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Prostate cancer: Case volume and improved outcomes across cancer care

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In patients with cancer who undergo surgery as part of their overall cancer care, the relationship between increased surgical case volume at the treating hospital and improved survival outcomes is well established.^{1–3} Surgery, however, represents only one of the three major modalities used today to treat cancer patients. For radiation therapy and chemotherapy, the link between the provider's level of experience and patient outcomes has not been as well defined but is equally important; these modalities are often administered on an outpatient basis over an extended period of time, placing considerable logistical and financial burden on patients. In an article in the *International Journal of Radiation Oncology Biology Physics*, Chen *et al.*⁴ examine the association between treatment at a high-volume facility and long-term survival in men who underwent definitive radiation therapy between 2004 and 2006 for high-risk prostate cancer, as defined by the National Comprehensive Cancer Network. Using the National Cancer Database (NCDB), which captures treatment and outcomes data for roughly 70% of the US cancer patient population, they showed that increased prostate cancer radiation case volume was associated with improved overall survival,⁴ a finding that parallels conclusions in the surgical oncology literature.^{1–3} Indeed, the findings by Chen *et al.*⁴ add to a growing body of evidence in other cancer types relating provider experience to improved oncological outcomes in patients treated with definitive radiation, with recent reports indicating similar relationships in patients undergoing definitive radiation for cervical cancer and definitive chemoradiation for stage III non-small-cell lung cancer.^{5, 6}

The results of the study by Chen *et al.*⁴ might not be surprising to practicing radiation oncologists. Successful delivery of therapeutic radiation requires the navigation of a complex workflow process, which demands coordination between multiple team members to operate sophisticated technology to provide uniquely designed treatment. The opportunity for variation and deviation exists across a number of these steps, including target volume delineation, treatment plan formulation, dose prescription, image guidance, management of treatment toxicities, and/or follow-up care. Importantly, a number of these radiation-specific treatment variables have been individually associated with surrogate oncological end points, highlighting the importance of radiation quality.⁷ Furthermore, safety analyses in radiation oncology have revealed that errors in one or more steps in the process of radiation delivery

occur at a not insignificant frequency; some authors have stated that radiation oncology could learn from the airline industry, which is often cited as a gold standard for showing that high-risk and complex technology can be used safely.⁸

However, the association of case volume and improved outcome reported by Chen *et al.*⁴ probably extends beyond high-quality radiation therapy. Indeed, the provision of optimal cancer care is a multidisciplinary process that also draws upon the expertise of pathology, radiology, nuclear medicine, nursing, and multiple ancillary services. In each of these arenas, opportunity for specialization within a specific disease site only exists with increased case volume. Similarly, disease-specific clinical pathways and care delivery interventions can only be developed if supported by sufficient clinical volume. Disease-specific multidisciplinary clinics are an example of one such care delivery intervention that enables coordinated and comprehensive patient evaluation, which can result in dramatic improvement of the quality of care provided. As an example, development of a single-day pancreatic cancer multidisciplinary clinic at our institution has led to changes in therapeutic recommendations in roughly one-quarter of patients with pancreatic cancer who are seen in this clinic.⁹ Similar improvements in the quality of the staging and management of men with prostate cancer have also been seen following the establishment of a prostate cancer multidisciplinary clinic at our institution, which treats many men who underwent initial consultation at a low-volume centre.¹⁰ Indeed, the proficiency of collaborating physicians and high-quality clinical infrastructure are perhaps the most important, yet often overlooked, factors that result in the improved outcomes seen in high-volume centres.

Certainly, a few important limitations of the study by Chen *et al.*⁴ should be acknowledged. As noted above, any retrospective study is limited by unaccounted biases related to uncaptured data, and although the NCDB provides a rich resource for many parameters, it lacks important information on key variables that can drive outcomes, such as performance status. Performance status, for example, might influence a patient's ability to seek care at a high-volume centre that is not geographically convenient. Socioeconomic status and the availability of other resources can also affect this ability, and all of these variables are difficult to control for in a retrospective fashion. Furthermore, as not all deaths in the prostate cancer population are caused by prostate cancer itself, cause-specific survival would be the most relevant end point to use in these analyses, but this information is not available in the NCDB. The authors did try to mitigate this limitation, however, by restricting their analysis to the high-risk population and factoring in the Charlson Comorbidity Index.

Nevertheless, these findings have important implications for all key health system stakeholders, including patients, payers, and providers alike. For patients, assessment of the level of experience of the treating provider and cancer centre might be an important consideration when determining where to pursue treatment. Additional refinement of the added value of high-volume centres across disease sites could further help inform patient decision-making, which can be a particularly difficult task if treatment at a high-volume centre might result in significant hardship. Payers might be interested in negotiating contracts with high-volume centres if significant disparities in outcome between high-volume and low-volume centres continue to be discerned. As an increasing proportion of services are tied to quality metrics, understanding whether case volume could and should be

incorporated into quality indicator design will be important. Lastly, although the NCDB is a helpful tool for understanding the macroscopic relationship between case volume and outcomes, providers and researchers at high-volume centres should better characterize which specific aspects of care might be driving increased quality and improved oncological outcomes across disease sites and treatment modalities. Indeed, these system-level analyses are critical for understanding—and ultimately rectifying—disparities in care.

Biographies

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The positive association between hospital case volume and surgical outcomes is well established in cancer care. Recent reports have increasingly indicated that this relationship also applies to other cancer disciplines, including radiation therapy. Characterizing the extent to which cancer centre experience drives oncological outcomes is critical for patient decision making.