GYNECOLOGY

Is there evidence of a July effect among patients undergoing hysterectomy surgery?

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BACKGROUND: It is hypothesized that the quality of health care decreases during trainee turnovers at the beginning of the academic year. The influx of new gynecology and surgery residents into hospitals in this setting may be associated with poorer surgical outcomes, known as the July effect.

OBJECTIVE: We sought to systematically study hysterectomy outcomes in the state of Maryland during the 3-month period July through September as compared to all other months of the academic year, in order to assess for the presence of a July effect in hysterectomy surgery.

STUDY DESIGN: This is a retrospective study of the Maryland Health Services Cost Review Commission Database from July 2012 through September 2015 focused on women undergoing hysterectomies for benign or malignant disease, either by obstetricians and gynecologists or gynecologic oncologists, during July through September vs October through June. Multivariable logistic regressions accounted for clustering by hospitals and adjusted for several cofactors. The primary outcome includes at least 1 of 11 major perioperative in-hospital complications; the secondary outcomes were extended postoperative length of stay (defined as >2 days) and 30-day inpatient readmission rates.

RESULTS: We identified 6311 hysterectomies (78.2% benign) performed by 424 surgeons at 20 academic hospitals. Patients were primarily white (42.8%), 45–64 years old (54.4%), and had private insurance (66.3%). The unadjusted rate of in-hospital complications was 16.8%, extended length of stay was 30.3%, and 30-day readmissions was 6.6%. After adjustment, patients undergoing hysterectomies during July through September did not have more adverse outcomes relative to those undergoing surgery at other times of the year: complications (adjusted odds ratio, 0.87; 95% confidence interval, 0.75–1.01), length of stay >2 days (adjusted odds ratio, 1.03; 95% confidence interval, 0.90–1.19), and 30-day readmissions (adjusted odds ratio, 0.99; 95% confidence interval, 0.80–1.23). Sensitivity analyses assessing individual complications, hysterectomy outcomes at nonacademic hospitals, and benign vs malignant indications for hysterectomies yielded similar findings.

CONCLUSION: Women in Maryland undergoing hysterectomy surgery at academic hospitals during July through September of the academic year did not experience worse outcomes relative to women having surgery in other months. Additional studies are necessary to further assess the possibility of a July effect in hysterectomy on a national basis. Institutions should continue to provide effective surgical training environments for new interns and residents transitioning to more senior roles, while maintaining optimal patient safety.

Key words: academic hospitals, gynecology surgery, hysterectomy, July effect, perioperative outcomes, residency training

Introduction

Hysterectomy is the second most frequently performed surgical procedure after cesarean delivery in reproductive-aged women, making it the most common major surgical procedure performed in the US female population.[1] The Centers for Disease Control and Prevention has reported that approximately 500,000 hysterectomies are performed annually in the United States, and one third of all women ≥60 years of age have had a hysterectomy.[2] The majority of cases are performed for benign gynecologic conditions, including uterine leiomyomata, endometriosis, abnormal menstrual bleeding, and pelvic organ prolapse.[1]

While hysterectomy surgery is a well-studied topic, little is known regarding contemporary US hysterectomy complication trends during the months of July through September at academic hospitals. These months represent the beginning of each academic year, during which a large turnover of resident trainees occurs. Senior residents graduate from their respective training programs and enter the medical workforce as fellows or attending physicians, existing trainees transition to more senior roles and gain more responsibility, and newly promoted medical students join the resident workforce. It is understood that the latter physician-trainees may, relatively, lack the knowledge, skill, experience, or decision-making capacity of their seniors in their newly promoted roles. This annual shift is the historical means by which aspiring physicians enter, graduate, and progress through residency programs, to gain the knowledge and skills required to practice medicine as independent practitioners.

Given this historical approach to training and annual resident turnover, studies have sought to understand a phenomenon called the "July effect" using indices appropriate to several distinct services and departments in single hospital and regional populations.[3–6] The evidence related to the enormous yearly turnover and hospitals' overall transition from more experienced to less experienced trainees has been postulated to be responsible for an increase in medical errors. However, the data are largely mixed. A recent systematic review of July effect literature reported that mortality and efficiency of care may worsen at the

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AJOG at a Glance

Why was this study conducted?

In an era in which medical centers and physicians prioritize patient safety and outcomes above all else, balancing the responsibilities required for training the next generation of physicians at academic centers while ensuring optimal surgical patient well-being remains a priority and continues to warrant ongoing research.

Key findings

In examining the hysterectomy outcomes at academic hospitals during the months of July through September, compared to all other months of the year, we found that overall unadjusted rates of experiencing 1 of 11 common perioperative complications were 16.8%, extended postoperative length of stay (>2 days) were 30.3%, and 30-day readmissions were 6.6%. There existed no unadjusted or adjusted significant differences in these outcomes by the time of year (July through September vs other months) that the procedure was performed. Several sensitivity analyses, including those comparing hysterectomy outcomes at academic hospitals relative to nonacademic hospitals during July through September, demonstrated similar results.

What does this add to what is known?

Numerous studies have sought to understand the July effect in both medical and surgical fields. However, to our knowledge, this serves as one of the first studies to evaluate the evidence of a July effect in hysterectomy surgery.

beginning of the academic year, but without much understanding of the potential contributing causes.[7] Several July effect studies have alternatively reported no such phenomenon.[3,4,7–10] There are only a handful of studies exploring the July effect in obstetrics and gynecology,[5,9–11] and to our knowledge, few studies exploring this for specific gynecologic procedures. Therefore, we addressed the concept of the July effect in hysterectomy surgery performed for either benign or malignant indications at academic hospitals in Maryland. We hypothesized that hysterectomy outcomes may differ in the beginning of the academic year relative to the remainder of the year at academic centers.

Materials and Methods

Maryland Health Services Cost Review Commission Database

The institutional review board of the Johns Hopkins School of Medicine, Baltimore, MD, exempted this study. We queried Maryland's all-payer claims database, the Health Services Cost Review Commission Database (HSCRC), to identify all elective hysterectomies performed at academic teaching and at nonacademic hospitals from July 1, 2012, through Sept. 30, 2015. The data from this time frame were analyzed because they were the most contemporary available information from the HSCRC that also included data on unique physician identifiers. The HSCRC database captures patients who underwent either same-day surgery and hospital discharge or those admitted to the hospital for ≥23 hours. Using the Medicare Physician Compare database, we only included elective hysterectomies with a planned admission that were performed by surgeons with a primary specialty of obstetrics and gynecology or gynecologic oncology, the only 2 reported specialties available in the database for the field of obstetrics and gynecology. Hysterectomies performed by other surgeon specialties, such as general surgery, likely included concomitant procedures that may confound our analysis. We identified hysterectomies using the following *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*), procedure codes: open abdominal hysterectomy (68.3, 68.39, 68.4, 68.49), laparoscopic hysterectomy (68.31, 68.41, 68.51), robotic-assisted procedures (17.4, 17.41, 17.42), and vaginal hysterectomy (68.5, 68.59).[12,13] We identified hospital characteristics from the American Hospital Association.

We identified malignant indications for a hysterectomy using the following *ICD-9-CM* diagnosis codes: uterine cancer (179, 182), malignant cervical cancer (180), placental cancer (181), ovarian cancer (183), and other female genital cancer (184).[12] To obtain a homogenous surgical population, we removed hysterectomies that also required urologic (59.3–5, 59.7, 59.71, 59.79) or obstetric (72, 73, 74) procedures. Finally, to identify the influx of new interns at these academic hospitals, we dichotomized the months of each hysterectomy either into July through September, or October through June. To further ensure that the case mix of hysterectomies was similar across all quarters, we tabulated the incidence of lysis of adhesions (54.4), pelvic organ prolapse (618.1), and lymph node dissections (40.10, 40.11, 40.20, 40.29, 40.50, 40.52, 40.53) throughout the 3 full academic years at both academic and nonacademic centers (July 2012 through June 2015).

Patient and hospital characteristics

We recorded patient, surgical, and hospital characteristics related to clinical practice and the existing published literature.[12,13] These characteristics included: age (20–44, 45–64, ≥65 years), race and ethnicity (white, black, Hispanic, other), payer (private, Medicare, Medicaid, self-pay, other/unknown), indication (benign, malignant), operative technique (minimally invasive vs open), surgeon volume (≤10 hysterectomies/year, >10 hysterectomies/year), and hospital beds (≤400, >400). To further account for differences in case mix, we used the Elixhauser score, which captures >30 acute or chronic conditions and has been shown to be significantly associated with in-hospital mortality (0–1, 2–4, ≥5 comorbidities).[14] Patients with missing variables were excluded.

Outcomes

The primary study outcome was the presence of at least 1 of 11 in-hospital