

● Special Feature

REVIEW OF THE MANPOWER ISSUE IN RADIATION ONCOLOGY

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INTRODUCTION

A series of studies were performed in the early 1980s to evaluate whether we were training enough radiation oncologists in the United States to meet the country's projected needs. These were undertaken because there was a major shortage of radiation oncologists in the 1960s and 70s. The early studies were performed by the Graduate Medical Education National Advisory Committee (GMENAC) and the American College of Radiology (ACR) Patterns of Care Study. These reports indicated there would be a continued shortage of radiation oncologists until at least 1990, based on the assumption that the supply would remain relatively stable and the need would increase in keeping with the incidence of cancer in an enlarging and aging population. However, a 1986 ACR report prepared by the Education Committee of the Commission for Radiation Therapy predicted that the supply would exceed the projected need, principally because the number of radiation oncologists being trained was substantially greater than previously predicted.

Now that 1990 has come and gone, it is appropriate to reassess the manpower issue to determine which of these reports was most predictive of the actual outcome, that is, the predictions of a shortage as outlined in the GMENAC report, or the predictions of an oversupply as outlined in the ACR Education Committee report. Using this information, we will then evaluate whether the supply of radiation oncologists today matches the country's needs, and whether any imbalance that exists is likely to improve or worsen in the coming 5 years.

DISCUSSION

GMENAC report

The Graduate Medical Education National Advisory Committee (GMENAC) study was undertaken in 1982 to evaluate the manpower needs of five hospital-based specialties (4). The results for radiation oncology were summarized in an ACR report published in 1983 (1). The

GMENAC report made a number of assumptions about population growth, numbers of new patients, and numbers of residents in training. For example, it assumed that the U.S. population would be 244 million in 1985, and that 439,000 cancer patients diagnosed in 1985 would be treated with radiation therapy. Further assumptions were that 110 radiation oncology residents would complete training and enter the practice each year, and that each full-time equivalent (FTE) radiation oncologist would treat 220 new patients per year. It also assumed that each academic radiation oncologist would treat half as many patients as a radiation oncologist in private practice (i.e., one academic radiation oncologist = 0.5 FTE), and that each resident would function as 0.35 of a full-time radiation oncologist (0.35 FTE).

On the basis of these assumptions, the American College of Radiology (ACR) estimated that there would be a continued shortage of radiation oncologists until 1990, at which time the need would approximately equal the demand (Table 1). They estimated that approximately 2,320 radiation oncologists would be required by 1990, and that this would closely match the number actually in practice.

ACR education committee report

The Manpower Report published by the Education Committee of the Commission on Radiation Therapy of the American College of Radiology was published in 1986 (2). In this report, the Education Committee judged that the GMENAC report had overestimated the growth of the U.S. population and the number of new radiation therapy patients, and had underestimated the number of radiation oncologists who would complete training between 1985 and 1990. Whereas the GMENAC report had projected a U.S. population of 255 million in 1990, the ACR Education Committee projected a U.S. population of 248 million. The ACR/GMENAC report predicted that 472,000 new patients would be treated with radiation therapy in 1990, whereas, the ACR Education Committee estimated that 437,000 new patients would be treated with

Table 1. ACR/GMENAC estimates of the number of radiation oncologists required (1981–1990)*

Year	U.S. population (in millions)	New RT patients per year	Radiation oncologists required	Radiation oncologists supply	Shortfall
1981	234	412,000	2017	1824	193
1982	237	419,000	2057	1853	204
1983	240	427,000	2098	1919	179
1984	242	433,000	2118	1970	148
1985	244	439,000	2158	2018	140
1986	246	445,000	2178	2073	105
1987	248	451,000	2219	2145	74
1988	251	459,000	2259	2214	45
1989	253	466,000	2279	2279	—
1990	255	472,000	2320	2343	(23) [†]

* From GMENAC Report and Patterns of Care Study data (3, 4), modified from ACR Report, 1983.

[†] Oversupply.

radiation therapy. Furthermore, whereas the GMENAC report was based on 110 trainees entering practice each year, the Education Committee estimated that 155 residents would enter practice each year.

On the basis of these projections, the Education Committee estimated that 2,159 radiation oncologists would be required in 1990, and that 2,702 radiation oncologists would be available (Table 2). This would represent an oversupply of ~543 radiation oncologists.

Actual outcome

On the basis of U.S. Census Bureau statistics and a knowledge of numbers of radiation oncologists completing training, it appears that the ACR Education Committee prediction came closer to projecting the actual manpower needs in radiation oncology in 1990 than did the GMENAC report.

The GMENAC report projected a U.S. population of 244 million in 1985 and 255 million in 1990. The actual population was 237 million in 1985 and 249 million in 1990, figures almost identical to those used in the Education Committee report. The GMENAC report estimated that 472,000 new patients would be treated with radiation therapy in 1990, whereas the Education Committee projected a figure of approximately 437,000. The Patterns of Care Study facilities master list for 1990 has just become

available (3), and that study showed an 11% increase in the number of new patients treated with radiation therapy, from 444,000 in 1985 to 492,000 in 1990. The Education Committee projected a 30% increase in the number of radiation oncologists in the United States (Table 2) during this same period. This fits well with the members of the American Society for Therapeutic Radiology and Oncology (ASTRO), whose membership increased 25% between 1984 and 1989 (Fig. 1).

The major problem with the GMENAC report is that it did not foresee the large influx of applicants into radiation oncology and therefore underestimated the manpower supply. GMENAC assumed that 110 radiation oncologists would enter the field each year and that ~60 would retire. This would represent a net gain of ~50 radiation oncologists per year. The Education Committee predicted a net gain of ~105 radiation oncologists per year. This is because the number of residents in training increased markedly between 1983 and 1985 (Fig. 2).

Between 1976 and 1981, all radiation oncology training programs were 3 years in length. During those years, there was a plateau in the resident census with 370 (± 10) residents nationwide (~110 residents per year) (Fig. 2). During this period, the total number of vacancies in training programs was ~150, and there was an appreciable dropout rate. Between 1983 and 1985, there was a period of rapid growth in the total number of residents.

Table 2. ACR education committee estimates of the number of radiation oncologists required (1985–1990)*

Year	U.S. population (in millions)	New RT patients per year	Radiation oncologists required	Radiation oncologists supply	Oversupply
1985	237	405,000	2018	2065	47
1986	239	411,000	2038	2210	172
1987	241	417,000	2079	2344	265
1988	244	425,000	2119	2464	345
1989	246	431,000	2139	2585	446
1990	248	437,000	2159	2702	543

* Adapted from Davis et al. (2).

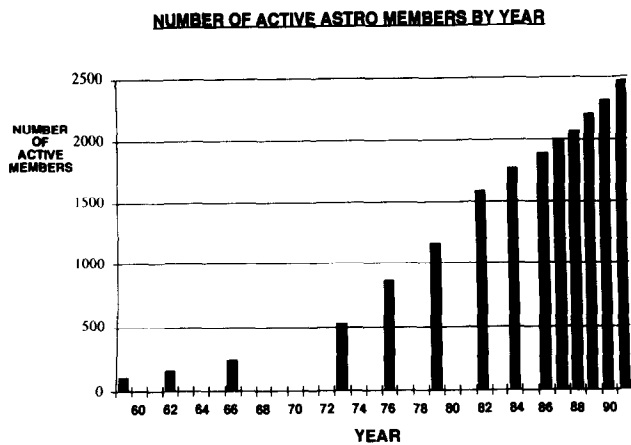


Fig. 1. Number of active ASTRO members by year.

The resident census stabilized at another plateau between 1985 and 1990 (540 residents $\pm$ 15). During these years, there were few if any vacancies, and the dropout rate was negligible ($< 1\%$ per year). In recent years, the number of residents entering practice each year has averaged 155 (range: 142–170), the same figure projected by the ACR Education Committee.

Current numbers and demand for radiation oncologists

The GMENAC report estimated that there would be 2,343 radiation oncologists in the United States in 1990. This is clearly an underestimate. The membership of the American Society of Therapeutic Radiologists and Oncologists (ASTRO) totaled 2,463 for January 1991, reflecting the number of practicing members for the previous year. There are approximately 200 practicing radiation oncologists who are not members of ASTRO. When one adds these to the total number registered in ASTRO, the ACR Education Committee's reported estimate of $\sim 2,700$ FTEs seems reasonable.

It is difficult to obtain an accurate assessment of the number of radiation oncologists leaving practice each year. If there are 2,700 FTE radiation oncologists in practice, and if the average length of practice is 35 years, the average number leaving practice would be ~ 75 (FTE). However, radiation oncology is a relatively young specialty, so that

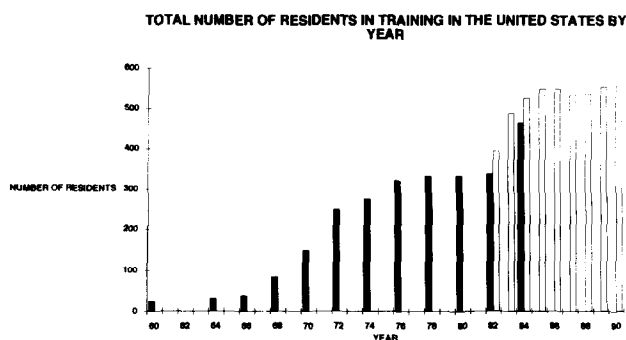


Fig. 2. Total number of residents in training in the United States by year.

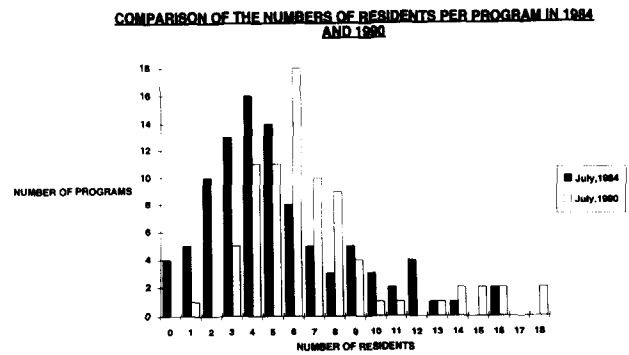


Fig. 3. Comparison of the numbers of residents per program in 1984 and 1990.

an estimate of 50 FTE radiation oncologists retiring each year seems reasonable.

Data from the ACR's Professional Bureau seems to support the concept that there is a declining demand for radiation oncologists. In 1983, there were 69 published openings compared to 63 published applicants, that is a ratio of openings to applicants of 1.1. In 1990, there were only 112 published openings for 183 applicants, that is a ratio of openings to applicants of 0.61 (Flynn, D. F. Written communication, April 1991).

The size of training programs

We are currently graduating many more residents from radiation oncology training programs than we were in 1983. There are several reasons for this. In the late 1970s, many training programs were not filled, and there was an appreciable dropout rate. In 1991, all programs are filled, and there are essentially no dropouts. Furthermore, if one compares the size of the training programs in 1984 with those in 1990, there has been an average increase of about two residents per training program. The increase has occurred in both large and small programs (Fig. 3). In 1984, there were 32 programs with less than four residents, whereas in 1990 there were only six. In 1984, there were 16 programs with 6–9 residents, compared to 37 in 1990. In 1984, only three training programs had more than 13 residents, whereas in 1990 eight programs had more than 13 residents (Fig. 3).

In summary, for 1990 the GMENAC estimate for the number of patients treated with radiation was more accurate but the Education Committee estimate of the number of radiation oncologists in practice was more accurate. There are fewer job opportunities now relative to the number of residents completing training. The imbalance is expected to worsen in the coming years. Most residents currently in training are well aware of this situation. In early 1991 there were 557 residents and fellows in training and another 340 (170 per year) have been accepted to begin training in 1991 or 1992 (Flynn, D. F. Written communication, April 1991). Therefore, the total number in training, or committed to begin training by

1992 is approximately 900. Some of those who are entering training in 1992 will be in 4-year programs. Nevertheless, approximately 800 radiation oncologists will enter full-time practice between 1991 and 1995. During this period, the number estimated to leave practice is

~250. It remains to be seen whether or not there will be enough appropriate positions to absorb a net increase of 550 radiation oncologists by 1995. Will an oversupply of manpower result in some marginal practices with limited resources and diminished quality assurance?

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