

## Costello Award abstracts

Students from Cork University Dental School and Hospital and the Dublin Dental University Hospital presented the following two abstracts at the IDA ASM 2022 for consideration for the Costello Award.

### Cork University Dental School and Hospital

**Should patients on long-term systemic steroid medication receive supplementary glucocorticoids or 'steroid cover' when undergoing certain dental treatments?**

*Ivanisevic, O., Smeenk, G., Brady, P.*

**Background:** Glucocorticoids are a popular class of drug prescribed for a variety of autoimmune and inflammatory diseases. Long-term glucocorticoid therapy can result in adrenal gland atrophy, leading to an inadequate release of endogenous adrenocortical hormones in response to stress, and may progress to a potentially life-threatening adrenal crisis. Despite the rarity of adrenal crises, there are documented incidences precipitated by dental treatment. Pre-operative steroid cover is recommended to prevent adrenal crisis; however, most guidelines proposed are found within the contexts of medical literature. There lacks a metric for categorising what is considered a stressful enough procedure to warrant supplementation of steroids in dentistry.

**Aim:** to investigate the relative need for prophylactic glucocorticoid supplementation prior to dental treatments in patients on long-term glucocorticoid treatment.

**Methods:** The PubMed, Cochrane Library and Web of Science databases were searched for literature published between 2000 and 2022. Randomised controlled trials, systematic reviews, meta-analyses, cohort studies and cross-sectional studies were included, while *in-vitro* studies were excluded. From 940 sources identified, 20 were included in the review after screening.

**Results:** Based on the current literature, patients on long-term glucocorticoid medication do not require routine steroid cover for restorative dental procedures under local anaesthesia.

Generally, patients taking low-dose long-term glucocorticoids (less than 7.5mg prednisolone/day) should not require steroid cover with minor surgical procedures under local anaesthetic. However, patients taking higher-dose long-term glucocorticoids should double their dose the day of minor surgical procedures under local anaesthetic. It is suggested that for minor surgical procedures under general anaesthetic, a 100mg intramuscular dose of hydrocortisone should be supplemented in addition to their regular daily dose. Finally, patients undergoing major surgery under general anaesthetic require a pre-operative 100mg bolus dose of hydrocortisone followed by 50mg every eight hours for 48 hours after the procedure.

**Conclusion:** Dentists may take comfort in knowing that patients on long-term glucocorticoids do not require pre-procedural management for routine dental work under local anaesthetic. Dentists should still be wary of the signs of adrenal crisis and consult the patient's prescribing physician about any concerns prior to commencing treatment.

### Dublin Dental University Hospital

**Environmental sustainability policies in healthcare: a global qualitative review of policy content and production**

*Price, C., Ademaj, D.*

**Background:** Climate change is an increasing threat to humanity. The healthcare sector produces more than 4% of global carbon emissions. So far, little work has been done to increase the environmental sustainability of healthcare delivery. When action has been taken, it has been mostly aspirational in nature and inconsistent in its approach and goals.

**Aim:** To determine if, when and where environmental scans of environmental sustainability policies have been published. To investigate the types and content of published sustainability policies, the likelihood of successful policy implementation, and their applicability to improving sustainability in Irish dentistry.

**Methods:** Two research databases were searched (Medline and Scopus) for previously published scans. A Google search of grey literature from 59 English-speaking countries and key organisations was performed to identify policy documents and included policies underwent thematic analysis.

**Results:** No previously published environmental scans were found in the databases. A total of 106 policy documents were identified. Several key sustainability themes were identified including: travel; building standards; waste prevention; staff awareness; and, changing models of care. Most of the policies were produced by State organisations or regulatory groups in developed countries.

**Conclusion:** The approach in high-income countries to developing and implementing environmental sustainability frameworks has been piecemeal and inconsistent. Where success has occurred, it has been driven by legislation or by altering financial incentives. Policy design should be guided by centres of global expertise with increased emphasis on disease prevention.

### Cancer vaccines: building a bridge over troubled waters.

Sellars, M.C., Wu, C.J., Fritsch, E.F.

#### Abstract

Cancer vaccines aim to direct the immune system to eradicate cancer cells. Here we review the essential immunologic concepts underpinning natural immunity and highlight the multiple unique challenges faced by vaccines targeting cancer. Recent technological advances in mass spectrometry, neo-antigen prediction, genetically and pharmacologically engineered mouse models, and single-cell omics have revealed new biology, which can help to bridge this divide. We particularly focus on translationally relevant aspects, such as antigen selection and delivery, and the monitoring of human post-vaccination responses, and encourage more aggressive exploration of novel approaches.

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### Chronic exercise preserves lean muscle mass in masters athletes

Wroblewski, A.P., Amati, F., Smiley, M.A., Goodpaster, B., Wright, V.

#### Abstract

Ageing is commonly associated with a loss of muscle mass and strength, resulting in falls, functional decline, and the subjective feeling of weakness. Exercise modulates the morbidities of muscle ageing. Most studies, however, have examined muscle loss changes in sedentary ageing adults. This leaves the question of whether the changes that are commonly associated with muscle ageing reflect the true physiology of muscle ageing, or whether they reflect disuse atrophy. This study evaluated whether high levels of chronic exercise prevent the loss of lean muscle mass and strength experienced in sedentary ageing adults. A cross-section of 40 high-level recreational athletes ("masters athletes") who were aged 40 to 81 years and trained four to five times per week underwent tests of health/activity, body composition, quadriceps peak torque (PT), and magnetic resonance imaging (MRI) of bilateral quadriceps. Mid-thigh muscle area, quadriceps area (QA), subcutaneous adipose tissue, and intramuscular adipose tissue were quantified in MRI using medical image processing, analysis, and visualisation software. One-way analysis of variance was used to examine age group differences. Relationships were evaluated using Spearman correlations. Mid-thigh muscle area ( $P = 0.31$ ) and lean mass ( $P = 0.15$ ) did not increase with age and were significantly related to retention of mid-thigh muscle area ( $P < 0.0001$ ). This occurred despite an increase in total body fat percentage ( $P = 0.003$ ) with age. Mid-thigh muscle area ( $P = 0.12$ ), QA ( $P = 0.17$ ), and quadriceps PT did not decline with age. Specific strength (strength per QA) did not decline significantly with age ( $P = 0.06$ ). As muscle area increased, PT increased significantly ( $P = 0.008$ ). There was not a significant relationship between intramuscular adipose tissue ( $P = 0.71$ ) or lean mass ( $P = 0.4$ ) and PT. This study contradicts the common observation that muscle mass and strength decline as a function of aging alone. Instead, these declines may signal the effect of chronic disuse rather than muscle ageing. Evaluation of masters athletes removes disuse as a confounding variable in the study of lower-extremity function and loss of lean muscle mass. This maintenance of muscle mass and strength may decrease or eliminate the falls, functional decline, and loss of independence that are commonly seen in ageing adults.

*The Physician and Sportsmedicine* 2011; 39 (3): 172-178.

### Effectiveness of a chairside acrylic adjustment cabinet in reducing dental acrylic debris and aerosols

Srivastava, A., Andersen, M.R., Alshehri, A.M., Lara, B., Bashiri, R., Li, G., et al.

#### Abstract

**Purpose:** Chairside prosthesis adjustment procedures generate contaminated acrylic particle debris that include visible splatter (particles  $>50\mu\text{m}$ ), as well as invisible aerosols ( $<50\mu\text{m}$ ). The purpose of this study was to evaluate the effectiveness of a chairside acrylic adjustment cabinet (CAAC) in reducing airborne aerosol particles ( $<10\mu\text{m}$ ) and visible acrylic debris, time required for airborne aerosols to return to baseline levels after an acrylic adjustment procedure, and the effect on operatory turnover time.

**Materials and methods:** A total of 40 acrylic adjustment procedures were carried out in a simulated setting with (experiment) and without (control) a CAAC. Standardised acrylic samples of self-polymerised, and heat-polymerised polymethylmethacrylate resins, Triad and Fastray custom tray materials were evaluated. Airborne aerosol measurements were done using a handheld laser particle counter for absolute particle counts of sizes 0.3, 0.5, 1.0, 2.5, 5.0, and  $10.0\mu\text{m}$  before, during, and immediately after adjustment, and 10 minutes post adjustment. Spread of aerosols was assessed at three distinct locations within the dental operatory specific to the provider, the patient, and the caregiver/guest. Visible acrylic debris and operatory turnover time were evaluated immediately post adjustments by a blinded investigator. Repeated measures ANOVA was used to estimate group effect, time effect and interaction between group and time for air particle analysis. Independent sample T-tests were used for group differences between operatory turnover time, and time for aerosols to return to baseline. Chi-square test was used for visible surface analysis.

**Results:** In the control group, total aerosol particle counts increased from  $6,542.7 \pm 162.6$  particles at baseline to  $598,378.7 \pm 586,363.2$  and  $367,569.9 \pm 432,220.8$  particles during and immediately post adjustment, respectively. Adjustments made in the experiment group led to significantly reduced aerosol counts during ( $97,738.9 \pm 97,866.5$ ) and immediately post adjustment ( $19,786.5 \pm 14,004.9$ ;  $F = 17.8$ ,  $p = 0.006$ ). Similar trends were noted for the patient and guest positions. Time for aerosol particles to return to baseline was significantly lower in the experiment group ( $20.56 \pm 14.5$  minutes) compared to the control group ( $37.9 \pm 31.96$  minutes;  $p = 0.03$ ). Visible acrylic debris analysis showed a significant decrease of 78% in the experiment group ( $p < 0.001$ ). No significant differences were noted in operatory turnover time between the two groups ( $p = 0.61$ ).

**Conclusions:** Acrylic adjustment procedures generated aerosols of particle sizes less than  $10\mu\text{m}$  and were measured in significant quantities throughout the dental operatory for up to 115 minutes. Chairside acrylic adjustment cabinets significantly decreased airborne aerosols, visible acrylic particle debris, and reduced the time for airborne aerosols to return to baseline levels.

*Journal of Prosthodontics* 2022; 31 (6): 488-495.

## Topical fluoride effectiveness in high-caries-risk adults

Jurasic, M.M., Gibson, G., Orner, M.B., Wehler, C.J., Jones, J.A., Cabral, H.J.

### Abstract

This retrospective analysis of longitudinal data was developed to determine which types, combinations, and intensities of topical fluorides more effectively prevent new caries-related restorations and extractions in high-caries-risk adults. We included data from October 1, 2008, through June 30, 2018, from the electronic dental and medical records and pharmacy database of the US Department of Veterans Affairs. Veterans who were eligible for continuing and comprehensive care, met the criteria of high caries risk (received two or more caries-related restorations within a 365-day period), and had three years of follow-up, were included. Multivariable logistic regression models estimated the odds of caries-related treatment during the one-year observation period, controlling for age, gender, race and ethnicity, illness burden (Selim comorbidity index), use of prescription medications, attendance at dental prophylaxis appointments, number of caries-related restorations during the index year, and time between first and last caries-related restoration during the

index year. The study sample included 68,757 veterans, who were primarily male (91.5%), white (73.6%), had a mean age of  $59.2 \pm 13.5$  years, and had significant medical comorbidity as measured by the Selim index ( $3.7 \pm 2.4$  physical and  $1.3 \pm 1.2$  mental diagnoses). They had  $10.8 \pm 6.3$  prescription VA drug classes, took  $0.6 \pm 0.8$  strong anticholinergic medications, and had  $3.9 \pm 2.6$  teeth restored due to caries during the index year. Adjusted multivariable logistic regression models showed that veterans who received a varnish or gel/rinse fluoride intervention versus no fluoride had approximately 29% decreased odds of receiving caries-related treatment during the observation period (gel/rinse adjusted odds ratio [AOR] = 0.72; 95% confidence interval [CI], 0.67-0.76; varnish AOR = 0.71; 95% CI, 0.67-0.75). The receipt of a varnish and gel/rinse did not demonstrate statistically better odds than each intervention alone (AOR = 0.69; 95% CI, 0.64-0.75). A dose-response effect was observed. Two-plus applications of varnish versus none (AOR = 0.73; 95% CI, 0.69-0.77) and two-plus applications of gel/rinse versus none (AOR = 0.71; 95% CI, 0.67-0.75) were more effective than one application of either modality versus none.

*Journal of Dental Research* 2022; 101 (8): 898-904.

## Quiz answers

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| <p><b>1.</b></p> <p>New cases of head and neck cancer, including all sites, collectively accounted for what percentage of all cancer cases worldwide in 2018 (Bosetti <i>et al.</i>, 2020)?</p> <p><b>Correct answer:</b><br/>3.8%</p> | <p><b>2.</b></p> <p>In Ireland, what is the most common age group for head and neck cancer (NCRI, 2018)?</p> <p><b>Correct answer:</b><br/>55+ years of age</p> | <p><b>3.</b></p> <p>What percentage of Irish 65+ year-old edentulous individuals “occasionally or never” visit a dentist (National Survey of Adult Dental Health, 2007)?</p> <p><b>Correct answer:</b><br/>80-100%</p> | <p><b>4.</b></p> <p>A survey on the first Mouth Cancer Awareness Day in Ireland (MacCarthy, D., <i>et al.</i>, JIDA 2012) revealed that 94% of respondents had never received any information about mouth head and neck cancer. What are the most common modifiable risk factors for mouth head and neck cancer?</p> <p><b>Correct answer:</b><br/>Alcohol consumption and tobacco use</p> |
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