

What is New in Treating Early Childhood Caries

December, 2017

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Purpose

- What is the collective evidence-base for preventing ECC.
- What are the next steps in clinical and community trials for preventing ECC

Background ECC

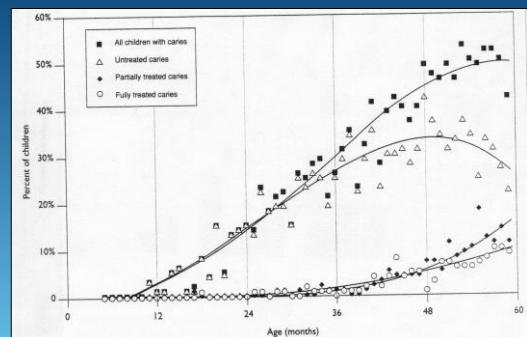
12 month old



36 month old



Background: Untreated Caries and Treatment in 5,171 Arizona Preschool Children



Tang et al., Public Health Reports 112: 319, 1997.

Background: Cost of Treating ECC in the OR



In 2011, over \$2B (medical and dental charges) spent in US to treat ECC

CONCLUSION "...broader community-based prevention efforts could include further education about diet and dental hygiene..." "...could reduce the burdens and cost of these dental problems."

Breun et al., JADA 147: 702-708, 2016

Lens for Examining the Evidence for Preventing ECC

- **Clinical Anecdotes** – evidence collected from observations
- **Efficacy Trials** – interventions under ideal circumstances
(Randomized Controlled Trials (RCT); Systematic Reviews to analyze evidence from multiple RCTs)
- **Effectiveness Trials** – degree of benefit under real world conditions

Anecdote 1: Self-Efficacy Enhancement and Professional Fluoride

- March –17 months old, Mother receives self-efficacy enhancement training to eliminate bottle use and daily home tooth brushing
 - reportedly put to bed with bottle containing juice, sweetened milk or milk
 - child reportedly brushes his own teeth 2-3 times a week
 - 6 incisors present without defects
 - mutans streptococci level = moderate

- April -- Self-efficacy enhancement training to foster eliminating bottle use and daily brushing with 0.4% stannous fluoride gel
- June -- Training Session
 - mutans streptococci level =high
 - **mother reports child is still using bottle**
- July -- Training Session
 - **mother reports that child is still using bottle**
- October -- Training Session
 - **mother reports that child is still using bottle**
 - child referred to evaluate "staining"

- October -- Exam at 24 months
- 14 teeth present
- carious lesions now present on incisors
- mutans streptococci levels = high
- mother says grandmother giving child bottle at night



Mother given option of preventive program with monthly visits, treatment of caries in chair, or operating room treatment -- mother enthusiastically agrees to preventive program

November

- mutans sample: high
- mother reports brushing child's teeth daily with 0.4% stannous fluoride gel and child is no longer using bottle
- clinical exam suggests that lesions are not growing



December

- lesions appear to have increased in size
- mutans levels: high
- decided to perform "atraumatic restorative treatment" on next visit
- mother reports that child's teeth are brushed daily fluoridated toothpaste and child not using bottle

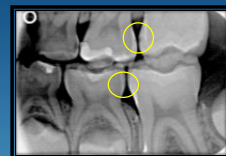
February

- Caries restored with glass ionomer/composite
- After appointment it was noted that child was given a bottle in the dental operator!

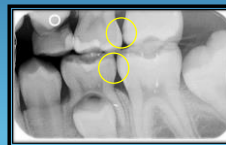


Anecdote 2: Active Surveillance

3/22/12



8/7/13



Anecdote 3: Silver Nitrate in a Native American Clinic

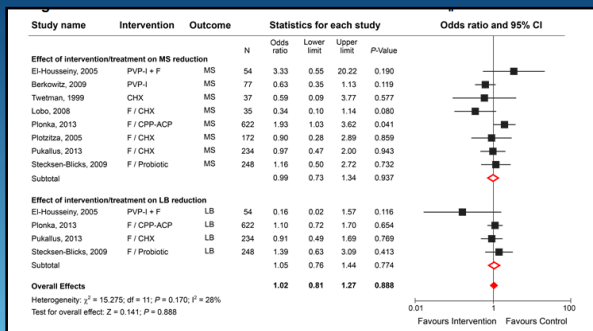
- One operator reporting on 3 ½ years experience in a Native American clinic in Warm Springs, Oregon
- 75% of children had no new caries
- 88% of children did not need local anesthesia
- Less than 5% receiving crowns
- 95% not needing restorations

Anecdotes may have information; may suggest hypotheses; but need validation with unbiased/rigorous trials

Efficacy Trials

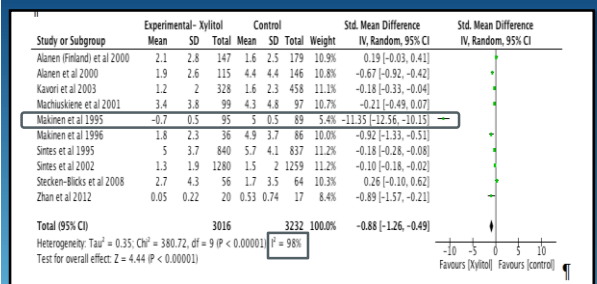
Trials with ideal conditions, generally with control groups, randomization of subjects, and sample size analysis (e.g RCTs or case control studies)

Systematic Review of RCTs of Antimicrobials to Reduce MS and LB



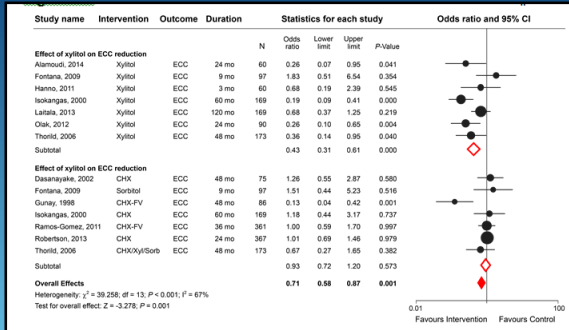
Li and Tanner, Pediatric Dent. 37:226, 2015

Systematic Review for Xylitol Effect in Reducing Caries



Margalini, et al., Pediatric Dent. 39:217, 2017.

Systematic Review of Maternal Interventions on ECC



Li and Tanner, Pediatric Dent. 37:226, 2015

Systematic Review of MI paste on ECC

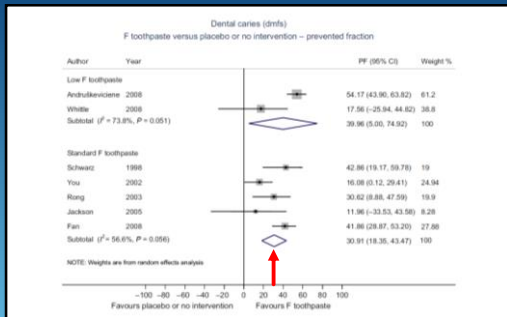
Is there a place for Tooth Mousse® in the prevention and treatment of early dental caries? A systematic review

Sarah Raphael¹ and Anthony Blinkhorn²

Abstract
Background: It is important for Dental Professionals to consider the effectiveness of the preventive strategies used to maintain good oral health and reduce the risk of caries in their patients. Whilst many of the traditional preventive activities, including the recommendation and use of fluoride products and the placement of fissure sealants have a wealth of clinical evidence to support their use, some of the newer preventive agents have a more limited evidence base. In order to investigate the level of scientific support behind one such technology, a systematic literature review was carried out to assess the effectiveness of Tooth Mousse® (TM Paste®) and Tooth Mousse Plus® (TM Paste Plus®) in the prevention and treatment of early dental caries.
Methods: A broad search strategy using Medline via OvidSP and EMBASE was performed in order to capture all published studies to related Casein Phosphopeptide-Amorphous Calcium Phosphate. In addition to the above searches the terms "CFP-ACP" and "casein phosphopeptide amorphous calcium phosphate" were searched using PubMed, EMBASE and the Cochrane Central Register of Controlled Trials. Inclusion criteria were clinical trials of participants of any age, comparing the use of Tooth Mousse® (TM Paste®) or Tooth Mousse Plus® (TM Paste Plus®) to a routine oral care regimen and reporting recognized clinical outcome measures for early caries lesions. Only research studies in English were selected.
Results: 7576 articles were identified, but the majority were duplicates. Once these were removed 172 articles were inspected and the focus on CFP-ACP formulations of Tooth Mousse® (TM Paste®) and Tooth Mousse Plus® (TM Paste Plus®) resulted in 29 articles being selected, and of these 12 studies met the inclusion criteria and were considered acceptable for the systematic review.
Discussion: The overall findings of this review did not show any significant benefits of using Tooth Mousse® (TM Paste®) products over fluoride varnish in the prevention of early dental caries. Whilst the use of Tooth Mousse Plus® (TM Paste Plus®) was found to be significantly better than fluoride varnish for the use of Tooth Mousse® (TM Paste®) but the quality of evidence is limited. There is a lack of evidence to support the use of Tooth Mousse Plus® (TM Paste Plus®) over Tooth Mousse® (TM Paste®) at this time.

Raphael & Blinkhorn, BMC Oral Health 15:1, 2017

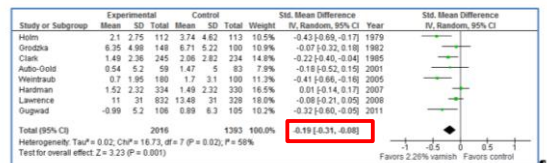
Systematic Review of Fluoride Toothpaste Reducing Caries



Santos et al., Community Dent Oral Epidemiol. 41:1, 2013

Systematic Review of Fluoride Varnish on Caries Increment on Primary Teeth

Figure 4. Standardized mean differences from meta-analysis of 2.26% fluoride varnish studies on primary teeth [d(e/m)fs]*



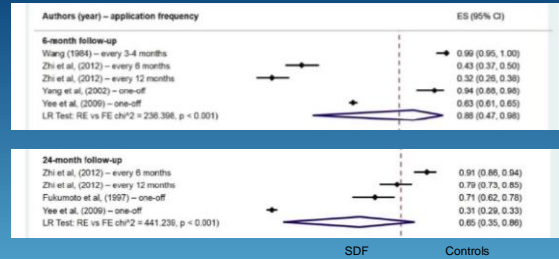
ADA, Council of Scientific Affairs, 2013

Trials of Silver Diamine Fluoride (up to 2012, English only)



- Five clinical trials from 1994 to 2012 (16 years).
- No study is really blinded.
- Only two studies did sample size analysis (Lidora, 2005; Yee, 2009).
- Four out of five studies examined "caries arrestment", but criteria is not defined.
- Two studies found a remarkable mean (74%) reduction in new caries.

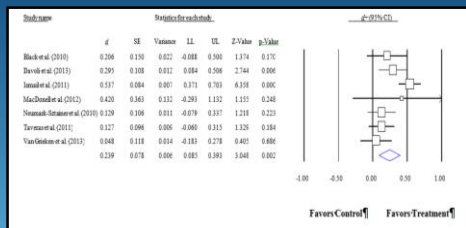
Systematic Review of SDF Clinical Trials



- All studies rated as low-quality of evidence; high heterogeneity.
- From the 24 month data, the carious lesion arrests in the treatment group was 72% and the control group arrests was 50% -- a **33% difference**.

Gao et al., J. Dent Res., 1:201, 2016

Systematic Reviews of Motivational Interviewing Affecting Dietary Behaviors



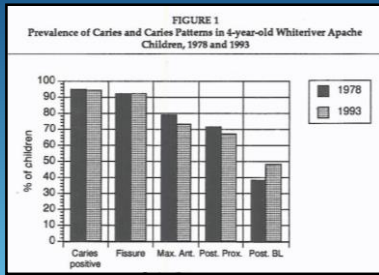
Borrelli et al., Pediatric Dent. 37:254, 2015

New (2017) AAP guidance about detrimental effects of fruit juice and avoiding it before year 1.

Effectiveness Trials

Benefit under real world conditions

Effectiveness Trial: Changes in Dental Caries in Native American Pre-School Children after Intensive Baby Bottle Tooth Decay (BBTD) Campaign



Douglass, et al., J Pub Health Dent., 56:171, 1996

Effectiveness Trial – Preventive Dental Practice in a Pediatric Dental Practice in Connecticut

Very High Salivary *Streptococcus Mutans* Predicts Caries Progression in Young Children

Burton L. Edelstein, DDS, MPH • Steven D. Ureles, DMD, MS • Aileen Simaldone, PhD, CFM, CDE

Abstract Purpose: Culturing mutans streptococci (MS) from children's saliva has high utility in caries risk assessment. The purpose of this retrospective cohort study was to examine its ability in predicting caries progression and determine sensitivity, specificity, and likelihood ratios of a very high *P*-too numerous to count (TNTC) MS test result. **Methods:** 200 preschoolers (3;3±1.2 years, 50 percent no recoverable MS, 50 percent TNTC MS at first dental visit) were followed for five or more years. Caries experience of both groups was compared to identify predictors of caries presence and its progression. **Results:** Controlling for demographic, oral health, and dental visit factors, TNTC preschoolers had both greater presence and extent of caries at the first dental visit [adjusted odds ratio (aOR) 8.0, 95 percent confidence interval (CI) 2.5 to 25.5] and caries progression of five or more years (OR 6.0, 95 percent CI 2.4 to 15.0). Fewer TNTC preschoolers remained caries free over five years or longer (3 percent versus 17 percent for no MS). Overall sensitivities and specificities exceeded 75 percent. **Conclusions:** Despite engagement in preventive dental care, children with TNTC MS were six times more likely to experience cavity increments than preschoolers with no recoverable MS at first visit. (Pediatr Dent 2016;38(4):375-381. Received February 23, 2016; / Last Revision May 1, 2016; / Accepted May 16, 2016)

Edelstein et al., Pediatric Dent. 38:325, 2016

Effectiveness Trial: Retrospective Study of Costs and Procedures in Children Treated with SN/FV vs Controls

	SN/FV n=4,612	Conventional treatment n=13,498	P-value
Length of follow-up coverage (months) MeansSD	28.2±6.6	28.1±6.8	0.38
No. of days with visits in the first year after silver nitrate MeansSD	4.6±2.4	1.9±1.3	<.0001
Dental cost distribution over the first year post-index (U.S. \$) Conditional means(SD)*			
Diagnostic services (n=2,731 n=9,616)	152.1 (113.8)	173.9 (145.0)	<.0001
Preventive services (n=4,281 n=8,529)	240.1 (163.1)	241.5 (207.7)	<.0001
Restorative dentistry (n=1,791 n=7,161)	342.0 (306.4)	537.8 (743.0)	0.016
Dental cost distribution over the entire follow-up period (U.S. \$) Conditional means(SD)*			
Diagnostic services (n=3,811 n=8,237)	319.9 (224.4)	139.2 (121.2)	<.0001
Preventive services (n=4,457 n=7,519)	486.1 (359.9)	191.2 (173.3)	<.0001
Restorative dentistry (n=2,732 n=5,155)	528.0 (457.9)	505.3 (693.6)	<.0001

Overall costs 32% higher in SN/FV group

Hansen et al. Pediatric Dent. 39:217, 2017

Estimates of Efficacy of ECC Interventions

- Fluoride Toothpaste -- 30%
- Fluoride Varnish -- 19%
- Silver Diamine Fluoride --33%

Note: There probably is a wide variation in efficacy, in part, depending on populations/children's levels of risk.

Possible Steps for Reducing ECC

- Optimize preventive procedures and measure effectiveness of professionally delivered F (FV and SDF) and home delivered F (toothpaste) [e.g., brush/book/bed].
- Need trials on sealants, interim therapeutic restorations, MI, self-management/self-efficacy enhancement.
- Adopt measures that reduce sugar consumption (optimize food in convenience stores; SSB tax; adjust juice recommendations in government/school programs).
- More efforts with interprofessional/community-based care (including lay health workers, physicians, nutritionists).

Back to the Bruen (JADA 2016) article -

How can community-based/family-based prevention efforts reduce the over \$2 billion cost of treating ECC ?