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COMMENTARY

Supply and Demand for Radiation Oncology in the United States: A Resident Perspective

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The recent study by Pan et al (1) has raised concerns within the American radiation oncology (RO) trainee community. The authors update supply and demand projections for RO in the United States. Whereas projections several years ago forecasted an undersupply of radiation oncologists (ROs), the study cites updated data for the proposition that supply will outpace demand over the next decade, resulting in an excess of ROs (2). This excess would be driven, in part, by residency expansion, creating a 27% predicted increase in practicing ROs, with only a 19% predicted increase in radiation therapy (RT) demand. This study parallels the current perception held by many graduating residents who have encountered a seemingly increasingly competitive job market and is in concert with previously published concerns that we are training too many providers (3, 4).

American trainees are not alone in this concern. Graduating trainees in Australia are currently struggling to find consultant jobs, with many completing multiple fellowships before obtaining employment. Half of Australian trainees say they would have reconsidered their choice of specialty had they known about possible oversupply in the workforce (5). Tight job markets for newly minted Canadian ROs have also led to delayed workforce entry with extended training via fellowships. Their graduates are also emigrating to other nations in search of jobs (6).

In the United States, other specialties, such as pathology and radiology, have experienced challenging job markets (7). In 2015, 96% of pathology residents planned on fellowship training, with 44% of residents expecting to complete 2 or more fellowships. The top reasons to pursue multiple fellowships were (*1*) the belief that multiple areas of subspecialty training are needed to compete in the job market and (*2*) desired job not available after the completion of first fellowship (8). Only 22 of the graduating 1190 postgraduate year 3/4 pathology residents reported applying for jobs in 2015 (8). Similarly, an oversupply in diagnostic radiology has resulted in graduating radiologists seeking out fellowships, even though the majority of radiologists will spend a minority of their time practicing in their subspecialty area (9) (E. Bluth, personal communication, April 8, 2016). The National Residency Match Program (NRMP) reports that radiology residency positions

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increased by 23% per year from 1998 until 2009 and by 16 positions per year since 2009, in spite of the job market approaching saturation (7). A total of 1156 radiology residency positions were offered through the NRMP in 2015 despite a projected 840 to 1103 radiology jobs in 2018 (9, 10). Previously a highly competitive field, diagnostic radiology has gone from a 99% fill rate (the positions filled through the NRMP divided by the positions offered) in 2009 to an 86% fill rate in 2015. The number (and percentage) of US medical students filling these positions has dropped from 816 (86%) in 2009 to 579 (58%) in 2015, an absolute difference of 237 fewer US medical students entering radiology residencies, possibly a result of medical students' perception of the diminished job market (7, 10, 11). A similar trend may already be occurring in RO (12).

Radiation oncology residents are justifiably anxious in the face of these new data. By almost any NRMP metric, our specialty has the privilege of being one of the most competitive and recruits the most talented medical students. United States seniors matched to RO in 2014 had a mean United States Medical Licensing Examination Step 1 score over 240, and 24% were Alpha Omega Alpha Honor Medical Society members, compared with all matched US seniors with 230 and 16%, respectively (13, 14). Graduating ROs have dedicated a minimum of 13 years to higher education and training (often more, because almost 1 in 4 medical students matched to RO have a PhD) and potentially accumulated large student loan burdens (the average medical school graduate indebtedness in 2015 was $180,000) (15). They hope to find attractive jobs at the end of training and avoid the path of Australian or Canadian RO trainees or American pathology or radiology trainees.

This is not the first time a fear of oversupply has touched our field (16-20). A surge in graduating residents led to a 23% increase in ROs with only a 13% rise in demand for RT between 1989 and 1993. Decreasing job opportunities was the biggest concern among residents at the time, partly incited by 161 candidates interviewing with only 44 employers at the 1995 American Society for Radiation Oncology Annual Meeting (18). In response, leaders in the field called for more data on the workforce supply and needs, and they suggested that "limiting the number of trainees offers only a part of the appropriate solution" (18, 19). The Society of Chairs of Academic Radiation Oncology Programs encouraged redefining the future of RO by restructuring training requirements and residency curriculums to adapt new concepts within cancer care, and to plan beyond individual and institutional self-interests. Radiation oncologists were encouraged to maintain expertise across a broad spectrum of cancer care, including cancer biology and technology, to advance the field with innovative and novel therapies (19). During this era, RO training increased from 3 years to 4 years, and there was a 23% decrease in the number of training positions offered from 1996 to 1997. Further reductions in positions were planned owing to decreased job opportunities and funding issues (21). Despite this reportedly bleak environment for trainees in the 1990s, the field survived. In fact, RO experienced a renaissance with the development of multileaf collimators, 3-dimensional conformal RT, intensity modulated RT, image guided RT, an improved understanding of tumor biology response to RT, and favorable reimbursement patterns (22, 23).

So what should be done about today's conundrum? First, we must recognize that these numbers are projections. The 2010 projections did not end up being accurate, and these forecasts may meet a similar fate. For example, the authors recognize uncertainty in predicting the impact that increased use of hypofractionation will have on supply and demand. However, the current data cannot be ignored. After all, training an excess of ROs is a waste of human capital. Alternatively, an undersupply would be devastating for patients. As Pan et al point out (1), there is currently no entity tasked with RO workforce planning, and residency positions have increased from 128 in 2006 to 200 in 2015, a 56% increase over the past decade. Other specialties, such as dermatology and plastic surgery, have sought to seek a balance between supply and demand (7). The American Society of Plastic Surgeons created a Plastic Surgery Workforce Task Force to make recommendations regarding their workforce needs (24). In fact, there is an American Society for Radiation Oncology Workforce Subcommittee that conducted the 2012 Radiation Oncology Workforce Survey (25). A subcommittee could examine the impact of residency expansion and also investigate the issue of maldistribution (20). Radiation oncologists are concentrated in metropolitan areas, largely along the coastal United States, leaving areas such as the rural Midwest with insufficient access (26). This discrepancy likely obfuscates the true relationship between supply and demand. The subcommittee could seek to answer questions regarding the type of training provided, the characteristics of residents, such as residents' clinical and research priorities and goals, and review residents' appropriateness for meeting marketplace needs. For example, are we matching candidates likely to practice in underserved areas affected by maldistribution?

Another concerning finding by Pan et al (1) is the decrease in projected demand for RT. This, combined with impending oncology payment reform (27), likely poses a far greater threat to the need for RT than any amount of unbridled residency expansion. We know that RT is a highly effective, cost-efficient treatment modality for cancer patients. For example, prostate brachytherapy is the least costly definitive treatment for prostate cancer, with outcomes as good as other modalities (28). Pan et al (1) show that the decreased projections for RT demand are driven largely by prostate cancer. There has been approximately a 50% decline in brachytherapy use for prostate cancer over the past decade (29). There are many possible reasons for this decline, including increased use of active surveillance, negative publicity, inadequate training during residency, and the increased utilization of well reimbursed

treatment methods, such as minimally invasive radical prostatectomy (29-32). It is also feasible that many patients are not consulting with ROs when a patient's treatment correlates strongly with the consultant's specialty (33).

Therefore, it is imperative that ROs are leaders in health care on both the local and national level. Locally, being actively involved in tumor boards and other multidisciplinary collaborations is essential. Nationally, being engaged in policy creation during these turbulent times is critical. Value-based bundled care payment initiatives, such as the Oncology Care Model, which is being piloted this year, portend a radical change in reimbursement for cancer care (27, 34). The moment is ripe for cost-effective modalities, such as brachytherapy.

Despite these new projections for the RO job market, we do see optimism in the future of our field. We survived oversupply issues in the 1990s and will do so again. Abundant data support the efficacy of RT, and our talented physicians are certain to continue to bring forth ingenuity and innovation with novel applications of radiation and expand our scope of practice. However, that alone is not enough. We must take a conscientious, data-driven approach to the workforce needs and continue to advocate for our specialty and patients, from the clinic to Capitol Hill.

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