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Oncology Curricula in Postgraduate General Dentistry Programs: a Survey of Residency Program Directors

Evan B. Rosen [1] · Alexander Drew [1] · Joseph M. Huryn [1]

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Abstract
Management of patients undergoing treatment for cancer requires a multidisciplinary team including general dentistry providers; however, the relative knowledge and training of general dentists in the management of this patient population are relatively unknown. The purpose of this study was to assess the oncology curricula of postgraduate general dentistry training programs, from the perspective of the program directors, to better understand the opportunities for and/or barriers to dental care for cancer patients. A cross-sectional survey was sent to the 275 Commission on Dental Accreditation–accredited programs; 82 program directors responded (response rate, 30%). More than 50% of respondents indicated "none" or "little" curricular emphasis on cancer biology, bone marrow transplantation, immunotherapy, or prosthetics for use during head and/or neck surgery. Conversely, more than 50% of respondents indicated "moderate" or "substantial" emphasis on acute oral effects of cancer-related therapy, long-term oral effects of cancer-related therapy, antiresorptive medication pharmacology, radiotherapy techniques and biological effects, and osteonecrosis of the jaw. Residents had the most experience with radiotherapy patients and the least with bone marrow or transplantation patients. Overall, general dentistry program directors were enthusiastic to participate in the multidisciplinary team but reported challenges to including oncology curricula in residency training programs. Training for general dentistry providers in formalized postgraduate residency programs may be variable or limited—as a result, communication regarding patient management is critical. Opportunities exist to enhance the general dentistry curricula and, thereby, improve access to dental care for patients receiving treatment for cancer.

Keywords Attitudes · Knowledge · Dental · Oncology · Education

Introduction

Management of patients undergoing treatment for cancer requires a multidisciplinary team including general dentistry providers [1]. These providers, depending on the setting, may be charged with contributing to the oncology treatment team in various capacities, including pre-oncology treatment screening and evaluation [2] and long-term oral health management [1].

The American Dental Association Health Policy Institute reported that, in 2016, general dentists composed nearly 80% of the dentistry workforce, with a minority of practitioners designated as specialist providers [3]. Therefore, the vast majority of practitioners involved in the oral health management of cancer patients are general dentists. After completing 4 years of dental school, general dentists in the US have the option to complete a 12-month full-time postgraduate program in advanced education in general dentistry (AEGD) or a general practice residency (GPR)—the primary difference is that GPR programs provide hospital experience. These programs are accredited by the Commission on Dental Accreditation (CODA) and may include an option for a second year. Continuing education outside of this structure is rarely full-time and is not regulated by CODA.

It is well-established that general dentists play a role in screening for oral cancer [4–6]; however, the relative knowledge and training of the general dentist in the management of patients with cancer are less well-understood. The purpose of this study was to assess the oncology curricula of AEGD and GPR programs from the perspective of the directors of these training programs, as this will provide insight into the opportunities for and/or barriers to care for cancer patients seeking dental care from general dentistry providers.

✉ Evan B. Rosen
rosene@mskcc.org

[1] Dental Service, Department of Surgery, Memorial Sloan Kettering Cancer Center, 1275 York Avenue, New York, NY 10065, USA

Methods

The Human Research Protection Program at Memorial Sloan Kettering Cancer Center (MSK) reviewed our protocol and granted an exemption from Institutional Review Board oversight (X17-033). Participants invited to take part in this study were current program directors of CODA-accredited AEGD and GPR programs. The sole inclusion criterion was to be a current program director of a CODA-accredited AEGD or GPR program in the US ($n = 275$). We created an online survey using RedCap software (Vanderbilt University, Nashville, TN). The survey questions were developed to identify oncology curriculum and training experiences within AEGD and GPR programs. The final questions were reviewed by MSK Dental Service faculty members and were assessed for face and content validity by consulting faculty members with survey expertise.

A list of email addresses of AEGD and GPR program directors was obtained via public domain websites and compiled for this study. All AEGD and GPR programs were located within the US, and all programs that were contacted were accredited by CODA at the time of the survey. When there was ambiguity regarding the director of the residency program, a phone call was made directly to the center to identify the program director and their preferred email address. An introductory letter explaining the study and inviting participation was then sent via email to all program directors. The program directors were advised that all data would be presented anonymously and in aggregate. A follow-up email with a link to the survey was sent to the program directors 24 h later. Completion of the survey constituted consent to participate. Two reminder emails were sent to all study participants at 2-week intervals. The emails were sent in August and September 2017.

The survey consisted of 36 questions on the program's location, number of residents and faculty members, length, and oncologic component, as well as the role of residents in the care of cancer patients. Last, program directors were asked an open-ended question about their thoughts on the role of AEGD and GPR residents in the care of cancer patients. To verify that the person completing the survey was the director of the program, all survey participants were asked to provide their position and academic title. This question was removed from the data set. Additionally, participants were permitted to skip any questions if desired. Descriptive statistics were generated from the deidentified data set using Microsoft Excel (2007; Redmond, WA). The open-ended responses for the final question were thematically grouped for reporting.

Results

Of the 275 program directors contacted, 82 responded (25 AEGD program directors and 57 GPR program directors; response rate, 30%). Data came from all regions of the US, with 34 states represented in the respondent cohort. More than two thirds of the respondents reported that their programs were affiliated with centers that provide primary cancer care. Additional program data are listed in Table 1.

More than 50% of respondents indicated "none" or "little" emphasis on cancer biology, bone marrow transplantation, immunotherapy, or prosthetics for use during head and/or neck surgery in the oncology curricula. More specifically, 64% of AEGD program directors indicated "none" or "little" emphasis on prosthetics for radiotherapy (e.g., mouth guards or stents). Conversely, more than 50% of respondents indicated "moderate" or "substantial" emphasis on acute oral effects

Table 1 Characteristics of responding programs

Variable	AEGD ($n = 25$)	GPR ($N = 57$)
Program location, % (n)		
Urban	56 (14)	76 (42)
Suburban	20 (5)	22 (12)
Rural	12 (3)	0 (0)
Other	12 (3)	2 (1)
Residents, mean, median (SD)		
First year	6.24, 6.00 (3.37)	6.79, 5.00 (8.84)
Second year	1.44, 0.00 (3.00)	1.07, 0.00 (3.14)
Faculty		
Full-time	4.83, 4.50 (3.62)	4.25, 3.00 (4.30)
Part-time	4.52, 3.00 (4.12)	9.24, 4.00 (14.80)
Affiliation with center providing primary cancer care, % (n)		
Yes	72 (18)	80 (45)
No	28 (7)	20 (11)

AEGD, advanced education in general dentistry; *GPR*, general practice residency

Table 2 Oncology curriculum areas of relative emphasis as reported by AEGD and GPR program directors

Oncology curriculum area	All programs ($n = 82$)						AEGD ($n = 25$)						GPR ($n = 57$)					
	N	L	M	S	NS	PNA	N	L	M	S	NS	PNA	N	L	M	S	NS	PNA
Cancer biology	15	49	30	4	1	0	24	32	40	0	4	0	11	57	26	6	0	0
Acute oral effects of cancer-related therapy	0	7	37	56	0	0	0	16	32	52	0	0	0	4	40	57	0	0
Long-term oral effects of cancer-related therapy	1	11	32	56	0	0	0	24	28	48	0	0	2	5	34	59	0	0
Antiresorptive medication pharmacology	6	28	30	35	1	0	8	36	20	32	4	0	5	25	34	36	0	0
Bone marrow transplantation	15	48	26	10	1	0	16	60	20	0	4	0	14	43	29	14	0	0
Immunotherapy	12	47	32	7	1	0	24	44	28	0	4	0	7	48	34	11	0	0
Radiotherapy techniques and biological effects	4	29	35	31	1	0	12	36	28	20	4	0	0	26	38	36	0	0
Osteonecrosis of the jaw	0	7	37	55	0	0	0	16	32	52	0	0	0	4	39	57	0	0
Prosthetics for radiotherapy (e.g., mouth guards/stents)	12	36	28	21	3	0	20	44	16	16	4	0	9	32	34	23	2	0
Prosthetics for use during head and/or neck surgery	19	45	21	13	1	1	13	58	21	0	4	4	21	39	21	18	0	0

Data are %. *AEGD*, advanced education in general dentistry; *GPR*, general practice residency; *L*, little; *M*, moderate; *N*, none; *NS*, not sure; *PNA*, prefer not to answer; *S*, substantial

of cancer-related therapy, long-term oral effects of cancer-related therapy, antiresorptive medication pharmacology, radiotherapy techniques and biological effects, and osteonecrosis of the jaw. The areas of relative emphasis in the curricula were largely similar between AEGD and GPR programs, as indicated in Table 2. Thirty-six percent of programs have a member specifically responsible for cancer care education within the general dentistry faculty. These faculty members have varying educational backgrounds, including general dentistry, oral and maxillofacial surgery, oral medicine, oral pathology, and maxillofacial prosthodontics.

In approximately half of programs, residents were involved in the care of patients either before or after the cancer treatment occurred; in a slightly smaller percentage of programs, residents were involved in the care of patients during cancer treatment (Fig. 1). More than 50% of respondents indicated that residents had experience "often" or "always" evaluating and treating patients before planned head and/or neck radiotherapy. The majority of respondents indicated that residents had minimal experience evaluating and treating patients during bone marrow or stem cell transplantation (Table 3).

Most respondents reported that their residents benefited from oncology training as part of their residency programs. Additionally, program directors expressed challenges related to integration of workflows to allow residents to have consistent experience with the management of patients undergoing treatment for cancer. Some of the responses to the open-ended question included the following: "The integration of oral oncology/oncologists as a component of a multidisciplinary oncology care system is critical to patient care, and a hands-on experience for GPR residents is invaluable." "In our system, dentistry is part of the pretreatment protocols for many cancer therapies, and especially radiation oncology. We are improving integration into the presurgical evaluations for

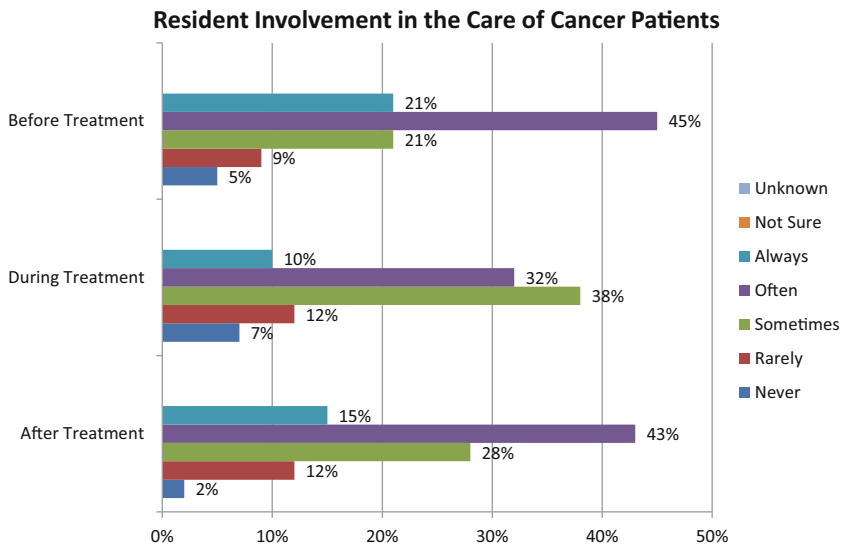

Fig. 1 Frequency of resident involvement in the care of cancer patients during phases of cancer treatment

Table 3 Relative experience of residents evaluating and treating patients as reported by AEGD and GPR program directors in oncology treatment situations

Treatment situation	All Programs ($n = 82$)							AEGD ($n = 25$)							GPR ($n = 57$)						
	N	R	S	O	A	NS	U	N	R	S	O	A	NS	U	N	R	S	O	A	NS	U
Before planned head and/or neck radiotherapy	5	11	26	39	20	0	0	8	20	32	24	16	0	0	4	7	23	46	21	0	0
Before planned head and/or neck surgery	6	17	37	31	10	0	0	16	24	36	8	12	4	0	4	12	37	35	12	0	0
Before planned bone marrow transplantation/stem cell transplantation	16	23	29	18	11	2	0	12	28	36	20	4	0	0	16	23	26	23	11	2	0
Before planned treatment with antiresorptive medications	10	19	22	28	17	4	0	20	12	20	24	16	8	0	5	21	23	30	18	2	0
During treatment with head and/or neck radiotherapy	10	18	46	18	7	0	0	16	28	36	12	8	0	0	7	14	51	21	7	0	0
During bone marrow transplantation/stem cell transplantation	20	33	37	5	3	3	0	24	40	28	0	4	4	0	18	30	41	7	2	2	0
During treatment with antiresorptive medications	10	24	27	28	7	4	0	20	24	28	12	12	4	0	5	25	26	35	5	4	0
After head and/or neck radiotherapy	4	13	37	34	12	0	0	12	12	44	24	8	0	0	0	14	33	39	14	0	0
After head and/or neck cancer surgery	4	19	37	32	9	0	0	12	24	40	20	4	0	0	0	16	36	38	11	0	0
After bone marrow transplantation/stem cell transplantation	15	27	35	16	5	3	0	17	33	29	13	4	4	0	14	25	37	18	5	2	0
After treatment with antiresorptive medications	10	15	30	33	10	3	0	20	12	32	24	8	4	0	5	16	29	38	11	2	0
With osteonecrosis of the jaw	6	25	37	22	10	0	0	8	42	33	8	8	0	0	5	18	39	28	11	0	0

Data are %. *A*, always; *AEGD*, advanced education in general dentistry; *GPR*, general practice residency; *N*, never; *NS*, not sure; *O*, often; *R*, rarely; *S*, sometimes; *U*, unsure

otolaryngology and are consistently involved in such evaluations with oral and maxillofacial surgery. We also participate in many of the hematologic cancer protocols but tend to find these referrals less consistent."

Discussion

Oral health management provided by general dentists is an important component of the acute and long-term care of patients with cancer. As indicated by the findings of this study, terminal formalized general dentistry training programs often lack adequate focus on the foundational knowledge and hands-on experience required to treat these patients.

The limited emphasis of postgraduate general dentistry curricula on evolving cancer treatments, such as bone marrow transplantation and immunotherapy, is not surprising. Gaps in knowledge among providers of nononcology services have been reported [7]. Additionally, the rapidly changing knowledge base related to cancer care, such as the approaches and agents used for immunotherapy [8], can present challenges for a primary care provider to remain current. Oncologists should be cognizant of this limitation and should understand the need to adequately communicate with the general dentistry practitioner to ensure optimal management of the oral health needs of the shared cancer patient.

Owing to the differences in residency training experiences, general dentistry providers have different levels of familiarity with the nuances of oral health management. The general dentistry practitioner is skilled in restorative dentistry, and their potential contributions in this capacity should be encouraged by the multidisciplinary team [1]. Specific parameters for screening or treatment considerations should be clearly communicated to the collaborating general dentistry provider to ensure that all parties share a unified goal of intervention [2]. For fabrication of prosthetics or other areas that may fall outside of the bounds of typical general dentistry training, patients can be referred to a maxillofacial prosthodontist, who is a dental specialist trained specifically in the intraoral rehabilitation of patients with cancer [9].

Improvements can be made in general dentistry training to address the unmet needs of cancer patients [10, 11]. To begin, a greater emphasis on the treatment of cancer patients can be made at the pre-doctoral level. Previous reports indicate that graduating students and recent graduates of dental school programs have a perceived lack of knowledge in this specific subject area [12–14]. Focused efforts should be made to address this shortcoming in postgraduate general dentistry training programs as well. Dental trainees have reported that interdisciplinary education in other oral health contexts increases confidence and enthusiasm to provide services [15]. There is an opportunity, especially at centers where primary cancer care is provided, to promote such training, as it has the potential to improve the care of patients with cancer. Ultimately, as indicated by the open-ended comments from our survey, general dentists are enthusiastic to actively collaborate in the care of patients with cancer. To develop strategies for improved collaboration and provision of service, future studies should seek to identify potential barriers to oral care from the oncologist's perspective.

This study has several limitations. First, although data were obtained from program directors throughout the US, the data in this study were limited by the response rate. Data from the nonresponding programs would be helpful to further understand the training and experiences of general dentistry providers in the US. Additionally, this was a cross-sectional study. Although the curriculum design and evolution of AEGD and GPR programs have been described [16], there has been limited discussion specifically about the educational parameters necessary in formalized GPR programs to manage a population of patients with cancer. As cancer care changes rapidly, it would be worthwhile to better understand how general dentistry educational programs have changed over time.

Conclusion

General dentistry practitioners are valuable members of the multidisciplinary oncology treatment team and can offer intraoral rehabilitation services before, during, and after treatment for cancer. Training of general dentistry providers in formalized postgraduate residency programs may be variable or limited, and as a result, communication regarding patient management is critical. Opportunities exist to enhance general dentistry curricula and, thereby, improve access to dental care for patients receiving treatment for cancer.

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