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Teledermatology (TD) is an emerging modality for providing remote dermatologic care with high diagnostic and management 25 concordance compared to face-to-face clinic dermatology. TD training among dermatology residency programs in the United 26 States has not been characterized. We disseminated a survey to all dermatology residents at ACGME accredited programs in the 27 United States to explore the prevalence and distribution of TD training and trainee perceptions of TD. One hundred out of a 28 potential 1170 responses (RR 8.5%) were collected from residents in every geographic location from all years in training: 67/100 29 of residents reported that TD was practiced at their institutions, although at these sites only 21/100 residents participated in 30 clinical sessions. Residents with TD exposure were more likely to feel comfortable managing a TD consult after residency 31 ($p<0.001$), but were not more likely to incorporate teledermatology into their future plans. Results of this study provide insight 32 into the impact of TD exposure on resident perceptions of TD and demonstrate the need for expanding TD training across all 33 dermatology residency programs.

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Letter

Exposure to teledermatology and resident preparedness for future practice: results of a national survey

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Abstract

Teledermatology (TD) is an emerging modality for providing remote dermatologic care with high diagnostic and management concordance compared to face-to-face clinic dermatology. TD training among dermatology residency programs in the United States has not been characterized. We disseminated a survey to all dermatology residents at ACGME accredited programs in the United States to explore the prevalence and distribution of TD training and trainee perceptions of TD. One hundred out of a potential 1170 responses (RR 8.5%) were collected from residents in every geographic location from all years in training: 67/100 of residents reported that TD was practiced at their institutions, although at these sites only 21/100 residents participated in clinical sessions. Residents with TD exposure were more likely to feel comfortable managing a TD consult after residency ($p<0.001$), but were not more likely to incorporate teledermatology into their future plans. Results of this study provide insight into the impact of TD exposure on resident perceptions of TD and demonstrate the need for expanding TD training across all dermatology residency programs.

Keywords: teledermatology, residency, education, curriculum

Introduction

Teledermatology has been growing in popularity as an effective method for providing remote dermatologic care [1]. As consultation volume for teledermatology continues to rise [2], teledermatology is increasingly likely to be part of current residents' future practice. Despite this trend, no study has evaluated residents' exposure to teledermatology during residency and its impact on future plans. In a recent study, diagnostic and management concordance between resident and attending dermatologists was 53% and 65%, respectively, revealing that training in teledermatology during residency may in fact be limited [3]. We conducted a national cross-sectional study assessing teledermatology exposure during residency training and its effect on comfort with managing a teledermatology consultation.

Methods

In June 2015, we contacted all United States dermatology residency program administrators with a request to disseminate a link to our survey to residents in their program. Follow-up invitations were sent at 1 and 2 weeks. Survey domains include demographics, exposure to teledermatology, comfort with teledermatology, and future plans. We performed a t-test to evaluate differences in means for continuous variables and chi-square test for categorical variables. Fisher's exact tests were performed for comparisons with small cell size. This study was approved by the Partners Institutional Review Board.

Results

Table 1. Participant Characteristics

n, %	Overall N=100	Exposed to Teledermatology N= 21	Not Exposed to Teledermatology N=79	p-value*
PGY				0.565
PGY-1	2 (2.0)	0 (0.0)	2 (2.5)	
PGY-2	40 (40.0)	6 (28.6)	34 (43.0)	
PGY-3	30 (30.0)	7 (33.3)	23 (29.1)	
PGY-4	27 (27.0)	8 (38.1)	19 (24.1)	
PGY-5	1 (1.0)	0 (0.0)	1 (1.3)	
Region				0.852
Northeast	35 (35.0)	8 (38.1)	27 (34.2)	
Southeast	14 (14.0)	2 (9.5)	12 (15.2)	
Midwest	24 (24.0)	6 (28.6)	18 (22.8)	
West	11 (11.0)	1 (4.8)	10 (12.7)	
Southwest	15 (15.0)	4 (19.0)	11 (13.9)	
Alaska or Hawaii	1 (1.0)	0 (0.0)	1 (1.3)	
How many residents in program				0.228
< 9	21 (21.0)	2 (9.5)	19 (24.1)	
≥ 9	79 (79.0)	19 (90.5)	60 (75.9)	
Teledermatology practiced at institution				<0.001
Yes	67 (67.0)	21 (100.0)	46 (58.2)	
No	33 (33.0)	0 (0.0)	33 (41.8)	

A total of 100 responses out of 1170 potential survey participants (8.5%) were collected from every regional location in the US and residents in all years of training (Table 1). Most residents (67%) reported teledermatology was practiced at their institution or an affiliated hospital. However, only 21% of residents participated in teledermatology. Among those who participated in teledermatology, 33% had 1-5 teledermatology sessions, 27% had 5-20 sessions, and 10% had greater than 20 sessions. Teledermatology was practiced most commonly at a Veterans Affairs' Center (60%) or a primary academic center (56.7%). Store-and-forward teledermatology was most common (60%), although live-in-person (13%) and a combination of both approaches (27%) were also used.

Table 2. Comfort* with Teledermatology by Exposure

	Overall N=100	Exposed to Teledermatology N= 21	Not Exposed to Teledermatology N=79	p-value*
Level of comfort managing a teledermatology consultation, mean (SD)	2.75 (0.95)	3.57 (0.68)	2.53 (0.89)	<0.001
Level of comfort with ruling out melanoma with a teledermatology	2.22 (1.02)	2.71 (0.90)	2.07 (1.01)	0.011

consultation, mean (SD)				
Level of comfort ruling out NMSC with a teledermatology consultation, mean (SD)	2.71 (0.95)	3.14 (1.01)	2.59 (0.89)	0.017
Level of comfort ruling out rashes with a teledermatology consultation, mean (SD)	2.88 (0.88)	3.05 (0.59)	2.82 (0.95)	0.207
Plan to use teledermatology in future practice, n (%)				0.381
Yes	22 (22.0)	5 (23.8)	17 (21.5)	
No	15 (15.0)	1 (4.8)	14 (17.7)	
Maybe/unsure	63 (63.0)	15 (71.4)	48 (60.8)	
Feels ready to manage teledermatology after residency, n (%)				<0.001
Yes	31 (31.0)	14 (66.7)	17 (21.5)	
No	21 (21.0)	2 (9.5)	19 (24.1)	
Maybe/unsure	48 (48.0)	5 (23.8)	43 (54.4)	

* Comfort was rated on a scale from 1 (completely uncomfortable) to 5 (completely comfortable).

There was no difference in residency year, regional location, and program size between residents who were exposed to teledermatology and those unexposed (Table 1). Residents who spent clinical sessions in teledermatology reported higher overall comfort with managing a teledermatology consultation (Table 2). Although teledermatology exposure was associated with greater comfort in diagnosing and managing melanoma and nonmelanoma skin cancers, there was no difference in comfort between the two groups for the evaluation of rashes. When asked whether they will be ready to manage a teledermatology consultation by the end of their training, residents exposed to teledermatology were more like to report future preparedness than those with no exposure ($p<0.001$).

Discussion

Our data demonstrate the need for expanding resident exposure to teledermatology. TD has been previously shown to be an important educational tool in teaching core competencies such as practice-based learning and improvement in medical knowledge [4]. Results of this study suggest that any number of clinical sessions is correlated with greater confidence in management of teleconsultations. Although even moderate exposure to teledermatology improves resident confidence, only 67% of institutions have teledermatology and within those institutions, only 21% of residents are involved in teledermatology clinics. These two findings are clear practice gaps in dermatology graduate medical education: in order to train residents for a future in dermatology, all residency programs should have access to teledermatology and all residents should have teledermatology clinics as part of their curricula.

Interestingly, even though they may feel more comfortable with teledermatology, residents with any exposure were not more likely to incorporate teledermatology in their future practice ($p=0.381$). This suggests that barriers beyond extent of their teledermatology education are likely to prevent dermatologists from providing off-site consultations. Contributing factors may include evolving regulatory challenges surrounding data security and reimbursement. Addressing these issues within the curriculum may serve to help residents adopt teledermatology into their future practice.

These data must be interpreted in the context of the study design. This is a cross-sectional survey study with a low response rate (100 out of approximately 1170 potential respondents), which limits generalizability of results and prevented further stratification of comfort level based on number of clinical sessions in teledermatology. In order to maintain complete anonymity of responders, we were unable to determine the institutions from which residents responded. However, this design also prevented further characterization of results based on participating institutions. Future studies with larger sample sizes may be needed to capture the full spectrum of residents' perceptions of teledermatology based on their level of experience.

Although teledermatology has been shown to have high management agreement rates with clinical dermatology [5], many residents may not feel adequately prepared to manage a teledermatology consultation after training. Expansion of dermatology residency curricula to include focused sessions in teledermatology will be needed to help residents achieve comprehensive training as well as to solidify teledermatology's unique role in conventional clinical practice.

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