

VIEWPOINT

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A Broad Impact for Global Oncology

Global oncology demands attention, with approximately 9 million people dying from cancer annually. It provides an extraordinary opportunity to address the urgent need for cancer care and be a catalyst for solutions to address critical societal issues including the disruptive forces in and among countries involving the health of individuals and the planet, relationships among cultures, the digital revolution, inequality, and the sociopolitical conflict of globalism vs isolationism.

The World Health Organization tabulates the incidence of disease in the less-developed world.¹ There is a false dichotomy of investment in infectious diseases (IDs) vs the noncommunicable diseases (NCDs). Indeed, the number of deaths from NCDs is many times greater than that from IDs in lower-middle and upper-middle-income countries. Cardiovascular disease is the most common followed by oncologic, respiratory, and metabolic diseases. This is not to establish a competition but to note that cancer is a substantial cause of death globally. The geographic shortage of health care affects half the world's population, most located in Africa, South-East Asia, and the Eastern Mediterranean region.¹

Addressing the shortage of care for the NCDs is among the United Nations Sustainable Development Goals. We recognize that global oncology is considered a low priority by some based on suppositions including the following: (1) there is a need to address other diseases before cancer; (2) cancer care is too expensive; (3) the physical health care infrastructure is poor; (4) the gap in cancer care is too overwhelming; and (5) for those pursuing academic and private-sector careers, such work does not earn sufficient revenue. These can be addressed with data that challenge the assumptions and by novel programs that can remove obstacles.

Cancer is related to IDs and has common etiologies with other major NCDs. Cancer, like IDs, needs immediate intervention. Addressing IDs and the full spectrum of cancer care (prevention, screening, treatment, and follow-up) requires significant investment in infrastructure. This ID capacity is necessary to effectively prevent cancer with vaccines and for the treatment of sepsis that can occur with cancer treatment. It allows for surveillance that might detect an emerging epidemic early and serve as a focal point for rapid response. Because IDs and nononcologic NCDs are risk factors for cancer, addressing them is critical for the general population to prevent cancer as well as for survivors of cancer.

The model used by the International Cancer Expert Corps (ICEC) for building sustainable on-the-ground capacity and capability is based on mentorship extending from undergraduate training through working career to the opportunity to contribute, as a career capstone, the wisdom often lost to retirement.

There is a shortage of mentors from resource-rich countries because participation in global health activities

is often discouraged in academic and practical settings. The emerging generation of oncology residents is leading the way through the Global Health Initiative of the Association of Residents in Radiation Oncology,² the American Board of Radiology's residents' Holman Research Pathway that now includes global health,³ ICEC's Young Investigator Conferences,⁴ and early-career leaders awards that bring attention to their accomplishments. Continuity of professional commitments and person-to-person relationships are essential in global health care. This includes potentially building novel professional and economic models among academic and private practices, providing education in the ethics of global health, and creating mutual education programs among academia and practitioners.

Research and development, from basic science to disruptive technological innovation, are essential. The basic science linkage between cancer and infectious diseases is well known (eg, hepatitis and human papilloma viruses). Global health improvement demands studying the etiology of disease and the role of the environment, microbiome, and new treatment strategies. Capturing the power of diagnostic microtechnology, artificial intelligence/machine learning, and developing smart imaging and treatment technology will greatly reduce the time and personnel needed for routine health care tasks.

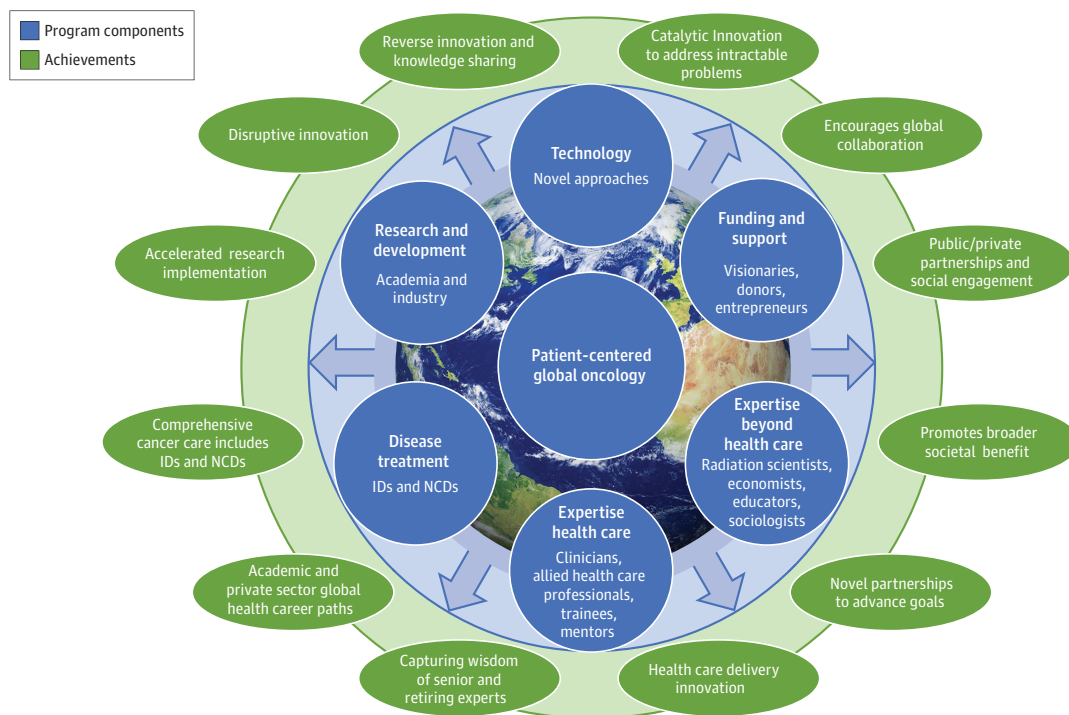
The estimated current shortage of approximately 5000 linear accelerators⁵ means that if 1 was commissioned each week with the needed expertise and infrastructure, it would take a century to fill the gap. Radiotherapy being too expensive is negated by a landmark project by the Global Task Force for Radiotherapy for Cancer Control that concluded "...investment in radiotherapy not only enables treatment of large numbers of cancer cases to save lives, but also brings positive economic benefits."^{6(p1153)} The need for geometric expansion of capacity including stable physical infrastructure led to paradigm-changing considerations in workshops attended by physicists, engineers, physicians, and policy makers from developing and highly developed countries.⁷ Rodin et al⁸ report ongoing efforts to close the radiotherapy expertise gap with a new career path.

Expertise beyond health care includes contributions from economists, educators, communicators, and others. An example is the successful Walking Forward Program for American Indians in South Dakota,⁹ initially supported by the National Cancer Institute, developed by a community-based principle investigator's building trust, offering participation in cancer research appropriate for the advanced stages of disease encountered, and training reservation-based navigators and health care assistants. Addressing the needs and remoteness are similar to that in low- and lower-middle-income countries answers the frequent question: "Why help people outside our country when we have our own problems?"

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Figure. A Systems Approach to Global Oncology



Six program components (blue circles) are interrelated in a complex system with achievements (green ovals) that provide patient-centered global oncology care. Details are in the text. ID indicates infectious disease; NCD, noncommunicable disease.

Sources of funding and support include governments, nongovernment organizations, philanthropy, and socially oriented businesses whose profits go both to investors and to address critical societal needs. Enhancing the number of parties interested in global health, including building advocacy groups, will garner public and political support and investment. The broad application of the radiation sciences from cancer care to energy policy to space exploration brings in a wide range of interested parties.¹⁰

The size and complexity of the problems present a grand challenge worthy of the best minds and transformational

approaches, often requiring partnerships that have potential for common projects even among countries and neighbors who have political conflicts. How could one not want to eradicate cancer and its deleterious impact? The Figure provides the components and benefits of a systems approach that supports leading-edge science and technology but, critically, pays attention to those populations historically and currently left behind in the trailing-edge turbulence of inequality. In this way, creativity, innovation, altruism, and commitment can bring rewarding results.

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REFERENCES

1. WHO Health Statistics. https://www.who.int/healthinfo/global_burden_disease/en/. Accessed February 16, 2019.
2. Association of Residents in Radiation Oncology. Global Health Initiative. <https://www.astro.org/>

Affiliate/ARRO/Global-Health-Initiative. Accessed February 16, 2019.

3. Board of Radiology Residents. Holman Research Pathway. <https://www.theabr.org/radiation-oncology/initial-certification/alternate-pathways/holman-research-pathway>. Accessed February 16, 2019.
4. Young Investigator Conferences. <https://www.iceccancer.org/young-investigators-conference-pioneering-action-for-global-cancer-care-new-version/>. Accessed February 16, 2019.
5. Advisory Group on increasing access to Radiotherapy Technology in low and middle income countries (AGaRT). <https://cancer.iaea.org/agart.asp>. Accessed February 16, 2019.
6. Atun R, Jaffray DA, Barton MB, et al. Expanding global access to radiotherapy. *Lancet Oncol*. 2015;16(10):1153-1186.
7. Dosanjh M, Aggarwal A, Pistenmaa D, et al. Developing innovative, robust and affordable

medical linear accelerators for challenging environments. *Clin Oncol (R Coll Radiol)*. 2019;31(6):352-355. doi:10.1016/j.clon.2019.02.002

8. Rodin D, Longo J, Sherertz T, et al. Mobilising expertise and resources to close the radiotherapy gap in cancer care. *Clin Oncol (R Coll Radiol)*. 2017;29(2):135-140. doi:10.1016/j.clon.2016.11.008

9. Guadagnolo BA, Peterreit DG, Coleman CN. Cancer care access and outcomes for American Indian populations in the United States: challenges and models for progress. *Semin Radiat Oncol*. 2017;27(2):143-149. doi:10.1016/j.semradonc.2016.11.006

10. Coleman CN, Prasanna PGS, Bernhard EJ, et al. Accurate, precision radiation medicine: a meta-strategy for impacting cancer care, global health, and nuclear policy and mitigating radiation injury from necessary medical use, space exploration, and potential terrorism. *Int J Radiat Oncol Biol Phys*. 2018;101(2):250-253.