THE PREMED SCENE, SEPTEMBER 2021

SEPTEMBER 2021 MEDICAL NEWSLETTER

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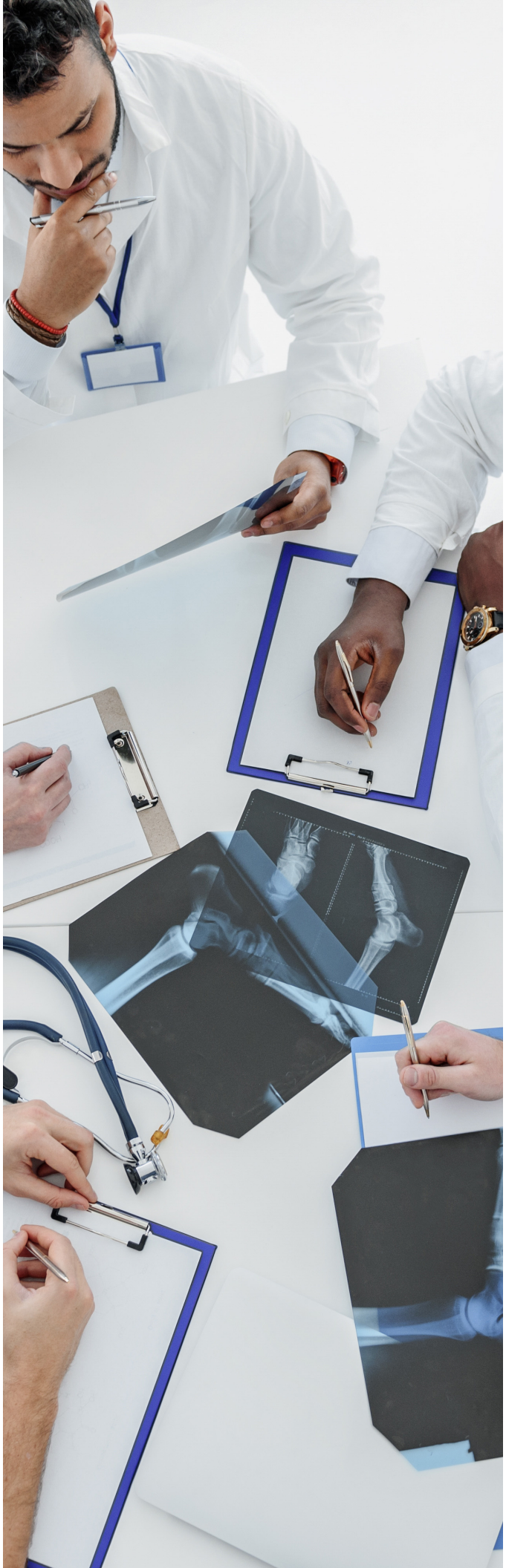


A NOTE FROM OUR NEWSLETTER DIRECTOR:

Two years ago, countries across the world shut down their businesses, schools, and other essential tools of society, as the COVID-19 pandemic spread throughout the globe. The Premed Scene was launched to provide alternative opportunities to pre-medical and pre-health students (for you :)), not to replace, but to enhance your shadowing experiences, and provide resources for your benefit.
In the Spring of 2021, The Premed Scene launched our monthly medical newsletter, designed to provide the most up-to-date advances in the field of medicine.

For this month's newsletter, The Premed Scene's blog writers, Aprile Bertomo, Ashlyn Southerland, Ilana Saidov, and Oriana Tolentino, have gathered the most exclusive news in the field of medicine, and presented these in their articles. This month will give you a glimpse into the field of Immunology, show the connection between dementia and traffic noise, introduce you to advances in glaucoma surgery, hit on the newest within the opioid crisis, as well as touch on the impact of air quality on our day-to-day cognitive function.
Welcome to our September Medical Newsletter.

Enjoy!

Ryen Belle Harran, Content Director

Specialty Spotlight: Allergy and Immunology

Ashlyn Southerland

Allergy and immunology is a medical specialty that distinctly focuses on the study, diagnosis, and treatment of conditions affecting the immune system, which also includes allergic reactions and other allergic diseases.

What are some examples of diseases that allergists/immunologists are able to treat?

- Allergic rhinitis
- Food allergies
- Atopic dermatitis (eczema)
- Celiac disease
- Autoimmune diseases (lupus, MS, rheumatoid arthritis)
- Bronchitis
- Angioedema

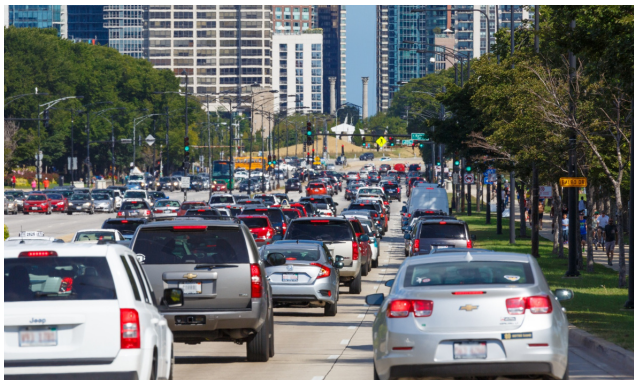
What is the typical route to become an allergist/immunologist?

In comparison to other medical specialties, allergy and immunology is considered to have one of the longest medical paths, totaling between 15-16 years of clinical training and education:

- *Earn a Bachelor's degree (4 years)* - The purpose of undergraduate schooling is to complete the necessary prerequisites for medical school admissions. This includes taking premedical courses, studying for the MCAT, and being involved in extracurricular, volunteer, or clinical work.
- *Take the Medical College Admission Test (MCAT)* - This test assesses your problem solving, critical thinking, and overall knowledge of science concepts.
- *Earn a Medical degree (4 years)* - Once a student receives an acceptance to medical school, they will be provided extensive training and education for their career as a physician.
- *Take the United States Medical Licensing Examination (USMLE)* - This examination evaluates the student's knowledge and ability to practice medicine.
- *Complete a Residency Program (4 years)* - Once licensure has been passed, a student begins post-graduate training to gain more experience in their specialty.
- *Complete an Allergy and Immunology Fellowship Training Program (2 years)* - The training program encourages sub-specialization and increased expertise in medicine and diagnosis.
- *Earn final Allergy and Immunology certification* - This certification must be renewed every 5 years by the American Board of Allergy and Immunology (ABAI).

Overall, if you are looking for a specialty that heavily relies on analytical thinking, attention to detail, and high dependability, look no further! Individuals with these characteristics will flourish and thrive in this particular profession.

Hold That Honk: How Traffic Noise Can Spur Development of Dementia



Aprile Bertomo

Admit it. Sometimes, you are on the road, driving peacefully and enjoying your favorite tunes. Suddenly, someone cuts in front of you from the right lane. Instinct kicks in, and you beep loudly at the car, adding to the multitude of honks of other angry drivers around you. However, you may want to think twice about honking that horn. A new study conducted by Cantuaria et al., 2021 finds that transportation noise has the potential to contribute to the development of dementia. (1)

Dementia has been defined by the Center for Disease Control and Prevention not as a type of specific disease but rather as an umbrella term for one's incapability to recall certain information, generally think, or make proper decisions. Those experiencing dementia are often at least approximately 65 years old. It has been predicted that about 5 million adults had dementia issues in 2014, and others currently suggest that almost 14 million individuals could experience dementia by the year 2060. While one's age can be indicative of one's risk of developing dementia, dementia is not a part of the normal aging process, as some individuals live their entire lives without experiencing any form of dementia. In addition to age, other factors that can potentially increase one's risk for dementia include one's family history, history of traumatic brain injury, race and ethnicity, and poor heart health. Common symptoms associated with dementia include having issues with memory, communicating, properly directing attention, and problem solving. (2)

Noise resulting from transportation has been ranked as the second-worst public health environmental risk factor in Europe. Such noise has been correlated with instances of developing obesity, coronary heart disease, and diabetes as well. Consequently, scientists decided to determine whether transportation noise plays a role in dementia development. (1)

Cantuaria et al., 2021 attempted to test this question by incorporating almost two million individuals who were 60 years old or older from the Danish Civil Registration System and ensuring that these individuals did not have a prior history of dementia. The researchers later obtained the addresses of these individuals in order to determine which areas to measure for transportation noise. The observational study was performed over the course of approximately ten years, with follow-ups to determine dementia development occurring after an average of about 8.5 years. (1)

Following the study, it was found that there existed an association between transportation noise resulting from road traffic and railway and a greater risk of developing dementia. There was a correlation between road traffic and railway noise and the development of Alzheimer's disease, specifically, and there was an association between road traffic noise only and the development of vascular dementia. (1)

Although further studies are required in order to investigate the results a bit further, it is evident that the results of this long-term observational study are of tremendous significance. Such may be particularly useful in evaluating health from a public health perspective. For now, one thing is certain- it may be best to limit the road rage and horn honking. (1)

Sources:

·Cantuaria M L, Waldorff F B, Wermuth L, Pedersen E R, Poulsen A H, Thacher J D et al. Residential exposure to transportation noise in Denmark and incidence of dementia: national cohort study BMJ 2021; 374 :n1954 doi:10.1136/bmj.n1954
·"What Is Dementia?" Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, 5 Apr. 2019, www.cdc.gov/aging/dementia/index.html.

Glaucoma Filtration Surgery: Incidence Measurement of Steroid Response

Ashlyn Southerland

For many, glaucoma is a serious cause of concern. This disease, which currently affects 3 million Americans, is commonly characterized by substantial fluid buildup, increased eye pressure, damage of the optic nerve, and, if untreated, eventual blindness.

Within recent decades, newfound discoveries and technologies have provided hope for individuals with glaucoma. In particular, utilization of glaucoma filtration surgery has been noted as the main treatment for affected individuals. Since these surgeries may present some postoperative inflammation within the eye, topical steroids are provided to the patient to help reduce this inflammation.

However, there has been discussion as to whether the steroids are completely safe for surgery-treated eyes. Although multiple studies have proven that topical steroids do reduce postoperative inflammation, they are also known for significant side effects, such as elevation of intraocular pressure (IOP). IOP is commonly presented in glaucoma, and therefore should decrease after surgery. Because IOP could manifest from neuronal, hormonal, cytokine, and systemic drug effects, this indicates a potential risk, as the high pressure can cause further damage to the eye itself.

To measure the severity of IOP incidence and steroid responses, Pandit et al. performed a comprehensive study composed of patients with primary open-angle glaucoma (POAG), primary angle-closure glaucoma (PACG), and juvenile open-angle glaucoma (JOAG). 298 patients were able to qualify for this study. All 298 participants underwent the same form of glaucoma filtration surgery (trabeculectomy) and were prescribed the same topical eye treatment (prednisolone acetate 1% eye drops). Each participant was instructed to use these eye drops following a strict weekly tapering regiment for at least 6 weeks.

A defined data collection strategy was implemented for this study as well. All data analysis activities were performed using IBM SPSS Statistics, Version 20.0. The statistical software implemented descriptive statistics and chi-square tests to study the associations between steroid response and glaucoma. To indicate the presence of a steroid response, Pandit et al. defined the response as a rise in IOP by more than (or equal to) 6 mmHg from the previous baseline (preoperative) IOP.

After the conduction of the study, it was revealed that 21% of the study population received a steroid response of equal or more than 6 mmHg from the previous baseline IOP. Since this result indicates that more than 1 out of 5 glaucoma patients experienced an increase in IOP from the use of topical steroid treatments, this treatment could not be considered wholly safe. Communications with patients regarding this side effect, along with taking in their history of steroid use, will be necessary to lower the detriments associated with IOP development.

Sources:

Boyd, K. (September 22,2021). *What is Glaucoma?* American Academy of Ophthalmology. https://www.aao.org/eye-health/diseases/what-is-glaucoma

Pandit, R., George, R.J., Lingam, V., & Balekudaru, S. (2021). Incidence of presumed steroid response in contralateral eye of patients who underwent glaucoma filtration surgery. *Indian Journal of Ophthalmology, 69*(9), 2481-2483. https://doi.org/10.4103/ijo.IJO_3069_20

Opioid Misuse After Sports Medicine Procedures

Ilana Saidov

The opioid epidemic has played a major role in the daily lives of athletes recovering from intense surgical procedures. Opioids bind to active receptors in the brain. The process of a receptor binding triggers the release of dopamine which is a neurotransmitter responsible for pleasure and learning. A problem arises when opioids are used over a long period of time, as they begin to change the number of dopamine receptors in the brain. Thus many individuals begin to feel the need to restore these levels by increasing their dosage, which triggers the start of opioid misuse. To combat this issue, the goal is to educate and inform the public on safe drug use as well as on overdose symptoms. If we achieve this task as a community, the number of individuals who lose their lives to addiction will lessen.

In order to determine how to effectively decrease the number of individuals impacted by opioid addiction and misuse, researchers conducted an experiment with 195 patients who underwent a shoulder procedure. Their findings were essential in preventing the next spike during this epidemic. They were able to conclude that the percentage of unused prescribed opioids is 31% for shoulder procedures, 34% for knee procedures, and 64% for hip procedures. The most frequent medications prescribed are oral codeine, with hydrocodone and oxycodone ranked second and third. It was also determined that 26% of patients asked for a refill on their prescription following their surgery. Thus, these patients were overprescribed and took in a larger dose of this pain medication. Additionally, only 36% were informed of how to properly dispose of their unused medication. Thus, overall information about how to effectively and safely overcome postsurgical pain management was not communicated with patients as well as with their coaches and doctors. Miscommunication, as well as lack of education about the process, are the main contributors to the epidemic.

We must ask ourselves how we can achieve the goal of spreading awareness and establishing communication between the patient, their coach, as well as their doctor in order to prevent opioid misuse. Researchers at South Carolina State University proposed a three-step plan in order to bridge any gaps in information concerning the patient's recovery plan. The plan focuses on education and transparency as the fundamentals principles of preventing opioid misuse while simultaneously ensuring a successful recovery for the patient. Any patient recovering from an intense orthopedic procedure would benefit from receiving detailed information about his or her pain management plan during the preoperative and postoperative phases. In terms of education on drug disposal, there has been a lack of awareness of how to properly dispose of opioids which is essential to preventing patients from simply storing the medication, which can threaten other individuals. Another main factor to consider is previous drug use and abuse. It is the prescribers job to evaluate the patient and collect an extensive history of drug-related information in order to rule out any red flags. Thus, this information can contribute to the overall pain management plan and prevent patients from falling into opioid abuse due to previous habits. Not only is the prescriber responsible for determining whether a patient should take opioids, he or she should also prioritize the health of the patient in the long term. Thus, it has been proposed that the prescriber should shorten the duration and prescribe the lowest dose of the opioid. This would prevent overprescribing medications as well lessen the occurrences of improper disposal methods. Overall, the goal of these protocols is to decrease the rate of the current opioid epidemic which peaked last in 2019. Through the support of athletic trainers as resources who can explain post-surgical procedures to their patients and serve as their advocates, the patient will be able to confidently avoid opioid misuse during the recovery period.

Source: O'Mara, Caitlin S., Michael G. Ward, and Zachary K. Winkelmann. "Opioid Medication Use and Education Following Sports Medicine Procedures: An Evidence-to-Practice Review." Clinical Practice in Athletic Training 4.2 (2021).

Impacts of Office Air Quality to Cognitive Function and Productivity

Oriana Tolentino

With the continuous production of goods by industries to satisfy the population's growing demand, it is no doubt that the environment's health, more specifically the air quality, is deteriorating. As a result, most people spend an increased amount of time indoors, thinking that they could escape the unhealthy air. However, they are unaware that outdoor sources of such pollutants are capable of entering indoors, depending on the ventilation, filtration, and infiltration. Therefore, a group from the Harvard T.H. Chan School of Public Health published a research study early this month to discover how the air quality in office buildings affects the employees' overall cognition and productivity for a period of one year.

The 12-month study involved 302 participants who worked in commercial buildings for a minimum of thrice a week in the United States, United Kingdom, Thailand, China, India, and Mexico. The workstation of each participant had a low-cost environmental sensor that would keep track of the indoor concentrations of fine particulate matter (PM2.5), carbon dioxide (CO2), relative humidity, and temperature. Additionally, each person's smartphone had to be downloaded with ForHealth, an application developed by Harvard University for this research. This was required for the participants to accomplish tests for 15 minutes each week within their respective work hours. These activities were signaled either by the researchers' previously scheduled time or the environmental target values (for PM2.5: below 50% and above 100%; for CO2: < 600ppm and > 950ppm).

The first activity was the Stroop color-word test which determined the participants' processing speed and inhibitory control. The results showed that with higher PM2.5 and CO2 levels, they completed it with lower accuracies and longer response times. The second assessment was the two-digit, visual addition-subtraction test which evaluated the participants' memory and cognitive speed. The researchers found out that with increased amounts of both pollutants, the employees also had more incorrect answers. However, only higher levels of CO2 were linked to increased response times.

The study proved that prolonged exposure to such pollutants is detrimental to one's health as it negatively affects the central nervous system (CNS). Inhaling large amounts of PM2.5 would increase the likelihood of having inflammations and neurodegenerative illnesses. Additionally, cognition and productivity would be impacted by the sympathetic activation of the autonomic nervous system due to higher concentrations of CO2 in the blood.

The researchers are urging businesses to create or adopt better methods that would improve the employees' health and productivity. Furthermore, transmission of infectious diseases as well as contraction of respiratory and cardiovascular illnesses would also be significantly reduced by higher ventilation rates.

Sources:

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- Cedeño Laurent, J. G., MacNaughton, P., Jones, E., Young, A. S., Bliss, M., Flanigan, S., Vallarino, J., Chen, L. J., Cao, X., & Allen, J. G. (2021). Associations between acute exposures to PM2.5 and carbon DIOXIDE indoors and cognitive function in office workers: A multicountry LONGITUDINAL prospective observational study. Environmental Research Letters, 16(9), 094047. https://doi.org/10.1088/1748-9326/ac1bd8

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