Analyzing Disparities in Access to Teledermatology Compared to Dermatology Clinic Visits Before, During, and After COVID-19 Quarantine

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Title: Analyzing Disparities in Access to Teledermatology Compared to Dermatology Clinic Visits Before, During, and After COVID-19 Quarantine

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Declarations of interest: None

Abstract:

BACKGROUND:

The COVID-19 pandemic has caused significant changes in dermatologic care, likely exacerbating health disparities for specific minority populations. The use of teledermatology has also become more prevalent during this period.

OBJECTIVE: To determine if the proportion of teledermatology versus office-based visits varied significantly during 3 study periods of the COVID-19 pandemic. The secondary objective is to determine whether there are significant differences in the use of dermatology office-based versus teledermatology care across the demographic sub-groups: insurance type, race/ethnicity, age, or language during the same periods.

METHODS: Chart review of dermatology visits in electronic medical records (EMR) at a tertiary referral center in Washington, DC.

RESULTS: Overall telehealth visit rate was 0% in the pre-quarantine period, 61.12% during the quarantine period, and 10.59% in the post-quarantine period. After assessing telehealth utilization rates amongst the demographic subgroups, Medicaid users, Black patients, 64-year-olds or older, and English speakers may benefit the least from telehealth services.

CONCLUSION: Teledermatology utilization necessitated by the COVID-19 pandemic may have promoted healthcare disparities for specific marginalized populations.

Introduction:

The COVID-19 pandemic initiated an abrupt transition from in-person office visits to telemedicine when national recommendations mandated the suspension of all non-urgent consultations around mid-March of 2020. This change urged government-sponsored insurance, such as Medicaid and Medicare, to loosen restrictions on coverage and reimbursement for telemedicine visits for patients previously ineligible to receive these services from their homes.[1-3] This policy, designed to reduce healthcare disparities among vulnerable populations, decreased transportation access barriers associated with the transition to telemedicine. [1] The literature suggests telemedicine could potentially promote technological disparities for low socioeconomic, minority backgrounds, older adults, or those with limited English-speaking proficiencies. [4-7] For example, non-English speaking patients with baseline lower digital and health literacy skills may have trouble with the technological complexity of virtual visits. [8] Additionally, the use of video requires internet access, a service lacking in many low-income and rural areas. [9] Thus, vulnerable populations, who already face barriers to care, may have difficulties meaningfully engaging with telemedicine technology.[4-7]

Many in-office dermatologic visits became widely unavailable and were substituted by teledermatology services during the pandemic. [2] There are three main categories of teledermatology: synchronous, asynchronous, and hybrid. The synchronous live interaction teledermatology modality involves video and audio conferencing for real-time interactive feedback between patient and provider. In contrast, the asynchronous, store, and forward teledermatology modality involves uploading dermatologic images to a portal for providers to review and aid in diagnosis or treatment. [1,10] The hybrid model combines elements of both systems with options for live interaction and store-and-forward technology. Of the three, synchronous live interaction is analogous to an in-person clinical encounter.

There are several potential benefits of the use of teledermatology. For example, a retrospective review from 2014 to 2017 of teledermatology consultations in an urban safety-net healthcare system found that wait times from teledermatology referrals were shorter, no-show rates were lower, and biopsy rates increased. [4] Another study found that implementation of a teledermatology triage system at a San Fransisco hospital was associated with cost savings. [11]

The overall utility of telemedicine and its impact on health inequities remains unclear in dermatology. The objective of this study is to determine whether the proportion of teledermatology versus office-based visits varied significantly during the three study periods: the three months prior to COVID-19 quarantine, three months after COVID-19 quarantine, and three months after COVID-19 vaccine availability to assess the impacts of the pandemic on utilization patterns of dermatologic services. Additionally, to determine disparities in access to teledermatology, this study assesses differences in visit type utilization across four significant characteristics: insurance type, race/ethnicity, age, and language.

Methods:

This study was approved by the Georgetown University Institutional Review Board (IRB). Electronic medical records (EMR) from the Medstar Health System in Washington DC were queried to collect visit-level data from three dermatology outpatient clinics for retrospective review over the following study periods – pre-quarantine: 3-month period prior to COVID-19 quarantine (December 2019 to February 2020), during quarantine: 3 month period during the quarantine (April 2020 to June 2020), and post-quarantine: 3 month period of vaccine availability and distribution after quarantine (January 2021 to March 2021). Inclusion was limited to completed Medstar Dermatology clinical encounters conducted at Georgetown University Hospital, Washington Hospital Center, and Chevy Chase outpatient sites between 12/01/2019 and 03/31/2021. All outpatient encounters within the study periods aggregated across the 3 study sites were included in the analysis.

Teledermatology visits were defined as visits completed under the synchronous modality of teledermatology. In-office dermatology visits were defined as visits completed in person in the clinic, office, or concierge setting. Visit demographics were selected for this study based on the potential to illustrate significant disparities in access to care across subgroups.

Data characteristics were summarized by frequency and percentage. The Chi-square test was used to analyze the differences in the proportion of dermatologic service utilization among the 3 study periods. Fisher's exact test was utilized instead of the Chi-square test when the expected cell count was less than 5.

Data was also separated by insurance type, race/ethnicity, age, and lingual groups. There were five subgroups when separated by insurance type (Medicare, Medicaid, private insurance, self-pay, and other/unknown), five subgroups when separated by race/ethnicity (Black, Hispanic/Latino, Caucasian/White, Asian, and other/unknown), three subgroups when separated by age groups (0-18 y/o, 19-64 y/o, and >64 y/o), or two subgroups when separated by lingual groups (English speaking and non-English speaking). The differences in dermatologic service utilization among 3 study periods within each subgroup were also assessed by the Chi-square test or Fisher's exact test, based on the expected cell count.

Relevant follow-up tests were carried out in case of significant results. We controlled for familywise error rates across tests using Benjamini and Hochberg's false discovery rate (FDR) approach (1995).

For all tests, *P*-value less than .05 was considered significant. All statistical analyses were performed using RStudio (Version 1.4.1106).

Results:

Baseline Encounter Characteristics

One hundred percent of pre-quarantine encounters were conducted via routine office visits. Thus, this distribution was used as a proxy for baseline access to dermatologic services across visit demographics, as reported in Table 1. Broken by insurance type – 62% of all pre-

quarantine visits were with private insurance users, 23% with Medicaid users, 14% with Medicare users, and 1% with self-pay/other/unknown. Broken down by race/ethnicity – 46% of all visits were with Caucasian patients, 25% with Black patients, 21% with other/unknown, 6% with Hispanic/Latino patients, and 2% with Asian patients. Stratified by age, 67% of patients were in the 19-64 age group, 29% were in the >64 age group, and 4% were in the 0-18 age group. 81% of all visits were with English-speaking patients, while 19% were with non-English-speaking patients and patients whose language was unknown.

Primary Outcome

Comparing visit type utilization across the 3 study periods revealed that the telehealth visits rate was 0% in the pre-quarantine period, 61.12% during the quarantine period, and 10.59% in the post-quarantine period. The telehealth visits rate was statistically significantly different from the office visit rate across the 3 study periods ($P<.0001$).

Secondary Outcomes

Post-hoc analysis with pairwise tests controlling for familywise error rate using false discovery rate (FDR) approach showed that the telehealth visits rate was significantly different between quarantine and post-quarantine periods across all insurance groups ($P<.05$) (Figure 1), all racial/ethnic groups ($P<.05$) (Figure 2), both language groups ($P<.05$) (Figure 3), and all age groups ($P<.05$) (Figure 4).

Discussion:

Utilization by Visit Type

In the three months before the COVID-19 quarantine, telehealth was not used at the clinic sites included in this study; however, there was a significant overall shift to telehealth during the quarantine. Once mandates restricting in-person services were lifted in COVID-19 vaccine availability, there was an overall shift back to primarily office visits (89.41%) (Table 1).

Utilization by Insurance Type

Before the quarantine, private insurance users accessed dermatologic services at Medstar Health more than any other insurance group. Medicare users were the most underrepresented among the three major insurance types (Table 1).

Comparing telehealth visit rates versus office visit rates by insurance type across quarantine and post-quarantine periods, our data revealed that the self-pay insurance group had the highest telehealth visit rate both during and after the quarantine (Figure 1). This could be because telehealth visits are more cost-efficient than office visits, an important consideration for patients paying for services exclusively out of pocket. [1,11] Alternatively, the Medicaid insurance type had the lowest telehealth visit rate (excluding other/unknown) both during and after the quarantine (Figure 1). These findings suggest that the widespread use of telehealth instead of in-person visits during the pandemic decreased access to dermatologic care for the Medicaid insurance group. This is consistent with propositions in the literature suggesting disparities in access to telehealth among lower socioeconomic groups for whom this insurance type is intended. [1, 5-7] Additionally, Medicare patients were the most represented in total telehealth visits during and post-quarantine (Table 1). This could be a result of telemedicine

services eliminating mobility challenges faced by the elderly populations and increasing accessibility of services for this subset of patients. [1]

Utilization by Race/Ethnicity

Pre-quarantine office visits broken down by race/ethnicity reveal that Caucasian patients had the lowest rate of telehealth usage during the quarantine (57.99%). In comparison, Black and Hispanic populations had the lowest rates of telehealth utilization in the post-quarantine period (8.38% and 9.57%, respectively) (Figure 2).

Consistent with our hypothesis, these results emphasize the difficulties with maintaining access to technology in a group that is already considered to be disproportionately disadvantaged. [9] A cross-sectional study evaluating patient satisfaction with teledermatology showed that non-white patients were more concerned with conversation privacy and inappropriate access to their data. [12] Black and Hispanic patients are also less likely to own a computer or have broadband internet access at home. [9] Additionally, negative cultural perceptions of the telemedicine model may influence their distrust of the telehealth environment.[6]

The Asian patient population had the highest telehealth visit rate during and even after the quarantine (73.44% and 18.09%, respectively) (Figure 2). This is inconsistent with other findings in the literature suggesting that Asian populations have a lower desire for telehealth visits especially compared to their Caucasian counterparts. [12] This may be because the English-speaking Asian population has higher rates of technology-based, technically-skilled jobs than the rest. [9] Our data could reflect this population's comfort and familiarity with the abrupt transition to telemedicine technology.

Utilization by Language

Pre-quarantine office visits stratified by language reveal that prior to the quarantine, English speakers accessed dermatologic services at Medstar H health more than non-English speakers (Table 1). The n on-English-speaking patient population had the highest telehealth visit utilization rate after the quarantine (13.5%) (Figure 3).

Our findings are inconsistent with other findings in the literature suggesting that non-English-speaking populations would have trouble connecting with telehealth care. [8] One hypothesis is that these patients may find Medstar Health's teledermatology system relatively user-friendly. Virtual interpreters are a potential barrier for non-English speakers. Therefore, having a robust medical interpretation system for telehealth visits is essential. Accessing medical translators (either through designated medical translator devices or via cell phone) during in-person office visits can be cumbersome, and utilizing one can be time-consuming when aiming for smooth patient-provider communication. [9] Ultimately, with a well-integrated and user-friendly virtual visit platform, non-English speakers may benefit from teledermatology.[13]

Utilization by Age

To assess variations in telehealth utilization by age, the study population was stratified into three age groups. Patients between the ages of 19 to 64 comprise the most significant percentage of the patient population during the pre-quarantine period (Table 1). During the quarantine period, 0 to 18-year-olds utilized teledermatology at the lowest rate (79.61%) but utilized it at the highest rate post-quarantine (20.39%) (Figure 4). We posit that most of this age

group are minors and likely cannot independently commute to their office visits. As a result, they may prefer telehealth visits as a more convenient option for their guardians.

During the post-quarantine period, patients 64 years and above-utilized telehealth at the lowest rates compared to their counterparts from other age groups (5.57%) (Figure 4). This may be because members of this age group are less likely to find comfort with new technology and prefer the less complex, traditional in-office visits when readily available. The transition to telehealth services during the COVID-19 pandemic may have created healthcare barriers for older age groups while benefiting younger age groups, further supporting the utility of maintaining teledermatology services and office visits in the future. [1,14]

Study Limitations

The racial designations in our study were obtained from self-reported EM R data. Approximately 20% of study participants categorized their race and ethnicity as unknown, making it impossible to conclude that subset. Similarly, 19% of study participants were non-English speaking patients whose primary language was unknown. For this group, it is impossible to make inferences about how language or translation access might have played a role in their telehealth utilization. As the literature describes, the unknown population may mask healthcare disparities among minority groups. [15] Additionally, our results regarding ethnicity/race are specific to MedStar Health and do not necessarily reflect the ethnic representations in other health systems. Lastly, only synchronous teledermatology visits were included in this study, so the results from our study may not be generalizable to practices that utilize asynchronous or hybrid modalities of teledermatology.

Conclusion:

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U utilization of teledermatology services during and after the quarantine differed significantly across the insurance, race/ethnicity, language, and age subgroups. Medicaid patients were the least represented in total telehealth visits during and after the quarantine period in this study. Black and Hispanic patients returned to traditional office visits during the post-quarantine period at a higher rate than their counterparts from other races. The non-English-speaking patient population had the highest rate of telehealth visit utilization both during and after the quarantine. Patients over 64 years of age utilized telehealth at a lower rate than other age groups during and after the quarantine period. Specific patient groups such as Medicaid users, the elderly, and Black or Hispanics may experience fewer telehealth benefits than other patients.

Further studies are needed to characterize the demographic of patients most likely to access and benefit from telehealth services. Additional research regarding disaster preparedness and contingency planning for telehealth during future pandemics may be beneficial.

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References:

1. Brotman JJ, Kotloff RM. Providing Outpatient Telehealth Services in the United States: Before and During Coronavirus Disease 2019. Chest. 2021;159(4):1548-1558.

2. Elsner P. Teledermatology in the times of COVID-19 - a systematic review. J Dtsch Dermatol Ges. 2020;18(8):841-845.

3. Kichloo A, Alberta M, Dettloff K, et al. Telemedicine, the current COVID-19 pandemic and the future: a narrative review and perspectives moving forward in the USA. Fam Med Community Health. 2020;8(3):e000530.

4. Dobry A, Begaj T, Mengistu K, et al. Implementation and Impact of a Store-and-Forward Teledermatology Platform in an Urban Academic Safety-Net Health Care System. Telemed J E Health. 2021;27(3):308-315.

5. Katzow MW, Steinway C, Jan S. Telemedicine and Health Disparities During COVID-19. Pediatrics. 2020;146(2):e20201586.

6. Ramirez AV, Ojeaga M, Espinoza V, Hensler B, Honrubia V. Telemedicine in Minority and Socioeconomically Disadvantaged Communities Amidst COVID-19 Pandemic. Otolaryngol Head Neck Surg. 2021;164(1):91-92.

7. Ortega G, Rodriguez JA, Maurer LR, et al. Telemedicine, COVID-19, and disparities: Policy implications. Health Policy Technol. 2020;9(3):368-371.

8. Tan-McGrory A, Schwamm LH, Kirwan C, Betancourt JR, Barreto EA. Addressing virtual care disparities for patients with limited English proficiency. Am J Manag Care. 2022;28(1):36-40.

9. Eberly LA, Kallan MJ, Julien HM, et al. Patient Characteristics Associated With Telemedicine Access for Primary and Specialty Ambulatory Care During the COVID-19 Pandemic [published correction appears in JAMA Netw Open. 2021 Feb 1;4(2):e211913]. JAMA Netw Open. 2020;3(12):e2031640.

10. Campagna M, Naka F, Lu J. Teledermatology: An updated overview of clinical applications and reimbursement policies. Int J Womens Dermatol. 2017;3(3):176-179.

11. Zakaria A, Miclau TA, Maurer T, Leslie KS, Amerson E. Cost Minimization Analysis of a Teledermatology Triage System in a Managed Care Setting. JAMA Dermatol. 2021;157(1):52-58.

12. Chang M, Lipner S. Disparities in Telemedicine Satisfaction Among Older and Non-White Dermatology Patients: A Cross-Sectional Study. J Drugs Dermatol. 2022;21(2):210-214.

13. Rodriguez JA, Saadi A, Schwamm LH, Bates DW, Samal L. Disparities In Telehealth Use Among California Patients With Limited English Proficiency. Health Aff (Millwood). 2021;40(3):487-495.

14. Stevens JP, Mechanic O, Markson L, O'Donoghue A, Kimball AB. Telehealth Use by Age and Race at a Single Academic Medical Center During the COVID-19 Pandemic: Retrospective Cohort Study. J Med Internet Res. 2021;23(5):e23905.

15. Labgold K, Hamid S, Shah S, et al. Estimating the Unknown: Greater Racial and Ethnic Disparities in COVID-19 Burden After Accounting for Missing Race and Ethnicity Data. Epidemiology. 2021;32(2):157-161.

Figure legends:

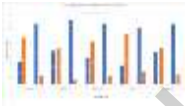

Figure 1: This figure represents the distribution (in percentages) of patients who accessed dermatologic care using in-office versus telehealth across various types of insurance during the quarantine and post-quarantine era of the COVID-19 pandemic.

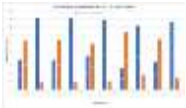

Figure 2: This figure represents the distribution (in percentages) of patients who accessed dermatologic care using in-office versus telehealth across various race and ethnicity groups during the quarantine and post-quarantine era of the COVID-19 pandemic.

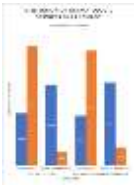

Figure 3: This figure represents the distribution (in percentages) of patients who accessed dermatologic care using in-office versus telehealth between English-speaking and non-English-speaking patients during the quarantine and post-quarantine era of the COVID-19 pandemic.

Figure 4: This figure represents the distribution (in percentages) of patients who accessed dermatologic care using in-office versus telehealth across three age groups during the quarantine and post-quarantine era of the COVID-19 pandemic.

Table 1: Characteristics of the study population and the distribution of patients utilizing teledermatology vs. in-office visits across each study parameter.

Variable 1	Level 1	Variable 2	Level 2	Pre-quarantine	Quarantine	Post-quarantine	p-value
Overall		Utilization of dermatologic	Office visits (%)	5541 (100)	965 (38.88	4110 (89.41)	<0.000

		services			)		1
			Telehealth visits (%)	0 (0)	1517 (61.12)	487 (10.59)	
Insurance	Medicare	Utilization of dermatologic services	Office visits (%)	777 (100)	140 (32.71)	786 (88.81)	<0.0001
			Telehealth visits (%)	0 (0)	288 (67.29)	99 (11.19)	
	Medicaid	Utilization of dermatologic services	Office visits (%)	1270 (100)	240 (48.29)	820 (93.93)	<0.0001
			Telehealth visits (%)	0 (0)	257 (51.71)	53 (6.07)	
	Private insurance	Utilization of dermatologic services	Office visits (%)	3410 (100)	575 (37.56)	2475 (88.24)	<0.0001
			Telehealth visits (%)	0 (0)	956 (62.44)	330 (11.76)	
	Self-Pay	Utilization of dermatologic services	Office visits (%)	26 (100)	3 (27.27)	9 (81.82)	<0.0001
			Telehealth visits (%)	0 (0)	8 (72.73)	2 (18.18)	
	Other/Unknown	Utilization of dermatologic services	Office visits (%)	58 (100)	7 (46.67)	20 (86.96)	<0.0001
			Telehealth visits (%)	0 (0)	8 (53.33)	3 (13.04)	
Race/ethnicity	Black/African-American	Utilization of dermatologic services	Office visits (%)	1390 (100)	282 (37.85)	1191 (91.62)	<0.0001
			Telehealth visits (%)	0 (0)	463 (62.15)	109 (8.38)	
	Hispanic/Latino	Utilization of	Office	317	36	255	<0.

		dermatologic services	visits (%)	(100)	(36.73)	(90.43)	0001
			Telehealth visits (%)	0 (0)	62 (63.27)	27 (9.57)	
	Caucasia/White	Utilization of dermatologic services	Office visits (%)	2564 (100)	452 (42.01)	1767 (89.65)	<0.0001
			Telehealth visits (%)	0 (0)	624 (57.99)	204 (10.35)	
	Asian	Utilization of dermatologic services	Office visits (%)	128 (100)	17 (26.56)	77 (81.91)	<0.0001
			Telehealth visits (%)	0 (0)	47 (73.44)	17 (18.09)	
	Other/Unknown	Utilization of dermatologic services	Office visits (%)	1142 (100)	178 (35.67)	820 (86.32)	<0.0001
			Telehealth visits (%)	0 (0)	321 (64.33)	130 (13.68)	
Age	0-18 y/o	Utilization of dermatologic services	Office visits (%)	204 (100)	20 (21.28)	121 (79.61)	<0.0001
			Telehealth visits (%)	0 (0)	74 (78.72)	31 (20.39)	
	19-64 y/o	Utilization of dermatologic services	Office visits (%)	3741 (100)	643 (36.2)	3040 (88.37)	<0.0001
			Telehealth visits (%)	0 (0)	1133 (63.8)	400 (11.63)	
	>64 y/o	Utilization of dermatologic services	Office visits (%)	1596 (100)	302 (49.35)	949 (94.43)	<0.0001
			Telehealth visits (%)	0 (0)	310 (50.65)	56 (5.57)	

Language	English speaking	Utilization of dermatologic services	Office visits (%)	4482 (100)	818 (39.14)	3296 (90.15)	<0.0001
			Telehealth visits (%)	0 (0)	1272 (60.86)	360 (9.85)	
	non-English speaking/Unknown	Utilization of dermatologic services	Office visits (%)	1059 (100)	147 (37.5)	814 (86.5)	<0.0001
			Telehealth visits (%)	0 (0)	245 (62.5)	127 (13.5)	