

Oral Health Research Review

Making Education Easy

Issue 1 - 2009

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Welcome to the first edition of Oral Health Research Review, a unique New Zealand publication designed to make life easier for oral health practitioners.

We aim to save you time by regularly summarising what we think are the most significant new papers from around the world, and include local commentary on why they are important and how they can potentially affect practice. The selection and review of the papers is carried out independently, and links to the abstract or fully published papers are provided wherever possible so you can form your own judgement.

We hope you find our inaugural selection for Oral Health Research Review stimulating reading, and we welcome your feedback.

Kind regards,

Jonathan Leichter D.M.D

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Salivary changes and dental erosion in bulimia nervosa

Authors: Dynesen AW et al

Summary: The possibility that salivary gland function is altered in individuals with bulimia nervosa (BN), and that such changes are related to dental erosion, was explored in 20 women with this condition and 20 matched controls. The BN group had a lower unstimulated whole saliva flow rate than controls, and this was attributed mainly to medication use. Saliva composition was similar between the BN and control groups.

Comment (JL): Although the diagnosis of BN is complicated, dental complications due to the eroding effects of vomit are objective signs of BN, with dental erosion the most distinct and consistent oral finding. This research was carried out to see if BN has an impact on salivary gland function and if such changes are related to dental erosion. It was noted that there was a higher intake of 'acidic drinks' and more smokers in the BN group, and that 9 persons in this group were medicated. The study found that the unstimulated whole saliva flow rate was significantly lower in the BN group, but no major changes in saliva composition were found. The dental erosion score was significantly higher in the BN group. The conclusions drawn were that the reduced flow rate is primarily due to the intake of medications (antidepressants) and that the increased dental erosion was related to the duration of the eating disorder. We need to be aware of this condition, not only because as oral health providers we may be the first ones to detect a problem, but also because we are in a position to suggest and implement strategies to preserve and protect the dentition.

Comment (WP): BN can be challenging to treat for oral health professionals because often there is a social stigma attached to the disease and it is, at times, not admitted to health professionals. The authors note that as oral health professionals, we must piece together the signs and/or oral manifestations to gain the whole picture. As pointed out in the article, there may be salivary changes, xerostomia, erosion of enamel surfaces, enlarged salivary glands, and self medication with laxatives. Yet these signs can vary greatly depending on the timeframe a patient has been suffering from BN. There needs to be a tailored preventative regimen for each patient depending on the duration and severity of the disease. Preventative strategies may involve smoking cessation, dietary advice, advice on what to do after purging, erosion prevention and brushing regimes, although all of these are only dealing with the effects of the disease. From a holistic and long-term treatment perspective, getting the patient to address the disease BN is central to overcoming all the secondary effects. Counselling advice and help lines are important strategies to have available in treating patients with this disorder.

Reference: *Oral Surg Oral Med Oral Radiol Endod* 2008; 106(5): 696-707

<http://tinyurl.com/OSOMOPORE-106-696>

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A double blind RCT of at-home tooth bleaching using two carbamide peroxide concentrations: 6-month follow-up

Authors: Meireles SS et al

Summary: In this RCT, 92 volunteers were randomised to 10% or 16% carbamide peroxide 2 h/day for 3 weeks to compare the durability of the whitening effects of the two strengths. Tooth shade at 6 months follow-up was significantly lighter than at baseline in both groups, and the between-group difference was not significant.

Comment (JL): At-home tooth bleaching has become a widely requested treatment as more patients embark upon their quest for eternal youth. Manufacturers have increased the concentrations of carbamide or hydrogen peroxide in an attempt to increase the effectiveness and longevity of the whitening effect. In this study, two carbamide peroxide strengths, 10% and 16%, were used in custom-made bleaching trays for a 3-week period with 92 volunteers taking part. Evaluation was done at baseline, 1 week and finally at 6 months postbleaching. Both visual and digital spectrophotometer analyses were used. Volunteers were also questioned regarding their intake of staining foods and drinks. The results of the study showed that, although the intake of a staining diet was high in both groups, it did not appear to influence the bleaching effect durability. With this information in mind, I will continue to recommend the 10% 'standard' concentration.

Comment (WP): An interesting study concluding that carbamide peroxide strengths (10% and 16%) in at-home bleaching systems ('Whiteness Perfect', FGM Dental Products, Joinville, Brazil) do not affect the degree of whitening achieved at 6 months follow-up. Diet was not considered to have an influence on the whitening longevity; however, there did not seem to be a verifiable mode of evaluating the impact of diet on whiteness other than a questionnaire. Results 1 year postbleaching would also be interesting to see. Continued research in this area is valuable, as products are constantly evolving in efficacy, both in office and take-home products. Presumably there would also be variation in results with the use of different products other than the ones used in this study.

Reference: *J Dent* 2008; 36(11): 878-84

<http://tinyurl.com/JDent-36-878>

Oral manifestations of alcohol abuse

Authors: Spencer L

Summary: This paper on managing patients with the disease of alcohol abuse highlights that the subject often needs to be broached in a general manner. Displaying recommendations for oral healthcare and contact details for support services in the waiting room is suggested. Specific recommendations for patients with known or suspected alcoholism are provided (see Comment).

Comment (JL): The impact of alcohol on oral health is a much neglected area, with most of the attention being paid to the social and medical effects of alcohol abuse. Although it is easy to list many of the systemic sequelae of alcohol abuse, such as pancreatitis, cirrhosis, heart damage and depression, information regarding the oral cavity and dental management of these patients appears to be sparse. We all treat alcoholic patients, mostly unknowingly, as people tend not to be honest regarding their alcohol consumption. This article briefly discusses the oral manifestations such as oral cancer, irritation of the soft tissues, poor oral hygiene, xerostomia, caries, erosion, leukoplakia and increased bruxism. The author recommends incorporating a question about alcohol consumption into our initial screening session, displaying information sheets in our waiting rooms and, of course, dealing with any oral problems. A few key points are made: avoid brushing after vomiting or consuming acidic drinks, fluoride therapy is useful, and avoid using or recommending mouthrinses containing alcohol when treating alcoholics. A list of useful website addresses is also provided.

Comment (WP): The author points out that the prevalence of alcoholism in the UK is reasonably high, thus it is important for health professional to be aware of the oral health implications of excessive alcohol consumption. Like other diseases with social stigma attached, alcoholism is not always admitted and therefore the manifestations of alcohol abuse on the oral cavity need to be known. Many of the oral effects of alcoholism can also be linked to other medical, systemic and habitual conditions, so importance needs to be placed on thorough medical histories and intra-oral exams to help piece together what might not be openly admitted. Being in the role of an oral health advisor, it is clear we are here to help with advice and regimes to minimise the impact of the disease on a holistic level, and therefore we need to have available not only preventative advice for oral effects of alcohol abuse, but also information and contact details for local support groups and help lines to deal with the disease itself.

Reference: *Dental Health* 2008; 47(6): 16-8

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Caries prevalence four years after the end of an RCT

Authors: Pine CM et al

Summary: This paper presented follow-up data from 329 of 428 school children from a relatively deprived area who completed an RCT in which supervised tooth brushing with 1000 ppm fluoride toothpaste at school plus a pack encouraging twice daily at-home brushing with a toothbrush and paste, and a brushing chart for school holidays was compared with no intervention. A reduction in caries in permanent molar teeth was seen in the intervention group in the 30-month RCT (baseline age 5 years), and the follow-up analysis when the children were aged 12 years showed that the intervention group still had less caries than the no-intervention group (D₃FS increment 1.62 vs. 2.65; p<0.05).

Comment (JL): Although this article was published in 2007, it is still highly relevant. Children were examined every 6 months during the trial, then at 6, 18, 30 and 54 months after the trial had ended. It was no great surprise that the majority of the teeth that had developed caries were the first permanent molars, but what was interesting is that 7 years after the start of the trial, children in the intervention group had developed significantly less caries in their first permanent molars than those in the no-intervention group. Was this as a result of the biological effect or was it due to a behavioural change? It was mentioned that findings from this study have influenced government policy within Scotland – how about NZ?

Comment (WP): From an epidemiological approach, it is very difficult to compare two different communities to each other due to the mounting number of variables between the communities concerned. This is shown by the differing results of fluoride use and the benefits gained thereof included in the studies in this article. Yet also from an epidemiological point of view, the Scottish RCT showed good participation over the entire length of the study with fairly conclusive results. Oral health education in school-age children can only be of benefit if the education programme is effective in its approach and increases awareness. As an oral health practitioner, oral health instruction plays a vital role in implementing change on an individual basis.

Reference: *Caries Res* 2007; 41(6): 431-6

<http://tinyurl.com/CariesRes-41-431>

Independent commentary by Jonathan Leichter DMD, Cert Perio (Harvard). Dr Leichter is currently Senior Lecturer in the Department of Oral Sciences at the University of Otago. Dr Leichter joined the faculty after 20 years in fulltime private practice in New York and Boston, 18 of which were spent in specialist practice limited to periodontology and implant dentistry. Trained at Tufts University and obtaining his specialist training at Harvard University, he has been actively involved in clinical dental implant practice since 1984. Since 2002, he has supervised and mentored postgraduate students in periodontology, endodontics and prosthodontics. His research interests and publications are in the field of periodontology, dental trauma and laser applications in dentistry.

Independent commentary by Wynton Perrott, Dental Hygienist. He holds a Diploma in Dental Hygiene from the University of Otago where he is currently enrolled in Health Sciences and has also gained entry into the Bachelor of Dental Surgery Programme.

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Effects of erosive, cariogenic or combined erosive/cariogenic challenges on human enamel

Authors: Honório HM et al

Summary: The effects of immersing plaque-free and plaque-covered enamel blocks in erosive beverages 3 times daily for 2 weeks were investigated. Four different plaque-covered blocks were also immersed in a sucrose solution 8 times daily for 2 weeks, with two of them also immersed in a cola drink 3 times daily. The mean wear value for the plaque-free blocks immersed in only the erosive beverage was 4.82 µm, compared with 0.14 µm for plaque-covered blocks immersed in the erosive solution only, and 0.34 and 0.42 µm for the plaque-covered blocks immersed in both solutions and in only the sucrose solution, respectively; the respective changes in hardness were 310, 48, 245 and 309 kp/mm².

Comment (JL): We are faced daily with patients who live on a diet of carbonated drinks and cariogenic foods; these two assaults on their dentition generally going hand in hand. The aim of this study was to investigate a possible caries/erosion interaction. Plaque fluid always contains Ca, P and some F, while in erosion the causative agents rarely have significant Ca, P or F concentrations with the rate of dissolution much slower in caries than in erosion. A crossover study was performed in two phases of 14 days each, with a washout period of 7 days. Eleven volunteers wore custom-made acrylic appliances containing four enamel specimens. Immersion of the appliances in a cola drink ('Coca-cola', not degassed, pH of 2.6) 3 times daily, and a 20% sucrose solution 8 times daily were used as the erosive and cariogenic challenges. In this study, no cumulative effect was observed. Interestingly enough, the results suggest that the presence of dental plaque can decrease the acid attack of erosive drinks. I would not suggest that this be used as an excuse to neglect oral hygiene – some patients will use any excuse not to brush!

Comment (WP): An inconclusive study using a small group of eleven volunteers in which the relationship between caries and erosion is investigated. Previous studies have evaluated the pathogenesis of caries and dental erosion, but this study analyses the combined effect of erosive and cariogenic challenges on human enamel, more specifically the presence of dental plaque in conjunction with erosive drinks. As this is an inconclusive study, the results may not have a direct impact on how an oral health professional provides care; however, findings from previous studies, mentioned in this article and included in the hypothesis, were of interest. Previous findings of Featherstone and Lussi, 2006 showed that the rate of dissolution of enamel from cariogenic sources (dental plaque) is lower than that of erosion alone. Often in private practice it is the mouth that exhibits noticeably poor oral hygiene that is then referred to the hygienist for periodontal treatment and intensive oral hygiene instruction. However, as these studies show, the effects of dental erosion, which may not be as noticeable, can be more detrimental in regards to the loss of enamel than poor oral hygiene. It makes good practice sense for all practitioners to be vigilant in ensuring that access to hygiene treatment and oral hygiene instruction (including dietary advice) is available to all patients.

Reference: *Caries Res* 2008; 42(6): 454-9

<http://tinyurl.com/CariesRes-42-454>

Polishing performance of multiple-use silicone rubber-based polishing instruments with and without disinfection/sterilization

Authors: Heintze SD et al

Summary: Surface gloss, surface roughness, composite loss and loss of rubber material were measured in preroughened composite specimens after polishing for 10 seconds (F & P disc) and 30 seconds (HP disc) with the 'Astropol' 3-step polishing system under standardised contact pressure with and without a disinfection/sterilisation protocol. Polishing performance was significantly inferior when the instruments used were not disinfected or sterilised. Moreover, loss in performance increased further with re-use. Instruments which underwent prolonged disinfection did not exhibit loss in performance on re-use. Loss of silicone rubber material on the F & P discs adversely affected polishing performance, but not on the HP discs, and adherence of rubber particles to the composite occurred. There was no difference between the test and control groups on surface roughness for the discs that were only sterilised, but surface gloss was inferior to the control group.

Comment (JL): The recommendation to use a new rubber polishing instrument for each restoration when polishing multiple restorations in the same patient is certainly something I had never given any thought to. Multiple uses without disinfection simulated the clinical situation where multiple restorations in the same patient are polished, while multiple uses after disinfection simulated using the same instrument in different patients after disinfection. I found the results rather interesting and certainly not what I expected. The polishing performance was maintained or even improved where instruments were subjected to a disinfection/sterilisation process. This was not the case with instruments reused but not disinfected/sterilised. What was not unexpected was that prolonged disinfection causes early disintegration and wear of the silicone rubber material. Besides adherence to recognised infection control procedures, this study provides an added incentive to sterilise!

Comment (WP): For clinicians who use the 'Astropol' system, this study produced by the Ivoclar research department would be useful in enabling clinicians to provide the highest standard of polishing for patients. The study shows that disinfection alone can result in faster degradation of the 'Astropol' discs. While disinfection alone may be common in some areas, sterilisation of materials used is not only more effective, it also preserves the integrity of the materials, enabling discs to be reused. The authors of this article recommend using a new disc for each restoration polished. This obviously would produce the best polishing result, but economic restraints would probably be a factor.

Reference: *Am J Dent* 2008; 21(5): 288-94

<http://www.amjdent.com/Archive/Abstracts/October%202008%20Abstracts.htm#Heintze>

Fluoride supplements, dental caries and fluorosis

Authors: Ismail AI et al

Summary: This review of trials investigating fluoride supplements (including 11 reports that evaluated dosage schedules that were in line with ADA recommendations) found there was evidence that such supplements prevent caries in permanent teeth, but the evidence for caries prevention in primary teeth was weak and inconsistent. Data from five studies showed that fluoride supplements are associated with an increased risk of mild-to-moderate dental fluorosis, especially during the first 3 years.

Comment (JL): After reviewing 20 reports from 12 trials that met their defined criteria, as well as an additional five studies regarding the association between fluorosis and supplements, the authors of this review suggest that the recommendations for use of fluoride supplements during the first 6 years of life should be re-examined. In 1991 it was suggested by a group of European experts that fluoride supplements have no application as a public health measure. In 2006 the Australian Research Centre for Population Oral Health concluded that fluoride supplements in the form of drops or tablets should not be used. I have found that many parents, who themselves took fluoride tablets, are concerned that I have not advised the same 'advantage' for their children – this article will be a useful reference.

Comment (WP): This review seems to be very comprehensive in analysing the effectiveness of fluoride supplements and the associated risks of fluorosis. The main body of contributing research seems to be pre-2000, and more recent research would be interesting to evaluate as fluoride exposure may have changed over that time with the presence of fluoride in food and water and in dentifrices as mentioned by the authors. It is in the best interests of all health professionals to be educated on the subject of fluoride use and supplements indication, as it is a subject that attracts significant public concern, some of which may not be derived from evidence-based research. While fluorosis is considered by many to be a negative side effect of fluoride use, it was noted that patients with fluorosis experienced lower levels of decay. The authors commented that research should be examined to evaluate societal tolerance levels of fluorosis and the impact on the individual. The authors also recommended that fluoride exposure should be reduced in the first 3 years of a child's life, due to the increase in prevalence of fluorosis in the US.

Reference: *J Am Dent Assoc* 2008; 139(11): 1457-68

<http://jada.ada.org/cgi/content/full/139/11/1457>

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Chlorhexidine efficacy in preventing lesion formation in enamel and dentine

Authors: van Strijp AJP et al

Summary: This randomised study investigated the efficacy of chlorhexidine mouthrinse for protecting enamel and dentine from demineralisation in 14 participants with partial prostheses. The degree of demineralisation was not significantly different between participants randomised to receive chlorhexidine mouthrinse and those randomised to saline mouthrinse (control), with similar between-group findings for acid production in plaque samples from the prostheses and natural tooth surfaces.

Comment (JL): Chlorhexidine, a broad-spectrum antibacterial mouthrinse, is commonly used as an adjunct to oral hygiene therapy and homecare, and its suppression of cariogenic bacteria is well documented. However, when it comes to caries prevention, the picture is less clear as there are other cariogenic micro-organisms that are less susceptible to chlorhexidine. This *in situ* study determined the effect of chlorhexidine on the mineral content of enamel and dentine and not on its plaque-inhibiting effect. The authors concluded that a 0.2% chlorhexidine mouthrinse is not the caries-preventive agent of choice. As I have always considered chlorhexidine to be an excellent short-term strategy post-op and for acute periodontal problems, this article will not change any of my treatment modalities regarding caries prevention.

Comment (WP): Based on this study, where plaque levels were left undisturbed, the benefit of lesion prevention in enamel and dentine surfaces through chlorhexidine rinses was shown to be inconclusive. This study does show that chlorhexidine has bactericidal and bacteriostatic properties, which are useful in oral treatments when given the correct circumstances, yet the study once again backs up the point that without effective homecare and good plaque removal, even chlorhexidine has little or no benefit on lesion prevention. This was not a big study and perhaps with a larger study we might see a greater range of oral environments with flora more or less vulnerable to chlorhexidine, as this study shows the efficacy of chlorhexidine is greatly reduced by the dense plaque biofilm.

Reference: *Caries Res* 2008; 42(6): 460-5

<http://tinyurl.com/CariesRes-42-460>

Pulpotomies in primary teeth

Authors: Borasio V

Summary: This review presents basic principles of managing pulpitis in primary teeth, including current management with pulp capping and pulpotomy. The author also addresses the question, should formocresol, which contains the carcinogen formaldehyde, still be in use? A literature review concludes that: 1) the risk associated with formocresol use in paediatric patients is "inconsequential"; 2) mineral trioxide aggregate (MTA), with an astringent, could be used for direct and indirect pulp capping and pulpotomies, although it is expensive; 3) stainless steel crowns should be the final restoration; and 4) composite and amalgam can be considered when the patient refuses a stainless steel crown.

Comment (JL): This article caught my eye because concerns are continually being raised about formocresol, as formaldehyde, its main constituent, has been classified as a probable carcinogen by the International Agency for Research on Cancer. Notwithstanding, formocresol continues to be used in children. The author briefly discusses the basic principles of pulp treatment in primary teeth before moving on to a literature review on the different treatment options available. My fears were allayed when the research results suggested an inconsequential risk of carcinogenesis associated with formaldehyde use in paediatric pulp therapy. If, however, one chooses to err on the side of caution, a list of alternatives is discussed. These include MTA, both white and grey, ferric sulphate, biologically active odontogenic protein enamel matrix derivatives and ND:YAG laser. Of these, MTA certainly stands out as the best alternative and can be used for direct and indirect pulp capping as well as pulpotomies.

Comment (WP): This article deals with areas more pertaining to paediatrics in the final stages, yet oral hygiene instruction is to play a vital role in prevention as is stated in the author's conclusion. Based on the author's review, MTA appears to be the superior product for pulpotomies, as it has shown to limit the adverse effects such as apexogenesis and microleakage, with good biocompatibility and is noncarcinogenic to humans. Oral hygiene and diet are leading influences to caries activity, so it would be the sensible treatment route when dealing with patients with pulpotomy requirements to also give oral hygiene and diet instruction.

Reference: *Dental Health* 2008; 47(6): 10-4

<http://tinyurl.com/JDent-36-878>

In vitro tooth whitening effect of two medicated chewing gums compared to a whitening gum and saliva

Authors: Moore M et al

Summary: The tooth whitening effects of two nicotine-medicated chewing gums, confectionary whitening gum and saliva were compared in stained bovine incisors. Both the nicotine-medicated gums had the greatest whitening effect, while the confectionary whitening gum had only a mild whitening effect. The investigators commented that the superiority of the nicotine-medicated gums in whitening teeth might boost a smoker's resolve to quit.

Comment (JL): We have all seen patients, friends or family go through the battle to give up smoking and any additional motivation could help tip the balance as, in my experience, they appear to walk a fine line between success and relapse. This study found that the medicated gums removed significantly greater amount of extrinsic stain than the positive control. Saliva was the least effective. Perhaps we could use this whitening effect to promote the use of NRT chewing gums to our patients, thus achieving two objectives – covering the former smoker's nicotine needs as well as improving aesthetics, which may further help strengthen the smoker's motivation to quit. Surely anything is worth a try?

Comment (WP): Smokers often, as stated in this article, want to improve the aesthetic appearance of their teeth and are motivated to stop smoking for this reason. As a possible avenue of smoking cessation, nicotine replacement gum has a dual benefit in that it helps to remove extrinsic stains as well as replace the nicotine in the body. Quitting smoking is a monumental task for the smoker to achieve. Any perceived added incentive such as whiter teeth may help the patient to achieve their goal of smoking cessation. Added benefits are also associated with chewing gum, especially after meals with the stimulation of saliva production inciting a buffering action on acid attack of enamel surfaces, thus making such a recommendation to patients looking to quit smoking packed with benefits.

Reference: *BMC Oral Health* 2008; 8: 23

<http://www.biomedcentral.com/1472-6831/8/23>

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