Saliva Substitutes Can Be Harmful If Not Selected Properly

Effects of Carboxymethyl Cellulose-Based Saliva Substitutes With Varying Degrees of Saturation With Respect to Calcium Phosphates on Artificial Enamel Lesions.

Meyer-Lueckel H, Cölfen H, et al:

Caries Res 2010; 44 (April 2): 127-134

Less phosphate may yield more remineralization than full saturation in providing an effective saliva substitute for radiation therapy patients.

Background: Studies confirm that a patient's dry-mouth experience following radiation therapy in the head and neck area is accompanied by oral discomfort and a rapid destruction of dentition. In patients with diminished salivary flow, an increasing caries experience can occur unless strong preventive efforts are initiated. Saliva substitutes based on carboxymethyl cellulose (CMC), mucin, or linseed are administered to support caries prevention and mitigate oral pain. The concern is that some marketed products seem to introduce a demineralizing effect on dental hard tissues. As well, some products have been withdrawn from the market due to pH instabilities and bacterial growth. Therefore, a stable saliva substitute with remineralizing properties is still needed. For a saliva substitute to achieve remineralization, an adequate degree of saturation of phosphates is crucial. The degree of saturation with octacalcium phosphate ($S_{OCP}$) and dicalcium phosphate dihydrate ($S_{DCPD}$) plays a critical role in mineralization.

Objective: To evaluate the effects of experimental saliva substitutes based on CMC and differing degrees of saturation, as it relates to calcium phosphates in the mineral loss of enamel in vitro.

Methods: 32 recently extracted permanent demineralized bovine central incisors with subsurface lesions were exposed to 1 of 6 experimental CMC-based solutions with theoretical degrees of saturation relating to $S_{OCP}$ of S0, S0.5, S1, S2, S4, and S8 for 10 weeks. Glandosane, a previously studied saliva substitute, and 2 aqueous solutions (C0 and C1) served as controls. Mineral losses and lesion depths, both before and after storage, were evaluated using microradiographs. Free and bound calcium as well as phosphate and fluoride concentrations were recorded.

Results: $S_{OCP}$ of S2, S4, and S8 was 0.3, 1.1, and 3.4, respectively. Storage in Glandosane and both negative controls resulted in significant demineralization ($P < 0.05$). Only S2 significantly remineralized the specimens ($P < 0.05$). All other solutions showed neutral effects. No significant differences in mineralization between S0 and C0 as well as between S1 and C1 could be observed ($P > 0.05$).

Conclusions: A CMC-based solution, actually unsaturated with respect to octacalcium phosphate (S2), exhibited the most definite remineralization capability under chosen conditions. The study's hypothesis, that with increasing degrees of saturation of these solutions, an enhanced remineralization can be observed, must now be tossed out.

Reviewer's Comments: While this study requires that a number of methodological issues be considered when interpreting the results, cited evidence helps clinicians move away from saliva substitute products that are shown to demineralize rather than remineralize our patients’ dental hard tissues. This study also makes us take a look at phosphates used in other remineralizing agents and to ask if more is too much. (Reviewer-Joel Berg, DDS).

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Keywords: Saliva, Radiation Therapy, Prevention

Print Tag: Refer to original journal article
Objective: To provide an overview of the mechanisms that may be at play in post-whitening sensitivity and provide suggestions that may help prevent or reduce any resultant sensitivity. Discussion: The author reviewed relevant anatomy and physiology of teeth, models of dentin sensitivity and peroxide-induced sensitivity, and therapeutic solutions for post-whitening pain. On the basis of symptomology, the author differentiated bleaching sensitivity from dentin sensitivity. Bleaching sensitivity is often characterized as tingling or shooting pain that presents without provocation as opposed to dentin sensitivity that is often triggered by what would otherwise be innocuous thermal or tactile stimuli. The author speculated that since characteristics of dentin sensitivity and bleaching sensitivity are different, that different mechanisms of pulpal sensitivity may be at work. The hydrodynamic theory of pulp sensitivity, implicated in dentin sensitivity, suggests that fluid movement in dentinal tubules stimulates nerve endings and produces pain. Evidence suggests that the hydrodynamic theory does not fit bleaching sensitivity well. Alternatively, the author reviewed histological evidence that points to direct contact of carbamide peroxide with the pulp-inducing inflammation and stimulation of a specific cellular ion channel known as TRPA1 as the major factors in bleaching sensitivity. This evidence suggests that risk assessment for bleaching sensitivity should be focused on conditions that may allow peroxide to diffuse deeply though dental tissues to the pulp. Thus, patients with exposed dentin or defective restorations should be at greater risk for bleaching sensitivity; a finding borne out in clinical studies. Conclusions: The author suggests that agents that reduce nerve-excitability such as potassium-based desensitizing dentifrices should be more effective than dentinal tubule occluding agents that have been demonstrated as efficacious for reduction of dentin sensitivity. Alternatively, tubule-blocking agents such as amorphous calcium phosphate may be effective in reducing bleaching sensitivity by increasing the mineral density of enamel and hindering the influx of peroxide into the pulp via the enamel. Reviewer's Comments: In many teenage patients, the desire for the perfect smile is strong. For those patients with intrinsic staining, the drive may be even greater. Many patients proceed with bleaching their teeth with the full knowledge that postoperative bleaching sensitivity may be a consequence. Evidence that amorphous calcium phosphate products as well as potassium-based dentifrices may reduce sensitivity, as well as the knowledge that open carious lesions and exposed dentin increase the risk of post-bleaching sensitivity, can assist dentists in preventing and mitigating their patient's discomfort with bleaching. (Reviewer-Michael J. Casas, DDS).
Interceptive treatment can reduce the severity of malocclusions in patients with severe concerns to a point that makes further treatment elective in nature.

**Background:** Distributing financial resources efficiently for patients on public assistance who need orthodontic treatment can be a challenging problem. If there was a way to decrease the severity of malocclusions significantly enough to make treatment relatively unnecessary that would limit expenses and be very beneficial.

**Objective:** To compare Medicaid patients in the mixed dentition with significant malocclusions randomized to either receive interceptive orthodontics treatment or observation.

**Design:** Randomized clinical trial.

**Participants:** 170 Medicaid-eligible children with significant malocclusions referred by local community health clinics.

**Methods:** During the period of this preliminary report, children were randomized into 2 groups: one receiving interceptive treatment in the mixed dentition and the other only observed for now, but who would eventually receive comprehensive orthodontic treatment. Orthodontic graduate students, supervised by faculty, performed all treatments. Study models before and after treatment or observation were compared using the Peer Assessment Rating (PAR) and the Handicapping Labio-lingual Deviation Index (HLD).

**Results:** Intraexaminer reliability was determined to be acceptable at 1.8 for PAR and 2.3 for HLD. While there were no significant differences in PAR between groups pretreatment, there was a mean significant improvement in the interceptive group of 50% and a mean worsening of -6% for the observation group. Only patients who were classified as medically necessary according to the HLD pretreatment were compared for changes after 2 years. Of these, 79% of the interceptive group no longer had a medically handicapping malocclusion, while only 6% of the observation group had this result.

**Conclusions:** Interceptive treatment significantly improved malocclusion severity by 50%, while observation alone showed a mean worsening of 6%. However, while interceptive treatment may decrease severity of malocclusions, ultimately, it may not provide adequate treatment.

**Reviewer's Comments:** It’s important to remember that these are preliminary data, as the observation only group will eventually have comprehensive orthodontic care. In addition, as this information demonstrates, interceptive treatment alone does not produce a finished result for the patient. However, if patients with medically necessary malocclusions can be cost effectively treated to a category of elective needs, perhaps this is adequate enough under public assistance. Further finishing could then be accomplished if desired via private financing. (Reviewer-Jeffrey A. Dean, DDS).

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**Keywords:** Interceptive Orthodontics, Medicaid, Disparities, Funding Eligibility

**Print Tag:** Refer to original journal article
Orthodontic Extrusion Increases Pulp Necrosis in Injured Teeth

Influence of Orthodontic Extrusion on Pulpal Vitality of Traumatized Maxillary Incisors.
Bauss O, Schäfer W, et al:
J Endod 2010; 36 (February): 203-207

Periodontal injuries rather than crown fractures predispose injured teeth to pulp necrosis during orthodontics. Pulp vitality should be monitored regularly during orthodontic treatment of injured teeth.

Objective: To determine the effect of orthodontic extrusion on previously traumatized permanent maxillary incisors.

Design: Retrospective study.

Methods: Pulpal vitality was compared in 3 groups of patients: (1) orthodontically treated patients with traumatized incisors (ortho/trauma group); (2) orthodontically treated patients with no trauma (ortho group); and (3) patients with injured incisors but no orthodontic treatment (trauma group). Dental injuries were divided into 2 categories: (1) hard tissue injuries which included teeth with fractures of the crowns and or roots and (2) periodontal injuries which included any luxation injury. History of dental trauma was determined prior to initiation of orthodontic treatment based on clinical and radiographic exam and a pretreatment questionnaire. Pulpal sensitivity was assessed with a cryogenic spray. The ortho/trauma group totaled 66 patients, with a mean age of 15.5 years with 77 traumatized incisors. To be included, all teeth had to test positively for pulp vitality prior to orthodontic treatment. Of these teeth, 32 were classified as hard tissue injuries and 45 had periodontal tissue injuries. The ortho group was comprised of 100 randomly selected patients, with a mean age of 16 years, with 400 permanent incisors and no history of trauma. All treatment included extrusive forces of 20 gm per tooth to correct anterior open bite and the extrusion period was 5 months in both groups. The trauma group was comprised of 173 patients with 193 injured teeth, 68 with hard tissue injuries and 125 with periodontal injuries. All patients showed positive pulp sensitivity after trauma. Pulp sensitivity was again measured ≥3 years after the injury. Pulp vitality was measured at the end of the retention period for the ortho/trauma and ortho groups. Non-vitality was determined if the tooth showed 2 of the following 3 signs: loss of pulpal sensitivity, gray color change of crown, and periapical radiolucency on radiograph.

Results: Pulp necrosis occurred in 9.0% of teeth in the ortho/trauma group, 0.5% of the ortho group, and 1.6% of the trauma group. Teeth in the ortho/trauma group were significantly more likely to undergo necrosis than either of the other groups. Necrosis occurred most frequently in the early stages of orthodontic extrusion. All teeth that necrosed in the ortho/trauma group were in teeth with periodontal tissue injuries.

Conclusions: Teeth with a history of severe periodontal tissue injuries are more likely to undergo pulp necrosis during orthodontic extrusion than are non-traumatized teeth.

Reviewer's Comments: This study had some significant limitations. Notably, only a cold test was used to determine pulp vitality prior to orthodontic treatment. Also, designating traumatic injuries as either crown fractures or periodontal injuries is suspect as these injuries frequently occur simultaneously. Nevertheless, there is a dearth of literature reporting on the important question of orthodontic treatment after dental injury and this paper is a significant contribution. (Reviewer-Dennis J. McTigue, DDS, MS).

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Keywords: Dental Trauma, Orthodontic Treatment, Pulp Necrosis

Print Tag: Refer to original journal article
Microbes and risk factors which cause early childhood caries have been identified; ideally, this will lead to more effective screening and preventative tools.

**Objective:** To identify microbes in the mouths of preschool-aged high-risk subjects with and without cavities.

**Design:** Cohort prospective clinical trial.

**Participants:** 195 preschool-aged children recruited from pediatric clinics in the Boston area.

**Methods:** Inclusion criteria were: age 1 to 6 years, no antibiotics in the last 3 months, and parental consent to examination and samplings. Once recruited, 2 trained and calibrated hygienists examined children for presence or absence of cavities and visible plaque was recorded from the gingival third of anterior teeth, buccal and interproximal surfaces of posterior teeth, from cavitated teeth, and from midline of the tongue. Samples were collected, stored, and frozen in preparation for future analysis. Demographic, dietary, and socioeconomic data were collected. Analysis of the plaque used 74 specific species DNA probes. Data were analyzed and regression analysis was used to evaluate caries extent with age and multivariate analysis to detect correlations between independent variables and outcome variables.

**Results:** Participants were 51% female, 77% black, 7% white, and 1% Asians. Of parents, 57% had <12 years of education and annual household income was <$20,000 in 46% of families. Only 35 (18%) of subjects had cavities and Asians were more affected than blacks and whites. Variables associated with cavities were crackers, chips, and cereal consumption along with visible plaque. Older subjects with visible plaque had an increased risk. DNA probe data showed consistently higher species detection from teeth than from tongue samples. The most frequent species detected in >60% of children were *Streptococcus* and *Actinomyces*. For specific microbiota, it is recommended to order a reprint of the article. When data from all children were analyzed, plaque and *Streptococcus mutans* was associated with caries scores. *Lactobacillus acidophilus* was associated with lower caries scores.

**Conclusions:** The authors identified microbiota showing a high association with early childhood caries and others that showed a negative association with caries. They also demonstrated that sampling plaque from tooth surfaces is more useful than tongue surfaces. Other associated markers were snacking, low socioeconomic status, and low parental education.

**Reviewer’s Comments:** It should be noted that in this high-risk population, 82% of subjects had no caries. There were no data on fluoride exposure, brushing frequency, and weaning from the bottle or breast. It would be very useful to have a microbial screening test that is easy and rapid as suggested by the authors. Hopefully it will be available soon and we can then target those children that require optimal preventive services from those less at risk. (Reviewer-Arthur J. Nowak, DMD).

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Keywords: Caries, Microbial Markers, *Streptococcus mutans*

Print Tag: Refer to original journal article
Stem cells can be cultured from teeth with irreversible pulpitis; future studies are needed to determine the full potential of diseased cells from dental pulp tissue.

**Background:** It has been almost 10 years since the discovery that stem cells can be harvested from the pulp tissue and apical papilla of human teeth. In the past, study of these cells has been limited to healthy pulp tissue from exfoliated deciduous teeth or from permanent teeth extracted for orthodontics.

**Objective:** To determine if pulp tissue from teeth with irreversible pulpitis contain stem cells with proliferative potential.

**Methods:** Pulp tissues from healthy teeth and teeth with irreversible pulpitis were collected from patients aged 6 to 40 years. Controls consisted of healthy pulp tissues obtained from 8 patients who required extraction for orthodontic treatment. The diseased group consisted of pulp tissue diagnosed as having irreversible pulpitis from 8 patients. Diagnosis was based on clinical assessment as well as having a history of spontaneous pain and pain that lingered following cold stimulus. Cells from both groups were cultured following standard procedures. Assays were performed to assess the cell proliferation rate and the efficiency of colony formation. Stem cells in the culture were identified using a cell surface marker called STRO-1. Cells labeled with STRO-1 were enriched and then exposed to osteogenic/odontogenic induction medium to determine the cell’s ability to differentiate into different cell types.

**Results/Conclusions:** Tissue samples from control and disease groups were from patients of similar ages. All but one of the diseased samples had cell growth and all but one formed colonies. There was a significant difference between the control and disease groups in terms of the frequency of single cell-derived colony formation with the disease groups being significantly lower. This is a measure of the proliferative capacity of the cells. In subsequent passages of the cells, the diseased cells demonstrated lower potential for proliferation. A comparison of cells by percentage that were STRO-1 positive showed that both control and diseased cells were similar, indicating that comparable progenitor cells exist between groups. The majority of cells from both groups demonstrated odonto-osteogenic differentiation and there was no difference between groups in terms of presence of mineral deposition. There was also no significant difference between groups for the expression of 2 genes for odontoblast differentiation.

**Reviewer’s Comments:** This study demonstrates that the cells from diseased pulp tissue are capable of expanding and proliferating. Importantly, the presence of a similar percentage of cells that maintain the capability to differentiate into odontoblasts, suggests that these cells may be useful in pulp regeneration or in stem cell research and therapy. Future studies will determine the full spectrum of these cells’ differentiation potential and will provide opportunities for research and treatment related to other diseases as well. (Reviewer-Rebecca L. Slayton, DDS, MS, PhD).

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Keywords: Stem cells, Pulpitis, Pulp Tissue

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Enamel defects, especially hypoplasia, are common in low birth weight, preterm children; to prevent decay, frequent evaluation and reinforcement of preventive dental measures are very important.

**Background:** Tooth enamel has no natural repair mechanism and any disturbance that alters its matrix formation or maturation results in a structural defect in those developing teeth. These defects vary in number and size depending on the severity and/or length of the disturbance.

**Objective:** To determine the prevalence of enamel defects in a population of low birth weight (LBW) children and to evaluate the influence of prenatal and neonatal risk factors on the development of these defects in the primary dentition.

**Design:** Retrospective study.

**Participants/Methods:** 102 children, aged 4 to 5 years, were randomly selected from a hospital database. Participants were classified as either Group 1, which included 52 LBW children (<2500g), all preterm (<37 weeks); or Group 2 with 52 normal birth weight (NBW) children (≥2500g), all full term. Medical pre- and postnatal data included: (1) pregnancy variables, (2) cesarean vs vaginal delivery, (3) neonatal, perinatal, and postnatal variables, and (4) parental surveys. One pre-calibrated examiner used a mirror and probe to detect any defects or caries and recorded findings using the modified Developmental Defects of Enamel Index to include enamel opacity, hypoplasia, and combined defects as well as their severity and extent. Dental caries and plaque scores were also measured. Statistical analysis included student’s t-test, ANOVA, and Pearson’s correlation coefficient.

**Results:** 90% of LBW children had enamel defects compared to 80% of NBW children, with both groups having a similar prevalence of opacities (>75%). Prevalence and number of hypoplastic defects were significantly higher in Group 1 (60%; n=1.6) compared to Group 2 (16%; n=0.3); the prevalence of combined defects was 6% in Group 1 compared to 4% in Group 2. Average number of teeth with enamel defects was significantly higher (n=5.7) in the LBW group compared to the NBW group (n=3.6). No significant associations were found between developmental enamel defects, dental caries, and plaque scores. Young maternal age, multiple births, smoking during pregnancy, and birth by cesarean delivery along with low Apgar scores, parenteral nutrition, and orotracheal intubation were significantly associated with enamel defects.

**Conclusions:** Children with LBW and low gestational age have a higher prevalence of enamel defects than NBW. Further multidisciplinary studies with larger samples are needed clarify the associations found in this study.

**Reviewer’s Comments:** With the exception of an overall higher prevalence of enamel defects due to low birth weight preterm births and other neonatal and postnatal factors, this study was in agreement with previous investigations. Increased prevalence was most likely due to the sample age, 4 to 5 years, compared to 12 to 24 months of those from similar studies. Other differences in investigative methodology to include the teeth examined and diagnostic criteria may have also contributed to these variations. (Reviewer—Erwin G. Turner, DMD).

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Keywords: Hypoplasia, Low Birth Weight, Enamel Defects

Print Tag: Refer to original journal article
Obese children are significantly more likely to have lower extremity injuries than non-obese children.

**Background:** It has been known that 2 prevalent issues facing today’s youth are obesity and injury. Obesity appears to increase the risk of injury, increase time required for recovery, and results in increased morbidity.

**Objective:** To contrast injury characteristics of obese and non-obese children presenting to a pediatric emergency department.

**Design/Participants:** Retrospective study using 24,588 medical records of children aged 3 to 14 years presenting to the Cincinnati Children’s Hospital Medical Center Emergency Department from January 1, 2005, to March 31, 2008.

**Methods:** Records meeting age inclusion criteria and appropriate ICD-9 coding were reviewed; however, 1239 of these records did not provide weight data and were excluded, resulting in a study population of 23,349. ICD-9 discharge codes 800-899 for this sample were collected and statistically evaluated for trends.

**Results:** Of the sample, 60.7% were white, 61.7% were male, and 16.5% were obese. Obese and non-obese children had the same percentage of upper extremity injuries; however, obese children had significantly increased lower extremity injuries. Also, obese children had significantly fewer head and face injuries.

**Conclusions:** Obese children are significantly more likely to incur lower extremity injuries and less likely to incur head and face injuries. Strategies for injury prevention for this patient population are needed.

**Reviewer’s Comments:** Pediatric dentists should be aware of differences in injury patterns for obese and non-obese children. Also included in this study are interesting data on racial differences in obesity. Although obese children represented 16.5% of the sample, black (20.4%) and Hispanic (24.8%) children had a higher percentage of obesity than white (13.9%) children. (Reviewer-Paul O. Walker, DDS, MS).

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**Keywords:** Emergency Department, Pediatrics, Obesity, Injury

**Print Tag:** Refer to original journal article
Background: The American Academy of Pediatric Dentistry (AAPD) guidelines describe indirect pulp treatment (IPT) as a procedure in which the caries-affected dentin closest to the pulp tissue is left in place and covered with a biocompatible material, restoring the tooth to prevent microleakage. This simple intervention technique preserves dental substrate while maintaining pulp vitality, thereby avoiding direct intervention on the pulp tissue. It should be noted that IPT is not performed when the pulp tissue is exposed by caries or when the tooth presents with signs of irreversible pulpitis.

Objective: To evaluate clinical and radiographic outcomes of long-term function of primary teeth submitted to IPT when a self-etching primer or a calcium hydroxide agent was used under resin-based composite restorations.

Methods: The study was undertaken at the Federal University of Rio Grande do Sul, Pediatric Dentistry Unit, in Porto Alegre, Brazil, following protocol approval by the institutional review board. From 21 healthy children aged 4 to 8 years, 40 primary molars were chosen. Teeth with deep caries lesions without signs and symptoms of irreversible pulpitis were divided by random allocation into 2 groups, according to the capping material utilized over demineralized dentin: (1) experimental group with self-etching adhesive system (Clearfil SE Bond), or (2) controls with calcium hydroxide liner (Dycal). Both groups were filled with resin composite (Z250) and submitted to a clinical and radiographic monitoring period until exfoliation.

Results: After a long-term follow-up (up to 60 months), 15 children were reexamined for final evaluation and 32 teeth were evaluated. There was no statistical difference found between groups (P=0.514). The overall success rate reached 78%. Failures occurred after the first-year period recall.

Conclusions: This study represents a welcome, long-term evaluation of IPT, given that pulpotomy success is shown to decrease over time and early exfoliation remains a concern.

Reviewer's Comments: The study illuminates several key findings for dental clinicians to note: (1) dental students with differing abilities were shown to perform IPT with relatively equal success rates; (2) pediatric dentistry and endodontic communities in 2007 agreed that IPT holds hope, as a replacement for pulpotomy, as an acceptable technique for caries involved young permanent teeth; and (3) this less invasive, simple and effective technique for maintaining pulp vitality provides an alternative treatment for primary teeth with deep caries lesions. Careful consideration as to the health status of the pulp may be the ultimate key to success. (Reviewer-Joel Berg, DDS).

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Keywords: Pulp Therapy, Primary Teeth, Indirect Pulp Treatment

Print Tag: Refer to original journal article
The number of restorative procedures has continued to decline over the last 40 years; therefore, dentists may need to make adjustments in their practices due to this decrease.

**Background:** For 40 years, there have been reported reductions in dental caries in the United States. As a result, dental treatments have changed.

**Objective:** To determine if there have been changes in dental treatment trends in the United States.

**Design:** Retrospective review of dental insurance claims data from 1992 to 2007.

**Methods/Results:** Dental claims data from Delta Dental of Michigan, Ohio, and Indiana from licensed dentists in Michigan were evaluated. Number of individuals included in the analysis increased from 1.25 million in 1992 to 1.84 million in 2007. However, overall, the per capita number of restorations continued to decrease. Composite restorations continued to be preferred over amalgam restorations. Extractions and endodontic procedures also declined slightly, but implant procedures increased. Apparently, as oral health improves, the need for restorative procedures has decreased. The primary teeth of children in lower income groups showed increases in the number of decayed and filled teeth from the time periods 1988 to 1999 and 1994 to 2004. It is not known whether this increase was a result of increased restorations as opposed to extractions.

**Conclusions:** The number of restorative and prosthetic services for those born more recently is not as great as for older patients. Practitioners may need to adjust their practices accordingly.

**Reviewer's Comments:** Dentistry has certainly changed during the past 40 years and this report highlights the changes noted from 1992 to 2007. Dentists are advised to review this report for these changes noted in Michigan if they are to adjust to the decreases in restorative dentistry. (Reviewer-Paul O. Walker, DDS, MS).

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Keywords: Dental Insurance, Fixed Prosthetics, Removable Prosthetics, Oral Surgery Procedures, Endodontic Procedures

Print Tag: Refer to original journal article
Protecting Erupting Permanent First Molars From Decay


Tut OK, Milgrom PM:

J Pub Health Dent 2010; March 10 (): epub ahead of print

Adding iodine to fluoride varnish decreases the risk for caries on erupting first permanent molars.

**Background:** Opinions vary as to how well the health profession has met the Surgeon General’s 2010 Healthy People goals. Even though it is well known that dental caries is a bacterial infection and microbes are transmitted from the mother before age 2 years, caries are increasing in the group aged 2 to 5 years. This group does not receive early preventive intervention, so why aren't dentists scheduling infants and toddlers for their first examination shortly after age 12 months? In vitro and in vivo studies reported 30 years ago were promising using the antiseptic iodine to prevent caries, but studies in humans were small.

**Objective:** To combine fluoride varnish with topical polyvinylpyrrolidone (PVP)-iodine and apply to erupting first permanent molars to prevent decay.

**Design:** Retrospective cohort study.

**Participants:** 2 groups of kindergarten children (n=614) recruited as part of an on-going study in the Republic of the Marshall Islands, a population with a high prevalence of dental disease.

**Methods:** 428 subjects were in the study group with a mean age of 5.8 years; the control group had 186 subjects with a mean age of 5.9 years. The study group has 0.2 ml of a 10% solution of PVP-iodine painted on dried teeth, followed by an application of fluoride varnish. Controls only had applications of fluoride varnish. Both groups received fluoride dentifrice and brushes to use in school and home. Both groups had 3 applications applied during the school year. Initial visual examinations with a dental mirror were performed by one calibrated dentist and a final visual with mirror examination and artificial light at the end of the school year.

**Results:** Both groups had high caries rates at the beginning of the study: 8.9 for the study group and 9.4 for the control group. At the end of the study, the test group was twice as likely to be caries free in the permanent first molars as controls.

**Conclusions:** Iodine/fluoride intervention was most effective as the teeth were erupting and occlusal surfaces not colonized. PVD-iodine treatments had no protection in the already infected and damaged primary dentition. Lastly, there were no adverse effects noted, no staining of teeth or complaints of taste. The authors suggest it is time for a randomized clinical trial.

**Reviewer's Comments:** This study provides us with information on a new preventive treatment and, although the study was not randomized and only lasted 9 months, results are very promising and the technique appears to prevent caries on the occlusal surfaces of erupting first permanent molars. Once erupted, and if caries-free, we can then plan to do occlusal sealants. (Reviewer-Arthur J. Nowak, DMD).

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Keywords: Decay, First Permanent Molars, Iodine, Fluoride Varnish

Print Tag: Refer to original journal article
Rhinitis in children is strongly associated with allergy-related comorbidities and is often associated with severe bronchial hyperresponsiveness.

**Background:** One of the most common respiratory illnesses in children is chronic rhinitis (CR). There is evidence that comorbidities often associated with CR, such as asthma, otitis media, and conjunctivitis, can significantly impact a child's quality of life. A common form of chronic rhinitis is the allergic or Immunoglobulin E (IgE)-mediated form. Children who have rhinitis symptoms without respiratory manifestations have been noted to either be IgE(+) or IgE(-).

**Objective:** To examine comorbidities of rhinitis in a birth cohort for 10 years.

**Participants/Methods:** The birth cohort was derived from the Environment and Childhood Asthma (ECA) study in Norway. The ECA study was initiated in 1992 and originally enrolled 3754 children. From within this cohort, lung function was measured in 1215 children, of which 1019 (84%) completed a 10-year follow-up. A parental structured interview, skin allergen testing, and baseline spirometry were conducted.

**Results:** Of evaluated children, 25% had rhinitis symptoms 10 years from their initial diagnosis. One allergy-related comorbidity (such as conjunctivitis, eczema, asthma, otitis media, or reported anaphylaxis) was noted in 88% of the rhinitis (+) group, with 43% having 2 allergy-related comorbidities. Conjunctivitis was the most common rhinitis comorbidity, present in 76% of subjects. Children with rhinitis had a higher prevalence (32%) of asthma than those without rhinitis. The most common allergens were timothy grass, birch, cat, dog, and mugwort. Of interest was the fact that children with sensitization to >1 allergen were twice as likely to have rhinitis, as well as being more likely to have bronchial hyperresponsiveness (BHR).

**Conclusions:** Rhinitis in children was strongly associated with allergy-related comorbidities and often was associated with severe BHR. Children with polysensitization to allergens were more likely to present with respiratory symptoms.

**Reviewer's Comments:** What I thought was most telling in this paper is the connection made between respiratory illness and allergy-mediated illness. As pediatric dentists see children at younger ages, we need to often think in terms of comorbidities for it is rare that a child with a respiratory illness will have isolated symptoms or presentation. In many cases, respiratory illness in young children accompanies a constellation of other chronic illnesses. (Reviewer-S. Thikkurissy, DDS).

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Keywords: Rhinitis, Immunology, Phenotypes

Print Tag: Refer to original journal article
The vast majority of sickle cell patients report an emergency department visit within 12 months, with 53% resulting in hospitalization.

**Background:** Patients with sickle cell disease (SCD) are plagued by severe pain caused by vaso-occlusive crises that often lead to frequent and high-cost healthcare utilization. For SCD patients, one significant outcome measure is rehospitalization, and in the past 5 years, 30-day rehospitalization rates have been designated as valuable quality indicators of care. There is however, scant quality literature to support this benchmark designation of 30 days.

**Objective:** To create a realistic and reliable estimate of acute care utilization and rehospitalization rates for SCD patients.

**Design:** Retrospective review.

**Methods:** Data were collected from the Healthcare Cost and Utilization Project (HCUP) 2005 to 2006, as well as State Inpatient Databases (SID) and State Emergency Department Databases (SEDD). Data from HCUP, SID, and SEDD were collected from 8 states (Arizona, California, Florida, Massachusetts, Missouri, New York, South Carolina, and Tennessee). Primary outcome measures were acute care utilization and acute care utilization/rehospitalization following a hospital discharge.

**Results:** Data were collected from 21,112 records with 30% aged 18 to 30 years. An overwhelming majority of patients (94%) reported an ED visit within a 12-month visit, with 53% resulting in hospitalization. Patients had an acute care utilization rate of 2.6 visits per year, with age 18 to 30 years having the highest rate of 3.6 visits per year. Over one-third of all patients (33.4%) were rehospitalized within 30 days of a discharge.

**Conclusions:** Acute care utilization and rehospitalization rates were high for SCD patients, particularly among young adults.

**Reviewer's Comments:** For anyone who treats SCD patients, this is no surprise. These patients often present with a chronic history of acute admissions and readmissions due, most often, to sickling crises. In this study, the burden was particularly significant among those aged 18 to 30 years. It is important to be aggressive in oral health management, as these patients often have other more pressing health concerns governing their care-seeking behaviors. (Reviewer-S. Thikkurissy, DDS).

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**Keywords:** Sickle Cell Disease, Acute Sickle Crisis, Rehospitalizations

**Print Tag:** Refer to original journal article
Children have distinct physiologic and anatomical differences that can make them more prone to anesthesia-associated adverse respiratory events.

**Background:** Adverse respiratory events during general anesthesia are often associated with litigation. It has been estimated that 25% of all liability claims received by the American Society of Anesthesiologists is associated with anesthesia-associated adverse respiratory events (AARE). Aside from the legal aspect, AARE is also the most common cause of morbidity and mortality in the pediatric population undergoing anesthesia.

**Objective:** To outline physiologic, anatomical, and treatment specifics for children at risk for AARE.

**Design:** Literature review-based assessment of adverse pediatric airway events.

**Methods:** Physiologic differences in children compared to adult airways include increased oxygen consumption and ratio of minute ventilation to functional residual capacity. This is most significant in that it means the child does not have an adequate oxygen reserve to tolerate extended hypoxemia. Anatomical differences range from the most fundamental (a child's airway is funnel shaped, compared to a cylinder shaped adult airway) to the more nuanced (a child's airway has more compliance and therefore is more prone to obstruction compared to an adult airway). Acute epiglottitis is a bacterial infection that can result in an edematous epiglottis with resulting airway edema and sepsis. Other airway issues include laryngeal papillomas, parainfluenza infection (croup), and juvenile rheumatoid arthritis (JRA). When considering the obese patient, it should be noted there is decreased chest wall compliance and an increase in airway resistance. Patients with prematurity and gastroesophageal reflux disease are also more prone to AARE.

**Conclusions:** Children have distinct physiologic and anatomical differences that can make them more prone to AARE.

**Reviewer’s Comments:** I perform sedations weekly. I thought this was an excellent review of conditions that really need to be reinforced for anyone sedating children, namely they are not “little adults”. There are distinct anatomic and physiologic differences that can also be influenced by birth history and early childhood bacterial infections. (Reviewer-S. Thikkurissy, DDS).

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Keywords: Airway, Sedation, General Anesthesia

Print Tag: Refer to original journal article
Are Asthma and GERD Related?

Gastroesophageal Reflux and Asthma in Children: A Systematic Review.

Thakkar K, Boatright RO, et al:

Pediatrics 2010; 125 (April): e925-e930

Children with asthma are 5.5 times more likely to be diagnosed with gastroesophageal reflux disease.

Background: There has been a consistent association in the adult literature between asthma and gastroesophageal reflux (GERD). Of interest is that while there is an association, the direction of causality has been controversial and not readily established. The relationship is poorly understood in children.

Objective: To conduct a systematic review to determine the presence of abnormal esophageal findings in children with asthma.

Design: Systematic review.

Methods: The following databases were searched: Medline, Embase, and the Cochrane Library. Studies were included if they were published between 1966 and 2008, had Medical Subject Heading (MeSH) terms like reflux, GERD, esophagitis, hiatal hernia, and asthma, and were in English. There were 4 main desired study components: (1) assessment of GERD in asthmatics aged <18 years, (2) assessment of asthma in individuals aged <18 years with GERD, (3) assessment of abnormal esophageal acid exposure in children with asthma, and (4) reported positive endoscopy findings in kids aged <18 years. All studies had to have >20 subjects.

Results: Of 1562 articles identified in the initial search, 44 examined asthma and GERD, and of these, 20 fulfilled all-inclusion criteria; 95% of these examined GERD in asthmatics. Overall prevalence of GERD in children with asthma ranged from 19 to 80% with a sample-weighted overall prevalence of 23%. Children with asthma were 5.5 times more likely to be diagnosed with GERD.

Conclusions: While there is a consistent association between GERD and asthma in children represented in the literature, study design and qualitative measurements are rarely standardized between studies.

Reviewer's Comments: One area I am really interested in is the study of comorbidities, really a nascent area of study, and this systematic review reveals that, despite dealing with 2 very common chronic illnesses of childhood, only 20 studies satisfied inclusion criteria. The paucity of literature and lack of standardization in definitions is also reflected in the wide range of prevalence. (Reviewer-S. Thikkurissy, DDS).

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Keywords: Asthma, Gastroesophageal Reflux, Children

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The main cause of hemoptysis in the pediatric population was respiratory tract infection (25%).

**Background:** Hemoptysis is defined as the movement of blood extraorally from the nose or mouth to the respiratory system. In adults, hemoptysis is typically associated with infection, bronchial tumors, and telangiectasias. Published pediatric etiologies may include infection, but also foreign body aspiration and systemic illnesses such as congenital heart disease.

**Objective:** To assess etiologies associated with hemoptysis in a cohort of Korean children.

**Design/Participants:** Retrospective review of medical records of patients aged <18 years spanning a 12-year period (1996 to 2008).

**Methods:** Specific exclusion criteria included patients with bleeding disorders, trauma, and cancers. Degree of hemoptysis was defined as: mild (≤20mL), moderate (21 to 100mL), or massive (>100mL).

**Results:** Data were collected from 40 children with a 55% female distribution. Median age was 6 years 3 months with a range of 10 months to 18 years. Main cause of hemoptysis in this population was respiratory tract infection (25.0%) followed by congenital heart disease (17.5%). Within the respiratory infection group, both pharyngitis and bronchitis comprised 30% of the subgroup. Most children (43%) were aged 0 to 5 years. The majority of hemoptysis episodes were described as mild (62%). Surgical management was required to treat the hemoptysis in 12.5% of patients.

**Conclusions:** The most common etiology of hemoptysis in this cohort of Korean children was respiratory infection and degree of hemoptysis was minimal.

**Reviewer's Comments:** This is a clinically uncommon but incredibly serious problem. As with other illnesses, children with compromised respiratory systems are often most at risk of serious long-term consequences. I am curious as to how the authors accurately measured the level of hemoptysis; I assume that this is more of an estimation. Early recognition is key as the majority of patients were treated with routine medical management. (Reviewer-S. Thikkurissy, DDS).

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Keywords: Hemoptysis, Pediatric, Respiratory

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Children diagnosed with asthma were 21 times more likely to have a cow’s milk allergy that persisted beyond the age of 2 years.

**Background:** Cow’s milk allergy (CMA) has been reported to be the most common food allergy in the first years of life, with some studies citing prevalence as high as 46% in patients referred to pediatric allergy clinics. Despite its early prevalence, there has been a high reported degree of resolution (87%) of CMA by age 3 years.

**Objective:** To assess CMA in a population of Portuguese children, as well as identifying predictive factors.

**Participants/Methods:** Children with CMA were selected over a 9-year period. Initial diagnosis of CMA was made through symptoms and cow’s milk challenge. Based on the extent and onset of a reaction to challenge, the child was either classified as having Immunoglobulin E (IgE)-mediated or non-IgE mediated CMA.

**Results:** Data were collected from 139 children with a slight male predilection (53%). Average follow-up period was 7 years. Most children (n=133) were diagnosed with CMA at an early age (mean age 3.5 months). About one-third (32%) of children developed asthma and 20% atopic eczema. A small percentage (5%) of children had a family history of CMA and 35% had a family history of atopy. Children diagnosed with asthma were 21 times more likely to have a CMA that persisted beyond age 2 years.

**Conclusions:** Many children who presented with isolated CMAs were likely to outgrow them. If a child presented with a diagnosis of asthma, other food allergy, or significant weal diameter on allergy testing they were more likely to carry the CMA beyond age 2 years.

**Reviewer’s Comments:** There has been much in the press recently about the prevalence/incidence/diagnosis of food allergies. This study does a good job of putting cow’s milk allergy in this population in perspective. There are certain risk factors for disease persistence, namely asthma development, and other atopic-associated illnesses (eczema). Dentists need to be wary of food allergies as avoidance-specific diets can in some cases, favor cariogenic diets. (Reviewer-S. Thikkurissy, DDS).

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Keywords: Food Allergy, Milk Allergy, Immunology

Print Tag: Refer to original journal article
With pediatric sedations, complication rates rise as more medications are combined in polypharmacy.

**Background:** In recent years, there has been a growing understanding that children undergoing potentially painful procedures require not only thorough analgesia, but possibly also sedation/anesthesia to minimize procedural stress and long-term consequences of inadequate pain management. Recent studies have emphasized that painful procedures often require deeper levels of sedation, which have been traditionally provided by anesthesiologists, but recently by non-anesthesiologists.

**Objective:** To relate relevant aspects of anesthesia-based recommendations for sedation and analgesia in children. **Discussion:** Prior to sedation/analgesia, a thorough systems-based health history review needs to be conducted. This may include laboratory assessments as well as adherence to standardized fasting policies. A critical component of the pre-sedation appointment is the informed consent process on the day of the procedure. Sedation/analgesia should not be carried out in the absence of supplemental oxygen, as children typically tolerate greater incidences of hypercarbia prior to central respiratory stimulation. On the sedation team, the sedating physician's responsibility is to continuously monitor the patient, administer and adjust drugs, and manage any complications. All sedative medications given must be associated with an accompanying emergency plan. It should be noted that complication rates rise as more medications are combined in polypharmacy. All sedations MUST be accompanied by adequate pain control, typically through local anesthesia.

**Conclusions:** A standardized and methodical approach to sedation and analgesia in children needs to be employed.

**Reviewer's Comments:** Unfortunately, there are constant reminders of sedations gone bad, resulting in the unthinkable: the death of a child. This article does a wonderful job of reviewing some very salient points of the responsibilities of the sedating physician (dentist) and agrees with the 2007 American Academy of Pediatric Dentistry/American Academy of Pediatrics Sedation Guidelines. There is also a good insistence that pain control needs to be considered in procedures that require deeper sedation. (Reviewer-S. Thikkurissy, DDS).
Patients taking bisphosphonates may not be aware of potential side effects, particularly those associated with dental care.

**Background:** Bisphosphonates (BP) are a class of medications increasingly being used for a wide range of conditions including osteoporosis, cerebral palsy, and osteogenesis imperfecta. A reported morbidity associated with BP therapy is bisphosphonate-associated osteonecrosis (BON), which typically affects the bones of the craniofacial complex.

**Objective:** To determine whether patients taking BPs had knowledge of why they were taking them and to assess their awareness of adverse side effects.

**Participants:** 73 patients identified at a dental school clinic between June 2008 and April 2009.

**Methods:** Inclusion criteria were use of BPs (either oral or intravenous) and English speaking. Data were collected from consecutive subjects with a mean age of 66 years. Of subjects, 64% were Caucasian with 27% Hispanics. The most common BP reported was oral alendronate (60%) followed by oral risedronate (29%). Nearly three-quarters (74%) of subjects were using BP due to osteoporosis. When asked about their BP therapy, 82% reported not being informed of risks of side effects and 80% did not know how long they were going to be on therapy.

**Conclusions:** Patients taking BP may not be aware of potential side effects, particularly those associated with dental care.

**Reviewer's Comments:** Bisphosphonates are becoming more of a part of pediatric dentistry because of osteogenesis imperfecta, cerebral palsy, osteoporosis, and renal disease. These medications, while incredibly useful, have the potential for adverse effects with bony maxillofacial surgery (extractions, periodontal surgery). While there are no pediatric cases reported, frequency of use of this class of medication is drastically increasing. The fact that so many adults had limited knowledge of side effects suggests that parents may also be poorly informed. (Reviewer-S. Thikkurissy, DDS).

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Keywords: Bisphosphonates, Osteonecrosis, Patient Knowledge

Print Tag: Refer to original journal article
An under diagnosed and often ignored aspect of cerebral palsy is associated psychiatric disorders.

**Background:** Cerebral palsy (CP) affects every 2 to 3 children per 1000 births. It has been described in the past as a non-progressive static encephalopathy. Identified risk factors for CP include low birth weight, intrauterine infections, and multiple gestations with the most common risk factor being periventricular leukomalacia associated with prematurity. As many as one-third of all cases have no identifiable etiology. The primary focus of diagnosis and care of patients with CP has been on the resulting motor dysfunction. The overwhelming majority of children with CP will have some spasticity associated with the condition. An under diagnosed and often ignored aspect of the condition is associated psychiatric disorders. Psychiatric disorders that may accompany CP include depression, personality disorders, impulsiveness, separation anxiety, oppositional defiance, and bipolar disorder.

**Objective:** To present a case highlighting the complex behavioral challenges associated with CP patients.

**Discussion:** The patient is aged 15 years and was diagnosed with spastic CP at age 1 year. Despite strong strides and progress made with respect to her physical development and mobility issues, there were significant behavioral and emotional issues that surfaced over time. Of particular note was an increasing anxiety associated with social isolation and peer rejection. Despite academic success, the patient had 4 resulting “psychotic” episodes associated with self-instituted sleep deprivation, paranoia, and incessant, inappropriate laughter. She also began having seizures. She was admitted with acute change mental status and MRI/EEGs were normal. Despite multiple tests and admissions, no physical abnormalities associated with behavior changes could be identified; this included workup for stroke and thyroid disorder. After approximately 2 years of medical workups, she was referred to an adolescent behavioral clinic for assessment. Following workup, she was diagnosed with mood disorder associated with seizures with possible bipolar disorder as well. An accompanying diagnosis was “growing up with a physical and visual handicap” which contributed to her social school isolation.

**Conclusions:** Patients with CP should routinely be seen for mental health disturbances as a regular part of their care.

**Reviewer's Comments:** I thought this was a fascinating read; physical disabilities such as the spasticity associated with CP so often overshadow behavioral and mental health issues. It is no surprise to me that mental health in children with special health care needs is an underutilized and often ignored subspecialty. The child typifies what occurs: many years of physical-diagnosis focused treatment before a behavioral team is consulted. (Reviewer-S. Thikkurissy, DDS).

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Keywords: Cerebral Palsy, Behavioral Disorder

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Within the diagnoses of special health care needs, patients with behavioral, emotional, or developmental problems were significantly less likely to receive family-centered care.

**BACKGROUND:** Family-centered care (FCC) is an important aspect of healthcare delivery for children, particularly those with special health care needs (CSHCN). FCC is a concept that realizes the structure and participation of families are vital elements in quality of care. FCC is also critical in engaging and enabling parents of CHSCN in being “partners in the healthcare” of their child. Critical components of FCC include time spent with families by healthcare providers (HCP), the perception that HCP actually listen to families, the sensitivity HCP of families’ specific concerns and values, the dissemination of health-related information, the feeling of partnership a family felt in their child's care, and finally, the availability and appropriate use of interpreter services.

**Objective:** To examine racial and language-based FCC disparities.

**Design:** Retrospective analysis.

**Methods:** Data from the 2005-2006 National Survey of CSHCN (N-CSHCN) were used. The N-CSHCN is a telephone-based survey of 192,083 households with children aged ≥18 years.

**Results:** From 38,902 of households with CSHCN, it was determined that 66% of children received appropriate FCC. Minority children were significantly less likely to receive FCC than Caucasian children. Latino children in particular were half as likely to receive FCC. African-American and Latino CSHCN were significantly less likely to feel as though adequate time was spent with them by a HCP. If parents completed the survey in a language other than English they were less likely to perceive FCC, particularly when it came to understanding cultural values in the context of healthcare delivery.

**Conclusions:** Within the diagnoses of SHCN, patients with behavioral, emotional, or developmental problems were significantly less likely to receive FCC.

**Reviewer's Comments:** The concept of family-centered care seems intuitive; pediatric dentists do it all the time. We use parents as partners in behavior management. This study demonstrated that minority families, and particularly non-English speaking families, face significant barriers in feeling “appropriately taken care of” and “partnered” in their child's care. Furthermore, children with a behavioral-based special health care need were less likely to receive FCC. (Reviewer-S. Thikkurissy, DDS).

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Keywords: Children, Special Needs, Family-Centered Care

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