Investigation

Comparison of initial dental treatment decisions between in-person and asynchronous teledentistry examinations for people with special health care needs

Supplemental material is available online.

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ABSTRACT

Background. People with special health care needs in long-term care settings have difficulty accessing a traditional dental office. The goal of the authors was to assess initial treatment decision concordance between dentists conducting traditional in-person examinations using mobile equipment and additional dentists conducting examinations using asynchronous teledentistry technology.

Methods. Six dentists from Access Dental Care, a North Carolina mobile dentistry nonprofit, saw new patients on-site at 12 participating facilities or asynchronously off-site with electronic dental records, radiographs, and intraoral images, all captured by an on-site dental hygienist. Off-site dentists were masked to other dentists' treatment need decisions; 3 through 5 off-site examinations were conducted for each on-site examination. Demographic and binary treatment need category data were collected. For the 3 most prevalent treatment types needed (surgery, restorative, and new removable denture), the authors calculated the percentage agreement and κ statistics with bootstrapped CIs (1,000 replicates).

Results. The 100 enrolled patients included 47 from nursing homes, 45 from Programs of All-Inclusive Care for the Elderly, and 8 from group homes for those with intellectual and developmental disabilities. Mean (SD) age was 73.9 (16.5) years. Among dentate participants, the percentage agreement and bootstrapped κ (95% CI) were 87% and 0.74 (0.70 to 0.78) for surgery and 78% and 0.54 (0.50 to 0.58) for restorative needs, respectively, and among dentate and edentulous participants, they were 94% and 0.78 (0.74 to 0.83), respectively, for new removable dentures.

Conclusions. The authors assessed the initial dental treatment decision concordance between on-site dentists conducting in-person examinations with a mobile oral health care delivery model and off-site dentists conducting examinations with asynchronous dentistry. Concordance was substantial for surgery and removable denture treatment decisions and moderate for restorative needs. Patient characteristics and facility type were not significant factors in the levels of examiner agreement.

Practical Implications. This evidence supports teledentistry use for patients with special health care needs and could help improve their access to oral health care.

Key Words. Telemedicine; oral health; dental care delivery; clinical decision making; nursing homes; dental care for aged; teledentistry; older adults.

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As the US population continues to age, there is an increasing need for long-term health care services. However, access to many health care services, including oral health care, continues to remain limited for older adults. People living in long-term care (LTC) facilities, in particular, face substantial barriers in receiving oral health care, resulting in more untreated coronal and root caries and missing teeth than in people living independently.[1-5] These disparities can be attributed to several factors, including the limited mobility of this vulnerable population along with the complex medical conditions, cognitive decline, and other disabilities of people living in LTC

facilities. In addition, many LTC facilities often lack adequate equipment or sufficient training for staff members to provide oral health care to residents. Furthermore, most dentists do not leave their established fixed locations of practice to provide care elsewhere in the community.[6]

To help address the oral health needs of this population, mobile oral health care is a delivery model for adults in LTC settings and community programs in which providers bring services and supplies to the location of their patients.[7] However, the COVID-19 pandemic resulted in major limitations for mobile oral health care and further exacerbated the existing barriers to access oral health care for LTC residents. The pandemic exposed considerable disparities in oral health for many vulnerable populations, including LTC residents, due to staff shortages, an inability for caretakers to visit LTC facilities, and other limitations on oral health care delivery.[6,8] During this time, the use of teledentistry, or virtual oral health care delivery, increased. However, teledentistry is still underused in LTC settings and generally less studied than other oral health care delivery models.[8] An opportunity exists to use teledentistry to improve access to oral health care for populations with special care needs.

Studies have reported on the wide scope of purposes that teledentistry can be used for, including education and health promotion, consultation, referral, screening, detection of lesions, and assessment of oral function.[8-11] In a 2017 scoping review, specific to the use of teledentistry for older adults, only 1 of 19 studies reviewed was conducted in the United States, and most had small sample sizes or other study limitations.[9] Only 1 study, performed in France and Germany, included nursing home residents, and only 3 studies assessed the accuracy of teledentistry compared with on-site examination, each for different purposes.[8-11] Thus, our study's purpose was to assess the initial treatment decision concordance between dentists conducting traditional in-person examinations using mobile equipment and additional dentists conducting examinations using asynchronous teledentistry technology among adults with special health care needs, including mostly older adults.

Secondarily, we wanted to determine whether agreement between the on-site dentists using mobile equipment and off-site dentists (acting as teledentists) using teledentistry technology was affected by different patient characteristics and settings.

METHODS

Our study was reviewed by and received approval from the University of North Carolina (UNC) at Chapel Hill institutional review board (21-2456). We used the Strengthening the Reporting of Observational Studies in Epidemiology checklist as a guide for reporting this cross-sectional, observational study design (Figure 1).[12] For data collection, Adams School of Dentistry at UNC partnered with Access Dental Care (ADC), a nonprofit organization that provides comprehensive, on-site, portable oral health care to those in North Carolina living in skilled nursing homes and group homes for those with intellectual and developmental disabilities. ADC also serves 4 regional Programs of All-Inclusive Care for the Elderly (PACE). Each region has an ADC mobile dentistry team (dentist, dental hygienist, ≥ 1 dental assistants) that has a contract with and serves the LTC facilities in that region.

Eligibility criteria

Inclusion criteria were 18 years or older, located in or attending 1 of the 12 facilities that had contracted with ADC to provide mobile oral health care, requested a new patient dental examination from March 7, 2022, through June 5, 2023, and either the patient or his or her legal authorized representative (LAR) (ie, responsible party) could speak English and provide informed consent. Exclusion criteria were lack of informed consent and patients who were uncooperative during initial dental examination, undergoing intravenous feeding, or receiving palliative care.

Recruitment

The project coordinator (PC) (B.R.T.) was notified of new patients with consent to receive their dental care from ADC and contacted the patient or LAR via phone to discuss our study. Those agreeing to participate signed a study-specific consent form and a Health Insurance Portability and Accountability Act (commonly known as HIPAA) consent form to participate either electronically via DocuSign or via paper consent forms sent through the US Postal Service. After the consent process there was no difference, compared with usual care, with the initial dental examination the

ABBREVIATION KEY

ADC: Access Dental Care.
CAB: Community Advisory Board.
LAR: Legal authorized representative.
LTC: Long-term care.
NA: Not applicable.
PACE: Programs of All-Inclusive Care for the Elderly.
PC: Project coordinator.
UNC: University of North Carolina.

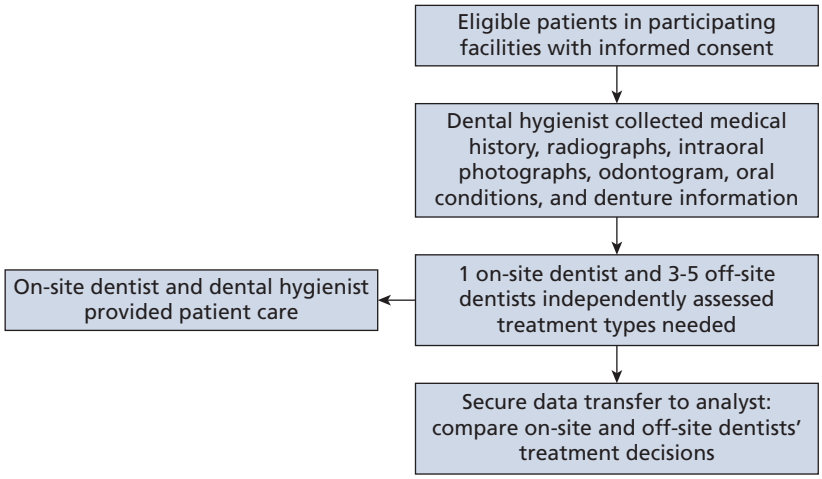

Figure 1. Study design.

patient received from the on-site dentist; however, different ADC dentists also looked at their records remotely. The number of patients seen by each on-site dentist and dental hygienist depended on the number newly enrolled in this mobile dentistry program who resided in their assigned region and provided study consent.

Training

Before initiating our study, we held an all-day session for all study personnel to understand the goals and study protocol and become familiar with the data-collection process, practicing with hypothetical patient scenarios. A hands-on session to practice using the digital MouthWatch Intraoral Camera (Mouthwatch, LLC) was included. Other than a discussion of what constitutes the need for urgent care, there was intentionally no attempt to standardize the dentists' treatment decisions, as that might bias the study results designed to reflect usual patient care. Clinicians who joined our study later received similar training.

Data collection

One of the on-site dental hygienists (B.W.; Julie Shore, RDH; Wendy Gray, RDH; Sherry L. Redmond, RDH; Cindy Shepherd, RDH) reviewed the medical history provided by the facility with 1 of the on-site dentists (B.E.M.; Steven D. Bryant, DMD; Diane Jacobs, DDS; Duy Ngo, DDS; Roberta Blazzio, DDS; Jae Hee Shim, DMD) before screening the patient, obtaining radiographs, or providing a dental prophylaxis or scaling and root planing. This prophylaxis often is conducted at the first visit before the dental examination because of the high prevalence of plaque and calculus in this population, making it challenging to visualize their dentition. The dental hygienist inputted the patient information, including chief concern, medical history, patient behavior and mobility status, number of teeth present, oral hygiene rating, radiographs (obtained using the NOMAD Pro Handheld X-Ray System [Aribex, Inc]), intraoral photographs, odontogram, and information regarding oral conditions and patient dentures (if applicable) electronically into Fuse (Patterson Dental), a Health Insurance Portability and Accountability Act–compliant cloud-based health record platform. The same information was collected for each patient by the dental hygienist unless patient behavior hindered data collection. The information on Fuse was shared with the on-site dentist the same day and off-site dentists asynchronously.

We developed a randomization protocol for a balanced study design for the PC to evenly assign 1 of the initial 4 dentists to conduct the on-site examination, with the other 3 as the off-site dentists for that patient. Using 3 off-site dentists instead of 1 for each patient provided more on-site dentist and remote dentist pairs in the data set. A larger total number of pairs can improve the agreement estimates. This means the 95% CIs for the κ statistic would have increased precision (ie, be narrower) with multiple pairs per patient than if there were only 1 off-site dentist per patient.

We later expanded the number of participating dentists to 6 to accelerate data collection, although they conducted fewer total examinations. To maintain blinding, all dentists independently recorded the types of treatment category each patient needed on paper data collection forms,

scanned their forms, and sent them securely to the PC. These binary treatment decisions were not entered into the electronic patient record until after all off-site dentists completed their reviews of the dental hygienists' digitized information asynchronously. These usually were completed within a few days and not more than a week.

The on-site dentist completed an in-person patient examination and provided treatment as per patient needs. If the on-site dentist needed additional diagnostic information or changed the treatment plan after seeing the patient, this was recorded. The PC transferred deidentified, coded, encrypted data securely to UNC for statistical analysis. We enlisted a 7-member Community Advisory Board (CAB) that included administrators and family members of residents from the different types of participating facilities to provide input about our study, including educational recruitment materials, findings, and dissemination.

STATISTICAL METHODS

Descriptive analysis included characteristics of study participants, dental care providers, patient setting, and frequency distribution of clinical decisions. We report the number and percentage of on-site treatment decisions and the number and percentage of the treatment decisions by 3 through 5 off-site dentists for each treatment type. We included some instances of dentists reporting "unable to determine" in the denominators to calculate percentages.

Given that 1 patient only had 1 on-site dentist but had multiple off-site dentists, we calculated the percentage of decision agreement as the ratio of the number of off-site dentists' decisions that reached the same treatment decision for a patient as the paired on-site dentist of the total number of on-site and off-site dentist pairs summed across all patients. For example, if a patient was examined by 1 on-site dentist (as all patients were) and 3 off-site dentists, then the sample size contribution of this patient was 3 to the denominator and a value of 0, 1, 2, or 3 in the numerator corresponding to the number of off-site dentists who reached the same treatment decision as the on-site dentist. We obtained P values from χ^2 tests.

We considered κ statistics with 95% CIs to measure concordance for treatment type between on-site and off-site dentists' decisions. Unlike with the percentage agreement among the 2 different dentist examination types, we calculated the κ scores to adjust for chance, which is a more conservative yet robust measure of concordance. κ between 0.41 and 0.60 is considered moderate agreement and between 0.61 and 0.80 is considered substantial agreement.[13] Our goal was to detect the substantial category of κ, with minimum κ of 0.61. Using the original, balanced study design based on 4 dentists, we used analytic derivations using matrix multiplication applied to an underlying multinomial distribution for the possible combinations of the 4 ratings to obtain the asymptotic SE for an estimated κ of 0.70 for agreement between on-site and off-site dentists' ratings (middle value of 0.61 and 0.80). In turn, further calculations suggested a planned sample size of 240 would provide a lower confidence bound of 0.618 corresponding to the low end of the range of substantial agreement.[14,15]

In addition, to adjust for multiple on-site and off-site pairs of ratings within patients in CIs, we computed the cluster-bootstrapped 95% CI for κ by means of taking 1,000 random samples of all on-site and off-site examination pairs with replacement. We report the average bootstrapped κ as the κ estimate, and the 2.5th and 97.5th percentiles were the confidence limits.

Interexaminer agreement between on-site and off-site dentists was stratified by treatment type and determined using percentage agreement. We used the on-site dentist examination as the reference standard to determine sensitivity and specificity for asynchronous teledentistry examinations. We did not assess diagnostic accuracy based on a stronger reference standard. We used logistic regression with random intercepts for multiple within-subject pairs of ratings to study the impact of covariates (patient demographic factors) on the level of clinical agreement and disagreement between on-site and off-site dentists for treatment types. We adjusted the threshold for significance using the Bonferroni statistic to account for multiple comparisons. We performed data processing and statistical analyses with SAS Version 9.4 (SAS Institute).

RESULTS

Study facilities, providers, and CAB

The 12 participating facilities, located in 11 counties, included 8 skilled nursing facilities, 3 PACE, and 1 organization with 3 participating group homes. The CAB provided feedback on educational

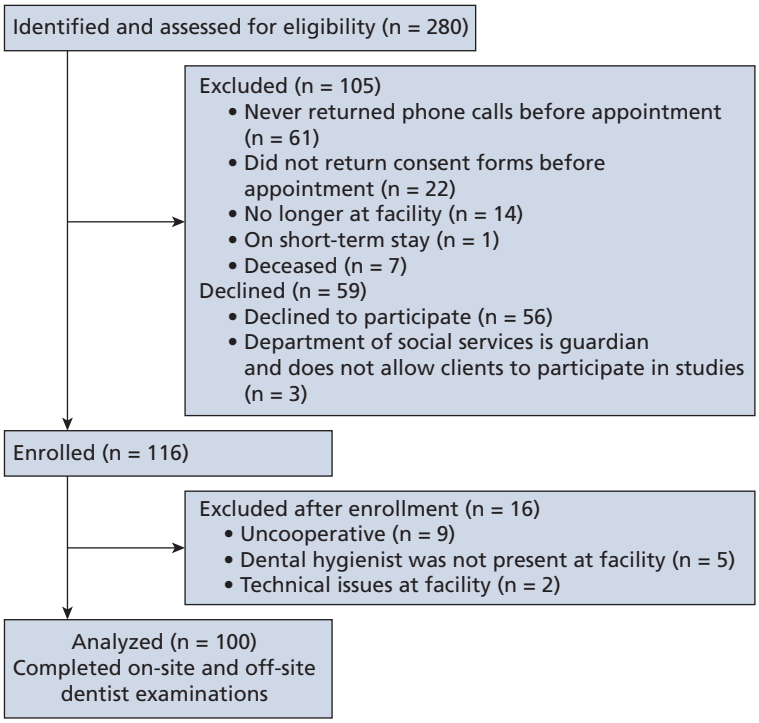

Figure 2. Flowchart of participant recruitment, eligibility, and enrollment, March 7, 2022-June 5, 2023.

materials developed to inform facility staff members, LAR, and residents about teledentistry and suggestions regarding recruitment and dissemination of findings.

The 3 male and 3 female dentists graduated from dental school from 1975 through 2022 and had worked with ADC from 1 through 23 years. The 5 female dental hygienists graduated from a dental hygiene program from 1995 through 2014 and had from less than 1 year through 23 years of experience working with ADC. The 1 male and 7 female dental assistants also participated and served as recorders for the dental hygienists in addition to their usual clinical roles during the in-person examinations.

Study participants

A flow diagram of participant recruitment, reasons for exclusion, and enrollment is shown in Figure 2. From the lists provided by the facilities, we attempted to contact 280 patients or their LAR to inform them about our study and obtain consent. For the 100 enrolled, 37 adults provided their own consent and 63 provided consent via their LAR. The dentists conducted 100 on-site dental examinations and 346 teledentistry examinations.

The participants' demographic characteristics are shown in Table 1. The mean (SD) age was 73.9 (16.5) years, ranging from 18 through 97 years. Patients were from skilled nursing homes (47%), PACE (45%), and group homes (8%). Those in group homes were younger, with mean (SD) age of 31.9 (12.6) years, ranging from 18 through 51 years. Women comprised 75% of participants. Approximately three-fourths were White and one-fourth were Black, with 2 people identifying as Hispanic. Regarding oral health status, 75% were dentate with a mean (SD) number of 19.9 (8.9) teeth, and 25% were edentulous. Cognitive impairment information was not available for almost one-half of the participants. One-half took blood thinners, 35% had diabetes, and 20% had had a stroke.

Each on-site dental hygienist assessed her own patients' ability to perform oral hygiene independently, and 70% of participants needed assistance or were dependent on others for this personal care. PACE participants were more likely to perform oral hygiene independently, whereas those in group homes were more likely to be dependent. The dental hygienists also recorded patient mobility; 54% of the participants were nonambulatory, with most of them needing assistance with transfer to a dental chair or a mechanical lift. For 79% of participants, their last dental visit was more than 2 years ago. In 6%, the dental hygienist was unable to complete obtaining the intraoral photographs because of lack of cooperation.

Table 1. Teledentistry study participants' characteristics (n = 100).

CHARACTERISTIC	VALUE
Demographics	
Race, %	
White	73
Black	26
Other	1
Ethnicity, %	
Hispanic	2
Non-Hispanic	98
Age, y, mean (SD), median, minimum-maximum	73.9 (16.5), 77, 18-97
Age group, y, %	
18-64	19
≥65	81
Sex, %	
Female	75
Male	25
Consent, %	
Self	37
Responsible party	63
Insurance, %	
Programs of All-Inclusive Care for the Elderly	45
Self-pay	19
Medicare Advantage dental plan	5
Medicaid	26
Private dental insurance	5
Facility type, %	
Nursing home	47
Programs of All-Inclusive Care for the Elderly	45
Group home	8
Length of stay, y, %	
<1	86
≥1	14
Oral Health Related	
Last dental visit, %	
<6 mo	3
6 mo-1 y	5
>1 y-2 y	13
>2 y	79
Dentate status, %	
Dentate	75
Edentulous	25
No. of teeth, all, mean (SD)	15.1 (11.6)
No. of teeth, dentate, mean (SD)	19.9 (8.9)
No. of teeth, %	
0	25
1-8	12
9-20	19
21-32	44
Oral hygiene ability, %	
Independent	29

Table 1. Continued

CHARACTERISTIC	VALUE
Needs assistance	41
Dependent	30
Tooth mobility, %	
Yes	14
No	80
Unable to determine	6
Partial denture, %	
Maxillary	2
Mandibular	7
Both	1
None	90
Full denture, %	
Maxillary	17
Mandibular	1
Both	12
None	70
Chief concern, %	
Tooth pain	2
Ill-fitting denture	8
Missing filling	1
Wants denture	5
None	58
Other	26
Medical and Physical	
Cognitive impairment, %	
Mild	7
Moderate	14
Severe	14
Unknown	48
None	17
Tobacco use, %	
Yes	5
No	90
Unknown	5
Diabetes, %	
Yes	35
No	65
Coronary heart disease, %	
Yes	18
No	82
Stroke, %	
Yes	20
No	80
Blood thinners, %	
Yes	50
No	50
Patient mobility, %	
Ambulatory	46
Nonambulatory	54

Table 2. Comparison of number and percentage of treatment decisions by on-site dentists and 3 to 5 off-site dentists using asynchronous teledentistry for each type of treatment needed, *P* value and percentage agreement.

TYPE OF TREATMENT NEEDED	ON-SITE DENTISTS' DECISIONS* USING IN-PERSON EXAMINATIONS, NO. (%)	ALL OFF-SITE DENTISTS' DECISIONS* USING ASYNCHRONOUS TELEDENTISTRY, NO. (%)	*P* VALUE	AGREEMENT, %
Restorative	48 (68.6)	138 (62.7)	.42	78.4
Surgery	33 (43.4)	107 (41.6)	.93	87.1
New Removable Denture	15 (15.0)	33 (15.3)	.96	94.4
Urgent Care	6 (7.9)	42 (16.3)	NA†	82.4
Pathology	5 (6.6)	10 (3.9)	NA	92.4
Crown	2 (2.6)	5 (2.0)	NA	97.5
Silver Diamine Fluoride	2 (2.6)	13 (5.1)	NA	95.2
Denture Reline	2 (2.6)	4 (1.2)	NA	98.1
Denture Repair	1 (1.0)	4 (1.2)	NA	99.4
Partial Repair	1 (1.0)	1 (0.4)	NA	98.8
Fixed Bridge	0	0	NA	100.0
Periodontal Surgery	0	1 (0.4)	NA	99.5

* Includes the few decisions reported as unable to determine in denominators. † NA: Not applicable.

Table 3. Measures of concordance between on-site and off-site dentists' decisions by patient treatment need type.

TYPE OF TREATMENT NEEDED	BOOTSTRAPPED κ (95% CI)	SENSITIVITY, %	SPECIFICITY, %
Dentate Only (n = 75)			
Restorative	0.54 (0.50 to 0.58)	78	79
Surgery	0.74 (0.70 to 0.78)	87	87
Dentate and Edentulous (n = 100)			
New removable denture	0.78 (.74 to 0.83)	76	98

Types of treatment needed

Table 2 shows the number and percentage of patient treatment decisions by type of treatment needed from the on-site dentists conducting in-person examinations and the number and percentage among the off-site dentists conducting asynchronous teledentistry examinations, the *P* values to compare the proportions between the 2 types of examinations for the 3 main treatment categories (most other categories had small sample sizes), and the percentage agreement between the on-site and off-site dentists' decisions. Only 6 patients were reported as needing urgent treatment by the on-site dentist, although most patients had not seen a dentist in more than 2 years. A resident may have received urgent oral health care from ADC before study enrollment, thus becoming ineligible.

The greatest need was for restorative care, followed by surgery and new removable denture. There were many categories with insufficient sample size to calculate κ statistics. Consequently, the 3 most prevalent types were analyzed further. There were no significant differences between the on-site and off-site dentists' decisions for these 3 treatment types.

Treatment concordance

Percentage agreement for these 3 main treatment types ranged from 78.4% through 94.4%, and κ ranged from 0.54 through 0.78 with relatively narrow bootstrapped 95% CI (width, <0.10). Sensitivity ranged from 76% through 87%, and specificity ranged from 79% through 98% (Table 3).

Table 4. Percentage agreement and disagreement for surgery treatment need by on-site and off-site dentist pairs for selected participant demographic characteristics.*

PATIENT CHARACTERISTIC	AGREEMENT, NO. (%)	DISAGREEMENT, NO. (%)	*P* VALUE†
Race			
White	141 (84.4)	26 (15.6)	.12
Other	48 (96.0)	2 (4.0)	
Age Group, Y			
18-74	71 (92.2)	6 (7.8)	.35
≥75	118 (84.3)	22 (15.7)	
Sex			
Male	38 (80.9)	9 (19.1)	.57
Female	151 (88.8)	19 (11.2)	
Consent			
Self	68 (90.7)	7 (9.3)	.42
Responsible party	121 (85.2)	21 (14.8)	
Medicaid			
Yes	43 (89.6)	5 (10.4)	.81
No	146 (86.4)	23 (13.6)	
Facility Type			
Programs of All-Inclusive Care for the Elderly	76 (84.4)	14 (15.6)	.93
Nursing home or group home	113 (89.0)	14 (11.0)	
Last Dental Visit, Y			
≤2	37 (88.1)	5 (11.9)	.99
>2	152 (86.9)	23 (13.1)	
No. of Teeth			
1-20	85 (89.5)	10 (10.5)	.53
21-32	99 (84.6)	18 (15.4)	
Oral Hygiene Ability			
Independent	53 (84.1)	10 (15.9)	.82
Needs assistance	80 (88.9)	10 (11.1)	
Dependent	56 (87.5)	8 (12.5)	
Patient Mobility			
Ambulatory	110 (92.4)	9 (7.6)	.23
Nonambulatory	79 (80.6)	19 (19.4)	
Diabetes			
Yes	71 (81.6)	16 (18.4)	.28
No	118 (90.8)	12 (9.2)	
Coronary Heart Disease			
Yes	35 (83.3)	7 (16.7)	.93
No	154 (88.0)	21 (12.0)	
Stroke			
Yes	46 (93.9)	3 (6.1)	.25
No	143 (85.1)	25 (14.9)	

* Treatment decisions for the 75 dentate participants. † None of the *P* values were below the Bonferroni threshold of .0038 for significance after multiple testing adjustment. The *P* values were calculated using logistic regression with random patient intercept and bias-adjusted empirical standard errors.

Relative to the on-site dentist's treatment decisions, the off-site dentists were good at determining who did and did not need different types of treatment. The on-site dentists reported needing additional information for 25%, mostly to determine whether the patient needed sedation for the next visit on the basis of their experience with the patient's behavior. After seeing the patient, they subsequently made a change in treatment needs for 13 patients for 8 different reasons. No pattern could be discerned. Off-site dentists did not have this opportunity. The on-site dentists reported in 1% through 7% of situations, varying by treatment type, that they were unable to make a treatment decision; this ranged from 2% through 10% for the off-site dentists, most frequently for surgery-related decisions.

We evaluated the percentage agreement and disagreement between the on-site and off-site dentists for each of the 3 treatments for 13 selected patient characteristics to determine whether these characteristics affected the level of concordance. Table 4 shows the results for the surgery treatment need. Results for the other 2 treatment types are shown in eTable 1 and eTable 2, available online at the end of this article. For the surgery and restorative categories, there was 100% agreement for the edentulous participants. Thus, for the remaining characteristics, comparisons were limited to the dentate participants. No significant differences in percentage agreement were found at *P* value below .05 for surgery. There were differences for restorative agreement for age group and sex, but they were no longer significant after correcting the *P* value for multiple testing with the Bonferroni threshold of *P* value equaling .05/13 (.0038). For removable denture, analysis included all participants regardless of dentition status. There was a significant difference by sex at the threshold of *P* value below .05, but not when using the adjusted Bonferroni threshold of *P* value of .0038. Thus, patient characteristics or facility type were not significant factors in the level of agreement of dentists' clinical treatment decisions.

DISCUSSION

Our results indicate a moderate to substantial level of concordance, using κ statistics, in the initial dental treatment decisions for patients with special health care needs between the 2 types of examination methods used in our study: dentists providing on-site mobile dental services in participating facilities and dentists using an asynchronous teledentistry, Health Insurance Portability and Accountability Act–compliant model. Given the concordance of these results, our findings suggest teledentistry can provide a valuable, timely benefit to various aspects of in-person oral health care, particularly among patient populations with otherwise limited access to care. Many patients in LTC cannot provide their own consent for treatment. With initial teledentistry screening, the dentist has a better idea of how soon the patient needs to be seen and the type of treatment needed. Treatment plans can be sent in advance to responsible parties, who may be at a distant location, to obtain treatment consent. This process can aid with appropriate scheduling of the visit to the facility, and when the dentist is on-site, treatment can be performed right away.

In a study of 291 children, the University of Rochester's Medical Center investigators found teledentistry examinations were comparable to the results of clinical examinations when screening for early childhood caries in preschool-aged children.[11]

Results of past surveys of patients' experiences with teledentistry have been favorable. Teledentistry can help dental care providers prioritize care for patients with urgent needs and provide oral health guidance and prescription services for managing conditions at home. This process saves time and money for the patient and allows the provider to focus on critical patient needs in person.[16]

The American Dental Association continues to update its teledentistry policies.[17] Results of a 2023 American Dental Association survey of panel member dentists indicated 30% were using teledentistry in their practices, primarily to care for adults aged 25 through 64 years.[18] Our results show teledentistry also can be of benefit to older adults, particularly people with disabilities and special health care needs.

As discussed in an American Dental Education Association policy report, implementation of teledentistry depends on state licensing regulations, allied health professionals' scope-of-practice provisions, and private and public reimbursement mechanisms.[19] Teledentistry can play an important role in reducing oral health disparities, including for those with special health care needs. In some states, regulations and reimbursement differ for synchronous and asynchronous teledentistry. For residents in LTC, asynchronous teledentistry is essential.

Our study has some limitations. The sample size and timeline were based on prepandemic enrollment of new patients into the ADC system. A smaller sample size than planned was obtained, and this limited analyses. However, κ values representing substantial agreement, used to determine sample size, were obtained for 2 of the 3 treatment categories. The lower κ for restorative needs may reflect difficulty obtaining high-quality radiographs in this population. Other investigators have reported variability in dentists' caries detection and management decisions.[20,21]

There were many unexpected challenges in recruiting facilities and patients. We approached 28 facilities but enrolled 12. The COVID-19 pandemic greatly affected nursing homes, resulting in clinic cancellations, severe staff shortages, and increased staff turnover, which continued throughout our study. Admission to residential facilities declined during the pandemic because of COVID-19 lockdowns, resulting in fewer new eligible residents. The proportion who declined to participate was higher than expected, which may have reflected, in part, a desire to not take on anything extra during the pandemic.

Our study results are based on data obtained from dental hygienists and dentists with a wide range of training and experience and a patient population with diverse characteristics. The small number of dentists limits generalizability. However, the variability in their training and experience enhances the generalizability of the results. Bootstrapping methods were used to obtain 95% CIs surrounding the κ scores.

In this model, the dental hygienist, using mobile dental equipment, could collect the necessary medical and dental information and obtain intraoral images and radiographs for electronic transmission to an off-site dentist. The favorable findings indicate asynchronous teledentistry can be recommended for initial treatment decisions by dentists who can then be much more prepared to provide the type of care needed when they are able to see the patient on-site.

CONCLUSIONS

People with special health care needs in nursing or group homes or PACE facilities face barriers in access to oral health care. For the 100 participating patients in 12 North Carolina facilities, there was moderate to substantial agreement among the 6 dentists (κ, 95% CI) between their on-site and asynchronous off-site dentist treatment decisions for surgery, restorative needs, and new removable dentures. The type of facility and patient characteristics did not affect significantly the level of examiner concordance. The results provide evidence that teledentistry can serve as a beneficial addition to the oral health care delivery system for people with special health care needs. ■

DISCLOSURES

Dr. Weintraub serves as an unpaid volunteer member on the Access Dental Care Board of Directors. None of the other authors reported any disclosures.

SUPPLEMENTAL DATA

Supplemental data related to this article can be found at: https://doi.org/10.1016/j.adaj.2024.05.004.

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eTable 1. Percentage agreement and disagreement for restorative treatment need decisions by on-site and off-site dentist pairs for selected participant demographic characteristics*.

PATIENT CHARACTERISTIC	AGREEMENT, NO. (%)	DISAGREEMENT, NO. (%)	*P* VALUE†
Race			
White	129 (81.1)	30 (18.9)	.18
Other	31 (68.9)	14 (31.1)	
Age Group, Y			
18-74	66 (88.0)	9 (12.0)	.04
≥75	94 (72.9)	35 (27.1)	
Sex			
Male	48 (92.3)	4 (7.7)	.01
Female	112 (73.7)	40 (26.3)	
Consent			
Self	61 (79.2)	16 (20.8)	.79
Responsible party	99 (78.0)	28 (22.0)	
Medicaid			
Yes	37 (78.7)	10 (21.3)	.89
No	123 (78.3)	34 (21.7)	
Facility Type			
Programs of All-Inclusive Care for the Elderly	70 (77.8)	20 (22.2)	.95
Nursing home or group home	90 (78.9)	24 (21.1)	
Last Dental Visit, Y			
≤2	23 (71.9)	9 (28.1)	.43
>2	137 (79.7)	35 (20.3)	
No. of Teeth			
1-20	64 (77.1)	19 (22.9)	.85
21-32	91 (78.4)	25 (21.6)	
Oral Hygiene Ability			
Independent	51 (81.0)	12 (19.0)	.38
Needs assistance	62 (72.9)	23 (27.1)	
Dependent	47 (83.9)	9 (16.1)	
Patient Mobility			
Ambulatory	72 (74.2)	25 (25.8)	.30
Nonambulatory	88 (82.2)	19 (17.8)	
Diabetes			
Yes	61 (79.2)	16 (20.8)	.88
No	99 (78.0)	28 (22.0)	
Coronary Heart Disease			
Yes	27 (75.0)	9 (25.0)	.60
No	133 (79.2)	35 (20.8)	
Stroke			
Yes	30 (71.4)	12 (28.6)	.37
No	130 (80.2)	32 (19.8)	

* Treatment decisions for the 75 dentate participants. † None of the *P* values are below the Bonferroni threshold of .0038 for significance after multiple testing adjustment. The *P* values were calculated using logistic regression with random patient intercept and bias-adjusted empirical standard errors.

eTable 2. Percentage agreement and disagreement for new removable denture treatment need decisions by on-site and off-site dentist pairs for selected participant demographic characteristics*.

PATIENT CHARACTERISTIC	AGREEMENT, NO. (%)	DISAGREEMENT, NO. (%)	*P* VALUE†
Race			
White	223 (94.1)	14 (5.9)	.98
Other	63 (95.5)	3 (4.5)	
Age Group, Y			
18-74	100 (91.7)	9 (8.3)	.40
≥ 75	186 (95.9)	8 (4.1)	
Sex			
Male	64 (85.3)	11 (14.7)	.04
Female	222 (97.4)	6 (2.6)	
Consent			
Self	100 (91.7)	9 (8.3)	.28
Responsible party	186 (95.9)	8 (4.1)	
Medicaid			
Yes	79 (95.2)	4 (4.8)	.88
No	207 (94.1)	13 (5.9)	
Facility Type			
Programs of All-Inclusive Care for the Elderly	114 (91.2)	11 (8.8)	.13
Nursing home or group home	172 (96.1)	6 (3.9)	
Last Dental Visit, Y			
≤ 2	49 (92.5)	4 (7.5)	.92
> 2	237 (94.8)	13 (5.2)	
No. of Teeth			
1-20	81 (91.0)	8 (9.0)	.38
21-32	131 (95.6)	6 (4.4)	
Oral Hygiene Ability			
Independent	88 (97.8)	2 (2.2)	.60
Needs assistance	111 (94.1)	7 (5.9)	
Dependent	87 (91.6)	8 (8.4)	
Patient Mobility			
Ambulatory	130 (94.2)	8 (5.8)	.52
Nonambulatory	156 (94.5)	9 (5.5)	
Diabetes			
Yes	179 (97.3)	3 (2.7)	.40
No	179 (92.7)	14 (7.3)	
Coronary Heart Disease			
Yes	243 (85.0)	43 (15.0)	.45
No	14 (82.4)	3 (17.6)	
Stroke			
Yes	56 (93.3)	4 (6.7)	.60
No	230 (94.7)	13 (5.3)	

* Treatment decisions for the 100 dentate and edentulous participants. † None of the *P* values are below the Bonferroni threshold of .0038 for significance after multiple testing adjustment. The *P* values were calculated using logistic regression with random patient intercept and bias-adjusted empirical standard errors.