**Variability in Surgical Management of Benign Ovarian Neoplasms in Children**

Dani O. Gonzalez MD, Jennifer N. Cooper PhD, Jennifer H. Aldrink MD, Geri D. Hewitt MD, Peter C. Minneci MD MHSc, Katherine J. Deans MD MHSc

*Center for Surgical Outcomes Research, The Research Institute at Nationwide Children’s Hospital; †Department of Surgery, Division of Pediatric Surgery, The Ohio State University College of Medicine, Nationwide Children’s Hospital; ‡Department of Surgery, Division of Obstetrics and Gynecology, The Ohio State University College of Medicine, Nationwide Children’s Hospital*

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**Background**
- Ovarian neoplasms affect 2.6 per 100,000 children each year
- The majority of ovarian neoplasms are benign, with malignancy occurring in ~10% of cases
- Options for the surgical management of ovarian neoplasms include oophorectomy and ovary-sparing surgery (OSS)
- Reasons to attempt OSS: premature ovarian failure, early menopause, shorter reproductive lifespans, risk for contralateral neoplasm and/or torsion

**Objective**
To assess whether variability in management exists across hospitals and physician specialties

**Methods**
- Multi-institutional retrospective review of patients treated between 2006-2014 in the Pediatric Health Information System
- Inclusion criteria:
  - Age 6-21 years
  - Diagnosis of benign ovarian neoplasm, as identified by ICD-9 diagnosis code 220
  - Surgical procedure, as identified by ICD-9 procedure codes (categorized into oophorectomy vs. OSS)
- Inter-hospital variability and predictors of the type of surgery were determined using logistic mixed effects models with random hospital effects
- Institutional chart review to identify the misclassification rate of diagnosis and procedure codes

**Results**
- Of 1164 patients with benign ovarian neoplasms, 646 (55%) underwent oophorectomy and 518 (45%) underwent OSS (Figure 1)
- Across specialties, 36% of patients managed by Pediatric Surgeons underwent OSS, while 68% who were managed by Pediatric & Adolescent Gynecologists (PAGs) underwent OSS (Figure 2)
- In multivariable analyses, patients who underwent OSS were older, not admitted through the emergency department (ED), and treated at hospitals with more procedures performed by PAGs (Table 1)
- Across hospitals, there was significant variability in the proportion of OSS (range 18-81%); this variability remained after adjusting for patient and hospital characteristics (Figure 3)
- Misclassification rates of diagnosis and procedure codes were <10% and <2%, respectively

**Discussion**
- Significant variability exists in the management of benign ovarian neoplasms across hospitals and specialties
- Patients more likely to undergo OSS: older patients, those managed by PAGs or at hospitals with high PAG activity, those not admitted through the ED
- Collaborative efforts between specialties may improve implementation of evidence-based guidelines for OSS
- Future efforts include a multi-institutional quality improvement initiative to more broadly implement best practices and reduce variability in the care of patients with benign ovarian neoplasms

**Table 1: Predictors of OSS for Benign Ovarian Neoplasms**
<table>
<thead>
<tr>
<th>OR</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>1.06</td>
<td>1.02 - 1.11</td>
</tr>
<tr>
<td>Admission through ED</td>
<td>0.76</td>
<td>0.58 - 0.99</td>
</tr>
<tr>
<td>Physician specialty (ref: PAG)</td>
<td>Physician Surgeon: 0.27</td>
<td>0.17 - 0.43</td>
</tr>
<tr>
<td>Other</td>
<td>0.23</td>
<td>0.12 - 0.43</td>
</tr>
<tr>
<td>Unknown</td>
<td>1.05</td>
<td>0.37 - 2.96</td>
</tr>
<tr>
<td>High-volume PAG hospital</td>
<td>2.71</td>
<td>1.42 - 5.16</td>
</tr>
</tbody>
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**Figure 1: Cohort Development**
- Inpatient and observation encounters at 25 hospitals during 2006-2014
- Age 6-21 years with a benign ovarian neoplasm (N = 1339)
- Ovarian procedure (N = 1260)
- Treated at hospitals that managed ≥30 cases (N = 1164)

**Figure 2: Management of Benign Ovarian Neoplasms Across Specialties**
- Pediatric Surgeons
  - Oophorectomy: 36%
  - OSS: 64%
- Pediatric & Adolescent Gynecologists
  - Oophorectomy: 68%
  - OSS: 32%

**Figure 3: Inter-Hospital Variability in the Proportion of Patients Undergoing OSS**
- Percent of patients with OSS across hospitals
- All p<0.001 (●): unadjusted (○): adjusted