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Review

The future of innovation and training in surgical oncology

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A B S T R A C T

This article addresses the current paradigms of surgical oncology training and the directions in which the training process may evolve over the course of the next decade. In doing so, the potential influences upon this evolution are discussed along with potential barriers associated with each of these factors. In particular, the topics include issues of specialty training with regard to new technologies and procedures, involvement of the surgeon as part of the multi-disciplinary team of oncologists, and the very real issue of burnout and career satisfaction associated with the profession of surgical oncology. Changes to the training of tomorrow's cancer surgeons will need to involve each one of these factors in a comprehensive and efficient manner, in order to ensure the continued strength and growth of the field.

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Introduction

While progress in the scientific understanding and clinical management of all diseases has accelerated over the last quarter century, the challenge facing the field of oncology has been especially pronounced with respect to the array of options available for diagnosis and treatment of malignancies. From the advent of biologic medications targeting cellular processes of tumors, to advancements in radiotherapy for focused treatment with decreased side effects, and to development of technologies for less invasive surgery, cancer care has come a long way in the last several decades.

The unique difficulty for the surgical oncologist comes with understanding the balance between surgical and non-surgical therapies for solid tumors. A single practitioner must be versed in an incredibly wide array of treatment modalities in order to select the right patients for surgery at the right point in the natural history of their disease, and then be able to perform the most appropriate operations at a level of proficiency that ensures the best possible clinical outcomes.

Training systems have also evolved to keep pace with the changing methods of clinical care and the growing body of scientific knowledge necessary for contemporary surgical oncologists. Many of these developments are discussed in this issue of *Surgical Oncology* by the very educators who are pioneering the delivery and assessment of said manual, cognitive, interpersonal, and investigative skills requisite for a complete practitioner. Rather than reiterate these topics or speculate on the content of future training systems, this article focuses on the philosophical changes required for the evolving educational systems for surgical oncology. In particular, three areas of focus for the educational process of future surgical oncology training are addressed; growth in the understanding of

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operative competency, effective participation in a multi-disciplinary team of cancer care providers, and issues of burnout associated with a demanding career as a surgeon-oncologist.

Procedural training and technical competency

The defining characteristic of a surgical oncologist is expertise in specialized operative procedures for diagnosis, cure, or palliation of cancer patients. This expertise must be specific to the particular techniques and technologies needed for a surgical procedure, but also in the application of these modalities to the treatment of solid tumors. It is unlikely, however, that this level of aptitude can be achieved in the course of generalist surgical training. Results from a recent national survey of general surgery training programs in the United States make it clear that the initial training process provides at best a heterogeneous exposure to cancer surgery and at worst a rather narrow scope of experience in select operative procedures [1]. While generalist training is necessary for a basis of skills prior to many sub-specialty surgical fellowships, the results of this nationwide study reinforce the importance of focused exposure to particular oncologic procedures during surgical oncology fellowships [2,3].

Indeed, the first two requirements of fellowship programs in the United States, as set forth by the Society for Surgical Oncology (SSO), stipulate that the training of a specialist surgical oncologist must encompass not only the newest techniques and equipment, but that trainees should be adept at applying these unique procedures for even the most difficult and complex cases [4]. While there are still many general surgical oncology fellowship programs approved by the SSO, specialization also means focus on particular organ systems. In addition to the oncologic training pathways already in place for organ system specialties such as Urology and Gynecology, the SSO now is starting to divide its fellowships into organ systems such as Breast Oncology and Hepato-Biliary and Pancreatic Oncology [5]. Should this trend continue, it is easy to see how the surgical oncologist of the future will really be a super-specialist, both of oncologic medicine and focused within the realm of a particular organ system.

Regardless of which part of the body, the anatomic site-specialist surgical oncologist will require incorporating new sets of technical skills as surgical technology evolves. This challenge was exemplified by the advent of laparoscopy over the last several decades [6]. Training in new surgical techniques does not necessarily need to be extensive in volume but it does need to ensure proficiency in particular operations. Operative volume is still often used as a surrogate marker for surgeon expertise, but there is a growing body of literature with respect to highly specialized procedures indicating that focused training is more important than the sheer number of operations performed.

For complex procedures such as gastrectomy and colectomy, a sub-specialty oncology focus compared to generalist training was demonstrated to have a beneficial influence on perioperative mortality in a large United States population study [7]. When specifically considering the advanced laparoscopic skills necessary for minimally invasive colectomy, a separate, nationwide U.S. study demonstrated that operative volume was not associated with outcomes for surgeons who were suitably trained and credentialed in the technique [8]. Of particular note, the lack of difference between high and low volume surgeons was true not only for perioperative clinical complications and rates of conversion, but it was also true for specific oncologic outcomes such as disease-free survival. What cannot be discerned from these studies is whether the specialty training provides improved proficiency through factors such as operative judgment or pre-operative management, in addition to pure technical practice.

Given this evidence that specialty operative training for individual providers is associated with improved patient clinical outcomes, the unstated implication is that lack of specialty training may lead to poor results for surgical cancer patients. Ensuring the educational adequacy of surgical oncology training programs requires reliable measures of clinical, and specifically operative competency. There is an international interest in measurement of surgical trainee proficiency in the operative theatre with evaluation systems that can now focus on discrete technical steps of laparoscopic and open cancer operations [9–12]. Looking to the near future of surgical oncology training, all educational programs will likely soon incorporate such validated and specific measures. From a broader view, proficiency measures will also likely be required for those surgeons already in practice in order that they too can keep up with the endless wave of new technologies and techniques [13].

Leaders of the multi-disciplinary team

Surgical oncologists may be defined by their ability to operate on patients with solid tumors, but their roles as cancer physicians extend far beyond the operating room. Current requirements for a number of specialty surgical oncology fellowships include knowledge of various strategies for the diagnosis or staging of new or recurrent cancer patients, as well as a thorough understanding of the non-operative management options for these patients [4,14]. Comprehensive care encompasses issues of surgical pathology, imaging, radiation therapy, and the full array of chemotherapeutic drugs best suited for specific tumors.

Given this breadth of knowledge, a surgical oncologist cannot be expected to individually select the right patients at the right point in their disease progression for surgical treatment. The surgeon is one member of a team of oncologic specialists that must cohesively treat cancer patients in order to ensure the best possible clinical outcomes. Whether patients are discussed at a joint conference or seen simultaneously by different specialists, a multi-disciplinary team approach to cancer care has not only become an accepted practice for many oncology centers, it has been increasingly associated with better results for patients. This has been shown for a number of tumor types and has been demonstrated at institutions in various countries [15,16].

A separate article in this issue of *Surgical Oncology* covers the topic of multi-disciplinary cancer care more thoroughly, but there is an important philosophical issue that should be addressed with respect to the future of training paradigms for surgical oncologists. While multi-disciplinary team care has become the standard for some providers, there are still a number of barriers to implementation of this strategy. The reasons for the lack of a team approach are often pragmatic, in that many surgeons feel that there is insufficient time or financial incentive associated with participation in a multi-disciplinary team [17].

A review of the literature on multi-disciplinary cancer care also highlights the lack of leadership in oncology teams as an additional a concern for the further progress of the team approach. This review and the associated proposal for multi-disciplinary team practice guidelines for the province of Ontario, Canada, focus not only on the need for an organizational figure but also a clinical leader for teams of cancer providers [18]. Of the various members of the care team, surgeons are the best suited for this role.

Aside from the cliché of being authoritative personalities in the operative theatre, there are a number of arguments as to why surgeons should step up to lead multi-disciplinary teams. Surgeons are familiar with the effects of medical and radiation therapies when they operate on patients who have received neo-adjuvant treatment or if a chemotherapy patient needs an emergent surgical procedure. Conversely, medical and radiation oncologists rarely treat patients in the acute perioperative setting where they can witness first-hand the morbidity of surgery.