9)                             |
| Fecal incontinence          | 1,166 (1.4)                               |

Data are n (%).

comparison across different regions where a procedure is performed by standardizing the mean. Interdecile range, or the difference between the 10th and 90th percentile regions, eliminates the outliers in either the bottom or top 10% of regions. The rates were analyzed by hospital referral region, which are regions based around at least one hospital that provides cardiovascular procedures and neurosurgical care, representing 306 U.S. tertiary care markets.<sup>16</sup>

We considered crude and adjusted rates in our analysis. Consistent with small area variation methods used in the Dartmouth Atlas,<sup>16</sup> adjusted rates controlled for patient age (categorized into three strata: 65–74, 75–84, 85–99 years) and race (Black and additional categories that include White, Asian, Hispanic, North American Native, none of these, and unknown) using the Research Triangle Institute algorithm. These adjustments were designed to identify regional variation that is the consequence of physician behavior rather than regional disparities in health needs or long-standing barriers to access.<sup>3,19–21</sup> Sensitivity analysis using either Pearson correlation coefficient or R<sup>2</sup> was completed for each year and all three combined between adjusted and unadjusted rates. As shown in Appendix 2 (available online at <http://links.lww.com/AOG/C626>), the adjustments made little difference, and so our primary results will be presented for crude rates. We included race and age to describe the population studied to enable readers to determine the applicability of these results to their local community. Statistical analysis was performed using SAS 9.4.

## RESULTS

A total of 81,459 apical POP procedures with and without concurrent hysterectomy and urinary incontinence procedures were performed during the 3-year



**Table 2. Procedure Code Count, 2016–2018**

| Procedure Type              | HCPCS  | HCPCS Label                                     | No. of Procedures | No. of Beneficiaries |
|-----------------------------|--------|---|-------------------|----------------------|
| Vaginal prolapse repair     | 57,282 | Colpopexy extraperitoneal                       | 19,603            | 19,303               |
|                             | 57,283 | Colpopexy intraperitoneal                       | 12,469            | 12,407               |
|                             | 57,295 | Revision vaginal graft                          | 3,442             | 3,305                |
|                             | 57,268 | Enterocoele repair                              | 1,926             | 1,912                |
|                             | 58,263 | Less than 250-g hysterectomy or BSO+enterocoele | 1,179             | 1,175                |
|                             | 58,270 | Less than 250-g hysterectomy+enterocoele        | 856               | 853                  |
| Abdominal prolapse repair   | 58,294 | Greater than 250-g hysterectomy+enterocoele     | 28                | 28                   |
|                             | 57,425 | Laparoscopic colpopexy                          | 22,236            | 22,056               |
|                             | 57,280 | Colpopexy                                       | 3,118             | 3,096                |
|                             | 57,270 | Enterocoele repair                              | 878               | 869                  |
|                             | 58,400 | Uterine suspension                              | 352               | 349                  |
|                             | 57,426 | Endoscopy or laparoscopy                        | 241               | 240                  |
|                             | 57,296 | Revision vaginal graft                          | 218               | 210                  |
|                             | 58,410 | Uterine suspension+sympathectomy                | −999              | −999                 |
| Obliterative or vaginectomy | 57,120 | Colpocleisis                                    | 9,368             | 9,266                |
|                             | 57,110 | Vaginectomy complete                            | 2,837             | 2,830                |
|                             | 57,106 | Vaginectomy partial                             | 2,243             | 2,190                |
|                             | 58,275 | Vaginal hysterectomy+vaginectomy                | 280               | 280                  |
|                             | 58,280 | Vaginal hysterectomy+vaginectomy+enterocoele    | 179               | 179                  |

HCPCS, Healthcare Common Procedure Coding System.

period (Table 1). Of these, 76,443 (93.8%), had a diagnosis of POP, and 23,203 had a concurrent hysterectomy (28.5%). The majority of women were White (n=74,403; 91.3%) and aged 65–74 years (n=52,351; 64.3%).

Among vaginal apical prolapse repairs, extraperitoneal colpopexy (n=19,603; 50%) comprised the majority with intraperitoneal colpopexy (n=12,469, 32%) as the second most common approach. Eighty-five percent (n=22,236) of the abdominal apical POP procedures were laparoscopic sacral colpopexy. Colpocleisis accounted for the majority of the obliterative procedures (n=9,368, 63%) (Table 2).

Rates adjusted for age and race were compared with crude rates with a Pearson correlation coefficient; they exhibited equal average values and were highly correlated with crude rates (the Pearson correlation rate was 0.98); therefore, we proceeded with using crude rates for the remainder of the analysis. The mean rate for all apical POP procedures was 1.79 per 1,000 beneficiaries per year (95% CI 1.74–1.84) across all hospital referral regions with minimal variability (coefficient of variation 0.25, interdecile range 1.18). Analysis of all apical POP procedures demonstrated a nearly fourfold difference in rates between the lowest region (Alexandria, Louisiana: 0.87/1,000/year, 95% CI 0.63–1.11) and highest region (Akron, Ohio: 3.33/1,000/year, 95% CI 2.91–3.74). (Table 3).

Vaginal apical POP procedures had the next highest mean (0.88/1,000/year; 95% CI 0.84–0.92) followed by abdominal procedures (mean 0.62/1,000/year; 95% CI 0.59–0.66). Among the vaginal procedures, three hospital referral regions were suppressed owing to the low number of procedures performed, which left 303 hospital referral regions for analysis. St. Paul, Minnesota, had the lowest rate of vaginal apical POP procedures performed (0.24/1,000; 95% CI 0.12–0.35), which was eight times lower than the highest in Mesa, Arizona (2.24/1,000, 95% CI 2.01–2.48). After removing the highest and lowest 10th percentiles, the interdecile range was 0.77 and the coefficient of variation was 0.36. Six hospital referral regions were high utilizers overall of apical POP procedures (Winchester, Virginia; Kettering, Ohio; Fort Worth, Texas; Provo, Utah; Sun City, Arizona; and Mesa, Arizona) (Figs. 1 and 2).

For abdominal sacral colpopexy, 19 hospital referral regions were suppressed after Centers for Medicare & Medicaid Services guidelines, leaving 287 hospital referral regions in the analysis. This procedure had a high degree of variation between the lowest (Columbus, Missouri: 0.10/1,000; 95% CI 0.05–1.15) and highest (Gainesville, Florida: 1.9416/1,000; 95% CI 1.69–2.22) regions, with a coefficient of variation of 0.52. The interdecile range was 0.73, indicating a tighter range of rates, with the highest and lowest





**Table 3. Apical Pelvic Organ Prolapse Procedure Crude Rates by Hospital Referral Region, 2016–2018**

|                                    | All POP Procedures    | Vaginal Procedures  | Abdominal Procedures | Obliterative Procedures |
|------------------------------------|-----------------------|---------------------|----------------------|-------------------------|
| No. of unique beneficiaries        | 75,695                | 37,958              | 19,303               | 12,407                  |
| Suppressed HRRs                    | 0                     | 3                   | 19                   | 55                      |
| HRRs more than 2 SD above the mean | 10                    | 9                   | 10                   | 8                       |
| HRRs less than 2 SD below the mean | 1                     | 1                   | 0                    | 0                       |
| Mean rate (95% CI)*                | 1.79 (1.74–1.84)      | 0.88 (0.84–0.92)    | 0.62 (0.59–0.66)     | 0.35 (0.33–0.37)        |
| HRR with lowest rate               | Alexandria, Louisiana | St. Paul, Minnesota | Columbus, Missouri   | Memphis, Tennessee      |
| Minimum HRR rate (95% CI)*         | 0.87 (0.63–1.11)      | 0.24 (0.12–0.35)    | 0.10 (0.05–1.15)     | 0.10 (0.06–0.14)        |
| HRR with highest rate              | Akron, Ohio           | Mesa, Arizona       | Gainesville, Florida | Tuscaloosa, Alabama     |
| Maximum HRR rate (95% CI)*         | 3.33 (2.91–3.74)      | 2.24 (2.01–2.48)    | 1.95 (1.69–2.22)     | 0.81 (0.54–1.09)        |
| SD                                 | 0.45                  | 0.32                | 0.32                 | 0.14                    |
| Percentile                         |                       |                     |                      |                         |
| 10th                               | 1.2                   | 0.51                | 0.29                 | 0.2                     |
| 25th                               | 1.48                  | 0.64                | 0.36                 | 0.22                    |
| 50th                               | 1.74                  | 0.84                | 0.54                 | 0.30                    |
| 75th                               | 2.08                  | 1.09                | 0.79                 | 0.40                    |
| 90th                               | 2.38                  | 1.28                | 1.02                 | 0.53                    |
| Interdecile range                  | 1.18                  | 0.77                | 0.73                 | 0.33                    |
| Coefficient of variation           | 0.25                  | 0.36                | 0.52                 | 0.40                    |

POP, pelvic organ prolapse; HRR, hospital referral region.

Data are n unless otherwise specified.

\* Excludes suppressed HRRs.

10th percentile hospital referral regions removed. Four hospital referral regions were co-listed as high utilizers for all apical POP procedures (Richmond, Virginia; Akron, Ohio; Austin, Texas; and Gainesville, Florida). (Figs. 1 and 2).

Obliterative procedures had moderate variation between regions with coefficient of variation of 0.40 and 55 regions required suppression (hospital referral region 251). Obliterative apical POP procedures were performed most often in Tuscaloosa, Alabama (0.81/1,000, 95% CI 0.54–1.09), and the least in Memphis, Tennessee (0.10/1,000, 95% CI 0.06–0.14), with a mean rate of 0.35 per 1,000 (95% CI 0.33–0.37) and a coefficient of variation of 0.4 (Figs. 1 and 2).

## DISCUSSION

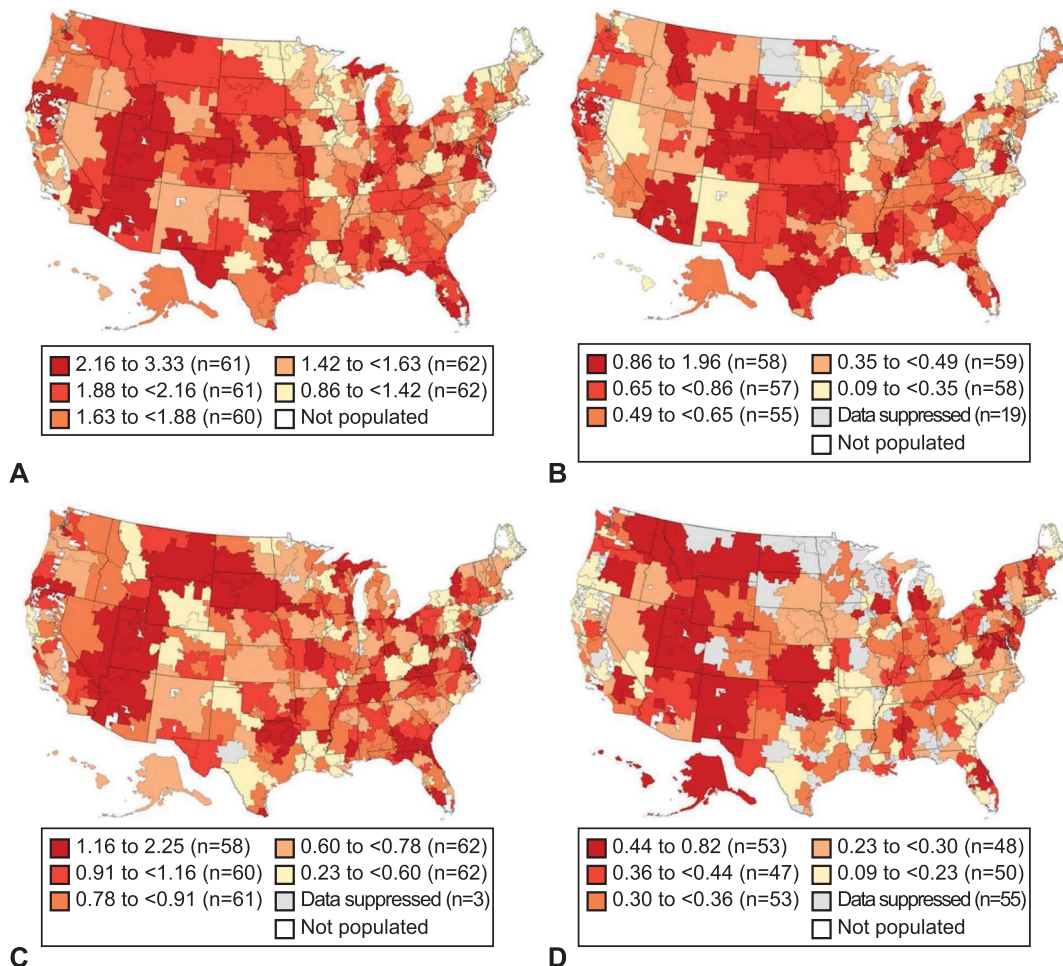
In this national cross-sectional study of 81,459 apical POP procedures among Medicare beneficiaries from 2016 to 2018, we found a fourfold difference in apical POP procedure rates across hospital referral regions. Additionally, rates of abdominal apical POP procedures exhibited the greatest degree of regional variation, with nearly 20-fold difference between hospital referral regions. Most of the variation in abdominal prolapse procedures, however, can be explained by several hospital referral regions with extremely high rates; when excluding these outliers, the variation is

more consistent across hospital referral regions for all apical POP procedures. Obliterative procedures had the highest number of suppressed regions, which may indicate that there are many regions where these procedures are either not available or underutilized, even though they have been found to be safe and effective.<sup>22</sup> Jones et al<sup>23</sup> noted similar variation of obliterative procedure utilization among gynecologists.

The reasons for variation among surgical procedure rates have been discussed in prior literature and include patient preference, physician beliefs regarding surgical options, professional society guideline adherence, available equipment, and physician training.<sup>15,24</sup> Birkmeyer et al discussed the complexity of influences on surgical rates given that patient preference is dependent on the ability to comprehend risks and benefits of the procedure, which are often influenced by physician presentation.<sup>13</sup> Often professional practice guidelines can decrease variation when they are specific and there is a clear treatment pathway. However, physicians who seek guidelines for apical POP treatment do not find an explicit surgical pathway.

The American College of Obstetricians and Gynecologists and the American Urogynecologic Society cite level A evidence to support native tissue





**Fig. 1.** Maps of pelvic organ prolapse (POP) apical support procedures per 1,000 female Medicare beneficiaries by hospital referral region (2016–2018). All apical POP procedures (**A**), abdominal POP procedures (**B**), vaginal POP procedures (**C**), obliterative procedures (**D**).

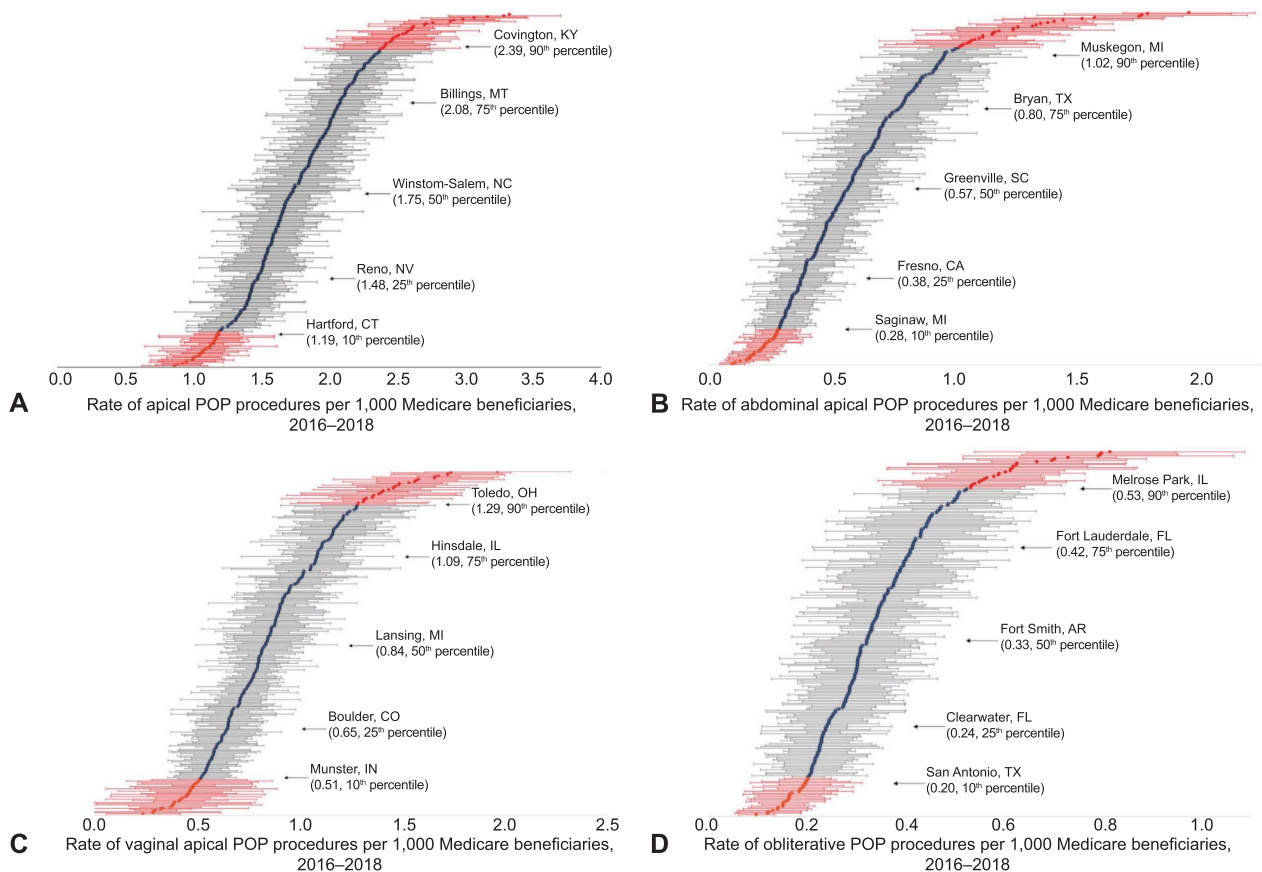
Gerjevic. Variation of Apical Support Procedures. *Obstet Gynecol* 2022.

repairs for the correction of apical POP and level B evidence to support abdominal sacrocolpopexy with synthetic mesh for the same condition, but do not make a recommendation as to which to choose for primary treatment. However, they do note the significant increase in risk relating to synthetic mesh use.<sup>25</sup> The burden is on the physician to adequately and clearly explain this risk to the patient to arrive at a shared decision. The recommendations from the 2017 International Consultation of Incontinence differ and clearly endorse native tissue repair at the time of hysterectomy for the primary treatment of POP owing to the mesh-related risks.<sup>26</sup> This conflicting guidance leads to physician interpretation and results in variation in surgical approaches.

Local resources such as medical equipment, physician training, and physician experience may also

play a role in the type of procedures offered for apical POP. For example, hospitals with robotic equipment are more likely to be incentivized to perform more robotic hysterectomies for benign indications.<sup>27</sup> Utilization of robotic-assisted mesh sacral colpopexies have increased over the past decade, but have not necessarily demonstrated better outcomes over standard laparoscopy.<sup>28</sup> Physician training patterns may also affect types of procedures offered. Fellowship training programs in female pelvic medicine and reconstructive surgery follow the American Board of Obstetrics and Gynecology and the Accreditation Council for Graduate Medical Education guidelines and milestones, but the minimum case volumes for procedures are still being established. Thus, female pelvic medicine and reconstructive surgery fellowship program graduates may have differing surgical





**Fig. 2.** Caterpillar plots of all apical support procedures (A), abdominal apical pelvic organ prolapse (POP) procedures (B), vaginal apical POP procedures (C), and obliterative procedures (D) per 1,000 Medicare beneficiaries for the treatment of POP procedures.

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exposures to apical procedures and approaches, which could influence patterns of care. According to the Association of American Medical Colleges, 54.2% of physicians will remain in the same state where they completed residency<sup>29</sup>; therefore, contributing to the geographic variation in the types of surgical options offered to women with POP.

Prior studies evaluating physician-driven variation in surgical care and other medical treatments have used regional variation to target quality improvement efforts and advance more consistent, evidence-based guidelines to best serve patients.<sup>30–33</sup> For instance, attention has been paid to rural-urban disparities in ovarian cancer care, demonstrating that women in rural communities are less likely to have optimal cytoreduction by a gynecologic oncologist.<sup>34</sup> Barnato et al<sup>32</sup> evaluated disparities between two different institutions with extremes of end-of-life care and intensive care unit utilization. They found differences in physician-patient-family goal setting, physician opinion regarding the

definition of dying, and “self-efficacy for life sustaining treatment decisions”, which in turn drove hospital policy and affected utilization. Additionally, this type of study could be applied to other gynecologic procedures. In 1973, Wennberg and Gittelsohn discovered that hysterectomy rates in Maine varied widely. For example, the region with the highest hysterectomy rate exceeded the state average by 60% and the lowest region by 125%.<sup>35</sup>

Similarly, by uncovering those factors that affect the decision for type of surgery for POP, we might find solutions to enhance POP surgical care, including to better elucidate rural and urban disparities in access to surgical treatment for prolapse. Although there is no established “right rate” for the surgical treatment of apical POP, it is unlikely that the vast differences between regions represent best practices.

There are several limitations of this study. First, restricting the cohort to fee-for-service Medicare Part A and B beneficiaries who are aged 65 years or older



means the results may not be applicable to women younger than age 65 years or women enrolled in Medicare Advantage plans, Veteran's Health Administration plans, or private plans. Second, prolapse procedures performed in hospitals or at surgical centers that do not generate physician claims would be excluded.<sup>36</sup> However, the rates of apical POP surgery we observed are unlikely to be substantially affected by the relatively small numbers of these claims. Third, the assignment of hospital referral region is based on where Medicare recipients live (not where they seek care) and there is a lack of information on prior or repeat prolapse procedures and outcomes. Fourth, we cannot definitely rule out patient preference as an explanation for the threefold differences in rates, but previous literature suggests only a minor role of patient preferences in explaining regional differences in utilization.<sup>37</sup> Finally, claims data are not amenable to obtaining patient level clinical history or surgical outcomes.

Strengths of this study include a large cohort of women across the United States who are enrolled in Medicare Parts A and B over multiple years. When evaluating a single year, many low-volume hospital referral regions are suppressed giving a larger presence to those hospital referral regions where a higher number of apical POP procedures are performed. By combining years, this study is able to represent those lower volume areas. The Medicare data set is reflective of the population of women who are affected disproportionately by POP and may require surgical treatment. This study was careful to avoid large shifts in use of mesh materials for prolapse repairs by choosing to analyze a timeframe that fell between warnings by the U.S. Food and Drug Administration. Although we recognize that the warnings for mesh use were limited to transvaginal, this may have affected sacral colpopexy use as well.

In conclusion, geographic variation exists among hospital referral regions for the treatment of POP. Women with POP are limited on their surgical treatment options based on where they live and seek care. Although some of the differences may be the consequence of differences in health needs and patient preference, geographic disparities are likely to reflect variation in physician preference towards different apical POP procedure as demonstrated in other specialties. Influences on this particular specialty variation are unknown and warrant further investigation.

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