Published in final edited form as:

Am J Surg. 2018 January ; 215(1): 1–7. doi:10.1016/j.amjsurg.2017.05.004.

Cancer Care in the Developed World: A Comparison of Surgical Oncology Training Programs

Motaz Qadan, MD PhD¹, Andrew R. Davies, MD², Hiram C. Polk Jr., MD³, William H. Allum, MD⁴, and Murray F. Brennan, GNZM MD⁵

¹Assistant Professor of Surgery, Division of Surgical Oncology, Department of Surgery, Massachusetts General Hospital, Boston, MA

²Consultant in Esophagogastric Surgery, Department of Surgery, Guy's and St. Thomas NHS Foundation Trust, London, England, UK

³Ben A. Reid, Sr., MD, Emeritus Professor of Surgery, Department of Surgery, University of Louisville and Commissioner of Health, Kentucky Department of Public Health, Commonwealth of Kentucky

⁴Consultant in Esophagogastric Surgery, Department of Surgery, Royal Marsden Hospital, London, England, UK

⁵Vice President for International Program, Benno C. Schmidt Chair in Clinical Oncology, and Director of The Bobst International Center, Department of Surgery, Memorial Sloan Kettering Cancer Center, New York, NY

Introduction

In examining cancer trends between the United States (US) and United Kingdom (UK), data have suggested that differences in cancer management and outcomes exist between these highly advanced and sophisticated cancer care systems.^{1,2} While several differences are frequently highlighted, including variation in tumor screening and detection, access and availability of care, diagnostic and treatment modalities, healthcare spending, accuracy of reported outcomes, and patient cultural preferences, few studies have examined differences in surgical oncology education programs between the two systems.

In this report, we compare factors that differentiate the US surgical oncology education model from the UK system in the context of differences in healthcare infrastructure between the two systems, with the objective of providing insight into the role of US cancer care systems in global cancer education.

Comparing the US and UK Health Systems

Within the US, the development of surgical oncology training is a 'work-in-progress'. We acknowledge that much of cancer surgery in the US, especially breast and colon cancer,

Please address all correspondence to Dr. Motaz Qadan.

The authors have no conflicts of interest, financial or otherwise, to disclose.

continues to be performed by general surgeons. In addition, a significant component of oncologic care is non-surgical. The authors believe that while surgery continues to play a dominant role in the cure of many tumors, surgical training is less likely to influence overall outcome differences between the two systems. However, marked differences exist between the two surgical training systems and warrant reporting, as attempts to globalize surgical oncology training are becoming a focus of national and international societies and global consortiums, such as the Society of Surgical Oncology (SSO) and European Society of Surgical Oncology (ESSO).^{3,4}

Both the US and UK systems have evolved well-structured programs with global reputations that train competent surgeons. Each country is a magnet for surgical trainees from all parts of the world, including high-income countries (HIC) and low and middle-income countries (LMIC). The training systems are predominately designed to serve the perceived needs of the national population, not the needs of international trainees.

Inherent differences are noted between the two systems. The UK has maintained an organ or systems-based approach for specialist training. This includes distinct disciplines in upper gastrointestinal, colorectal, and hepatobiliary and pancreatic surgery, which focus on management by discipline rather than by disease (e.g. cancer). While training includes significant cross specialty exposure to different disciplines during training, pathways in the UK ultimately generate highly specialized organ-based surgeons who are able to care for patients with an array of benign to malignant pathology, but still within the context of multidisciplinary pathways. Conversely, subspecialized training pathways in the US promote a streamlined approach to the treatment of cancer under the umbrella of 'complex general surgical oncology' fellowships, with heavier exposure to a cancer knowledge base but broader clinical practice, rather than the discipline-based approach in the UK. These differences are interestingly noted in the authors' titles.

Surgical Oncology Training in the US

In surgical oncology, US surgical training typically begins with a 5-year general surgical residency. The application involves a computer match that competitively evaluates academic merit and interview performance. Upon matching, the resident enters a structured training program that involves 1 intern year, 2 years of mid-level residency training, followed by senior resident and chief resident years (5 total clinical years). Training is often centered in a single university or hospital-based system and has remained highly structured since its inception by Halsted.⁵ Programs permit, encourage, or mandate dedicated research time with potential for some candidates to seek additional post-graduate degrees in order to improve their competitive outlook for fellowship training and future academic career opportunities. As these programs evolve in other sub-disciplines, such as vascular and cardiothoracic surgery, earlier specialty differentiation may be possible. With an interest in surgical oncology, a chief resident is frequently able to structure rotations during the senior portion of their general surgery residency training to match personal interests.

Training is generally intensive and rigorous, with 80-hour work weeks in short concentrated programs that build on the concept of repetition, continuity of care, consolidated learning, and progressive assumption of responsibility for care. The ability to achieve this while at a

single program improves resident rapport with supervising staff and level of comfort and familiarity with the residents' knowledge and abilities, thereby allowing a graded responsibility approach, both in and out of the operating room. While continuity of institution in the US is a positive for those trainees assigned to an excellent training institution, it can be damaging to those who match in lower quality programs.

Although autonomy during training is variable, education remains heavily supervised. Annual in-service examinations are carried out under the auspices of the American Board of Surgery (ABS). The preservation of the quality of training of surgical residents is a core component of US programs, and is a topic of great national interest.⁶ At completion of residency, the graduating resident is eligible to begin the ABS certification process, with an option to continue fellowship training in a field such as surgical oncology, through a further match system.

Upon completion of residency and successful entry into a surgical oncology fellowship, training continues either at a large academic hospital or a freestanding cancer center. Freestanding cancer institutions that offer such training opportunities are typically National Cancer Institute (NCI)-designated cancer centers. Surgical oncology fellowship training positions are limited in the US to approximately 60 annual positions for a national population of greater than 300 million, although most surgeons who practice oncologic surgery are not fellowship trained, or trained in fellowships other than surgical oncology (e.g. colorectal). Prior to, or during the initial portion of fellowship, the fellow completes board certification in general surgery, which is required for independent practice in the US. This involves passing both written and oral examinations, which confer national board certification by the ABS.

Surgical oncology fellowships are now nationally standardized and rigorously monitored by the Accreditation Council for General Medical Education (ACGME). This governing body controls all residency training in the US, but has recently expanded to apply similar evaluation, training, and work-hour criteria to numerous fellowships, including surgical oncology. Cancer training in the US adheres to meticulously defined standards, and includes surgical rotations in multiple cancer disciplines incorporating gastrointestinal oncology, melanoma, sarcoma, colorectal, and breast surgery, with additional surgical training opportunities in endocrine, thoracic, gynecologic, and head and neck surgery. Exposure to non-surgical disciplines including pathology, radiation oncology, medical oncology, and academic research is mandated.⁷ The proportion and volume of each of these rotations varies according to fellowship and trainee interest, often with opportunities to tailor the education program according to interest. In addition to taking care of patients with complex diseases, structured educational opportunities exist. These include surgical conferences, journal clubs, tumor board meetings, and national video meetings that complete the learning opportunities outside the operating room, thereby providing a busy, well-rounded, and complete experience in the development and maturation of the complex general surgical oncologist.

In terms of operative exposure, specific case numbers for surgical oncology programs are shown in Table 1. The specific objectives of fellowship are identified and presented on the SSO website, with highlights including the acquisition of clinical and technical skills in the

provision of comprehensive cancer care to patients with complex and recurrent neoplasms. The list of objectives is shown in Figure 1.

Following exposure to a wide variety of surgical pathology over a 24-month training period, the fellow becomes eligible for examination in the discipline of surgical oncology. Board certification in surgical oncology is accreditation that has only recently been implemented in order to define an appropriate level of training and knowledge. The general desire is that such accreditation will serve to enhance surgical care delivered to cancer patients.^{8,9} This may also serve to centralize cancer care among high volume institutions, where volume has been an independent surrogate marker of surgical outcome that contributes to differences in survival.^{10–12} The board certification process in surgical oncology is still in its early phases, and the true value of board certification in surgical oncology remains to be objectively determined.

Surgical Oncology Training in the UK

The UK system has evolved in recent years with some attempts to emulate positive aspects of the structured US training (development of foundation year (FY), core training (CT), and specialist training (ST) years), and a shift in emphasis to competence as opposed to time-based training. The system continues to generate highly competent surgeons who provide specialized organ-based care.¹³ This evolution reflects a desire to enhance the quality of training experience, a need to produce competent surgeons for the National Health Service (NHS), and recognition of a previous overly long training program in which emphasis was tipped towards service rather than education. This occurred within the context of the European Working Time Regulations (EWTR), which, although opposed by many surgeons, reduced the working week to 48 hours. Compared with a typical 80-hour average US work week, the European Work-Time Directive (EWTD) mandates 11 hours of rest per day, a right to 1 day off each week, a right to a rest break if the working day is longer than 6 hours, and 5.6 weeks of paid leave each year. Overall, the restriction of work hours has meant comprehensive demanding training programs are 10 to 12 years in length. Historically, a “top-heavy” approach meant that surgical volume was frequently limited to senior trainees, with critical exposure to complex surgical cases often encountered late in the training period. A significant proportion of trainees’ most productive years were frequently spent in prolonged basic training programs, which these changes were designed to address.

Training is implemented under the supervision of the General Medical Council (GMC), which is the statutory regulator for medical practice in the UK. The GMC is responsible for quality assurance of all aspects for education including approval of training programs and specialty curricula. The provision of training is commissioned by health education bodies within the four UK nations, which are responsible to their own respective Departments of Health. In England, Health Education England (HEE) oversees the training programs, which are regional and historically based around university institutions. The management of training provided at both university hospitals and district general (community) hospitals is managed by the regional Schools of Surgery. Representatives of the Joint Committee on Surgical Training (JCST) work closely with Schools of Surgery to provide external quality review of training at the local provider level. HEE determines the numbers of trainees in a

particular specialty based on workforce requirements within the NHS. There are plans to use workforce data to estimate the requirement for complex cancer surgery and develop training opportunities accordingly.

The content of training is determined by the JCST that works on behalf of the four Royal Colleges of Surgeons. The JCST includes 10 Specialty Advisory Groups who develop the respective specialty curricula. In General Surgery, the curriculum is systems-based, rather than disease-specific. It defines both the syllabus for knowledge, clinical and technical skills, and professional skills, as well as the assessment processes both in the workplace and in examinations. All surgical curricula are supported by the Intercollegiate Surgical Curriculum Program (ISCP), which is a web-based resource that describes curricula content and provides a portfolio for trainees to record their experiences and assessments.

Trainees who complete general surgery training are competent in managing common elective and emergency problems, and identify an interest in one of the specialty systems (upper gastrointestinal, coloproctology, breast, endocrine, or transplantation surgery). Trainees typically rotate around different hospitals within their geographical region on an annual basis. While this reduces the institutional continuity enjoyed by US trainees and is socially disruptive for a group of doctors in their early 30's, there are advantages encountered from the wider exposure to the breadth of decision-making, patient management, and surgical techniques that can only be gained by observing variations in practice among senior colleagues.

Exposure to cancer surgery in the UK is part of the elective systems-based training. There are fellowships available in complex areas of cancer surgery under the auspices of the JCST in Head and Neck oncology and Oncoplastic Breast surgery. These fellowships cross over with other specialties as 'Training Interface' fellowships. There are other fellowships available, which are funded from non-statutory sources in individual centers; the Royal College of Surgeons of England has latterly facilitated recognition of these posts. Trainees who wish to work in consultant practice in a complex area of cancer surgery commonly undertake one of these fellowships but also look to overseas opportunities such as North America, Europe, or Australia. While these individual programs have proved popular and effective, there is an absence of national standardization across surgical oncology specialties, as found in the US. Guidelines do exist in terms of operative volumes required to complete specialist training, but these are considered indicative in the context of competence-based training.

Trainee exposure to research is variable. Some regions adopt a traditional UK approach, mandating time out of training to complete a masters or doctoral thesis, while others are more selective, taking the view that many clinicians will choose not to have an active research role in their consultant practice and that this takes further time out of their training for little eventual benefit.

Within an organ-specific subspecialty, the requirement of UK surgeons is that they support benign and emergency practices within their designated field. There are very few UK

examples of focused cancer hospitals and the skills employed in cancer surgery are useful in the management of catastrophic emergencies to a given organ system.

There are notable advantages of the UK system, including a greater degree of autonomy with safe operating standards that can promote independent operating from an earlier stage. The lower levels of medical educational financial debts among UK surgical trainees ensure trainees are under less pressure to complete training for loan repayment purposes, with an ability to concentrate and focus on surgical training while minimizing distractions. However, the recent introduction of university tuition fees will have a negative impact in this regard. Trainees continue to achieve superior work-life balance in comparison with their US counterparts, owing to strictly enforced EWTD rules that have limited training and working hours across the continent since 2009. Whether these factors account for any differences in cancer-related outcomes is unlikely, although unknown. Notable differences in training, culture, and approach to surgical oncology exist between these two, highly advanced and evolved, first-world training systems.¹⁴ It is important to appreciate these marked differences when devising global surgical oncology training programs, including among other HIC and LMIC programs who may preferentially emulate one or the other surgical training model.

A number of issues within the UK training structure have an impact on the ability of trainees to adapt rapidly to consultant (attending) practice. The first is the emphasis on the production of competent elective and emergency general surgeons, rather than an excess of highly trained specialists without available consultant positions at the end of training. This alignment of supply and demand is inherently logical, particularly within a public health system continuously struggling to balance education with service demands. Centralization of specialist services has been effectively instituted in the UK, arguably to a greater degree than in the US, with an understanding that most trainees who have completed general surgical training will need to gain additional specialist fellowship experience, at home or abroad, prior to taking up a specialist consultant position. The controversial implementation of the EWTD, which was opposed by many surgeons, has reduced the total hours of surgical exposure of the current trainee to a fraction of that experienced by their predecessors 20 years ago. This experience is further diluted by recent transparency initiatives, such as the publishing of individual consultant surgeon outcomes in the UK, which have encouraged an increase in dual consultant operative cases in high-risk specialties. The effect of this on training is yet to be quantified.

Comparisons of Training in the Broader Context of the US and UK Healthcare Systems

The contract of setting expectations between healthcare professional and patient are key to patient satisfaction, which are important determinants of outcome measures that are critical in today's evidence-based and outcome-driven era. While surgical outcomes are largely determined by patient operative risk, other factors such as socioeconomic class, religious, cultural, and societal trends invariably contribute to outcomes.¹⁵⁻¹⁷

The UK system is a socialized healthcare model that serves to provide universal access to free care at its core. Patients may present with problems ranging from acute emergencies to lower acuity medical problems such as back pain or biliary colic. Patients are effectively triaged in order to determine their need for inpatient versus outpatient treatment, and further

wait times are subsequently determined based on their condition. Depending on potential wait times associated with treatment, the system provides a flexible outlet for those wishing to pursue private care and expedited pathways; it is important to note that the UK system is not a single payer system like the Canadian healthcare system. Therefore, a unique opportunity exists to 'offload' the public NHS system in cases where patients choose the private route, and this may be self-funded or supported by patient purchased insurance. While patients may experience prolonged wait times within the NHS for elective operations, higher-acuity problems, including cancer, are more appropriately expedited. The rates of privately insured patients appear to be dropping in the UK, owing to general financial economic constraints.¹⁸

Overall, patient satisfaction with socialized healthcare is high, litigation rates are low, as are core elements that thrive in association with a litigious environment (presence of lawyers, television commercials, and patient mindset). Physicians frequently practice cost-effective care in training, with little fear of reprimand and reflex application of defensive medicine. This permits the adequate, timely, and non-ballistic use of resources and investigations, which results in lower rates of false positives and over-diagnosis of disease, contained healthcare costs, and the ability to rationally apply guidelines, such as the National Institute of Clinical Excellence (NICE) guidelines, to all patients.¹⁹ These robust guidelines provide a global example of a cost-effective system with comparative-effectiveness as its core. The pathways within these guidelines are evaluated, revised, and republished every 2 to 3 years on average, and provide a strong framework for treating physicians in the management of their patients. Incidentally, these are contrasted with their US counterparts, the Surgical Care Improvement Project (SCIP) guidelines, which were produced in 2003 but have never been modified, despite several core elements of the original guidelines having since been disproved,^{20–23} and the National Comprehensive Cancer Network (NCCN) guidelines, which, in contrast, are periodically revised to provide robust specific cancer algorithms that effectively guide treating physicians alike.²⁴ End-of-life pathways have been commonly used as examples for global cancer care in satisfaction, acceptance, and palliation of terminal cancer conditions, without spiraling healthcare costs during times of futility.²⁵ The UK cancer training system promotes patient-centric learning while engaging patients in their desire for total individualistic and holistic care.

While training systems in the US are well structured and goals clearly defined, patient expectations in the US reflect a nation's demands for the most advanced care at the individual level, with cost being a secondary consideration. Patients have high expectations and perceive short waiting times with readily available specialized oncologists as a standard of care. Stringent cancer screening programs are implemented, and patient autonomy is central to patient satisfaction in a system that relies on patients and their feedback as consumers driven by advertising, marketing, and choice. With willing physicians, any and every test can be ordered, and an inclusive state-of-the-art workup is achieved. The enthusiastic adoption of robotic surgery in US cancer care systems despite the absence of trials to demonstrate superiority readily illustrates the point. This technology is often commercially driven with acquisition of the robotic system being dependent on the surrounding competitive hospital market.²⁶ Another example is the utilization of breast MRI

in the evaluation of breast cancer, which bears little impact on overall survival or disease recurrence, and is liberally utilized in cases where survival may already exceed 90%.²⁷

The US system is a wealthy system with expansive funding opportunities for cutting-edge research and technology. Hospitals and clinics continue to expand and grow with continued mergers, satellite acquisitions, and ever-expanding facilities, in markets that have grown so competitive and with massive financial stake; administrators assume critical positions in hospitals, as they govern growth of multi-billion dollar institutions, with a priority towards increasing volume and expanding clinical practice. The affiliation with reputable academic institutions attracts significant market share. The ultimate badge of honor in cancer care today is the highly selective NCI-designation seal of approval, which permits conveyance of the ultimate standard of cancer care in a society that prides itself on standards, resulting in increased referrals and a greater market share of cancer patients in large catchment areas.²⁸ As reputation and volume expand, the competition for training positions increase, and, with it, trainee caliber and surgical outcomes.

While highly structured, such benefits carry spiraling financial, societal, and patient cost. Insurance companies are intricately embedded within the reimbursement system, serving as intermediaries between patients and hospitals. In order to ensure a non-negotiable profit margin, hospitals over-inflate the charge of care in order to ensure continued reimbursement from payers, who, in turn, continue to reimburse hospitals at lower rates, with patients facing some of the burden of larger bills, especially with the rise of deductible health plans.

The entrenchment of the pharmaceutical and medical device industry within the US healthcare system and oncology in particular is evident from an early stage in training. With an expanded presence and financial stake in the 2010 Patient Protection and Affordable Care Act and while seeking to provide highly effective novel therapies in the treatment of cancer, industry presents serious conflicts of interest to which most UK trainees are not exposed. Approval of drugs, including ones associated with minimal survival benefit (if any), promotes early availability to patients at high cost. As such, cost containment is a near impossibility in the US, which is contrasted with the measured lengthy negotiations and potential delay in uptake of new commercial medicines by the UK national formulary.

The high cost of care in the US raises concern for affordability of future care for upcoming generations; as the US healthcare system continues to increase spending per capita, despite being already higher than any other developed nation. The system is not financially sustainable, and the sustainability of such expectations may be limited. Whether a move towards delivery of cost-effective care in era of comparative effectiveness will adversely affect cancer outcomes in the US remains unknown.

The US System as a Global Example for Surgical Oncology Training

There are considerable variations between US and UK healthcare systems and surgical education, each with notable advantages and disadvantages (Tables 2 and 3). Interestingly, while both systems emerge as global leaders in surgical training and provision of cancer care, there is little appeal for direct trainee exchange and crossover between the US and UK

(Table 4). So where does this leave the US medical system in the global treatment of cancer patients today? The US cancer system provides some patients with the best cancer care in the world. However, a recent review highlights that the US cancer system has suffered from expensive care owing to overcharging to ensure maximal reimbursement, with some limited access for uninsured and underinsured patients, and with over-diagnosis, over-investigation, and over-treatment often for the rest.^{29,30}

The US cancer care system is not exportable in its current state. What is exportable is an extremely structured and exceedingly evolved education program that may be highly reproducible in many developed and even developing nations. Through opportunities provided at hospitals such as Memorial Sloan Kettering Cancer Center (MSKCC), international fellowships are available to surgeons who seek to experience and be trained within the US surgical oncology pathway, with exposure to complex surgical oncologic pathology both in and out of the operating room. As well as providing direct access to the US educational approach in surgical oncology training, permanent collaborations are formed between international institutions through graduating fellows who return to their countries of origin.³¹ Combined with shorter observerships that constitute 1 to 3 month rotations, valuable exposure can be sought without the need for accreditation that is required for formal fellowship training. Thus, visitors who seek expertise in the US gain surgical and oncologic exposure in an environment rich in resources.

In the last 5 years, 2,786 observers from 86 countries have successfully participated in traveler observerships at the MSKCC alone. As such opportunities continue to form and expand across the US, the transferability of the US cancer training system will continue to improve, thereby ensuring that patients across all systems are hybridized products of an international education system that is superior to any single system on its own. The development of an intellectual infrastructure is a controllable variable, and its effects on variability in survival can thus be minimized.

Conclusions

We discuss differences in surgical oncology training between two first-world advanced healthcare systems in the context of inherent differences between the two systems. The UK generates highly competent surgeons with cost containment and comparative-effectiveness at its core. The US system provides meticulously structured training programs with cutting edge advances in a system that is detrimentally challenged by cost containment and financial viability. On the latter front, limitless spending in the US is certain to work to the long-term disadvantage of the US economy and monetary value of the healthcare dollar. The highly structured US surgical education program provides an exportable platform for the development of a global surgical oncology program.

Acknowledgments

This study was supported in part by NIH/NCI P30 CA0088748 (Cancer Center Support Grant).

References

1. Allemani C, Weir HK, Carreira H, et al. Global surveillance of cancer survival 1995-2009: analysis of individual data for 25,676,887 patients from 279 population-based registries in 67 countries (CONCORD-2). *Lancet*. 2015; 385:977–1010. [PubMed: 25467588]
2. Coleman MP, Quaresma M, Berrino F, et al. Cancer survival in five continents: a worldwide population-based study (CONCORD). *Lancet Oncol*. 2008; 9:730–756. [PubMed: 18639491]
3. Are C, Berman RS, Wyld L, et al. Global Curriculum in Surgical Oncology. *Ann Surg Oncol*. 2016; 23:1782–1795. [PubMed: 27120187]
4. Are C, Caniglia A, Malik M, et al. Variations in Training of Surgical Oncologists: Proposal for a Global Curriculum. *Ann Surg Oncol*. 2016; 23:1769–1781. [PubMed: 27120186]
5. Halsted WS. The training of the surgeon. *Yale Medical Journal*. 1904; 11:1–23.
6. Polk HC Jr. Preserving the quality of training surgical residents. *Am J Surg*. 2011; 201:719–720. [PubMed: 21741506]
7. Society of Surgical Oncology. 2016. 11-27-2016. Ref Type: Online Source.
8. Galandiuk S. A surgical subspecialist enhances general surgical operative experience. *Arch Surg*. 1995; 130:1136–1138. [PubMed: 7575129]
9. Lee DY, Flaherty DC, Lau BJ, et al. Attitudes and Perceptions of Surgical Oncology Fellows on ACGME Accreditation and the Complex General Surgical Oncology Certification. *Ann Surg Oncol*. 2015; 22:3776–3784. [PubMed: 26122371]
10. Begg CB, Cramer LD, Hoskins WJ, et al. Impact of hospital volume on operative mortality for major cancer surgery. *JAMA*. 1998; 280:1747–1751. [PubMed: 9842949]
11. Birkmeyer JD, Siewers AE, Finlayson EV, et al. Hospital volume and surgical mortality in the United States. *N Engl J Med*. 2002; 346:1128–1137. [PubMed: 11948273]
12. Birkmeyer JD, Stukel TA, Siewers AE, et al. Surgeon volume and operative mortality in the United States. *N Engl J Med*. 2003; 349:2117–2127. [PubMed: 14645640]
13. John AK. Surgical education: the new curriculum and training in the UK. *Br J Hosp Med (Lond)*. 2010; 71:520–523. [PubMed: 20852548]
14. Frandsen TL, Heyman M, Abrahamsson J, et al. Complying with the European Clinical Trials directive while surviving the administrative pressure – an alternative approach to toxicity registration in a cancer trial. *Eur J Cancer*. 2014; 50:251–259. [PubMed: 24231337]
15. Peteet JR, Balboni MJ. Spirituality and religion in oncology. *CA Cancer J Clin*. 2013; 63:280–289. [PubMed: 23625473]
16. Schreiber JA, Brockopp DY. Twenty-five years later—what do we know about religion/spirituality and psychological well-being among breast cancer survivors? A systematic review. *J Cancer Surviv*. 2012; 6:82–94. [PubMed: 22198806]
17. Horwitz RI. Equity in Cancer Care and Outcomes of Treatment: A Different Type of Cancer Moonshot. *JAMA*. 2016; 315:1231–1232. [PubMed: 27002441]
18. Private Healthcare UK. 2016. 11-27-2016. Ref Type: Online Source.
19. National Institute of Clinical Excellence. 2016. 11-27-2016. Ref Type: Online Source.
20. Finfer S, Chittock DR, Su SY, et al. Intensive versus conventional glucose control in critically ill patients. *N Engl J Med*. 2009; 360:1283–1297. [PubMed: 19318384]
21. Pastor C, Artinyan A, Varma MG, et al. An increase in compliance with the Surgical Care Improvement Project measures does not prevent surgical site infection in colorectal surgery. *Dis Colon Rectum*. 2010; 53:24–30. [PubMed: 20010346]
22. Qadan M, Tyson M, McCafferty MH, et al. Venous thromboembolism in elective operations: balancing the choices. *Surgery*. 2008; 144:654–60. discussion. [PubMed: 18847651]
23. Wijeyesundera DN, Duncan D, Nkonde-Price C, et al. Perioperative beta blockade in noncardiac surgery: a systematic review for the 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery: a report of the American College of Cardiology/American Heart Association Task Force on practice guidelines. *J Am Coll Cardiol*. 2014; 64:2406–2425. [PubMed: 25091545]
24. National Comprehensive Cancer Network. 2016. 11-27-2016. Ref Type: Online Source.

25. Geue C, Lorgelly P, Lewsey J, et al. Hospital expenditure at the end-of-life: what are the impacts of health status and health risks? *PLoS One*. 2015; 10:e0119035. [PubMed: 25746728]
26. Wright JD, Tergas AI, Hou JY, et al. Effect of Regional Hospital Competition and Hospital Financial Status on the Use of Robotic-Assisted Surgery. *JAMA Surg*. 2016
27. Houssami N, Turner R, Macaskill P, et al. An individual person data meta-analysis of preoperative magnetic resonance imaging and breast cancer recurrence. *J Clin Oncol*. 2014; 32:392–401. [PubMed: 24395846]
28. Birkmeyer NJ, Goodney PP, Stukel TA, et al. Do cancer centers designated by the National Cancer Institute have better surgical outcomes? *Cancer*. 2005; 103:435–441. [PubMed: 15622523]
29. Brennan M. The role of U.S. cancer centers in global cancer care. *Ann Surg Oncol*. 2015; 22:747–749. [PubMed: 25582741]
30. Kesselheim AS, Brennan TA. Overbilling vs. downcoding—the battle between physicians and insurers. *N Engl J Med*. 2005; 352:855–857. [PubMed: 15745973]
31. Dominguez-Rosado I, Moutinho V Jr, DeMatteo RP, et al. Outcomes of the Memorial Sloan Kettering Cancer Center International General Surgical Oncology Fellowship. *J Am Coll Surg*. 2016

1.0 OBJECTIVES

The fellowship should provide fellows with the following:

1.1 Knowledge, Skills, and Clinical Experiences

1.1.1 Clinical and technical skills for providing comprehensive care to cancer patients. An essential component of the fellowship is training in new techniques, to produce surgeons capable of providing state-of-the-art surgical care to cancer patients.

1.1.2 Skills in performing special and unusual operations for patients with complex or recurrent neoplasms.

1.1.3 Expertise in diagnosis and management of rare or unusual tumors, based on knowledge of the natural history of such cancers.

1.1.4 Knowledge and experience to determine disease stage and treatment options for individual cancer patients, at the time of diagnosis and throughout the disease course.

1.1.5 Broad knowledge of other cancer treatment modalities (including radiotherapy, chemotherapy, immunotherapy, and endocrine therapy). This requires an understanding of the fundamental biology of cancer, clinical pharmacology, tumor immunology, and endocrinology as well as an understanding of potential complications of multimodality therapy.

1.1.6 Expertise in the selection of patients for surgical therapy in combination with other forms of cancer treatment, as well as knowledge of the benefits and risks associated with a multidisciplinary approach.

1.1.7 Expertise in palliative techniques including proper selection of patients, proper performance of appropriate palliative surgical procedures, and knowledge of nonsurgical palliative treatments.

1.1.8 Knowledge of tumor biology, carcinogenesis, epidemiology, tumor markers, and tumor pathology.

1.2 Cancer Research

1.2.1 Knowledge to design and implement a prospective data base and to conduct clinical cancer research, especially prospective clinical trials.

1.2.2 Sufficient familiarity with statistical methods to properly evaluate results of published research studies.

1.2.3 Knowledge to guide a trainee or other personnel in laboratory or clinical oncology research.

1.2.4 Knowledge of the interface of basic science with clinical cancer care, to facilitate translational research.

1.3 Cancer Education

1.3.1 Educational knowledge and skills to train students and physicians in the multimodality management of cancer patients.

1.3.2 Knowledge and skills to train non-physicians (physician assistants, oncology nurses, enterostomal therapists, etc.) in specialized cancer care.

1.3.3 Skills to organize and conduct cancer-related public education programs.

1.4 Leadership in Oncology

Skills to develop and support:

- institutional programs relating to cancer, including a tumor registry;
- institutional policies regarding cancer programs and problems;
- interdisciplinary meetings and discussions on cancer topics, patient care, and oncology research program
- psychosocial and rehabilitative programs for cancer patients and their families.

Figure 1.
Objectives of Training in Surgical Oncology in the US.⁷

Table 1Minimum Case Requirements for US Clinical Training in Surgical Oncology.⁷

Oncologic Field	Minimum Case Number	Multidisciplinary Cases
Breast	40	25
Endocrine	15	15
GI (not HPB)	50	25
HPB	35	25
Melanoma/Sarcoma	30	30
Total	170	120
Additional	70 additional cases in any of the areas	0
Total Cases	240	120

Table 2

Favorable Components of Surgical Oncology Training US vs. UK.

Factor	United States	United Kingdom
Training Factors	<ul style="list-style-type: none"> • Cancer-based • Structured residency • Short intensive program • Consolidated learning • Single institution • Graded responsibility • Defined fellowships • Clinical research • 80-hour week • Supervised training • Higher physician salaries upon completion of training 	<ul style="list-style-type: none"> • Focused organ/system-based • Benign and malignant exposure • More independent operating • Lower debt burden
Patient Factors	<ul style="list-style-type: none"> • Highest standard of care • Patient autonomy • Short waiting times to OR • Direct access to oncologist • More stringent cancer screening • Perceived better cancer outcomes 	<ul style="list-style-type: none"> • Universal access • Free healthcare • Single-payer with option for private healthcare • Low litigation rate • Non-defensive medicine practice • High user satisfaction rates • Realistic patient expectations • Reasonable end-of-life pathways
System Factors	<ul style="list-style-type: none"> • Rich in clinical protocols • State of the art research and funding • Direct access to high impact journals and national conferences • Advanced information technology systems • High healthcare expenditure • Availability of innovative therapies • NCI designation (4 tiers) 	<ul style="list-style-type: none"> • Devoid of insurance companies • Controlled pharmaceutical costs • Aligned hospital and physician interests • Focus on primary prevention • No over-inflation of cost of care to maintain reimbursement • No denial or limitation of care • Cost-effective standard of care • Uniform evidence-based protocols (NICE/ SIGN, comparative effectiveness)

Table 3

Unfavorable Components of Surgical Oncology Training US vs. UK.

Factor	United States	United Kingdom
Training Factors	<ul style="list-style-type: none"> • Less independent operating • High debt burden • Arduous and intensive training 	<ul style="list-style-type: none"> • Less structured residency • Prolonged training programs • Poorly defined fellowships • Less consolidated learning
Patient Factors	<ul style="list-style-type: none"> • Demanding patients dictate care • No universal access • Litigious nature • Defensive medicine • Intermediate satisfaction by users • Unrealistic expectations • No end of life pathways 	<ul style="list-style-type: none"> • Long waiting times • No direct access to oncologist • Less stringent cancer screening • Suboptimal cancer outcomes • Limited patient autonomy
System Factors	<ul style="list-style-type: none"> • Insurance company involvement • Uncontrolled pharmaceutical cost • Misaligned hospital and physician interests • Poorly developed primary prevention programs • Over-inflation of charge to maximize reimbursement • Denial of care and limited patient access • Cost-ineffective care • No uniform guidelines 	<ul style="list-style-type: none"> • Outdated facilities • Delayed availability of innovative therapies and medicines • Poor information technology systems • Limited access to high impact journals and national conferences • Limited funding for research

Table 4

Strengths and Weaknesses of UK vs. US Healthcare Models for Trainees from LMIC.

Country	Funds	Expertise	End-Result
USA	Less restricted	Available	Excellent Care Cost-ineffective
UK	Restricted	Available	Cost-effective Utilitarian
Middle East	Less restricted	Unavailable	State-of-the-Art Empty large hospitals
Africa	Restricted	Unavailable	Poor Care Underserved