# Innovative Pediatric Dental Care: Exploring Minimally Invasive Procedures

October 24, 2024





# Housekeeping

- We will keep all lines muted to avoid background noise.
- We will send a copy of the slides and a link to the recording via email after the live program.
- We'll also make the slides and recording available on carequest.org.

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- Look for the evaluation form, which we'll send via email within 24 hours.
- Complete the evaluation by Friday, November 1.
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\*Full disclosures available upon request





## **Question & Answer Logistics**

- Feel free to enter your questions into the **Question & Answer box** throughout the presentations.
- We will turn to your questions and comments toward the end of the hour.

	-		~
Welcome			
Feel free to ask the host and panelis	ts question:	S	
Type your question here			
Type your question here			
Type your question here			



#### Thank You



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# Webinar

# Innovative Pediatric Dental Care: Exploring Minimally Invasive Procedures

Thursday, October 24, 2024 7-8 p.m. ET

#### ADA CERP Credits: 1



#### Elizabeth Powell, DDS, MPH

Assistant Professor, Clinical Pediatric Dentistry and Community Oral Health, University of Pennsylvania School of Dental Medicine



#### Sofía Iribarren DDS, MS Assistant Professor,

University of Nebraska



#### Jean Star, DDS, MPH

Assistant Professor of Clinical Orofacial Sciences, Pediatric Dentistry, University of California San Francisco

## Learning Objectives

- Identify the key elements of the caries disease process and recognize how risk assessments guide patient-centric care decisions.
- Explain the principles of minimally invasive dentistry, including tooth remineralization and preservation.
- Discuss the benefits of several treatments as they relate to caries management, including silver diamine fluoride (SDF), glass ionomer materials, atraumatic restorative treatment (ART), and Hall crowns.



### What Can We Improve?







# **Objective 1**

Identify the key elements of the caries disease process and recognize how risk assessments guide patientcentric care decisions.





#### **Caries Disease Process**

**CareQue** 

Institute for Oral Health.



### **Caries Risk Assessment**

ADA American Dental Associatio America's leading advocate for oral health						
Cai	ries Ris	sk Assessment Form (Age >6)	)			
Patie	ent Name:					
Birth Date:			Date:			
Age:	Age:			Initials:		
			Levy Diek	Madavata Diak	Uish Disk	
			LOW RISK	Moderate Risk	HIGH KISK	
		Contributing Conditions	Check or Circle the conditions that apply			
I.	Fluoride E profession	Exposure (through drinking water, supplements, al applications, toothpaste)	Yes	No		
II.	Sugary Fo	<b>bods or Drinks</b> (including juice, carbonated or onated soft drinks, energy drinks, medicinal syrups)	Primarily at mealtimes		Frequent or prolonged between meal exposures/day	
III.	Caries Ex other Sibl	perience of Mother, Caregiver and/or ings (for patients ages 6-14)	No carious lesions in last 24 months	Carious lesions in last 7-23 months	Carious lesions in last 6 months	
IV.	Dental Home: established patient of record, receiving regular dental care in a dental office		Yes	No		
		General Health Conditions	Check or Circle the conditions that apply			
I.	Special Health Care Needs (developmental, physical, medi- cal or mental disabilities that prevent or limit performance of adequate oral health care by themselves or caregivers)		No	Yes (over age 14)	Yes (ages 6-14)	
П.	Chemo/Radiation Therapy		No		Yes	
III.	Eating Disorders		No	Yes		
IV.	Medications that Reduce Salivary Flow		No	Yes		
V.	Drug/Alco	phol Abuse	No	Yes		
		Clinical Conditions	Check or Circle the conditions that apply			
I.	Cavitated Carious Lo radiograph	l or Non-Cavitated (incipient) esions or Restorations (visually or nically evident)	No new carious lesions or restorations in last 36 months	1 or 2 new carious lesions or restorations in last 36 months	rious 3 or more carious rations lesions or restorations in last 36 months	
П.	Teeth Mis	sing Due to Caries in past 36 months	No		Yes	
III.	Visible Pla	aque	No	Yes		
IV.	Unusual To oral hygier	ooth Morphology that compromises	No	Yes		
V.	Interprox	imal Restorations - 1 or more	No	Yes		
VI.	Exposed F	Root Surfaces Present	No	Yes		
VII.	Restoration Contacts	ons with Overhangs and/or Open Margins; Open with Food Impaction	No	Yes		
VIII.	Dental/O	rthodontic Appliances (fixed or removable)	No	Yes		
IX.	Severe Dr	ry Mouth (Xerostomia)	No		Yes	

- MID alone is not effective
- Have to identify caries risk, risk factors, and support families in behaviors that reduce caries risk
  - Fluoride exposure
  - Diet hygiene
  - Preventive dental care





https://www.ada.org/-/media/project/ada-organization/ada/ada-org/files/resources/public-programs/give-kids-a-smile/gkas\_caries\_risk\_assessment\_forms.pdf

### **Caries Risk Assessment**

Table 2. Caries-risk Assessment Form for ≥6 Years Old <sup>25</sup>							
(For Dental Providers)							
Use of this tool will help the health care provider assess the child's risk for developing caries lesions. In addition, reviewing specific factors will help the practitioner and patient/parent understand the variable influences that contribute to or protect from dental caries.							
Factors	High risk	Moderate risk	Low risk				
Risk factors, social/behavioral/medical							
Patient has life-time of poverty, low health literacy	Yes						
Patient has frequent exposure (>3 times/day) between-meal sugar-containing snacks or beverages per day	Yes						
Child is a recent immigrant		Yes					
Patient uses hyposalivatory medication(s)		Yes					
Patient has special health care needs $\alpha$		Yes					
Risk factors, clinical							
Patient has low salivary flow	Yes						
Patient has visible plaque on teeth	Yes						
Patient presents with dental enamel defects	Yes						
Patient wears an intraoral appliance		Yes					
Patient has defective restorations		Yes					
Protective factors							
Patient receives optimally-fluoridated drinking water			Yes				
Patient has teeth brushed daily with fluoridated toothpaste			Yes				
Patient receives topical fluoride from health professional			Yes				
Patient has dental home/regular dental care			Yes				
Disease indicators $\beta$							
Patient has interproximal caries lesion(s)	Yes						
Patient has new noncavitated (white spot) caries lesions	Yes						
Patient has new cavitated caries lesions or lesions into dentin radiographically	Yes						
Patient has restorations that were placed in the last 3 years (new patient) or in the last 12 months (patient of record)	Yes						

α Practitioners may choose a different risk level based on specific medical diagnosis and unique circumstances, especially conditions that affect motor coordination or cooperation.

<sup>B</sup> While these do not cause caries directly or indirectly, they indicate presence of factors that do.

Instructions: Circle "Yes" that corresponds with those conditions that apply to a specific patient. Use the circled responses to visualize the balance among risk factors, protective factors, and disease indicators. Use this balance or imbalance, together with clinical judgment, to assign a caries risk level of low, moderate, or high based on the preponderance of factors for the individual. Clinical judgment may justify the weighting of one factor (e.g., heavy plaque on the teeth) more than others.

Overall assessment of the dental caries risk: High 🗆 Moderate 🗆 Low 🗆





- MID alone is not effective
- Have to identify caries risk, risk factors, and support families in behaviors that reduce caries risk
  - Risk factors (-)
  - Protective factors (+)

2023:301-7

# **Objective 2**

Explain the principles of minimally invasive dentistry, including tooth remineralization and preservation.





## Minimally Invasive Dentistry/Care

#### **Minimally Invasive Care**

'Minimally invasive care (MIC) in dentistry is focused on preventing and healing tooth decay without removing any tooth structures. MIC includes **prevention**, counseling, and painless treatments, such as fluorides, **antimicrobials**, diagnostic solutions, and **therapeutic fillings** and sealants that are brushed onto teeth.'

-CareQuest Institute for Oral Health

#### **Minimally Invasive Dentistry**

MID is a philosophy of dental care concerned with **early identification** of disease, factors contributing to the disease, intervention to **arrest** the disease, and, if needed, restorative Treatment

#### -American Academy of Pediatric Dentistry











- Reduce bacterial load
- Reduce bacterial activity
- Kill caries
  causing bacteria



ARREST the disease process





 Reduce bacteria's access to fermentable carbohydrates

ARREST

the

disease

process













 Reverse the weakening of tooth structure caused by acid produced from caries bacteria

REMINERALIZE

the disease

process







### **Caries Arrest**

- Caries has stopped progressing for advancing
- Disease is 'inactive'







https://dentalblog.3m.com/dental/strategies-to-arrest-dental-caries-during-pandemic/ Sharma, G., Puranik, M. P., & Sowmya, K. R. (2015). Approaches to arresting dental caries: an update. *Journal of clinical and diagnostic research: JCDR, 9*(5), ZE08.

## Remineralization

- 'Remineralization occurs when calcium and phosphate in the water among the enamel or dentin crystals recrystallize on the surfaces of existing crystal remnants.'
- 'Remineralization is a natural repair process for caries lesions.'
- 'Fluoride is very effective at enhancing remineralization'







## **Tooth Structure Preservation**

- Traditional dental treatments and restorations are course
- Health and diseased tooth tissues are removed to accommodate traditional dental restorations
  - Importantly, when thinking of caring for children and adolescents, these usually require local anesthetic, drilling.







# **Objective 3**

Discuss the benefits of several treatments as they relate to caries management, including silver diamine fluoride (SDF), glass ionomer materials, atraumatic restorative treatment (ART), and Hall crowns.





### Fluoride







## Fluoride Toothpaste

#### **OTC Fluoride Toothpaste**



#### **5000ppm Fluoride Toothpaste (Rx)**









### Fluoride Toothpaste



#### **5000ppm Fluoride Toothpaste (Rx)**







Godenzi, D., Bommer, C., Heinzel-Gutenbrunner, M., Keeper, J. H., & Peters, K. (2023). Remineralizing potential of the biomimetic P11-4 self-assembling peptide on noncavitated caries lesions: A retrospective cohort study evaluating semistandardized before-and-after radiographs. *The Journal of the American Dental Association*, 154(10), 885-896.

#### Fluoride Toothpaste



#### **5000ppm Fluoride Toothpaste (Rx)**







Godenzi, D., Bommer, C., Heinzel-Gutenbrunner, M., Keeper, J. H., & Peters, K. (2023). Remineralizing potential of the biomimetic P11-4 self-assembling peptide on noncavitated caries lesions: A retrospective cohort study evaluating semistandardized before-and-after radiographs. *The Journal of the American Dental Association, 154*(10), 885-896. https://barriedentist.ca/big-mouth-blog/braces-and-invisalign-articles/straighten-teeth-quickly-with-fast-braces

#### Fluoride Varnish







# Silver Diamine Fluoride (SDF)

#### OTC Fluoride Toothpaste

- Alkaline solution containing 38% weight/volume Ag(NH<sub>3</sub>)<sub>2</sub>F (Silver Diamine Fluoride)
- Key components:
  - Silver (Ag): Antimicrobial
  - Fluoride (F): Promotes remineralization
  - Ammonia (NH<sub>3</sub>): Stabilizes the solution







## Silver Diamine Fluoride (SDF)





#### Silver = anti-microbial = kills cavity causing germs

Fluoride = promotes remineralization = re-hardens tooth structure that caries has weakened





#### Yes, SDF Can Look Like This . . .







# It Can Also Look Like This . . .

Case selection & early intervention leads to less esthetic concerns











## **SDF** Application











# SDF Clinical Case





#### March 2022 4-and-a-half-year-old female First time able to capture posterior bitewing radiographs









#### March 2022 4-and-a-half-year-old female First time able to capture posterior bitewing radiographs








#### March 2022 For our dental providers, what are you thinking here?







Dr. Jean Marie Star, DDS, MPH



#### Traditional approach

- Local anesthetic
- Isolation
- Tooth preparation
- #L-DO composite

Let me be clear: This is not wrong. It is an option. But let's talk about a MID approach.







#### **Traditional approach**

- Local anesthetic
- Isolation
- Tooth preparation
- #L-DO composite

Let me be clear: This is not wrong. It is an option. But let's talk about a MID approach.





#### March 2022 SDF Application #1









#### September 2022 Six months post-SDF application, SDF re-applied







#### November 2023 21 months later, 2 SDF applications







#### July 2024 >2.5 years later

ARRESTED the disease process





# July 2024 > 2.5 years follow up, 3 SDF applications



March 2022: 4.5 years old

July 2024: 7 years old

Expect these teeth to exfoliate ~ 2026!

44





### **Best Indications for SDF**

- Initial caries lesion (ideally to enamel only)
- Occlusal and buccal lesions are easier to access for SDF application
- Early intervention for interproximal caries
- Consider esthetic concerns (anterior vs. posterior)



# **Objective 3**

Discuss the benefits of several treatments as they relate to caries management, including silver diamine fluoride (SDF), glass ionomer materials, atraumatic restorative treatment (ART), and Hall crowns.





#### **Cavitated Carious Lesions**









# Atraumatic Restorative Treatment (ART)

No local anesthesia

Use hand instrument or slow speed

Partial or no caries removal

Restore with fluoride-releasing material ideally







The atraumatic restorative treatment (ART) approach for primary teeth: review of literature is available <u>here.</u>

# ART Clinical Case #1











Kanellis, Michael. "Minimally InvasiveDentistry." *Department of Pediatric Dentistry, The University of Iowa College of Dentistry*, Lecture





































# ART Clinical Case #2



#### 8/29/2022



Case by: Dr. Mike Kanellis, University of Iowa







- 6 years old
  - Broken appointments
  - Complex social history
- #B (DO) caries
- #K (O) caries
- Occasional pain
- Cooperative

#### BW: 7/1/2024 About 2 years later









Case by: Dr. Mike Kanellis, University of Iowa



Photo: 7/1/2024 2 years later



Case by: Dr. Mike Kanellis, University of Iowa





### **GI** Adolescents Application: Sealing Incipient Lesions









# **Objective 3**

Discuss the benefits of several treatments as they relate to caries management, including silver diamine fluoride (SDF), glass ionomer materials, atraumatic restorative treatment (ART), and Hall crowns.





### Hall Crown SSC



MID principles of minimal removal of tooth structure

No local anesthesia or tooth preparation needed





Hall Technique SSC restorations on baby molars statistically, and clinically, significantly outperformed standard restorations in the long term.

#### **RESEARCH REPORTS**

#### Clinical

N.P.T. Innes<sup>1</sup>\*, D.J.P. Evans<sup>1</sup>, and D.R. Stirrups<sup>2</sup>

<sup>1</sup>University of Dundee, Unit of Dental and Oral Health, Park Place, Dundee, DD1 4HN, UK; and <sup>2</sup>The James Cook University Hospital, Middlesbrough, UK; \*corresponding author, n.p.innes@dundee.ac.uk

J Dent Res 90(12):1405-1410, 2011

Sealing Caries in Primary Molars: Randomized Control Trial, 5-year Results



Innes, N., Evans, D. Managing caries in primary teeth. *BDJ Team* **1**, 14118 (2015). https://doi.org/10.1038/bdjteam.2014.118







#### Research article



#### The Hall Technique; a randomized controlled clinical trial of a novel method of managing carious primary molars in general dental practice: acceptability of the technique and outcomes at 23 months Nicola P Innes\*, Dafydd JP Evans and David R Stirrups

Address: Dundee Dental Hospital and School, Park Place, Dundee DD1 4HR, UK

Email: Nicola P Innes\* - n.p.innes@dundee.ac.uk; Dafydd JP Evans - d.j.p.evans@dundee.ac.uk; David R Stirrups - stirrups@btinternet.com

\* Corresponding author

The Hall Crown Technique was preferred to conventional restorations by the majority of children, parents, and dentists.





## Hall Crown Clinical Indications

- Decayed primary teeth
- No pain (or non-spontaneous)
- Radiograph shows clear band of dentin between the carious lesion and the pulp







## Contraindications

- Decay extends into the nerve
- Pain (spontaneous) or infection
- Non restorable teeth
- Poor behavior prevents airway from being protected







Innes N.P., Evans D.J., Hall N. The Hall Technique for managing carious primary molars. Dent. here

## Hall Crown SSC Procedure

#### **Materials:**

- If closed contact, ortho separators, stripping system, flame bur
- Stainless steel crowns
- Glass ionomer cement
- Bitestick or cotton rolls
- Wet gauze, floss







## Guidance for an Open Contact

- Orthodontic separators (Wait 20 minutes after placement or reschedule)
- Stripping system
- Flame bur











## Guidance for Selecting an SSC

- Size crown: 4s are a good start.
- Use slight finger pressure
  - May not want to fully fit



Case by: Dr. Mike Kanellis, University of Iowa





#### Hall Crown SSC Tooth A















Hall Crown Clinical Case






Case by: Dr. Sofia Iribarren

CareQuest



- 4 years old
  - Uncooperative
  - Previous OR
- Able to cooperate for exam, radiographs
- #S (MOD) caries
- #T (MO) caries
- Asymptomatic









## Options:

- 1. Do nothing
- 2. Re-apply SDF
- 3. Traditional Composite or SSC Restoration
- 4. Hall Crown
- 5. Sedation
- 6. General Anesthesia







### Options:

- 1. Do nothing
- 2. Reapply SDF
- 3. Traditional composite or SSC Restoration
- 4. Hall crown
- 5. Sedation
- 6. General anesthesia















Case by: Dr. Sofia Iribarren

# Conclusions

- Having additional minimally invasive dental techniques can improve the <u>experience of dental care</u> for children.
- It can allow providers to feel more confident in treating caries in children.
- And, ultimately, it can help children grow into adults who have a <u>positive</u> <u>perception of dental care.</u>

Excellent clinical success!









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Jean Star, DDS, MPH Assistant Professor of Clinical Orofacial Sciences Pediatric Dentistry University of California San Francisco jean.star@ucsf.edu



# **Question and Answer**





#### **Elizabeth Powell, DDS, MPH**

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# Webinar Evaluation

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