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## Student Perspectives on Oncology Curricula at United States Medical Schools

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### Abstract

Delivering a cohesive oncology curriculum to medical students is challenging due to oncology's multidisciplinary nature, predominantly outpatient clinical setting, and lack of data describing effective approaches to teaching it. We sought to better characterize approaches to oncology education at US medical schools by surveying third and fourth year medical students who serve on their institution's curriculum committee. We received responses from students at 19 schools (15.2% response rate). Key findings included the following: (1) an under-emphasis of cancer in the curriculum relative to other common diseases; (2) imbalanced involvement of different clinical subspecialists as educators; (3) infrequent requirements for students to rotate through non-surgical oncologic clerkships; and (4) students are less confident in their knowledge of cancer treatment compared to basic science/natural history or workup/diagnosis. Based on these findings, we provide several recommendations to achieve robust multidisciplinary curriculum design and implementation that better balances the clinical and classroom aspects of oncology education.

### Keywords

Oncology education; Undergraduate oncology education; Medical student oncology education; Cancer education; Cancer curriculum

### Manuscript

Cancer represents a major public health concern in the USA, not only for the oncologic subspecialists who treat cancer but also for primary care physicians and other specialists

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who play a crucial role in prevention, screening, early diagnosis, symptom management, and survivorship care. The importance of primary care physicians in oncologic outcomes will only increase in the coming years, as a rise in new cancer diagnoses is projected [1], and geographical access to care is likely to remain limited in more rural parts of the country [2]. As such, medical students must obtain sufficient background knowledge in clinical oncology regardless of career aspiration.

Unfortunately, this may not always be easy to achieve, as clinical oncology practice is one of the more multidisciplinary areas of medicine [3], providing challenges for educators and administrators alike in organizing an effective curriculum. Furthermore, imbalances in the number of oncologic subspecialists that serve as educators may lead to bias in the material presented, or to a failure of students to grasp the multidisciplinary nature of cancer care. Finally, a large percentage of cancer patients are managed in the outpatient setting, making it harder for students to take part in their care since the majority of clinical clerkships are based in the inpatient setting.

We sought to better understand how oncology is taught at US medical schools by surveying third and fourth year students who serve on curriculum committees of 125 certified allopathic and osteopathic medical institutions in the USA. In order to reach these students, we sent an email containing a cover letter and survey link to the deans of undergraduate medical education at each school between February and May of 2016, asking them to forward the link to the relevant students. Two follow-up emails were sent to deans of schools from which no students responded. Participation was anonymous, voluntary, and did not include a financial incentive. The question structures were predominately multiple choice and Likert-type scales (ranging from 1 to 5, with 1 being the worst, lowest, or least likely choice and 5 being the best, highest, or most likely option, depending on the question). If more than one student responded from a given school, the median response of those students served as the data point for each question in the subsequent analysis comparing different schools.

A total of 94 responses to the survey were received, representing 19 medical institutions across 15 states. The response rate for medical schools was 15.2% (20.8% margin of error at 95% confidence interval). A slight majority of students were enrolled in private schools (54.3 vs. 43.6% public schools) and were in their fourth year of medical school (51.1 vs. 48.9% third year). The median participant was only “slightly” likely to pursue an oncological specialty during residency and/or fellowship (median Likert-type score 2 [IQR 1–3]).

In reference to the six most common causes of death in the USA, the greatest overall curricular time was perceived to be devoted to heart disease (median rank 6 [IQR 6–6]), followed by chronic obstructive pulmonary disorder (COPD)/chronic lung diseases (median rank 4.5 [IQR 4–5]), cerebrovascular disease/stroke (median rank 4 [IQR 3.75–4.5]), cancer (median rank 3 [IQR 3–4]), Alzheimer’s disease (median rank 2 [IQR 1.25–2.25]), and accidents/trauma (median rank 1.5 [IQR 1–2.25]). The Kruskal-Wallis H test showed a significant difference within these ranks ( $\chi^2(5) = 57.1, p < 0.001$ ).

During the preclinical years, hematologic, colorectal, lung, breast, and gynecologic malignancies were perceived to receive the most curricular time (mean 5–8 h each), whereas prostate cancer received significantly less (mean 2.5 h,  $p < 0.001$ ). Pathologists, scientists/Ph.Ds., and medical oncologists were reported as the primary instructors. During the mandatory clinical clerkships the surgery, internal medicine, and obstetrics/gynecology rotations incorporated the most oncology didactics (median 4 h, range 0 to > 10 h), and involved care of the highest percentage of patients with a primary diagnosis of cancer (median 25%, range 0 to 80%). Medical oncologists and surgical oncologists reportedly provided the majority of oncologic teaching. Radiation oncologists were significantly less likely to be involved in medical student education than any other type of clinical oncologist during both the preclinical and clinical years ( $p < 0.001$ ).

Fewer than half (47%) of medical schools captured in the survey incorporated an oncology-oriented clinical rotation into their required clerkships, most commonly in gynecologic oncology (42%), surgical oncology (21%), and pediatric oncology (16%). Pathology, hematology/oncology, and radiation oncology rotations were only required at one institution each. Overall, participants had greater confidence in their knowledge of basic science/natural history of cancer (median Likert-type score 3.5 [IQR 3–4]) compared to that of treatment (median Likert-type score 2 [IQR 2–3],  $p < 0.001$ ), and also workup/diagnosis (median Likert-type score 3 [IQR 3–3.25]) compared to treatment ( $p = 0.002$ ).

Given the limited amount of curricular time that can be devoted to any one area of medicine, the previously mentioned challenges inherent to developing an effective curriculum in oncology, and the commonly deficient areas in oncology curricula described in this study, we offer the following recommendations:

1. Improve the coordination and organizational structure of oncology didactics across all 4 years of medical school, in order to avoid redundancy or inadvertent omission of content, and to ensure balance among the types of cancer covered and the types of educators involved in teaching.
2. Invite multidisciplinary participation in curriculum development, in order to ensure a more holistic approach to teaching cancer management.
3. Avoid purely organ-system or disease-site specific courses, instead complementing them with didactics on general overarching principles of clinical oncology, palliative medicine, survivorship care, and the role of primary care physicians in cancer prevention, diagnosis, and management.
4. Develop a multidisciplinary oncology clerkship that provides broad exposure to caring for patients with cancer, and incorporates outpatient oncology exposure for those students planning to pursue non-oncologic fields.
5. Support the development of national guidelines for effective undergraduate medical education in oncology, as have been developed in Australia, Canada, and Europe [4–6].

The main limitations of this study are our relatively low response rate and the selection bias inherent to any survey of this nature, in which those who chose to respond may not be

representative of the entire population of medical students at a given institution or between institutions. Despite this, we believe that our findings are likely to be accurate, given that the population studied had experienced the majority of their medical curriculum at the time of the survey, was likely to be knowledgeable about the content of the curricula based on their committee work, and was less likely to be biased by a particular interest in pursuing an oncologic specialty as a career. Our findings were also quite similar to previous reports related to this topic [7, 8].

In summary, this study demonstrates that oncology is underemphasized in US medical school curricula relative to cancer incidence in the population. Furthermore, a lack of required clinical oncology exposures and multidisciplinary instruction may result in a gap in students' understanding of clinical aspects of cancer care. A customized approach for delivering this content to students is appropriate based on available resources at different institutions. However, given the increasing incidence of cancer, its major burden on the healthcare system, the growing need for adequate survivor-ship care, and the expanding role of primary care physicians before, during, and after a cancer diagnosis, more of an effort should be made to longitudinally integrate oncology into the curriculum throughout all 4 years of medical school. By highlighting common deficiencies in medical school oncology curricula and techniques for their improvement, we aim to facilitate a more collaborative and efficient process to produce well-trained clinicians that will ultimately provide high-quality care to patients with cancer.

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