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Is it time to centralize ovarian cancer care in the United States?

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Abstract

Purpose—The purpose of this article is to broadly review the most up-to-date information pertaining to the centralization of ovarian cancer care in the United States and worldwide.

Methods—Much of the present literature pertaining to disparities in and centralization of ovarian cancer care in the United States and internationally was reviewed and included, specifically, original research and review articles.

Results—Data show improved optimal debulking rates, NCCN guideline adherence, and overall survival rates in higher volume, more specialized hospitals and amongst higher volume providers.

Conclusion—Patients with invasive epithelial ovarian cancer, especially those with higher stages (III and IV), are better served by centralized care in high-volume hospitals, by high-volume physicians, who adhere to NCCN guidelines wherever possible. More research is needed to determine the policy changes that can increase NCCN guideline adherence in low-volume hospitals and in low-provider caseload scenarios. Policy and future research should be aimed at increasing patient access, either directly or indirectly, to high-volume hospital and high-volume providers, especially amongst Medicare, lower socioeconomic status, and minority patients.

Introduction

The American Cancer Society estimates there will be 21,290 new ovarian cancer diagnoses, with the majority of patients being diagnosed at advanced stages, and 14,180 deaths in 2015 [1]. Though the 5-year survival rates have been increasing and overall mortality decreasing since 1975 [1], there is still more that can be done to increase survival and patient benefit.

Uncontrollable factors such as stage and tumor grade have a large impact on overall survival, but there are other modifiable factors that lend themselves to intervention [2].

In 1997, the Society for Surgical Oncology charged, “Optimal treatment of [ovarian cancer] requires the skillful and appropriate integration of cancer surgery and chemotherapy, and is best carried out in centers in which an experienced and coordinated multidisciplinary team is available” [3]. Since then there has been large debate over the centralization of ovarian cancer care, particularly the role and benefit of high-volume hospitals and providers. The objective of this article is to provide a broad review of the most up-to-date data pertaining to the centralization of ovarian cancer care, the potential health disparities that exist, and how these factors affect patient outcomes, specifically in the United States.

Epidemiology

Many studies have shown that ovarian cancer patients benefit the most from receiving their care from gynecologic oncology specialists, who are the highest-volume providers for ovarian cancer care [5,6]. They operate on more patients with ovarian cancer per year than general gynecologists or other surgical subspecialists. There are approximately 1000 gynecologic oncologists in the U.S., with the majority of providers practicing within 50 miles of large metropolitan areas, mostly in the Northeast and along the Atlantic coast. There are 61 National Cancer Institute (NCI) designated cancer centers that provide patient care in the U.S.; these centers follow this same geographic distribution [7–9], as do many academic and research institutions. Despite this seemingly large numbers of providers, a recent 2015 spatial analysis reported that almost 10% of the U.S. female population lives greater than 50 miles from a gynecologic oncologist [8]. This brings up an important question of how many patients actually have access to specialty care.

Multiple studies have sought to differentiate between high-volume and low-volume hospitals. In the United States, high-volume hospitals have generally been defined as those in which more than 10–20 ovarian cancer cases are performed per year [2,10–14]. Most high-volume hospitals are comprehensive cancer centers and/or academic research institutions [11,16–19]. Most studies conclude that the majority of hospitals are low-volume as it pertains to ovarian cancer care. For example, in 2015 Cliby et al reviewed National Cancer Database data from 1998 to 2008 and found that 65% of centers that provide the initial ovarian cancer management treated only 1–7 ovarian cancer cases per year institution-wide [11]. A 2010 study of the New York, Florida, Washington, and California cancer registries found that 80% of hospitals in these areas treating stage IIIc and IV ovarian cancer patients handled less than 10 of these cases per year [13]. Patient populations treated in low-volume centers are also different from those treated in higher-volume hospitals. These hospitals are more likely to treat patients in lower socioeconomic strata, patients with Medicare or Medicaid insurance, and patients with Stage IV disease [2,11,12]. Those patients with higher socioeconomic status and white patients are more likely to travel farther to high-volume hospitals for care. Those patients in the lowest socioeconomic strata are more likely to receive their care within 5km of their primary residence [20]. Women treated at high-volume centers are more likely to have higher household incomes, be of white race, and have private insurance [9]. Socioeconomic status has been shown to be the most

consistent predictor of where a patient receives her ovarian cancer care [12]. There are very clear disparities in the distribution and access to gynecologic oncologists, the high-volume providers, and to the higher-volume or more specialized hospitals. Whether or not these access and distribution issues make a difference in cancer care has been hotly debated across multiple cancer types [21–25].

Benefits of High Volume/High Provider Care

Improved Patient Outcomes

Surgery in the treatment of ovarian cancer is of prime importance. Data over the past few decades support extensive abdominal and pelvic surgery in achieving optimal cytoreduction [26,27]. Studies reveal that patients are more likely to be optimally debulked when operated on by a high-volume or more specialized provider and/or in a high-volume center [6,10,15,18,19]. A prospective study of ovarian cancer patients in Finland found higher percentages of stage III patients with no residual macroscopic disease after cytoreductive surgery in those patients who were treated by high-volume surgeons in university hospitals [18]. A 2015 study of the California Cancer Database reported similar findings, with low-volume hospitals and low-volume physicians associated with lower rates of debulking and higher rates of patients not receiving surgery at all [10]. Not only are optimal debulking rates higher for higher-volume physicians, but patients treated in high-volume hospitals are five times more likely to be adequately staged than those treated in low-volume hospitals [6].

One of the most important outcomes in cancer research is survival. Many studies have used 5-year survival, progression-free survival, and overall survival as the primary outcomes in evaluating the effects of high-volume care [2,5,13,15–17,19,28]. Almost all of these studies revealed that lower-volume hospitals/providers also have poorer survival outcomes. Ioka's 2004 review of the Osaka Cancer Registry is one of the earliest studies to report these findings in Japan, where they found that 5-year survival rates increased as hospital volume increased [15]. In the U.S., Bristow's 2010 study found that below a hospital surgical volume of 21 cases per year, there was a stepwise decrease in overall survival [2]. There were similar findings in Mercado's study, which showed a 40% higher survival rate in patients treated by specialized physicians in higher-volume hospitals [13].

A 2012 study by Wright et al posed that one reason for increased survival was the increased and improved ability of resource-rich hospitals to save patients who experience complications secondary to their cancer treatment. Despite high-volume hospitals often having slightly higher complication rates, patients were 50% more likely to die from their complications at low-volume hospitals [9].

It is possible that this increase in survival at high-volume centers is secondary to patients receiving more appropriate care. According to the National Comprehensive Cancer Network (NCCN), the optimal primary treatment for advanced epithelial ovarian cancer is optimal cytoreductive surgery followed by 6–8 cycles of dual-agent platinum- and taxane-based chemotherapy [27]. Despite these nationally recognized guidelines, rates of patients receiving NCCN guideline-adherent care ranges from 30–61% across the U.S. [2,11,20,29]. Non-white race and lower socioeconomic status are significantly and independently

associated with not receiving NCCN guideline-adherent regimens [10,14,20]. Receiving non-guideline-adherent care is independently associated with worse outcomes, particularly, survival [5,11,29]. There are many factors that may determine whether a patient is eligible for NCCN guideline-adherent care. These factors may be physician or patient driven and are often difficult to assess, especially in large population-based studies. Regardless of the reason why, however, lower-volume hospitals and physicians are more likely to not administer guideline-adherent care [2,5,10,11,29]. Improving adherence to national guidelines will improve overall survival and patient outcomes.

Increased Cost-Effectiveness

There is valid concern regarding the cost of centralizing care to high-volume hospitals and providers that likely use more resources. Here the data have been more limited. In 2007, Bristow et al created a decision analysis model based on hypothetical scenarios to simulate projected clinical benefits and economic costs of centralized ovarian cancer care for advanced-stage patients and found that referral to an expert center was consistently more cost-effective than referring to a less experienced center [30]. They found that while the overall upfront cost per patient may be higher at expert centers, that strategy proved more cost-effective in the long run because of the increased quality-adjusted life years [30]. Two years later, Greving et al performed a similar study in the Netherlands [31]. They, however, created a decision analysis model based on actual patient data of 879 patients from a random sample of 18 Dutch hospitals where they were able to collect the specific costs of surgery, inpatient stay, and chemotherapy [31]. Results showed no statistically significant difference in chemotherapy, surgical, or total mean costs for the periods spent disease-free and increased total mean costs for residual or relapsed disease in tertiary care centers. However, again, when compared to quality-adjusted life years, they found it more cost-effective to have patients treated in the centers with the highest optimal debulking rates, concluding that the other strategy led to paying the same price for poorer outcomes [31].

An Argument against Centralized Care

Much of the data seem to be in favor of high-volume hospitals and providers, assuming that these centers and providers are not only more expert and specialized, but also have more resources. However, there are a few special scenarios where volume has not proven to be synonymous with improved outcomes. A 2013 retrospective chart review from the Brooke Army Medical Center in San Antonio, TX examined the outcomes from 48 stage III-IV ovarian cancer patients between 2002 and 2010 and found their statistics to be comparable if not better than those reported from higher volume centers [28]. They reported an overall median survival of 37.1 months, an optimal debulking rate of 73%, and a NCCN guideline adherence rate of 85.4%, which is higher than any of the reported data from population based studies. Phippen makes the argument that low-volume centers can achieve similar surgical outcomes when committed to optimal cytoreductive surgery and NCCN guideline adherence [28]. Despite being what would be considered a low-volume hospital as it pertains to ovarian cancer care, the Brooke Army Medical Center has board-certified and fellowship trained gynecologic, medical, and radiation oncologists on staff. As one of the largest military hospitals in the country, it has the same model as a higher volume, more specialized

center, and provide access to appropriate NCCN guideline care. Therefore, it cannot truly be compared to low-volume hospital and provider models.

The International Experience

This issue has been similarly studied abroad and has yielded many of the same results [6,15–19,31]. There are many countries pushing for policy changes that would increase patient access to more specialized care. In 1995, Health Region IV in Norway implemented a system of centralized ovarian cancer care that led to these patients being treated at the one teaching hospital in the region where there is a well supported gynecologic oncology department, as opposed to one of the seven non-teaching institutions staffed by general gynecologists. Since this policy change, 84% of all ovarian cancer patients in this region have been operated on by a gynecologic oncologist at the teaching hospital. They were also able to report optimal debulking rates of 71% at the teaching hospital, compared to 16% at the non-teaching hospitals. They are still collecting data to compare 5-year and overall survival statistics [32].

Recently, Doufekas wrote a review to evaluate the change in the clinical epidemiology of epithelial ovarian cancer in the United Kingdom over the past 10 years, since the National Health System established “Cancer Networks” to emphasize a multidisciplinary team approach to cancer treatment. He found an increase in surgery being performed by gynecologic oncologists, improved adherence to appropriate chemotherapy regimen guidelines, an increase in 5-year survival, and an overall 20% decline in the mortality rate from ovarian cancer in the UK in the last decade. These improvements coincide with the institution of centralized cancer care [16]. While there may be other confounding factors contributing to this progress, it is likely that the centralization of treatment led to the improved surgical and medical care the patients received and therefore the improved mortality outcomes.

Where do we go from here?

The data from the past decade clearly support a high-volume hospital and provider model, presenting multiple results of improved surgical, survival, and guideline adherence outcomes. There are, however, many confounding factors that the current research has not been able to address sufficiently. In order to effect policy change, there needs to be more research examining the true cost of centralized ovarian cancer care. Ongoing research should focus on both direct costs, such as operating room time, chemotherapy and hospital admission, and indirect costs, such as quality of life years, travel, lodging and family burden. To our knowledge, there have been no studies on the quality of life of patients receiving centralized care versus non-centralized care. It is possible that the community hospitals and low-volume hospitals provide a convenience that may be more beneficial to the patient. None of the discussed research takes into account patient preference, ability to travel, or any other patient mediated factor in the selection of ovarian cancer care provider or hospital setting [12]. There also have not been any U.S. studies describing how best to implement centralized ovarian cancer care in our health system. Specialized hospitals and providers need to be able to manage the influx of patients from outside centers. With approximately

1000 gynecologic oncologists and 21,000 new ovarian cancer cases each year [8], there should be 21 cases per surgeon per year; however, these numbers may not reflect how many providers are actually operating and accepting new patients. We need to ensure that the specialty truly can accommodate the volume.

In the meantime, there are sufficient data to address some key issues of access to appropriate ovarian cancer care. Wherever possible, efforts should be made to refer suspected ovarian malignancy to a gynecologic oncologist and patients should be treated according to NCCN guidelines. A recent study highlighted the discrepancy in intraperitoneal (IP)/intravenous (IV) chemotherapy administration amongst various institutions [33]. The use of IP treatment is associated with survival but it is logistically challenging and not every center is equipped to do it. High-volume and specialized centers often are staffed by specialty pathologists, radiologists, and medical oncologists who also have increased expertise in ovarian cancer care.

Computed tomography (CT) is recognized as the most informative and accurate test to evaluate extent of ovarian cancer. This single and widely available test contributes to assessment of resectability and helps triage patients. Ultimately, preoperative computed tomography serves as a “road map” for the surgeons and contributes to optimal debulking. Follow-up CT and positron emission tomography (PET) CT imaging are valuable tools that can help in the early detection of recurrent disease. While there is literature documenting significant associations between imaging features and clinical outcomes, more data are needed regarding the optimal timing to perform imaging assessments and the relationship between different imaging schedules, imaging modalities, and improved patient outcomes. When clinically indicated, follow-up CT and PET CT imaging are valuable tools that help in the early detection of recurrent disease that may be amenable to surgical resection. Recent data show that radiology review by a radiologist who specializes in gynecology can change management in 20–21.5% of cases [34].

When limited by extenuating factors, centers and providers with less experience and less expertise should reach out to more specialized hospitals to ensure the patient is receiving the most appropriate care possible. This may even require that high-volume surgeons travel to low-access areas to perform surgical cases or participate in teaching and training those with less experience. This could also take the form of alliance networks or cross-county disease management teams. There can be joint tumor planning conferences. We should take advantage of the technology available to make sure that access to information is not a barrier. There needs to be quick and extensive diffusion of advancements in surgical techniques and chemotherapy regimens.

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Synopsis

This is a review of the benefits and limitations of centralized care for advanced ovarian cancer in the United States and a call to action to address the barriers for care in this most relevant public health issue.

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