

# Asynchronous and Synchronous Teledentistry Modalities and Pediatric Dental Home

**Dorota T. Kopycka-Kedzierawski DDS, MPH**

Professor of Dentistry and Center for Oral Biology

Eastman Institute for Oral Health

**Sean McLaren, DDS, MS**

Chair Pediatric Dentistry

Associate Professor of Dentistry and Pediatrics

Eastman Institute for Oral Health

University of Rochester

May 20<sup>th</sup>, 2020



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Application of Asynchronous Modality to Establish a Dental Home for Underserved Urban Children



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Teledentistry beginnings

- The first entity to explore teledentistry was the US Army. Two US Army pilot projects were begun in 1994, and they demonstrated that teledentistry could save patient travel.
- Subsequently, teledentistry has slowly evolved and is currently used for patient screenings, specialty consultations, referrals, education, and emergency care in various dental specialties (including pediatric dentistry, oral medicine, orthodontics, and maxillofacial and oral surgery).
- The virtual dental home program to deliver dental care to underserved and vulnerable patients was created in California in 2012. The virtual dental home is an innovative model for delivering dental care in locations where underserved and vulnerable populations receive integrated oral health and general health services along with educational and social services.



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Chronology of Teledentistry at EIOH

- **Collaboration with Pediatrics Health-e-Access program**
- We took advantage of a Health-e-Access project, already in place at local Head-Start Centers. Health-e-Access program was operated by Pediatricians from the University of Rochester
- **R21 planning grant to reduce disparities in oral health among Rochester children:**
- Pilot study was conducted to assess feasibility of dental images to diagnose oral diseases (2003)
- **Aetna Foundation and Monroe County Department of Health grants (2004-2007)**
- To screen underserved preschool children for oral disease
- **NIH/NIDCR Funded study (2007-20012)**
- To assess effectiveness of teledentistry in reducing oral health burden in urban preschool children
- **Department of Agriculture, HRSA (2010-present)**
- Synchronous modality to screen and refer rural children for oral care
- **2016-present:** asynchronous model to screen for ECC onset (Dept. of Psychiatry and Einstein School of Medicine projects funded by NIH)



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Modalities of Teledentistry

Teledentistry can take one of three forms:

- asynchronous (the transmission of a patient's oral images that are not used in real time; that is, storing and forwarding images),
- synchronous (the use of real-time interactive technologies, such as two-way interactive video), and
- mobile health care services (the use of mobile technology, such as smartphone apps and text messages, to manage and track dental health conditions or promote healthy behaviors).



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# How did we start?

- **Collaboration with Pediatrics Health-e-Access program**

We took advantage of a Health-e-Access project, already in place at local Head-Start Centers. Health-e-Access program is operated by Pediatricians from the University of Rochester

- **R21 planning grant to reduce disparities in oral health among Rochester children:** Pilot study was conducted to assess feasibility of dental images to diagnose oral diseases



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

## Asynchronous modality: what do we need?

- **An intraoral camera and storage mechanism for digital files**
- **Non-dental personnel can be trained to take intraoral images (start with a typodont and an adult)-practice!**
- **Color printer and referral forms**



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Why focusing on ECC and S-ECC?

**S-ECC onset**  
(peak 3 years of age)



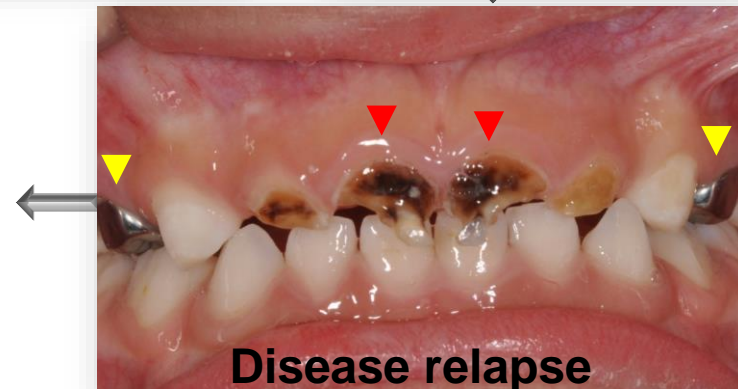
**Oral rehabilitation (OR)**



**“Silver smile”**



**Increased caries risk and caries experience in *adult dentition***



**Disease relapse**  
(~40% relapse 6 months post OR)

Graves CE, et al. 2004;  
Berkowitz RJ, et al. 2011

Courtesy of Dr. J. Xiao



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER



# Severe Early Childhood Caries (S-ECC)- treatment in the OR



❖ Courtesy of Dr. Sean McLaren



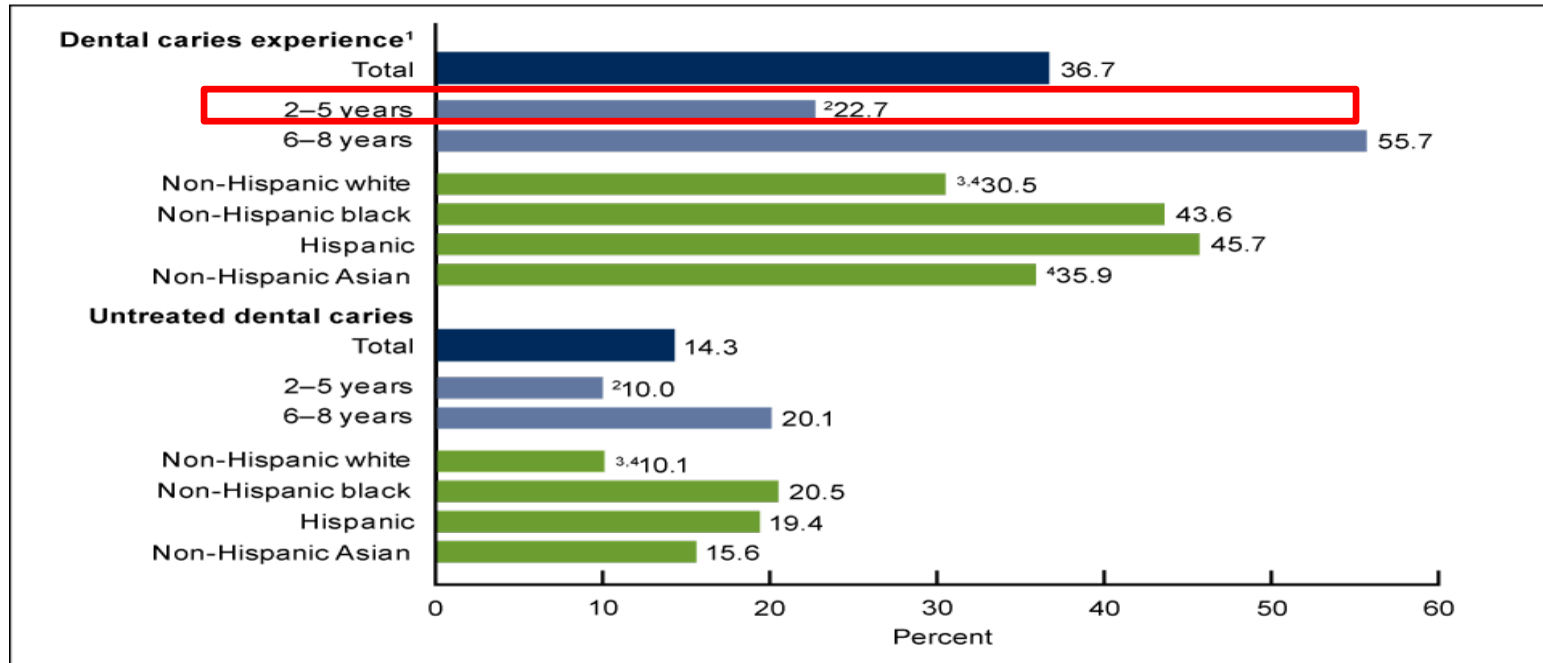
UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Data Brief on dental caries in primary teeth of US children, NHANES 2011-2012

Figure 1. Prevalence of dental caries in primary teeth, by age and race and Hispanic origin among children aged 2–8 years: United States, 2011–2012



<sup>1</sup>Includes untreated and treated (restored) dental caries.

<sup>2</sup>Significantly different from those aged 6–8 years,  $p < 0.05$ .

<sup>3</sup>Significantly different from non-Hispanic black children,  $p < 0.05$ .

<sup>4</sup>Significantly different from Hispanic children,  $p < 0.05$ .

NOTE: Access data table for Figure 1 at: [http://www.cdc.gov/nchs/data/databriefs/db191\\_table.pdf#1](http://www.cdc.gov/nchs/data/databriefs/db191_table.pdf#1).

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2011–2012.



UNIVERSITY of  
ROCHESTER  
MEDICAL CENTER

EASTMAN  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Feasibility study

- Fifty Head Start enrollees from an inner city day care center were examined by a trained and calibrated dental hygienist
- By using an intraoral camera, the health aide from the day care center recorded computer images of children's teeth
- Six dental images were taken of each child's teeth using Camscope intraoral camera
- Digital images were sent to the remote dental site and were read by the dental hygienist
- The number of decayed, missing and filled surfaces was calculated for both methods and compared by means of kappa statistics



# Austin Head-Start Daycare Center, Rochester, NY



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Traditional hands-on exams



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Intraoral camera (Doctor Camscope) screening



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Digital images of anterior teeth



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Digital images of upper posterior teeth



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER



# Digital images of lower posterior teeth



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# How good were these images?

- **Diagnostic qualities of images obtained with the intraoral camera were superior to traditional dental examinations conducted with a dental mirror and a spot light**

Kopycka-Kedzierawski DT, Billings RJ, McConnochie KM. "Dental screening of preschool children using teledentistry: a feasibility study". *Pediatr Dent.* 2007; 29(3): 209-13.



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Aetna Study and Monroe County Health Department Survey-oral screenings via asynchronous modality

## Mean and Standard Deviation (SD) Caries Scores for All Children Examined

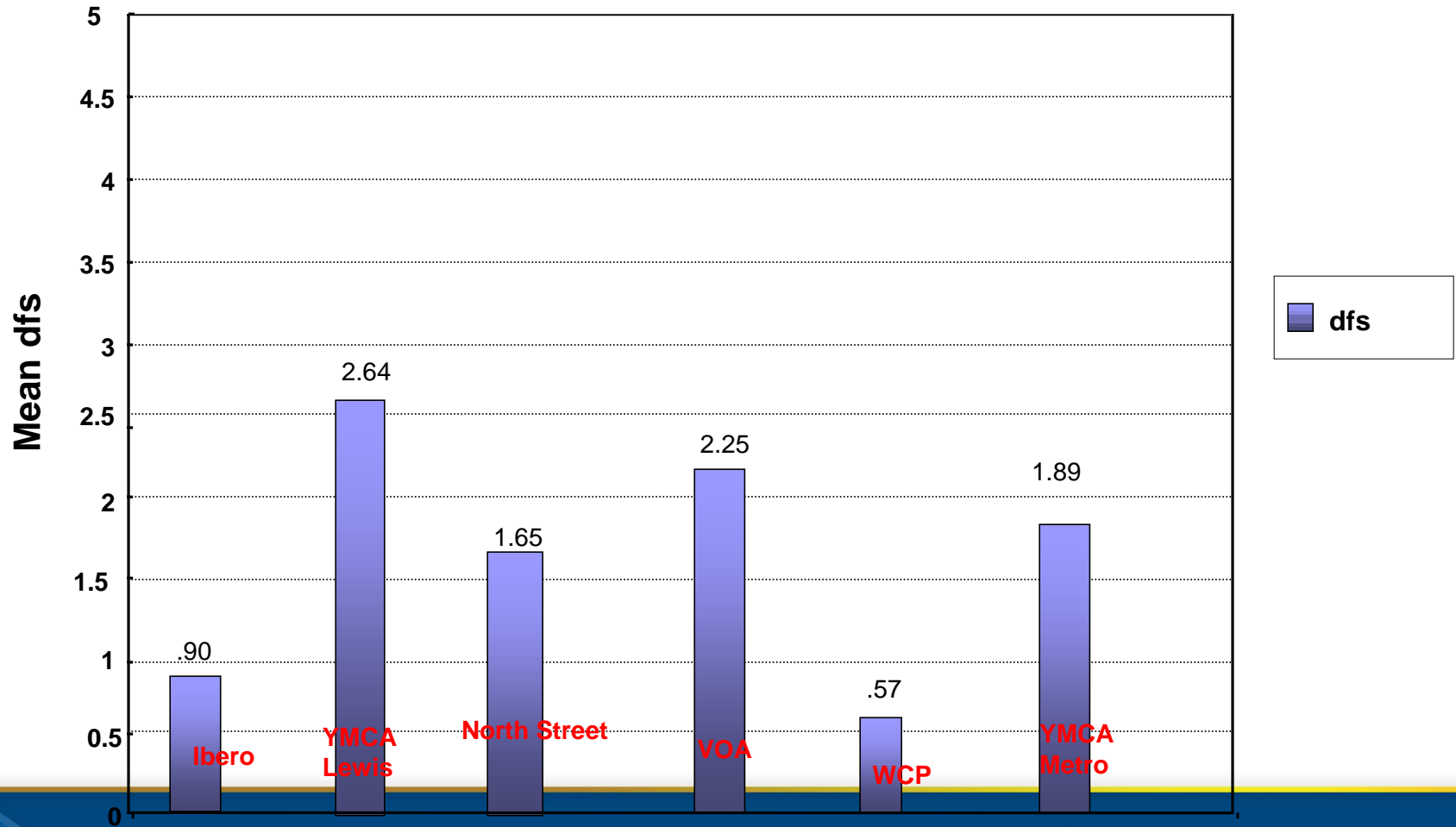
	Number of Children= 201			
	Mean	SD	Min	Max
dfs	1.72	3.23	0.00	20.00
dft	1.20	1.96	0.00	10.00

## Mean and Standard Deviation (SD) Caries Scores by Age

	Number of Children= 201									
	1		2		3		4		5	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
dfs	0.16	0.63	1.23	3.40	1.67	3.32	2.06	2.93	3.63	4.21
dft	0.13	0.49	0.94	2.21	1.17	2.08	1.53	1.73	2.26	2.26



# Mean dfs of preschool inner-city children, 2006-2007 Monroe County Dept. of Health, Aetna Foundation study



Pre-School

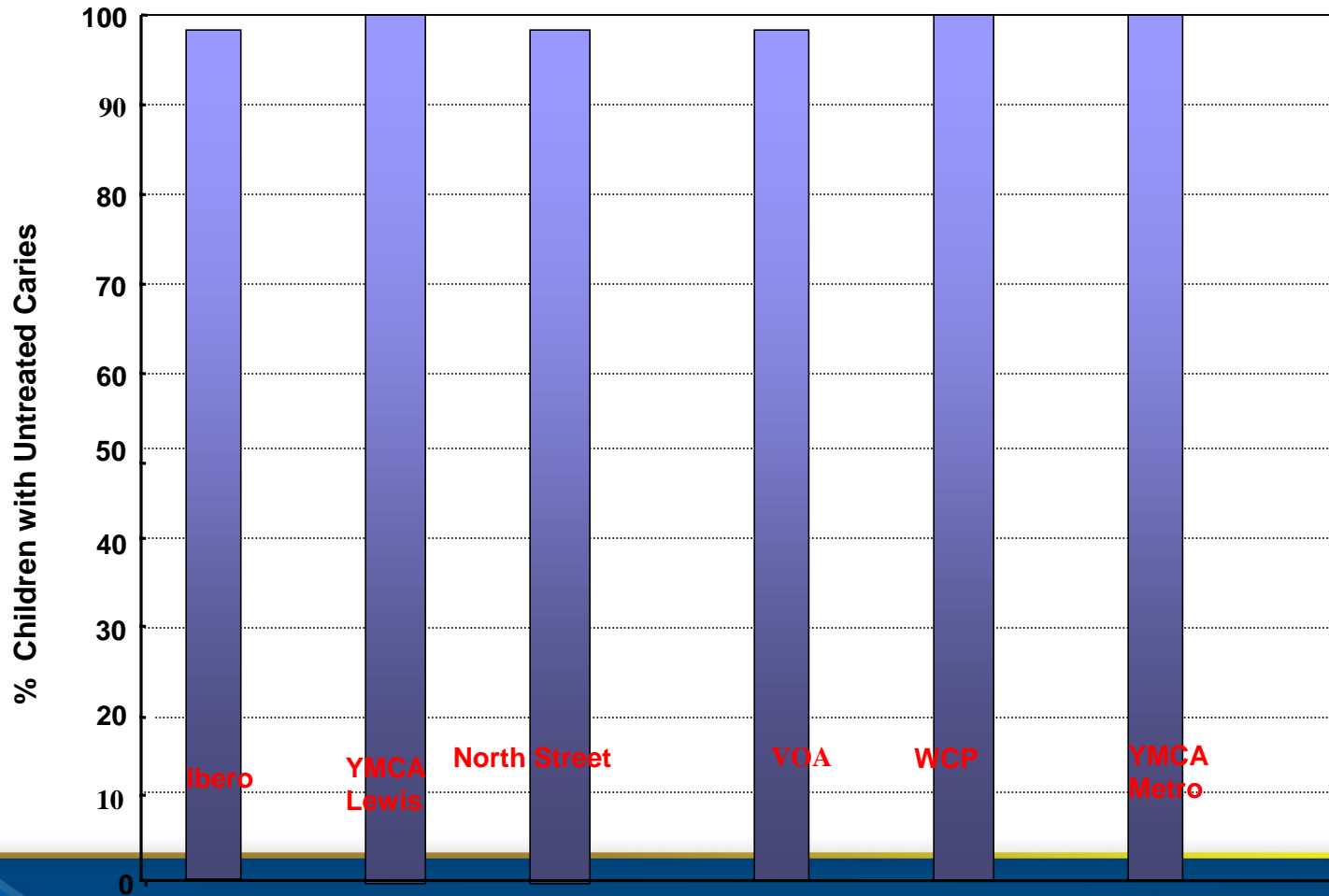


UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Prevalence (%) of Untreated Dental Caries in pre-school inner-city children 2006-2007



Pre-School

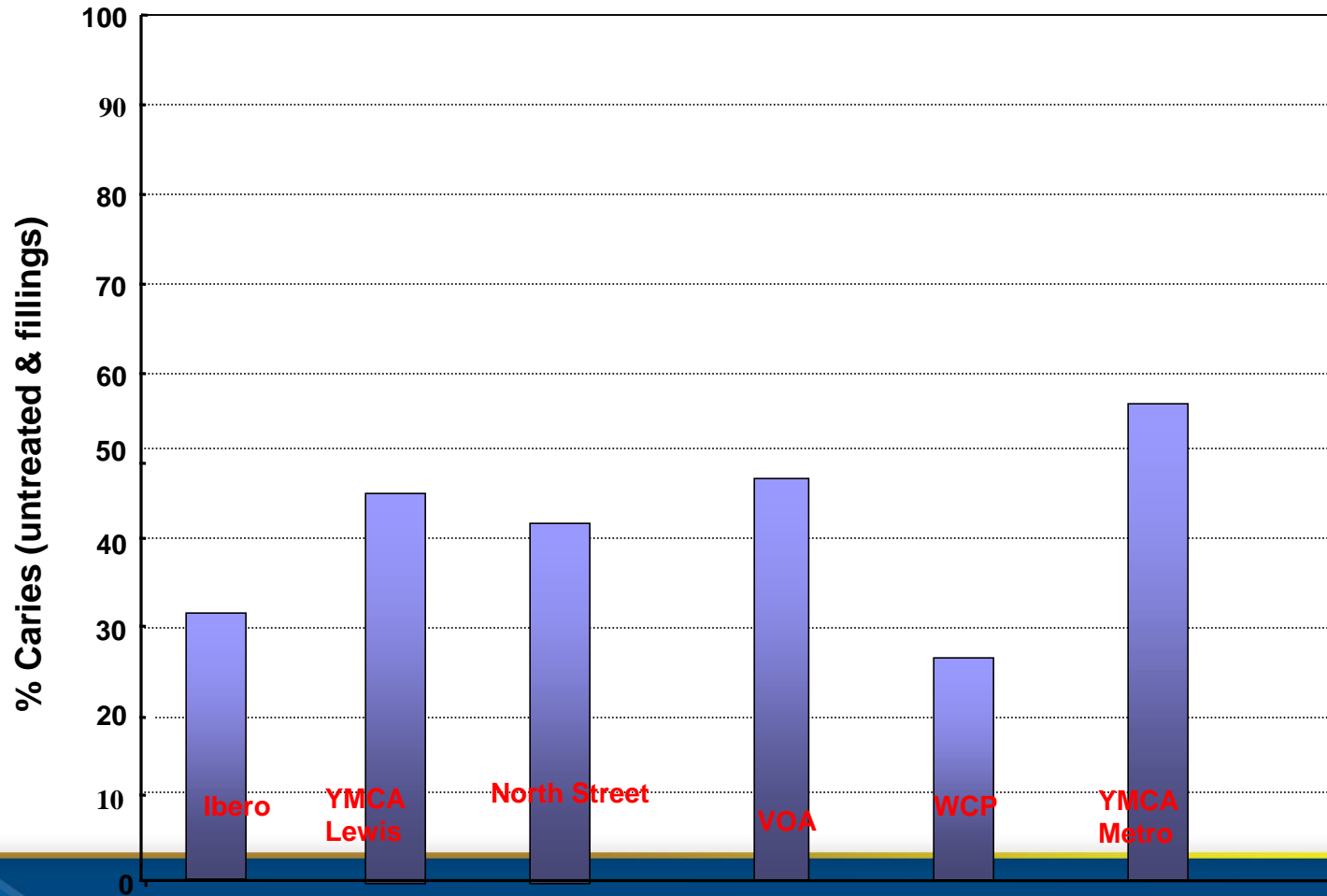


UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Prevalence (%) of Dental Caries in pre-school inner-city children 2006-2007



Pre-School



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# In the field...



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Asynchronous modality cont.



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER



# Comparing toothbrushes

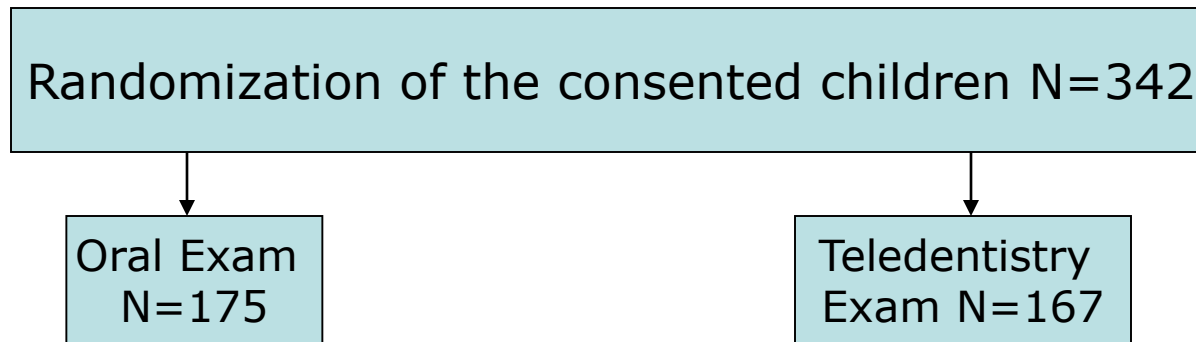


UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

An asynchronous modality to decrease oral health burden in preschool children from the selected daycare centers, Rochester NY-oral screenings via asynchronous modality (2007-2012)



Follow-up for 12 months with subsequent screenings at 6- and 12 months



UNIVERSITY of  
ROCHESTER  
MEDICAL CENTER

EASTMAN  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

## Number of children with filled surfaces at baseline and at 12 months by exam modality

- There was no statistical difference among children screen via teledentistry and visual/tactile examination at baseline related to the children with restoration(s) present (Fisher's exact test,  $p=.3$ )
- There was a statistical difference in the number of children with restoration(s) present at 12 months by exam type (teledentistry vs. visual/tactile), (Fisher's exact test,  $p<.001$ )
- Kopycka-Kedzierawski and Billings, Telemedicine and e-Health, 2013



# Baseline questionnaire (N=291)

Parents/Guardians	
Mean Age	27.5 years of age (SD=6.28) Min-Max 16-50
Mean # of children	2.35 (SD= 1.37) Min-Max 1-11
Gender	7% Male <b>93% Female</b>
Race/Ethnicity	<b>77% A-American</b> 26% Hispanic 20% White              74% Not Hispanic 3% American/Indian
Work Status	61% Currently employed 39% Currently unemployed
Education	<b>5% Middle school</b> <b>40% High School</b> 22% more than High School 29% College level 3% Post graduate level
Marital status	13% Married <b>75% Single</b> 9% Separated or Divorced 3% Other
Income	<b>71% \$0-19,999</b> 20% \$20,000-29,999 9% \$30,000-50,000+

# Baseline questionnaire cont.

Children	
Dental insurance	68% Medicaid 12% Child Health Plus 17% other 3% None
Medical insurance	65% Medicaid 14% Child Health Plus 19% Other 2% None
Emergency room visit in the last 12 months	22% Yes 78% No
Did you make dental appointment in the last 12 months for your Child with a dentist?	62% Yes 38% <b>No</b>
Did you take your child for routine dental visit in the past 12 months?	61% Yes 39% <b>No</b>
Are you thinking of taking your child to see a dentist in the next 6 months?	88% yes 12% No
Did you make an appointment for your child to see a dentist in the next 6 months?	52% Yes 48% <b>No</b>
In the last year how much of a problem was it to get care for your child that you or your dentist believed was necessary?	3% A big problem 5% A small problem 92% <b>Not a problem</b>
Last dental check-up of your child	63% Past 12 months 4% 1-2 years ago 1% More than 2 years ago 32% <b>Never</b>
Does your child currently need any dental work?	12% Yes 88% No
Your child's dental health status	46% Excellent, 30% Very Good, 22% Good, 1% fair, 1% Poor

# Prognostic ECC model: Decayed, filled, and decayed and filled, surfaces for children who were available for the baseline, 6-month and 12-month follow-up visit

Examination	variable	Mean (SD)	Min-Max	Lower 95% CI	Upper 95% CI	Number of children (N)
Baseline	$d_b$	0.69 (2.00)	0-11	0.32	1.06	116
	$f_b$	0.12 (0.80)	0-7	0.03	0.27	
	$dfs_b$	0.81 (2.17)	0-11	0.41	1.21	
6-month follow-up	$d_6$	0.84 (2.29)	0-13	0.41	1.27	113
	$f_6$	0.42 (1.75)	0-26	0.29	1.46	
	$dfs_6$	1.26 (2.82)	0-26	1.37	3.07	
12-month follow-up	$d_{12}$	1.34 (3.63)	0-21	0.68	2.01	116
	$f_{12}$	0.88 (3.18)	0-26	0.29	1.46	
	$dfs_{12}$	2.22 (4.62)	0-26	1.37	3.07	

Kopycka-Kedzierawski DT, Billings RJ, Feng C. 2018.  
Eur Arch Paediatr Dent.



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

## Results from the WGEE model with decayed surfaces (ds) in the primary dentition being an outcome variable

Variable	Level	Estimate	SE	95% CI	P-value
Exam type	0	-0.190	0.283	-0.745-0.365	0.05
	1 (reference )				
dfs status at baseline	0 (dfs=0)	<b>-2.953</b>	0.462	-3.871-2.035	<b>&lt;0.0001</b>
	1 (dfs>0, reference)				
Work status	1(Employed)	-0.561	0.343	-1.232-0.111	0.10
	Unemployed (reference)				
Child's Dental Insurance	1 (public)	-0.566	0.611	-1.765-0.632	0.35
	Reference: other				
Child's Medical Insurance	1(public)	-0.016	0.586	-1.165-1.133	0.98
	Reference: other				
Problem in the past 12 months	0( a big problem)	3.283	3.085	-2.763-9.330	0.29
	1(a small problem)	-0.269	0.686	-1.613-1.076	0.70
	Reference: no problem				
Current need of dental work	0 (yes)	<b>0.753</b>	0.266	0.240-1.266	<b>0.004</b>
	Reference: no				

According to the children's parents/caregivers, children who currently needed dental care (the question was asked at baseline) had 0.75 more carious surfaces (ds) in the primary dentition at the end of the study than children who did not need dental care (p=0.004). Additionally, children without decayed primary surfaces at baseline (ds=0) had almost 2.95 fewer carious surfaces at the 12-month follow-up examination.

Kopycka-Kedzierawski DT, Billings RJ, Feng C. 2018.  
Eur Arch Paediatr Dent.

## Results from the WGEE model with decayed and filled surfaces (dfs) being an outcome variable

Variable	Level	Estimate	SE	95% CI	P-value
Exam type	0 (clinical)	-0.526	0.406	-1.322-0.270	0.1952
	1 (teledentistry)	0.000	0.000	0.000-0.000	.
dfs status at baseline	0(dfs=0)	<b>-5.493</b>	0.730	-6.924--4.062	<b>&lt;.0001</b>
	1(dfs>0)	0.000	0.000	0.000-0.000	.
Child's Dental Insurance	1 (public)	-1.227	1.074	-3.331-0.877	0.2530
	2 (other)	0.000	0.000	0.000-0.000	.
Child's Medical Insurance	1 (public)	1.395	1.993	-0.956-3.745	0.2448
	2(other)	0.000	0.000	0.000-0.000	.
In the last 12 months how much of a problem, if any, was it to get care for your child that you or a dentist believed was necessary	0(a big problem)	9.538	7.316	-4.800-23.877	0.1923
	1( a small problem)	-1.125	0.645	-2.382-0.138	0.0809
	2(not a problem)	0.000	0.000	0.000-0.000	.
Does your child currently need dental work?	0 (yes)	0.467	0.408	-0.333-1.266	0.253
	1(no)	0.000	0.000	0.000-0.000	.

Children without ECC at the baseline examination (dfs=0) had 5.49 fewer decayed surfaces and filled surfaces (dfs) in the primary dentition at the end of the study than children who had ECC at the baseline examination (dfs>0) (p<0.0001).

Kopycka-Kedzierawski DT, Billings RJ, Feng C. 2018.  
Eur Arch Paediatr Dent.



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER



# Study results and conclusions

- Almost 28% of the screened children had caries experience at the baseline examination.
- Teledentistry and clinical examinations at baseline were comparable when screening for dental caries in preschool children.
- Results of the parental questionnaire indicated that 39% of the children had not seen a dentist in the past 12 months and 32% of children had never seen a dentist.
- More children from the Teledentistry group had dental treatment than children from the clinical examination group, as evidenced by fillings for tooth decay.
- (Kopycka-Kedzierawski and Billings, EAPD, 2011; Kopycka-Kedzierawski and Billings, Telemedicine and e-Health, 2013)



UNIVERSITY of  
ROCHESTER  
MEDICAL CENTER

EASTMAN  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

## What are the barriers?

- **Lack of dental insurance reimbursement**
- **Differences in the state laws and licensures**
- **Data security**
- **“Buy in” of the medical colleagues**



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Future opportunities for Asynchronous modality

- **Screening (Public Health): Currently with Dept. Psychiatry and Einstein School of Medicine**
- **Consultation (Diagnosis and referral)**
- **Patient education (Public Health to enhance access and utilization)**



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Thank you



UNIVERSITY *of*  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE *of* THE HIGHEST ORDER

# Application of Synchronous Modality to Establish a Dental Home for Underserved Rural Children



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

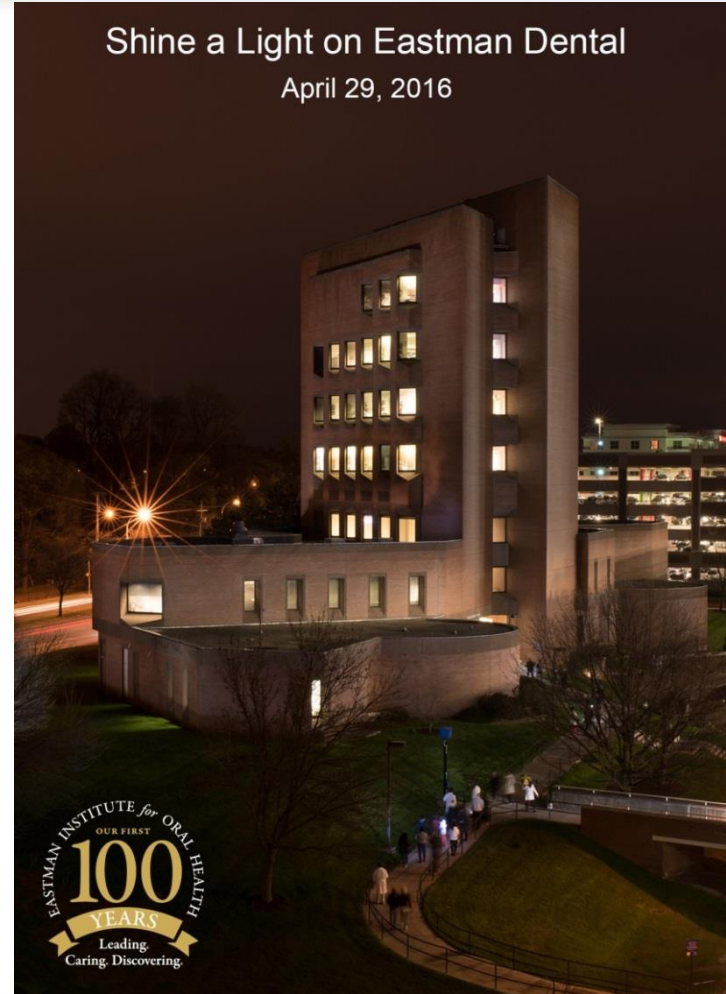
**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

Shine a Light on Eastman Dental  
Pre-Lighting



Shine a Light on Eastman Dental  
April 29, 2016



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Eastman Institute for Oral Health

## Division of Pediatric Dentistry

- 14 GME funded residents
- ~21,000 patient visits a year in resident clinic
- ~6,000 outreach visits
- 5 Full time faculty
- 2 .6 FTE's and 5 other part time faculty
- Serve as a safety net provider for large part of New York State



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# New York State Pediatric Dentistry Residency Programs:

1 Buffalo  
1 Rochester



18 New York City  
Metropolitan Area



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER



# Synchronous Teledentistry Modality at EIOH

- Teledentistry collaboration between FLCH and EIOH initiated and started in April 2010
- A telepresenter and patient are at a remote site and pediatric dentist is at EIOH



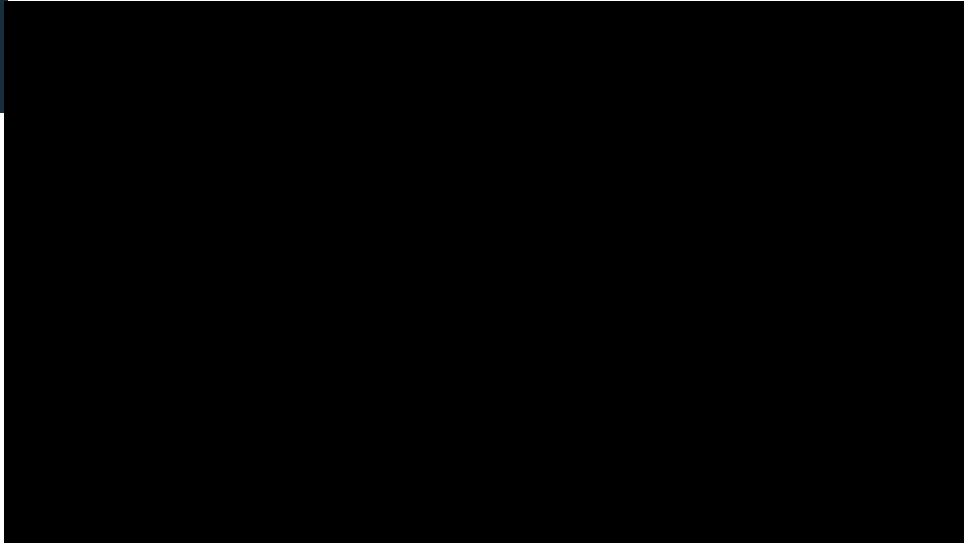
UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# WXXI – Need To Know Segment

**WXXI**  
Go Public.



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Original Videoconferencing Equipment

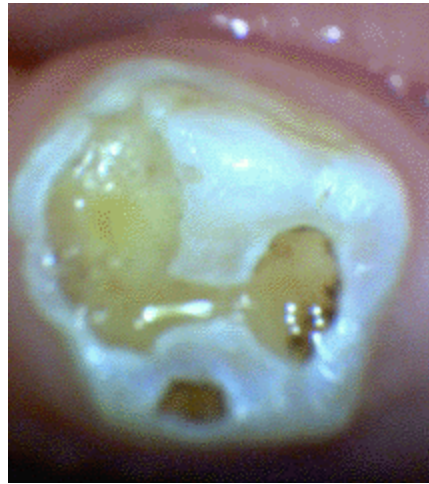


UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Intraoral Images



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Synchronous Teledentistry



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Synchronous Teledentistry

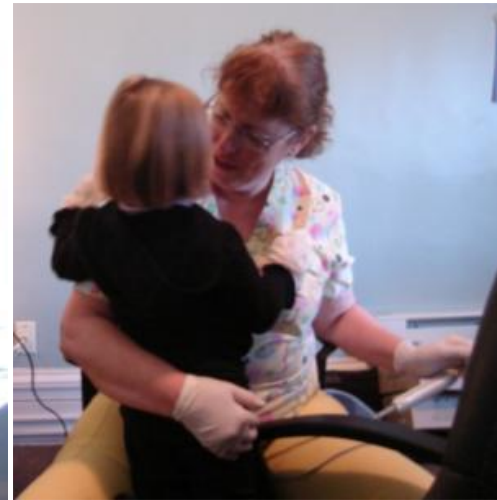


UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# A Relaxed Atmosphere.....



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Treatment completion for complex dental cases

- An internal chart review of children seen through the mobile dental van program from 2003-2011 was completed by FLCH (n=158).
- A 15% treatment completion rate was observed for children referred for complex dental treatment.





# Synchronous Teledentistry Visits

- A live-video teleconference appointment is set up when a child has been identified as having extensive dental needs by general dentists at FLCH.
- The live-video teleconference modality (synchronous teledentistry) is used rather than a store and forward modality (asynchronous teledentistry) because the pediatric dentist is also trying to assess patient behavior.



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Synchronous Teledentistry Visits

- On day of appointment a live-video connection is established between remote site and EIOH (written consent obtained prior to live-video conferencing).
- Patient and family are introduced to pediatric dentist through webcam.
- Medical history is reviewed with parents.



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Synchronous Teledentistry Visits

- All questions/concerns addressed by pediatric dentist to parents.
- Live-video feed switched from webcam to intraoral camera and oral exam begins.
- Telepresenter manipulates intraoral camera at request of pediatric dentist.



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Synchronous Teledentistry Visits

- Live-video feed switched back to webcam.
- Observations discussed with parents.
- Treatment modalities discussed with parents.
- Treatment modalities: in-office treatment, treatment with nitrous oxide, treatment with oral sedation, treatment in operating room, treatment consultation.



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Setting up an appointment for dental care

- Appointment set up for treatment at EIOH (joint effort with patient's guardians, FLCH community health worker and EIOH staff)
- Community health workers aid patients/their families with appointment attendance, H and P appointments if needed, transportation, and follow-up.



# Review of the Program

- RSRB approval from University of Rochester obtained for retrospective chart review.
- Retrospective chart review completed for 251 patients seen in the synchronous teledentistry program from 4/2010-12/2013.



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Patients Age

Number of Subjects	Mean age in years	Median age in age	Standard deviation	Min age	Max age	95%LCI	95%UCI
251	4.77	4.00	2.36	1.00	19.00	4.48	5.06

More than 70% of the children were 5 years of age or younger



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Distribution of Treatment Modalities and Treatment Completion

Dental treatment recommended	Number of children with that recommendation	Number of children who completed recommended treatment	Number of children who completed some of the recommended treatment	Number of children who did not complete recommended treatment	Percentage of children who completed the recommended treatment
Office tx in EIOH	4	4	0	0	<b>100</b>
Tx with nitrous oxide sedation	110	62	19	48	<b>56</b>
Tx with oral sedation	15	13	0	2	<b>87</b>
Tx in the OR	112	104	0	8	<b>93</b>
Consultation	10	9	0	1	<b>90</b>

The compliance rates for all treatment modalities were not significantly different (Fisher's exact test,  $p > 0.05$ ).





# Results of the Review

- Results show that 93% of children initially identified for treatment in operating room completed their treatment.
- 87% completion rate for children initially identified for treatment using oral sedation.
- 56% completion rate for children requiring N2O/O2, however 19 of the remaining 48 patients completed some of the treatment recommended



# Results of the Review

- The high completion rates observed for children requiring operating room services may be attributed to all treatment being completed in 1 trip to Rochester.
- Treatment modalities (N2O/O2) requiring multiple trips to Rochester resulted in decreased completion rates.



# Logistical considerations and challenges

- Dissimilarities and conflicts in state and federal laws
- Limited reimbursement, logistical encounters, and concerns about data quality and security
- Differences in payment and coverage for teledentistry services in the public and private sector, as well as different policies across states



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# State policies

- States have enacted various policies related to Medicaid and in several cases, private payers
- State policy typically determines what constitutes telehealth, including teledentistry; the types of technologies, services and providers that are eligible for reimbursement; where teledentistry is covered and how.



# State policies cont.

- With technology's ability to cross state borders, provider licensure transferability is a key issue that states are examining to expand access and improve efficiency in the existing workforce
- Ensuring safe teledentistry encounters for patients and privacy and data security has become an increasingly important issue as teledentistry has grown



UNIVERSITY of  
ROCHESTER  
MEDICAL CENTER

EASTMAN  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Potential solutions???

- With the establishment of a well-adjusted and thoughtful framework for the practice, use, and reimbursement of teledentistry in a mainstream clinical dentistry operation, patients, dental providers, and oral health care systems will be able to realize the full potential of teledentistry.



UNIVERSITY of  
ROCHESTER  
MEDICAL CENTER

EASTMAN  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Future Plans

- To demonstrate that Teledentistry examinations for oral disease are a feasible alternative to oral examinations of small children and have the potential to be especially useful in rural areas where access to care may be difficult or unavailable.
- To promote Teledentistry in day care centers and in primary and secondary schools.
- To assess the cost-effectiveness of Teledentistry as an alternative to oral health examinations of school children in public health surveys at the federal (NHANES), state (NYSOHS) and local level (MCOHS).
- To explore the potential utility of Teledentistry for rural community dwelling older adults who may lack access to oral health care, as well as home bound adults and adults in long-term care facilities.



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

# Acknowledgments

- Drs. Ronald Billings, Kenneth McConnochie, Jeff Karp
- Pediatric residents from EIOH
- Staff from the FLCH
- Funding agencies:
- NIDCR
- Department of Agriculture
- HRSA, *This project is supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) as part of an award totaling \$3,400,000. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by HRSA, HHS or the U.S. Government.*”



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER



# Questions



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE of THE HIGHEST ORDER

Thank you



UNIVERSITY *of*  
**ROCHESTER**  
MEDICAL CENTER

**EASTMAN**  
INSTITUTE FOR ORAL HEALTH

MEDICINE *of* THE HIGHEST ORDER