

Assessment of teledermatology education during residency training: a nationwide survey of residents and program directors

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To the Editor:

Teledermatology, defined as use of telecommunication technologies to virtually diagnose and treat dermatologic conditions, can increase access to specialists, alleviate healthcare disparities, and reduce delays in care [1-4]. Teledermatology is a timely solution for healthcare provision during the coronavirus disease 2019 (COVID-19) pandemic as many physicians have augmented their virtual clinical capabilities to deliver safe care. However, little is known about teledermatology training in dermatology residencies, resident comfort with teledermatology, or attitudes toward teledermatology. In 2016, Qureshi and Mostaghimi reported that only 21% of residents had participated in teledermatology [5]. Given the rapidly changing context of teledermatology utilization, herein we explore the landscape of teledermatology education prior to the COVID-19 crisis, factors that increase resident comfort with teledermatology, and the attitudes of dermatology residents and program directors (PD) toward teledermatology.

We administered surveys regarding teledermatology education to dermatology residents and PD nationwide using the Association of Professors of Dermatology listserv in the fall of 2018. Descriptive statistics were performed and univariate and

multivariable analyses were done to identify factors associated with resident comfort with teledermatology. Chi-squared tests were utilized to determine significance ($P \leq 0.05$). Multivariable models were built by stepwise regression using the likelihood ratio test. Statistical analyses were performed using STATA v14.0 (College Station, TX). This study received approval from the University of Texas at Austin Institutional Review Board and all participants provided informed consent prior to participating in the survey.

Approximately 15% (N=215) of dermatology residents and 26% (N=37) of PD in the United States responded to the survey (**Table 1**). Fifty-nine percent of residents (N=127) reported participating in teledermatology cases during residency, 22% (N=47) in over fifty cases. Sixty-one percent (N=130) reported receiving teledermatology didactic sessions. Most (N=149; 69%) believed teledermatology education should be required in residency. Seventy-eight percent of PD (N=29) indicated that their residents participated in teledermatology with half (N=18; 49%) reporting average resident participation of more than fifty cases. Of PD, 78% (N=29) reported teledermatology didactics at their institutions. Physician-to-physician store-and-forward teledermatology was the most common type reported by PD and residents.

Of the residents who participated in teledermatology, 73% (N=93) reported that they felt comfortable with teledermatology. Fifty-nine

Table 1. Resident and program director demographics.

	Total Resident Respondents	Number (%)	Total Program Director Respondents	Number (%)
Gender	215		37	
Male		70 (32.6)		14 (37.8)
Female		145 (67.4)		23 (62.2)
Median Age (Interquartile Range)	203	30 (28-32)	32	42.0 (37.0-49.5)
Post-Graduate Year	215		-	
2		79 (36.7)		-
3		69 (32.1)		-
4		67 (31.2)		-
Program Size Per Year (Number of Residents)	215		36	
1-3		67 (31.2)		12 (32.4)
4-6		90 (41.9)		12 (32.4)
7+		58 (26.9)		12 (32.4)
Program Location	215		37	
Northeast		59 (27.4)		7 (18.9)
Southeast		41 (19.1)		5 (13.5)
Southwest		30 (14.0)		5 (13.5)
West		31 (14.4)		11 (29.7)
Midwest		54 (25.1)		9 (24.3)
Number of Teledermatology Cases Performed	215		37	
None		88 (40.9)		8 (21.6)
1-5		21 (9.8)		1 (2.7)
6-10		16 (7.4)		2 (5.4)
11-30		28 (13.0)		6 (16.2)
31-50		15 (7.0)		2 (5.4)
>50		47 (21.9)		18 (48.6)
Presence of Teledermatology Rotation	214		37	
No		160 (74.8)		27 (73.0)
Yes		54 (25.2)		10 (27.0)
Type of Didactic Received	213		37	
None		83 (40.0)		8 (21.6)
Formal Lecture		34 (16.0)		7 (18.9)
Demonstration		33 (15.5)		16 (43.2)
Informal Instruction		111 (52.1)		25 (67.6)
Type of Teledermatology	215		37	
Live Video		57 (26.5)		12 (32.4)
Store-and-forward (physician-to-patient)		34 (15.8)		26 (70.2)
Store-and-forward (physician-to-physician)		90 (41.9)		11 (29.7)
Location	126		29	
Inpatient		35 (27.8)		12 (41.4)
VA Outpatient		73 (57.9)		14 (48.3)
Safety Net/Continuity Clinic		23 (18.3)		9 (31.0)
Attending Outpatient Practice		42 (33.3)		11 (37.9)
Other		14 (11.1)		3 (10.3)

percent (N=126) of all residents believed teledermatology would be important in their future practices. Our data indicate a direct relationship between number of teledermatology cases performed and teledermatology comfort (**Table 2**).

In multivariable modeling, the number of cases remained most strongly correlated with teledermatology comfort (odds ratio [OR] 36 for ≥ 50 cases, 95% confidence interval [CI] 6.96-189.93, $P < 0.001$). Presence of teledermatology didactics (OR

Table 2. Teledermatology resident comfort and multivariable models.

Variable	Total number responding (N)	Number of Residents (%)	Number Reporting Comfort (%)	Univariate Analysis		Full Multivariable Model		Best Adjusted Multivariable Model	
				Odds Ratio (95% CI)	P Value	Odds Ratio (95% CI)	P Value	Odds Ratio (95% CI)	P Value
Number of Cases	127								
1-10		37 (29.1)	14 (37.8)	-	-	-	-	-	-
11-30		28 (22.1)	21 (75.0)	4.9 (1.7-14.6)	0.004	5.90 (1.79-19.50)	0.004	6.59 (1.99-21.84)	0.002
31-50		15 (11.8)	13 (92.9)	21.4 (2.5-181.5)	0.005	14.11 (1.56-127.58)	0.018	18.14 (2.07-159.06)	0.009
>50		47 (37.0)	45 (95.7)	37.0 (7.7-176.7)	<0.001	30.04 (5.65-159.63)	<0.001	36.37 (6.96-189.93)	<0.001
PGY Level	127								
PGY2/3		76 (59.8)	48 (64.0)	-	-	-	-	-	-
PGY4		51 (40.2)	45 (88.2)	4.22 (1.59-11.2)	0.004	3.24 (0.98-10.76)	0.055	3.35 (1.01-11.10)	0.048
Program Size	127								
1-6		92 (72.4)	62 (67.4)	-	-	-	-	-	-
7+		35 (27.6)	31 (88.6)	3.63 (1.17-11.23)	0.026	1.72 (0.39-7.56)	0.47	-	-
Teledermatology Didactics Received	127								
No		32 (25.2)	18 (56.3)	-	-	-	-	-	-
Yes		95 (74.8)	75 (79.8)	3.07 (1.3-7.26)	0.011	3.94 (1.26-12.34)	0.019	3.91 (1.26-12.63)	0.019
Presence of Teledermatology Rotation	126								
No		87 (69.1)	62 (71.3)	-	-	-	-	-	-
Yes		39 (30.9)	30 (78.9)	1.51 (0.61-3.75)	0.37	-	-	-	-

3.91, 95% CI 1.26-12.63, P=0.02) also maintained significance. Residents who performed more cases were more likely to believe teledermatology would be important in their future practices (OR 3.08, 95% CI 1.23-7.72, P=0.02). Regardless of teledermatology exposure, residents did not consider the quality of care to be equal between teledermatology and in-person visits (P=0.74).

Almost 60% of residents and 80% of PD report resident participation in teledermatology, which is a significant increase from 21% reported by Qureshi and Mostaghimi in 2016 [5]. Residents are now more likely to indicate that teledermatology will be important in their future practices, especially those with more teledermatology exposure. The number of teledermatology cases performed most strongly

correlated with self-reported comfort, which was not just a result of advanced post-graduate year. Although the COVID-19 crisis has certainly changed resident participation in teledermatology, our data are useful because they suggest two actionable ways to increase resident comfort with teledermatology: increasing hands-on exposure to teledermatology cases and providing teledermatology didactics. Regardless of the number of cases performed, residents indicated the quality of care in teledermatology was not equal to that of traditional in-person visits, the cause of which requires further investigation. Study limitations include self-selection bias, recall bias, and subjectivity in self-reported comfort.

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Teledermatology education is expanding in residency programs throughout the country and most residents and PD support increased teledermatology education. The COVID-19 crisis serves as a springboard for the utilization of telemedicine in more dermatology practices. Educational efforts to increase hands-on cases and teledermatology-specific didactics will prepare the future workforce to fully engage in a dynamic, access-oriented healthcare system.

Potential conflicts of interest

The authors declare no conflicts of interest.