RESEARCH ARTICLE

Feasibility and Acceptability of a Multidisciplinary Academic Telemedicine System for Memory Care in Response to COVID-19

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Abstract

Background and Objectives

In response to the restrictions imposed by the COVID-19 pandemic, the University of California San Francisco Memory and Aging Center (UCSF MAC) has deployed a comprehensive telemedicine model for the diagnosis and management of Alzheimer disease and related dementias. This review summarizes a large academic behavioral neurology clinic's experience transitioning to telemedicine services, including the impact on clinic care indicators, access metrics, and provider's experience. We compared these outcomes from 3 years before COVID-19 to 12 months after the transition to video teleconferencing (VTC) encounters.

Methods

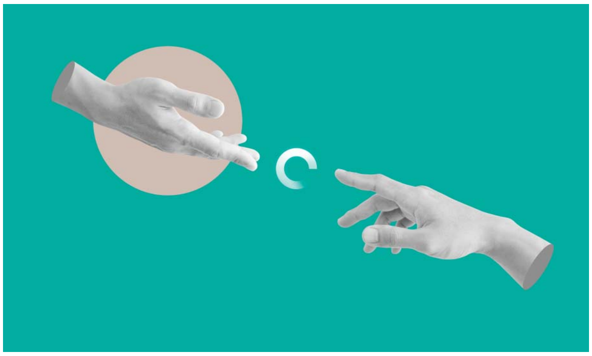
Patient demographics and appointment data (dates, visit types, and departments) were extracted from our institution's electronic health record database from January 1, 2017, to May 1, 2021. We present data as descriptive statistics and comparisons using Wilcoxon rank-sum tests and Fisher exact tests. The results of anonymous surveys conducted among the clinic's providers are reported as descriptive findings.

Results

After the implementation of telemedicine services, the proportion of clinic encounters completed via VTC increased from 1.9% to 86.4%. There was a statistically significant decline in both the percentage of scheduled appointments that were canceled (32.9% vs 27.9%; $p < 0.01$) and total cancelations per month (mean 240.3 vs 179.4/mo; $p < 0.01$). There was an increase in the percentage of completed scheduled appointments (60.2% vs 64.8%; $p < 0.01$) and an increase in the average estimated commuting distance patients would need to drive for follow-up appointments (mean 49.8 vs 54.7 miles; $p < 0.01$). The transition to telemedicine services did not significantly affect the clinic's patient population as measured by age, gender, estimated income, area deprivation index, or self-reported racial/ethnic identity. The results of the provider survey revealed that physicians reported a more positive experience relative to neuropsychologists. Both types of providers reported telemedicine services as a reasonable equivalent and acceptable alternative to in-person evaluations with notable caveats.

Discussion

UCSF MAC's comprehensive integration of telemedicine services maintained critical ambulatory care to patients living with dementia during the COVID-19 pandemic. The recognized benefits of our care model suggest dementia telemedicine may be used as a feasible and equivalent alternative to in-person ambulatory care in the after COVID-19 era.



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Dementia care specialists face a future of exponential demand and constrained supply foreshadowing a public health crisis. According to the United States Census Bureau, within 5 years, half of all baby boomers will be over the age of 65. There will be 14 million people living with dementia in the United States by 2050.[1] These challenges are further exacerbated by a chronic shortage of dementia care specialists.[2-4] Individuals living with dementia often face a complex myriad of behavioral problems whose nuanced management is often beyond the capacity of their primary care providers. Without specialist guidance, these patients often face less than optimal clinical outcomes, including but not limited to the overuse of psychotropic medications and longer hospital admissions.[5-8] Alzheimer disease and related dementias (ADRD) are among the most critical challenges of the 21st century and will require the integration of preventative, behavioral health, and risk reduction strategies into the healthcare system to meet the growing demand of an aging population.[9,10] New comprehensive and sustainable approaches to dementia care are critically needed.

The use of telemedicine for the provision of ADRD-related care has been in active practice internationally since the beginning of modern video teleconferencing (VTC) telemedicine. South Korea has some of the world's most well-established telemedicine information technology infrastructure dating back to 1988[11] and was among the first countries to implement telemedicine for ADRD management in 1999.[12] Since the adoption of ADRD telemedicine in South Korea, multiple international studies have shown it to be a reproducible and cost-effective means of providing care that is acceptable to caregivers and patients with varying degrees of cognitive impairment.[13-17] Comparative studies have found agreement between in-person and telemedicine assessments using standardized neurocognitive assessments and dementia rating scales.[18-20] Multiple investigations have demonstrated that ADRD specialist evaluations performed via VTC are comparable with in-person examinations for accuracy of diagnosis[18,21] and effectively improving access to quality ADRD care in remote regions.[22,23] Regardless of these benefits, acceptance and integration of telemedicine into ADRD care delivery models have not been significantly implemented outside academic and government health services.[11,12,24] Widespread adoption of telemedicine care for ADRD has been stifled by many of the similar barriers faced by medicine globally, including but not limited to inconsistent reimbursement, legal restrictions, patient inexperience with technology, and a lack of acceptance by providers who report concerns about the inadequacy of VTC to evaluate complex chronic conditions such as ADRD.[25-29] Despite these concerns, widespread ADRD telemedicine services were rapidly adopted nationally in response to the significant disruptions to care services imposed by the COVID-19 pandemic. The feasibility and consequences of integrating multidisciplinary telemedicine into dementia care have not yet been fully explored.

This study analyzed clinical care indicators and provider experience of a telemedicine dementia care model at the University of California, San Francisco (UCSF) Memory and Aging Center (MAC), a multidisciplinary behavioral neurology outpatient continuity clinic. We provide a comprehensive overview and analysis of the feasibility and acceptability of the telemedicine model for dementia care at a large academic medical center to guide policymakers, inform stakeholders, and support the growing number of health providers invested in developing effective telemedicine programs. This report is aimed primarily at memory clinic providers and managers and is also intended to provide insights for researchers interested in evaluating healthcare information and communications technologies.

Methods

This study was performed at the UCSF MAC, an Alzheimer disease and related dementias outpatient specialty clinic predominantly serving the 9-county San Francisco Bay Area and providing in-person and remote care nationally and internationally. The clinic includes specialists in neurology, neuropsychology, geriatrics, geropsychiatry, pharmacy, nursing, social work, and speech pathology, who collectively participate in a patient's evaluation and management. This study describes the change in provider experiences and patient access related to neurologic and neuropsychological evaluations after the transition to telemedicine services during the COVID-19 period. Please see eAppendix 1, http://links.lww.com/CPJ/A383: UCSF Telemedicine Clinic Model for a full description of this transition.

Data and Participants

Clinical Care Indicators

Data from the Epic electronic health records (EHR) system was accessed using UCSF-specific built-in data extraction tool. The extraction protocol identifies all outpatient encounters, including 3 categories of telemedicine encounters (video new, video follow-up, and scheduled telephone follow-up). This study uses VTC to refer exclusively to patient encounters performed through audio and video software. In contrast, telemedicine refers to clinical encounters conducted through VTC or telephone. Telephone encounters included all components of a VTC encounter except visualization of the patient and a remote physical examination. Unscheduled telephone calls by a provider in response to a patient message were not considered telephone encounters and were not included in the analyses. We assessed all appointments scheduled between January 1, 2017, and January 1, 2020 (pretelemedicine), and between May 1, 2020, and May 1, 2021 (telemedicine). Additional variables extracted from EHR included patient age, sex, race, ethnicity, ZIP + 4, insurance type, and use of interpreter services. Median household income was estimated using data from the US Census Bureau. We used ZIP + 4 codes to derive the area deprivation index (ADI) national percentiles, a widely validated measure of neighborhood disadvantage.[30] The national percentiles were coded as low (ADI values 1–24), midrange (ADI values 25–75), and high (ADI values 76–100) disparity neighborhoods.[30] In addition, we used ZIP + 4 to calculate the estimated commuting distance patients would need to travel from their home address to be seen at the clinic in person.

Provider Experience

Nine months after the rollout of telemedicine services, we conducted an anonymous survey of 46 clinic providers (neurologists, psychiatrists, geriatricians, and neuropsychologists). The survey was designed to assess providers' satisfaction with telemedicine services, acceptability and feasibility of telemedicine services, and interest in practicing telemedicine in the future. The survey was designed and piloted among a small group of providers and distributed via a secure online survey system. The full version of the survey is available in the eAppendix 2, http://links.lww.com/CPJ/A383. Of 46 total providers contacted, 30 (65%) completed the survey.

Statistical Analyses

For EHR data, we conducted between-group analyses to evaluate the differences in clinical care indicators (number of encounters) and patient demographics preintroduction and postintroduction of the telemedicine care model. Fisher exact tests were used for categorical variables, and the Wilcoxon rank-sum tests were used for continuous variables. Provider survey data were analyzed using descriptive statistics. All analyses were conducted separately for physicians (neurologists, psychiatrists, and geriatricians) and neuropsychologists. All analyses were performed using R Project for Statistical Computing (v.4.1.0) with a 2-tailed significance level set at $p < 0.05$.

Standard Protocol Approvals, Registrations, and Patient Consents

This study was approved by the University of California San Francisco's Institutional Review Board (21–33610). All analyses were performed in accordance with the institutional Health Insurance Portability and Accountability Act (HIPAA) compliant framework. Informed consent was obtained before the survey of clinic providers.

Data Availability

Owing to HIPAA restrictions, raw data are not publicly available, but a limited data set can be requested by qualified researchers using standard data request procedures.

Results

Clinical Care Indicators

A total of 26,283 scheduled appointments resulting in 15,810 completed clinical encounters were performed during the pretelemedicine period between January 1, 2017, and January 1, 2020. After the transition to telemedicine services between May 1, 2020, and May 1, 2021, a total of 7,717 scheduled appointments resulted in 5,000 completed clinical encounters, and the proportion of completed clinical encounters via telemedicine (scheduled telephone or VTC) increased from 13.1% to 95.8% of all clinical encounters. The number and types of encounters in the pretelemedicine and telemedicine periods are presented in Table 1. Compared with the pretelemedicine period, there was a decrease in the average number of scheduled appointments made per month (mean 730.1 vs 643.1/mo; $p < 0.01$) but not in the average number of completed appointments per month (mean 439.2 vs 413.8/mo; $p = 0.11$). We found a decrease in the average number of canceled appointments per month during the telemedicine period (mean 240.3 vs 179.4/mo; $p < 0.01$) that did not significantly vary based on patients' age, gender, race/ethnicity, or ADI. Consistently, we found a decrease in the percentage of appointments that resulted in cancelations (32.9% vs 27.9%; $p < 0.01$) and a minor increase in the percentage of scheduled appointments that resulted in no-shows (6.8% vs 7.1%; $p = 0.13$) during the telemedicine period.

We then evaluated changes in the number of clinical encounters separately for physicians and neuropsychologists. For physician encounters, there was a minor decrease in the average number of scheduled physicians' appointments per month (543.1 vs 513.4; $p = 0.09$). We observed a decrease in the percentage of scheduled physician appointments that were canceled (32.2% vs 25.4%; $p < 0.01$) and a decline in the average number of physician appointment cancellations per month for both new (44.3 vs 33.7/mo; $p < 0.05$) and follow-up appointments (127.3 vs 94.2/mo; $p < 0.01$). We observed a minor increase in the percentage of scheduled physician appointments that were completed (60.9% vs 67.5%; $p = 0.13$) and completed

Table 1 Clinic Utilization Between January 2017–January 2020 (Pretelemedicine) and May 2020–May 2021 (Telemedicine)

				Pretelemedicine	Telemedicine	
	2017–2018 (N = 8,808)	2018–2019 (N = 8,517)	2019–2020 (N = 8,958)	2017–2020 (N = 26,283)	2020–2021 (N = 7,717)	*p* Value
Out-of-state, no. (%)	410 (4.7)	346 (4.1)	339 (3.8)	1,094 (4.2)	359 (4.7)	0.38
No show appts, no. (%)	670 (7.6)	542 (6.4)	563 (6.3)	1,775 (6.8)	550 (7.1)	0.19
Canceled appts, no. (%)	2,854 (32.4)	2,701 (31.7)	3,097 (34.6)	8,652 (32.9)	2,155 (27.9)	<0.01
Completed appts, no. (%)	5,266 (59.8)	5,261 (61.8)	5,283 (58.9)	15,810 (60.2)	5,000 (64.8)	<0.01
In-person, no. (%)	4,696 (89.2)	4,525 (86.0)	4,511 (85.4)	13,732 (86.9)	209 (4.2)	<0.01
Telemedicine, no. (%)	570 (10.8)	736 (13.9)	772 (14.6)	2,078 (13.1)	4,791 (95.8)	<0.01
VTC, no. (%)	87 (1.7)	65 (1.2)	155 (2.9)	307 (1.9)	4,321 (86.4)	<0.01

VTC = Video Teleconferencing, Telemedicine (VTC and Scheduled Telephone Encounters).

Table 2 Clinic Patient Characteristics Between January 2017–January 2020 (Pretelemedicine) and May 2020–May 2021 (Telemedicine)

Characteristic	Pretelemedicine (N = 15,810)	Telemedicine (N = 5,000)	*p* Value
Age–y	70.5 ± 12.5	71.3 ± 11.9	<0.01
Sex, no. (%)			0.16
Men	7,572 (47.9)	2,378 (47.6)	
Women	8,235 (52.1)	2,620 (52.4)	
Insurance, no. (%)			
Commercial	4,174 (26.4)	1,132 (22.6)	<0.01
Medicare	10,645 (67.3)	3,578 (71.6)	<0.01
Medicaid	795 (5.0)	242 (4.8)	0.59
Other, such as workers' compensation	44 (0.3)	10 (0.2)	0.34
Unknown, uninsured, or self-pay	152 (1.0)	38 (0.8)	0.19
Est. Household median income, $	80,209 ± 28,394	8,01,120 ± 28,133	0.85
Race, no. (%)[a]			
White	11,466 (72.5)	3,343 (66.9)	<0.01
Black or African American	624 (3.9)	213 (4.3)	0.35
Asian	1,837 (11.6)	546 (10.9)	0.23
American Indian or Alaska native	74 (0.5)	34 (0.7)	0.07
Native Hawaiian or other Pacific Islander	108 (0.7)	33 (0.7)	0.06
Other	1,441 (9.1)	404 (8.1)	<0.05
Unknown	620 (3.9)	430 (8.6)	<0.01
Ethnicity, no. (%)			
Hispanic/Latino	1,142 (7.2)	322 (6.4)	0.06
Not His/Lat	13,891 (87.9)	4,038 (80.1)	<0.01
Unknown/declined	777 (4.9)	640 (19.2)	<0.01
Interpreter services required	2,704 (10.3)	623 (8.1)	<0.01

[a] May add to greater than 100% as some individuals report multiple races.

follow-up appointments per month (mean 234.9 vs 250.6/mo; $p = 0.09$) and a minor decrease in the number of completed new appointments per month (87.8 vs 85.5/mo; $p = 0.33$). However, there was an increase in the number of patients who completed a follow-up appointment within a calendar year of their first appointment (32.1% vs 52.3%; $p < 0.01$) and within a calendar year of a follow-up appointment (24.9% vs 28.2%; $p < 0.01$).

In contrast, we could not reliably compare neuropsychologist appointment data between the pretelemedicine and telemedicine periods because of a change in our clinic's workflow model. Pretelemedicine, all new patients were seen by neuropsychology on the day of their first physician encounter. During the COVID-19 pandemic, most neuropsychological clinical encounters were seen by referral after their first physician clinical visit and were labeled as follow-up encounters preventing any further meaningful comparison between years.

Patient Demographics and Access

Demographic and socioeconomic characteristics of the patient population during the pretelemedicine and telemedicine periods are presented in Table 2. After the implementation of telemedicine services, there was a small increase in the average age of the patients (mean 70.5 vs 71.3 year-old; $p < 0.01$). This correlated with a small increase in the percentage of patients using Medicare (mean 67.3% vs 71.6%; $p < 0.01$) and a decrease in the percentage of patients with private (mean 26.4% vs 22.6%; $p < 0.01$) insurance types.

Table 3 State ADI of In-State Patients Compared Between January 2017–January 2020 (Pretelemedicine) and May 2020–May 2021 (Telemedicine)

		Pretelemedicine			Telemedicine			
		Low	Mid	High	Low	Mid	High	
	Type of appointment	N = 21,209	N = 3,205	N = 149	N = 5,781	N = 826	N = 51	*p* Value
State-ADI	Canceled, no. (%)							
	All	6,917 (85.5)	1,124 (13.9)	53 (0.7)	1,622 (87.4)	220 (11.9)	14 (0.8)	0.06
	Follow-up	4,092 (86.5)	609 (12.9)	34 (0.8)	1,087 (87.7)	143 (11.6)	10 (0.9)	0.44
	New	2,703 (84.3)	488 (15.3)	18 (0.6)	520 (87.6)	70 (11.8)	4 (0.7)	0.09
	Completed, no. (%)							
	All	12,805 (86.9)	1,855 (12.6)	91 (0.7)	3,760 (86.5)	562 (13)	27 (0.7)	0.83
	Follow-up (in-person, VTC, telephone)	7,623 (87.9)	1,010 (11.7)	42 (0.5)	2,950 (86.7)	433 (12.8)	22 (0.7)	0.14
	Follow-up (in-person, VTC)	6,213 (88.5)	782 (11.2)	29 (0.5)	2,568 (86.9)	370 (12.6)	20 (0.7)	0.03
	Follow-up (telephone)	1,410 (85.5)	228 (13.9)	13 (0.8)	382 (85.5)	63 (14.1)	2 (0.5)	0.81
	New	4,907 (85.3)	802 (14)	46 (0.8)	729 (86.8)	107 (12.8)	4 (0.5)	0.37

Abbreviations: ADI = Area Deprivation Index; Low = Low Disparity Communities indicated by State ADI 1–24; Mid = Midrange Disparity Communities indicated by State ADI 25–75; High = High Disparity Communities indicated by State ADI 76–100; VTC = Video Teleconferencing.

There was a decrease in the percentage of patients identifying as White/Caucasian (mean 72.5% vs 66.9%; $p < 0.01$) and other (mean 9.1% vs 8.1%; $p < 0.01$), whereas the number of patients reporting unknown (mean 4.5% vs 8.8%; <0.01) race increased. This observation correlated with a decrease in the number of patients who ethnically identified as non-Hispanic/Latino (mean 87.9% vs 80.1%; $p < 0.01$) and an increase in those who did not identify ethnically (mean 4.9% vs 19.2%; $p < 0.01$). There were no differences in the percentage of patients who identified as Black/African American, Hispanic/Latino, Asian, American Indian, and Pacific Islander after the implementation of telemedicine services. After the implementation of telemedicine, there was a decrease in the percentage of all scheduled appointments that involved an interpreter (10% vs 8.1%; $p < 0.01$) without a change in the percentage of these appointments that were completed, canceled, or resulted in no shows.

There were no differences in the estimated household income of patients before and after the implementation of telemedicine services. After the implementation of VTC services, the percentage of scheduled appointments made by in-state patients who lived in low, midrange, and high disparity neighborhoods did not significantly change. There was an increase in the percentage of patients from midrange and high disparity neighborhoods who were able to attend in-person or VTC follow-up appointments after the implementation of telemedicine (88.5/11.2/0.5 vs 86.9/12.6/0.7 [%]; $p < 0.05$; Table 3).

Clinic accessibility data, as measured by estimated home-to-clinic travel distance preimplementation and postimplementation of telemedicine services, are presented in Table 3. After the implementation of VTC services, the average estimated travel distance of new in-state patients who canceled their appointment decreased (mean 61.8 vs 50.4 miles; $p < 0.01$; Table 4). The average estimated distance that in-state patients would need to travel for in-person appointments did not change for new appointments (mean 61.1 vs 58.3 miles; $p = 0.18$) but increased for follow-up appointments (mean 46.8 vs 55.2 miles; $p < 0.001$). This corresponded with a decrease in the average estimated travel distance of patients who relied on the telephone for follow-up encounters (mean 61.5 vs 51.1 miles; $p < 0.01$). There were no changes in cancellations or completed clinical encounters for out-of-state patients.

Provider Experience

The demographic characteristics of 30 providers who completed the online survey are summarized in Table 5. Most respondents to the provider experience survey were men (66.7%), neurologists (63.7%), faculty staff (66.7%), and the average age was 36.7 years. The experience of transitioning to telemedicine services was notably different between physicians and neuropsychologists. More physicians (78%) reported previous telemedicine experience than neuropsychologists (43%; Table 6). Physicians reported more satisfaction and interest in the future application of telemedicine than neuropsychologists (Table 6). Physicians reported they found telemedicine "quite acceptable" for new and "extremely acceptable" for follow-up evaluations. In contrast, neuropsychologists reported that the application of telemedicine was moderately acceptable for new assessments and less so for follow-up assessments. Table 7 highlights the perceived benefits and challenges of telemedicine. Both

Table 4 Estimated Home-to-Clinic Driving Distance by Patients Compared Between January 2017–January 2020 (Pretelemedicine) and May 2020–May 2021 (Telemedicine)

	Type of appointment	Pretelemedicine N = 25,466	Telemedicine N = 6,746	*p* Value
In-state	Canceled, no. (mean distance in miles)			
	All	7,686 (56.8)	2,129 (54.8)	0.136
	Follow-up	4,209 (54.2)	1,182 (55)	0.369
	New	1,418 (61.8)	362 (50.4)	0.004
	Completed, no. (mean distance in miles)			
	All	14,208 (54.3)	4,509 (55.6)	0.145
	Follow-up (in-person, VTC, telephone)	7,932 (49.8)	3,454 (54.7)	0.001
	Follow-up (in-person, VTC)	5,620 (46.8)	3,032 (55.2)	0.000
	Follow-up (telephone)	1,628 (61.5)	422 (51.1)	0.005
	New	2,801 (61.1)	934 (58.3)	0.182

	Type of appointment	Pretelemedicine N = 922	Telemedicine N = 312	*p* Value
Out-of-state	Canceled, no. (mean distance in miles)			
	All	293 (1,084.2)	105 (1,045.1)	0.713
	Follow-up	236 (1,074.1)	73 (1,060.6)	0.915
	New	52 (1,160.4)	32 (1,009.5)	0.476
	Completed, no. (mean distance in miles)			
	All	588 (1,081.5)	191 (1,048.0)	0.667
	Follow-up (in-person, VTC, telephone)	279 (971.6)	131 (941.6)	0.742
	Follow-up (in-person, VTC)	221 (1,045.8)	124 (938.7)	0.274
	Follow-up (telephone)	58 (689.0)	7 (993.6)	0.305
	New	299 (1,190.8)	58 (1,317.1)	0.378

VTC = Video Teleconferencing.

physicians and neuropsychologists agreed that telemedicine improved the accessibility to care for patients and their families while noting concern regarding the capacity of patients to use the technology because of either technological literacy or sensory impairment. Both specialists were concerned about the quality of their respective evaluations; neurologists about their physical examination and neuropsychologists about their limited battery of neurocognitive tests that could be provided through VTC and the lack of validation data through this medium. More specifically, physicians reported having less confidence in the sensory and motoric aspects of their examinations, whereas neuropsychologists had less confidence in their assessment of executive function abilities (eTable 1, http://links.lww.com/CPJ/A383). Most physicians and neuropsychologists reported slightly less confidence in their diagnosis. Physicians noted that several clinical syndromes (most commonly Parkinson spectrum syndromes and motor neuron disease) were better suited for in-person evaluations.

Discussion

The COVID-19 pandemic presented new challenges that telemedicine was uniquely situated to solve. Changes that would typically encompass months of planning and pilot testing were compressed into weeks. We demonstrate that the rapid implementation and expansion of telemedicine services at the UCSF Memory and Aging Center outpatient clinic was feasible and acceptable to providers and did not significantly affect the clinic's utility and accessibility metrics.

After the implementation and transition to telemedicine, our clinic reached and surpassed previous clinic utility metrics. Despite an overall drop in scheduled appointments during the COVID-19 pandemic, canceled appointments declined, whereas the number of completed physician encounters per month increased. Multiple factors drove this increase in clinic accessibility. Implementation of VTC reduced the rate of follow-up appointment cancellations for patients who lived in

Table 5 Demographic Characteristics of Survey Respondents

Characteristic	N (%)
Completed surveys	30
Faculty	20 (66.7%)
Fellows	10 (33.3%)
Gender	
Women	10 (33.3%)
Men	20 (66.7%)
Specialty	
Neurology	21 (63.7%)
Geriatrics	2 (6.1%)
Neuropsychology	7 (21.3%)
Age	
<34	10 (30.4%)
35–44	11 (33.4%)
45–54	7 (21.3%)
55–64	2 (6.1%)

midrange disparity neighborhoods and those who lived greater than 50 miles from the clinic. Furthermore, the implementation of VTC was associated with a reduction in the number of new patients who canceled their appointments, possibly suggesting that VTC reduced an unmeasured barrier to care. Multiple features of VTC increased the opportunity for patients from mid and high disparity neighborhoods to attend in-person or VTC follow-up appointments and increased the probability of new patients attending a follow-up clinical encounter within 1 calendar year of their first appointment. Overall, these results favor the use of VTC for ambulatory ADRD evaluations in physician clinical encounters.

The United States health care system has adopted telemedicine with remarkable speed for COVID-19–related care and chronic disease management. Given that telemedicine has become the default means of delivery of care during the COVID-19 pandemic, it is imperative that we proactively evaluate and address telemedicine's potential impact on health disparities in our vulnerable ADRD population. The observations mentioned above suggest that the implementation of telemedicine services at our clinic did not significantly affect the diversity of our clinic's population based on ethnic/racial status, estimated household income, age, gender, or ADI. Regarding our clinic's accessibility to non-English speakers, the available data can only comment on accessibility related to the use, but not the request for, interpreting services. As such, our data provide a limited window into whether language is a barrier to telemedicine services. There was a decrease in the total number of patients scheduled and seen in the clinic with an interpreter compared with the pretelemedicine era. However, established patients who required an interpreter maintained the same access to our clinic. As our clinic's capacity to provide in-person/virtual interpreters did not change after the implementation of telemedicine, the decline in new patients who required an interpreter was likely related to an unmeasured accessibility variable before or during the scheduling of new patients. These results suggest that ADRD telemedicine services did not exacerbate health disparities in vulnerable populations. At the same time, these results reinforce the observation that, nationally, patients with preexisting disparities in healthcare, such as language barriers, have experienced increased barriers to care during the COVID-19 pandemic.[31,32] Further analysis is warranted after the lifting of COVID-19 restrictions to confirm the pandemic's influence on patient referrals and scheduling.

Finally, we gained valuable insights by surveying physician and neuropsychologist experiences with telemedicine. First, physicians reported more previous telemedicine experience than neuropsychologists, likely given the lack of a well-established teleneuropsychology model.[33(p19)] Before COVID-19, the American Psychological Association endorsed limited guidelines for remote services that were not readily in use or relevant to the challenges imposed by the pandemic.[33-35] It would not be until July 2020 that the Inter Organizational Practice Committee would issue a new set of guidelines for formal teleneuropsychological evaluation applicable to pandemic limitations.[36] At this point, the UCSF MAC clinic had already changed its clinic model and reestablished pretelemedicine patient volume. This new model fundamentally disrupted our neuropsychologist's workflow, which we suspect was a major component of our neuropsychologists' negative experience compared with physicians. Of particular interest, although physicians reported that telemedicine was more appropriate for follow-up visits than new encounters, neuropsychologists reported the opposite. We suspect the contrast is likely because of nuanced differences in each group's clinical evaluation. Physicians reported considerably less confidence in their physical examination, which is often necessary for diagnosing new patients with dementia syndromes defined by subtle motoric features. Neuropsychologists conversely lacked a reliable battery of teleneurocognitive tasks with proven equivalence to in-person evaluations. Accordingly, follow-up evaluations that relied on comparison to previous in-person assessments proved more problematic than new evaluations dependent on the new measures. Both groups reported similar key perceived benefits (improved patient access, family participation, and patient convenience) with minor differences related to the nuanced work experiences of the subspecialties. Finally, both groups reported concerns that the quality of their evaluations was diminished through the modality of VTC. Examples include VTC magnifying the impact of a patient's sensory (hearing/visual) deficit or a lack of technology literacy, causing another barrier to effective care. These results are promising and suggest that key stakeholders in ADRD-related care overall found telemedicine services to be a reasonable and acceptable alternative to in-person evaluations with notable caveats. Ongoing use and future deployment of ADRD telemedicine services must address and

Table 6 Telemedicine Experience/Impression Survey Questions

	Neurologists/Geriatricians N = 23	Neuropsychologists N = 7
Did you have clinical experience using telemedicine before COVID-19?		
Yes	18 (78%)	3 (43%)
How satisfied are you with providing clinical services via telemedicine?		
More satisfied	16 (70%)	2 (29%)
About the same	2 (9%)	0 (0%)
Less satisfied	5 (22%)	5 (71%)
How interested are you in continuing to use telemedicine as part of usual practice after COVID-19?		
Extremely interested	15 (65%)	0 (0%)
Quite interested	5 (22%)	2 (29%)
Moderately interested	2 (9%)	2 (29%)
Slightly interested	0 (0%)	3 (43%)
Not at all	1 (4%)	0 (0%)
How acceptable do you think new patient evaluations via telemedicine are as an alternative to in-person visits?		
Extremely acceptable	3 (13%)	1 (14%)
Quite acceptable	7 (30%)	1 (14%)
Moderately acceptable	6 (26%)	3 (43%)
Slightly acceptable	4 (17%)	2 (29%)
Not at all	3 (13%)	0 (0%)
How acceptable do you think follow-up patient evaluations via telemedicine are as an alternative to in-person visits?		
Extremely acceptable	12 (52%)	0 (0%)
Quite acceptable	8 (35%)	2 (29%)
Moderately acceptable	3 (13%)	2 (29%)
Slightly acceptable	0 (0%)	2 (29%)
Not at all	0 (0%)	1 (14%)
How confident do you feel in diagnosing new patients via telemedicine?		
More confident	0 (0%)	0 (0%)
About the same	8 (35%)	2 (29%)
Less confident	15 (65%)	5 (71%)

validate these quality concerns related to diagnosis and use nuanced triage protocols to determine an individual patient's suitability for telemedicine evaluations.

Telemedicine has historically been embroiled in controversies related to the sanctity of face-to-face visits and the metaphysical relationship between patients and physicians. However, over 20 years of international experience with ADRD telemedicine programs have demonstrated that telemedicine can be an equivalent and acceptable alternative to providers and patients alike that may be a more practical solution to care in the modern world. Regardless, there remain critical limitations that have not yet been addressed. Future research must address our lack of knowledge related to the diagnostic quality and economics of VTC encounters.

Although previous research has investigated the capacity of VTC to diagnose MCI vs unspecified ADRD, to the author's knowledge, no study has addressed the specificity of diagnosis beyond the MCI-dementia dichotomy nor appraised ADRD VTC clinical outcomes. The survey of providers' telemedicine experience highlighted this concern. Neuropsychologists reported concerns that VTC assessment of executive function abilities was limited by the testing methods available and the uncontrollable environment of the VTC encounter. Physicians reported concerns focused on

Table 7 Top 5 Survey Questions

	Neurologists/Geriatricians		Neuropsychologists	
	N = 23		N = 7	
Top 5 benefits				
1	Increased access	23 (100%)	Increased access	5 (71%)
2	Continuity of care	22 (96%)	Family participation	5 (71%)
3	Patient convenience	22 (96%)	Patient convenience	5 (71%)
4	Family participation	21 (91%)	Personal convenience	4 (57%)
5	Ability to assess living environment	18 (74%)	No rooming issues	4 (43%)
Top 5 challenges				
1	Reliable examination	18 (74%)	Limited range of measures	7 (100%)
2	Technology familiarity	18 (74%)	Limited validation data	5 (71%)
3	Sensory impairment	14 (57%)	Sensory impairment	5 (71%)
4	Interpreters	12 (49%)	Greater disparities	5 (71%)
5	Technology disruptions	10 (43%)	Technology familiarity	4 (57%)
Top 5 diagnosis that should be performed in-person (physicians only)				
1	Progressive supranuclear palsy	26 (85%)	—	—
2	Motor neuron disease	24 (80%)	—	—
3	Corticobasal syndrome	23 (75%)	—	—
4	Diffuse Lewy body dementia/Parkinson disease dementia	23 (75%)	—	—
5	Rapidly progressive dementia	15 (50%)	—	—

the limitations of the physical evaluations, specifically the ability to differentiate Parkinson spectrum syndromes (dementia with Lewy body, Parkinson disease dementia, etc.) and motor neuron disease spectrum (frontotemporal dementia and amyotrophic lateral sclerosis), further evidenced by their ranking of least appropriate clinical syndromes to be seen via VTC. Given the nature of our retrospective review and the limitations of available data, we cannot reliably comment on whether the implementation of telemedicine services objectively affected the ability of providers to make certain diagnoses accurately. Future research must address the shortcomings of video-based physical examination and limited reliable measures of executive function through video telemedicine. We suspect that given the current limitations of ADRD telemedicine, new triage and preclinical screening protocols will be necessary to determine which patients are clinically appropriate for telehealth evaluations. Neuropsychologists will need to create new digital neurocognitive assessments that can be performed remotely without close supervision and verify their sensitivity and specificity relative to gold standard in-person assessments.[33(p19)] ADRD specializing physicians will need to explore the use and test the validity of new digital surrogates for physical examination components such as eye movement, muscle tone, and cortical sensory deficits.[37] Should we be unable to replace certain aspects of the physical examination reliably, it will be necessary to support the creation of remote VTC clinic sites where an in-person medical staff and facilitate the examination of a remote ADRD specialist. Comparing the effectiveness of remote patient monitoring using technologies such as telemedicine with standard in-person care has been listed as one of the top 50 priorities for health care by the National Institute of Medicine in the United States,[38] highlighting the issue of access to health care as a global one.[39] If ADRD telemedicine is unable to reliably differentiate certain conditions, the potential benefits of this technology may not be worth the shortcomings of inaccurate neurodegenerative phenotyping.

Determining the socioeconomic savings of ADRD telemedicine is another challenge. Our study only touched the surface of these complex issues and found that reducing travel barriers increased clinic accessibility. From the patient's perspective, the continued availability of appropriate telemedicine services provides the opportunity to access healthcare services while avoiding travel-related costs and decreasing time spent away from work or other obligations. However, for providers, the socioeconomic impact is less clear. Telemedicine can be efficiently delivered at a cost lower than in-person services, given the decreased need for physical space and staff support. However, the incremental resources and associated costs of electronic platforms and staff required to help patients remotely have increased the overall cost of telemedicine infrastructure and may negate any potential savings. Future research must address the need to balance the opposing market forces while facilitating collaborative efforts with our partners in public health, insurance providers, and primary care to prevent bottlenecking the referral process for patients already at risk for health disparities. We will need to begin streamlining our referral and care management networks to find and fill gaps in clinical care. Furthermore, we will need to begin standardizing state laws and coding/billing practices that would further facilitate ADRD teleneurology. If such implementation is successful, financial and, care-related performance improvements could be significant.

There are several key limitations of this study that need to be acknowledged. We did not evaluate the qualitative or clinical outcomes of telemedicine encounters, including patient satisfaction or a cost-benefit analysis. The study is from a single, large academic center, and our findings may not be generalizable to other specialties, practices, or locations. In particular, minority populations who may have lacked VTC technology may have been underrepresented in this study. Furthermore, this study has compared telemedicine implementation data between pandemic and prepandemic epochs. Accordingly, unmeasured psychosocial and economic disturbances experienced by our patients during the COVID-19 pandemic may have created significant biases that have affected the observed rate of cancellations and no-shows. ADRD telemedicine, despite 20 years of experience, remains an underdeveloped domain of neurology for which there remain many questions of accuracy, equity, and practicality. Regardless, this study provides valuable insights into the experience of a memory clinic transition to ADRD telemedicine services in response to COVID-19 and is the first study to describe how this transition affected clinic utility metrics, patient populations, and provider experiences relative to clinic performance before the COVID-19 pandemic.

In the UCSF Memory and Aging Center, we have demonstrated that the integration of telemedicine into dementia care is a feasible and acceptable alternative to in-person care leading to an increase in follow-up encounters and a decrease in cancelations without negatively affecting clinic demographics. The COVID-19 pandemic has forced us to radically rethink and change our memory care delivery models. We anticipate that evidence will demonstrate that virtual visits are valuable in certain clinical contexts and, in time, will be integrated alongside in-person evaluations into a new model of care. How our profession adapts to this technology in the coming years will determine whether we shape its deployment to meet our needs or adjust our practice to meet its demand.

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Appendix (continued)

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References

1. Bureau UC. ByAll baby boomers will be age 65 or older. The United States Census Bureau; 2030. Accessed July 11, 2020. census.gov/library/stories/2019/12/by-2030-all-baby-boomers-will-be-age-65-or-older.html.
2. Liu JL, Hlavka JP, Hillestad R, Mattke S. Assessing the preparedness of the U.S. Health care system infrastructure for an Alzheimer's treatment; 2017. Accessed February 20, 2021. rand.org/pubs/research_reports/RR2272.html.
3. Dall TM, Storm MV, Chakrabarti R, et al. Supply and demand analysis of the current and future US neurology workforce. *Neurology* 2013;81(5):470-478. doi: 10.1212/WNL.0b013e318294b1cf.
4. Gerontological Society of America. The gerontological society of America workgroup on cognitive impairment detection and earlier diagnosis: report and recommendations. geron.org/images/gsa/documents/gsaciworkgroup2015report.pdf.
5. Boustani M, Callahan CM, Unverzagt FW, et al. Implementing a screening and diagnosis program for dementia in primary care. *J Gen Intern Med* 2005;20(7):572-577. doi: 10.1007/s11606-005-0103-7.
6. Thunell J, Ferido P, Zissimopoulos J. Measuring Alzheimer's disease and other dementias in diverse populations using Medicare claims data. *J Alzheimers Dis* 2019;72(1):29-33. doi: 10.3233/JAD-190310.
7. Drabo EF, Barthold D, Joyce G, Ferido P, Chang Chui H, Zissimopoulos J. Longitudinal analysis of dementia diagnosis and specialty care among racially diverse Medicare beneficiaries. *Alzheimers Demen* 2019;15(11):1402-1411. doi: 10.1016/j.jalz.2019.07.005.
8. Alzheimer's Disease Facts and Figures. (2020). *Alzheimers Dement*. 2020;16(3):391-460.
9. The growing challenge of dementia care|NEJM catalyst. Accessed January 30, 2022. catalyst.nejm.org/doi/full/10.1056/CAT.21.0285?casa_token=exqurKdUnE8AAAAA:DoS5xU_otG5eci-nByx9N_lg_s83U0oNeL6ne38PKQqWab4ijCJVvRNYlO28BdVLBYygCWbMsR7R3Cg.
10. Galvin JE, Aisen P, Langbaum JB, et al. Early stages of Alzheimer's disease: evolving the care team for optimal patient management. *Front Neurol.* 2020;11:592302. doi: 10.3389/fneur.2020.592302
11. Kim AY, Choi WS. Considerations on the implementation of the telemedicine system encountered with stakeholders' resistance in COVID-19 pandemic. *Telemed E-Health.* 2021;27(5):475-480. doi: 10.1089/tmj.2020.0293.
12. Lee JH, Kim JH, Jhoo JH, et al. A telemedicine system as a care modality for dementia patients in Korea. *Alzheimer Dis Associated Disord.* 2000;14(2):94-101. doi: 10.1097/00002093-200004000-00007.
13. Mair F, Whitten P. Systematic review of studies of patient satisfaction with telemedicine. *BMJ.* 2000;320(7248):1517-1520. doi: 10.1136/bmj.320.7248.1517.
14. Currell R, Urquhart C, Wainwright P, Lewis R. Telemedicine versus face to face patient care: effects on professional practice and health care outcomes. *Cochrane Database Systematic Reviews.* 2000(2):CD002098. doi: 10.1002/14651858.CD002098.
15. Asghar I, Cang S, Yu H. Usability evaluation of assistive technologies through qualitative research focusing on people with mild dementia. *Comput Hum Behav.* 2018;79:192-201. doi: 10.1016/j.chb.2017.08.034.
16. Zucchella C, Sinforiani E, Tamburin S, et al. The multidisciplinary approach to Alzheimer's disease and dementia. A narrative review of non-pharmacological treatment. *Front Neurol.* 2018;9:1058. doi: 10.3389/fneur.2018.01058.
17. Patterson V. Teleneurology in northern Ireland: a success. *J Telemed Telecare.* 2002;8(3 suppl 6):46-47. doi: 10.1258/13576330260440835.
18. Lindauer A, Seelye A, Lyons B, et al. Dementia care comes home: patient and caregiver assessment via telemedicine. *Gerontologist.* 2017;57(5):e85-e93. doi: 10.1093/geront/gnw206.
19. Loh PK, Donaldson M, Flicker L, Maher S, Goldswain P. Development of a telemedicine protocol for the diagnosis of Alzheimer's disease. *J Telemed Telecare.* 2007;13(2):90-94. doi: 10.1258/135763307780096159.
20. Loh PK, Ramesh P, Maher S, Saligari J, Flicker L, Goldswain P. Can patients with dementia be assessed at a distance? The use of telehealth and standardised assessments. *Intern Med J.* 2004;34(5):239-42. doi: 10.1258/135763307780096159.
21. Martin-Khan M, Flicker L, Wootton R, et al. The diagnostic accuracy of telegeriatrics for the diagnosis of dementia via video conferencing. *J Am Med Directors Assoc.* 2012;13(5):487.e19-24. doi: 10.1016/j.jamda.2012.03.004.
22. Barton C, Morris R, Rothlind J, Yaffe K. Video-telemedicine in a memory disorders clinic: evaluation and management of rural elders with cognitive impairment. *Telemed J E Health.* 2011;17(10):789-793. doi: 10.1089/tmj.2011.0083.
23. Moo LR, Gately ME, Jafri Z, Shirk SD. Home-based video telemedicine for dementia management. *Clin Gerontologist.* 2020;43(2):193-203. doi: 10.1080/07317115.2019.1655510.
24. Oh JY, Park YT, Jo EC, Kim SM. Current status and progress of telemedicine in Korea and other countries. *Healthc Inform Res.* 2015;21(4):239-243. doi: 10.4258/hir.2015.21.4.239.
25. Chirra M, Marsili L, Wattley L, et al. Telemedicine in neurological disorders: opportunities and challenges. *Telemed J E Health.* 2019;25(7):541-550. doi: 10.1089/tmj.2018.0101.
26. D'hooghe M, Van Gassen G, Kos D, et al. Improving fatigue in multiple sclerosis by smartphone-supported energy management: the MS TeleCoach feasibility study. *Mult Scler Relat Disord.* 2018;22:90-96. doi: 10.1016/j.msard.2018.03.020.
27. Howard IM, Kaufman MS. Telehealth applications for outpatients with neuromuscular or musculoskeletal disorders. *Muscle Nerve.* 2018;58(4):475-485. doi: 10.1002/mus.26115.
28. Sokol LL, Shapiro D, Young MJ, et al. The Parkinson care advocate: integrating care delivery. *Front Neurol.* 2017;8:364. doi: 10.3389/fneur.2017.00364.
29. Lam K, Lu AD, Shi Y, Covinsky KE. Assessing telemedicine unreadiness among older adults in the United States during the COVID-19 pandemic. *JAMA Intern Med.* 2020;180(10):1389-1391. doi: 10.1001/jamainternmed.2020.2671.
30. Kind AJH, Buckingham WR. Making neighborhood-disadvantage metrics accessible—the neighborhood atlas. *N Engl J Med.* 2018;378(26):2456-2458. doi: 10.1056/NEJMp1802313.
31. 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. *JAMA Netw Open.* 2020;3(12):e2031640. doi: 10.1001/jamanetworkopen.2020.31640.
32. Darrat I, Tam S, Boulis M, Williams AM. Socioeconomic disparities in patient use of telehealth during the coronavirus disease 2019 surge. *JAMA Otolaryngol Head Neck Surg.* 2021;147(3):287-295. doi: 10.1001/jamaoto.2020.5161.
33. Kitaigorodsky M, Loewenstein D, Curiel Cid R, Crocco E, Gorman K, González-Jiménez C. A teleneuropsychology protocol for the cognitive assessment of older adults during COVID-19. *Front Psychol.* 2021;12:651136. doi: 10.3389/fpsyg.2021.651136.
34. Joint Task Force for the Development of Telepsychology Guidelines for Psychologists. Guidelines for the practice of telepsychology. *Am Psychol.* 2013;68(9):791-800. doi: 10.1037/a0035001.
35. Guidance on psychological tele-assessment during the COVID-19 crisis. APA Services. Accessed May 12, 2022. apaservices.org/practice/reimbursement/health-codes/testing/tele-assessment-covid-19.
36. Bilder RM, Postal KS, Barisa M, et al. Inter organizational practice committee recommendations/guidance for teleneuropsychology in response to the COVID-19 pandemic. *Arch Clin Neuropsychol.* 2020;35(6):647-659. doi: 10.1093/arclin/acaa046.
37. Cohen AB, Nahed BV. The digital neurologic examination. *Digit Biomark.* 2021;5(1):114-126. doi: 10.1159/000515577.
38. Care I of M (US) R on V& SDH. *Comparative Effectiveness Research Priorities: IOM Recommendations (2009)*. National Academies Press (US); 2011. Accessed November 5, 2020. ncbi.nlm.nih.gov/books/NBK64788/.
39. Institute of Medicine (US) Committee on Quality of Health Care in America. *Crossing the Quality Chasm: A New Health System for the 21st Century.* National Academies Press (US); 2001. Accessed November 5, 2020. ncbi.nlm.nih.gov/books/NBK222274/.

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Feasibility and Acceptability of a Multidisciplinary Academic Telemedicine System for Memory Care in Response to COVID-19

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