

# Teledermatology Platforms Usage and Barriers: A Cross-Sectional Analysis of United States-Based Dermatologists Pre- and Post-COVID-19

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## ABSTRACT

**Background:** During the global COVID-19 pandemic, dermatologists increasingly adopted teledermatology to facilitate patient care.

**Objective:** To identify differences in teledermatology platform usage and functionality among dermatologists as a means of understanding the potential effect on virtual healthcare access.

**Methods:** Results from a 2021 cross-sectional pre-validated survey distributed to actively practicing United States dermatologists were analyzed based on timepoint when teledermatology was adopted relative to COVID-19, previous/currently used platforms, self-reported platform functionality, and barriers to teledermatology implementation. Analysis was performed using chi-square and odds ratios (OR) with 95% confidence intervals (95% CI) for categorical data and single-factor analysis of variance (ANOVA) with post-hoc Tukey-Kramer for continuous data.  $P < .05$  was considered significant.

**Results:** Early adopters (EAs) trialed significantly more (2.3 vs 1.9,  $P = 0.02$ ) platforms than (post) COVID adopters (CAs) before choosing their current platform. More EAs reported using platforms capable of uploading images ( $P = .002$ ), required a mobile application ( $P = .006$ ), and allowed staff to join patient encounters ( $P < .001$ ). While poor image quality was the most cited barrier to implementation, CAs and non-adopters (NAs) were materially more likely to cite it as their largest barrier to teledermatology.

**Limitations:** The retrospective nature of the study and potential response bias.

**Conclusion:** Dermatologists' use of teledermatology materially correlates with their teledermatology-adoption timepoint, and future usage may be materially impacted by the end of the COVID-19 public health emergency. Future studies should aim at how implementation and barriers to teledermatology usage may impact access to care.

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## INTRODUCTION

United States-based dermatologists adapted to the COVID-19 public health emergency in part by integrating teledermatology into their practices.<sup>1,2</sup> Pre-COVID-19, asynchronous or store-and-forward (SAF) teledermatology was a relatively cost-effective tool providing care to patients with minimal healthcare access.<sup>3-5</sup> Post-COVID-19, studies suggest that teledermatology usage materially shifted towards synchronous or live-interactive (LI)/video-based modalities.<sup>6-13</sup> This study aimed to identify differences between teledermatology-adoption timepoints (TAT) (relative to COVID-19) and associated teledermatology barriers to usage and platform characteristics.

## METHODS

This study was exempt per Institutional Review Board (IRB) guidelines. A pre-validated anonymous survey was distributed

via email to a proprietary purchased listserv of actively practicing US dermatologists. Completed results were stratified by TAT. Analysis was performed using chi-square, odds ratios (OR) with 95% confidence intervals (95% CI) for categorical data, t-tests for continuous data, and rank-based overlap (RBO) to compare ranked-ordered lists on a continuous scale from 0 (completely different) to 1 (identical) using Python 3.9.6.

## RESULTS

Data from 338 practicing dermatologists were analyzed. The analysis regarding demographics and TAT is described in separate studies<sup>12,13</sup>; briefly, pre-COVID/early adopters (EA) were significantly more likely to have  $\leq 10$  years of experience (YoE) and be associated with academic medical-dermatology practices, while (post-) COVID adopters (CAs) were more likely to have  $\geq 20$  YoE and be associated with private medical-

TABLE 1.

**Top 5 teledermatology platforms Pre- and Post-COVID-19.** Top 5 platforms that EAs and CAs of teledermatology have previously trialed compared with their current primary platform, using RBO to determine the degree of similarity between 0 (completely different) and 1 (identical).

EA (n, %)			CA (n, %)			P-value
# Platforms trialed, mean (SD)	2.3 (1.4)		1.9 (1.1)			0.02*
Trialed Platforms (n, %)	Current Platform (n, %)	Trialed v. Current RBO	Trialed Platforms (n, %)	Current Platform (n, %)	Trialed v. Current RBO	Current Platforms RBO
1. Doximity (29, 24.2%)	1. Epic MyChart (14, 18.2%)	0.26	1. Facetime (97, 27.2%)	1. Doxy.me (44, 18.2%)	0.8	0.33
2. Zoom (27, 22.5%)	2. EMA (10, 13.0%)		2. Doxy.me (73, 20.5%)	2. Facetime (43, 17.8%)		
3. Facetime (23, 19.2%)	3. Doxy.me (9, 11.7%)		3. Zoom (72, 20.2%)	3. Zoom (31, 12.8%)		
4. Epic MyChart (22, 18.3%)	4. Zoom (9, 11.7%)		4. Doximity (68, 19.1%)	4. Doximity (29, 12.0%)		
5. EMA (12, 10.0%)	5. Doximity (8, 10.4%)		5. EMA (50, 14.0%)	5. EMA (26, 10.7%)		

CA, (post) COVID adopter; EA, early adopter; RBO, rank-based overlap; SD, standard deviation.

\*2-tailed t-test

Comparing the top 5 previously used with current-primary platforms, EAs' RBO is materially smaller than CAs' and suggests that CAs experimented with significantly fewer platforms than EAs (mean±SD 2.3±1.4 vs 1.9±1.1,  $P=0.02$ ). The RBO comparing the top 5 current primary platforms between EAs and CAs is 0.33, suggesting a material difference in practice-integrated platforms (Table 1). Compared with CAs, proportionally more EAs reported using platforms that required a mobile application [62.0% v 45.3%;  $\chi^2$  (2,n=322)=10.10,  $P=.006$ ], were capable of uploading images [63.3% v 42.0%;  $\chi^2$  (2,n=322)=12.00,  $P=.002$ ], and allowed staff to join ongoing patient encounters [57.0% vs 32.5%;  $\chi^2$  (2,n=322)=15.65,  $P<.001$ ; Table 2]. There was no statistical difference based on platform compliance with Health Insurance Portability and Accountability Act (HIPAA) regulations [ $\chi^2$  (2,n=322)=3.56,  $P=.17$ ].

There was a significant relationship between TAT and the self-reported largest barrier to implementing teledermatology [ $\chi^2$  (12,n=338)=26.35,  $P=.01$ ; Table 3]. While concerns regarding image quality were most cited across groups, compared with EAs non-adapters (NAs) were 7x (OR 7.77, 95% CI 2.26-26.7) and CAs were 1.58x (OR 1.58, 95% CI 0.91-2.76) more likely to cite poor image quality as their largest barrier to implementation.

## DISCUSSION

We have previously demonstrated a significant increase in synchronous/LI teledermatology, especially among CAs<sup>12,13</sup>; reflected here by the self-reported popularity of video-based platforms. The RBO analysis demonstrates material heterogeneity between EAs and CAs post-COVID platform usage, suggesting that CAs (largely private dermatologists) are using teledermatology differently than their EA (largely Academic/Government-based) peers.<sup>13</sup> This is supported by

TABLE 2.

**Self-reported teledermatology platform properties.** Teledermatology platform properties stratified by when technology was adopted. There was a statistically significant relationship between timepoints of adoption and platform functionality. CAs were less likely to use platforms capable of uploading images, requiring an app to use, and allowing staff to join patient visits. There was no significant difference in HIPAA compliance between EAs and CAs.

	EA n (%)	CA n (%)	P-value ( $\chi^2$ )
HIPAA compliant			
Yes	63 (79.7)	170 (70.0)	$P=.17$ $\chi^2$ (2,n=322)=3.56
No	7 (8.9)	23 (9.5)	
Unsure	9 (11.4)	50 (20.6)	
Uploading Images			
Yes	50 (63.3)	102 (42.0)	$P=.002$ $\chi^2$ (2,n=322)=12.00
No	20 (25.3)	80 (32.9)	
Unsure	9 (11.4)	61 (25.1)	
App required			
Yes	49 (62.0)	110 (45.3)	$P=.006$ $\chi^2$ (2,n=322)=10.10
No	27 (34.2)	96 (39.5)	
Unsure	3 (3.8)	37 (15.2)	
Allows staff to join			
Yes	45 (57.0)	79 (32.5)	$P<.001$ $\chi^2$ (2,n=322)=15.65
No	19 (24.1)	78 (32.1)	
Unsure	15 (19.0)	86 (35.4)	

CA, (post) COVID adopter; EA, early adopter; HIPAA, Health Insurance Portability and Accountability Act.

TABLE 3.

**Barriers to teledermatology implementation.** Largest barrier to teledermatology usage stratified by when/if technology was adopted. There was a statistically significant relationship between timepoint of adoption and self-reported largest barrier. CAs and NAs were more likely to cite image quality as their largest barrier, while EAs reported their primary concern was reimbursement.

	EA n (%)	CA n (%)	NA n (%)	P-value ( $\chi^2$ )
None of the above, we are currently using telemedicine	22 (27.8)	65 (26.7)	0 (0.0)	$P=.01$ $\chi^2$ (12,n=338)=26.35
Patients are unable to use platforms/technology	20 (25.3)	56 (23.0)	2 (12.5)	
Staff are unable to use platforms/technology	2 (2.5)	4 (1.6)	1 (6.3)	
Image quality prevents accurate assessment	22 (27.8)	96 (39.5)	12 (75.0)	
Concerns about reimbursements for patient visits	11 (13.9)	18 (7.4)	0 (0.0)	
Concern with HIPAA compliance	0 (0.0)	3 (1.2)	0 (0.0)	
Financial concerns about investing in a platform	2 (2.5)	1 (0.4)	1 (6.3)	

CA, (post) COVID adopter; EA, early adopter; HIPAA, Health Insurance Portability and Accountability Act; NA non-adopter.

the fact that a greater percentage of EAs than CAs reported using platforms capable of asynchronous teledermatology (ie, uploading images), that allowed staff to join visits and required an “app” to use.

Image quality was highlighted as the greatest concern materially more often by CAs/NAs. Although our prior study indicated no material regional difference between EAs and CAs/NAs,<sup>13</sup> it is unclear how available mobile devices, mobile applications, and access to broadband internet play a role, especially among rural/lower socioeconomic patient populations with other barriers to healthcare access.<sup>15</sup> While asynchronous/SAF teledermatology can potentially partially mitigate these concerns, our previous study has found this method to be underused by ~50% of actively practicing US dermatologists.<sup>13</sup>

Of note, >30% of CAs reported using platforms without, at the time of writing, known integration with electronic medical records (EMRs), while 17.8% reported using Facetime as their current primary platform, which is not currently Health Insurance Portability and Accountability Act (HIPAA)-compliant. With the end of the COVID-19 public health emergency (May 11, 2023), covered healthcare providers have had until August 9, 2023, to transition to HIPAA-compliant platforms.<sup>14</sup> This may disproportionately affect private dermatologists and their ability to provide care to their patients.<sup>1,5,13,16</sup>

As CAs are disproportionately private dermatologists (a group that represents 80-90% of the current actively practicing US dermatologist workforce), it is important to understand the (evolving) role of technology in their practices.<sup>5,16</sup> With the end of the COVID-19 public health emergency, this may be an opportunity for CAs to expand their use of teledermatology, and adopt HIPAA-compliant platforms and additional modalities to care for all patient populations.

Limitations include retrospective study and response bias, with limited responses from NAs/rural dermatologists.

## CONCLUSION

Our study demonstrates that teledermatology usage and implementation vary and correlate with when the technology was incorporated into US-based practices. Future studies should aim to investigate barriers to implementation, as well as how these barriers and teledermatology have impacted and may impact equitable access to dermatologic care.

## DISCLOSURES

JWM has served as a Digital Health Fellow and an advisory board member for Doximity, Inc. RMC, MA, GHL, SP, and DSR have no relevant disclosures or conflicts of interest to declare.

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