Teledentistry: Increasing Access to Oral Health Services for Children in Rural Populations

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ABSTRACT

Objectives: The objective of this study was to evaluate factors influencing access to oral health services in primary dental clinics among children living in rural upstate New York following a teledentistry consultation.

Methods: The study was based on dental information collected for 144 children with serious dental decay who had a specialty teledentistry consultation at one of the Finger Lakes Community Health clinics in 2015-2016. Associations between access to oral health services in primary dental clinics and children's sociodemographic characteristics as well as teledentistry consult and clinical outcome covariates were evaluated using Fisher Exact and Mann–Whitney U tests in SAS v9.4.

Results: The majority of study subjects were white children (70%), non-Hispanic (75%), under 6 years of age (75%) at the time of the teledentistry consultation. The study results indicate that most children completed a recommended treatment plan (97%) and subsequently accessed follow-up oral health services at one of the local primary dental clinics (77%). The findings suggest that children's access to oral health services in primary dental clinics was positively and significantly associated with a dental treatment recommendation using nitrous oxide (*P*=0.028), fewer case management interventions (*P*=0.003), and shorter time to treatment initiation (*P*=0.012) or completion (*P*=0.020). Children's demographics and travel distance to the dental clinic were not associated with their access to oral health services in the community.

Conclusions: The study findings show that teledentistry consultation promoted access and utilization of specialty oral health care as well as follow-up services at local dental clinics for rural children.

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INTRODUCTION

- The importance of increasing access to oral health services for underserved populations has dominated discussions about effective strategies to improve population oral health.
- Teledentistry is used for providing oral health screening, assessment and examination, specialty care consults, follow-up examinations, and distance learning.
- Teledentistry may be also a useful tool in helping children establish a dental home.
- The objectives of this study were to:
  - Evaluate whether children who received a teledentistry consultation and treatment with a pediatric dental specialist accessed follow-up oral health services at general dentistry clinics
  - Assess the factors influencing access to oral health services in primary dental clinics among children living in rural upstate New York following a teledentistry consultation with pediatric dental specialists

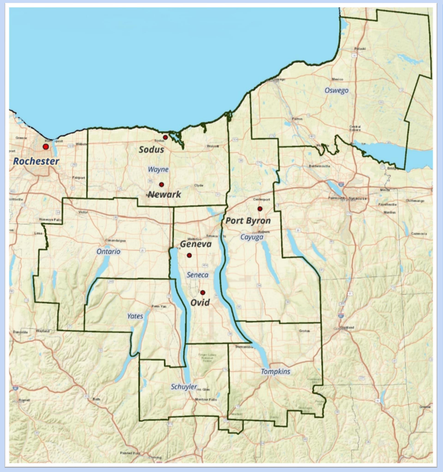
METHODS

- Study location - Finger Lakes Community Health (FLCH), headquartered in Penn Yan, New York, which:
  - Has provided telehealth services since 2002 and teledentistry services since 2010 for rural populations
  - Has 6 co-located dental clinics and 2 stand-alone dental centers providing general dentistry services
  - Partnered with pediatric dental specialists at the Eastman Institute for Oral Health (EIOH) in Rochester, NY
- Subjects & data collection:
  - 144 children with serious dental decay who had a teledentistry consultation in one of the FLCH dental clinics from 2015–2016; the study was conducted in 2017
  - FLCH health and dental records: sociodemographics, teledentistry and case management services, clinical outcomes, follow-up general dentistry visits at the FLCH
- Data Analysis:
  - Outcome: utilization of follow-up dental services at the FLCH general dentistry clinics defined as ≥1 visit per year after specialty dental treatment at EIOH in Rochester NY
  - Covariates:
    - Timeliness of initiation/completion of specialty dental treatment estimated by calculating # of weeks between:
      - Teledentistry & 1st in-person consultation w/pediatric dentist
      - 1st in-person specialty consultation and treatment completion
    - Intensity of case management services estimated by calculating # of contacts by community health workers (CHWs), including telephone calls, letters, & home visits
    - Travel distance from the children's residence to FLCH general dentistry clinics estimated by calculating # of miles between the two zip code locations
  - Statistical analyses: associations between utilization of follow-up dental services and covariates evaluated using Fisher Exact and Mann–Whitney U tests using SAS v9.4

RESULTS

The current analysis included 144 children living in the Finger Lakes region of New York with a teledentistry consultation at one of the FLCH general dentistry clinics located in Geneva, Newark, Ovid, Port Byron, and Sodus.

Figure 1. Location of Finger Lakes Community Health (FLCH) General Dentistry Clinics and Eastman Institute for Oral Health (EIOH)



Finger Lakes Community Health (FLCH) General Dentistry Clinics Where the Study Subjects Had the Live-Video Teledentistry Consultation with a Pediatric Dental Specialist Located at the Eastman Institute for Oral Health (EIOH) in Rochester NY

Note: The counties bordered in black indicate the counties of residence of children in the study.

Most study children completed a specialty dental treatment plan (97.2%) and subsequently accessed follow-up oral health services at one of the FLCH general dentistry clinics (77.1%).

Children with follow-up visits had 1 to 5 visits (mean=2.2) after the specialty dental treatment (over a period of up to 2.3 years).

Overall, slightly more subjects who accessed follow-up oral health services at the FLCH general dentistry clinics were:

- Girls, older, White, of ethnicity other than Hispanic, living in a two-parent family, and had no history of a behavioral or developmental disorder
- However, these differences were not statistically significant

Table 1. Characteristics of Study Subjects by Utilization of Follow-Up Oral Health Services at One of the Finger Lakes Community Health (FLCH) General Dentistry Clinics

Characteristics of study subjects	All children (*n=144*)		Utilization of follow-up oral health services at FLCH				*P*
			Yes (*n=111*)		No (*n=33*)		
	n	%	n	%	n	%	
Gender							0.16
Girls	74	51.4%	61	55.0%	13	39.4%	
Boys	70	48.6%	50	45.1%	20	60.6%	
Age (years)							0.21
Mean (range)	144	4.9 (2.0-10.0)	111	5.0 (2.0-10.0)	33	4.7 (2.0-9.0)	
Race							0.83
White	101	70.1%	77	69.4%	24	72.7%	
Other race	43	29.9%	34	30.6%	9	27.3%	
Ethnicity							0.44
Hispanic	26	18.1%	22	19.8%	4	12.1%	
Other ethnicity	118	81.9%	89	80.2%	29	87.9%	
Living situation							0.30
Lives in two-parent family	95	66.0%	76	68.5%	19	57.6%	
Lives with single parent, other	49	34.0%	35	31.5%	14	42.4%	
Behavioral or developmental disorder[a]							0.79
No	120	83.3%	93	83.8%	27	81.8%	
Yes	24	16.7%	18	16.2%	6	18.2%	

[a] Attention deficit/hyperactivity disorder, autism, speech delay, developmental delay, physical disability.

RESULTS (cont.)

Compared to children who did not use follow-up oral health services at a local general dentistry clinic, children who did:

- Resided closer to the FLCH (14.6 *vs* 17.9 miles) although the difference was not statistically significant
- Were significantly less likely to have a recommendation for general anesthesia (70.3% *vs* 75.8%; *P*=0.028)
- Required significantly fewer contacts by CHWs to complete the teledentistry consultation and/or dental treatment with a pediatric dentist (15.5 *vs* 25.7 contacts; *P*=0.003)
- Had significantly fewer weeks to dental treatment initiation (9.1 vs 17.0 weeks; *P*=0.012) but more weeks to dental treatment completion (2.0 *vs* 0.2 weeks; *P*=0.012)

Table 2. Teledentistry Consultation and Dental Treatment with a Pediatric Dental Specialist by Utilization of Follow-Up Oral Health Services at Finger Lakes Community Health (FLCH)

Teledentistry consultation and specialty dental treatment covariates	All children (*n=144*)		Utilization of follow-up oral health services at FLCH				*P*
			Yes (*n=111*)		No (*n=33*)		
	n	%	n	%	n	%	
Travel distance to one of the FLCH general dentistry clinics (miles)							0.17
Mean (range)	144	15.4 (3.0-74.0)	111	14.6 (3.0-71.0)	33	17.9 (3.0-74.0)	
Treatment recommendation							0.028
General anesthesia	103	71.5%	78	70.3%	25	75.8%	
Administration of nitrous oxide	31	21.5%	28	25.2%	3	9.1%	
Oral sedation, local anesthesia	10	7.0%	5	4.5%	5	15.2%	
Number of CHW-patient contacts							0.003
Mean (range)	144	17.9 (0.0-94.0)	111	15.5 (0.0-57.0)	33	25.7 (3.0-94.0)	
Number of weeks for initiating the treatment							0.012
Mean (range)	137	10.8 (0.0-51.9)	107	9.1 (0.0-38.7)	30	17.0 (1.6-51.9)	
Number weeks for completing the treatment (adjusted for the number of visits)							0.020
Mean (range)	135	1.7 (0.0-34.4)	106	2.0 (0.0-34.4)	29	0.2 (0.0-3.9)	

CONCLUSIONS

- The study findings show that that teledentistry consultation promoted access and utilization of specialty oral health care as well as follow-up services at local dental clinics for rural children with serious dental decay.
- The results indicate that case severity and compliance to treatment are predictors of ongoing utilization of oral health services in general dentistry clinics.
- The study findings also suggest that case management interventions are important in facilitating specialty dental care as well as follow-up care at community dental clinics, particularly in rural, underserved communities.
- A study of the long-term dental utilization patterns of these children who experience a teledentistry consultation and a surgical intervention in early childhood would be instructive.

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