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# Quality Improvement in the Surgical Approach to Advanced Ovarian Cancer: The Mayo Clinic Experience

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- BACKGROUND:** After observing disparate rates of cytoreduction, we initiated efforts to improve outcomes through feedback and education, and we reassessed outcomes.
- STUDY DESIGN:** Outcomes from group A (2006 and 2007, n = 105) were compared with those from the cohort predating quality-improvement efforts (group B, 2000 to 2003, n = 132). All stage IIIC ovarian cancer patients at our institution were evaluated for tumor dissemination, age, performance status, surgical complexity, residual disease (RD), morbidity, and mortality. A surgical complexity score previously described was used to categorize extent of operation.
- RESULTS:** No significant differences in age, performance status, or extent of disease were observed between cohorts. Surgical complexity increased after initiation of quality improvement (mean surgical complexity score, 5.5 to 7.1;  $p < 0.001$ ), rates of optimal RD ( $< 1$  cm) improved from 77% to 85% ( $p = 0.157$ ), and rates of complete resection of all gross disease rose from 31% to 43% ( $p = 0.188$ ). In the subset of patients with carcinomatosis most likely to benefit from extended surgical resection, radical procedures were used more frequently (63% versus 79%;  $p = 0.028$ ), rates of optimal debulking (RD  $< 1$  cm) increased (64% to 79%), and the rate of RD = 0 increased from 6% to 24% ( $p = 0.006$ ). When disease was noted on the diaphragm, procedures to remove the disease were more frequently used (38% to 64%;  $p = 0.001$ ). The rates of major perioperative morbidity (group B, 21% versus group A, 20%;  $p = 0.819$ ) and 3-month mortality (8% versus 6%;  $p = 0.475$ ) were not affected despite this more aggressive surgical approach.
- CONCLUSIONS:** Analysis of outcomes with appropriate feedback and education is a powerful tool for quality improvement. We observed improvements in rates of cytoreduction and use of specific radical procedures, with no increase in morbidity as a result of this process. (*J Am Coll Surg* 2009;208:614–620. © 2009 by the American College of Surgeons)
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Despite several improvements in advanced ovarian cancer care, this aggressive disease remains the leading cause of death among gynecologic malignancies, with nearly 16,000 deaths estimated to occur in the US during 2008.<sup>1</sup> During the last decades, the importance of optimal surgical cytoreduction before administration of cytotoxic chemotherapy has been more evidently established in the gynecologic oncology literature. The

significance of complete, as opposed to optimal, cytoreduction has also been appreciated, with reported 5-year survival rates between 40% and 50% for patients with advanced disease cytoreduced to microscopic residual disease.<sup>2–6</sup> The rate of complete cytoreduction and associated survival has been shown to be both surgeon and institution dependent,<sup>7–9</sup> but it also correlates with the intrinsic biology and dissemination of the tumor itself. At present, the only factors we are able to alter are the type of operation, the subsequent amount of residual disease left behind at the end of the surgical procedure, and the type of chemotherapy administered. Improving education and training and our daily practice should be a primary goal, especially in academic tertiary centers.

In 2001, the Institute of Medicine stressed the importance of the quality of care in the US with a “call to ac-

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**Abbreviations and Acronyms**

NSQIP	= National Surgical Quality Improvement Program
RD	= residual disease
SCS	= surgical complexity score
VA	= Department of Veterans Affairs

tion.”<sup>10</sup> Despite this remarkable address, few reports are available about attempts to standardize and improve the quality of care for patients with cancer.

A pilot study from the Society of Clinical Oncology, called Quality Oncology Practice Initiative (QOPI),<sup>11</sup> provided a tool for an objective measurement of quality of care, allowing comparisons among practices and over time, and a mechanism for measuring accordance with published guidelines. Overall, it allows self-examination, promoting an improvement in cancer care. Another initiative, called the National Initiative for Cancer Care Quality (NICCQ),<sup>12</sup> concentrated on breast and colon cancer, showing a substantial consistency with evidence-based practice.

Another well-established tool in the context of general surgery is the National Surgical Quality Improvement Project (NSQIP), which validated a risk-adjustment model for the prediction of surgical outcomes and the comparative assessment of the quality of surgical care among multiple institutions. Since the program started in the Department of Veterans Affairs hospitals (VA) in 1991, the 30-day morbidity rate after major surgery has decreased by 45%, and the 30-day mortality rate by 31%. In 2003 the VA Health System was positively cited by the Institute of Medicine for the initiatives using performance measures.<sup>13</sup> Now the NSQIP involves several VA and non-VA hospitals across the US.<sup>14</sup>

We started a process at our institution in an attempt to standardize and improve surgical management of patients with ovarian cancer. We recently evaluated the effects of radical procedures for their impact on both cytoreduction and survival. We confirmed that residual disease was a strong independent predictor of outcomes, but there were disparate rates of residual disease and implementation of radical procedures among surgeons in our group. This information was published and was the focus of an ongoing conference quality-improvement program within our surgical section in an effort to improve the overall quality. To evaluate the effect of this effort on surgical quality, the rates of specific procedures were evaluated in the calendar years 2006 and 2007 and compared with the cohort of consecutive patients predating our quality-improvement efforts.

**METHODS****Education and feedback**

After reporting internally at our institution the outcomes of patients with advanced ovarian cancer during a 5-year time frame (1994 to 1998), this became the object of a quality-improvement program. This program consisted of four points:

1. Data were periodically discussed at our weekly conference, also comparing the results obtained with those in the most recent literature. This first step allowed a critique of our practice, starting from different points of view. Fellows were also encouraged to present the most recent published reports as a way to positively critique the current practice.
2. Confidential benchmarking was used so that staff members could see where their performance stood relative to that of their peers in a nonthreatening fashion to allow self-improvement.
3. Several seminars and cadaver sessions were used to teach fellows in training and young staff to learn new and complex techniques and become more familiar with the anatomy.
4. Staff members particularly experienced with advanced procedures were also available to scrub in difficult cases or as necessary when requested by younger or less experienced staff. This allowed a collaborative environment without overt criticism.

The whole process was a great opportunity for surgeons to share different views and to collaborate inside and outside of the operating room.

**Data collection**

Mayo Foundation Institutional Review Board approval was obtained for this study. All patients diagnosed with primary epithelial ovarian cancer between January 2000 and December 2003 and between January 2006 and December 2007 were identified from surgical records. Consecutive patients undergoing primary surgical exploration with a postoperative diagnosis of epithelial ovarian cancer were included. We specifically included these two cohorts. The first, previously published,<sup>4,7</sup> represents practice patterns existing before a retrospective study identifying variation in practice within our section. This publication was accompanied by a period of data sharing, individual surgeon feedback, and education between 2004 and 2005. The second cohort consisted of consecutive patients treated after this quality-improvement initiative to examine the impact of these efforts. Patients between January 2004 and December 2005 were excluded, because they were treated during the transition period between the start of the quality-improvement process and publication of our data.

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