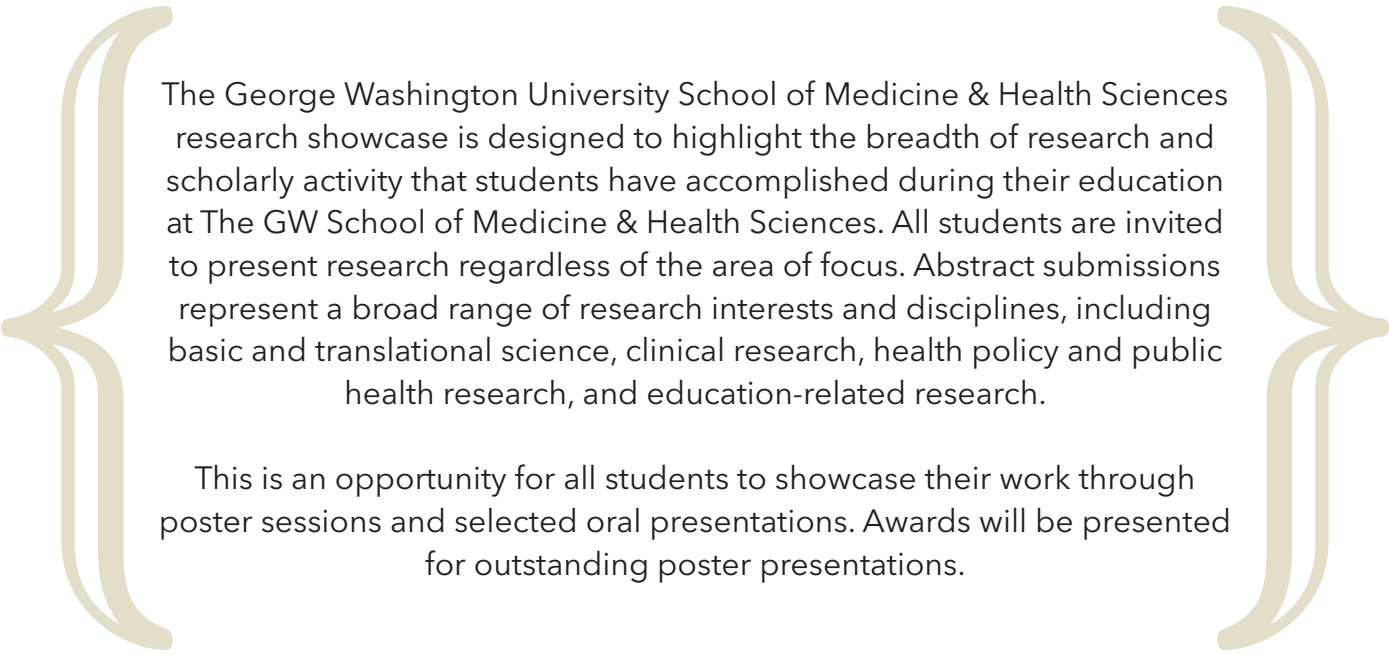


GW SMHS RESEARCH SHOWCASE

APRIL 25, 2024



THE GEORGE WASHINGTON UNIVERSITY



The George Washington University School of Medicine & Health Sciences research showcase is designed to highlight the breadth of research and scholarly activity that students have accomplished during their education at The GW School of Medicine & Health Sciences. All students are invited to present research regardless of the area of focus. Abstract submissions represent a broad range of research interests and disciplines, including basic and translational science, clinical research, health policy and public health research, and education-related research.

This is an opportunity for all students to showcase their work through poster sessions and selected oral presentations. Awards will be presented for outstanding poster presentations.

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**GW SMHS RESEARCH
SHOWCASE**
————— ABSTRACTS

INTEGRATED BIOMEDICAL SCIENCES PHD

[SMHS.GWU.EDU/RESEARCHSHOWCASE](https://smhs.gwu.edu/researchshowcase)

School of Medicine
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[THE GEORGE WASHINGTON UNIVERSITY](https://www.gwu.edu)

INTEGRATED BIOMEDICAL SCIENCES PHD

Dermal Fibroblast-mediated Macrophage Recruitment Supports Acute Skin Wound Healing

Inflammation, one of the earliest stages in the skin wound healing process, is a critical step in tissue repair. During this phase, intricate cell-cell communication networks generate the pro-inflammatory environment in the wound and recruit immune cells such as macrophages to assist in the healing process. While tissue-resident immune cells and keratinocytes have long been appreciated for their role in the early immune response of skin wound healing, little is known about how mesenchymal cells contribute to the early steps of injury-induced inflammation. Using single nuclei RNA-sequencing, we defined changes in gene expression associated with inflammation at 1-day post-wounding (dpw) in mouse skin. We detected multiple fibroblast subsets with increased expression of pro-inflammatory genes, including numerous immune cell chemoattractants. To validate immune cell recruitment as a functional role for fibroblasts after injury, we isolated fibroblasts from uninjured skin and wounds 1.5 days post-wound (dpw) and tested their ability to induce macrophage migration in vitro. Wound fibroblasts induced significantly more migration than fibroblasts from uninjured skin, and the amount of macrophage migration was comparable to that induced by keratinocytes and macrophages. These findings implicate fibroblasts as potent mediators of myeloid cell influx into wounds. Interestingly, further computational analysis implied that fibroblasts with greater pro-inflammatory potential were associated with deeper layers of the skin. In particular, SCA1+ fibroblasts were enriched for many immune cell-recruiting chemokines, including CCL2 and CCL7, during early inflammation compared to SCA1- fibroblasts. This finding supports other studies highlighting distinct roles for different fibroblasts subsets depending on where they reside in the skin. We extended our analysis of the impact of fibroblast-derived factors on immune cell recruitment to an in vivo wound model where the Ccl2 gene was conditionally knocked down in fibroblasts. Knockout mice had over 50% fewer macrophages and monocytes present in the wounds during the inflammation phase of repair compared to control mice ($p < 0.05$). These animals also exhibited significantly lower revascularization and re-epithelialization at 5dpw, indicating stark defects in the healing process with loss of fibroblast-derived CCL2 ($p < 0.05$). Together, these results highlight the essential contribution of dermal fibroblasts to the inflammatory environment in the earliest stages of repair and the impact of immune cell dysregulation on subsequent tissue healing.

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INTEGRATED BIOMEDICAL SCIENCES PHD

A Receptor Tyrosine Kinase c-Met Regulates Head and Neck Cancer Migration Through Transcription Factor BACH1

Metastasis is estimated to be responsible for 90% of cancer deaths, and fewer than 10% of patients with metastatic head and neck squamous cell carcinoma (HNSCC) survive beyond 5 years. HNSCC is responsible for upwards of 270,000 global deaths annually, with up to 30% more cases projected annually by 2030. The proto-oncogene MET encodes for the tyrosine kinase receptor c-MET, which is overexpressed in over 80% of human papilloma virus (HPV)-negative HNSCC cases and particularly enriched in metastatic lymph nodes. c-MET is activated by its ligand, hepatocellular growth factor (HGF), and is known to promote cancer cell migration, proliferation, and metastasis through a variety of downstream effectors. Thus far, unfortunately, inhibition of c-MET has shown low efficacy as a single-agent therapy in clinical trials, which indicates a need for further understanding of the mechanisms underlying c-MET-mediated metastasis in HNSCC. We show here that human HNSCC cells upregulate expression of the transcription factor BACH1 through c-MET activation upon HGF treatment. In accordance with previous reports, HGF activation increased expression of Slug, a transcription factor for epithelial-mesenchymal transition (EMT). Similarly, BACH1 suppression reduced expression of Slug. By pharmacological inhibition of c-MET using FDA-approved capmatinib in combination with hemin treatment to reduce BACH1 expression, HNSCC migration was reduced compared to either treatment alone in scratch-wound migration assays. Collectively, these data indicate that BACH1 and c-MET are both necessary for the regulation of Slug expression and migration of HNSCC. Our data suggest the potential for combination therapy targeting both c-MET and BACH1 to reduce HNSCC metastasis. We plan to continue investigating the therapeutic potential of this combination by examining the signaling between c-MET and BACH1 in vitro and reduction in lymph node metastasis in vivo.

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INTEGRATED BIOMEDICAL SCIENCES PHD

A Generative Approach for Predicting Patient Response to Virus-Specific T Cell Therapy

Immune compromised patients, primarily patients with inborn errors of immunity and or recent transplant recipients, are at high risk for morbidity and mortality during viral infection. Available treatments, including antiviral medications and monoclonal antibodies are complicated by toxicities and emerging resistance, and reduction of immunosuppression is ineffective in absence of immune reconstitution. Virus-specific T cell (VST) therapy allows rapid reconstitution of antiviral T cell immunity, with 70-90% response rates following HLA-mismatched VST therapy, with minimal risks of toxicity or graft-versus-host disease (GVHD) compared with unmanipulated donor lymphocyte infusion. However, failure of VST therapy to control viral infections remains a frequent problem. Aside from immunosuppressive agents, there is limited understanding of why patients fail VST therapy, which complicates selection of patients for VST therapy. We hypothesized that a variety of commonly collected clinical variables from the period prior to VST therapy, such as pre-treatment viral load, prior drugs received, and diagnostic category, could be used in a deep learning model to predict the likelihood of response to VST therapy. Here, response is defined as the viral load reaching an undetectable level via PCR or a noticeable reduction in viral load combined with other clinical indicators of improved health. We collected clinical data from prior VST studies, which covers 79 infusions across three different types of viral infections. To model response, we first utilized a variational autoencoder (VAE) to overcome the limited sample size ($n = 79$). Using most of the real records for training ($n = 69$), the VAE generated ~20,000 synthetic infusion records with high similarity to the real infusion records, as assessed using correlation tests. A combination of the real and synthetic data ($n \sim 20,069$) was then used to train a deep neural network to ultimately predict response or non-response based on the input variables of viral load, drugs received, diagnosis, to name a few. The model was then tested on a subset of the real records which were withheld from the entire process ($n = 10$) and evaluated using standard metrics of precision, recall, and F1-score. This process was repeated over 100 iterations to ensure the accuracy of the prediction metrics. Averaging over 100 iterations, the model achieved over 80% recall, precision, and F1, indicating the model's usefulness in predicting patient response to VST therapy. The in-silico model will help identify the best VST therapy candidates to optimize treatment planning.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Heterogeneous Cellular Senescence in the Subfornical Organ During Angiotensin II-Induced Hypertension

Chronic uncontrolled hypertension is a global health concern, although the underlying contributing mechanisms remain unclear. Angiotensin-II (Ang-II) is a well-recognized driver of hypertension, particularly through its actions in the central nervous system to promote sympathoexcitation. However, as a peptide hormone, Ang-II is too large to cross into the brain and acts at circumventricular regions lacking a blood-brain-barrier, notably the subfornical organ (SFO). Ang-II induces pro-hypertensive cellular stressors (e.g. oxidative stress, inflammation, endoplasmic reticulum stress) in the SFO, but how these stress pathways lead to long-term changes in cellular function remains unclear. Importantly, chronic activation of stress pathways can induce cellular senescence. Chronic senescence leads to detrimental changes in cell metabolism, macromolecule damage, and a pro-inflammatory environment capable of propagating senescence, known as the senescence-associated secretory phenotype (SASP). Thus, we hypothesized that Ang-II would elicit cellular senescence in the SFO. To test this, male C57Bl/6J mice were implanted with subcutaneous osmotic minipumps for chronic infusion of Ang-II (600 ng/kg/min) for 0 or 14 days (n=4-5/group). Using micropunches of the SFO, robust mRNA increases in key senescence indicators p16 (1.96 ± 0.23 fold Day 0, $p < 0.05$) and p21 (2.63 ± 0.52 fold Day 0, $p < 0.05$) were observed after 14 days of Ang-II infusion. This was paralleled by elevations in inflammatory SASP markers (e.g. IL-6: 2.06 ± 0.14 fold Day 0; IL-10: 2.07 ± 0.34 fold Day 0, both $p < 0.05$). Immunohistochemical analysis further revealed a marked increase in p16 (Integrated density: 1.46 ± 0.24 fold Day 0, $p = 0.07$) and p21 expression (Integrated density: 1.15 ± 0.09 fold Day 0, $p = 0.05$) throughout the rostral to caudal extent of the SFO in response to Ang-II infusion. We next aimed to characterize the SFO cell types affected by Ang-II-induced senescence. When examining neuronal populations with double immunohistochemistry, extremely low to no colocalization with p16 was found with neurons [p16/NeuN: Mander's overlap coefficient (MOC) = 0.08 ± 0.01]. However, p16 was highly colocalized with astrocytes (p16/GFAP: MOC = 0.98 ± 0.01). In contrast, p21 moderately colocalized with both neurons (p21/NeuN: MOC = 0.27 ± 0.03) and astrocytes (p21/GFAP: MOC = 0.39 ± 0.03). These findings indicate that: 1) Ang-II induces cellular senescence and SASP in the SFO during hypertension development; and 2) p16- and p21-associated senescence in response to Ang-II occurs in various SFO cell types.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Longitudinal Efficacy of GABAergic Progenitor Cell Implantation Therapy in Treating Focal Cortical Dysplasia Type II

Focal Cortical Dysplasia Type II (FCD II) is a debilitating developmental disorder in which dyslamination of the cerebral cortex results in a greatly increased risk for epileptic seizure and cognitive deficits. Approximately 25% of all patients with intractable epilepsy are diagnosed with FCD, and FCD II is the most severe type diagnosed in children. Despite the serious impact on the quality of life of people suffering from FCD II, surgical intervention is only about 60% effective. The mammalian target of rapamycin (mTOR) signaling pathway plays an essential role in brain development by promoting neural stem cell proliferation. Mutation E545K of the gene PIK3CA results in mTOR hyperactivation and is strongly linked to the manifestation of FCD II via cortical dyslamination. Most notably, a perturbation in the functionality of Parvalbumin expressing (PV+) interneurons due to mTOR hyperactivity has been observed in both preclinical models and humans. mTOR inhibitors such as Everolimus and Sirolimus are being explored as a potential treatment for FCD, however their efficacy in reducing seizures has been variable in clinical trials. Cortical dyslamination can result in a quantitative decrease in interneuron density within the affected region and leads to an imbalance between excitatory and inhibitory signaling. Signaling parity plays an important role in maintaining neural circuitry homeostasis and imbalance is a major contributor to epileptic seizure. Restoring balance using GABAergic progenitor cell implantation into the affected area as a treatment for epilepsy has been demonstrated in a variety of models. However, the efficacy of this therapy has never been assessed in treating FCD II caused by the E545K mutation. While the acute efficacy of GABAergic progenitor cell implantation as a treatment for different forms of epilepsy has been observed, longitudinal analysis of the therapy determined that seizures can return over time. The exact cause for the seizure rectification is not clear, but there is evidence to suggest that over time implanted progenitor cells will migrate and integrate away from the site of injection. A key element of FCD is predicated on the observation that cortical malformation is localized to a particular area, if the cells migrate away from the malformed area, this would present a potential challenge for treating focal epilepsy. Currently, there has been no longitudinal evaluation of GABAergic progenitor cell migration in the somatosensory cortex following implantation in an FCD II model.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Developing a Multiplexed Assay to Determine Autologous Antibody Binding to the HIV-1 CD4 Binding Site

In response to HIV infection, autologous antibodies develop that target the surface envelope protein (Env), comprised of gp120 and gp41 subunits. Autologous antibodies are unable to clear the virus because Env is heavily glycosylated and tolerant of escape mutations. Current antiretroviral treatment (ART) works well at suppressing virus replication, but latently infected cells still exist, demonstrating the need for additional treatment methods. One complementary therapeutic is broadly neutralizing antibodies (bNAbs), which target conserved regions on the viral Env. The CD4 receptor binding site (CD4bs) is one of these regions that has been targeted in clinical trials through administration of VRC01 and 3BNC117 bNAbs. However, virus escape occurs and a better characterization of how autologous antibodies affect bNAb therapy escape is needed. To measure autologous antibodies directed at the CD4bs in bNAb clinical trial participants, we developed a sample sparring ultra-sensitive multiplex assay. Using the previously isolated CD4bs protein resurfaced stabilized core (RSC3) and a double knockout variant (RSC3 D371I P363N) we have established a Meso Scale Discovery (MSD) binding assay. Each HIV Env protein of interest (Gp120, Gp41, RSC3, RSC3 D371I P363N) was biotinylated at various ratios (50, 10, 6, and 3) and bound to a linker specific for the MSD multiplexed plate. Primary samples tested were either bNAbs or serum from ART naive people living with HIV. BNAbs were tested from starting concentrations of 5ug/mL, 1 ug/mL, and 0.5 ug/mL while plasma was tested at 1:500, 1:5,000, and 1:10,000 dilutions, and both were serially diluted 5-fold. We also optimized secondaries which detect IgG subclasses 1-4, which were tested at concentrations ranging between 0.25ug/mL to 2ug/mL. Our results indicate that we have developed a specific and sensitive assay capable of determining binding patterns at the CD4bs. The optimal testing parameters, which lead to limited background binding at the highest concentration of diluted sample while maintaining high signal throughout the entire tested range was biotinylating the env proteins at a ratio of 50:1, using a bNAb starting concentration of 0.5ug/mL, and diluting sera 1:5000. There was no cross reactivity at any IgG2,3 and 4 secondary concentrations. Some anti-IgG3 cross reactivity for IgG1 was observed, but this cross reactivity was also observed with ELISA and thus specific to the clone, not an artifact of MSD. These results demonstrate an assay capable of determining autologous antibody responses from plasma who were treated with either CD4bs bNAbs VRC01 or 3BNC117.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Generation of multi-antigen specific T cells for ovarian cancer using Prussian Blue nanoparticles and photothermal therapy

The immunosuppressive nature of ovarian cancer (OC) allows these tumors to evade the immune system, contributing to the late-stage diagnoses and poor clinical outcomes often experienced by patients. However, a higher number of tumor-infiltrating lymphocytes is associated with improved clinical outcomes in OC. One type of lymphocyte, the T cell, can traffic to the tumor and kill tumor cells. We have shown that treating tumor cells with Prussian Blue nanoparticles and photothermal therapy (PBNP-PTT) results in immunogenic cell death, a form of cell death that is visible to the immune system, including T cells. PBNP-PTT-treated tumor cells were then used to expand tumor-specific T cells from partially genetically matched healthy donors were then expanded against PBNP-PTT-treated breast and brain tumor cell lines. These expanded T cells were better able to recognize and kill the target tumor cell lines than bulk unexpanded T cells from the same donors. Therefore, we hypothesized that using PBNP-PTT-treated OC cells would allow us to expand a polyclonal tumor-specific T cell product that is cytolytic against OC cells in vitro and in vivo. We first evaluated whether multi-antigen OC-specific T cells could be expanded from partially genetically matched healthy donors by confirming that PBNP-PTT elicited immunogenic cell death in two HLA-A*02:01 human OC cell lines, Hey and TykNu. Using our established in vitro T cell expansion protocol, we then expanded T cells from several healthy HLA-A*02:01 donors (n=5) against these cell lines. Functional analyses have demonstrated that while expanded T cells from all donors had anti-tumor responses against OC cell lines, there is some donor variability when comparing T cells expanded against PBNP-PTT treated tumor cells to bulk non-specific T cells derived from the same donors. Current work is expanding this approach to a syngeneic murine setting in C57BL/6J mice to evaluate the therapeutic efficacy of the expanded multi-antigen specific T cells in vivo. Moreover, we will evaluate HLA-matched T cells and tumor cells from patients with OC ex vivo. Collectively, these efforts serve as a novel approach towards a curative immunotherapy for OC.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Role of male sex hormone and sex-chromosome complement on the therapeutic efficacy of a TNFR2 agonist in EAE.

Approximately 80% of multiple sclerosis (MS) patients experience chronic neuropathic pain (CNP) while 50% suffer from paralysis, with no effective therapies available. Neuroinflammation and neuropathology are major pathophysiological hallmarks of MS. Recognizing that, we tested whether TNFR2 activation (an anti-inflammatory and neuroprotective immune response) could be a potential therapeutic for this devastating disease. Pharmacological and genetic studies determined that TNFR2 signaling is therapeutic for CNP in both male and female mice with experimental autoimmune encephalomyelitis (EAE). However, TNFR2 signaling was only therapeutic for paralysis in female mice. To interrogate these sex dependent mechanisms resulting in the limited therapeutic efficacy of TNFR2 signaling in EAE males, we performed experiments with wild type and four core genotype (FCG) mice with and without surgical and pharmacological manipulation of testosterone. We utilized 10 weeks old wild type males and females along with gonadectomized males with and without testosterone replacement. In addition, age matched gonadally intact males were either administered with flutamide (anti-androgen) or a placebo. XXsry+ (testis bearing) FCG males were used to study if the male sex-chromosome complement (XY) limited the TNFR2 signaling efficacy in mitigating the paralysis. All animals were immunized using the nonPTX-EAE method. A novel TNFR2 agonist (10mg/kg) was administered on days 10, 13, and 16 after immunization. Mechanical allodynia (Von Frey test) was evaluated weekly to assess CNP and paralysis was scored daily based on open field testing until 30 DPI. Surprisingly, the TNFR2 agonist did not alleviate CNP in gonadectomized EAE males, with or without testosterone replacement. However, the TNFR2 agonist was able to alleviate CNP in gonadally intact males administered with flutamide. Additionally, we found that there was a significant delay in paralysis onset and its severity in EAE XXsry+ males treated with the TNFR2 agonist as compared to EAE XY males. Our data indicates that alleviation of CNP by TNFR2 agonist in EAE males is dependent on male gonads and is independent of the presence of testosterone. Moreover, we found that the sex-dependent characteristic, which limited the efficacy of TNFR2 agonist in mitigating paralysis in EAE males is the presence the XY sex-chromosome complement. Understanding the sex-mediated mechanisms which limits the efficacy of TNFR2 agonist in males is important because unlike other therapies which have high side-effects, TNFR2 agonist could promote endogenous anti-inflammatory and repair pathways, making it a feasible therapy for MS.

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INTEGRATED BIOMEDICAL SCIENCES PHD

The Role of G Protein-Coupled Receptor 84 in Skin Wound Healing

Inflammation is an essential stage during the tissue wound healing process, and its magnitude affects subsequent healing phases. Cell-cell communication plays a major role in the initial response of wound healing, where tissue-resident cells release proinflammatory signals to fight infection and recruit immune cells. G protein-coupled receptor 84 (GPR84), a medium chain fatty acid (MCFA) receptor, has been shown to contribute to myeloid cell function during tissue inflammation. Its expression increases in many cell types during inflammation, and it plays a role in myeloid cell chemotaxis, phagocytosis, and cytokine secretion. However, its role in skin wound healing is understudied. Through tissue immunostaining and quantitative RT-PCR, we show that multiple cell types increase the expression of GPR84 after injury. In particular, we find that keratinocytes and adipocytes express GPR84. We hypothesized that GPR84 signaling in these tissue-resident cells will contribute to their pro-inflammatory function during the inflammation phase of tissue repair, thus influencing overall wound healing. Here, we use genetic mouse models to selectively delete GPR84 in keratinocytes and adipocytes and investigate delays in wound healing. Using flow cytometry and tissue immunostaining, we assess changes in tissue inflammation and subsequent tissue repair by measuring re-epithelialization, and revascularization. As prolonged inflammation contributes to chronic, non-healing wounds, GPR84 reveals itself as a therapeutic target with clinical agonists and antagonists capable of modulating inflammation to improve wound healing outcomes.

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INTEGRATED BIOMEDICAL SCIENCES PHD

PTPN1/PTPN2 Inhibitors Enhance MHC-1 Expression on CD4 T Cells

Human immunodeficiency virus (HIV) infection is characterized by the preferential targeting of CD4 T cells, leading to the development of Acquired Immune Deficiency Syndrome (AIDS). Despite advances in treatment, the persistence of latent HIV reservoirs presents a significant challenge to achieving a cure. Thus, latency-reversing agents (LRAs) have emerged as potential candidates for the shock-and-kill strategy aimed at eliminating latent viral reservoirs. In this study, we investigated the effects of the non-receptor tyrosine phosphatases PTPN1/PTPN2 HODHBt, ABBV-CLS-484 (AC-484), and the retinoids Isotretinoin and Alitretinoin on MHC-I expression (HLA-A/B/C, HLA-E, and HLA-F) on CD4 T cells. HODHBt and AC-484 have been shown to enhance γ -cytokine mediated STAT phosphorylation. Isotretinoin and the related compound Alitretinoin are transcriptional analogs of HODHBt identified through the connectivity map that work independently of STAT phosphorylation. PBMCs or isolated total CD4 T cells from HIV-negative donors were pre-treated with the different compounds for 2 hours followed by the addition of IL-15. 48 hours later, cells were collected, and MHC-I expression was analyzed by flow cytometry in CD4T cells. Both, HODHBt and AC-484 increase the expression of HLA-A/B/C either alone or in the presence of IL-15. Interestingly, HODHBt and AC-484 were sufficient to enhance HLA-E and HLA-F expression in CD4 T cells but only in the context of PBMCs but not purified CD4T cells. None of the retinoids tested had an effect on MHC-I expression. Overall, our findings demonstrate that the PTPN1/PTPN2 inhibitors HODHBt and AC-484 can enhance MHC-I expression in CD4T cells. This could provide an additional advantage for therapeutic strategies aimed at targeting the latent reservoir using CD8-based strategies such as therapeutic vaccines or antigen-specific T cells.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Circulating and Mucosal V₁ T Cells are Persistent Reservoirs of HIV-1

Incomplete characterization of cellular reservoirs is a major barrier for curing HIV. Memory CD4⁺ T cells are the main reservoir, but growing evidence suggests other cell populations contribute to HIV latency. Human $\gamma\delta$ T cells are comprised of two main subsets, V₁ and V₂ T cells. HIV infection induces the depletion of V₂ T cells and the expansion of the V₁ subset within both peripheral blood (PB) and the gastrointestinal tract (GI). We previously demonstrated that V₂ T cells that lack CD4 expression harbor replication-competent provirus. Therefore, we hypothesized that V₁ T cells may be susceptible to HIV infection and contribute to the latent reservoir in PB and the GI tract. PBMCs were isolated from 27 HIV-seronegative donors and 31 people living with HIV (PWH) on suppressive antiretroviral therapy. Sigmoidoscopy biopsies were obtained from 6 PWH for paired analyses. Phenotypic, functional, and gene expression comparisons of PB V₁ T cells from PWH and seronegative donors were conducted using flow cytometry, cytotoxic co-culture assays, and ATAC-seq. Latently infected V₁ T cells were measured by quantitative viral outgrowth assay (QVOA) and the Intact Proviral DNA Assay (IPDA) in PB and by DNAscope within the GI tract. Flow cytometry analysis of PB V₁ T cells from PWH compared to seronegative donors revealed comparably low expression of CD4 (Mean 1.07 v. 1.65%) ex vivo. PB V₁ from PWH displayed signatures of chronic activation marked skewing from a naive (CD45RA⁺CD27⁻) to a TEMRA-like (CD45RA⁺CD27⁻) phenotype with higher expression of cytotoxic markers CD8, CD56, CD16, and NKG2D. Functionally, PB V₁ T cells from PWH inhibited viral replication within superinfected autologous CD4⁺ T cells. However, PWH had reduced cytotoxicity against a lymphoma cell line (Daudi cells) indicating some functional impairment. Paired analysis of PB and GI V₁ T cells in PWH showed a similar phenotype with the exception of lower CD16 expression (Mean 55.1% v. 3.39%) and higher frequency of the TEM (CD45RA⁺CD27⁻) population (Mean 0.22% v. 79.6%) in the GI tract. Total HIV DNA was detected in 11/12 PWH and replication competent virus was recovered from 5/10 donors. Finally, HIV DNA was detected by DNAscope in 5/5 individuals. V₁ CD4⁺ cells constituted 7-30% of all infected CD4⁺ cells in sigmoidoscopy samples showing a high relative contribution to the total reservoir. Our study shows that V₁ T cells may represent a novel peripheral and tissue reservoir of latent HIV infection with critical implications for HIV cure strategies.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Biomarker Data Model Development and Integration

In the pursuit of evaluating disease and medical intervention outcomes, biomarkers emerge as pivotal tools for researchers and clinicians. Biomarker data is extensive, but disorganized over a vast number of papers and other resources. This project endeavors to establish a standardized biomarker definition and consolidate diverse biomarker data under a unified data model. Our biomarker definitions and model follow the FDA-NIH Biomarker Working Group's definition: characteristic measured as an indicator of normal biological processes, pathogenic processes, or responses to an exposure or intervention. Ongoing efforts are underway to develop a biomarker-centric view of data within the Biomarker Partnership, funded by the Common Fund Data Ecosystem (CFDE), an NIH initiative. The data model currently encompasses 'core' and 'contextual' biomarker data, forming the foundation for biomarker definition. Core data is essential to the model and must be fulfilled for a biomarker to be added to the data model (e.g. biomarker, assessed_biomarker_entity, condition). Contextual data (any extra data related to a biomarker) originates from various partner resources within the Biomarker Partnership, integrated into the data model framework. Any absent data is addressed through inference, guided by biomarker-centric rules. Biomarker curation follows this standardized data model, drawing from both manual curation of biomarker-related papers and automated extraction from public resources that have biomarker or biomarker-related data. The curated data includes essential biomarker information (e.g., biomarker entity, change, disease), ensuring accessibility for incorporation into the data model. Contextual data, curated from diverse partner resources, is integrated into the data model, and supplemented through inference if necessary. This approach solidifies the groundwork for an expansive biomarker knowledge graph. Preliminary data from OncoMX, OpenTargets, GWAS, ClinVar, and MarkerDB has been mapped into the biomarker data model agreed upon by the participating DCCs (LINCS, MW, IDG, SenNet/HuBMAP, and GlyGen) in the partnership. The data has been integrated into the biomarker data page (<https://hivlab.biochemistry.gwu.edu/biomarker-partnership/data>) with supporting documentation. A backend API is hosted to store all data collected into the biomarker data model. The backend API also supports search through the data endpoints. The data collected across the different resources are harmonized into the biomarker data model by comparing the core fields and a persistent ID assignment model. The culmination of biomarker data harmonization and the standardized data model promises unprecedented accessibility and search efficiency for biomarkers thereby improving their findability, accessibility, interoperability, and reuse.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Evaluating the effects of stimulating the Fc-region on NK cells

Human immunodeficiency virus (HIV) infection is still a leading cause of mortality and morbidity worldwide and has no cure. Natural Killer (NK) cells play an important role in controlling HIV infection. Importantly, different studies highlight the potential of harnessing NK cells to develop a protective HIV vaccine or a cure. In this study, we investigated the long-term effects of monoclonal antibodies (mAbs) stimulating CD16 receptors on NK cells. For that, we used VRC07-523 IgG1 and VRC07-523-GRLR IgG1, a mutant that abrogates Fc binding to CD16. First, we evaluated the ability of mAbs to promote NK activation. We first pre-coated 24 well plates overnight with the different mAbs. Then, NK cells were negatively isolated from peripheral blood mononuclear cells (PBMCs) and activated overnight with the pre-coated plates in the absence or the presence of IL-15, IL-15/IL-12, or IL-15/IL-12/IL-18. The following day, activation, measured as CD69 induction, and IFN- γ production were measured by flow cytometry. We confirm that VRC07-523 alone significantly increased activation ($p=0.004$) but not IFN- γ production ($p=0.166$) whereas VRC07-523-GRLR was unable to activate or promote IFN- γ production. Interestingly, combination of VRC07-523 with IL-15 or IL-15/IL-12 significantly promote IFN- γ ($p=0.014$ and $p=0.029$, respectively). The combination of IL-15/IL-12/IL-18 was sufficient to enhance NK activation and IFN- γ production but the addition of VRC07-523 did not significantly change NK activation or IFN- γ production ($p=0.097$ and $p=0.298$). We then measured whether mAb-activated NK cells can generate memory-like NK cells. Recently, NK cells have been shown to have 'memory-like' properties, both antigen dependent and independent. In the context of HIV, pre-existing memory-like NK cells have been shown to control viremia during primary infection. As such, understanding the signaling pathways and mechanisms promoting the generation of memory-like NK cells could lead to the development of therapeutic strategies to enhance HIV control mediated by memory-like NK cells. Activated NK cells as described above were kept in culture for 7 days in the presence of low IL-15. At day 7, NK cells were restimulated with IL-12 and IL-15 for 6 hours and IFN- γ production was measured by flow cytometry. Despite promoting activation, mAb alone or in combination with different cytokines was not sufficient to enhance memory generation. Further experiments are ongoing to evaluate whether stimulation with mAbs changes NK effector function against HIV-infected cells. In conclusion, understanding the long-term effects of mAbs binding to NK cells through CD16 could help in designing therapeutic strategies to improve the control of HIV by NK cells in the context of mAbs therapies.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Studying Dual Role of Glycosylation in Resistance to Broadly Neutralizing Antibodies in In Vitro Viral Escape Assay

Broadly neutralizing antibodies (bNAbs) provide a useful tool for HIV cure strategies because of their ability to target conserved regions on the envelope (Env) protein in the context of both virions and infected cells. One of the most well studied bNAbs is the CD4 binding site (CD4bs) antibody, VRC01 and related antibodies. Multiple clinical trials infusing VRC01 into people living with HIV (PWH) demonstrated transient viral suppression. The major obstacle to more effective treatment with bNAbs continues to be viral escape. A deeper understanding of escape pathways from VRC01-class antibodies in genetically diverse samples is needed. We developed an in vitro viral escape assay to test bNAb and Env combinations. Ex vivo CD4+ T cells were infected with infectious molecular clone 246.F3-NL4.3 (AC) in the presence of varying concentrations of VRC01. Cultures were maintained with suboptimal concentrations of bNAbs to induce escape. Replication kinetics were monitored by p24 every 3 days. Every 14 days, target cells were replenished and cultures tested for genotypic and phenotypic measures of bNAb resistance. This was accomplished by single genome sequencing envs and by TZM-bl neutralization assay. Individual mutations were then tested for their contribution to resistance to CD4bs bNAbs by pseudovirus neutralization assay using mutated env plasmids. Using our viral escape assay, we observed both previously published and novel escape mutations. Complete resistance to VRC01 was detected in 246.F3 by day 45. A mutation at position N276 that eliminated the glycan conferred complete resistance to VRC01, despite canonically increasing sensitivity. To study the neutralization profile of this mutation in various subtypes, it was inserted into 12-virus global panel of envs and tested for sensitivity compared to wildtype against a panel of CD4bs bNAbs. This mutation was shown to both increase resistance or sensitivity depending on the envelope and bNAb in question, emphasizing a dual role of this glycan in VRC01 class neutralization. Our data demonstrate that our viral escape assay can highlight novel pathways, such as the loss of glycan 276 conferring complete resistance to VRC01 in 246.F3 env. The role of this glycan in escape was demonstrated to be dependent on both the context of the env as well as the bNAb. This finding emphasizes the importance of studying viral escape with a genetically diverse library to develop a deeper understanding of various pathways.

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Platelet-NK Cell Complexes (PNKCs) are Elevated in People Living with HIV and Exhibit Activated Phenotypes

Human Immunodeficiency Virus (HIV) infection can lead to acquired immunodeficiency syndrome (AIDS) without treatment. Today, anti-retroviral therapy (ART) is the standard of care that prevents progression to AIDS, extending the life of people living with HIV (PLWH). However, ART is not curative, and even while on ART, there are dysfunctional NK cells, a type of cytotoxic immune cell. The exact mechanism of this dysfunction is unknown, however, there are trends of platelet-immune cell complex formation in PLWH, which could play a role. Platelets are known to form complexes with immune cells at higher rates during viral infections, including HIV infection. Specifically, PLWH exhibit increased platelet-T cell complexes (PTCs) and platelet-monocyte complexes (PMCs) compared to uninfected controls. These complexes mediate HIV infection in PTCs and inflammation and migration in PMCs. Platelets can also lead to dysfunctional dendritic cell differentiation in vitro through PMCs. Platelet-immune cell complexes alter immune cell functions, therefore by understanding these complexes in HIV, we hope to establish mechanisms for future cure strategies. Given the lab's previous findings on HIV infection and immune responses for PTCs and PMCs, we propose another role of platelets in platelet-NK cell complexes (PNKCs). While PNKCs have not yet been investigated in the context of HIV, a recent SARS-CoV-2 paper found elevated PNKCs and hyperactivated NK cells during severe COVID-19. NK cells are known to be dysfunctional in PLWH, exhibiting reduced effector function and killing capacity. Since NK cells are known to be dysfunctional in PLWH, we predict that platelet-NK complexes promote NK dysfunction during HIV infection. This study utilizes multiparameter flow cytometry and correlative light and electron microscopy (CLEM) to identify and understand PNKCs in PLWH. Briefly, PBMCs were isolated from controls and PLWH. Then the PBMCs were stained for flow with markers for platelets, NK cells, NK activating/inhibitory receptors, and NK effector functions. Then, we developed a protocol for in vitro NK-platelet co-cultures and identified PNKCs via flow cytometry and CLEM. Our results indicate that PLWH have increased PNKCs, which are characterized by elevated NK activating receptors (NKG2D, NKp44), markers of activation (CD25 and CD69), and an inhibitory receptor (NKG2A). These findings indicate either a subset of NK cells is more likely to complex with platelets or that platelets may alter NK cells. Given this information, we plan to investigate further whether platelet complexes promote NK dysfunction in PLWH through targeted in vitro complexing experiments.

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INTEGRATED BIOMEDICAL SCIENCES PHD

The Role of Hydroxyprostaglandin Dehydrogenase in Contralateral Breast Cancer

Most treatments for breast cancer focus on unilateral tumors, although the incidence and mortality of contralateral breast cancer (CBC), especially in young women, is remarkable. CBC is defined as a second breast tumor in the unaffected breast from the original tumor. While incidence of unilateral breast cancer increases with age, paradoxically, CBC incidence rates among breast cancer patients younger than 35 years are 5 times higher than those for older patients. Major advances in breast cancer detection and treatment have significantly prolonged patient survival rates. However, breast cancer survivors still have a chance of developing CBC. CBC affects young patients disproportionately in terms of both incidence and mortality and is at a higher risk of development with hormone receptor-negative tumors, thus presenting a clinically unmet need. Little is known about what causes CBC development. Although some risk factors like family history and germline mutations have been linked to CBC, the molecular mechanisms for CBC tumorigenesis are not understood. Preliminary transcriptomic analysis has identified a set of lipid metabolic genes that are altered in the second unaffected breast from patients with unilateral breast tumors compared to healthy controls. Additionally, transcriptomic profiling of murine unaffected contralateral mammary fat pad, using preclinical tumor models, identified hydroxyprostaglandin dehydrogenase (Hpgd) as the top overexpressed gene. HPGD has been shown to affect cancer properties in other types of cancers. We hypothesize that the dysregulation of HPGD in the hormone receptor negative primary tumor leads to the promotion of CBC. Our preliminary results indicate that HPGD regulates human and murine triple negative breast cancer (TNBC) cell proliferation and self-renewal. Future studies will focus on screening additional murine cell lines to identify the effect of Hpgd on tumorigenesis. Additionally, Hpgd-overexpressing TNBC cells will be used in creating a syngeneic CBC mouse model. By investigating the underlying causes of this form of early-onset cancer, we will address the unmet clinical need and identify novel biomarkers for early detection and better screening for CBC in young breast cancer patients.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Age-dependent effects of milrinone may be linked to myocardial maturity

The majority of cardiac medications administered to hospitalized children have not been formally studied in the pediatric population. Congenital heart disease (CHD) patients often require pharmacological interventions to improve contractile function after corrective surgery. Milrinone is among the most commonly prescribed inotropic agents administered to 98% of CHD patients. Studies suggest that the efficacy of milrinone may be age-dependent. Pediatric cardiac pharmacology research has been limited by the scarcity of human models; however, preclinical animal models can support our understanding of cardiac development, drug responsiveness, and age-appropriate therapies in order to optimize patient outcomes. Objective: To examine the impact of postnatal age on baseline cardiac physiology and milrinone efficacy using a preclinical guinea pig model (neonatal-adult). Methods/Design: In-vivo electrocardiograms (ECG) were collected to analyze heart rate, beat rate variability, atrial and atrioventricular conduction, depolarization and repolarization time. Isolated, intact heart preparations were maintained using a constant-pressure Langendorff-perfusion system. Ex-vivo electrocardiograms were recorded and an electrophysiology stimulation protocol was performed. Optical action potentials and calcium transients were recorded using fluorescent dyes. Cardiac metrics were compared between age groups at baseline, and after acute exposure to milrinone. Results/Discussion: Age-dependent differences in ECG intervals were observed between neonatal and adult hearts at baseline. Neonatal heart rate (258 ± 18.1 BPM) was faster than adults (175 ± 11.6 BPM, $p < 0.05$), and neonatal repolarization time (158 ± 13.7 ms) was faster than adults (201 ± 18 ms, $p < 0.05$). Tachycardia was observed in all animals after 100 nM milrinone treatment, as noted by a 34% increase in neonatal and 35% increase in adult heart rate. At baseline, neonatal calcium transient duration time (CaD30: 76.8 ± 8.1 ms, CaD70: 110.3 ± 7.9 ms) was significantly shorter than adult calcium transient duration time (CaD30: $94.3 \pm$ ms, CaD70: 127.5 ± 9.4 ms; $p < 0.01$). Neonatal hearts displayed only a modest shortening in the calcium transient duration time (4.6% CaD30, 9.3% CaD70) after milrinone exposure - while this effect was more exaggerated in adult hearts (11.8% CaD30, 12.4% CaD70). Using a preclinical model, we observed that neonatal hearts have an abbreviated response to milrinone as compared to adult hearts. This finding is important, as pediatric patients may experience variable responses to milrinone treatment based on myocardial maturity.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Oncogenic KrasG12D and Cdkn2a/p16 knockout in murine-derived small intestinal LGR5 expressing 3D organoids enhance tumorigenic properties in vitro

KRAS activating mutations are reported in 42-54% and inactivation of CDKN2A/p16 in 14-30% of human small intestinal adenocarcinomas (SIAC), suggesting a role in small intestine (SI) adenocarcinogenesis. The phenotypic effects of oncogenic KRAS and p16 loss have not been well characterized in SI adenocarcinogenesis. We hypothesized that combining oncogenic KrasG12D and loss of Cdkn2a/p16 enhances tumorigenic potential compared to each alteration alone, and can drive early adenocarcinogenesis in the SI-duodenum. We generated conditional knockout of Cdkn2a/p16 (p16KO), conditional expression of KrasG12D, or both (p16KO+KrasG12D), targeted to mouse LGR5 gastrointestinal progenitor cells. P16KO+KrasG12D mice frequently developed SI adenomas in duodenum (SI-Duo) and older mice developed intramucosal/locally invasive adenocarcinomas. Our aim is to establish in vitro 3D cultured organoids to model well-defined genetic alterations that drive initiation and progression of SIAC. Methods. We isolated 3D organoids from SI-Duo of 6- and 12-month-old mice treated with tamoxifen for conditional activation of KrasG12D and/or Cdkn2a/p16 deletion in LGR5+ progenitor cells. SI-Duo organoids were cultured in supplemented media in Matrigel. Co-localization of GFP-marking LGR5-derived cells and TdTomato marking Cre-mediated-recombination-positive cells was observed with confocal microscopy. Cell growth and viability was measured by the Cell-Titer-Glo ATP-luciferase assay. Immunoblots were performed for KRASG12D and pERK. Histology was performed on tissue sections of SI organoid FFPE blocks, and morphology was analyzed by image analysis (QuPath software). Results. SI-Duo derived organoids demonstrate histological features that recapitulate small intestine in vivo, including expression of intestinal differentiation marker CDX2 and scattered goblet cells lining organoid crypts. GFP expression demonstrated all SI-Duo organoids models are LGR5+CRE+, indicating oncogenic alterations are expressed in vitro. Assessing organoid shape and size throughout culture using QuPath image analysis indicate p16 knockout alongside oncogenic KRAS expression significantly induces SI-Duo organoid size throughout culture. SI-Duo organoids isolated from adenoma-SIAC of p16KO+KrasG12D mice demonstrated significant increase in organoid size, loss of crypt morphology and increased cell growth throughout culture, compared to organoids derived from histologically normal SI-Duo tissue. Engraftment of lesion-derived p16KO+KrasG12D organoids in immunodeficient mice have not resulted in growth of tumors in vivo. Conclusions. 3D SI-Duo organoids recapitulate cell lineages and 3D features of normal and adenomatous small intestine and provide useful in vitro models for mechanistic studies of SI adenocarcinogenesis. P16KO+KrasG12D alterations occur early in SI adenocarcinogenesis and additional oncogenic events are likely needed to enhance tumorigenic potential and recapitulate SIAC growth behavior.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Sex-Dependent Effects of Angiotensin Type 2 Receptor Expressing Medial Prefrontal Cortex (mPFC) Interneurons in Fear Extinction Learning

The renin-angiotensin system (RAS) has been identified as a potential therapeutic target for PTSD, though its mechanisms are not well understood. Brain angiotensin type 2 receptors (AT2Rs) are a subtype of angiotensin II receptors located in stress and anxiety-related regions, including the medial prefrontal cortex (mPFC). Their function and mechanism in the mPFC, however, remain unexplored. We therefore used a combination of neuroanatomical, chemogenetic, and behavioral methods to investigate mPFC-AT2R-expressing neuron involvement in fear learning. Methods: To characterize mPFC-AT2R-expressing neurons in the mPFC, AT2R-Cre/td-Tomato male and female brains were perfused and used for immunohistochemistry. Brain sections were stained with glutamatergic or interneuron markers, and density of AT2R+ cells and colocalization with each marker was quantified. To assess fear-related behaviors in AT2R-flox mice, we selectively deleted AT2R from mPFC neurons using an AAV-Cre or GFP virus. Mice then underwent Pavlovian auditory fear conditioning and anxiety-like and locomotor behavior testing using open field (OF) and elevated plus maze (EPM) tests. Results: IHC revealed that AT2R is expressed throughout the mPFC in males (208.6 ± 48.8 cells/mm²) and females (139.0 ± 59.8 cells/mm²) and has low co-expression on glutamatergic neurons (TBR1 co-staining, males: $7.1\% \pm 1.8\%$; females: $13.2\% \pm 4.2\%$). Of the interneuron markers tested, AT2R is primarily expressed on somatostatin interneurons, and has higher colocalization in the mPFC of females than males (males: $16.5\% \pm 1.2\%$, females: $31.8\% \pm 4.2\%$, $p=0.02$). Following fear conditioning and extinction, mPFC-AT2R deletion impaired extinction in female ($p=0.03$) but not male ($p=0.76$) mice. Locomotion in the OF was unaltered by mPFC-AT2R deletion in males or females (total distance travelled; males: GFP $44.11\text{m} \pm 5.92\text{m}$, Cre $56.00\text{m} \pm 10.29\text{m}$, $p=0.35$; females: GFP $42.86\text{m} \pm 4.85\text{m}$, Cre $42.39\text{m} \pm 4.97\text{m}$, $p=0.95$), while AT2R-deleted females had increased exploratory behavior in the EPM (open arm entries; males: GFP 12.38 ± 1.02 , Cre 13.22 ± 1.54 , $p=0.66$; females: GFP 12.50 ± 0.96 , Cre 20.00 ± 2.81 , $p=0.02$). Conclusion: These results lend support for mPFC-AT2R+ neurons as a novel somatostatin subgroup that influences fear extinction in a sex-dependent manner. This furthers underscores the role of mPFC in top-down regulation and a unique role for peptidergic (ie., angiotensin) mPFC regulation of fear and sex differences, and increases the understanding of circuitry and function of the brain RAS in disordered fear learning. This may lead to improved therapeutic treatments for PTSD.

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INTEGRATED BIOMEDICAL SCIENCES PHD

AC484 a small molecule inhibitor of PTPN1 and PTPN2 enhances lymphocyte activation.

Human Immunodeficiency Virus (HIV) infects CD4 T cells for viral replication that leads to acquired immunodeficiency syndrome (AIDs). HIV infected CD4 T cells transition to latent cells that create an HIV reservoir that avoids detection and eradication by the immune system. Activation of latent CD4 T cells with latency reversal agents (LRAs) promotes detection and killing of infected cells through a "Shock and Kill" strategy. Our study focused on characterizing a novel LRA compound, AC484, which enhances pSTAT5 activity through inhibition of protein tyrosine phosphatases (PTPN1/PTPN2). We speculate that AC484 enhances activation of CD4 T cells, CD8 T cells, and NK cells. We treated PBMCs from multiple donors with AC484 and IL-15 _c-cytokine then measured the expression of surface activation marker CD69 in T and NK cell populations and compared the results to a known positive control LRA HODHBt. Flow analysis results from treated CD4 T cells, CD8 T cells, and NK cells showed that AC484 enhanced activation in a dose dependent response. Treatment of AC484 at 10µM enhanced activation in a similar fashion to HODHBt at 100µM. This study indicates that AC484 enhances immune cell activation like HODHBt but at a lower concentration and will promote the detection and eradication of the latent HIV reservoir.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Enhancing the Efficacy of B7H3 CAR-T Cell Therapy against High-Grade Glioma through the Use of DNA Methylation Inhibitors in Manufacturing

Gliomas, the most prevalent form of central nervous system cancer, demands improved therapeutic strategies due to their poor prognosis and limited treatment options. Chimeric Antigen Receptor (CAR) T-cell therapies offer a targeted approach to cancer treatment, but challenges such as epigenetic reprogramming and T-cell exhaustion significantly impact their persistence and effectiveness in solid and brain tumors. DNA methylation, a crucial epigenetic modification regulating gene function, plays a role in these processes. This study investigates the enhancement of anti-glioma activity of engineered CAR T-cells through targeted manipulation of the DNA methylome using DNA methyltransferase inhibitor (DNMTi) during manufacturing. We hypothesize that targeting the dysregulated DNA methylome in adoptive T-cells can improve immune activation and the anti-tumor efficacy of engineered adoptive immune cells. We optimized a transduction protocol that incorporates adding DNMTi early during the manufacturing process of murine CAR T-cells targeting B7-H3. Subsequently, standard in-vitro assays were conducted to evaluate whether DNMTi treatment of murine B79H3 CAR T-cells improved their effector function by regulating differentiation, cytokine responses, persistence, and cytotoxicity. Results show that integrating DNMTi during CAR T-cell manufacturing extends their persistence and cytotoxicity in-vitro. In repeated-stimulation assays, DNMTi-treated CAR T-cells exhibited significantly higher expansion and persistence levels compared to those without DNMTi exposure. Notably, DNMTi-treated CAR T-cells persisted up to 12 repeat stimulations, contrasting with a maximum of 7 stimulations for untreated CAR T-cells. Moreover, DNMTi-treated CAR T-cells expanded up to 55-folds higher than T-cells generated without DNMTi treatment upon repeated-stimulation with B7-H3-positive tumor cells. This was also associated with remarkably enhanced secretion of immune-stimulatory cytokines that persisted across repetitive stimulations. The treated T-cells also demonstrated greater cytotoxicity at lower effector-to-target ratios compared to untreated counterparts, maintaining this efficacy even after the 4th stimulation. Mechanistic studies suggest that DNMT inhibition enhances B7-H3 CAR T-cell anti-tumor activity by regulating activation and memory differentiation of CAR T-cells early in the production phase. These findings hold potential for addressing challenges related to CAR T-cell exhaustion and improving the overall efficacy of adoptive cellular therapies in Gliomas. Furthermore, these findings have implications for the treatment of solid and brain cancers, warranting the need for further investigation.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Postpartum Depression and Effects on Offspring Newborn Brain Structure and Communication

Maternal depression has been shown to have detrimental effects on fetal and neonatal brain structure and subsequent language and social development in young children. During the COVID-19 pandemic depression prevalence rose in pregnant women in a landscape of increased anxieties and social isolation. This study seeks to determine the relationship between maternal postpartum depression and infant brain structure and development. Methods: We prospectively recruited mother-baby dyads during the COVID-19 pandemic into a longitudinal infant brain development study. Postpartum maternal depression was evaluated using the Center for Epidemiological Studies Depression Scale Revised. Neonates underwent non-sedated brain MRI and images were segmented using DrawEM and 3D U-Net-based method followed by manual correction. Infant development was assessed using the 6- and 12-month Ages and Stages Questionnaire. An ordinary least squares linear regression model was used to assess the relationship in maternal depression, regional brain volumes of neonates, and infant development scores. Results: Postpartum depression during the newborn period was significantly negatively associated with cortical gray matter, hippocampal, amygdalar and cerebellar volumes in neonates. Cortical gray matter and hippocampal volumes were significantly negatively associated with scores in the communication domain of the Ages and Stages at 6 months of age. Maternal postpartum depression was significantly negatively associated with communication scores on the 6- and 12-month Ages and Stages. There was no significant effect of viral exposure on either brain structure or infant development. Conclusions: These findings suggest a link between maternal postpartum depression, regional neonatal brain volumes, and subsequent communication skills in the infant through the first year of life. The potential long-term consequences of this deficit in children is currently ongoing.

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INTEGRATED BIOMEDICAL SCIENCES PHD

Serotonergic Dysregulation and Social Dysfunction Following Early Life Stress

Early postnatal development is a critical period for the brain's developing cognitive and emotional circuitry. Early life stress (ELS) such as neglect, low socioeconomic status, and instability of resources have been shown to confer alterations in social behaviors and social dominance, as well as increased vulnerability to neuropsychiatric disease. Social behaviors and social hierarchies have significant lasting impacts on access to resources and health status across species. The brain's serotonergic (5-HT) system, which originates in the dorsal raphe nucleus (DRN) and exerts widespread neurotrophic and neuromodulatory effects, has been implicated in several social behaviors, including sociability and social status. Further, maladaptive serotonergic activity has been associated with negative social outcomes and decreased social status, and our preliminary electrophysiological data shows that ELS leads to reduced DRN 5-HT neuronal excitability in juvenile (PND 15) and adult (PND 80) mice, but this deficit is absent in adolescence (PND 35). Subsequently, our behavioral data suggests that ELS exposure results in alterations in social behaviors in adolescence and a robust subordinate phenotype in social dominance assays in adulthood, in both male and female mice. Based on these findings, we aim to investigate 1) whether there are differential effects of ELS on social behaviors between adolescence and adulthood, including acute use of a selective serotonin-reuptake inhibitor (fluoxetine) as a restorative mechanism, and 2) whether administration of fluoxetine during social competition assays would have restorative effects on the ELS-induced subordinate phenotype. To model ELS, we will use the limited bedding and nesting (LBN) paradigm in C57Bl/6 male and female mice for behavioral experiments. We will use the social play behavioral assay which quantifies direct social interactions between the experimental animal and a neutral playmate in both ELS and control mice, in presence and absence of fluoxetine administration. Finally, we will also examine adult social competition after fluoxetine administration by using both the dominance tube test assay and food competition assay to assess competition between ELS and control mice. Our preliminary findings suggest that separate changes in social behavior occur between adolescence and adulthood, and these findings coincide with alterations in DRN 5-HT neuronal excitability. These ongoing experiments aim to shed light on the relationship between ELS, social behaviors, and serotonergic function.

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MS ANATOMICAL AND TRANSLATIONAL SCIENCES

Shift in driving force of disease in the progression of different stages in an animal model of multiple sclerosis

Multiple sclerosis (MS) is an autoimmune, demyelinating disease of the central nervous system (CNS), characterized by myelin damage, inflammation, and axonal injury. The CNS is protected by the blood-brain barrier (BBB), which prevents entry of peripheral immune cells and neurotoxic factors. In MS, because of an impaired BBB, the immune cells enter the CNS and contribute to neuroinflammation and reactivity of CNS glial cells, such as microglia and astrocytes. Current disease-modifying therapies (DMT) primarily treat relapsing-remitting multiple sclerosis (RRMS), but few therapies have been successful in treating chronic primary or secondary progressive MS. Success with immunotherapies, such as rituximab, in patients with RRMS as well as in animal models suggests that infiltration of peripheral immune cells drives glial cell neurotoxicity and demyelination in MS. Given that there is a differential response to immunotherapies in chronic progressive MS, we hypothesize that inflammation is the driving factor in early stages of progressive disease, and axonal injury drives late chronic disease. Using experimental autoimmune encephalomyelitis (EAE), an animal model for MS, we compared the number of infiltrating immune cells, such as B cells, T cells, and microglia/macrophages in the thoracic spinal cords of animals with a clinical score of 2 (early disease) and 4 (late disease). Additionally, we analyzed the morphological changes in astrocytes, microglia, oligodendrocytes, and neurons in demyelinating lesions of the spinal cord to characterize the effects of immune cell infiltration on cells in the CNS. We report a decrease in the number of infiltrating immune cells, including macrophages, and an increase in myelin damage in EAE animals during late chronic disease compared to animals during early disease. This coincides with increased axonal damage seen during late chronic disease. Our data suggest that pathogenic inflammatory cells in EAE invade the CNS and contribute to myelin damage in early stages of progressive disease and plateau in later stages of chronic MS as axonal death becomes the driving force of the disease. As such, we provide insight into possible mechanisms of chronic MS pathology that differ from relapsing disease.

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G-Protein-Coupled Receptor 84 Regulates Acute Inflammation in Normal and Diabetic Skin Wounds

Skin wound healing relies on a coordinated immune response composed of multiple overlapping phases. The innate immune response is influenced by countless factors concentrated at the site of injury. Among the regulatory factors for myeloid and lymphoid cell function, are lipids. Herein, we investigate a medium-chain fatty acid (MCFA) receptor, G-protein-coupled receptor 84 (GPR84), for its potential to propagate lipid-induced pro-inflammatory signaling during skin wound healing. We found Gpr84 expression to be upregulated by a variety of cell types shortly after injury, when pro-inflammatory signaling is most necessary. Through in vivo administration of a pharmacological antagonist and the MCFA decanoic acid (DA), GPR84 signaling was identified as a key component of myeloid cell inflammation in normal murine skin wounds. Treatment with the GPR84 antagonist early during wound-induced inflammation subsequently decreased wound closure and tissue repair, revealing lasting effects of GPR84 modulation during wound inflammation. Diabetic skin wounds heal slowly due in part to impaired early myeloid cell inflammation. Thus, we probed murine diabetic wounds for the components necessary for GPR84 signaling. Gene expression analysis showed a robust increase in Gpr84 in murine diabetic (db/db) wounds early after injury; however, immunostaining indicated impaired injury-induced dermal adipocyte lipolysis. Concordantly, lipidomic analysis revealed a significant reduction in MCFAs. Local injection of DA to diabetic mouse (db/db) wounds rescued myeloid cell numbers and improved subsequent wound closure and revascularization. Thus, GPR84 presents a readily targetable lipid signaling pathway for manipulating injury-induced tissue inflammation with beneficial effects on acute diabetic wound healing.

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Identification of a Locus Coeruleus-Amygdala Angiotensinergic Circuit: Implications for Stress-related Cardiovascular Diseases

The locus coeruleus (LC) is a significant noradrenergic nucleus in the brain, sensitive to afferent interoceptive signals. It responds to behavioral challenges by increasing noradrenaline release through ascending. The brain renin-angiotensin system (RAS) plays a role in stress-related cardiovascular diseases, and previous research has identified angiotensin II (Ang II) and its receptors in the LC. The current study aimed to gain a deeper understanding of the function of the Ang II type 1 receptor (AT1R) in the LC, particularly its involvement in transmitting interoceptive cardiovascular signals by regulating LC activity. Methods: Using AT1R-eGFP and AT1R-Cre mice combined with neuroanatomical tract-tracing, chemogenetic and behavioral approaches, we examined AT1R expressing neurons in the LC. Dual immunohistochemistry was used in AT1R-eGFP reporter mice to characterize LC-AT1R-eGFP+ cells by looking at the colocalization of noradrenergic neuron marker tyrosine hydroxylase (TH) and GFP. Cre-inducible tracing with AT1R-cre mice was applied for circuit anterograde analysis and in vivo chemogenetics were used for behavior testing and analysis. Results: The majority of AT1R-eGFP+ neurons (94%) in the LC were found to be co-localized with TH. The AT1R+ neurons in the LC predominantly project to the amygdala and extended amygdala regions. Subsequently, AT1R was deleted from LC by injecting Cre virus into AT1R-Flox mice. Although the general anxiety level remained unchanged, restraint stress-induced anxiety was attenuated following LC AT1R deletion as shown by increased open arm distance in the elevated plus maze (EPM) test (21.7 ± 6.6 mm AAV-GFP vs. 98.1 ± 27.5 mm AAV-Cre, $p < 0.05$, $n = 10$). Moreover, the study employed Cre-dependent inhibitory and excitatory designer receptors exclusively activated by designer drug (hM4Di and hM3Dq DREADD) with Clozapine-n-oxide (CNO) to selectively silence and activate the AT1R+ neurons in the LC. The inhibition of AT1R+ neurons decreased the baseline anxiety level in mice (36.6 ± 8.6 mm Saline vs. 153.4 ± 38.9 mm CNO, $p < 0.01$, $n = 8$, EPM open arm distance), while activation of AT1R+ neurons increased baseline anxiety level (963.1 ± 223.1 mm Saline vs. 408.5 ± 92 mm CNO, $p < 0.01$, $n = 10$, EPM open arm distance). Conclusion: These findings suggest that a specific group of angiotensinergic LC neurons sends projections to the amygdala, highlighting the potential significance of AT1R in mediating noradrenergic activation between the LC and amygdala. Future investigations will explore the response of LC AT1R+ neurons to stress-induced cardiovascular stimuli and afferent interoceptive LC inputs, which may offer novel insights, and new therapeutic direction for the link between stress disorders and cardiovascular disease risk.

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2024 —————
**GW SMHS RESEARCH
SHOWCASE**
————— ABSTRACTS

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School of Medicine
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[THE GEORGE WASHINGTON UNIVERSITY](https://www.gwu.edu/~smhs)

RESIDENTS/FELLOWS

Long Term Pacemaker Dependency After TAVR Induced Bradyarrhythmia

Pacemaker implantation after TAVR is common with a prevalence range between 9% to 26%. It is unclear whether the peri-procedural bradyarrhythmia is transient or permanent. In this study, we evaluated the prevalence of long-term pacing dependency after TAVR. **Methods** We conducted retrospective analysis of post TAVR pacemaker implantation cohort between 2017 and 2023 in a tertiary academic hospital. We performed a multi-regression statistical analysis of the baseline characteristics and pacemaker dependency on device interrogation in follow-up clinic visits. Primary outcome of interest was pacing dependency on follow up device interrogation. We defined pacing dependency as >90% total ventricular pacing on outpatient device interrogation. **Results** A total of 35 patients who needed pacemaker implantation after TAVR were included. The mean age was 79.8 years. Sixty percent were males, 43% were high surgical risk, 25% were intermediate surgical risk, and 11% were low surgical risk. Ninety-six percent had a balloon expandable valve. After TAVR, 83% underwent leadless pacemaker implantation, 14% underwent dual chamber pacemaker implantation, and 3% underwent biventricular pacemaker implantation. Pacemaker indication was complete heart block in 66%, high grade AV block in 16%, sinus node dysfunction and sinus pause in 13%, and symptomatic first-degree AV block in 6%. Total ventricular pacing was >90% in 2 patients (7%), 10-90% in 13 patients (46%), and <10% in 13 patients (46%). **Conclusion** Most patients with pacemaker implantation after TAVR were not pacemaker dependent on the subsequent clinic visits indicating a possible transient conduction injury leading to bradyarrhythmia.

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RESIDENTS/FELLOWS

A Heart-Breaking Twist of Hypervirulent Klebsiella Endocarditis

Klebsiella pneumoniae is rarely associated with infective endocarditis (IE). We present a case of native mitral valve (MV) acute IE due to hypervirulent *K. Pneumoniae* (hvKP) in an immunocompetent individual causing embolic infarcts. Case: A 57-year-old female with hypertension and hyperlipidemia presented with 3 days of fever, malaise, shortness of breath and dyspnea on exertion after a recent episode of gastroenteritis. The patient was febrile, had tachycardia but was hemodynamically stable on presentation. Examination revealed a generally sick patient with bilateral crackles on lung examination. Initial lab work revealed leukocytosis and anemia, with elevations in NT-ProBNP, troponin, ESR, and CRP. Chest X-ray revealed interstitial edema, while CT abdomen noted a splenic infarct suggestive of septic emboli. Initial blood cultures grew *K. pneumoniae*. Both the transthoracic and transesophageal echocardiograms revealed a large 2.6 x 1.5cm mobile vegetation on the posterior MV leaflet, severe mitral regurgitation, and hyperdynamic 70-75% left ventricular systolic function. Antibiotic and diuretic therapy were promptly initiated, with emergent MV replacement following echocardiogram findings. A 27mm Mitris Inspiris valve and mitral annular reconstruction with a pericardial patch was performed. The patient experienced a post-operative embolic right cerebellar stroke, managed with high-dose aspirin. The patient later showed clinical improvement and was discharged with 6-weeks of antibiotic treatment. Conclusion: Bacterial gut translocation following a recent gastroenteritis was deemed the source of hvKP infection. Acute IE caused by hvKP in an immunocompetent person is an uncommon but potentially fatal manifestation, highlighting the importance of timely evaluation and intervention to reduce mortality.

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Timing of Ischemic and Hemorrhagic Stroke with Myeloproliferative Neoplasm Diagnosis among Veterans

Myeloproliferative Neoplasms (MPNs) are rare, acquired stem cell disorders, consisting of Essential Thrombocythemia (ET), Polycythemia Vera (PV), and Primary Myelofibrosis (PMF), complicated by thrombo-hemorrhagic events such as stroke. The timing of ischemic stroke and hemorrhagic stroke in relation to MPN diagnosis among Veterans remains undefined. We utilized the Veterans Affairs Informatics and Computing Infrastructure database from 1/2/2006 " 1/26/2023 and included 586,555 Veterans from Illinois, the state most representative of the US population. ICD-9 and -10 codes identified Veterans with stroke and MPN. Fisher's exact test was utilized to compare MPNs vs. non-MPNs. There were 237 MPNs and 15,221 non-MPNs with ischemic stroke while there were 26 MPNs and 1,567 non-MPNs with hemorrhagic stroke (Table 1). There were no differences in age of stroke diagnosis among MPNs vs. non-MPNs. There were higher rates of hypertension, smoking, and heart failure among MPNs vs. non-MPNs with ischemic stroke. The majority of ischemic stroke was diagnosed either more than three months before MPN diagnosis (N=115, 48.5%) or more than five years after diagnosis (N=98, 41.4%). Among MPNs with hemorrhagic stroke, stroke was predominantly diagnosed (N=14, 53.8%) more than three months before and (N=7, 26.9%) within 3 months of MPN diagnosis (Figure 1). Among MPNs there was recurrence of stroke among 45.18% of ischemic stroke and 40% of hemorrhagic stroke. Although MPN are infrequent causes of stroke, these findings suggest continued surveillance for MPN and workup for driver mutations after a stroke diagnosis. This study also suggests consideration for dual antiplatelet therapy for MPNs with cardiovascular risk factors to prevent ischemic stroke and a multidisciplinary approach between neurology and hematology.

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Risk for Ischemic and Hemorrhagic Stroke Is Increased in Veterans Exposed to Agent Orange and Those with Myeloproliferative Neoplasms

Agent Orange is a dioxin containing defoliant and carcinogen used in the Korean and Vietnam War. There is limited evidence of the association between Agent Orange exposure among Veterans and stroke. Stroke is not yet part of the list of presumptive conditions according to the Promise to Address Comprehensive Toxics (PACT) Act which provides Veterans and their survivors disability compensation for conditions arising from exposure to Agent Orange. Myeloproliferative Neoplasms (MPN) are uncommon etiologies of stroke but whether Agent Orange exposure increases incidence of stroke in MPN has not been described. Utilizing the Veterans Affairs Informatics and Computing Infrastructure (VINCI) database, a case-control study was performed from 1/1/2006 " 1/26/2023 on the Veterans from Illinois, the state most representative of the US population. ICD-9 and -10 codes identified Veterans with stroke and MPN. Agent Orange exposure was verified on the Veterans' service duration and location. Qualitative data were compared by chi-square tests. Among 586,555 Veterans from Illinois, there were 15,455 ischemic stroke, 1,593 hemorrhagic stroke, 2,752 MPN, and 59,393 with Agent Orange exposure. Among MPNs, there were 237 ischemic stroke (41 with Agent Orange) and 26 hemorrhagic stroke (3 with Agent Orange). ischemic stroke and hemorrhagic stroke were associated with Agent Orange exposure, OR 1.34 95% CI 1.28-1.41, $p<0.0001$, and OR 1.20 95% CI 1.03-1.39, $p=0.02$, respectively. MPN is associated with ischemic stroke and hemorrhagic stroke, OR 3.52, 95% CI 3.08-4.03, and OR 3.54, 95% CI 2.4-5.23, both $p<0.0001$, respectively. There is no significant association with Agent Orange exposure among Veterans with MPN with stroke. Among non-MPN Veterans with Agent Orange exposure, there was an earlier median age of ischemic stroke and hemorrhagic stroke, 67 vs. 70 and 67 vs. 71, both $p<0.0001$. There was no difference in median age of stroke among MPN Veterans with or without Agent Orange exposure. There were no differences with rates of hypertension, hyperlipidemia, diabetes, smoking, heart failure, and pulmonary hypertension among MPN Veterans with stroke with and without Agent Orange exposure. In conclusion, there is an association of Agent Orange exposure with ischemic stroke and hemorrhagic stroke with an earlier onset among those exposed. There is a strong association between MPN and stroke independent of Agent Orange exposure. The biologic plausibility of endothelial dysfunction and accelerated atherosclerosis from Agent Orange exposure warrants further investigation.

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A Rare Case of Yellow Nail Syndrome

A 41-year-old man with asthma presented with 6 months of bilateral lower extremity swelling with peripheral hair loss. Vitals were unremarkable. Physical exam shows 3+ pitting edema of bilateral lower extremities with hair loss and xanthonychia of first digits. Workup demonstrated a transient transaminitis, thrombocytopenia and anemia that all resolved after repeat labs a month later; spot protein/creatinine ratio was unremarkable. Duplex lower extremity dopplers, right upper quadrant ultrasound, and echocardiogram were all normal. A podiatry referral for biopsy ruled out onychomycosis, and was ultimately diagnosed with yellow nail syndrome. YNS is a rare syndrome that typically presents with slow-growing yellow dystrophic nails, lymphedema (80% of cases), and pulmonary abnormalities (36% of cases). It is commonly observed in adults over the age of 50. Though the presence of nail changes is needed to make the diagnosis, only one of the two other organ involvement is required to make the diagnosis. Literature has demonstrated that nail changes can be observed to precede the development of pulmonary manifestations. YNS is a diagnosis of exclusion, therefore a work-up to exclude liver, kidney, vascular, and cardiac involvement causing the lower extremity edema must be completed first, as completed in our patient. Chest X-ray should be obtained when respiratory symptoms are present to visualize effusions or lung changes, as well as a toenail biopsy to rule out fungal pathogens when xanthonychia. Once ruled out, a clinical diagnosis of exclusion of YNS should be considered. Treatment is usually centered around symptomatic care, such as thoracentesis for pleural effusion and compression garments for the lymphedema. Some case studies have shown resolution of symptoms with vitamin E and octreotide, but more robust studies are needed.

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Developing an Approach to Improve Resident Confidence with Inbox Management in Internal Medicine Continuity Clinic

Internal medicine residents spend considerable time managing outpatient inter-visit responsibilities for their own and their colleagues' patients. Resident confidence in completing inbox tasks is reduced by the nebulous workflow, limited time to complete unfamiliar tasks, and limited onboarding to electronic records. There is little guidance on how programs should train residents to manage their inbox tasks. This project aims to develop an approach to increase resident confidence with inbox management. We conducted a mixed-methods study to identify strategies to improve resident confidence with inbox management. A survey using a 5-point Likert scale assessed resident comfort levels regarding three common tasks (reviewing test results, patient inquiries and medication refill requests) for their own and their colleagues' patients. First, residents completed the survey after reviewing a tip sheet about inbox management. Second, the tip sheet and survey were made more accessible with QR codes to improve resident participation. Third, a focused group of first-year residents were surveyed before and after a second-year resident-led walkthrough of inbox tasks during lunch hour. In the initial survey of 108 residents, higher confidence was noted in managing test results (45% very confident, 38% confident) and patient messages (42% very confident, 42% confident) compared to medication refills (42% very confident, 33% confident) for their patients. Residents reported lower confidence in managing their colleagues' tasks in test results (4% very confident, 46% confident), patient messages (8% very confident, 33% confident), and medication refills (8% very confident, 38% confident). Among 19 survey participants, the 52% who reviewed the tip sheet compared to those who didn't, showed no change in confidence levels for their own or colleagues' patients tasks. Following office hours, first-year residents' confidence in managing medication refills increased, with two from neutral to confident and one from not confident to neutral. The study suggests targeted interventions, such as office hours, are more effective in enhancing resident confidence in task management compared to standardized tools like PDFs. Despite interventions, residents reported lower comfort levels with their colleagues' tasks, attributing this to excess chart reviewing and making decisions with limited data. First-year residents showed the greatest improvement post-intervention, with feedback emphasizing importance of senior support, real-time feedback, and patient-specific data review. These initial findings emphasize the importance of access to senior guidance and tailored interventions to address residents' task management needs. Future efforts should expand office hours to more resident cohorts and integrate interventions into schedules to enhance resident engagement.

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Enhancing Control: A Quality Improvement Initiative to Improve A1C Levels in a Primary Care Setting

Diabetes mellitus poses challenges to healthcare systems due to its link with microvascular complications, including retinopathy, neuropathy, and nephropathy. According to the American Diabetes Association, the goal for most adults with diabetes is an A1C that is less than 7%. Achieving and sustaining optimal A1C levels remains critical to prevent complications and improve health outcomes. Objective/Aim Statement: This project aimed to reduce the percentage of patients with severely uncontrolled diabetes (A1C >9%) from 30.6% to 21% within a GW resident primary care cohort from August 2023 until March 2024. Methods: This project consisted of three PDSA cycles. Cycle 1 involved proactive outreach to diabetic patients with uncontrolled A1C levels; this intervention was found to be ineffective and was discontinued in further cycles. In cycle 2, dot phrases were introduced into documentation, including their most recent A1C value and a prompt to order an A1C if overdue by three months. The final cycle will expand these changes in documentation to a larger patient population. The primary outcome was A1c <9% in diabetic patients. Measures were derived from the KPI dashboard in Epic. Process measures were numbers of A1C labs ordered and notes including the dot phrase in a random subset of diabetic patients. Results: Analysis of pre- and post-intervention data demonstrated an improvement in the rate of uncontrolled diabetes from 30% to 24%. The percentage of utilized dot phrases by providers was approximated to be 50% (32/61 patients reviewed), indicating moderate adoption of the documentation tool. Additionally, the rate of A1C values collected within the time frame of the study was 66% (47/61 patients reviewed) demonstrating engagement with A1C monitoring practices. Conclusion: The outcome demonstrates that provider engagement methods, such as dot phrases, may be effective for improved monitoring of diabetes and patient follow up. However, A1C ordering frequency was more robust than dot phrase utilization, which could indicate that dot phrase use was cumbersome for providers. More intuitive EMR-based solutions, like automated pop-up notifications, may save time and augment the success of this project. Greater stakeholder engagement can facilitate diabetes management in a system where time is limited and maintaining care continuity is challenging. Other limitations include ambiguity in the source of data that define patient panels and difficulty collecting data from multiple providers. Further research is warranted to assess sustainability and long-term impact.

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Lemierre Syndrome in a young male without radiographic IJV thrombus

Lemierre syndrome, or postanginal sepsis, manifests as septic thrombophlebitis of the internal jugular vein (IJV) secondary to a primary infection, often pharyngitis. This case details a young healthy patient presenting with severe sepsis, complicated by ambiguous radiographic findings, underscoring the necessity of leveraging radiographic indicators for timely diagnosis, initiating antibiotic therapy promptly, and exercising discretion in anticoagulation utilization. Case Presentation: A 31-year-old male with no known past medical history presented to the hospital with a six-day history of sore throat, fever, and chills. Shortly after arrival, he developed pleuritic chest pain and exhibited fever, hypotension, and tachycardia, necessitating supplemental oxygen. Admission was warranted for sepsis, initially suspected to be secondary to a parapharyngeal abscess. Oropharyngeal examination revealed thick secretions but no airway obstruction. Serologic tests for HIV, strep, chlamydia, gonorrhea, and tuberculosis were negative. Flexible laryngoscopy showed a patent airway with no abscess evidence. CT scan of the neck confirmed a small retropharyngeal effusion without evidence of an abscess. CT angiography of the lungs revealed scattered pulmonary nodules without pulmonary embolism. Subsequent contrast-enhanced CT of the chest, abdomen, and pelvis showed worsening bilateral lung nodules and a new pericardial effusion. Blood cultures grew *Fusobacterium necrophorum*. The patient was initially treated with vancomycin and piperacillin-tazobactam, later transitioned to intravenous ampicillin-sulbactam, resulting in clinical improvement and improvement in oxygen requirements. Upon discharge, follow-up CT of the thorax revealed near-complete resolution of lung nodules. Discussion: Despite the absence of thrombus in the patient's IJV, scattered pulmonary nodules suggestive of septic emboli were detected, likely originating from a thrombus source. This highlights the potential for prior embolization even without visible IJV thrombosis, a potential occurrence in such cases. The patient's history of odynophagia, coupled with findings indicating pharyngitis on imaging and examination, suggests this as the initial infection site, leading to inflammation and subsequent thrombus formation, spreading to the lungs. Positive blood culture for *F. necrophorum* strongly supports the diagnosis of Lemierre Syndrome, considering it's a prevalent causative agent. This case emphasizes the importance of radiological evidence in diagnosis, even when IJV thrombosis isn't apparent, with evidence of embolization serving as a surrogate. It's a rare example where anticoagulation wasn't needed, as antibiotic therapy alone led to clinical improvement and emboli resolution. However, careful consideration of anticoagulation may be warranted in high-risk patients or persistent thromboembolism cases despite treatment.

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Diabetes Management Quality Improvement in an Internal Medicine Resident Continuity Clinic

Internal medicine residents commonly encounter and manage patients with chronic diabetes in their continuity clinics, particularly those with uncontrolled disease. According to the American Diabetes Association, an A1c of 9% puts one at a higher risk for blindness, heart attack, nerve damage, and kidney failure. Studies have shown some barriers to achieving optimal glycemic targets include medication non-compliance, lifestyle factors, and socioeconomic status. We aimed to decrease the percentage of patients with an A1c > 9% in one resident clinic to less than 21% in five months. Between August 2023 and January 2024, the percentage of patients with an A1c > 9% was obtained from the Epic KPI Dashboard of one cohort of residents. Five PDSA cycles were conducted five weeks apart. After the patients on the resident panel were identified (PDSA1), an informal survey was conducted amongst residents to identify barriers to optimizing glycemic control in patients (PDSA2). Based on this, follow-up diabetes appointments were scheduled for these patients (PDSA3), and their diabetes medications and supplies were refilled (PDSA4). Lastly, A1C tests were ordered for those with an A1c > 9% for updated data (PDSA5). Data was collected after each cycle except the last. We analyzed A1c data from 113 patients under 12 residents. At baseline, 39 out of 104 patients (38%) had uncontrolled diabetes. Following PDSA1 and 2, there was minimal change in percentage of participants with A1c > 9%. After implementing PDSA3 with appointment scheduling, there was a 5% reduction in uncontrolled diabetes. PDSA4, involving medication/supply refills, further decreased uncontrolled diabetes to 31%. Although it did not meet its target goal, this quality improvement project successfully decreased the percentage of patients with uncontrolled diabetes from 38% to 31%. The informal survey showed that barriers to achieving better glycemic control included poor patient follow-up and medication compliance issues due to insurance formulary changes. The interventions that led to the highest decrease were scheduling follow-up appointments and refilling diabetes medications/supplies. This underscores the importance of incremental, longitudinal care, the need to spend more time counseling patients on their diabetes medications, and ensuring they have adequate resources. Limitations include the inability to collect data on the number of diabetes follow-up appointments that were scheduled, whether patients picked up their refilled medications and supplies, and the additional hours of work spent by residents and support staff on inter-visit care.

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Standardizing Advanced Care Planning in the Primary Care Clinic: A Quality Improvement Project

There is a lack of standardization of Advanced Care Planning (ACP) discussions during Medicare Annual Wellness (MAW) visits at our institution. In addition, there is no standardized way to access a patient's previous ACP documentation or conversations in our electronic medical record (EMR). Our aim was to improve the documentation for ACP for MAW visits by increasing the utilization of a standardized smart phrase by 15% over 6 months in our institution's primary care clinic by both residents and attendings. We initially worked with information technology (IT) to design a smart link section in our EMR specifically for ACP. The section includes a place for healthcare providers to document end of life planning conversations, healthcare proxy or durable power of attorney, and space to upload advanced directive documentation. To increase utilization of this section, we created a standardized smart phrase that when added to a note automatically transfers information to the ACP section of EMR. To increase the use of this smart phrase and ACP section of our EMR, we designed three Plan-Do-Study-Act (PDSA) cycles. We first held resident-led informational sessions with residents during their ambulatory clinic week with step-by-step instructions to add the smart phrase to their personal MAW visit templates. For the second PDSA, the geriatrics department provided an educational session to residents about ACP, documentation, and the importance of standardization of ACP discussions. Our last PDSA cycle included a resident-led education session for attending physicians on utilizing the standardized smart phrase. We also added the smart phrase to the institution's standardized MAW template and encouraged the use of this standardized template. We measured the number of times the ACP smart phrase was utilized during visits billed as MAW visits in our institution's ambulatory clinic every month. Baseline utilization of standardized ACP smart phrases during MAW visits was 0%. After implementation of the first PDSA cycle, utilization increased to 12.9%. After implementation of the second PDSA cycle, utilization increased to 17.8%, which surpassed our initial goal. Utilization after the third PDSA cycle is still pending at this time. Internal medicine residents receive little education about ACP, which is an essential part of primary care. Having brief educational sessions can reinforce the importance of ACP in the primary care setting. Utilizing standardized smart phrases that are incorporated into EMR templates can increase the standardization of conversations surrounding ACP during MAW visits and improve documentation of advanced directives for patients.

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Improving Prescription of Insulin and Insulin Supplies on Hospital Discharge " the INSU-QI (Insulin Supplies for Quality Improvement) Project

Hospitalized patients with diabetes have increased rates of complications, in-hospital mortality, and re-admissions. When discharging patients, the nuances and uncertainties involved in prescribing insulin supplies, like pen needles and syringes, can create barriers and problems which put patients at risk for diabetic-related complications and re-hospitalizations. The goal of the INSU-QI project was to improve the ease and uniformity for providers to prescribe insulin and proper supplies and thereby increase the number of patients who receive appropriate prescriptions when discharged. We aim to increase electronic orders of insulin needles and/or syringes by 25% in patients admitted to the medical inpatient service for diagnoses of diabetic foot ulcer, hyperglycemia, diabetic ketoacidosis (DKA), and hyperosmolar hyperglycemic state (HHS) over a three-month period (Nov 2023 " Jan 2024). Secondly, we also aim to increase the percentage of training physicians who prescribed needles and/or syringes with insulin by 25%. We implemented three plan-do-study-act (PDSA) cycles to introduce an instructive guide for prescribers. The guide, in the form of a poster, provided a step-by-step process for prescribing appropriate insulin supplies based on the type of insulin. It also offered an order set within the electronic medical record (EMR) for prescribers to copy to their profiles for all future prescriptions. Through PDSA cycles focused on education of prescribers on this guide, the self-reported frequency of providers electronically ordering these supplies in the EMR increased from 58.3% to 84.2%. For patients admitted to the medical inpatient service for diagnoses of diabetic foot ulcer, hyperglycemia, DKA, and HHS, the percentage of patients who were electronically prescribed needles and/or syringes increased from 9.1% to 54.5%. Additionally, resident physicians who prescribed needles and/or syringes with insulin increased from 56.7% to 78.3%. The INSU-QI project highlights that while prescribers can have varying levels of comfort in prescribing all necessary supplies for insulin, the introduction and reinforcement of an instructive tool and standardized order set can reduce uncertainty and improve reliability in insulin and insulin-supply prescriptions. With multidisciplinary input, implementing the order set automatically into the EMR may be the logical next step to provide easily accessible guidance to more prescribers and improve diabetes-related outcomes for patients.

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i-NPO: Reducing the Number of Hypoglycemic Events in NPO Patients on Long-Acting Insulin

This project aims to address the challenge of hypoglycemic events in patients on long-acting insulin who are designated as NPO (Nil Per Os; nothing by mouth). Our baseline data showed that 54% of patients admitted to a medicine unit who were on a long-acting insulin and were made NPO in anticipation of a procedure had hypoglycemic events. By implementing a multifaceted intervention, including resident education and a system reminder, we aim to reduce the frequency of hypoglycemic events and enhance overall patient safety. The intervention, denoted as "[] iNPO []", incorporates a two-fold strategy during sign-out, serving as both a phrase for communication and a prompt for workflow adjustments. The "[] i" signifies the proactive adjustment of insulin doses in anticipation of NPO status, while "NPO []" represents the placement of a "NPO past midnight" order. The primary objectives of this initiative are to protect patients from hypoglycemia while on long-acting insulin during periods of fasting, ensure optimal blood glucose control when resuming diet, and establish a standardized language for communicating diet changes and insulin adjustments. By incorporating the iNPO intervention into the sign-out process for inpatient medicine teams, we aim to improve efficiency by addressing two tasks in one communication, leading to a reduction in adverse events. After 3 PDSA cycles of change, the data showed a 35% reduction in hypoglycemic events among patients on a medicine unit who were on a long-acting insulin and were made NPO in anticipation of a procedure. Limitations included barriers to adding EMR (Electronic Medical Record) functions in a multihospital system, hindering the implementation of automated notifications. Therefore, the intervention heavily relied on education for interns and residents. Overall, the iNPO intervention systematically reminds and visually prompts insulin adjustments, promoting proactive diabetes management for planned procedures. This approach aims to prevent hypoglycemic events, streamline communication, and enhance patient safety in clinical settings.

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Utility of Aneurysmal Subarachnoid Hemorrhage Grading Scales in Predicting Shunt Dependence

Aneurysmal subarachnoid hemorrhage (aSAH) often results in significant morbidity and mortality. External ventricular device (EVD) placement is often indicated during the initial clinical deterioration in order to manage hydrocephalus that results from aSAH. In some instances, a permanent ventriculoperitoneal shunt (VPS) becomes necessary for long term management. This study analyzes the utility of common aSAH grading scales, namely Hunt-Hess and Fisher scores, in predicting VPS dependence and other secondary clinical outcomes. Method: 60 consecutive adult (> 18 years old) patients treated at George Washington University Hospital between 2015 and 2023 who were diagnosed with aSAH were analyzed via retrospective chart review in order to predict shunt dependence. All subjects received Hunt-Hess scores, Fisher and modified Fisher scores. Characteristics of aneurysm size, location, and treatment modality were collected. EVD and VPS utilization (duration of EVD placement, EVD weaning rate), hospital length of stay, and patient demographics were also evaluated. Results: Of the 60 patients diagnosed with aSAH, 4 (6.67%) required a VP shunt after failure to successfully remove their EVD. VP shunt dependent patients had mean HH and mFisher scores of 3 (range: 2 to 4) and 4 (range: 4 only), respectively, compared to non-VPS dependent patients having mean HH and mFisher scores of 3.2 (range: 1 to 5) and 2.9 (range: 1 to 4), respectively. [African American/Non-Hispanic African American (AA/NH-AA) patients and White/Non-Hispanic White (W/NH-W) patients each composed 50% (2 of 4 patients) of the VPS shunt dependent patients while AA/NH-AA and W/NH-W patients composed 38% and 36% of the non-VPS shunt dependent patients, respectively.] Further statistical analysis is still pending to determine if these and other results are statistically significant. Conclusions: Our data appears to demonstrate that use of non-invasive and triage screening methodologies has limited utility in predicting VPS dependence for patients with aSAH-associated hydrocephalus. Specifically, the modified Fischer score showed greater ability to predict such dependence than a HH score, but continued analysis is ongoing to determine if these findings reached statistical significance. Of note, Fisher scores may soon become obsolete given the fact almost no SAH on CT can be classified as thin, or less than 1mm thick with the advances in imaging modalities of the modern era.

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Development of a ChatGPT-style app for Ob-Gyn resident education

Introduction Generative Artificial Intelligence (GenAI) technology is currently under investigation for its applications in healthcare, with limited exploration in the context of medical education, despite its significant potential. Commercial GenAI apps like ChatGPT are limited due to not having been trained on domain-specific medical knowledge, and not tuned for a medical education use case. This study explored emerging machine learning techniques in medical education. We demonstrate the creation of a mobile, chat-based, GenAI application specifically trained on domain-specific content of Obstetrics and Gynecology speciality. Methods We leveraged Retrieval-Augmented Generation (RAG), an innovative technique to extend a foundational large language model (LLM). Data collection process involved gathering high-quality Ob/Gyn literature, including practice bulletins, committee opinions, and topic summaries from resident physicians. Data was chunked and stored in a vector database with an embedding model. A low-code bot building platform facilitated orchestration of data and question/answering, and enabled the deployment of a user-friendly chat interface for testing. We iteratively refined the system prompts and incorporated few-shot examples for prompt optimization. Thirteen Ob/Gyn residents participated in testing and subjective feedback. Results We successfully developed and deployed a GenAI application aligned to the Ob/Gyn domain. Residents used the app to seek answers from evidence-based literature, finding it convenient on mobile devices. The chat interface was intuitive, while the quality of literature summarization met acceptable standards. Some users expressed a preference for more specific actionable responses, especially in cases related to cervical screening management. Conclusions / implications Retrieval augmented generation can be an effective method for aligning a foundational LLM model to be domain-specific to the ob/gyn speciality. Such a system has the potential to be a valuable tool for assessing the accuracy and safety of GenAI in answering specialty-specific medical questions. The development of domain-specific GenAI applications could significantly enhance medical education and improve the accessibility of relevant medical knowledge.

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Ob/Gyn Resident Attitudes and Perspectives on Artificial Intelligence in Medical Education

Generative Artificial Intelligence (GenAI) has recently seen rapid exploration and adoption in healthcare, yet its application in Ob/Gyn medical education has not been thoroughly investigated. GenAI has the potential to transform the learning process for residents by providing swift access to personalized educational material summaries, thereby offering tailored learning experiences and real-time decision support. This study aims to investigate the perspectives and attitudes of Ob/Gyn residents towards GenAI integration in their training. This study can guide the development and successful implementation of a specialized educational GenAI platform within Ob/Gyn training, potentially enhancing the learning experience. **Methods** This was a qualitative study and included a structured survey of 13 questions covering residents' experiences, opinions, and expectations of GenAI integration in their training. **Results** There were 19 total responses, with most being PGY1s (33.3%), followed by PGY3s (27.8%). Almost all respondents (94.4%) had never used GenAI for medical education, with most feeling not very confident about using GenAI for learning (50%). Most had a positive attitude (55.6%) toward GenAI, with 88.8% believing it could positively enhance medical education. Residents had concerns about GenAI surrounding critical thinking, accuracy, equity, and patient complexity. They anticipated using GenAI in various residency settings, with the highest interest in consults/triages (88.2%). 77.8% noted that they would use a GenAI platform at least once a week. A GenAI platform was noted to be a potential benefit in diagnosis and treatment recommendations, medical content learning, and personalized study resources. **Conclusions / implications** This study reveals that most respondents have not used GenAI and currently lack confidence in it. However, there was a significantly positive attitude towards GenAI use in Ob/Gyn education. Overall, the results suggest a readiness among residents to embrace AI tools in their education, provided that it addresses their concerns.

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Teaching population sociodemographics to incoming residents, a QI project

On average, 50% of graduating medical students transition to another state for residency. Education regarding the socio-demographic breakdown of the service population is not routinely provided to incoming residents. In large urban areas, community clinics provide access for many underinsured patients. We aim to increase the familiarity that incoming Ob/Gyn resident physicians at George Washington University Hospital (GWUH) have about the populations they are going to serve and the neighboring community clinics where patients may receive care. This intervention was conducted during intern orientation week. Incoming resident physicians completed a pre-intervention survey followed by a 30-minute powerpoint presentation on the demographics and topographical nature of the District of Columbia, Maryland, Virginia area. The presentation focused on the wards served by GWUH, specifically the population of each ward including the race/ethnicity breakdown of the wards and average income. The presentation included information on community clinics where patients who are seen at GWUH may receive their care. The session ended with a post-intervention survey. Before the intervention, the majority (n=6) of residents were unfamiliar with the demographics of the DC area. This intervention increased incoming residents' knowledge of the demographics of the community they will serve by 75%. After the intervention, 100% (n=8) of residents felt comfortable describing community clinics outside of our hospital system. Informational sessions regarding the sociodemographics of the community are an effective way of increasing resident understanding of the populations they will serve. As an academic hospital in a highly populated urban area, knowledge of nearby community clinics is crucial. There is an opportunity to expand this to general medical education orientation to provide an opportunity to expand this intervention to all incoming resident physicians.

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Obstetrics and Gynecology Resident In-service Training Exam Scores Compared with TrueLearn Usage

TrueLearn is an online question bank utilized in the preparation for residency in-service training exams (ITE), including the obstetrics and gynecology (Ob/Gyn) exam, known as the Council on Resident Education in Obstetrics and Gynecology (CREOG) exam. Current data shows that a higher number of practice questions completed is associated with higher scores on CREOG exams, and that performance on CREOGs is predictive of performance on board exams. Studies from non-Ob/Gyn specialties found question banks may be able to identify areas of improvement by subject matter, which has not been previously examined within Ob/Gyn question banks. This study aims to examine the relationship between TrueLearn performance and CREOG scores at a single academic medical center. Furthermore, this study will examine scores by subject matter, the number of questions answered, and the percentage correct. Data was collected from post-graduate year (PGY) 1-4 Ob/Gyn residents at George Washington University Hospital from 2021-2023. Participants were excluded if they completed less than 150 TrueLearn questions or did not take the CREOG examination. Data collected included the number of unique TrueLearn questions used, total percent correct, and total percent correct by subject matter in comparison to overall CREOG scores, total CREOG percent correct, and total CREOG percent correct by subject. Linear regression was used to compare the TrueLearn usage and performance to CREOG performance. Data from 61 George Washington University Hospital Ob/Gyn residents were collected. TrueLearn % correct had a significant effect on CREOG % correct. For every 1% increase in TrueLearn scores, CREOG percentage increased by 0.44% after adjusting for the number of questions completed and PGY year. This effect was strongest in PGY4, though this interaction effect was not significant ($R^2 = 0.73$, $p = 0.14$). Furthermore, TrueLearn % correct had a significant positive relationship with CREOG obstetric-specific % correct ($p = 0.02$), but not with CREOG gynecologic-specific % correct ($p = 0.54$). TrueLearn % correct had a significant positive relationship with Office Practice CREOG questions ($p = .0017$), but only within PGY4 residents. Total number of TrueLearn questions answered, regardless of % correct, did not have a significant effect on any outcome. Our study demonstrated that improved performance on TrueLearn questions results in improved CREOG scores, obstetric-specific scores, and practice-based question scores. Question banks should be easily accessible to Ob/Gyn residents. Further studies may be useful in identifying at risk residents by question bank performance to improve preparedness for CREOG and board examinations.

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Cannabis Hyperemesis Syndrome-Related Death: An Emerging Public Health Threat

Cannabinoid hyperemesis syndrome (CHS) is characterized by recurrent episodes of cyclical nausea and vomiting associated with heavy cannabis consumption that may be accompanied by compulsive hot baths for relief of symptoms. CHS is considered to be an extension of cyclical vomiting syndrome, which is a functional gastrointestinal disorder, by the ROME IV criteria. CHS is usually initially misdiagnosed and only recognized after several recurrent emergency department visits, which leads to delayed prevention of its potentially life-threatening long-term sequelae. An example of a medico-legal autopsy involving CHS has come through the District of Columbia Office of the Chief Medical Examiner. The case is of a 39-year-old male who presented to an emergency department (ED) with the complaint of a 3-day duration of an intermittent, dull, epigastric pain, nausea, and vomiting that worsened with food and drink consumption. Medical record review revealed similar symptoms over the past year, and he was diagnosed with gastroesophageal reflux disease and discharged with reflux and pain medication with minimal relief. He reported a long history of smoking marijuana and cigarettes, and socially drinking alcohol. He subsequently visited the emergency department multiple times for the same complaint. His symptoms were attributed to THC use, and he was advised to abstain from THC consumption. One day following his last medical encounter for the same complaint, he was found unresponsive at home and was pronounced dead. At autopsy, there was 5.3 centimeters perforated gastric ulcer with 1300 milliliters gastric content within the abdominal cavity. The discussed case exemplifies a detrimental complication of a delayed diagnosis of CHS. There are limited literature reports of fatalities attributed to chronic heavy THC use. A recently published case series included three cases that described the death of three young adults, whom all had similar histories to the above discussed case. The cause of death was attributed to CHS. The long-term effects of cannabis use that have been described in the literature thus far include impairment of long-term memory, inattention, increased risk of anxiety and depression, and CHS. Cannabis is the most used recreational drug worldwide and its consumption is increasing following its legalization in many countries. It is of utmost importance to recognize the chronic effects of THC use, and to spread awareness to the general public and medical personnel. Appropriate recognition of symptoms to achieve better medical care and avoid complications is imperative to prevent negative outcomes.

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Struck by Lightning: Case Series of Lightning Strike Related Deaths and What's Climate Change Got to Do with It?

Lightning strikes are one of the leading causes of natural disaster related deaths worldwide. Victims of lightning strikes present with a variety of external and internal findings secondary to electrical, thermal and barotrauma (blast) injuries. Such injuries include abrasions, burns, skin charring, soft tissue hemorrhage and organ damage in primarily the ears, lungs, gastrointestinal tract, and hollow organs. Another widely recognized indicator of lightning injury in forensic pathology is the presence of superficial fern-leaf pattern skin reaction known as Lichtenberg figures. While these injuries are not specific to lightning strike deaths, they can certainly guide forensic pathologists during investigation and post-mortem examination. We present five cases of lightning strike deaths with various pathological manifestations. All cases within our database occurred between 2007 and 2022. Of note, three of the five cases were related to the same lightning strike incident. All victims had findings indicative of lightning strike and electrical/thermal damage: abrasions and burns (all cases), burnt and torn clothing (all cases), internal organ injury (2 of 5 cases), and Lichtenberg figures (2 of 5 cases). The cause of death in all five cases was electrocution due to lightning strike and the manner of death was accident. Our paper focuses on how to approach the investigation and autopsy of a lightning related death, as well as the common postmortem findings seen in these cases. In addition, our paper explores the correlation and effect of climate change on the incidence of lightning related fatalities worldwide. In the existing literature surrounding lightning and climate change, there is a direct correlation between the distribution of lightning and the Earth's climate. Warmer climates and fluctuations in temperature are said to influence the stability of the atmosphere and, therefore, the development of thunderstorms.

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Sarcomatoid Carcinoma of the Urinary Bladder: a rare aggressive entity diagnosed on histopathology

Sarcomatoid carcinoma i.e. with both mesenchymal and epithelial differentiation, is a rare primary tumor of the urinary bladder (comprising 0.1-0.3% of cases) which confers a poor prognosis (median overall survival of 14 months) compared to conventional urothelial carcinoma. Establishing a timely histopathological diagnosis is of utmost importance. Herein, we report the case of a 72-year-old male with a history of prostate cancer, paraplegia with suprapubic catheterization, type 2 diabetes, paroxysmal atrial fibrillation, heart failure, coronary artery disease, schizophrenia, and chronic obstructive pulmonary disease, who presented with pain around his suprapubic catheter. CT imaging demonstrated a 9.2 cm homogeneous mass surrounding the catheter and an ultrasound-guided biopsy revealed a spindle cell neoplasm compatible with sarcoma with fibroblastic/myofibroblastic differentiation. Subsequently, partial cystectomy with resection of the mass with pelvic lymph node dissection and anterior abdominal wall debridement was performed. On macroscopic examination, an 18 x 10 x 8 cm tan-pink exophytic ulcerated mass was identified arising from the bladder, abutting the soft tissue margin and grossly involving the bladder wall margin. Microscopic examination revealed a highly proliferative tumor with mesenchymal and epithelial (squamous) differentiation with atypia and palisading necrosis. Immunohistochemical stains demonstrated the mesenchymal component to be patchy positive for SMA only and negative for cytokeratins, melanocytic markers, neuroendocrine markers, CD34, desmin, NKX3.1 and beta-catenin. The tumor cells at the epithelial component are positive for cytokeratins. The final histopathological diagnosis rendered was a pT4b sarcomatoid carcinoma (high-grade sarcomatoid component 90% and well-differentiated squamous cell carcinoma 10%), involving bladder, dermis and invading the pelvic wall anteriorly. All lymph nodes were negative for sarcomatoid carcinoma, however four lymph nodes were positive for concurrent metastatic prostate carcinoma. Unfortunately, within a month of diagnosis, the patient expired due to sepsis related to hydronephrosis. No post-operative chemotherapy or radiotherapy was administered. Early detection and establishing histopathological diagnosis with tumor staging can be used to guide management.

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Correlating Cytomorphological Findings with Molecular Test Results of Indeterminate Thyroid Nodules in a Racially Diverse Cohort

Molecular tests (MT) are increasingly utilized for risk stratification of indeterminate thyroid nodules that are a diagnostic challenge for cytopathologists and clinicians. Historically, the indeterminate categories (such as 'Atypia of Undetermined Significance' (AUS) III. and 'Suspicious for Follicular Neoplasm' IV.) of the Bethesda Thyroid classification system were treated as a waste basket. There is a recognized need to better characterize and define these indeterminate categories to 1) better risk stratify nodules 2) limit the use of indeterminate categories and 3) provide more confident management guidelines overall. For these reasons it is important to conduct research that aims to correlate cytomorphological features with molecular findings. Methods: This is a retrospective medical record and slide review of all patients with ThyroSeq v3 MT results from October 2022 to January 2024 at a single academic hospital. The association between molecular results, race, gender, nodule size, and key cytomorphologic features for 74 patients were assessed manually by a cytopathologist. The cytomorphologic features examined were: 1) cellularity 1) architectural atypia 2) oncocyctic atypia 3) anisonucleosis 4) colloid 5) nuclear overlapping 6) nuclear elongation 7) nuclear atypia 8) chromatin clearing and 9) nucleolus. The molecular results examined included probability of cancer, mutations, somatic copy number alterations, fusions, and gene expression profile. To date, descriptive results are reported and analyzed. Results: Our patient cohort included 31 African Americans (41%), 23 Caucasians (31%), and 21 Other (28%) ethnicities. The average age was 55 years; 60 patients were females (81%) vs. 14 (19%) males. The average nodule size was 3.2 cm. Twenty-six (35%) patients had positive molecular results, of whom 20 (77%) had a high probability of cancer (risk: >50%), 5 (19%) had intermediate risk (>10% to <50%) and 1 (4%) had low risk (=10%). EIF1AX mutation was more common in low-to-intermediate patients, exhibited moderate cellularity, low colloid and a smaller number of worrisome nuclear features. NRAS mutation showed higher probability of cancer and was the most common high-risk alteration, again with high-cellularity, low colloid, but with a higher number of worrisome nuclear features such as a greater number of cases with prominent nucleoli. These two represent a spectrum, with intermediate cases represented by a wider variety of molecular alterations and nuclear features. Conclusion: Our findings identified cellularity, colloid, and nuclear features such as nucleoli among others as key parameters to better stratify patients who have indeterminate thyroid nodules.

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Epidemiology and Clinical Characteristics of Adult Astrovirus Gastroenteritis in Metropolitan Washington DC, USA: 2016-2023

Astrovirus gastroenteritis is commonly studied in children but not adults. Detection of astrovirus on PCR panels allows for characterization of infected patients. Here, we investigate the epidemiology and clinical characteristics of adult astrovirus infections at our institution. Methods: Stool specimens tested between 01/2016-03/2023 on a gastrointestinal PCR panel (BioFire Diagnostics, Salt Lake City, UT) were analyzed. Chart abstraction was performed to collect patient demographics, laboratory results, clinical presentation and management for patients positive for astrovirus. Fisher Exact Test and 95% Confidence Intervals were calculated where appropriate. Results: Overall positivity rate of astrovirus was 0.6% (34/5053) with highest (1.02%) in 2018 and none in 2020. The mean age was 32 years old (range:18-52 yo) with majority being Caucasian (56%) and female (56%). Symptoms included diarrhea (100%), abdominal pain (92%), vomiting (47%), and fever (35%). Comparing patients in age group 30-39 years versus other age groups, vomiting (21% vs 65%, $p=0.0173$) and fever (40% vs 67%, $p=0.717$) were less prevalent. More females had abdominal pain (95% vs 87%, $p=0.6$) while more males had fever (47% vs 26%, $p=0.3$) although insignificant. Average period of diarrhea was 3 days (range:1-10 days). 23.5% of patients had increased monocytes (CI 0.29-1.92 x 10³/μl), and 29.4% showed decreased lymphocytes (CI 0.29-1.10 x 10³/μl). Peak seasons were late winter to spring (February-April). All patients were immunocompetent except one (HIV+). Gastrointestinal co-infections included toxigenic *E. coli* (12%), *C. difficile* (6%), *Campylobacter* (3%), *Norovirus* (3%), *Salmonella* (3%) and *Strongyloides* (3%). In all 34 patients, clinicians acknowledged detection of astrovirus and discharged patients without antibiotics. Conclusions: To our knowledge, this is the first case series on adult astrovirus infections from the D.C. area. We report novel findings about adult astrovirus gastroenteritis that are different from observations in children. PCR can rapidly diagnose viral gastroenteritis and can reduce inappropriate antibiotic administration.

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Genomic and Transcriptomic Analysis of Carcinoma of Unknown Primary: a Single Institution Experience

Cancers of unknown primary (CUP) are a group of heterogeneous malignancies characterized by the presence of metastatic tumors for which the site of origin remains unidentified after a comprehensive diagnostic workup. These tumors pose a significant challenge in terms of diagnosis, treatment, and prognosis, as the lack of knowledge regarding the primary site hampers the ability to tailor treatment strategies specifically to the tumor's origin. Here we aim to understand the underlying biology of CUP through comprehensive molecular analysis. Design: All patients with CUP diagnosis were selected for this study among those with diverse cancer types that had been referred to Tempus Labs, Inc by our institution (n=441) since 2019. Mutations and gene expression signatures were obtained from reports of next-generation sequencing (NGS) data of 648 genes from tumor (71%) or cell-free circulating-tumor DNA (cfDNA) (64%). The clinicopathologic characteristics were gathered from the patients' electronic medical records. Predicted results of Tumor Origin (TO) assay, an RNA-sequencing-based machine learning classifier capable of discriminating between 68 clinically relevant cancer subtypes, were reviewed with results of pathological diagnosis (Table). Results: CUP was diagnosed in 28/441 (6.3%) patients, predominantly in women 18/28 (64%), with median age of 67 years old. The most common metastatic sites were the liver (n=10; 36%), followed by pleural effusion or lymph nodes (n=6; 21.4% each). Potentially actionable and biologically relevant mutations were found in 93% (n=26) of CUP (Figure). Pathway-wise, the highest frequencies of mutations were detected in the cell cycle, proliferation/MAPK signaling and chromatin remodeling genes. TO assay, performed in 8 patients, predicted diagnosis of cholangiocarcinoma and lung carcinoma (n=3; 37.5% each) and cervical cancer (n=1; 12.5%). Conclusions: In summary, the primary site for metastasis of CUP is the liver. The cell cycle, proliferation/MAPK signaling, and chromatin remodeling were identified as key oncogenic pathways in CUP. Despite advances in molecular diagnostic approaches, only 36% had a favored primary organ of origin identified after extensive ancillary testing. Further research efforts of patients with CUP to match gene, immune- and pathway-targeted therapies are warranted

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Differences in performance of DNA Mismatch Repair Immunohistochemistry and Microsatellite Instability PCR Test in Cancers of Colorectum, Endometrium and Other Organs

Background DNA mismatch repair (MMR) immunohistochemistry (IHC) and Microsatellite instability (MSI) are useful to help identify patients with Lynch syndrome, evaluate tumors for checkpoint inhibitor-therapy and assess prognosis. Cancers with deficient MMR (dMMR) due to loss of expression of MMR proteins are usually associated with MSI but this may differ in cancers arising in different organs. We sought to evaluate the performance of the OncoMate[®] MSI Dx Analysis System, a polymerase chain reaction (PCR) test that detects alterations in five microsatellite loci (BAT-25, BAT-26, NR-21, NR-24, and MONO-27), compared to MMR IHC in multiple cancers. MSI-high (MSI-H), defined as MSI in at least 2 of 5 loci, correlates highly with dMMR but there are exceptions. Design Cancers from 75 patients representing the population at our institution were tested with the Oncomate MSI test and by IHC with Dako / Agilent antibodies for MLH1, PMS2, MSH2 and MSH6, using FFPE tissues. After microdissection to enrich for cancer, PCR was performed with the GeneAmp PCR System 9700 Thermal Cycler, and products were resolved in the Genetic Analyzer 3500 xL followed by analysis with GeneMapper V5. There were 52 female (69%), median age 67; range 23-93, and 23 males (31%), median age 67; range 21-91 years; race distribution was: 23 White (31%), 37 Black or African American (49%), 15 other or unknown race. Adenocarcinomas were from colorectum (30; 40%), endometrium (26; 35%), and the remainder were cancers from pancreas, prostate, small intestine, gallbladder, stomach, esophagus, appendix, lung and ovary. Results Overall, dMMR was seen in 31/75 (43%) and MSI-H in 28/75 (40%) of our cases. One CRC case was MSI-L and showed preserved MMR IHC. Of 31 cases with dMMR there were: MLH1-PMS2 loss (21), MSH2-MSH6 loss (5), MSH6 alone loss (3), PMS1 alone loss (2). Overall, MSI by PCR sensitivity and specificity were 93% and 100%. Eight of 30 (27%) CRC and 16/26 (62%) endometrial cancers tested had MSI-H. Of 3 cases with MSH6 loss 2 were MSS: 1 endometrial cancer and 1 small intestine cancer. All dMMR CRC cases had MSI-H by PCR whereas 25 of 26 dMMR endometrial cancers had MSI-H by PCR (96% concordance). Conclusion Concordance between MMR IHC and the Oncomate MSI PCR assay was 100% for CRC but for other cancers may be lower. The MSI PCR test has low sensitivity in cases with isolated MSH6 loss, supporting the recommendation that MMR IHC may be favored over PCR in cancers such as those of endometrium.

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MED12, TERT Mutations and Loss of CDKN2A in Malignant Phyllodes Tumor with Heterologous Angiosarcoma Highlights Potential for Targeted Therapies

Malignant phyllodes tumor (MPT) with heterologous sarcomatous differentiation is rare. Angiosarcoma arising within MPT is exceedingly rare. Currently, the treatment choices are limited. We hereby describe a case of angiosarcoma arising within a malignant MPT and review the immunophenotypical and mutational landscapes. A 56-year-old Asian female with no history of radiation therapy presented with a palpable mass in her right breast. Imaging showed a well-circumscribed oval, heterogeneous mass measuring 9.4 cm with cystic and solid components. Histopathological examination of the excisional biopsy showed characteristic features of MPT, including stromal overgrowth, hypercellularity, increased mitoses and infiltrative borders. Distinctive hemorrhagic areas of the tumor exhibited atypical vascular proliferation with intraluminal tufting, nuclear hyperchromasia and increased mitoses. Immunohistochemical analyses were positive for endothelial markers: CD31, CD34, ERG, and FLI1, consistent with angiosarcoma. The diagnosis of MPT with heterologous angiosarcomatous component was revealed. Next-generation sequencing (NGS) and transcriptomic assay were performed. Mutations of MED12, TERT, and NRAS as well as copy number loss of ARID1A, CDKN2A and CDKN2B were identified. In prior studies, MPT was associated with co-mutation of MED12 and TERT. Prior reports indicated alterations affecting the MAPK pathway including NRAS and CDKN2A loss in primary angiosarcoma. Our genomic profiling is in agreement with the literature, however, more interestingly the angiosarcomatous component harbored both genetic alterations reported in MPT and angiosarcoma. Furthermore, variants of unknown significance included EPCAM c.903+5A>G, TRM1 c.1760G>A, ATP7B c.588C>A, and PHOX2B c.653C>A with an allelic variation of 50.7%, 47.2%, 43.4% and 43.0%. Subsequently patient underwent mastectomy with lymph node dissection with no residual tumor. She underwent treatment with radiation. Two months later patient returned with severe back pain and extensive osseous metastatic lytic lesions. The diagnosis of angiosarcoma was confirmed through bone marrow. The patient died several days later due to worsening progression of metastatic disease. Metastasis from an MPT with heterologous sarcoma may only contain the sarcomatous tumor as seen in our patient, which underscores meticulous histopathological sampling along with correct diagnosis and subtyping of the heterologous sarcoma. Due to the rarity of heterologous angiosarcoma, the prognosis is not well studied. Overall, the prognosis of MPT with heterologous sarcoma remains poor and improving the treatment opportunities is necessary. In this case, the angiosarcomatous component shares some recurrent genetic alterations with MPT and primary angiosarcomas. Incorporating similar genomic testing in larger series may help in predicting the biological behavior and defining therapeutic targets.

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HIV Type-1 Genotyping in the Context of the COVID-19 Pandemic: A Critical Tool for Identifying Antiretroviral Drug Resistance and Optimizing Treatment Strategies

The COVID-19 pandemic strained the healthcare system and the WHO recently reported increased rates of antibiotic resistance. Meanwhile, antiretroviral resistance can also lead to treatment failure and disease progression, especially in HIV patients. Here, we investigated the rates of HIV drug resistance (HIVDR) in our HIV population between pre and post-COVID-19 eras. Methods: The post-COVID-19 era began on 03/11/2020. Patients positive for HIV-1 between 01/2019-08/2021 were included (total: 94 patients, 46 pre-COVID-19; 48 post-COVID-19). Patients' charts were reviewed for demographics, laboratory results (including HIV-1 sequencing/genotyping (e.g., Genosure)), clinical presentation and management. Student t-test and Fisher exact test were calculated. Results: Most patients were male (70%) and had a mean age of 49 years. 70% of patients had sufficient viral loads in samples reflexed to HIV genotyping. Post-COVID-19 patients harbored lower viral loads (1.8×10 vs. 3.4×10 copies/mL, $p=0.05$), CD4 counts (174 vs. 196 cells/mcL, $p=0.7$), CD8 counts (555 vs. 800 cells/mcL, $p=0.04$), and higher CD4/CD8 ratio (0.312 vs. 0.266, $p=0.57$). Overall, 20% of patients had HIVDR. Following COVID-19 pandemic, there was a 9% increase in HIVDR, predominantly seen in non-nucleotide reverse transcriptase inhibitors (NNRTI), although insignificant. Specifically, high resistance was documented for drugs Efavirenz (16%), Nevirapine (16%), and Rilpivirine (13%). We observed an increased prevalence of G190A, K101, K103, and E138 mutations conferring resistance to NNRTIs. Changes to therapy were observed in 47.8% (42/88) of total cases, with an increase of 12.5% in patients from post-COVID-19 era. Additionally, changes to therapy were observed more in patients with infectious diseases consultation (16% increase). Conclusion: Increasing HIVDR was seen in our patient population post-COVID-19. Continued surveillance is critical to managing HIVDR and improving patient outcomes. The clinical utility of sequencing tests can outweigh the cost if results are appropriately acted upon which may involve the participation of other clinical teams and the antimicrobial stewardship committee.

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Utility of Microbiology versus Surgical Pathology in Diagnosis and Management of *Helicobacter pylori* Infections in the Washington DC Metropolitan Area

Helicobacter pylori causes persistent infections and has a sizeable disease burden related to gastritis, peptic ulcer disease and gastric cancer. Optimal treatment regimens depend on local resistance patterns. In this study, we characterized the patient population infected by *H. pylori* in metropolitan Washington DC and compared the utility of microbiology (MB) and surgical pathology (SP) approaches in diagnosing *H. pylori* infections. Methods: Between the months of April 2015 to March 2022, tissue biopsies were submitted to both MB and SP to rule-out *H. pylori* infection. Chart abstraction was performed for patient demographics, clinical presentation, laboratory results, and clinical management (including antimicrobial susceptibility testing (AST), when available) in positive *H. pylori* patients. Results: Amongst the positive 31 patients (female: 74%, mean age: 51 years), top clinical presentations were abdominal pain (55%), recurrent gastro-esophageal reflux disease/previous *H. pylori* infection (32%), and nausea/vomiting (10%). Many patients (84%) experienced recurrent disease; length of infection ranged from 1-30 years. SP ancillary stains (immunohistochemistry/Warthin-Starry stain) ordered on 26 patients (84%) showed chronic active gastritis as the most common diagnosis (82%). Concordance between MB and SP results was 97%. For both MB and SP approaches, antrum biopsies had the highest recovery rate (100%) followed by gastric body (80-86%). In patients with >1 biopsies submitted, concordance among the biopsies was higher for MB (79%) than SP (67%) results. Time to preliminary positive stain result was 88 hours faster for MB than SP (8 hours vs 4 days, $p < 0.00001$). AST revealed five (5/29, 17.2%) multi-drug resistant and two (2/29, 7%) pan-susceptible isolates. Resistance to clarithromycin (79.3%) and metronidazole (85.7%) were highest. Conclusions: The number of biopsies and the gastrointestinal site can affect *H. pylori* detection. The antrum should be an obligatory sampling site in all patients for maximizing diagnostic sensitivity. Specimens should be submitted with proper designation of biopsy site rather than marked as random. Both SP and MB workup are recommended as live bacteria cultured from MB cultures can be reflexed to AST. High resistance patterns warrant AST a priority to provide optimized therapy and prevent antimicrobial resistance, whilst adding further insights into local resistance patterns in the Washington DC area.

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IgA Plasma Cell Myeloma Presenting as Cold Agglutinin-Induced Hemolytic Transfusion Reaction.

Cold agglutinins produced in the setting of B cell neoplasms, such as lymphoplasmacytic lymphoma and plasma cell myeloma, can mediate autoimmune hemolytic anemia. Transfusion of these patients can exacerbate cold agglutinin-mediated hemolysis. Moreover, the workup for these reactions represents a diagnostic challenge due in part to false negative direct antiglobulin tests (DAT). Herein, we report an anemic patient who after a red blood cell (RBC) transfusion performed without blood warming, experienced a DAT-negative hemolytic transfusion reaction, and was later diagnosed with IgA-multiple myeloma, which showed an uncommon granular pattern by CD138 immunohistochemistry. Extensive workup excluded other diagnostic possibilities, including the presence of Donath-Landsteiner antibodies and cryoglobulins. Successful treatment with CyBORd (cyclophosphamide, bortezomib, and dexamethasone) achieved complete remission, and additional RBC transfusions using warmers were completed uneventfully.

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Refractory Status Asthmaticus: A Case of Near-Fatal Asthma Successfully Treated with Inhaled Anesthetics and Venovenous Extracorporeal Membrane Oxygenation

Asthma exacerbations account for nearly 1.7 million emergency room visits and 3,500 deaths annually in the US. Near-fatal asthma (NFA) represents the most severe clinical presentation and is associated with profound hypoxemia, hypercapnia and a falling pH. Endotracheal intubation with mechanical ventilation is often required while waiting for bronchodilators and steroids to reverse airway inflammation and bronchoconstriction. However, dynamic hyperinflation and increased intrathoracic pressures can result in ventilator-induced lung injury.⁴ Extracorporeal membrane oxygenation (ECMO) has been suggested as a rescue therapy for NFA. Case A 51-year-old woman with poorly-controlled asthma and two-day URI was brought to the ED after being found in respiratory distress with acute dyspnea and wheezing unresponsive to SABA inhaler. Worsening somnolence and a concern for imminent respiratory arrest, prompted emergent intubation before hospital arrival. Physical exam was notable for bilateral wheezes and rhonchi. CXR showed hyperinflation. ABG revealed pH 7.04, pCO₂ 81.7mmHg, pO₂ 125mmHg, bicarbonate 20mEq/L, and SaO₂ 96% on PRVC using a set tidal volume of 400cc, rate 20/min, PEEP of 5cm H₂O, and FiO₂ 90%. PIPs fluctuated around 50cm H₂O. A diagnosis of status asthmaticus was made. She received continuous nebulized SABA, intramuscular and nebulized racemic epinephrine, systemic steroids, magnesium sulfate, ketamine, and paralytic agents and, was admitted to the ICU where sevoflurane was started at 2.5%. On continued deterioration with worsening respiratory acidosis and hypoxemia on PC with PIP 35cm H₂O, PEEP 5cm H₂O, rate 30/min, FiO₂ 100%, the decision to pursue Venovenous ECMO was made. The ECMO circuit was initiated at 4.2 L/min flow rate, 6100 rpm pump speed, and 6 L/min sweep rate. Post-cannulation ABG revealed pH 7.30, pCO₂ 34mmHg, pO₂ >530mmHg, and SaO₂ 100%. Sevoflurane was resumed because of low tidal volumes. Nebulizer treatment with SABA and systemic steroids were continued. As her respiratory status improved, she was weaned off sevoflurane, decannulated on day three, and extubated a day later. She continued to improve and was discharged on day ten. Discussion Respiratory failure in status asthmaticus remains a reversible disease process that does not have to be fatal. When patients fail to respond to conventional treatments, inhaled anesthetics and VV-ECMO can be lifesaving. Volatile anesthetics such as sevoflurane have direct bronchodilatory effects. VV-ECMO can support gas-exchange while preventing lung injury, and can be an effective bridging strategy. It is pertinent that patients with NFA are transferred in time to a center with ECMO capabilities to improve outcomes.

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Predicting Clinical Outcomes in Acute Ischemic Stroke (AIS) Patients Using Shallow Machine Learning (ML) Algorithms based on Multiphase CT-angiography (CTA) Imaging

Developing a faster and more accurate prognostic method that could predict the outcome of patients with acute ischemic stroke based on their initial imaging and clinical data, using shallow machine learning models. METHODS: A database of patients with AIS in the middle cerebral artery (MCA) distribution, who were initially evaluated by multiphase CTA and perfusion imaging at their initial presentation, was retrospectively reviewed. This database included 1) the arterial collateral filling (AC) score which was previously scored 2) the cortical venous filling (CV) which was previously scored manually, 3) the medullary venous filling (MV) which was previously scored 4) perfusion parameters which were calculated using FDA-approved automated software, 5) ASPECTS, and 6) patient demographics and clinical information initially and up to 90 days post-stroke. Three ML models were used to predict the outcomes (i.e., logistic regression [LR], decision trees [DT], and support vector machine [SVM]), using a combination of AC, CV, MV, perfusion parameters, ASPECTS, NIHSS, age, and gender variables. Modified Rankin Scale of 0-2 at 90 days post-stroke was the main clinical outcome to follow up. Through comparing the performance of each model on the training and test sets overfitting was checked. A grid search was also performed to optimize the hyperparameters of the models. Feature selection using mutual information was carried out, and the top ten features were selected. The dataset was split into training (80%) and test (20%) datasets. AUC was used to evaluate the predictive performance of the models, along with accuracy, precision, recall, and F1-score. RESULTS: A total of 64 patients were included. Our analysis showed that the SVM, LR and DT models performed reasonably well in predicting the outcome of the patients. SVM achieved an accuracy of 0.8, precision of 0.7, recall of 0.875, AUC of 0.927, and F1-score of 0.77, while LR model achieved an accuracy of 0.769, precision of 0.80, recall of 0.66, AUC of 0.95, and F1-score of 0.72. DT model got similar results with 80% for accuracy, 82% for precision, 81% for recall, AUC of 91.6 %, and 84% for F1 score. CONCLUSION: The ML models using the combination of multiple CT-based measurements and initial clinical scores are predictive of good functional outcome in AIS patients, especially when working with small datasets. Having automated tools that could predict the patient's outcome based on their initial imaging and clinical presentations could improve patient selection, treatment approach, prognostication, and research design.

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Reduced Morbidity of Buccal Mucosal Graft Donor Site Closure

Introduction and Objective: Buccal mucosal grafts are a mainstay for urethroplasty and other reconstruction. With these comes a risk of oral deficits. Previous studies found harvest site complications of 20-40%. We propose that a parallelogram harvest site with an offset closure results in lower oral complications. **Methods:** A retrospective review of patients who underwent buccal graft excision from September 2015 through November 2021 was performed. All donor site excisions were by a single fellowship trained reconstructive urologist. The harvest site was excised in a parallelogram shape and closed primarily in an offset fashion resulting in a lightning bolt shaped closure (Figure 1). Motor or sensory deficits were assessed at 2-3 weeks post-operatively and at subsequent visits. Patients were excluded if there were no documented oral symptoms at initial follow up. **Results:** A total 108 patients and 117 graft sites were reviewed. Patients were followed for average 16 months (range 1 - 89 months). Average age was 53 and all patients were male. The graft was taken from the left in 89%, right in 6% and both in 5%. Average graft size was 5cmx2.5cm. At initial follow up, donor site pain was reported in 3 grafts (3%), contracture was reported after 8 grafts (7%). All initial contracture symptoms were mild. After the initial postoperative visit, no pain was reported at subsequent follow ups and mild contracture was reported after 3 grafts (3%). Trouble whistling was reported by 1 patient; no other patients reported limited function. 25% did not follow up after their first visit or oral symptoms were not documented. Any donor site pain or contracture was estimated at 14%; these were largely mild and self-limiting. **Conclusions:** Compared to the literature, our series resulted in lower donor site complications. We propose that a parallelogram graft and offset closure may result in lower tension and lower complication rates.

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Streamlining the Triage of Kidney Stone Patients: Preliminary Data to Support Joint Education Between Emergency Medicine and Urology

Introduction and Objectives: Renal stone disease results in over 1 million emergency room visits per year. Significant health care costs are accrued from these emergency department (ED) visits. ED providers must triage which patients require inpatient intervention and which are appropriate for an outpatient trial of passage. We sought to perform a preliminary study to determine how many admissions and interventions resulted from ED consultations for kidney stones. **Methods:** All ED kidney stone consults received by the urology service at a single academic center were included from January 2022 through July 2022. Patient demographics, vital signs, laboratory results, imaging, and outcomes were collected. Consults were categorized as needing urology review if the patient had an obstructing kidney stone with a fever, tachycardia, hypotension, leukocytosis, elevated creatinine, nitrite positive urinalysis, or an abnormal feature on imaging. Consults were categorized as not needing urologic review if the renal stones were non-obstructing, or if there were no abnormalities in vital signs or laboratory results. **Results:** The urology service received 47 consults for kidney stones over 7 months. 21 (45%) patients required admission to the hospital. Of the admitted patients, 16 (76%) required a surgical intervention while admitted. Using the criteria described above, 33 (70%) consults were categorized as needing urologic evaluation, while 14 (30%) did not need urologic review. **Conclusions:** While many consults from the ED resulted in admission and intervention, 30% did not require a urologist's review. Future directions include pursuing joint educational sessions with the ED and the urology department. We plan to use this preliminary data to help create an educational curriculum and evaluation algorithm to streamline kidney stone evaluation in conjunction with our ED colleagues.

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Examining Cytogenetic and Molecular Characteristics of Mixed Phenotype Acute Leukemia in US Veterans: Implications for Therapeutic Approaches

Mixed phenotype acute leukemia (MPAL) is a rare and heterogeneous subtype of acute leukemia. Per the 2022 WHO criteria, it is categorized based on its predominant immunophenotypic lineage (B vs. T) and the presence of a Philadelphia chromosome (Ph+) or a KMT2A rearrangement. While many other cytogenetic and molecular abnormalities have been described, due to the rarity of this disease, neither their incidence nor the role of targeted therapies has been well defined. We conducted a retrospective study of all veterans with MPAL diagnosed between 2000-2023 to examine the impact of different clinical, immunophenotypic, cytogenetic, molecular, and treatment strategies on overall survival (OS). Methods: Electronic medical record data from the Veterans Affairs Informatics and Computing Infrastructure database were used to identify 320 patients diagnosed with MPAL between 2000-2023 using the text utilization integration feature to query all notes. All patient charts were reviewed manually. Pathology reports and clinical notes were reviewed to collect data on diagnosis, treatment, and outcome. To date, 74 patients have been identified and included in this preliminary analysis. Cox regression analyses were used to compare OS between patients with different MPAL subtypes, cytogenetic, and molecular features as well as different treatment approaches. Multivariate analysis was performed with controls for age, race, and BMI. Results: In line with prior research, decreases in OS were seen among older patients > 65 yo compared to patients < 30 yo and those who received an AML induction over ALL induction regimen with HR of 8.28 (p 0.04) and 2.02 (p 0.03) respectively. Patients who had a transplant had significantly improved OS with a HR of 0.19 (p < 0.001). Of the 32 patients who had potentially targetable mutations, 14 received targeted maintenance therapy with either Ph+ or FLT3 inhibitors. Patients who got targeted maintenance therapy (including FLT3 inhibitors) had an OS of 55 months compared to 17 months for those who did not. 50% of those patients who did not get maintenance therapy went to transplant and 31% of patients who did get maintenance therapy went to transplant yet these patients still had improved OS. Conclusions: This preliminary data demonstrate that while MPAL is a complex and heterogeneous disease, a significant portion of patients have targetable mutations. Further studies evaluating targeted therapies such as FLT3, IDH, and menin inhibitors in MPAL patients may be warranted.

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Optic Neuropathy in Chronic Lymphocytic Leukemia

Problem Statement/Introduction: The prevalence of central nervous system (CNS) involvement of chronic lymphocytic leukemia (CLL) is extremely rare and underdiagnosed. (1) Diagnosis relies on clinical suspicion, imaging, and cerebrospinal fluid (CSF) cytology, which has high specificity (>95%) but low sensitivity (<50%). Our case describes the diagnostic and therapeutic challenges, as well as the potential need for prophylaxis to prevent CNS involvement of CLL which has poor prognosis.

Case description: A 77-year-old male with a complex medical history including atrial flutter, prostate cancer, and chronic lymphocytic leukemia (CLL) presented with sudden bilateral blurred vision and throbbing occipital headache. Patient had been on Zanubrutinib after having failed other chemotherapeutic agents. Further examination revealed bilateral disc edema and worsening vision over three days, alongside leukocytosis and anemia. Initial differential diagnoses included CSF flow obstruction, infectious disease, autoimmune diseases, CNS malignancy infiltration, or drug side effects. Imaging and lumbar puncture were conducted, revealing bilateral optic nerve enhancement on MRI orbits and elevated opening pressure, protein, and white blood cell count in the cerebrospinal fluid (CSF). CSF infectious panels and initial flow cytometry was negative. The patient's neurological status improved, but blurry vision persisted, prompting a repeat lumbar puncture, which showed elevated white blood cells, lymphocyte predominance, and low CSF glucose levels, and malignant cells on flowcytometry confirming CNS involvement of CLL. Further testing was pending to determine the involvement of autoimmune and viral etiologies. The diagnosis was narrowed down to CLL involvement causing leukemic optic neuropathy or an infectious etiology, with idiopathic intracranial hypertension considered less likely.

Conclusion: Factors increasing the likelihood of a true positive test include repeat flow cytometry with an optimal CSF sample volume (>10.5 mL), CSF immunophenotyping, and sampling proximal to the tumor. In our case, initial CSF analysis was negative, but repeat testing revealed malignant cells, highlighting the importance of retesting. Low CSF glucose levels, elevated nucleated cells, and lymphocyte counts are associated with CNS involvement of CLL, all observed in our patient upon repeat CSF studies. Repeat lumbar puncture with cerebrospinal fluid (CSF) flow cytometry was crucial in diagnosing central nervous system (CNS) involvement of chronic lymphocytic leukemia (CLL) causing optic neuropathy, emphasizing the diagnostic significance of repeat testing in such cases. This case underscores the need for further research to address preventative, diagnostic, and therapeutic challenges associated with CNS involvement of CLL, including the potential utility of CNS prophylaxis in CLL patients.

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2024 —————
**GW SMHS RESEARCH
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————— ABSTRACTS

HEALTH SCIENCES

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EDUCATIONAL SCHOLARSHIP

The Virtual Mentoring Space: A Feasibility Study

Background: Despite high student satisfaction with mentoring programs in occupational therapy education, evidence as to best practices and guidelines is scarce. This study focuses on formalizing the virtual mentoring space program supporting student learning as an adjunct to the OETH 606 Adult and Older Adult Neurological Occupational Therapy course at Towson University. **Study Design:** This study was a feasibility study. **Methods:** Conducted as a feasibility study, this study had multiple phases, including receiving feedback on the process, implementation, and perceived outcomes from students and faculty. Surveys were used to assess the needs for, satisfaction with, feasibility, and challenges of the virtual mentoring space for future use. The surveys consisted of both a Likert scale and open-ended questions. The analysis of the surveys utilized descriptive statistics for Likert scale questions and content analysis for all open-ended questions. **Results:** The needs assessment indicated that 100% of students (n = 6) and faculty (n = 2) reported the need for a virtual mentor in the course. The content expert checks confirmed the alignment of learning modules with the syllabus and suggested modifying content to sharpen analysis and application skills. The satisfaction survey revealed that 100% of students (n = 17) found the virtual mentorship supportive, with 94% (n = 16) highly satisfied with the virtual mentor support and quality. Both faculty respondents (n = 2) agreed the virtual mentor covered the syllabus content. **Implications:** Satisfaction notwithstanding, feasibility for future use is contingent upon course budget constraints. Thus informing best practices and guidelines for mentoring programs in occupational therapy education.

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EDUCATIONAL SCHOLARSHIP

Using admissions criteria to predict success in Medical Laboratory Science programs.

The purpose of this study is to describe the contribution of admission factors on academic success in undergraduate medical laboratory science (MLS) programs. Methods: Data from students admitted from 2017–2020 ($n=352$) were collected. Predictors included pre-matriculation data of cumulative Grade Point Average (CGPA), science GPA (SGPA), number of withdrawals (Ws), Ds, and Fs, and post-matriculation data of number of Ds, number of Fs, total DFs, score on program comprehensive exam, score on end-of-rotation (EOR) practicum exams, final program GPA, score on the American Society for Clinical Pathology (ASCP) certification exam, withdrawals, dismissals, and graduation. Post-matriculation variables were used as measures of success. Pearson correlation coefficient and logistic and linear regression analyses were used with both pre- and post-matriculation variables. Results: CGPA and SGPA were associated ($p=0.05$) with final program GPA, all four EOR exams, program comprehensive exam, and ASCP exam, with just CGPA associated with total Fs in program and total DFs in program. Pre-matriculation Ds were associated with final program GPA, all four EOR exams, program comprehensive exam, and ASCP exam. Pre-matriculation Fs were associated with total Fs in program. A defined set of five predictor variables accounted for a small percentage of the variance related to academic success including the outcomes of student withdrawal, dismissal, and graduation. Conclusion: Our findings indicate that using the selection criteria of CGPA, SGPA, and number of Ws, Ds, and Fs may be helpful in selecting successful MLS applicants.

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EDUCATIONAL SCHOLARSHIP

Implications of Educational Genetic Testing

The integration of personal genetic testing into college and medical school classes presents ethical implications. This practice offers students hands-on experience with their genetic makeup, which can lead to a deeper understanding of genetic principles and medical applications. However, ethical, privacy, and psychological concerns arise, warranting careful consideration. Educational institutions must address issues like consent, data security, and the psychological aspects of uncovering sensitive health information. Analyzing college and medical school courses that have offered classes with personal genomic analysis can shed light on the implementation of this type of curriculum. Looking at the types of software, class structure, and student outcomes can help to consider the possible pros and cons of genetic testing in education, and will help provide a clearer understanding of whether genetic testing has a permanent place in the classroom. Balancing educational benefits with ethical and practical considerations is crucial in harnessing the potential of personal genetic testing in academic settings.

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EDUCATIONAL SCHOLARSHIP

Improving Scholarly Activity through Faculty-Resident Connection and Research Ideas Via QR Codes

While scholarly activity is a common requirement across residency programs, residents report many barriers to engaging in scholarly activity. Two commonly reported barriers are lack of faculty mentorship and lack of ideas for scholarly activity projects. Objective: Create a new intervention for scholarly activity centered around faculty mentorship and idea development. Methods: During the academic year 2022-2023, an internal medicine residency program with 30 residents and 17 faculty members participated in this two-part educational innovation. Residents in the academic year 2021-2022 served as the comparison group. The faculty component consisted of brainstorming ideas for new projects and providing sign-up sheets with quick response (QR) codes in the didactics room. The resident component required first-year residents to have signed up for a project or have their own protocol developed within three months of beginning residency. Results: There was an increase in original research projects, presentations, and publications in PubMed indexed journals. The most notable increase was in presentations, which went from three in the pre-intervention year to seven in the post-intervention year. There was also an increase in the number of projects across all post-graduate years, not just amongst the first-years who were specifically targeted. Conclusions: Scholarly activity improved from the comparison year to the intervention year with increases in the number of presentations, publications, and projects. Scholarly activity also increased across all resident classes. The use of a QR code for study recruitment is cheap, easy to implement, and could be adopted by other residency programs.

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EDUCATIONAL SCHOLARSHIP

Medical Laboratory Sciences Preceptors: Perceptions of Benefits and Challenges in Clinical Education

Laboratory preceptors are critical to the quality of the clinical educational experience and play a central role in developing competent future laboratory professionals. This study examined preceptor perceptions of benefits and challenges of providing clinical instruction; assessed preceptor development; and explored associations among benefits and rewards, support, development, and commitment to the preceptor role. Data were collected from preceptors across the United States using an online, self-administered, 37-item survey. Seventy-four preceptors responded to the survey. Laboratory preceptors associated meaningful benefits and rewards with the preceptor role. Preceptors were committed to their role, but they had an overall low perception of support provided by employers and academic programs. The main challenges preceptors reported were increased workload, longer workday, and stress related to students' behavior and attitudes. Preceptors also felt inadequately developed in their role, with most having little to no knowledge of the available developmental initiatives. Lack of time was reported to be the greatest barrier to development. This study demonstrates that preceptor commitment may be increased by enhancing their development and perceptions of support. Organizations and academic programs have a collaborative role in retaining preceptor talent and increasing their commitment by effectively addressing preceptorship challenges and development.

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RESEARCH PROMOTING JUSTICE, EQUITY, AND INCLUSION

The Black Male Dementia Caregiver Study: An Analysis of the Relationship between Informal Caregiving, Sleep, Depression, and Cognitive Functioning

Stress associated with caregiving for a person with Alzheimer's Disease and Alzheimer's Disease Related Dementias (AD/RD) has negative health implications. However, little is known about the implications of stress on non-Hispanic Black (NHB) informal male caregivers. This study aims to examine the relationship between caregiver status and sleep, depression, and cognitive function in a sample of NHB informal male caregivers in the metropolitan Washington, D.C. area. This cross-sectional study (n=68) included informal caregivers (n=29) and non-caregivers (n=39) who participated in self-perceived health questionnaires and a series of cognitive assessments. Multiple ordinary least squares regression was used to explore the relationships between caregiving (the exposure) on the outcomes: cognitive health (assessed with the Uniform Data Set (UDS)), sleep (Pittsburgh Sleep Quality Index, PSQI), and depression (Center for Epidemiological Studies Depression Scale, CES-D). All models were adjusted for age and education. Three exposure variables were used to explore caregiving: caregiver status, years spent giving care, and hours per week spent caregiving. The average age of caregivers (58) and non-caregivers (59), as well as educational attainment, were similar. Being a caregiver was associated with higher rates of depressive symptomatology and greater sleep dysfunction, represented by higher average scores on the CES-D scale (0.60, 8.08, $p = 0.024$) and the PSQI (0.19, 3.67, $p = 0.030$). Additional hours spent weekly providing care were associated with slightly higher PSQI scores, with each 10 additional hours associated with an average 0.2 (0.01, 0.04, $p=0.002$) points higher score. Caregivers received 4.5 less points of the Verbal Fluency Test (-9.02, -0.10, $p = 0.046$) and 4.9 less points on the Verbal Naming Test (-9.0, -0.73, $p = 0.022$). Each additional year spent caregiving was associated with lower an average 0.7 (-1.18, -0.24, $p = 0.004$) Number Span Test score. These results indicate lexical retrieval and attentivity difficulties. In this study of NHB male informal caregivers, providing care for a loved one with AD/RD is associated with worse depression and diminished sleep quality, with the more time spent weekly giving care exacerbating this. Additionally, giving care was associated with an increased difficulty with lexical retrieval and attentivity. The number of years spent caregiving is associated with reduced verbal short term and working memory. The results from this pilot study indicate a need for interventions towards reducing the burden of caregiving among NHB males. NHB males' perspectives on help seeking and sleep must be considered to best cultivate care.

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RESEARCH PROMOTING JUSTICE, EQUITY, AND INCLUSION

Would therapy be more effective if they knew what they said was truly confidential? Behavioral health providers' experiences in telehealth with socially vulnerable clients, a mixed methods study.

Telebehavioral health [TBH] experienced a rapid utilization increase during the COVID-19 pandemic. Behavioral health providers serving Medicare and Medicaid populations were not broadly prepared to switch to this modality, and relaxed policies reduced the emphasis on privacy practices during the public health emergency. This study examined the impact of client-end privacy issues during TBH appointments and used a mixed-methods survey approach of behavioral health clinicians.

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RESEARCH PROMOTING JUSTICE, EQUITY, AND INCLUSION

Assessing Well-Being and Support in Sibling Caregivers of Individuals with Intellectual and Developmental Disabilities Across Socioeconomic Groups

Little research addresses well-being outcomes of adult sibling caregivers of individuals with intellectual developmental disability (IDD) across different socioeconomic groups. This lack of information results in gaps of knowledge regarding the current access to and optimal use of support services for sibling caregivers. This study aimed to understand connections between well-being and level of support across socioeconomic groups of sibling caregivers of individuals with intellectual and developmental disabilities. This observational survey design study gathered sociodemographic information and self-reported well-being needs assessed using measures with the following domains: (1) depressive symptoms; (2) self-rated health; (3) life satisfaction; and (4) perceived control over life. Insights from adult sibling caregivers of individuals with IDD, about their well-being and level of support were also collected. Adult sibling caregivers of individuals with IDD were recruited from across the United States. One-hundred participants completed an online questionnaire with established measures and open-ended items. Thirty-one states were represented, with the majority of participants being female (89%). Data suggests siblings are taking care of their well-being but 60 % indicated that they only sometimes occasionally or rarely feel secure about their financial future. 79% of sibling caregivers indicated that they sometimes, quite frequently, nearly always feel that they are stressed between caring for their sibling and trying to meet other responsibilities. Sibling caregiving is perceived as a high burden but 85% indicated that they never rarely or sometimes feel that they have lost control of their life since their sibling's disabilities. While siblings are taking care of their well-being, many worry what the future will hold, given that many of their adult siblings with IDD still live at home with their parents.

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RESEARCH PROMOTING JUSTICE, EQUITY, AND INCLUSION

Genetic Counselors' Professional Identity - A Scoping Review

Schein defined professional identity (PI) as the relatively stable and enduring constellation of attributes, beliefs, values, motives, and experiences in terms of which people define themselves in a professional role. PI evolves and adapts as professionals enter new roles through socialization with others in the workplace. While there have been several studies exploring the expanding roles of genetic counselors in response to the growing availability of genomic testing, few have specifically addressed PI. The purpose of this scoping review was to describe the contexts in which concepts related to PI have been discussed or examined in the field of genetic counseling. Using the PRISMA-ScR Checklist, articles related to PI and genetic counselors or genetic counseling were searched using PubMed, Scopus, and CINAHL. A priori terms including and related to PI, such as professional development, scope of practice, career satisfaction, and meaning-making, as well as post-hoc terms identified during the review, were used in the search. Articles based in the United States or Canada and of all study designs, commentaries, and speeches were included. Date of publication was not restricted. Initially two out of three reviewers applied inclusion and exclusion criteria to all titles and abstracts, with conflicts addressed through consensus among three reviewers. Articles deemed relevant were subject to full-text review by two out of four reviewers, with consensus made by all four reviewers. A total of 5,523 titles and/or abstracts were screened, and 467 full-text articles were evaluated and categorized as (1) focusing on PI specifically, (2) containing elements of PI although focused on another topic, or (3) not related to PI. Eighty-seven (87) articles were reviewed during the extraction phase. Ultimately only 41 articles were deemed to meet the agreed upon description of professional identity. While empirical studies of professional identity among genetic counselors were limited, PI is being addressed in research focused on related areas, including professional development and diversity, equity, and inclusion, as well as in personal accounts, addresses, and commentaries. Sentiments regarding professional identity voiced among genetic counselors align with those reported among other health professionals. Given the lack of diversity in the field and rapidly expanding opportunities for genetic counselors, there is risk of some members of the profession feeling excluded, which in turn could negatively impact the collective identity of the profession, career satisfaction, and patient care. Additional research regarding the professional identity of genetic counselors is needed.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Feasibility and Usability of Gaze Stabilization Exercises in Virtual Reality Using Incrementing Visual Complexity Levels

Background visual complexity is difficult to standardize and head movement is rarely objectively measured when dosing gaze stabilization exercises. This study examined feasibility and usability of custom software within a commercially available virtual reality device (VRD) to deliver X1 exercises with 6 levels of visual complexity in healthy individuals. Participants: Twenty-three volunteers aged 22 to 40 years without known vestibular disorder. participated. Methods: Participants completed yaw plane X1 exercises within the VRD using 6 backgrounds (levels) with presumed incrementing in visual complexity. VRD hardware measured head angular velocity and excursion during each 30 seconds bout. Symptoms before and after each level were queried. Standard instructions given were to move your head from side to side as fast as you can while keeping the letter X in focus. Results: Nineteen of 23 completed all levels within an a priori cutoff of less than 3 points increase in reported dizziness on a 0-10 scale. Average head turn of each level ranged from 50-64 degrees. Mean peak velocity exceeded 120 deg/sec for each level. Across all levels, mean angular velocity and excursion were not different ($p>0.05$). Median dizziness increased 1/10 only for the 2 highest levels. Subjects indicated increased perceived difficulty with incrementing levels. Conclusions: Subjects without known vestibular pathology are able to maintain head movement parameters of excursion and peak velocity when performing gaze stabilization X1 exercises in a VRD involving levels of incrementing background visual complexity. Subjects reported incrementing difficulty with each increase in background complexity, though median reported dizziness increased 1/10 in only the 2 highest levels. Clinical Relevance: It is feasible that commercially available VRD with custom software may be used to provide a hierarchy of visual complexity and to measure performance and compliance of gaze stabilization exercise.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Putting the Patient at the Center: An Exploration of Patient Experience Data in Clinical Drug Development

The Patient-focused drug development (PFDD) initiative was introduced in 2012 with the enactment of the Food and Drug Administration Safety and Innovation Act and was further promoted in 2016 with the enactment of the 21st Century Cures Act (Cures Act). PFDD is a systematic approach that promotes the role of patients in drug development in large part through the collection of patient experience data (PED). Although PED has increased markedly since the initiative's inception, PED collection and analysis frequently lack rigor. This limits the contribution of PED in regulatory decision making which prevents translation of PED to product labels for use by providers and patients. This disparity is most apparent in oncology development programs. Therefore, the purpose of this research is to explore the challenges associated with the collection and translation of patient experience data in drug development with an emphasis on oncology development. Methods The research process consisted of three phases. Phase one consisted of a qualitative case study using drug products approved by the FDA before and after the Cures Act. Phase 2 consisted of a modified scoping review to explore what is known in the literature about the factors affecting patient experience data in oncology clinical trials. Lastly, phase three consisted of a quantitative case-control study to explore predictors of PED-based label claims of drug products approved by the FDA between the years of 2012 through 2023. Results Content analysis in the qualitative case study revealed an increase in patient centrality based on code frequency however neither of the post-Cures Act approved drug product cases contained PED-based label claims. The scoping review revealed various factors affecting the collection and reporting of PED including issues pertaining to trial design, PED measures, and PED analysis. Lastly, the case-control study added insight into potential predictors of PED-based label claims in oncology drug products as compared drug products in other therapeutic areas. Conclusions Taken together, the findings suggest that drug development is moving toward greater patient-centricity through the collection of PED, but significant challenges remain that will need to be reconciled.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Toward a Patient-Partnered Model of Clinical Trial Design: A Qualitative Descriptive Case Study of the Duchenne Muscular Dystrophy Clinical Research Partnership

To provide actionable information about safety and efficacy of new medications, clinical trials should be designed to test outcomes that patients find meaningful. This imperative is increasingly acknowledged by the scientific community and regulatory authorities and in recent years has been enshrined in regulatory guidance documents for industry; however, clinical trials often fail to adequately address patient priorities. Evidence suggests that partnerships between researchers and patient communities may result in clinical trials that better reflect the patient experience, but there are few successful models of such partnerships. Within the clinical research landscape, the Duchenne Muscular Dystrophy [DMD] community has emerged as a positive outlier in this regard, having engaged in a research partnership over multiple years and resulting in the approval of several disease modifying therapies where previously there were none. After seeking feedback from key stakeholders from the muscular dystrophy community and incorporating it into the research design, we undertook a qualitative descriptive case study to examine the factors that have enabled the DMD community to effectively create and sustain this partnership, and to develop a model that may assist other communities in forging similar partnerships. Data was collected from interviews with 18 individual interview participants and four participants in a group interview. Participants were patients, parents, and researchers from academic and industry settings. Observations were also conducted at large meetings of the patient and research communities, which were used to contextualize and aid in the interpretation of interview data. Interview data were analyzed using initial open episodic coding followed by axial and selective coding. Five themes emerged from the qualitative analysis: specific nature of the condition; utilize legislative advocacy to influence funding and regulatory climate; create a cohesive community and leverage its resources; foster a culture of collaboration; and fight for future generations. These themes were interpreted through the lens of the Behaviour Change Wheel, the guiding framework for the project, to create an academic model of patient community readiness for research partnership. This model was further translated into a stakeholder-facing application model, the FOCUS Model, which describes the key factors identified in this study and how they interact to impact community readiness for research partnership. The FOCUS Model is presented along with a discussion guide that communities may use in a meeting or workshop setting to evaluate and improve their research partnership readiness.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Brain Health Registry Study Partner Portal: Novel Infrastructure for Digital, Dyadic Data Collection

In Alzheimer's disease (AD) research, subjective reports of cognitive and functional decline from participant-study partner dyads is an efficient method of assessing cognitive impairment and clinical progression. METHODS Demographics and subjective cognitive/functional decline (Everyday Cognition Scale [ECog]) scores from dyads enrolled in the Brain Health Registry (BHR) Study Partner Portal were analyzed. Associations between dyad characteristics and both ECog scores and study engagement were investigated. RESULTS A total of 10,494 BHR participants (mean age = 66.9 ± 12.16 standard deviations, 67.4% female) have enrolled study partners (mean age = 64.3 ± 14.3 standard deviations, 49.3% female), including 8987 dyads with a participant 55 years of age or older. Older and more educated study partners were more likely to complete tasks and return for follow-up. Twenty-five percent to 27% of older adult participants had self and study partner-report ECog scores indicating a possible cognitive impairment. DISCUSSION The BHR Study Partner Portal is a unique digital tool for capturing dyadic data, with high impact applications in the clinical neuroscience and AD field.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

ATN-224's Impact on Reactive Oxygen Species Production in Neutrophils: Insights from Assay-based Analysis

Neutrophils, a type of white blood cell, are important in the human immune system because they contain specific granules that can produce antimicrobial reactive oxygen species (ROS). Reactive oxygen species production helps white blood cells fight infections in individuals. Reactive oxygen species production is achieved by a chemical reaction that reduces oxygen to superoxide (O_2^-) by superoxide dismutase (SOD). Reactive oxygen species include hydrogen peroxide and superoxide ($O_2^{\cdot-}$). ATN-224 is a known inhibitor of superoxide dismutase which converts superoxide into hydrogen peroxide. ATN-224 has previously been studied for antiangiogenic and antitumor effects using mononuclear cells but not specifically using polymorphonuclear cells. This research study examined the effect of ROS production upon addition of ATN-224 to polymorphonuclear cells isolated from a healthy volunteer. It was theorized that with the addition of ATN-224 the conversion of superoxide will be blocked. This research study used two different assays to measure the inhibition of superoxide dismutase. The first is the superoxide assay which measures the superoxide (O_2^-) production outside of the cells by cytochrome c reduction with the addition of the activator Phorbol myristate acetate (PMA). The second assay is the chemiluminescence assay which uses luminol treated cells to measure ROS production within the cells with the activator PMA. Reactive oxygen species production within neutrophils was shown to be affected by the addition of ATN-224. The chemiluminescence assay demonstrated a decrease in relative light units as the concentration of ATN-224 was increased. This confirmed that ATN-224 is inhibiting the production of reactive oxygen species within the cell. The superoxide assay resulted in no significant change in ROS production after the addition of ATN-224. This research study aids scientists in further understanding the process of ROS production within neutrophils shedding light on its potential therapeutic implications.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Time to Total Knee Arthroplasty (TKA) post Intra-Articular Injection

Background Osteoarthritis (OA) causes pain and disability in middle-aged and elderly adults affecting 7% of the global population (>500 million). Disease modifying treatments are not currently developed to target the underlying causes of OA, but rather treatments target symptoms. This unmet need for treatment is exacerbated as knee OA (KOA) is a progressive chronic disease often asymptomatic early and end stage joint OA can only be treated with an arthroplasty. The primary objective is to evaluate a large national database to determine the time between first injection and total knee arthroplasty in patients solely administered intra-articular (IA) platelet rich plasma (PRP), hyaluronic acid (HA), or corticosteroids (CS). Secondary objectives of this study are two determine any potential differences between the groups as well as performing a survival analysis. Methods A retrospective query was performed on a national, all-payer claims database (PearlDiver, Colorado Springs, CO), a composite of over 160 million Health Insurance Portability and Accountability Act compliant orthopedic records across all states and territories of the United States spanning 2016 to 2022. The database was queried to produce three distinct cohorts for analysis and comparison (PRP, CS, and HA). Time to total knee arthroplasty was the primary outcome measure for this study. This was defined as the time between the first instance of the respective IA injection and the total knee arthroplasty in the same laterality. Results The Corticosteroid cohort had a total population of which 801,588 of which 50,775 (6.3%) received a subsequent TKA. The HA cohort had a total population of which 198,572 of which 17,956 (9.0%) received a subsequent TKA. Due to the low population within the PRP group, this group was excluded from population comparisons between groups. The mean time to TKA from first injection in the HA group was 354.9 days vs. the CS group at 350.9 days not reaching statistical significance, $P=0.1597$. The PRP group had a mean of 365.9 days until TKA. The proportions of TKA-free survival for CS and HA when compared at 4 years post injection was similar between groups ($p=0.1$). Discussion and Practice Implications Patients that received only IA-corticosteroids or IA-hyaluronic acid had a similar length of time between the first injection and the total knee arthroplasty associated with the injected joint. This real-world evidence provides information for clinicians and patients alike when contemplating the risks and benefits of these non-surgical injection modalities for KOA.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Effect of Suborbital Rocket Transport on Blood Product Viability

Alternative methods of blood product transportation are crucial for the speed and effectiveness of military humanitarian aid in emergent and disaster relief efforts. To date, no studies have examined potential utilization of rocket transportation methods for blood products which has the capacity to provide medical logistics aid anywhere in the world within 1 hour. This study investigates the first of several projects to support the 2022 National Defense Strategy (NDS) in the development for space-linked medical solutions by analyzing any occurrence of blood product viability criteria variation before and after undergoing simulated vibration conditions that mimic rocket test-flight profiles. Study Design and Methods: Ten of each whole blood (WB), packed red blood cell (RBC), and leukocytes reduced apheresis platelet (PLT) units were tested for baseline measurements of respective hemoglobin (Hgb), hematocrit (Hct), serum potassium (K+), prothrombin time (PT), activated partial thromboplastin time (APTT), power of hydrogen (pH), platelet count, and mean platelet volume (MPV) before and after exposure of two environmental conditions: control (ground-level, no vibration), and simulated rocket thruster vibration [ground-level, 33 hertz (Hz) at 2 gravitational (g) forces] to analyze variation and potential for effective transfusion. Results: There was no evidence of red cell hemolysis and no statistically significant ($p > 0.05$) changes to WB, RBC, and PLT exposure and control groups when tested for Hgb, Hct, K+, PT, platelet count, and pH respectively. Both exposure and control groups for PLT MPV testing demonstrated statistical significance ($p < 0.05$) before and after exposure. WB APTT results were excluded due to preexisting upper limit abnormal values that resulted in failed/non-numerical assay measurements in 6 out of 10 units pre-test analysis and 8 out of 10 units post-test analysis. Conclusion: Rocket-based transportation of blood products has the potential to pose no greater risk to blood product viability measurements as traditional methods of transportation. With further research needed on larger sample sizes of WB, RBC, PLT and other exposure types, rocket-based transportation has the capability to serve as a novel military solution for rapid humanitarian assistance of blood product delivery.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

X-ray Irradiation on Day 28 of Leukoreduced Red Blood Cells Collected in DEHP-Based CPD/AS-5 Blood Bag System: Impact on Cell Viability up to Day 43

As the European Union has mandated cease production of DEHP-based medical products by 2025, there is a need for an international effort to compare storage lesions of red blood cells (RBCs) collected in DEHP versus non-DEHP blood bags under various processing conditions. This study examined the effect of X-ray irradiation on the storage lesion of blood collected in a DEHP-based CPD/AS-5 blood bag system by measuring percentage hemolysis, pH, potassium, and lactate dehydrogenase. Study Design and Methods: 20 donors were recruited to prepare six pairs of RBC products with identical ABO and RhD blood types collected in CPD/AS-5 blood bags. Each pair was pooled, mixed, and split in equal weight as either the treatment or the control group. The 10 units in the treatment group were irradiated with an X-ray central dose of 25 Gy on Day 28. All the units were tested for percentage hemolysis, pH, potassium, and lactate dehydrogenase on Days 0, 14, 21, 28 pre-irradiation, 28 post-irradiation, 35, 42, and 43. Percentage hemolysis was measured using the manual Drabkin's method and the microhematocrit method. Supernatant potassium and lactate dehydrogenase were measured using an automated chemistry instrument. The pH levels were measured using a pH meter at 20°C. Results: The mean percentage hemolysis increased by 0.47% and 0.17% in the treatment and control groups, respectively, from Day 0 to Day 43. The mean supernatant potassium increased by 73.24 mEq/L and 58.94 mEq/L in the treatment and control groups, respectively, from Day 0 to Day 43. The mean supernatant lactate dehydrogenase increased by 253.53 IU/L and 93.33 IU/L in the treatment and control groups, respectively, from Day 0 to Day 43. The mean pH decreased by 0.73 in both groups from Day 0 to Day 43. The mean percentage hemolysis, potassium, and lactate dehydrogenase were significantly different at $\alpha=0.05$ starting from Day 35 to Day 43 between the treatment and control groups. The mean pH did not differ throughout the study between the two groups. Conclusion: Over 43 post-collection days, all 20 RBC units underwent significant storage lesions. Nevertheless, the current DEHP-based CPD/AS-5 bags have proven to be effective at preserving RBCs for at least up to 42 days as the percentage hemolysis in both the treatment and control groups stayed well under the requirements mandated by federal regulations. Future research warrants comparing them to non-DEHP bags.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

High School Blood Donors- Perceived Barriers to Blood Donation

The blood industry needs to understand and implement ways to recruit and retain young high school blood donors. To accomplish this goal, the motivators and deterrents of young potential donors need to be understood. This will help to ensure the younger population will become lifelong blood donors. Study Design/Methods An anonymous survey was used to determine the motivators and deterrents to blood donation for high school students at mobile blood drives. Both blood donors and non-blood donors were recruited for the study, which used a Likert-scale survey to rate motivators and deterrents on a scale of 1 to 5. Results The motivators that attracted donors to donate were altruistic in nature. Anxiety or fear was not a major deterrent in most students, but a large portion of students remained unsure on these deterrents and might benefit from education to alleviate apprehension about donation. Many responses highlighted the donor's lack of knowledge and neutral attitudes towards blood donation. These areas are possible targets for educational interventions to improve student knowledge on the need for blood donation, how to properly prepare for a donation event, and the donation process in general. Conclusion High school students have limited experience and do not often understand the needs or preparation necessary for a safe blood donation experience. Using these areas to develop an educational tool could help expand potential high school blood donors' knowledge on blood preparation and the donation process which can help recruit and retain young blood donors.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

The Impact of Physician Assistants on Resource Utilization in a Community Emergency Department.

Objectives The utilization of physician assistants (PAs) in community emergency medicine is not well represented in previous investigations. This study aims to describe the rate of resource utilization and ED recidivism for patients managed by PAs in a community ED, matched for acuity and compared to physicians, and explore the relationship of physician co-management and years of PA experience on these outcomes. **Methods** This retrospective observational cohort study was performed in a community ED in Oregon. All arrivals between June 1 and June 14, 2023, were reviewed, encounters above the 95th percentile for length of stay (LOS) or ending in left without completion of treatment (LWOT) were excluded. Data extracted included age, sex, race, Emergency Severity Index score (ESI), resource utilization metrics (LOS, number of laboratory and imaging tests ordered, disposition, and presence of a return visit within 72-hours), presence of collaborating physician co-management, and PA years of experience. Mann-Whitney U, Chi-square, Fisher's Exact tests, and Pearson's or Point Biserial correlation coefficients were utilized for statistical analysis. Results 1,093 encounters were recorded; 42 were excluded for LWOT, and 52 were excluded in the LOS analysis. Among high acuity (ESI 1 and 2) encounters, resource utilization measures were not significantly different between PAs and physicians: mean length of stay 260.2 and 263.8 minutes respectively, $p=0.958$; imaging orders 1.7 and 1.5, $p=0.896$; laboratory orders 6.8 and 6.3, $p=0.248$; and admission/transfers 45.7% and 46.1%, $p=0.970$. Among low acuity encounters (ESI 3, 4 and 5), the number of laboratory orders (2.6 and 2.4 orders, $p=0.433$) and admission/transfers (11.8% and 8.4%, $p=0.100$) were not statistically significantly different. The mean length of stay (199.7 and 187.5 minutes, $p=0.029$) and number of imaging studies (1.1 and 0.8 orders, $p<0.001$) were higher for PAs. The difference in mean length of stay (12.2 minutes) did not exceed the clinically important difference of 15 minutes. Post hoc analysis revealed higher rates of radiographic studies, without significant differences in US, CT, or MRI utilization. 72-hour return rates were not significantly different between PAs (4.5%) and physicians (3.3%, $p=0.343$). Resource utilization was higher in cases of physician co-management but demonstrated a weak negative correlation with years of PA experience. **Conclusion** Utilization of PAs in community emergency medicine does not adversely increase overall resource utilization, though the disparate radiograph ordering warrants further investigation. Additionally, results support previous findings suggesting PAs appropriately seek physician collaboration and co-management for complex patients.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Patient-Centered Communication, Health Literacy, and Discussing Information from Social Media with Healthcare Providers

Health-related misinformation found on social media can be damaging to one's health and wellness. Healthcare providers through open communication can help clarify health misinformation found on social media. The complex relationship between patient-centered communication, health literacy, and information found on social media in discussions with a healthcare provider has not been fully explored. Methods: A secondary analysis was undertaken using cross-sectional data from the Health Information National Trends Survey Cycle 6 to assess the relationship between patient-centered communication, health literacy, and information found on social media in discussions with a healthcare provider. Jackknife replicate weights were used to compute variance estimates from obtained population estimates. Descriptive, bivariate, and regression analyses were performed. Effect modification was explored. The study variables included socio-demographic and health-related factors (e.g., race/ethnicity, age, birth gender, education level, income, number of chronic conditions, and health status), a Patient-Centered Communication Composite Score, a Constructed Health Literacy Composite Score, and using information from social media in discussions with a healthcare provider. Results: Among respondents ($n = 4061$), no statistical significance was found between the Patient-Centered Communication Composite Score ($OR: 1.000$; $p > 0.05$), and patients discussing information found on social media with a healthcare provider. The Constructed Health Literacy Composite Score did not moderate this relationship. Whereas of socio-demographic and health-related factors explored, having one or more chronic conditions ($OR: 1.923$; $p < 0.0001$), and being a high school graduate ($OR: 0.404$; $p < 0.05$) were statistically significantly associated with patients discussing information found on social media with a healthcare provider. Conclusion: These findings provide preliminary insight into research exploring the use of social media information in discussions with a healthcare provider. In particular, population-level data was used to identify factors associated with the use of social media information in discussions with a healthcare provider. Health communication efforts should further explore extraneous variables using different study designs, and populations to test strategies that motivate patient use of social media information in discussions with a healthcare provider.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Optimizing the Incubation Time for Blood Cultures in the BACT/ALERT VIRTUO System

ABSTRACT The number of true positives and contaminants increased after implementing the BACT/ALERT VIRTUO system (bioMerieux) in the VA Northeast Ohio Health Care System. According to the CLSI guidelines, the benchmark for the contamination rates is below 3%. The study aimed to find the optimal incubation time to reduce contamination rates below 3%. We retrospectively reviewed data on the positive blood cultures from the VIRTUO between January 2021 and December 2021. True positives and contaminants were identified based on the review of data from the VISTA laboratory information system. Based on the time to detection, the true positives and contaminants from Day 1 through Day 5 were sorted out for each month, and the percentage was calculated for each day. 977 (8.8%) out of 11,102 bottles were flagged positive during the study period. On Day 4, the contamination rate (2.6%) was higher than that of the true positivity (0.89%). The true positives and the contaminants recovered on Day 4 ($P < 0.05$) were significantly lower than on Day 3. As no growth was observed on Day 5, reducing the incubation time to four days would not affect the clinical decision-making. As the specimen volume and the time of specimen collection were unavailable during the study period, the elimination of Day 4 requires more research.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Barriers, Facilitators, and Sustainability of Hypertension Management Programs by U.S. Nonprofit and Nongovernmental Organizations in sub-Saharan Africa: A Mixed-methods Study.

Hypertension (HTN) is one of the most prevalent noncommunicable diseases, yet disease treatment and control is significantly below global averages in sub-Saharan Africa (SSA). Nonprofit Organizations (NPO) and Nongovernmental Organizations (NGO) act as an adjunct to healthcare services, yet limited research exists on the unique barriers these U.S. NPOs/NGOs face in SSA. This study was designed to assess the characteristics and trends of HTN management programs in SSA and identify barriers and successes to their sustainability. Design/Methods: A convergent parallel mixed-method design was used for this research. Quantitative data was gathered through a survey and qualitative data was collected via a follow-up semi-structured interview and open-ended survey responses. Descriptive analysis was conducted, qualitative data was coded and themed while the quantitative data was analyzed, and variables compared between groups to establish significant associations and correlations. Results: A total of 141 NPOs/NGOs were identified during prescreening. The response rate was 35%. Finance was perceived as the most frequent barrier to the successful execution of desired programs, while partnerships were the most predominant facilitatory. Short-term medical mission trips were correlated with HTN awareness and screening while NPO/NGO owning/operating healthcare facilities correlated with HTN treatment and monitoring. Sustainment in operations during the Coronavirus Disease 2019 pandemic were reported by NGOs/NPOs operating long-term medical mission trips and/or own/operate healthcare facilities in the community. Conclusion: Organizations were able to identify the threats to their program and organizational sustainability along with their efforts to mitigate these threats. Most organizations reported that their programs were sustainable. This aligned with the fact that less than 15% of all organizations reported the inability to provide services during the pandemic. Organizations report successes in hypertension program sustainment with fee-for-service models, scaling up communicable disease programs, and expanding short-term medical mission trips to programs with a permanent presence in the community.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Barriers and Facilitators to Recruitment in Rural Health Communities in Mississippi: Perspectives of Rural Health Physicians.

Study Design: Cross-Sectional Survey **Background:** The United States faces a critical challenge in ensuring access to primary care physicians, particularly in rural areas (Choi et al., 2013). A decade-long decline in medical school graduates pursuing primary care careers has worsened this issue along with the increasing healthcare needs of the population (Choi et al., 2013). Physician availability is recognized as a top barrier to healthcare access, leading to significant shortages, with rural areas experiencing a disproportionate impact (Zhang et al., 2020). As one of the poorest states, the state of Mississippi lacks physicians overall in rural areas and further struggles to find female physicians (Jack, 2007). **Methods:** A 17-question qualitative survey was conducted to examine Mississippi's barriers and facilitators to recruiting physicians. REDCap was used to distribute the survey to 200 rural health physicians across 82 counties in Mississippi from October-November 2023. **Results:** 21 participants responded for a response rate of 11% (11/200). A thematic analysis approach was used to analyze the data (data familiarization, coding, identifying, and reviewing themes). Several sub themes of within the main themes of barriers and facilitators were identified. Subthemes of barriers included insufficient human resources, inadequate reimbursement processes, insufficient state support, financial constraints, scarce resources and opportunities, and unattractive lifestyles. Facilitators sub themes included sense of impact and fulfilment, training or career development, rural background, quality of life, financial incentives and relief, enhanced compensation, rural experiential learning, partnerships with foreign and local medical schools, career growth pathways, effective lifestyle marketing, increased exposure to patients and lifestyles, and building empathy in care. **Conclusion:** These findings reveal the most important barriers and facilitators of rural physician recruitment in Mississippi from a physician's perspective. Recruitment of physicians was perceived to be hampered primarily by economic and infrastructure barriers. Opportunities exists to highlight positive aspects of the environment and potential incentives. This study provides further evidence needed to address these challenges and provides possibilities for future physician recruitment in rural communities.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Virtual Education Implementation for Children with Autism Spectrum Disorders Amidst the COVID-19 Pandemic

The COVID-19 pandemic led to widespread school closures in the Washington DC metropolitan region, necessitating a shift from traditional in-person education to virtual platforms. The challenges and uncertainties related to school closures, phased reopening, and hybrid learning formats significantly impacted children with Autism Spectrum Disorders (ASD), who rely on specialized educational interventions outlined in Individualized Education Plans (IEPs). Caregivers and education providers had to adapt their strategies for implementing educational interventions using technology, yet evidence-informed guidance in implementation practices in virtual education for children with ASD is lacking. **OBJECTIVE:** This study aims to describe contextual complexities surrounding the experiences of caregivers and education providers implementing virtual education for children with ASD in the Washington DC metropolitan region during the COVID-19 pandemic. It explores factors influencing implementation experiences related to the development and implementation of educational interventions, collaboration among IEP team members, impact of educational interventions on IEP goal achievement, and changes in roles and resources during the pandemic. **Methods:** A multi-case study design was conducted using qualitative methods. A purposive selection process identified twenty-five participants, comprised of sixteen caregivers and nine education providers. Each participant engaged in an one-hour virtual interview guided by the Consolidated Framework for Implementation Research (CFIR) featuring open-ended questions. Memos captured significant participant comments, and interviews were transcribed, reviewed for accuracy, and analyzed thematically using NVivo. **RESULTS:** Thematic data analysis identified thirty-four initial codes grouped into eight sub-themes, revealing three overarching themes. Participants encountered significant challenges in transitioning to virtual education, fostering team collaboration, and implementing virtual education effectively. Study findings highlight the critical need for development of: needs assessments, guidelines, and training. This research culminated in the creation of the Model of Translation and Implementation of Virtual Education for children with ASD (MOTIVE-ASD), standing as a robust call to action and a guide for the development of Standards for Virtual Implementation tailored specifically for virtual education programs. **PRACTICAL IMPLICATIONS:** This study provides valuable insights into the development and implementation of virtual education, team collaboration dynamics, IEP goal achievement, and changes in roles and resources during the pandemic. The findings are instrumental for guiding the development of tailored virtual education programs for enhancing the virtual education experience. As virtual education continues to evolve, interested-parties will be equipped with knowledge and resources to navigate educational implementation remotely for children with ASD, in the face of future natural or public health disasters.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Caregivers' Resilience and Advocacy in the Care of Individuals in Disordered States of Consciousness

To describe family caregivers experiences of caring for a loved one in disordered consciousness (DOC) after severe brain injury (sBI) and their role as advocates within the context of a rehabilitation team. Design: Qualitative, narrative analysis of semi-structured interviews to understand caregiver perceptions of interactions with rehabilitation practitioners (RP). Study team composed of cross-disciplinary researchers including caregivers, occupational therapists, speech-language pathologists and experts in qualitative methods and hermeneutics. Setting: NA Participants: Sixteen family caregivers (12 female) of persons in DOC following sBI recruited using snowball sampling. Interventions: NA Main Outcome Measures: NA Results: Caregivers described challenging experiences caring for loved ones in DoC. These challenges require them to advocate for their loved ones who require high levels of support with cognition and communication. These caregivers also described examples of resilience as they navigate rehabilitation services. Caregivers emotional resilience is evident by their ability to witness unpleasant medical procedures, “they were doing painful stimulation, but I knew they had to do it. Further, surviving the emotional highs and lows inherent in caregiving was seen through statements such as “that brought tears to my eyes, and “the only thing I can do is keep climbing the mountain with him.” Caregivers found purpose and meaning in their role, exemplified by the realization that they may wonder “what’s the point, but then she does something, she stands, and suddenly that’s the point, that’s why we keep on keeping on.” Through perseverance and a deep knowledge of their loved one, they develop ways of interpreting their situations such as, when she was happier, her arm moved less and “it’s like she’s looking into your soul. Their tireless advocacy is seen in phrases like we took her to everything, and you really have to be their advocate. Caregivers commitment and unique relationship with their loved one supports more informed care when their knowledge is valued you know him better than anybody, and included we had to teach a therapist to use what words we’re using, but tension arises when they feel practitioners are not hearing their concerns, such as, [providers] see me as intrusive.... Conclusions: Caregivers of loved ones in DOC demonstrate advocacy and emotional resilience. The emotional highs and lows contribute to their perseverance as advocates for their loved ones. Recognizing and valuing caregivers knowledge of the person in DoC is crucial for enhancing patient outcomes and fostering effective collaboration within a rehabilitation team.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Experiences of School-based OT Practitioners Using Technology/Apps for Virtual Learning in Current Practice: A Qualitative Phenomenological Study.

As a result of the COVID-19 pandemic, many school districts in Southwest Florida, closed their doors in March 2022 to reduce the spread of the COVID-19 pandemic and quickly transitioned to technology to educate and to allow students to continue receiving their related services via the telehealth model. Now that School-based Occupational Therapy Practitioners (SBOTPs) have transitioned back to traditional in-person treatment sessions, there is no data of SBOTPs' current usage of technology and whether there is the adoption of technology used during the COVID-19 pandemic in current practice. Objective: The primary aim of this doctoral capstone study is to gain a deeper understanding and meaning of SBOTPs' lived experiences incorporating technology/apps into current practice. Study Design: This study used a qualitative phenomenological research design. Participants: Participants (n=7) of this study are Florida-licensed SBOTPs employed with the School District of Lee County (SDLC) on or before January 2020 to present. Methods: Convenience sampling was used to recruit SBOTPs (n=7) from the SDLC. Between June 2023 to August 2023, participants engaged in a one-time individualized semi-structured Zoom audio-video interview (60 minutes) to explore the overarching research question and sub-research questions. Interviews were transcribed verbatim using the Zoom live transcript service for analysis. An inductive thematic approach was used to analyze and categorize the data for initial codes until overarching themes and categories emerged. The interpretation of the final themes was presented as a rich-detailed descriptive narrative with in-vivo quotes and a table to represent the study's findings visually. Results: Seven SBOTPs were recruited (n=7). Six themes emerged from this study: Telehealth-A Huge Learning Curve; An Attitudinal Shift Towards Technology; School-based OT Practitioners Value Technology Differently; Multiple Barriers Still Exist; Identifying and Measuring the Quality and Features of Apps, and Integration, Caveats for Technology Use and Future Technology/App Trends. Conclusion: The study revealed that SBOTPs experienced a huge learning curve from their telehealth experience to their current practice. Participants are integrating technology/apps in practice in a blended form with improved attitude and comfort level interfacing with technology/apps. SBOTPs continue to face multiple technology barriers in practice. SBOTPs have increased their knowledge of identifying and measuring quality apps, are better prepared to use technology in a future crisis and envision an uptake in technology use in future practice. Increased technology training and education, revisiting prior skills, and updating app resources are still needed for SBOTPs to increase their technology proficiency skill sets.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Effects of a modified nurse training program on completion rate of forms and assessments in the Electronic Medical Record: A Retrospective Study

In modern healthcare, the role of nurses in ensuring effective patient care through electronic medical record (EMR) utilization has become vital. This study addresses the pressing issue of medical errors, the third leading cause of death in the United States and emphasizes the pivotal role of nurses in preventing such incidents. Substandard documentation has been identified as a critical factor linked to patient mortality, highlighting the need for nurses to possess meticulous documentation skills. This research explores the modification of a nurse orientation training program to improve EMR competencies. The program incorporates simulation-based training, continuing education, strategies to overcome resistance, computer training, and evidence-based mentorship practices. Continuous education initiatives, including self-paced learning, were implemented to address the evolving nature of healthcare and meet the specific needs of nursing staff. Additionally, efforts were made to foster open communication, overcoming resistance to change within nursing cultures. Computer training, recognized as crucial in modern healthcare, was integrated into the program, and addressing skill gaps. The study aimed to assess the impact of the modified training program on nurses in a long-term care setting. We hypothesized that there would be an improvement in documentation completion percentage after implementation of a new program. The study's analysis, incorporating both descriptive and inferential statistics, reveal $p < 0.05$ for 5 variables (Admission Assessment, Morse Fall Risk Assessment, Braden Risk, Elopement Risk Assessment, Weekly Skin Check) demonstrating significant improvements in completion rates.

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TRANSLATIONAL RESEARCH - CLINICAL, COMMUNITY, AND BASIC

Neuromuscular Control Strategies of Older vs. Younger Adults while Learning a Novel Cognitive-Motor Dual-Task

Engaging in novel activities in later adulthood, such as pickleball or dancing, facilitates healthy aging, but it also necessitates motor skill acquisition. This acquisition often coincides with cognitive tasks, like conversation, termed cognitive-motor dual-tasking (CMDT). When learning a CMDT, older adults require higher repetitions than younger adults to achieve proficiency. During early motor skill learning, joints are stiff to increase stability, and as performance improves, stiffness gradually decreases. Few studies have investigated age-related differences in neuromuscular strategies when learning a new CMDT. The purpose of this study is to examine the control strategies of older vs younger adults when learning a new CMDT with varying cognitive task difficulties. Methods: Wireless surface electromyography (sEMG) electrodes were placed on the skin over 12 lower extremity muscles. Participants stood in front of a screen that used an RGB camera to display a skeletal image of their legs on the screen in real-time. Participants were asked to perform a motor task of matching the skeletal image of their knee to a target that moved on the screen, inducing a marching-in-place activity. Participants were randomly allocated to three cognitive groups: no cognitive task, a simple cognitive task involving counting the frequency of a specific character appearing on the screen, and a more complex task of counting the frequency of two characters that appeared on the screen amongst random characters. All participants performed 20 trials. EMG data was processed using MATLAB. Stiffness ratios were created by dividing the sEMG integral of the muscles of flexion by those of extension. Statistical analysis was conducted using SAS. Results: A pilot of 15 younger adults (18-30 years) and 10 older adults (60-72 years) participated. Non-parametric statistics revealed no significant difference ($p > 0.05$) in stiffness between groups. However, analysis revealed a trend: older adults performing more complex CMDTs exhibited higher and more sustained muscle stiffness compared to their peers performing lower complexity tasks ($p = 0.06$) and their younger counterparts ($p = 0.12$). Discussion: Neuromuscular control strategies may differ between older and younger adults, where older adults performing CMDTs with high cognitive loads increase the stiffness of their legs the most. Further, stiffness remains elevated, prolonging increased forces on their joints and increasing their risk of injury. Continued research will reveal the time course of muscle strategies during learning and inform future studies to increase the efficiency of neuromuscular control strategies during CMDT learning.

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2024 —————
**GW SMHS RESEARCH
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————— ABSTRACTS

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CLINICAL AND TRANSLATIONAL RESEARCH

ANESTHESIOLOGY AND CRITICAL CARE

Efficacy of Single-Injection Erector Spinae Blocks in VATS: A Prospective Randomized Control Study

Background: Dissecting the lateral thoracic region during pulmonary resection surgery (PRS) disrupts spinal nerve tributaries, causing significant pain (Hamilton et al., 2022). Optimizing postoperative pain promotes respiratory rehabilitation and reduces opioid use per Early Recovery After Surgery guidelines (Dinic et al., 2018). Erector spinae blocks (ESBs) with bupivacaine or ropivacaine bolus infusion therapy is used to treat spinal nerve pain in rib fractures and thoracoscopic and breast surgeries (Abdella et al., 2022; Kot et al., 2019). However, the efficacy of ESB in PRS varies (Klaibert et al., 2022). This study explored whether ESBs with bupivacaine bolus infusions decreases postsurgical pain and opioid consumption in adults undergoing video-assisted thoracoscopic (VATS) PRS. **Methods:** This non-blinded, two-arm randomized controlled trial enrolled adults (18 to 90 years old) undergoing VATS PRS at The George Washington University. The control group received standard oral and intravenous pain management. The intervention group received standard care plus a preoperative ultrasound-guided ESB dosed with 30 mL of bupivacaine on the posterior thoracic transverse process correlating with surgical intervention. Pain scores using the numerical Visual Analogue Scale (VAS) and total oral morphine equivalent (OME) consumption were recorded at 6-12-24 hours post-surgery. Secondary outcomes, including length of hospital stay, were collected via chart review. Statistical analyses included the Wilcoxon Mann-Whitney U test for demographic comparisons, and regression tests for subgroup analysis. **Results:** No differences were found between the control (n=14) and intervention (n=19) groups for 6-12-24 hours postsurgical VAS scores (p=0.868, 0.236, 0.643 respectively), total OME consumption (p=0.77) and length of hospital stay (p=0.887). Age was significantly associated with total OME consumption (coefficient -1.28, 95% CI [-2.44 to -0.13], p=0.031) and 12 hours postsurgical VAS pain scores (odds ratio 0.92, 95% CI [0.87 to 0.97], p=0.002). With each additional year of age, OME consumption decreased by 1.28 units and the odds of having more pain scores after 12 hours of surgery decreased by 8%. **Discussion:** The findings reflect preliminary results for 33 patients enrolled out of an expected 70. Study limitations like small sample size impacted the statistical power and detection of differences in outcomes. Other limitations include variability in duration and extent of surgery and inconsistency of the intraoperative anesthesia provider. For example, some patients received intraoperative narcotics or dexamethasone which may impact block pharmacodynamics. These variables confound outcomes, necessitating further investigation of effective regional pain management for VATS PRS. **Keywords:** Video-Assisted Thoracoscopic Surgery; Acute Postoperative Pain; Opioids; Anesthesia, Regional

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CLINICAL AND TRANSLATIONAL RESEARCH

ANESTHESIOLOGY AND CRITICAL CARE

Blood-Brain Barrier Dysfunction Biomarkers in Patients with Traumatic Brain Injury at Risk of Neurocognitive and Neurological Disorders

TBIs are a major source of health loss and disability worldwide. The recovery process for many patients is arduous and often comes with further health exacerbations. Detecting biomarkers of early injury through molecular screening of TBI patients can help identify the onset of recovery complications and prevent their progression. Previous literature has looked at targeting general mediators in the inflammatory pathway to treat TBIs. This study aims to expand on those findings and measure specific neurogenic markers related to BBB disruption. We predict that early detection of brain biomarkers can identify areas of therapeutic intervention and aid in the treatment and prognosis of these patients. We included 50 patients with severe TBI and a control group of 10 individuals undergoing cardiac surgery without complications. Patients were ages 18-75 years with mild to severe TBI based on the Glasgow Coma Scale (GCS). Blood samples were obtained upon ICU admission, at 24 hours, 1 week, and 1 month. We measured the blood concentration of a panel of well-known plasmatic proteins associated with blood-brain barrier protection (Angiogenin, Pigment epithelium-derived factor-PEGF, Osteopontin, Brain-derived neurotrophic factor-BDNF, Neural cell adhesion molecule-NCAM, and Triggering receptor expressed on myeloid cells 2-TREM2; and with blood-brain barrier disruption (Neurogranin, Contactin-1, Kallikrein-6, Soluble receptor for advanced glycation endproducts-RANTES, Fetuin-A, Serum Amyloid Protein-SAP, Angiotensinogen, VCAM-1, and PDGF-AB/BB). Results showed a remarkable imbalance between blood-brain barrier protection and disruption molecules, with PEGF, BDNF, SAP, NCAM, VCAM1, RANTES, PDGF-AB/BB significantly increasing since 24 hours after head trauma compared to control cases without TBI. Most of these factors remained elevated 1 week later. TREM2 and Contactin-1 also increased 1 week after head trauma and remained elevated 4 weeks later together with PEGF and NCAM. Our results demonstrate the interest of using the BBB protection/dysfunction biomarker balance to monitor patients with TBI at risk of neurocognitive and neurological disorders. These markers can potentially serve as therapeutic targets to improve long term TBI rehabilitation.

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CLINICAL AND TRANSLATIONAL RESEARCH

ANESTHESIOLOGY AND CRITICAL CARE

Poor Olfaction Prior to Cardiac Surgery: Associations with Cognition, Plasma Neurofilament Light and Postoperative Delirium in a Prospective Nested Cohort Study

Objective: This study examined the association between pre-operative olfactory performance and delirium after cardiac surgery. As a secondary aim, we examined the relationship between baseline olfaction, cognitive functioning, and plasma neurofilament light (NfL). **Method:** Individuals undergoing cardiac surgery were recruited as part of a clinical trial in which blood pressure during bypass was targeted using cerebral autoregulation monitoring. There were 189 participants (mean age = 70 years; 75% men). At baseline, olfaction, cognition, and plasma concentrations of NfL were assessed using the 12-item Brief Smell Identification Test (BSIT), a battery of neuropsychological tests, and the Simoa[®] NF-Light Assay, respectively. Impaired olfaction was defined as a score of ≤ 8 for men and ≤ 9 for women. Delirium was assessed using the Confusion Assessment Method (CAM) and CAM-ICU, and delirium severity was assessed using the Delirium Rating Scale-Revised-1998 (DRS-R-98). The association of baseline olfaction and delirium and delirium severity was examined in regression models adjusting for age, duration of bypass, a surgery risk score, and baseline cognitive performance. **Results:** In adjusted models, impaired olfaction at baseline was associated with both incident delirium (OR=2.25, $p=0.04$) and greater delirium severity (OR=2.10, $p=0.04$) after cardiac surgery. Furthermore, worse baseline olfaction was associated with impaired cognition ($p < 0.001$) and increased perioperative concentrations of plasma NfL ($p=0.04$). **Conclusions:** Pre-operative olfactory testing may provide insight into brain vulnerability, cognitive dysfunction, and delirium risk in individuals undergoing cardiac surgery. Psychophysical olfactory assessment may inform strategies for patient risk stratification and early identification of individuals at risk for post-operative delirium, allowing for delirium-prevention strategies.

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CLINICAL AND TRANSLATIONAL RESEARCH

ANESTHESIOLOGY AND CRITICAL CARE

Perioperative Utilization of Ultrasonography for Enhanced Airway Assessment

Background: The advent of point-of-care ultrasound and the general adaptation of ultrasonography (US) in Anesthesia may provide alternative approaches to pre-intubation airway assessment. Direct mechanical injury from intubation can instigate local laryngeal inflammation modulated by a myriad of perioperative factors. Post-extubation airway complications may not be fully appreciated until the maneuver has already been performed. Coupled with the fact that current predictive methods for such do not always confer strong predictive power, it is prudent to assess new protocols. Skin-to-epiglottis distance measured by US has been shown to hold some merit. Our study seeks to contribute to the ongoing exploration of US in the perioperative environment, providing greater scrutiny of structures already assessed in the literature while also evaluating new ones. Methods: Patients undergoing general anesthesia with intubation at a large academic center were included in this study. The following airway measurements were collected pre- and immediately postoperatively: skin-to-epiglottis distance (STE), epiglottis width (EW), lingual artery distance (LAD), tongue width (TW), tongue thickness (TT), oral cavity height (OCH), and tongue sagittal cross-sectional area (CSA). Neck circumference (NC) was collected using tape measure between the thyroid and cricoid cartilages. All measurements were collected by a single individual who underwent blind precision testing. Shapiro-Wilks testing was used to assess data normality and paired T-tests were utilized for comparison of data perioperatively. Stratified cohort analysis was performed to assess the influence of demographic and perioperative factors. Results: Forty-five patients were included with an average age of 47.2 ± 15.3 years and average BMI of 30.2 ± 8.94 . Of the airways structures measured overall, TT, OCH, TW, LAD, STE, and EW all showed significant increases from pre- to postoperative environments (6.29%, 5.97%, 9.00%, 7.03%, 6.02%, and 6.38%; $P < 0.05$). All other measurements, including calculated TT/OCH ratio, were not statistically significant. Once stratified by type of intubation, only endotracheal tube as compared to supraglottic airway associated with significant airway changes. Discussion: This study demonstrates significant perioperative change in several airway structures. The ability for US imaging to appreciate these changes affirms its role in airway assessment. However, the more widespread structural change indicates that STE may not be the only important measurement as previous studies have asserted. Methods such as Mallampati and Cormack-Lehane scoring have not shown to be as helpful in delineating less obvious at-risk patients. It will be important for clinicians to expand their airway assessment protocols to include US measurement for more precise predictions.

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CLINICAL AND TRANSLATIONAL RESEARCH

ANESTHESIOLOGY AND CRITICAL CARE

Comparing Midline vs Central Line Venous Pressures: Is This a New Tool in Resuscitation?

INTRODUCTION Midlines (ML) are long peripheral intravenous catheters placed in an upper extremity above the antecubital space via the basilic, cephalic, or brachial veins. These provide safe and comfortable long-term vascular access for critically ill patients. Central venous pressures (CVP) are obtained from central venous catheters (CVC) and are often used as resuscitation parameters. Given the proximity of ML to the axillary vein, we set out to see if the MVP is comparable to the CVP. **METHODS** This is a prospective observational study conducted in adult critical care patients. Inclusion criteria were patients with a CVC in the internal jugular or subclavian vein and a ML in an upper extremity as part of their ICU care. Using a standard pressure measuring system, venous pressure measurements were recorded from both catheters every 15 minutes over a 60-minute period. The values were analyzed for skewness and kurtosis to assess if the data were parametric. Means for the continuous measurements were compared using paired t testing. Spearman's correlation was used to evaluate the monotonic relationship between the paired data. Demographic, clinical, and physiological data points were collected. **RESULTS** In our preliminary analysis, we enrolled a total of 15 patients with 5 pressure measurements taken per patient ($n = 75$). The average patient age is 57.5 ± 17.5 years. The mean SOFA and APACHE II scores are 8.7 ± 3.2 and 19.9 ± 7.5 respectively. The mean MVP and CVP were 8.4 ± 5.7 mmHg and 10.1 ± 5.8 mmHg respectively ($p < 0.001$). In the Bland Altman analysis, the mean bias was -1.7 ± 3.4 mmHg with 95% limits of agreement -8.4 to 5.0 mmHg. There was a strong monotonic positive correlation between CVP and MVP values, with a Spearman's coefficient of 0.81 ($p < 0.001$). **CONCLUSIONS** MVP as a correlate of CVP is an intriguing concept and its clinical utility remains to be seen. Our analysis showed significantly different mean pressures with large 95% limits of agreement. Spearman's correlation showed a monotonic correlation between MVP and CVP, however, this does not provide information about the linear relationship between the pressures. Currently, our results do not support that MVP is interchangeable with CVP. Further investigation is ongoing.

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CLINICAL AND TRANSLATIONAL RESEARCH

CANCER

A Single-cell RNA Sequencing analysis of the effect of Macrophage-based Cell Therapy on the Melanoma Tumor Microenvironment

It is well-established that macrophages exhibit both pro and anti-inflammatory properties. Classically, this distinction has been between the M1, pro-inflammatory phenotype and the M2, anti-inflammatory phenotype. M1-like macrophages enhance the immune system's ability to identify, target and kill malignant cells. However, signals present in the tumor microenvironment (TME) appear to promote the M2-like phenotype, thus encouraging pro-tumor macrophage activity. We propose a novel adoptive cell therapy involving host macrophages that are polarized to the M1 phenotype and treated with HDAC6 inhibitors ex vivo prior to injection into melanoma tumors. Single-cell RNA sequencing data analysis demonstrates the effect of this therapy on the cellular make-up and properties of the TME. The focus of this project is to demonstrate the power of Single-cell RNA sequencing (scRNA seq) technology that allows for detailed investigation of the TME at the transcriptional level. Since the introduction of this technology, there have been many open-source computational techniques developed to perform a wide range of analyses using scRNA seq data. This project showcases several scRNA seq analysis techniques and illustrates their applications by investigating the effect of the proposed macrophage-based adoptive cell therapy in the treatment of melanoma. The techniques demonstrated in this analysis include Seurat, Bayesian Inference Transcription Factor Activity Model (BITFAM), and NicheNet. Single-cell RNA sequencing allows for incisive analysis of the effect of adoptive cell therapy in the make-up and cellular communications of the TME. Seurat, BITFAM, and NicheNet demonstrate possible mechanisms by which the proposed macrophage-based adoptive cell therapy promotes pro-inflammatory properties in the TME, decreases tumor burden, and increases survival. This project demonstrates the utility of scRNA seq analysis and showcases how this data can be used to reach interesting conclusions. The use of other scRNA seq tools will likely reveal additional insights and should be pursued.

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CLINICAL AND TRANSLATIONAL RESEARCH

CANCER

Need for Standardization of Cytokine Profiling in CAR T-Cell Therapy

With expansion of CAR T-cell therapy and broader utilization of anti-cytokine directed therapeutics for toxicity mitigation, the routine assessment of cytokines may enhance understanding of toxicity profiles, guide therapeutic interventions, and facilitate cross-trial comparisons. As specific cytokine elevations can correlate to CAR T-cell toxicities like Cytokine Release Syndrome (CRS) and Immune effector cell-associated neurotoxicity syndrome (ICANS), we conducted a systematic review to explore the reporting and measurement of cytokines across clinical trials. In this analysis we reviewed 21 clinical trials across 60 manuscripts that featured a Food and Drug Administration-approved CAR T-cell construct or one of its predecessors and highlighted the substantial variability and limited reporting of cytokine measurement platforms and panels used across CAR T-cell clinical trials. Specifically, across 60 publications, 28 (46.7%) did not report any cytokine data, representing 6 of 21 (28.6%) clinical trials. Across cytokines, IL-6 and IFN γ were the most frequently reported, although still in the minority of publications, being reported in just 26 (43.3%) and 28 (46.7%) of the 60 publications, respectively. In comparison, the routinely available biomarkers CRP and ferritin, were each reported in 20 (33.3%) publications. There was substantial variability in the frequency at which cytokines were measured with some reporting data for as many as 16 timepoints within the first 31 days post-infusion of CAR T-cells and others reporting as few as 1 timepoint—often the peak cytokine value. Collectively, 6 (28.6%) trials reported some correlation of cytokine levels to ICANS, CRS, and CRS severity, 5 (23.8%) trials reported correlations to CRS and CRS severity, and 9 (42.86%) provided correlations of cytokine levels to ICANS. In the 15 trials reporting cytokine data, at least 4 different platforms were used. Considering the fundamental role of cytokines in CAR T-cell toxicity and efficacy, our manuscript supports the need to establish standardization of cytokine measurements as a key biomarker essential to improving outcomes of CAR T-cell therapy.

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CLINICAL AND TRANSLATIONAL RESEARCH

CANCER

Influence of Radiation Modality on Radiation-Induced Lymphopenia in Breast Cancer

Female breast cancer accounts for 31% of all new cancer cases and is responsible for 15% of cancer deaths in the United States. In the multidisciplinary management of breast cancer, radiotherapy (RT) plays an important role. RT can reduce the rate of local and distant recurrence by 75% and can improve 15-year breast cancer-specific survival by 7%. However, RT is known to result in late adverse reaction due to RT's damaging of normal healthy tissue, and immune system status at the time of cancer diagnosis impacts patient outcomes. Lymphopenia, or low peripheral lymphocyte count (PLC) is a common side effect of radiation and is associated with poor survival in patients with metastatic breast cancer. Lymphopenia is observed in 20-25% of patients with advanced cancers. This study evaluated 16 breast cancer patients > 18 years of age receiving hypofractionated VMAT, 3D-EBRT, or proton RT at a single hospital. Peripheral lymphocyte counts (PLC) at baseline, immediately after RT, and 1-month post-RT were measured and flow analysis was performed. Matched analysis was used to compare statistical significance between RT techniques. A total of 16 patients met the study criteria and completed three sample collection timepoints. The primary endpoint was nadir-PLC/baseline-PLC <0.8 and the secondary endpoints included changes in other T-cell subsets at all time-points. For patient who received VMAT, the mean PLC was $1.43 \times 10^9/L$ at baseline and $0.60 \times 10^9/L$ post-RT ($P < 0.02$). For patients who received 3D-EBRT, the mean PLC was $1.05 \times 10^9/L$ at baseline and $0.70 \times 10^9/L$ post-RT ($P = 0.05$). Finally, for patients who received protons, the mean PLC was $1.69 \times 10^9/L$ before and $0.99 \times 10^9/L$ post-RT ($P = 0.003$). At the end of RT, 75% of patients had lymphopenia in the 3D-EBRT and VMAT group, while 28.6% of patients had lymphopenia in the protons group. Regarding flow analysis, CD3+CD56- cell populations decreased from baseline to follow-up in patients who received EBRT ($P < 0.05$). CD25+CD56+ cell populations decreased for patients that received 3D-EBRT compared to patients who received proton therapy ($P < 0.05$). CD3+CD56+ cell populations were lower in the VMAT group overall compared to proton and 3D-EBRT patients ($P < 0.05$). Moreover, lymphopenia is common patients with breast cancer who receive adjuvant RT, but rates of lymphopenia differ based on RT modality. Patient who received proton RT had the lowest rate of lymphopenia compared , followed by 3D-EBRT, and finally VMAT, suggesting that choice RT technique should be further studied and considered in order to minimize lymphopenia and improve treatment outcomes.

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CLINICAL AND TRANSLATIONAL RESEARCH

CANCER

Focal boosted IMRT treatment of prostate cancer to 84 Gy in 28 fractions: Preliminary clinical outcomes, toxicity, and dosimetry

Introduction: The FLAME trial reported that focal boosting of prostate tumor up to 95 Gy in 35 fractions improves biochemical control (disease free survival). However, this treatment (regimen) is not commonly used in the United States. We investigated a focally boosted treatment of 84 Gy in 28 fractions (EQD2 108 Gy, BED 252 Gy). Methods: We retrospectively evaluated men with unfavorable-intermediate risk (uIR) and high risk (HR) prostate cancer treated with focal boost IMRT between 2019-2022. The dose levels were 84 Gy to the gross tumor volume (GTV) as defined on mpMRI (T2W and ADC) with no added margin, 70 Gy to the prostate and proximal seminal vesicles, and optional 50.4 Gy to elective pelvic lymph nodes (all 28 fractions). Patients received fiducial markers and hydrogel spacer. The treatment planning goal was to cover 95% of the GTV at 84 Gy, and also meet the target and normal tissue dosimetry criteria of the hypofractionated treatment arm of NRG-GU005. VMAT was used for treatment delivery. ADT was given at the discretion of the treating physician. Results: 20 men were included in the study, 2 (10%) uIR and 18 (90%) HR. 9 (45%) tumors were GG 1, 7 (35%) GG2, 3 (15%) GG3, 6 (30%) were GG4, and 4 (20%) were GG5. There were 13 (65%) stage cT1, 4 (20%) cT2 and 3 (15%) cT3. One (5%) patient received short term ADT, 18 (95%) long term ADT, and 1 (5%) refused ADT. 18 (90%) men received elective pelvic nodal radiation. The mean baseline PSA was 25.1ng/mL (range 4.2-73.4). The median baseline IPSS score was 11.1 (IQR 4.5-12); 4 patients had severe baseline urinary symptoms (IPSS =20). The mean baseline prostate volume was 57.4 cc (range 26.8-198.3). The mean volume of the 84 Gy boost target was 7.1 cc (range 2.3-15.0) and the mean proportion of the prostate boosted was 14.8% (range 2% - 47%). There were 10 (50%) men with 1 boost target, 6 (30%) with two, 3 (15%) with three, and 1 (5%) had 4 boost targets. Targets were located in peripheral zone (85%), transition zone (30%), and central zone (5%). Patients met all per-protocol normal tissue criteria of NRG-GU005, except for bladder D0.03cc. The mean $\pm$ SD (Gy) rectum D15%, D25%, and D30% were 51 $\pm$ 5, 45 $\pm$ 5, 42 $\pm$ 4. The mean $\pm$ SD (Gy) bladder D0.03cc, D30%, D50% were 79 $\pm$ 4, 50 $\pm$ 8, 38 $\pm$ 10. At a median follow up time of 21.3 months (range 7.1-38.2), no patients

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CLINICAL AND TRANSLATIONAL RESEARCH

CANCER

A Retrospective Study of Barrett's Esophagus and Esophageal Adenocarcinoma in a Diverse Patient Population at a Mid-sized Medical Institution.

Introduction: Barrett's esophagus (BE) is a metaplastic precursor with characteristic intestinal metaplasia (IM), of esophageal adenocarcinoma (EAC), that is caused by chronic gastroesophageal reflux disease (GERD) that results in inflammation-driven injury to esophageal tissues. The 2022 guidelines from the American College of Gastroenterology (ACG) recommend preventive screening for dysplasia and EAC with regular esophagogastroduodenoscopies (EGD) for men of European ancestry over 50 years old with chronic GERD symptoms and other risk factors. Reported progression rates from BE to dysplasia and EAC are low but may be variable, with a specific knowledge gap regarding minority populations. **Methods:** Our retrospective study aimed to determine the frequency of BE, dysplasia, and EAC over a two-year period at our institution. Utilizing an internal pathological specimen archive database that included esophageal biopsies, endoscopic mucosal and surgical resections, and autopsies, 1033 accessions were screened for diagnoses of esophageal intestinal metaplasia (IM), IM with no other specification (IM-NOS), BE, dysplasia, EAC, or squamous cell carcinoma (SqCC). After excluding 894 accessions negative for the diagnostic pathological criteria, autopsies, or lack of clinical information, an in-depth chart review was conducted on the remaining 139 accessions from 128 patients. Clinical information was collected from the available Electronic Medical Record (EMR), including demographics, prior history of BE or IM, and prior or current presence of dysplasia or cancer. **Results:** Of the 128 included patients, 36(28%) had IM-NOS, 67(52.3%) had BE with or without dysplasia, 16(12.5%) had EAC, and 11(8.5%) had squamous cell carcinoma. In the combined BE/IM subset, the demographic distribution was 34% female and 30.1% Black. In the biopsy-proven BE-only category, 22% were female and 21% were Black. Patients with EAC were 18.8% female and 12.5% Black. These numbers contrast with an overall frequency of 45% of our catchment area population self-identifying as Black. **Discussion:** In this study, there is a progressive reduction in the proportion of female and Black patients from IM NOS to biopsy-proven BE to EAC. This is consistent with observations in other geographic regions in the US and the ongoing hypothesis that genetic and/or environmental mechanisms may provide protective factors against BE to EAC progression in the Black population. **Key Words:** Barrett's Esophagus, Esophageal Adenocarcinoma, Epidemiology, Incidence, Screening, Dysplasia, Diverse Populations, African American, Race

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CLINICAL AND TRANSLATIONAL RESEARCH

CANCER

Validation of SimBioSys TumorScope to Predict Response to Neoadjuvant Chemotherapy in Breast Cancer

Introduction: Breast cancer remains the most common malignancy in women in the United States. About one in eight U.S. women will develop invasive breast cancer throughout her lifetime. Treatments are selected in clinical settings with the target to achieve complete pathological response (pCR) as this allows physicians to prognosticate, escalate, or deescalate therapy and develop treatment strategies post-surgery. Even though standard-of-care protocols exist for early-stage and metastatic breast cancers, there is still significant variation in decision-making. Varying opinions among clinicians result from a lack of tools to standardize how data is utilized in the planning process. TumorScope (TS) is a commercially available platform used to predict response to therapy in solid tumors. The platform utilizes a combination of artificial intelligence and biophysical simulations to capture tumor biology in-silico, enabling testing of both pre-clinical and standard-of-care agents on a virtual model of a patient's tumor.

Design: Patients treated for breast cancer with a prior MRI at a single tertiary institution between 11/05/2020 and 8/9/2023 were obtained. Patients who have received diagnostic Dynamic Contrast-Enhanced MRI before the start of treatment were eligible for inclusion in this study. Patients who were missing pathology in their medical notes or did not complete neoadjuvant, endocrine, or surgical treatment were excluded from the study. Cases in which major MRI artifacts inhibit TS's ability to interpret MR imaging (including poor fat suppression, significant coil flare, low signal-to-noise ratio, incomplete DICOM series, and other non-correctable registration issues) also lead to exclusion from the study. Twenty patients fit the selection criteria and were included in the study.

Results: All 20 patients received neoadjuvant and surgical treatment. 8 of the patients received Taxotere, Carboplatin, Herceptin, and Perjeta (TCHP), 2 had Taxotere and Cyclophosphamide (TC), 8 received dose-dense Doxorubicin & Cyclophosphamide followed by Taxol (ddAC-T), and 2 had Doxorubicin & Cyclophosphamide followed by Taxol (AC-T). Of those 20 patients, 9 (45%) had a complete pathological response to their treatment, and 11 (55%) had a partial response to treatment. Of the 20 patients, 15 had some form of adjuvant chemotherapy or endocrine therapy. After receiving the TS analysis from SimBioSys, we will assess the accuracy, sensitivity, specificity, positive predictive value, and negative predictive values of TS predicting capabilities.

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CLINICAL AND TRANSLATIONAL RESEARCH

CANCER

CD25-Targeted Near-Infrared Photoimmunotherapy in vitro

Introduction: Lymphoma is the ninth leading cause of cancer deaths in the United States, estimated to affect 4% of the population in 2023. Near-infrared photoimmunotherapy (NIR-PIT) is an emerging therapeutic modality which utilizes a light-activatable dye IRDye700Dx (IR700) conjugated to a monoclonal antibody (APC) targeted against tumor-associated antigens. Thus, by utilizing NIR-PIT targeted against CD25, which is characteristically overexpressed in a subtype of lymphoma, lymphoma tumor cells are predicted to undergo selective cell death. This study investigated the efficacy of CD25-targeted NIR-PIT using the new antibody for lymphoma on two cancer cell lines: Ramos & EOL-1. Methods: CD25 expression on each cell line was first confirmed to validate the potential utility of CD25-targeted NIR-PIT. Cells were stained with either human CD25 (hCD25) antibody or mouse CD25 (mCD25) antibody and labeled cells were counted using fluorescence activated cell counting (FACS) analysis. For the in vitro NIR-PIT experiments, cells were incubated for 60 minutes with one of the following: 1) hCD25-IR700 (positive control), 2) mCD25-IR700 (negative control) or 3) no APC (negative control). NIR-PIT with light doses of 0, 5, 10, 20 or 50 J/cm² were applied to the cells (690nm). Cells were subsequently stained with propidium iodide (PI) and viable cells were counted using FACS analysis. Statistical significance compared to the control group (no APC, 0 J/cm²) were assessed with a one-way ANOVA. Results: CD25 expression FACS analysis showed a higher expression of hCD25 expression compared to mCD25 expression in both Ramos and EOL-1 cell lines. CD25-targeted NIR-PIT resulted in a light dose-dependent tumor cell death in both cell lines. Significant cell death was achieved at 20 and 50 J/cm² for the Ramos cell line ($p < 0.01$, $p < .005$, $n=5$) and at 10, 20 and 50 J/cm² for the EOL-1 cell line ($p < 0.05$, $p < 0.05$, $p < 0.001$, $n=5$). No significant cell death was observed in the Ramos cell line treated with mCD25-IR700 ($n=5$). Conclusions: Ramos and EOL-1 cell lines were found to both express CD25, supporting further investigation of CD25-targeted NIR-PIT. CD25-targeted NIR-PIT significantly induced tumor cell death in a light-dose dependent manner in both cell lines. Thus, CD25-targeted NIR-PIT shows therapeutic potential for treating lymphoma in patients. Future experiments will further evaluate the efficacy of in vivo NIR-PIT using a mouse model with implanted Ramos and EOL-1 tumor cells.

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CLINICAL AND TRANSLATIONAL RESEARCH

CANCER

Hypofractionated IMRT for Oligometastatic or Oligoprogressive Cancer Not Amenable to SBRT

Background: Stereotactic body radiotherapy (SBRT) has become more widely accepted as a standard treatment regimen for oligometastatic and oligoprogressive cancer. At our institution, tumors >5cm, invading major blood vessels, invading or touching bowel, invading bladder, invading or touching major airway, and/or invading or touching skin have not been treated with SBRT due to concerns about toxicity. We evaluated an alternative hypofractionated intensity-modulated radiation therapy (IMRT) (typically 45 Gy in 15 fractions) for the treatment of oligometastatic cancers (1-5 sites) not amenable to SBRT. Objective: The primary objective was to assess the use of hypofractionated IMRT in patients with oligometastatic or oligoprogressive cancer. Methods: We retrospectively reviewed and analyzed the data for 30 patients with oligometastatic or oligoprogressive cancer not amenable to SBRT who began radiation therapy using the aforementioned alternative regimen of hypofractionated IMRT between 2018 and 2023. Results: Of the 30 patients who received hypofractionated IMRT, 63% were male. The median follow up was 10 months (range, 2-53) overall and 17 months in surviving patients. The mean age ($\pm$ SD, range) was 67 ($\pm$ 13, 37-91) years. The mean tumor size ($\pm$ SD, range) treated was 6cm ($\pm$ 4, 1.2-23) and mean planning target volume (PTV) ($\pm$ SD, range) was 689cc ($\pm$ 623, 28-2022). The majority of patients (76%) received 45 Gy in 15 fractions. The main indications for this treatment was a tumor size greater than 5cm (36%), bladder invasion by tumor (16%), tumors touching or invading skin, tumors invading major blood vessels (both 13%), tumors adjacent to the airway (10%), and tumors touching or invading bowel, bladder, or a major joint (3%). The cancer primary sites were GU (43%), GYN (16%), GI (13%), thorax (13%), head and neck (10%), and breast (3%). The IMRT treatment sites were the pelvis (40%), thorax (22%), abdomen (20%), head and neck (10%), and bone (6%). The abdomen was the treatment site with the largest mean tumor size (9.9cm), and bone was the site with the smallest mean tumor size (1.8cm). The local controls at 1 and 2-years were 94% and 72%, respectively. The overall survival at 1 and 2-years were 61% and 48%, respectively. Conclusion: Hypofractionated IMRT might be a suitable treatment method for oligometastatic and oligoprogressive cancer not amenable to SBRT. Future studies are warranted to further evaluate this technique and report on toxicity.

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CLINICAL AND TRANSLATIONAL RESEARCH

CANCER

MRI Changes in the Cochlea as a Predictor of Clinically Significant Hearing Loss in Children Receiving Ototoxic Chemotherapy for Treatment of Brain Tumors

Central nervous system tumors are the most common pediatric solid neoplasm. Platinum based chemotherapy regimens, typically first-line treatments, are associated with permanent, dose-dependent ototoxic effects. While audiometry remains the gold standard for monitoring for otologic sequelae, patient age and comorbidity may limit reliability testing. Recent studies have highlighted inner ear signal changes on magnetic resonance imaging (MRI) during the evolution of chemotherapy-induced hearing changes, which may precede clinically detectable hearing loss. Ability to see MRI signal changes prior to hearing loss may influence the therapeutic regimen and/or audiologic monitoring protocol. This study presents the first longitudinal investigation of the association of MRI signal changes and hearing outcomes in pediatric patients undergoing chemotherapy for intracranial neoplasm. A retrospective cohort study of patients receiving treatment for intracranial neoplasms at Children's National Hospital between 2000-2019 was performed. We included patients with intracranial neoplasms who underwent serial MRI and audiologic examinations (n=29). The timeline of initial cochlear signal abnormality and audiometric four-tone pure tone average were assessed. The temporal relationship between cochlear changes on MRI and onset of hearing loss was evaluated. Our analysis includes 29 children with intracranial neoplasms. No patients demonstrated abnormal radiographic findings on initial MRI, while all developed abnormal signal changes on subsequent imaging. 27 patients (93.1%) developed hearing loss. Most patients (18/29, 62.1%) demonstrated normal hearing at the time of first abnormal radiographic changes. The median number of weeks between MRI change and hearing loss for patients who experienced MRI change prior to hearing loss was 20.8 weeks (IQR: 9.43, 97.4). Median time from start of radiotherapy to MRI change was significantly higher in the mild MRI change group compared to the moderate/severe MRI change group ($P = <0.001$). There was no significant difference in the start of chemotherapy to MRI change duration between the groups ($P = 0.108$). Median time to hearing loss in patients with MRI change before hearing loss was 4.7 months (95% CI: 3.8, 15.5) versus median time to hearing loss in patients with hearing loss prior to MRI change was 3.8 months (95% CI: 2.8, 5.8). These findings suggest that radiographic changes in the cochlea may predate the onset of clinically significant hearing loss, suggesting a possibility for intervention. No significant difference was identified between degree of MRI change and time to hearing loss. Additionally, there was no significant difference in time between the start of chemotherapy to MRI changes between the mild and moderate/severe groups.

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CLINICAL AND TRANSLATIONAL RESEARCH

CANCER

Utilization of Neoadjuvant Chemotherapy and Pathologic Outcomes in Upper Tract Urothelial Carcinoma

Background: Upper tract urothelial carcinoma (UTUC) is a rare malignancy with a poorer prognosis compared to bladder urothelial carcinoma. Radical nephroureterectomy (RNU) remains the standard treatment for high-risk UTUC. Considering the decline in renal function with RNU and promising pathologic complete response rates from the phase II trial ECOG-ACRIN 8141, neoadjuvant chemotherapy (NAC) has emerged as a favored perioperative treatment regimen for chemo-eligible patients with high-risk UTUC. However, RCTs exploring NAC's efficacy are absent, and large-scale studies examining NAC's role and predictors for its use are scarce. **Methods:** This study aimed to assess trends in NAC utilization, determinants for receiving NAC, and pathologic outcomes. The National Cancer Database was queried for patients with high-grade cM0 UTUC treated with RNU from 2004-2019. Outcomes included pathologic response (pR) and pathologic complete response (pCR), defined as $\geq$ pT1pN0/X and pT0pN0/X, respectively. Multivariate regressions were adjusted for relevant patient and tumor characteristics. **Results:** Of 6,436 patients treated with RNU alone and 209 with RNU and NAC, older age, greater home distance from the treatment facility, and higher comorbidity scores decreased the likelihood of receiving NAC. In contrast, higher cT stage (OR 1.72, $p=0.028$) and cN+ status (OR 7.40, $p<0.001$) predicted NAC treatment. NAC was more commonly used in academic centers (OR 2.02, $p<0.001$). Use of NAC peaked in 2016 at 10%, but dropped to ~2% by 2019. There was minimal nodal response to NAC (23.4% cN+ vs 22.0% pN+). NAC was associated with 34.0% pR and 5.3% pCR rates, increasing the likelihood of pCR (OR 57.5, $p<0.001$). In cT2-4 UTUC, 19.3% and 7.1% of patients had pR and pCR with NAC, and NAC improved odds of pR (OR 1.78, $p=0.024$). **Conclusions:** Our study demonstrated variable NAC use for UTUC, illustrating the evolving landscape of perioperative systemic therapies. We report significant response rates even in cT2-4 UTUC. Our observed poor nodal response to NAC emphasizes the crucial role of retroperitoneal lymph node dissection in staging, regardless of NAC status. We note poor NAC utilization in non-academic settings and among patients living farther from care facilities, underscoring the need for improved care quality in the context of regionalization and multi-disciplinary approaches in UTUC management.

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CLINICAL AND TRANSLATIONAL RESEARCH

CANCER

Blood-Brain Barrier Biomarkers Predictive of Immune Effector Cell-Associated Neurotoxicity Syndrome in Patients with Diffuse Large B Cell Lymphoma Treated with CAR-T Cells

Chimeric antigen receptor T-cell (CAR-T) immunotherapy represents a promising treatment for patients with relapsed/refractory hematologic malignancies. However, neurotoxicity is a common complication, with a reported incidence of 30-50% that can occur in the days to weeks following CAR-T cell infusion, and whose clinical effects range from delirium and language dysfunction to seizures, coma, and cerebral oedema. Its development depends on a life-threatening immunoinflammatory cytokine response known as the Immune Effector Cell-Associated Neurotoxicity Syndrome (ICANS). The pathogenesis of ICANS is unclear although impairment of the blood-brain barrier (BBB) has been reported using astrocyte and axonal damage biomarkers including glial fibrillary acidic protein and neurofilament light chain, respectively. In this retrospective observational study of patients with chemoresistant diffuse large B cell lymphoma (DLBCL) treated with CAR-T cells, we determined the blood concentration of a comprehensive panel of immuno-metabolic, immuno-thrombogenic, neuroplastic, neuro- stress, and neurovascular biomarkers associated to BBB protection (Angiogenin, Pigment epithelium-derived factor-VEGF, Osteopontin, Brain-derived neurotrophic factor-BDNF, Neural cell adhesion molecule-NCAM, and Triggering receptor expressed on myeloid cells 2-TREM2); and disruption (Neurogranin, Contactin-1, Kallikrein-6, Soluble receptor for advanced glycation endproducts-sRANTES, Fetuin-A, Serum Amyloid Protein-SAP, Angiotensinogen, VCAM-1, and PDGF-AB/BB). Results showed that patients developing ICANS had significantly higher blood levels of CRP, SAP, VCAM1 and PEDF, and lower levels of Angiotensinogen, contactin-1, and PDGF-AB/BB prior to CAR-T cell infusion than those cases not developing ICANS. In addition, compared to patients non developing ICANS, those developing ICANS showed an inverse correlation between Osteopontin and NCAM, between Kallikrein-6 and CRP, between contactin-1 and RANTES and between VCAM1 and BDNF-PDGF-AB/BB-RANTES. Moreover, following CAR-T cell infusion, patients developing ICANS were those with higher blood levels of SAP, VCAM1 and PEDF, and lower levels of contactin-1, and PDGF-AB/BB than those cases not developing ICANS. Furthermore, compared to patients non developing ICANS, those patients developing ICANS showed an inverse correlation between BDNF-RANTES-CRP-SAP-Neurogranin-PDGF-AB/BB-PEDF and NCAM-Contactin-1-BDNF-RANTES-Neurogranin-PDGF-AB/BB. Altogether, our results demonstrate distinct BBB molecular biomarker patterns in patients with DLBCL with and without ICANS following CAR-T cell immunotherapy, which further supports the pathophysiological link between ICANS and BBB impairment in these patients. Our results also suggest the interest of using the BBB protection/dysfunction biomarker balance as a complementary diagnostic test to predict occurrence of ICANS in patients with DLBCL treated with CAR-T cells.

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CLINICAL AND TRANSLATIONAL RESEARCH

CARDIOLOGY

High Accuracy of Artificial Intelligence versus Human Assessment for Coronary Artery Disease by AI-Quantitative Computed Tomography (AI-QCT)

Background: Heart disease is the number one cause of mortality while coronary artery disease (CAD) specifically affects over 20 million individuals in the United States. Coronary CT angiography (CCTA) is now a first line approach by guidelines for CAD diagnosis. However, accurate assessment may be time-consuming, influenced by reader experience, and prone to inter-observer variability, leading to up to 40% of overestimation of CAD severity versus research core lab analysis. This may contribute to excess downstream testing and inappropriate coronary stenting that is part of an estimated 800 million dollars of excess Medicare expenditures yearly. This study evaluated the diagnostic accuracy of a novel artificial intelligence-guided approach to coronary stenosis quantification (AI-QCT, Cleerly Inc, Denver, CO) versus human assessment. Methods: The diagnostic accuracy study included 208 prospectively enrolled patients with suspected CAD undergoing CCTA from the previously published Prospective Comparison of Cardiac PET/CT, SPECT/CT Perfusion Imaging and CT Coronary Angiography With Invasive Coronary Angiography (PACIFIC-1) study. Separate core lab AI-QCT vs blinded readers assessed coronary artery stenosis following the Coronary Artery Disease Reporting and Data System (CAD-RADS) Society of Cardiovascular Computed Tomography/American College of Cardiology/American College of Radiology multi-society expert consensus. Accuracy of AI-QCT was compared with a level 3 (expert) and two level 2 (basic competency) clinical readers against a core-lab invasive quantitative coronary angiography (QCA) reference standard (=50% stenosis) in an area under the curve (AUC) analysis. A per-patient and per-vessel analysis was done with further stratification by quantified plaque volume. Results: Among 208 patients with a mean age of 58 ± 9 years and 37% women, AI-QCT demonstrated superior concordance with QCA compared to clinical reader assessments. For detection of obstructive stenosis (=50%), AI-QCT achieved an AUC of 0.91 on a per-patient level, outperforming level 3 (AUC 0.77; $p < 0.001$) and level 2 readers (AUC 0.79; $p < 0.001$ and AUC 0.76; $p < 0.001$). The higher accuracy AI-QCT was most prominent in patients above median plaque volume. At the per-vessel level, AI-QCT achieved an AUC of 0.86, similar to level 3 (AUC 0.82; $p = 0.098$) stenosis, but superior to level 2 readers (both AUC 0.69; $p < 0.001$). Conclusions: AI-QCT demonstrated superior agreement with invasive QCA compared to clinical CCTA assessments, particularly compared to level 2 readers in those with extensive CAD. Integrating AI-QCT into routine clinical practice holds promise for improving accuracy of CAD diagnosis, reducing excess testing, and lowering healthcare costs.

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CLINICAL AND TRANSLATIONAL RESEARCH

CARDIOLOGY

Deep Phenotyping by Machine Learning of Participants in the Systolic Blood Pressure Intervention Trial (SPRINT)

Background The NHLBI-supported Systolic Blood Pressure (SBP) Intervention Trial (SPRINT) (NCT01206062) aimed to identify an SBP target for hypertensive, non-diabetic patients of age ≥ 50 at increased cardiovascular (CV) risk to reduce the incidence of CV morbidity and mortality. We reused publicly available patient-level SPRINT data from NHLBI BioLINCC to perform secondary analysis by machine learning (ML) to identify cluster-specific risk predictors. **Methods** Data from SPRINT participants ($n=9361$) was clustered based on 30 baseline variables by distribution-based clustering through Gaussian Mixture Models (GMM). Top predictors of all-cause mortality were identified for each cluster using Random Survival Forest (RSF), an ensemble method for right-censored data that ranks survival outcome predictors in order of importance. **Results** Of the 3 clusters identified by GMM (Fig 1A), Cluster 3 had the lowest survival probability (Fig 1B). Patients in Cluster 3 had several indicators of abnormal renal function, including an average high serum creatinine, urine/albumin creatinine ratio, and CKD prevalence, as well as a low average eGFR (Fig 1C). Within Cluster 3, RSF identified renal biomarkers as 3 of the top 5 predictors of all-cause mortality (Fig 1C). **Conclusion** This study highlights the utility of supervised and unsupervised ML methods together to identify unique patient profiles and risk predictors to guide precision diagnoses, treatments, and disease prevention.

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CLINICAL AND TRANSLATIONAL RESEARCH

CARDIOLOGY

Sequencing of Blood RNA from INOCA Patients Identifies Changes in Innate, Invariant, and Acquired Immune Pathways

Ischemia with non-obstructive coronary arteries (INOCA) is an important clinical entity involving coronary microvasculature dysfunction (CMD) and/or vasospasm of the coronary arteries or arterioles. Approximately 20-30% of patients presenting with non-acute chest pain are affected by INOCA, which is diagnosed by undergoing a series of tests often including a cardiac stress test, ultrasound imaging, and invasive coronary angiography (ICA) or CT angiography (CTA). INOCA is related to and could progress to angina with no obstructive coronary arteries (ANOCA) and myocardial infarction NOCA (MINOCA). An estimated 3-4 million individuals in the US are affected with INOCA, with females having a greater prevalence. Sequencing of whole blood RNA (Illumina) from 177 patients that underwent a stress test and invasive coronary angiography (ICA) was conducted. INOCA-related differentially expressed genes (DEGs) were identified by comparing 40 stress+/ICA- patients to 39 Control (stress-/ICA-). CAD-related DEGs were identified by comparing 38 stress-/ICA+ to Control. DeSeq2 was used to identify DEGs in both INOCA and CAD comparisons. Gene ontology and Blood Atlas analyzed the pathways and cell types. The INOCA analysis identified 199 DEGs with a greater than 1.5-fold increase compared to Controls, 66 of which were upregulated and 133 downregulated. In INOCA, elevated transcripts from mucosal-associated invariant T (MAIT) cells, plasmacytoid dendritic cells (pcDC), and memory B cells were observed that have been identified in other autoimmune-related diseases such as rheumatoid arthritis. Decreased transcripts were associated with neutrophils and monocytes, but cell-specific markers indicated normal abundance of these cells. Some transcripts were sensitive to sex, with changes greater in females. The ICA+ CAD analysis identified 181 DEGs with a greater than 1.5-fold increase compared to control, 104 of which were upregulated and 77 downregulated. ICA+ CAD transcripts had some overlap, but were related to T cell functions, indicating both shared and unique pathways involved in CAD and INOCA. Elevated transcripts related to pcDC, MAIT, and B cells suggests an autoimmune component to INOCA. The reduced neutrophil transcripts are likely attributed to chronic activation leading to increased translational degradation. Neutrophil extracellular traps (NETs) have well documented adverse effects on microvascular integrity. Thus, INOCA may be an autoimmune syndrome in which an immune trigger initiates B cell, pcDC, MAIT, and neutrophil activation that compromises cardiac microvascular function via thrombosis and NETosis. Additionally, the expression profile of INOCA likely does not involve an active bacterial, biofilm, or viral infection.

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CLINICAL AND TRANSLATIONAL RESEARCH

CARDIOLOGY

Outcomes of Formalized Transitional Programs for Pediatric Patients with Congenital Heart Disease Transferring to Adult Care: A Scoping Review

Introduction: An increasing number of adults live with heart defects. This has increased the need for establishing formalized transitional programming that serve patients as they transition from pediatric to adult cardiology care. Although formalized transitional care models for patients with CHD have been implemented and evaluated by various institutions across geographical regions, there is a dearth of literature investigating the effectiveness of these transitional programs and interventions on clinical outcomes and quality of life metrics. **Objectives:** The objective of this study is to conduct a scoping review of the literature on transitional programming for children and adolescents with CHD, report the clinical outcomes of various models that have been implemented across geographical regions, and provide relevant future directions for the field. **Methods:** A thorough search of PUBMED/Medline, Scopus Advance (including EMBASE), CINAHL (Nursing and Allied Health), and Cochrane Library (including CENTRAL trial registry records) was completed to identify relevant literature. All articles were screened for the following inclusion/exclusion criteria: original research articles, written in English, included a transitional program focused on patients with congenital heart disease, and investigated qualitative or quantitative outcomes of the transitional program. The outcomes were organized and reported in the following categories: medical knowledge, clinical care coordination, health utilization, successful transfer, and patient empowerment. **Results:** Eleven studies were included in the analysis. All seven studies that reported outcomes of medical knowledge reported a significant increase in patients' medical knowledge after the transitional program, although each study measured outcomes differently, using various scoring systems. Seven studies investigated clinical care coordination, four of which exhibited a significant improvement. However, there were also a plethora of scoring criteria used. Few studies reported outcomes on healthcare utilization and successful transfer. **Conclusion:** Rather than focusing efforts on identifying the "optimal model" for transition programming for patients across the field, it is important to advocate for increased resources, stronger reimbursement models, better infrastructure, and robust education/training to encourage institutions to develop their own transitional models that meet their patient needs.

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CLINICAL AND TRANSLATIONAL RESEARCH

DERMATOLOGY

Isobornyl Acrylate-Induced Allergic Contact Dermatitis: A Case of Nail Cosmetic Sensitization

Isobornyl acrylate (IBOA), a photopolymerizable monomer commonly employed in coatings, sealants, glues, and adhesives, has garnered attention for its role in causing allergic contact dermatitis (ACD) to glucose monitors and insulin pumps. We present a novel case of ACD to IBOA found in a home nail glue, expanding the spectrum of this acrylate allergen to nail cosmetics. We present a case of a 40-year-old woman with atopic dermatitis who developed pruritic, painful fingertip and periungual dermatitis following the use of home gel nail products. Patch testing revealed positive reactions to various acrylates, including isobornyl acrylate (IBOA) found in the nail glue used by the patient. Despite its infrequent presence in cosmetic nail formulations, IBOA is implicated in allergic contact dermatitis (ACD) due to its use in adhesives for medical devices. This case highlights the importance of considering IBOA as a potential allergen in nail cosmetics, especially with the increasing popularity of home gel nail kits. This case raises awareness of the potential for ACD to IBOA in nail cosmetics. Although IBOA may be uncommon in the ingredients list, recent studies suggest it may be present but undeclared in nail products. Considering the growing popularity of home gel nail kits and diverse uses of IBOA, including diabetes devices, nonoccupational sensitization may have broader implications in the future.

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CLINICAL AND TRANSLATIONAL RESEARCH

DERMATOLOGY

The Impact of Next-Generation Sequencing on Interobserver Agreement and Diagnostic Accuracy of Desmoplastic Melanocytic Neoplasms

Background: Next generation sequencing (NGS) is increasingly being utilized as an ancillary tool for diagnostically challenging melanocytic neoplasms. It is incumbent upon the pathology community to perform studies assessing the benefits and limitations of these tools in specific diagnostic scenarios. One of the most challenging diagnostic scenarios faced by skin pathologists involves accurate diagnosis of desmoplastic melanocytic neoplasms (DMNs). Methods: In this study 20 expert melanoma pathologists rendered a diagnosis on 47 DMNs based on hematoxylin and eosin (H&E) sections with demographic information. After submitting their diagnosis, the experts were given the same cases but this time with comprehensive genomic sequencing results and asked to render a diagnosis again. Results: Identification of desmoplastic melanoma (DM) improved by 7% and this difference was statistically significant ($p < 0.05$). Additionally, among the 15 melanoma cases, in the pre-genomic assessment only 12 were favored to be DM by the experts while after genomics this improved to 14 of the cases being favored to be DM. In fact, some cases resulting in metastatic disease had a substantial increase in the number of experts recognizing them as DM after genomics. The impact of the genomic findings was less dramatic among benign and intermediate grade desmoplastic tumors (BIDTs). Interobserver agreement also improved with the Fleiss multi-rater Kappa being 0.36 before genomics to 0.4 after genomics. Conclusion: NGS has the potential to improve diagnostic accuracy in the assessment of desmoplastic melanocytic tumors. The degree of improvement will be most substantial among pathologists with some background and experience in bioinformatics and melanoma genetics.

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CLINICAL AND TRANSLATIONAL RESEARCH

DERMATOLOGY

The Efficacy of Intense Pulsed Light and Laser Hair Removal in the Treatment of Hidradenitis Suppurativa

Background: Hidradenitis suppurativa (HS) is a multifactorial disease characterized by occlusion of hair follicles at apocrine gland-bearing sites and presents with a chronic cycle of inflammation, healing, and scarring, that elicits a profoundly negative impact on patient quality of life. Patients commonly develop painful, odorous dermal abscesses that evolve into chronic, draining sinus tracts and disfiguring scarring. While challenging to treat, systemic medications and surgical therapies have often shown to be effective for reducing lesion activity and inflammation, but sometimes only provide modest success in the prevention of future recurrences and disease progression, warranting adjunctive therapies, such as laser and light-based therapies.¹ Objective: Herein we performed a systematic review to assess the current level of evidence supporting intense pulsed light (IPL) and laser treatment for refractory HS, with a focus on pain reduction and decrease in the number of lesions with associated HS flares. Methods: GRADE assessments were performed using PubMed, with search terms including “hidradenitis suppurativa” OR “acne inversa” AND “laser” OR “hair removal” OR “epilation” OR “depilation.” Study selections were exclusive to randomized clinical trials (RCTs), retrospective studies, and case reports. Of 386 studies identified, 10 studies (n= 235) evaluated IPL or laser hair removal treatment and their effectiveness for reducing HS flares and associated pain. Results: Significant reductions in the overall count of inflammatory lesions were observed in all studies, with percentages ranging from 50% to 75%, and in some cases, achieving complete resolution. However, durations of disease remission varied. The chosen study designs predominantly included RCTs and produced similar clinical outcomes. Conclusion: These results provide a moderate-to-strong level of evidence supporting the effectiveness of IPL and laser hair removal as adjunctive therapy in the treatment of HS; however, further long-term studies are required to provide future guidance on the most effective treatment duration and intervals for sustaining disease clearance.

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CLINICAL AND TRANSLATIONAL RESEARCH

DERMATOLOGY

A comprehensive guide to the angiogenic niche during early acute skin inflammation using single-cell RNA sequencing

Background. Endothelial cell (EC) plays a leading role in angiogenesis during acute inflammation. However, an unbiased cellular signaling pathway of EC in the angiogenic niche has not been determined yet in vivo. In this study, we examined the transcriptional response of EC during early acute inflammation. **Methods.** Wound healing in wildtype C57 mice (n = 16) was assessed by 4x4 mm full-thickness dorsal skin punches among control, and 16, 36, 72 hours after inflammation. Skin samples were isolated by fluorescence-activated cell sorting and underwent single-cell RNA sequencing (10x Genomics). Cell clusters were identified by cellular markers and CellChat was used to analyze the communication network for EC. **Results.** EC mainly receives signals from neutrophil/monocyte, macrophage, and fibroblast from Vegf L-R interacting pairs. Also, in signals going towards EC, Spp1 ligand-receptor (L-R) pairs interaction from fibroblast was significantly involved. In the outgoing signals from EC, Lgals9-Cd44 was involved in various cell types including fibroblast, macrophage, and neutrophil/monocyte. In addition, Mif and Cxcl families were strong contributors to signals going from EC to neutrophil/monocyte and macrophage. **Conclusion.** During early acute inflammation, EC acts more as a receiver than a sender in the angiogenic network and the signals communicating EC gradually increases with time. In future studies, Vegf, Spp1, MIF, and CXCL signaling pathways need more in-depth investigation. Lgals9-Cd44 R-L pair interaction is worth experimental verification.

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CLINICAL AND TRANSLATIONAL RESEARCH

DERMATOLOGY

Topical Nanoencapsulated Cannabidiol Cream as an Innovative Strategy Combatting Ultraviolet A-Induced Nuclear and Mitochondrial DNA Injury: A Pilot Clinical Study

Background: Ultraviolet-A radiation (UVA) contributes to photoaging/ photocarcinogenesis by generating inflammation and oxidative damage. Current photoprotective strategies are limited by availability and utilization of UVA filters, highlighting an unmet need. Cannabidiol (CBD), having anti-inflammatory and antioxidant properties via regulation of NFR-2, HMOX1, and PPAR- γ activity, could potentially fill this gap and mitigate damage associated with UVA exposure. Methods: Prospective, single-center, randomized, split-buttock, double-blinded, pilot clinical trial (NCT05279495). Nineteen participants (23-64 YO, Fitzpatrick I-III) applied nano-CBD (nCBD) or vehicle (VC) cream to randomized, blinded buttock sites twice-daily for 14-days, then treated sites irradiated with $\approx 3\times$ their UVA minimal erythema dose. After 24-hours, punch biopsies were obtained for histology, immunohistochemistry, mitochondrial DNA real-time PCR. Results: At 24-hours, 21% of participants had less observed erythema on CBD-treated skin compared to VC. On histology, nCBD-treated samples had reduced UVA-induced epidermal hyperplasia compared to VC (11.3% change from baseline vs. 28.7%; $p=0.01$). Immunohistochemistry revealed reduced cytoplasmic and nuclear 8-oxo-guanine (for UV-induced DNA lesions) staining in nCBD-treated samples compared to VC ($p=0.009$). PCR of mtDNA demonstrated UVA-induced deletion of ND4 (proxy:4977bp deletion) was significantly reduced by nCBD treatment compared to VC ($p=0.003$) in the 7/19 subjects with identifiable ND4 deletion. UVA-induced ND1 deletion (proxy:3895bp deletion) was significantly reduced by nCBD treatment compared to VC ($p=0.002$) in the 8/19 subjects with identifiable ND1 deletion. Conclusion: Topically applied nCBD cream reduced UVA-induced formation of a frequent mutagenic nuclear DNA base lesion and protected against multiple types of mtDNA mutations. This trial is the first of its kind identifying the UV-protective capacity of CBD-containing topicals in humans.

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CLINICAL AND TRANSLATIONAL RESEARCH

DERMATOLOGY

Beyond the Skin: Unraveling the Intricacies of Leukocytoclastic Vasculitis with Systemic Manifestations

Leukocytoclastic vasculitis (LCV) is an immune-mediated small-vessel vasculitis with various underlying causes. We present a unique case of LCV in an elderly man to emphasize the importance of recognizing multi-organ signs associated with this rare pathology. Our patient presented with an evolving diffusely spread rash following upper respiratory symptoms accompanied by muscle weakness, hemoptysis, ocular manifestation, and hematuria. The patient's complex medical history featured focal segmental glomerulosclerosis (FSGS), hypertension, and a recent discontinuation of high-dose Prednisone. A comprehensive diagnostic approach, including skin biopsy, revealed LCV with eosinophilia. Treatment included systemic steroids, topical ointments, and prophylactic antibiotics and required a multidisciplinary approach involving dermatology, rheumatology, and nephrology. The patient showed gradual improvement and he was eventually discharged after nine days. Initially, differential diagnoses for the cause of the rash included infections, inflammatory processes, and autoimmune vasculitides such as IgA vasculitis, urticarial vasculitis, cryoglobulinemic vasculitis, and ANCA-associated vasculitides. While most instances of LCV are typically skin-limited and self-resolving, this case highlights how it can alternatively have diffuse systemic involvement requiring a broad diagnostic perspective.

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CLINICAL AND TRANSLATIONAL RESEARCH

DERMATOLOGY

A Brief Report on Poppers Dermatitis

Poppers dermatitis is a form of allergic contact dermatitis (ACD) and irritant contact dermatitis (ICD) caused by exposure to alkyl nitrite compounds contained in poppers, a drug commonly used in those who identify as men who have sex with men (MSM). The objective of this study is to collate and review case reports on poppers dermatitis to identify risk factors, clinical presentations, and management strategies. A literature search was conducted on PubMed, Google Scholar, and Scopus. Thirteen case reports met inclusion criteria and were extracted for analysis. Poppers dermatitis was most commonly seen in MSM between the ages of 23 and 56 who used poppers containing unspecified alkyl nitrite compounds. Clinical presentations of poppers dermatitis include erythematous, crusted, impetiginized, and vesicular lesions that most commonly appeared in the perinasal and perioral regions less than 24 hours after exposure. 36% of cases were diagnosed as ICD, 14% were ACD, 29% were unspecified contact dermatitis, 14% were both ACD and ICD, and 7% were a different form of contact dermatitis. A significant amount of ICD cases were attributed to poppers spillage events ($p < 0.001$). The most common management strategies included topical steroids and emollients. Poppers dermatitis has unique risk factors, clinical presentations, and management strategies which must be considered and discussed when treating MSM patients.

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CLINICAL AND TRANSLATIONAL RESEARCH

DERMATOLOGY

Clinical Management of Concurrent Vulvar Hidradenitis Suppurativa and Extraintestinal Crohn's Disease

Hidradenitis suppurativa (HS) is a chronic skin condition marked by recurring nodules, abscesses, and sinus tracts, typically affecting areas like the axillary, inguinal, and anogenital regions. Crohn's disease (CD) involves inflammation of the digestive tract and can manifest with extraintestinal symptoms such as sacroiliitis, uveitis, and cutaneous findings. Around 25% of patients develop extraintestinal symptoms before bowel disease onset, with CD commonly diagnosed between ages 15-30. The link between HS and CD was observed in the 1990s, supported by case reports noting similar pathologic features and genetic susceptibilities. This case presents a 20-year-old female with a complex medical history, initially presenting with labial draining furuncles and edema at age 12. Despite a previous suspicion of vulvar Crohn's disease, subsequent endoscopy revealed normal findings, leading to a diagnosis of vulvar Hidradenitis Suppurativa (HS). However, upon re-presentation five years later for management of HS, she exhibited rectal bleeding, perianal skin tags, general malaise, and significant weight loss, raising suspicion for concurrent inflammatory bowel disease (IBD). Despite normal endoscopic and colonoscopic biopsies, clinical manifestations suggested extraintestinal Crohn's disease, particularly in light of her known HS. Treatment with Infliximab initially showed improvement, but subsequent flare-ups and severe mood symptoms led to a change in therapy, including ertapenem, linezolid, and eventually ustekinumab. However, insurance issues halted ustekinumab treatment. The patient experienced numerous hospitalizations and required surgery at multiple sites, confirming cutaneous Crohn's disease near the clitoris. Management challenges included distinguishing perianal/vulvar Crohn's disease from active HS and treating both conditions simultaneously. The case underscores the importance of recognizing the potential co-existence of HS and CD, the difficulty in their clinical differentiation, and the necessity for prompt, tailored treatment to improve patient outcomes and quality of life. At a bare minimum, a strong relationship between the two is rather evident but certainly requires more research. Our case is instructive in not only the difficulty in distinguishing the two clinically, but in the importance of prompt recognition of the possibility that both entities can co-exist in the same patient. Further research is warranted to elucidate the relationship between these two conditions and optimize management strategies.

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CLINICAL AND TRANSLATIONAL RESEARCH

DERMATOLOGY

Evaluating Quality and Reliability of Most-Viewed #Spironolactone TikTok Videos

TikTok is a popular medium by which youth are exposed to diverse medical information, including a medication commonly prescribed for acne, spironolactone. Spironolactone is commonly used for hormonal acne in women and is both safe and well-tolerated. Hormonal acne, when severe, can be cystic, possibly resulting in post inflammatory hyperpigmentation and scarring. Given the wide viewership of TikTok videos created with the hashtag, #spironolactone, we evaluated the quality and reliability of these videos. A TikTok search was conducted on December 11, 2023 using the hashtag #spironolactone. At this time, videos linked to #spironolactone had 108.0 million views. The top 50 videos were retrieved from the “Top” tab. Two independent researchers viewed the videos and assigned scores using the modified DISCERN (mDISCERN) score and Global Quality Scale (GQS) criteria. The mDISCERN tool measures the reliability of health information and the GQS criteria evaluates the quality of health information. Both tools have a possible total score of 5, with a higher score indicating higher reliability or quality, respectively. Assigned scores were averaged for each video. Statistical analyses were conducted using one-way ANOVA and unpaired t-tests. Of all the videos, 39 were patient testimonials (78%), 10 were educational (20%), and 1 was a documentary (2%). Eight of the 10 educational videos were made by a physician. Average scores for all videos were 1/5 (SD=1) on the mDISCERN scale and 2/5 (SD=1) on the GQS scale. For reliability, average mDISCERN scores by video type were 3/5 (SD=1) for educational, 1/5 for documentary (SD=0), and 1/5 (SD=1) for patient testimonials. There was a significant difference in mDISCERN scores for testimonial videos compared to educational videos ($p<0.001$). For quality, average GQS scores by video type were 4/5 (SD=1) for educational, 2/5 (SD=1) for patient testimonials, and 1/5 (SD=0) for documentary. There was a significant difference in GQS scores for documentary videos ($p=0.0254$) and testimonial videos ($p<0.001$) compared to educational videos. Other than educational videos, which made up only 20% of content, the top 50 #spironolactone videos on TikTok had overall poor reliability and quality. Educational videos had the best quality and reliability, while patient testimonials had significantly lower quality and reliability. Given these results, it is critical for dermatologists to provide evidence-based information about the safety and efficacy of spironolactone to patients, while also gauging any impressions or misinformation based on social media.

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CLINICAL AND TRANSLATIONAL RESEARCH

DERMATOLOGY

Primary Hyperhidrosis and Sensitive Skin Syndrome: A National Pilot Survey

Introduction: Sensitive skin syndrome (SSS) is characterized by subjective cutaneous hyperreactivity to innocuous stimuli and affects approximately 50% of the US population. Early data suggests eccrine gland pathology and inappropriate activation of inflammatory mediators may contribute to SSS. Given primary hyperhidrosis (HH) is the most common disease of the eccrine gland, we sought to evaluate the frequency, quality, and location of SSS in this population. Methods: An IRB-exempt survey was disseminated by the International Hyperhidrosis Society to their membership. Statistical analysis was performed (GraphPad Prism). A predictive classification model for SSS was built using random forest machine-learning algorithms. Results: 38.19% (637/1668) of respondents suffered from primary HH. Of these, 89% self-reported SSS; 92% qualified as SSS via Sensitive Scale-10 scores (SS-10). 75% believe HH impacts their skin sensitivity. HH severity scores were significantly higher for SSS ($M=5.7/10$) than non-SSS ($M=4.9/10$; $p=0.0018$). SSS occurred frequently in body regions both affected and unaffected by HH: craniofacial HH frequently co-occurred with facial/axillary SSS; facial HH with axillary/plantar SSS; plantar HH with axillary/total body SSS; and axillary HH with facial/total body SSS. More severe primary HH was correlated with higher SS-10 scores ($p<0.0001$). Predictive modeling designated SS-10 scores as the most useful distinguishing feature for SSS. Conclusion: These data are the first to propose and support a relationship between SSS and HH; SSS occurred more frequently in this cohort than the general population even in areas unaffected by HH and/or sweat. While more research is needed, screening HH patients for SSS may be warranted.

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CLINICAL AND TRANSLATIONAL RESEARCH

DERMATOLOGY

The Efficacy of Apremilast Treatment in Patients with Psoriasis and Metabolic Abnormalities

Psoriasis is a chronic inflammatory dermatosis that affects over 60 million individuals globally and can significantly impact a patient's quality of life. Psoriasis presents with erythematous, sharply demarcated, scaly skin lesions that can cause pruritus, pain, and bleeding. Although psoriasis is primarily a dermatological condition, its immune-mediated pathogenesis generates systemic effects and is closely linked with comorbidities such as cardiovascular disease, metabolic syndrome, and diabetes mellitus. Apremilast, an oral phosphodiesterase 4 (PDE-4) inhibitor, shows promise in treating moderate to severe psoriasis and may offer cardiometabolic benefits. In a 12-month prospective observational study involving 137 patients with moderate to severe psoriasis, we assessed changes in psoriasis severity and cardiometabolic profiles from baseline (T0) to 52 weeks (T1) to evaluate the efficacy, safety, and tolerability of Apremilast in patients with associated cardiometabolic comorbidities. Clinical measurements included Psoriasis Area and Severity Index (PASI), Dermatology Life Quality Index (DLQI), Nail Area Psoriasis Severity Index Score (NAPSI), Itching Intensity on a Visual Analogue Scale (VAS), Tender Joint Count (TJC), Erythrocyte Sedimentation Rate (ESR), and C-reactive Protein (CRP). Apremilast demonstrated efficacy in reducing psoriatic disease severity, with a 75.2% reduction in PASI scores, supporting its role in psoriasis management. It also showed promise in modulating lipid profiles, particularly reducing cholesterol levels in patients with hypercholesterolemia, and exhibited positive responses in patients with hypertriglyceridemia and metabolic syndrome. Additionally, diabetic patients on insulin experienced decreased glycemic values. The treatment led to a statistically significant decrease in ESR and CRP, indicating reduced systemic inflammation. Subgroup analyses also suggested a potential synergistic effect between Apremilast and statins in reducing total cholesterol. Apremilast exhibited a favorable safety profile, with only 17 patients discontinuing treatment, primarily due to gastrointestinal symptoms. In conclusion, Apremilast demonstrated dual efficacy in managing psoriasis and improving metabolic comorbidities. These findings underscore the potential of Apremilast as a comprehensive treatment option for patients with psoriasis and associated risk factors. Although the results of our study must be validated on a larger scale, the use of Apremilast in the treatment of psoriatic patients with metabolic comorbidities yields promising results.

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CLINICAL AND TRANSLATIONAL RESEARCH

EMERGENCY MEDICINE

Evaluating Radiological Emergency Preparedness: A Survey of Emergency Medical Services Personnel in the Washington DC Metropolitan Area

Radiation exposure is slowly becoming a more probable threat to public health and safety. While nuclear power plant accidents are rare, they aren't improbable. More likely however, is the threat of radiological or nuclear terrorism. The Washington DC Metropolitan area faces both of these threats, as it is a probable target for any forms of terrorism, and is subsequently located approximately 50 miles from the Calvert Cliffs Nuclear Power Plant. Even though this poses a significant risk to the health and safety of those living in this area, little is known regarding the training and ability of emergency services to respond to such a disaster. One previous study (Rebmann et al., 2019) examined these questions for firefighters and EMS personnel in a midwestern greater metropolitan area, but no such study has been conducted in the DC Metropolitan area. The purpose of this study is therefore to examine the preparedness of EMS personnel to respond to a nuclear or radiological incident occurring in the DC Metropolitan Area. This will be assessed by surveying local EMS personnel regarding their knowledge and preparedness for these types of events.

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CLINICAL AND TRANSLATIONAL RESEARCH

EMERGENCY MEDICINE

A Retrospective Global Analysis of Weaponized Drone Attacks by Perpetrators Against Civilians and Critical Infrastructure

Background: Injuries due to drones have been increasing in incidence globally for the past few decades likely due to the increasing prevalence of drone use in global terrorism. Currently, little literature exists analyzing the impact of drone use and the magnitude of these attacks on injuries and mortality. The aim of this study is to analyze the epidemiology of drone attacks, and infrastructure being targeted by drones.

Methods: A retrospective analysis performed utilizing the Global Terrorism Database (GTD) from 1970 to 2020, a database created by the National Consortium for the Study of Terrorism and Responses to Terrorism (START). Data was searched using the GTD search function for all events where the primary term was “Drone”. The location and date of the attacks, weapon, attack types, perpetrators, country, number of injured, dead, and hostages were collected. Descriptive analysis was performed to report demographic information about drone attacks. Time series analysis with best fit curves was performed to assess the trends of the number of attacks, deaths, and injuries being reported over the period of time. Results: There were 178 drone attacks between 2016 to 2020, resulting in 109 deaths and 209 injuries with 172 attacks (97%) of these attacks involving explosives/bombing. Saudi Arabia (68, 38%), Iraq (46, 26%) and Yemen (41, 23%) were the top 3 affected countries. Most common targets included private citizens and properties (65, 37%) and military facilities (47, 26%). Trend analysis revealed an upward S-curve for annual drone attacks since 2016, starting at 7 (4%) and peaking in 2020 (63, 35%). Two deaths (2%) were in 2016 and peaked in 2017 (53, 49%) following a downward quadratic trend. Injuries were lowest in 2016 (2, 2%) and peaked in 2017 (53, 45%) with a similar downward trend. Conclusion: Analysis revealed an upward S-curve for drone attacks since 2016, peaking in 2020. Our findings underscore the importance of ongoing monitoring and analysis of drone-related incidents for effective prehospital and emergency response and to mitigate the impact of these attacks on public safety. Keywords: Drone injuries; global terrorism; terrorism; Drones

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CLINICAL AND TRANSLATIONAL RESEARCH

EMERGENCY MEDICINE

Vocal Biomarkers as a Screening Tool for Acute Myocardial Ischemia

About 5% of all emergency department (ED) visits are for chest pain. While emergency physicians are trained to rule out or identify high morbidity causes of chest pain, only about 5% of patients with chest pain have an acute life-threatening condition. Vocal biomarkers have previously been identified to detect voice, respiratory, and neurological disorders. Even minimal voice problems (i.e., not qualified to be a voice disorder) are detectable using measures of vocal instability, such as the fundamental frequency standard deviation (F0 SD) in prolonged vowel and cepstral peak prominence (CPP) in speech. The cardiac impact on voice can be attributed to systemic water retention, shared innervation, and proximity of nerves to associated anatomy. The purpose of this study is to investigate potential vocal biomarkers for myocardial infarction. We hypothesize that a vocal biomarker may be correlated with a patient's risk of a major adverse cardiac event like in the ED HEART score (history, ECG, age, risk factors and troponin) or EDACS score. We have 46 enrolled patients who presented to the ED with a chief complaint of chest pain and recorded vowel sounds, four sentences varying by phonetic types, and 30s of spontaneous speech. HEART and EDACS scores were calculated based on treating providers' clinical risk assessment. Using Praat, we obtained a voice report and calculated CPP for phonetically balanced sentences and F0 SD for vowel sounds. We followed up with patients six weeks later to identify major cardiac events during or after hospitalization. The average HEART score evaluating the risk of acute coronary syndrome was 3. From the analyzed voice recordings, we report statistically significant Spearman correlation coefficients of 0.3225 for initial troponin and sentence 2 CPP and 0.2986 for initial troponin and sentence 3 CPP. Preliminary analysis using Spearman coefficients show that only sentences 2 and 3, which have more voiced consonants than the other sentences, reveal a relationship between voice and initial troponin. The use of voice analysis has potential to improve current methods of evaluating chest pain and enhances existing risk stratification tools. Further analysis of the voice recordings is needed to determine other associations between vocal biomarkers and commonly used risk stratification measures. We will continue processing the recordings along with HEART and EDACS scores to identify potential relationships. Additionally, review of EKGs and timed chart abstractions will be completed along with machine learning to determine whether voice is a predictor of acute coronary syndrome.

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CLINICAL AND TRANSLATIONAL RESEARCH

EMERGENCY MEDICINE

Electrocardiogram Results in Youth Who Present to the Emergency Department with a Suicide Attempt by Intentional Self-Poisoning

Introduction: Suicide is the second leading cause of death among American youth ages 10-19 years. Emergency department (ED) visits for suicidality in pediatric patients have doubled over the past decade and are continuing to rise. Intentional self-poisoning is one common method by which youth and adolescents attempt suicide. When these patients present to the ED after an intentional self-poisoning, the evaluation often includes electrocardiogram (ECG) testing. Though there are some cases where the ECG may reveal an acute abnormality that requires intervention, it is often normal without any clinically significant findings, therefore the utility of routine ECG for all patients with an ingestion is unknown. **Objective:** The objective of this study is to describe ECG results in intentional self-poisoning patients where ECGs were obtained and determine whether these results led to interventions in the ED and what those interventions were. **Methods:** Data was collected by retrospective chart review from 616 patients who presented to a pediatric ED with a suicide attempt by intentional self-poisoning from March 2021 through March 2023. We report the final reads of the ECGs, as performed by the attending pediatric cardiologist, and reviewed the medication administration record and ED provider notes to determine if medications were given as a result of ECG findings. **Results:** 616 patients were included in this study. The patient population was 77% female, 13% male, and 10% Non-Binary/Non-conforming. 84% of the population spoke English as their primary language, and 16% spoke Spanish as their primary language. The average age of this population was 14.6 years old. 575 got an ECG, while 41 did not. Of those who got an ECG, 5% had sinus bradycardia, 76% had normal sinus rhythm, and 18% had sinus tachycardia. 82% had a normal QT interval, 7% had borderline QT prolongation, and 11% had a prolonged QT interval. 26 patients received an intervention (intravenous magnesium sulfate) for QT prolongation. 5 patients received intravenous sodium bicarbonate for QRS prolongation. **Conclusions:** While a subset of patients did require a medical intervention based on abnormal ECG findings, the vast majority of patients had a normal ECG or an abnormal result that did not require any specific intervention. Further study is required to determine which patients will benefit from an ECG, for example, by risk-stratifying based on the type of medication that was ingested or the patient's vital signs at presentation.

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CLINICAL AND TRANSLATIONAL RESEARCH

EMERGENCY MEDICINE

Cannabinoid Hyperemesis Syndrome and Health Care Utilization: A Cross-Sectional Survey Study

Background and Objectives: Cannabinoid Hyperemesis Syndrome (CHS) is a condition characterized by gastrointestinal distress in patients who are long-term regular consumers of cannabis. Due to the severity of the symptoms, CHS patients often receive extensive diagnostic testing and may require hospitalization for pain control, antiemetics and hydration. The prevalence of CHS is projected to increase as more people consume cannabis on a regular basis in the US. The objective of our study was to estimate the healthcare resource utilization among CHS patients. **Methods:** We performed an internet-based cross-sectional survey of adult cannabis users with a self-reported CHS diagnosis. Participant responses were collected using REDCap electronic data capture tools hosted at George Washington University School of Medicine and Health Sciences. The survey was distributed via posts in two private Facebook-based CHS awareness and support groups and the following CHS-focused subreddits: r/CHSline, r/CHSinfo, and r/cannabinoidhyperemesis. In addition, the survey was posted on Twitter (via the @cannabinoidhs account) and on the "drug research" discussion forum of Bluelight on-line drug forum. Participants were included if they were at least 18 years old and self-identified as having CHS. The purpose of this study was to estimate the percent of participants who required hospitalization, emergency department (ED) care, medical interventions such as intravenous (IV) fluids, and diagnostic testing such as a laboratory blood study, CT scan, ultrasound, upper endoscopy, or colonoscopy. **Results:** In our survey of adult cannabis users with a self-reported diagnosis of CHS, we analyzed 1475 participant responses collected between May 2023 and September 2023. Among all respondents, 83.9% required care in an ED setting and almost half (44.8%) reported staying overnight in a hospital at least once. The vast majority of respondents had received laboratory blood tests (84.3%) and IV fluids (80.9%). Respondents reported high rates of receiving a CT scan (63.7%), ultrasound (48.8%), upper endoscopy (45.3%), and colonoscopy (22.3%). **Conclusion:** In this internet-based cross-sectional study, participants with a self-reported CHS diagnosis were found to have a high rate of healthcare resource utilization. These results emphasize the personal and system-wide burden of CHS in the US and underline efforts to increase awareness of the syndrome among patients and healthcare practitioners.

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CLINICAL AND TRANSLATIONAL RESEARCH

EMERGENCY MEDICINE

Factors for a Clinical Prediction Score to Determine Complication Development After Cellulitis Diagnosis in Adult Patients

In Thailand, where cellulitis is a common infection that can progress to septicemia or necrotizing fasciitis if left untreated, approximately 7% of patients with cellulitis are hospitalized, with a mortality rate ranging from 1% to 2.5%.^{2,3} To address this, we aim to develop a clinical prediction score for hospitalized adult patients with cellulitis to allow for early recognition of patients with high risk and appropriate management strategies to further prevent bacteremia and its complications. This retrospective cohort study was conducted at a university-based tertiary care center in Bangkok, Thailand. All adult patients who were diagnosed with cellulitis between January 1, 2018 through December 31, 2022 and met study inclusion criteria were eligible. All related variables to be analyzed were collected from electronic medical records. Using STATA 16.1 for statistical analysis, we categorized patients by presence of complications, analyzed baseline characteristics, and compared group variables using t-tests and probability tests. Potential predictors were stratified via multivariable logistic regression analysis, whose efficacy was validated by the ROC curve and risk comparison. Patients were then assigned into low, moderate, and high-risk categories and further analyzed with calculated positive likelihood ratios and 95% confidence intervals. Among the 1,560 eligible patients, there were 47 reported cases with at least one complication, consisting of 27 visits with septicemia (6.68%) and 20 visits with necrotizing fasciitis (1.27%) during the 5-year study period. Based on the multivariable logistic regression analysis, six predictors of complication development following diagnosis of cellulitis were determined to be age = 65 years, Body Mass Index = 30 kg/m², diabetes mellitus, body temperature = 37.3°C, systolic blood pressure < 100 mmHg, and involvement of lower extremities. These clinical factors were utilized to develop the predictive score named Ramathibodi Necrotizing Fasciitis/ Septicemia (RAMA-NFS), with an accuracy of 82.3% (95% CI, 0.77-0.88). The predictive scores were categorized into three groups: low risk (score < 4), moderate risk (score 4-6), and high risk (score > 6). Patients in the high risk group have a likelihood ratio of 3.7 times for complication development. Our findings demonstrate that by considering a combination of clinical factors, the RAMA-NFS Prediction Score can be utilized to predict the likelihood of complications arising from cellulitis. This information can be valuable in assisting physicians with their clinical decision-making. However, further external validation is needed to evaluate the predictive score model's application in other clinical settings.

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CLINICAL AND TRANSLATIONAL RESEARCH

GASTROENTEROLOGY

Navigating Serrated Polyposis Syndrome: The Role of Personalized Surveillance

Serrated Polyposis Syndrome (SPS) is a condition characterized by multiple serrated polyps in the colon, leading to an increased risk of colorectal cancer (CRC). We present the case of a young woman with SPS who underwent a surveillance colonoscopy, revealing numerous sessile serrated adenomas and a hyperplastic polyp. SPS patients face approximately a 20% risk of developing CRC, and personalized surveillance strategies are crucial for managing this risk effectively. The guidelines recommend attempted removal of polyps >5 mm and surveillance colonoscopies every 1-3 years based on polyp characteristics and other risk factors. A personalized approach considering polyp burden, molecular pathology, and family history is essential. Ongoing research is needed to refine surveillance intervals and improve patient outcomes in SPS cases.

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CLINICAL AND TRANSLATIONAL RESEARCH

GASTROENTEROLOGY

Complete Resolution of Liver Injury from Autoimmune Hepatitis after Control of Secondary Syphilis in A Chronic HIV Patient

Autoimmune hepatitis (AIH) is a chronic inflammatory disorder of the liver due to a break in tolerance of hepatocyte autoantigens. We present a middle-aged male who came to our hospital with abdominal pain and was diagnosed with human immunodeficiency virus (HIV) and AIH secondary to syphilis. Laboratory investigations showed elevated AST, ALT, and alkaline phosphatase (AlkP) with high HIV viral load and a positive rapid plasma reagin (RPR) test. Antibiotics and combination antiretroviral therapy (cART) were initiated and liver enzymes completely normalized. This case investigates the interplay of chronic HIV infection and secondary syphilis and the resolution of AIH following the antibiotic treatment of syphilis.

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CLINICAL AND TRANSLATIONAL RESEARCH

GASTROENTEROLOGY

Plavix Induced Liver Injury Case Report

Clopidogrel, trade name Plavix, is rarely associated with cases of drug induced liver injury. A high degree of suspicion for drug-induced liver injury and prompt ruling out of other etiologies of hepatic injury with history and laboratory findings is necessary for diagnosis.

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CLINICAL AND TRANSLATIONAL RESEARCH

GASTROENTEROLOGY

A Single-institution Experience of Small Intestine Adenoma and Adenocarcinoma

Background: Small intestine tumors account for 3% of gastrointestinal tumors in the United States. Among malignant small intestine tumors, adenocarcinoma comprise approximately 40% of cases. Despite low prevalence, the prognosis of small intestine adenocarcinoma (SIAC) is poor, with a 5-year survival rate of 13-44% and increasing incidence. Adenomas in the small intestine (SA), though rarer than those in the colon, are thought to follow similar potential progression to adenocarcinoma. Associations between patient characteristics, risk factors and clinical outcomes of SIAC patients have not been well-studied. Here, we report a single-center experience of SIAC and SA. Methods: A retrospective chart review was conducted of patients from the George Washington University Hospital with pathology-confirmed adenocarcinoma or adenoma arising from the small intestine between 2013-2023. Pathology reports were used to obtain tumor features and to detail localization in the small intestine. Results: For SIAC and SA, the median age of diagnosis was 69 and 63 years, respectively. SIAC patients were 60% male and 55% Black. The most common primary tumor site was the duodenum, with 14/20 (70%) cases for SIAC and 50/52 (96%) cases for SA. 35% of patients with SIAC had metastatic disease and 55% had lymphovascular invasion. Median overall survival for SIAC was 0.88 years. Adjusted for age, patients with Stage 4 disease had lower median survival compared to patients with Stage 3 disease or lower ($p=0.021$). Body mass index (BMI) ≥ 30 was associated with Stage 3 or greater disease ($p=0.01$). Compared to those with normal CEA, patients with elevated CEA ($>3\text{ng/ml}$) had lower median survival (0.9 vs 3.5 years; $p=0.008$). Female patients with SIAC had lower survival compared to male patients (0.5 vs 2.7 years; non-significant). Compared to White patients, Black patients with SIAC had lower median survival (0.88 vs 1.95 years; non-significant). Black patients had higher median CEA levels compared to Whites (11.9 vs 1.34; $p=0.034$). There was no significant difference in adjuvant chemotherapy or radiotherapy use between White and Black patients ($p=0.5$). Conclusions: SIAC in our cohort was associated with low overall median survival, with worse outcomes for patients with Stage 4 disease. Increased body mass has been previously implicated in SIAC risk, and we observed a novel association of increased BMI with more advanced SIAC stages. A potential racial disparity on survival and CEA levels were observed between Black and White patients, suggesting the need for future studies with larger sample sizes to confirm these findings.

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CLINICAL AND TRANSLATIONAL RESEARCH

GASTROENTEROLOGY

Real-world experience with ustekinumab in children and young adults with Crohn's Disease: a single center retrospective study

Ustekinumab, a fully-humanized monoclonal antibody targeting interleukins 12 and 23, has shown efficacy in adult inflammatory bowel disease (IBD). However, its application in pediatric IBD remains relatively unexplored, with evolving literature in this area. Thus, this study aims to evaluate the outcomes of ustekinumab treatment in pediatric Crohn's disease patients. Methods: A retrospective observational cohort study was conducted, reviewing charts of pediatric Crohn's patients treated with ustekinumab at a tertiary pediatric hospital between 2016 and 2022. Patients meeting inclusion criteria had Crohn's disease and initiated ustekinumab within this timeframe. Patients were excluded if they had <6 months follow-up after starting ustekinumab. Paired samples t-test and chi-square analysis were used for statistical comparisons. Data was analyzed with the open-source statistical software Jamovi. Results: Fifty-five patients were included, with demographics showing 60% female, 58% white, and 35% black. Most had ileocolonic disease (76%) and a non-stricturing, non-penetrating phenotype (56%). At ustekinumab initiation, 85% of patients had Pediatric Crohn's Disease Activity Index (PCDAI) scores available, with varied disease severity. At 6 months, 50 patients (91%) remained on ustekinumab, with few discontinuations due to adverse effects (n=2), lack of response (n=1), or insurance delays (n=2). Laboratory parameters and PCDAI scores remained stable over this period. Twelve patients (22%) underwent Crohn's-related bowel surgery post-ustekinumab initiation. Median follow-up was 28 months, with 84% of patients still on ustekinumab. Frequency escalation, often every 4 weeks, was common for maintaining clinical benefit. Steroid use remained steady, with no significant change observed. At the time of the last follow-up visit, Physician Global Assessment (PGA) was available for 31 out of 55 (56%). In these 31 patients, PGA at the last visit corresponded to quiescent disease in 11 (36%), mild disease in 10 (32.3%), moderate disease in 6 (19.4%), and severe disease in 4 (12.9%). Conclusion: In this small retrospective cohort of adolescents and young adults with long-standing Crohn's disease who were previously exposed to biologics and immunomodulators, ustekinumab therapy did not affect short-term health as measured by PCDAI. Furthermore, steroid use did not significantly decrease at 6 months post-ustekinumab initiation, or at the last followup. However, compared to the baseline, patients who remained on ustekinumab at the last follow-up, had higher rates of steroid-free remission. After initiation of ustekinumab therapy, most patients remained on the medication long-term. However, almost two-thirds of these patients required frequency escalation, most commonly, every 4 weeks in order to maintain clinical benefit.

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CLINICAL AND TRANSLATIONAL RESEARCH

GASTROENTEROLOGY

Consequences of a Warming Climate: A Case of Heat Stroke-Induced Acute Liver Failure

A rise in global temperatures is intensifying already high temperatures on heat islands. Many urban areas are identified as heat islands due to increasing population densities and decreasing natural land area. Between 2030 and 2050, the health effects of extreme weather conditions and prolonged heat due to climate change are expected to cause approximately 250,000 additional deaths per year. Complications of extreme heat, including neurological dysfunction and multiorgan failure can be life-threatening. Hepatic involvement is common, with disease severity ranging from asymptomatic elevations in liver enzymes to acute fulminant liver failure in previously healthy patients. Therapeutic management is first via supportive care, with liver transplant as a last-resort intervention in patients with poor return of hepatic function and rapid clinical deterioration refractory to conservative measures. A 30-year-old previously healthy half-marathon runner with no significant medical history was transferred from an outside hospital after suffering exertional heat stroke during extreme heat conditions, complicated by seizure and altered mental status. The patient was also found to have acute kidney injury and rhabdomyolysis, with progression to acute liver failure. She had no personal or family history of liver disease, medication use, or heavy alcohol use. On initial presentation, the patient was hemodynamically unstable, with a temperature of 105 degrees Fahrenheit and a heart rate above 150. Liver enzymes were elevated with a total bilirubin 5.1, alkaline phosphatase (ALP) 82, aspartate aminotransferase (AST) 7,092, alanine aminotransferase (ALT) 7,950, and international normalized ratio (INR) 2.95. During her course, liver enzymes reached peak bilirubin 7.5, ALP 94, AST 11,274, ALT 12,873, and INR 4.43. Creatinine peaked at 1.9, and creatinine kinase peaked at 2,325. This patient's severe presentation prompted expedited evaluation for liver transplantation, and she was listed as status 1 for liver transplant. She was managed primarily with supportive care and N-acetylcysteine infusion. Five days after the initial insult, there was a significant clinical improvement with a downtrend in liver enzymes, resolution of hepatic encephalopathy, and improvement in INR. Our patient no longer needed a liver transplant. She was discharged home with hepatology follow-up. This case demonstrates the multifaceted approach to managing acute liver failure and the complexity of the decision-making process for transplant. While the timeline and criteria for liver transplant in acute liver failure have been ambiguous for years, the management of this case supports the 2023 guidelines for the management of acute liver failure to optimize survival outcomes.

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CLINICAL AND TRANSLATIONAL RESEARCH

IMMUNOLOGY

Hypereosinophilic syndrome: an atypical initial presentation with exclusive gastrointestinal involvement in a patient with asthma

Hypereosinophilic syndrome (HES) comprises of a rare group of heterogeneous myeloproliferative disorders defined by marked peripheral eosinophilia ($> 1.5 \times 10^9/L$ for ≥ 1 month) with evidence of organ dysfunction and without any identifiable secondary etiology (including allergic, parasitic, or malignant causes). Estimated prevalence of HES is between 0.3 and 6.3 cases per 100,000 people or approximately 5000 patients in the US, and often presents in males between ages 20-50. Clinical symptoms range widely and include rashes, fever, fatigue, cough, dyspnea, and myalgias. Organ systems commonly involved include the skin, cardiac, pulmonary, gastrointestinal, and nervous systems. In this rare case study, a 77 year old male with a past medical history of CAD, HTN, DMII, HFrEF, OSA, chronic rhinosinusitis, and asthma presented with one week of nausea, abdominal discomfort, and anorexia-an uncommon initial presentation of HES. The patient noted that he had lost his sense of taste and lost seven pounds in one week, but denied vomiting, shortness of breath, chest pain, fevers/chills, diarrhea, or recent illnesses. Eosinophil count was increased at 5600 (46.2%), and previous labs months prior indicated that the patient previously had mildly elevated eosinophils (2000). Troponin level was increased at .57 and BNP at 4500+, with concern for potential eosinophilic myocarditis as this is a major cause of morbidity/mortality in this population of patients; however, EKG demonstrated sinus rhythm with RBBB and T wave inversion in V5-V6 that improved. Peripheral blood smear was positive for eosinophilia, with normal RBCs and adequate platelets, and did not demonstrate evidence of blasts. In addition, strongyloides IgG was negative, ANCA screen was negative, serum tryptase elevated at 17.4 mcg/L, and B12 elevated at 1309 mg/mL. Patient remained hemodynamically stable throughout hospitalization and did not receive corticosteroids, which is the mainstay treatment of HES. In this case, our patient was discharged after clinically improving within three days and planned to follow up with hematology outpatient for additional labs/bone marrow biopsy. This clinical case highlights the variability of initial presenting symptoms for patients with HES, particularly as dermatologic (eczema, urticaria, angioedema, etc.) or pulmonary (dyspnea, cough, wheezing, etc.) manifestations are most commonly noted, and the diagnostic challenges that follow. Current literature in this topic is limited due to its rare occurrence, and this is a unique and noteworthy case of idiopathic HES with an initial presentation of exclusive gastrointestinal involvement.

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CLINICAL AND TRANSLATIONAL RESEARCH

IMMUNOLOGY

Characterizing the Effect of JAK Inhibition on CMV Virus-Specific T-cell Function

Background: Adoptive immunotherapy using donor-derived virus-specific T-cells (VSTs) in the setting of hematopoietic stem cell transplant (HSCT) has shown efficacy in reducing infectious complications in several Phase 1 and 2 trials. However, graft-versus-host disease (GVHD) remains a frequent comorbidity in recipients of HSCT, requiring the use of immunosuppressive therapy. JAK inhibitors such as ruxolitinib are a class of immunomodulators that suppress interferon and interleukin signaling to treat GVHD, but studies have shown frequent CMV and EBV reactivation, presenting a tradeoff between immunity against viral infections and the prevention and treatment of GVHD. Objective: The impact of JAK inhibition on VSTs is not well-defined, and this study aimed to assess the cell-mediated immune response of CMV VSTs exposed to ruxolitinib. Methods/Design: CMV VSTs were generated from peripheral blood mononuclear cells isolated from a CMV seropositive donor via a micro expansion protocol. Antigen specificity was achieved by pulsing antigen-presenting cells with overlapping peptide libraries for CMV antigens pp65 and IE1, followed by a 10-day incubation with IL-2, IL-4, and IL-7. Cells were expanded in increasing concentrations of ruxolitinib, with normal growth media and DMSO serving as negative controls. CMV-specific cytotoxicity was assessed using IFN- γ Eli-Spot stimulated with actin, SEB, pp65, and IE1. Immunophenotype and function was evaluated using flow cytometry identifying cell surface markers and IFN- γ /TNF- α CMV-specific T-cells. Prior to flow cytometry, VSTs exposed to ruxolitinib were split into their respective ruxolitinib concentrations and complete growth medium without ruxolitinib. Results/Discussion: Cell proliferation in the presence of ruxolitinib was significantly impaired at concentrations higher than 100 nM. EliSpot analysis showed CMV-specificity at concentrations between 10 nM and 100 nM, with reduced IFN- γ expression at higher concentrations. Flow cytometry analysis showed limited CD8+ cell proliferation. IFN- γ /TNF- α CD4+ T-cells were less predominant at higher concentrations of ruxolitinib. Analysis of memory cell phenotypes showed increased prevalence of naïve T-cells (CD45RO-/CCR7+) in both CD4+ and CD8+ cells. In concordance with the mechanism of action of ruxolitinib, VST expansion, differentiation, and function is impaired with reduced JAK-STAT mediated cytokine signaling. The increased incidence of infectious complications observed with ruxolitinib for GVHD could possibly be attributed to diminished CD4+ Th1 cell activity.

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CLINICAL AND TRANSLATIONAL RESEARCH

INFECTIOUS DISEASE

Clinical Utility of Fungal Blood Cultures for Diagnosis of Candidemia

Background: Candidemia is the most common invasive fungal infection in hospitalized children, and the third most common cause of pediatric nosocomial bloodstream infections. The gold standard for diagnosis of *Candida* bloodstream infections is with blood cultures, and clinicians can order aerobic or fungal blood cultures when suspecting fungemia. Objective: The objective of this study is to investigate the additional utility of fungal blood cultures (in addition to aerobic blood cultures) for detecting *Candida* bloodstream infections. Methods/Design: This retrospective cohort study analyzed all patients < 21 years of age, admitted to Children's National Hospital between January 1, 2010, and December 31, 2020, and had a positive fungal blood culture (using BHI-CG plates) for *Candida* species on day 1 of fungemia. Demographic data, *Candida* species, the concomitant positive aerobic blood cultures (using the bioMérieux BACT/ALERT blood culture system) were collected from the electronic health records through chart review. The time to detection of positive blood cultures was calculated for the fungal and aerobic blood cultures drawn on day 1 of fungemia. P-value < 0.05 was considered statistically significant. Results: Thirty-one episodes of *Candida* fungemia were included in this study, of which 28 episodes had an aerobic blood culture drawn on day 1 of fungemia that was positive for *Candida* species. All 31 episodes had an aerobic blood culture positive for *Candida* species within the duration of fungemia. The mean age of patients was 5.7 ± 6.0 years with mean duration of admission of 67.1 ± 79.6 days. *C. parapsilosis/guilliermondii* was the most frequently identified *Candida* species (15), followed by *C. albicans* (10), *C. lusitanae* (*Clavispora lusitanae*) (2), *C. tropicalis* (1), *C. krusei* (*Pichia kudriavzevii*) (1). There were two episodes of mixed *Candida* species. The mean time to positivity for aerobic blood cultures and fungal blood cultures were 26.4 ± 11.7 hours and 76.2 ± 29.6 hours, respectively ($p < 0.001$). Conclusion: All episodes of *Candida* species that grew on fungal cultures also had at least one aerobic culture positive for *Candida* species within the duration of fungemia. Aerobic blood cultures had a statistically significant shorter time to positivity for *Candida* than fungal blood cultures.

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CLINICAL AND TRANSLATIONAL RESEARCH

INFECTIOUS DISEASE

A Rare Case of Hemophagocytic Lymphohistiocytosis (HLH)-like Reaction following Ehrlichiosis

Introduction: Hemophagocytic lymphohistiocytosis (HLH) is a hematologic syndrome characterized by overactivation of the immune system resulting in widespread inflammation and decreased activation of regulatory pathways. Primary HLH often presents in pediatrics and is associated with inherited immunodeficiencies and genetic disorders. Secondary HLH is triggered by an underlying event such as infection, autoimmune stimulus, or malignancy. Case Presentation: A 50-year-old man with history of CNS vasculitis, cerebrovascular accidents, West Nile Virus, dyslipidemia, type 2 diabetes mellitus presented with fatigue and petechial purpura eruption on proximal extremities and abdomen for several days. He had been on chronic prednisone taper for several months and taking azathioprine, which was increased 2 months prior to admission. Vital signs on admission were T 36.5, BP 106/70, HR 94, RR 18, SpO2 95 on oxygen. Physical exam revealed petechiae throughout upper thighs and lower abdomen with erythema of chest and upper back. Patient was oriented to self and place, not time. Labs included WBC 3.61 x103/mcL, RBC 3.73 x 106/mcL, Platelets 71 x 103/mcL, Ferritin >10k ng/mL, Haptoglobin 235 mg/dL, CRP 73.7 mg/L, LD 1814 u/L, Fibrinogen 121 mg/dL, PT 12.2 sec, INR 1.09, Triglycerides 338 mg/dL, AST 219 u/L, ALT 66 u/L. Ehrlichia chaffeensis was detected on serology. Abdominal ultrasound was negative for splenomegaly. Head CT showed no acute masses, hemorrhages, or infarcts. Bone marrow biopsy showed mild hemophagocytosis. Patient was empirically covered with Doxycycline starting from day of admission and continued for ten days. Discussion: This patient's initial presentation enticed a wide differential including tick-borne illness, viral illness, vasculitis flare, HLH, myelodysplastic syndrome, and malignancy. Positive Ehrlichiosis serology with elevated triglycerides, elevated ferritin, and hypofibrinogenemia made HLH a more likely diagnosis. The Histiocyte Society for HLH established a diagnostic criteria in 2004, five of which must be met for the diagnosis of HLH. While our patient met 4 of the 9 criteria, the lack of additional symptoms could have been due to early initiation of Doxycycline. Late initiation of Doxycycline, considered 8 days following symptom onset, has been associated with increased morbidity and mortality. Additionally, chronic steroid use can lead to immunosuppression, increased risk of infection, and limited immune system activation. A limited number of cases describe HLH in the setting of ehrlichiosis. Identified patients vary widely in age and clinical presentations. Understanding the differences in presentations of Ehrlichiosis-induced HLH is crucial to early diagnosis, timely activation of consultation teams, and initiation of treatment.

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CLINICAL AND TRANSLATIONAL RESEARCH

INFECTIOUS DISEASE

Admission Point of Care Testing for the Clinical Care of Children with Cerebral Malaria

Point of care testing (PoCT) is an alternative to laboratory-based testing which may be useful in the acute management of pediatric cerebral malarial (CM) in resource-limited settings. This retrospective study evaluates the use of PoCT in a cohort of 193 Malawian children treated for WHO-defined CM between March 2019 and May 2023. We assessed the frequency of abnormal PoCT results as well as the clinical interventions taken to address these abnormalities. In addition, we evaluated the relationship between abnormal results and patient outcomes. Overall, 53.6% of all PoCT results were abnormal. Clinical interventions based on abnormal results occurred in 15.1% of cases and were most likely to occur with abnormal PoCT potassium (32.1%), lactate (22.0%), creatinine (16.3%), and glucose (9.8%) results. Patients with hyperlactatemia and hypocalcemia, as determined by PoCT, were at greater risk of mortality. High rates of abnormal PoCT values and relatively low intervention rates suggest that future research is needed to determine how PoCT can guide clinical decision-making to improve patient outcomes.

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CLINICAL AND TRANSLATIONAL RESEARCH

INTEGRATIVE MEDICINE

The Microbiota-Gut-Brain Axis in Mild Cognitive Impairment and Alzheimer's Disease

Alzheimer's disease (AD) poses a rapidly escalating neurological threat to public health in the United States and worldwide. This study addresses the current gap in knowledge regarding the potential role of intestinal microbiome in AD, a burgeoning field of research with promising implications for understanding and managing this condition. The primary objective of this project is to investigate the composition and diversity of the intestinal microbiome in individuals with early AD, mild cognitive impairment (MCI) and healthy controls, particularly following lifestyle modifications. Through this ongoing observational study, paired with a scoping review as well as a microbial profiling, we aim to establish a dose-dependent relationship, providing insights that could reshape prevention and treatment strategies for AD and related dementias. This research holds promise in contributing to the imperative need for effective solutions to combat the escalating global health crisis presented by the aging population susceptible to AD.

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CLINICAL AND TRANSLATIONAL RESEARCH

INTEGRATIVE MEDICINE

An Innovative Approach to Alleviating Fatigue in Metastatic Breast Cancer Patients

Background: Metastatic breast cancer (MBC) presents significant symptom challenges for patients with advanced cancer. Fatigue, co-existing with pain and sleep disturbance, is one of the most debilitating. Current interventions often involve exercise, which can be difficult to achieve, or medication, adding to the patient's symptom management burden. This study explores the potential of the Apollo Wearable® device, a non-pharmacological intervention delivering vibratory sensation to mitigate fatigue in MBC patients. Methods: In an 8-week pre and post single-arm trial, 27 female MBC patients experiencing fatigue used the Apollo Wearable® device. Primary endpoints included PROMIS-Fatigue and Functional Assessment of Cancer Therapy Fatigue (FACIT-F) scores to measure quality of life. Secondary endpoints were comprised of PROMIS pain interference, PROMIS sleep disturbance, and the Hospital Anxiety and Depressional Scale. Data were collected at baseline, 4 weeks, and 8 weeks. Results: Significant improvements were observed in PROMIS-Fatigue and Functional Assessment of Cancer Therapy Fatigue (FACT-F) scores from baseline to 4 and 8 weeks. The PROMIS pain scale showed significant differences among time points. No serious adverse events were reported. Discussion: Cancer-related fatigue, often co-occurring with pain and sleep disturbances, adversely affects quality of life. The Apollo device's non-invasive nature and positive results offer a promising alternative to pharmacological interventions. Conclusion: The Apollo device shows promise in alleviating fatigue in MBC patients. Larger randomized trials are needed to confirm its efficacy as well as its effect on co-occurring symptoms.

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CLINICAL AND TRANSLATIONAL RESEARCH

INTEGRATIVE MEDICINE

Brain Health & the Microbiome: A Proof-of-Concept Study in Patients with Mild Cognitive Impairment

Alzheimer's disease (AD) poses a rapidly escalating neurological threat to public health in the United States and worldwide. The purpose of the Brain Health and the Microbiome study is to address the current knowledge gap regarding the intestinal microbiome's potential role in AD, a burgeoning field of research with promising implications for understanding and managing this condition. This pilot study is comprised of two parts - a scoping review through Covidence to assess the current literature on the relationship between the intestinal microbiome and AD, and a clinical study that examines the gut microbiomes of individuals with early AD, MCI, and healthy controls to document how microbiomes may be altered following lifestyle changes—how diet, physical activity, and other health behaviors affect the microbes in the digestive tract. We have thus far evaluated sixty studies assessing the relationship between the intestinal microbiome and AD following lifestyle changes abiding by PRISMA guidelines. We found a total of 3224 articles that were screened against title and abstract and 1024 studies were screened against full-text review. Only sixty articles qualified for inclusion after full-text review. Our inclusion criteria involved original research, systematic reviews, and meta-analyses providing data on the relationship between the intestinal microbiome and AD/MCI in humans. Conclusions from our data extraction and clinical study are yet to be finalized as they are still in progress, however, we hope to report on trends identified in the related literature that coincide with our real-time clinical study.

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CLINICAL AND TRANSLATIONAL RESEARCH

INTEGRATIVE MEDICINE

Immunometabolic molecular biomarker pattern defines Metabolic Syndrome Phenotype

Visceral fat and related low-grade inflammation are driving forces in the Metabolic syndrome (MetS), which encompasses a cluster of pathophysiological conditions increasing cardiovascular risk and Type 2 Diabetes, and contributing to comorbidities, like nonalcoholic fatty liver disease, chronic kidney disease, rheumatic diseases, obstructive sleep apnea, and depression. Individuals with MetS have altered circulating cytokine profiles, immune cell infiltration into tissues, and activation of inflammatory pathways within tissues parenchyma spreading pathogenic effects of metabolic inflammation. In this prospective observational study, we analyzed the intricate links between metabolic and immunoinflammatory molecular mediators in patients with MetS, with the aim of identifying specific immunometabolic patterns associated to the clinical pathophysiology of these patients. We measured the concentration of a panel of well-known plasmatic proteins associated with obese's metabolic disorders (Leptin, total amylin, adiponectin, GIP, GLP-1, PYY, Resistin, Ghrelin, NGF, total PAI-1) in combination with another panel of immunoinflammatory cytokines associated to organ damage in same patients (lipocalin/NGAL, active MCP-1, TNF-alpha, IL-6, IL-10, IL-13, IL-17, IL-23, IL-27, IL-33). Results showed that immunometabolic biomarkers divided MetS patients (n= 75) into three subgroups, with high (n= 29), normal (n= 40) and low (n=6) blood levels of immunoregulatory cytokines (IL-10, IL-13, IL-17, IL-23, IL-27, and IL-33). Interestingly, patients with lower blood levels of these cytokines had higher levels of GLP-1, Ghrelin, PPY, IL-6, TNF-alpha and NGF. In addition, patients with higher blood levels of immunoregulatory cytokines had lower levels of Adiponectin, Leptin, GIP, PAI-1, Resistin and lipocalin/NGAL. And those patients with higher blood levels of Adiponectin, Leptin, GIP, PAI-1, Resistin and lipocalin/NGAL had lower levels of GLP-1, Ghrelin, PPY, IL-6, TNF-alpha and NGF. This molecular biomarker analysis sorted patients with MetS in three subgroups with distinct immunometabolic patterns. In turn, patient subgroups also clustered studied immunometabolic biomarkers in three subgroups, with a remarkable inverse correlation between immunoregulatory cytokines and GLP-1-Ghrelin-PPY-IL-6-TNF- alpha-NGF in some patients; and an additional inverse correlation between Adiponectin-Leptin-GIP-PAI-1-Resistin-lipocalin/NGAL and GLP-1-Ghrelin-PPY-IL-6- TNF-alpha-NGF in other patients. This study demonstrates that immunometabolic factor interplay defines the MetS subtype, and further supports the contribution of immunoinflammatory mediators to regulation of most relevant metabolic factors in these patients.

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

Characterizing Febrile Seizures, Thermoregulation, and likely Functional Deficits in Gabrg2+/Q390X, a mouse model recapitulating Dravet Syndrome

Background Dravet Syndrome is a severe form of epilepsy characterized by intractable seizures beginning in early childhood, increased seizure susceptibility at elevated body temperature, and a variety of other cognitive-behavioral, sequelae (Wirrell, 2017). One implicated mutation in Dravet Syndrome is located on the GABRG2 gene, and the corresponding mouse model (Gabrg2+/Q390X) was found to recapitulate many of the classic symptoms seen in clinical cases (Warner et al., 2017). By mapping the relationships between body temperature and seizure severity, as well as total seizures as a function of body temperature, this study defined new insights about the symptomology stemming from the y2(Q390X) mutation. Method EEG and EMG recordings were obtained from 16 Gabrg2+/Q390X knock-in mice. Core body temperature was also obtained using a rectal probe. A heat lamp was used to apply a constant amount of heat to elevate the core body temperature of the mice to a maximum of 42.5°C. Once at this peak temperature, the heat lamp was switched off, and the mouse was allowed to cool back down to resting body temperature. The EEG recordings were then analyzed and scored, noting the quantity and duration of individual seizure events such as myoclonic jerks, absence seizures, spike-and-wave discharges, and generalized tonic-clonic seizures. 36 mice underwent a variety of well-established behavioral tests to characterize the behavioral symptoms associated with Dravet Syndrome. These behavioral tests included anxiety tests (Elevated Zero Maze and Open Field Test) as well as cognition tests (Contextual Fear Test). Results Gabrg2+/Q390X mice showed altered thermoregulation, anxiety-like behaviors, and decreased locomotion. Elevation of body temperature beyond a particular threshold produced a sharp increase in seizure activity - encompassing myoclonic jerks, absence seizures, and generalized tonic-clonic seizures. A temporal lag was observed between the breach of this temperature threshold and the onset of aggressive seizure activity. Finally, there was increased mortality of the mutant mice. Conclusion The results study demonstrate that the Q390X nonsense mutation alone is sufficient to induce greater thermal susceptibility to seizure activity, impairment of thermoregulation, and anxiety-like behaviors. The results describe a possible window of opportunity for intervention, which makes this study unique. The findings show that there may be some benefit to modifying timing-till-intervention and amount of therapy administered in an acute episode. It is essential to further elucidate the many branches of pathology that accompany Dravet Syndrome to develop effective, personalized treatment options.

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

Electroencephalography Differentiates the Microbiologic Etiology of Febrile Coma in Malawian Children

Background: Neuro-infections caused by bacteria, viruses, or parasites remain a global health problem. In endemic areas, cerebral malaria (CM) is a leading neuroinfectious disease. In patients presenting with febrile coma previously exposed to malaria, there may be diagnostic uncertainty of the illness's microbiological etiology due to overlap in clinical and laboratory features of neuro-infections. In non-immune travelers to malaria endemic areas or people living in areas with low malaria transmission rates, this may be especially problematic as the coma and fever of CM may occur before blood smears or malaria rapid diagnostic tests become positive. Validating non-laboratory biomarkers associated with the microbiological etiology of neuro-infections may aid clinicians in the care of febrile coma. **Methods:** We evaluated whether electroencephalogram (EEG) is a valid biomarker to differentiate the microbiological etiology of febrile coma in African children. We compared results of qualitative and quantitative EEG interpretations from 203 children with CM to EEG results from 87 children with non-malarial febrile coma. Child participants were admitted to Queen Elizabeth Central Hospital in Blantyre, Malawi between 2013 and 2019. **Findings:** Either qualitative or quantitative EEG interpretation methods differentiate coma of malarial from non-malarial etiology. The area under Receiving Operating Curves (AUROC) using qualitative or quantitative EEG interpretation methods produced similar results with excellent discrimination of coma etiology using quantitative (AUROC curve of 0.89) or qualitative methods (AUROC of 0.80). **Interpretation:** Either qualitative or quantitative EEG methods can be used to discriminate the microbiological etiology of coma (malaria vs. non-malarial) in children with febrile coma living in malaria endemic regions. Further studies are warranted to assess EEG's ability to aid clinicians caring for patients with febrile coma who have returned from travel in malaria endemic regions, or to adults living in areas of low or high transmission intensity. **Funding:** Supported by the US National Institutes of Health (R03NS124536)

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

Associations between Prenatal Adversity and Neonatal White Matter Microstructure on Language Outcomes at Age 2 Years

Background: Early life adversity is associated with structural brain alterations in regions implicated in language impairments. However, it remains unclear if adversities experienced in utero shape the white matter pathways important for early language development, including the corpus callosum (CC), superior longitudinal fasciculus (SLF), arcuate fasciculus (AF), fronto-occipital fasciculus (IFOF), and uncinate. Methods: This longitudinal study includes 160 neonates, enriched for exposure to adversity, who underwent diffusion MRI (dMRI) in the first weeks of life. dMRI parameters were extracted from white matter tracts using probabilistic tractography in FSL. Measures of prenatal exposure to maternal social disadvantage and psychosocial stress were collected throughout pregnancy. At age 2 years, the Bayley Scales of Infant and Toddler Development, Third Edition (Bayley-III) evaluated language outcomes. Stepwise linear regression models adjusted for covariates were used to assess the independent and interactive associations between prenatal adversities and neonatal white matter microstructure on language skills. Results: Prenatal exposure to Social Disadvantage ($p < .001$) and Maternal Psychosocial Stress ($p < .001$) were inversely correlated with language outcomes. However, when modelled simultaneously, only Social Disadvantage remained significant ($p < .05$). There was no interaction between the prenatal adversity factors on language outcome ($p > .05$). Independent of Social Disadvantage ($p < .001$), lower CC fractional anisotropy (FA) was related to lower language scores ($p = .02$). Neonatal CC FA did not mediate the association between Social Disadvantage and language outcomes (indirect effect 95% CIs -0.96-0.15). The relationship between neonatal CC FA and language outcomes did not differ by family income-to-needs ratio (INR; $p > .05$). Bilateral SLF/AF, IFOF, uncinate, and corticospinal tracts (negative control) were not related to language outcomes (all $p > .05$). Conclusion: Prenatal exposure to Social Disadvantage and lower neonatal CC FA were independently associated with language delays by age 2. These findings elucidate the early neural underpinnings of language development and may identify infants who may benefit from early referral to language interventions.

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

EEG Correlates of Delirium in Critically Ill Children

In the pediatric critical care setting delirium contributes to heightened medication utilization and extended hospital stays. Existing pediatric delirium screening methods, such as the Clinical Assessment of Preoperative Delirium (CAPD), rely on subjective assessments by healthcare providers. The integration of a quantitative biological correlate for delirium could substantially improve diagnostic precision. At present, however, such a correlate does not exist. The current study aims to determine which, if any, EEG parameters are associated with a positive delirium screen in critically ill children. This single-center retrospective cohort study analyzed the use of EEG correlates to predict the presence or absence of delirium in children admitted to the PICU at a tertiary children's hospital. A total of 144 patients admitted to the PICU that received at least one 24-hour-long EEG, and had at least one CAPD score around the time of EEG were included in this study. Patients with pre-existing neurologic disorders were excluded. Delirium severity was determined by CAPD scores (0-32) with scores equal to or greater than 9 indicating a positive delirium screening. Patient records (n=213) were divided into delirious (n=173) and non-delirious (n=40) cohorts. Normal background activity was in 55% of non-delirious and 16.2% of delirious patients ($p < 0.00001$). Posterior dominant rhythm was in 55% of non-delirious and 17.9% of delirious patients ($p < 0.00001$). Generalized slowing was recorded in 60.2% of delirious patients and 30% of non-delirious patients ($p < 0.0004$). Delta frequency dominance was observed in 53.8% of delirious patients and 25% of non-delirious patients ($p < 0.0014$). Normal sleep features were in 62.5% of non-delirious compared to 23.7% of delirious patients ($p < 0.00001$) while the absence of normal sleep features was in 50.9% of delirious compared to 15% of non-delirious patients ($p < 0.00001$). Mild-grade encephalopathy was more prevalent in non-delirium patients (62.5 versus 23.7%) ($p < 0.00001$). Attenuated featureless activity, generalized rhythmic delta activity and severe and profound encephalopathy were only present in the delirious group. These preliminary results suggest that EEG features may serve as a useful adjunct in the diagnosis of delirium among critically ill children. Specifically, these features may be incorporated into a qualitative predictive risk model to mitigate the occurrence and severity of delirium in critically ill children. Current limitations include the single-center design, qualitative EEG interpretation, small non-delirious cohort size, and lack of control for covariates. Future research using quantitative EEG analyses and multivariate approaches will help overcome these limitations.

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

Development of an Operant Model of Social Self-Administration and Choice in Female Mice

Our current understanding of how social factors contribute to neurobiology or neuropsychiatric disorders remains limited. Mice serve as valuable subjects for investigating the neurobiological foundations of social interaction due to their genetic diversity and versatility in identifying specific cell types and neural circuits involved. However, mice typically exhibit lower social motivation compared to rats, prompting questions about their suitability for modeling complex human social behaviors. The paradigm of social self-administration, in which animals must perform an action (e.g. level-pushing) to obtain access to other animals, has served as a touchstone model for measuring sociability. While studies on mouse social behavior often measure variables such as time spent with a social partner or preference for social environments, they often neglect to evaluate volitional (subject-controlled) rewarding social interactions. In this study, we introduce a model of volitional social self-administration and choice, building upon our prior research with rats. Using mice, we systematically compared female adolescent and adult C57BL/6 mice with outbred CD1 mice. Our findings demonstrate significantly stronger operant social self-administration, social seeking during isolation periods, and preference for social interaction over palatable food in female CD1 mice compared to female C57BL/6J mice, regardless of age. We outline the necessary steps for constructing the social self-administration and choice apparatus and offer guidance for investigating the role of operant social reward in mice. Additionally, we discuss its potential application in studying brain mechanisms underlying operant social reward and its extension to mouse models of neuropsychiatric disorders. Training typically entails approximately 4 weeks to establish stable social self-administration, followed by an additional 3-4 weeks to conduct tests, including assessments of social seeking and choice.

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

Evaluating Surgeon Performance in Basic and Intermediate Surgical Tasks Using HoloLens2 Mixed Reality Headset

Feedback during neurosurgical residency is dependent on expert review of performance. Mixed-reality headsets, such as Microsoft's HoloLens2, can provide objective user data; however, it is unknown if articulated hand and eye-gaze tracking metrics can be used to evaluate user performance. This project aimed to evaluate the utility of HoloLens2-generated metrics such as hand and eye-gaze tracking in identifying neurosurgeon and trainee skill levels. To validate HoloLens2 generated metrics of neurosurgeon performance by comparing to expert video evaluations using a truncated version of the Objective Structured Assessment of Technical Skills (OSATS) grading system. NeuroAR, a custom HoloLens2 application, was developed to record and log user movements. Users performed tasks of varying difficulty while wearing the HoloLens2 headset and recording their field of vision. Participants performed a running suture on a silicone pad as the basic task and a retrosigmoid craniotomy on a cadaver head as the intermediate-level task. Eye gaze, hand movement, and hand disappearance metrics were logged. Videos were spliced into 30-second segments and then graded in random order by attending neurosurgeons. Experts graded suturing tasks along three OSATS domains: respect for tissue (RT), time and motion (T&M), and instrument handling (IH). Retrosigmoid craniotomies were graded along three additional OSATS domains: Overall Performance, Flow of Operation, and Knowledge of Instruments. HoloLens2-generated metrics were then compared against gold-standard OSATS metrics. Finer ocular movements (deltaGaze) are associated with higher OSATS grades for RT ($p=0.003$) and T&M ($p=0.044$). Longer distances traveled for both hands are associated with lower OSATS grades for T&M (left $p=0.012$; right $p=0.022$). Increased instances of hand disappearance are associated with lower OSATS grades for T&M (left $p<0.001$; right $p<0.001$) and IH (left $p<0.001$; right $p<0.001$). [Data from retrosigmoid craniotomies are not yet available for analysis]. HoloLens2 generated hand and eye-gaze tracking metrics have the potential to assess user performance during both basic and more advanced surgical tasks. Future studies will be required to assess the ability of mixed reality headsets to identify user performance, predict outcomes, and provide actionable feedback on more advanced procedures and approaches without requiring an expert opinion.

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

The Use of Intrathecal Baclofen in the Management of Stiff Person Syndrome

Case Diagnosis: A 70-year-old female diagnosed in 1997 with GAD+ Stiff Person Syndrome (SPS). Case Description: Her medications included Baclofen 20mg QID and Diazepam 5mg QID (later changed to Clonazepam 2mg BID). Despite these interventions, she reported daily somnolence and made numerous trips to the ED for painful muscle spasms, uncontrolled jerking, stiffness, gait impairment, and diffuse body pain. Additionally, she received several doses of IVIg in the hospital for symptom management. In 2021, she was counseled on intrathecal baclofen (ITB) to improve her symptoms and reduce her doses of sedating medications. After detailed discussions on risks, benefits, and alternatives with her previous treating neurologist, her ITB pump was implanted with no surgical complications. She was initiated on a dose of 50mcg which was slowly titrated to 147mcg. She also decreased her Baclofen dosage to 5mg QID and Clonazepam to 2mg daily. Discussion: Stiff Person Syndrome is an autoimmune disorder resulting in painful muscle spasms, truncal stiffness, and generalized rigidity. The mainstay of treatment includes oral antispasmodics and benzodiazepines such as baclofen and clonazepam. However, these medications can have intolerable, systemic side effects. ITB can be used as a next line in therapy and previous case reports have shown patients experiencing significant clinical and functional improvements. Once our patient's ITB dose was increased and oral medications decreased, she saw improvements in her spasms and a reduction in her sedation. She is on a multi-modal treatment plan including home physical and occupational therapy (PT/OT), which was initiated recently due to mobility impairments making regular outpatient PT/OT visits unfeasible. She reported feeling stronger allowing slightly more functional independence after only a few sessions. Conclusion: This case report is intended to add to the growing body of evidence outlining the successful utilization of ITB to minimize pill burden and reduce the deleterious effects of high doses of oral medications in patients with SPS.

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

Validation of Preoperative Lesion Identification Algorithm in Pediatric Focal Cortical Dysplasia-Related Epilepsy

Focal cortical dysplasia (FCD) is the most common etiology of pediatric pharmacoresistant epilepsy (PRE). Surgery can be curative, but lesions can be poorly demarcated on MRI. The Multi-centre Epilepsy Lesion Detection (MELD) project designed an automated, machine-learning algorithm to segment FCD on preoperative MRIs. We validated the MELD algorithm in three different pediatric population. We obtained our subjects from an epilepsy surgery database maintained by Children's National Hospital. Images from PRE, healthy control (HC), and "MRI-negative" patients were segmented by MELD. PRE patients with lesional preoperative MRIs were also segmented manually; overlap between manual/MELD masks was measured by Dice Similarity Coefficient. Outcomes measured: Sensitivity: proportion of patients with MELD/manual mask overlap; Specificity: proportion of HC yielding no MELD clusters. In MRI-negative patients, resulting MELD clusters were compared to estimated seizure onset zones (SOZ) from presurgical clinical data. 90 PRE, 19 HC and 19 MRI-negative patients were included. Twenty-two PRE images failed preprocessing and were excluded. Sensitivity was 38.2%. Specificity was 36.8%. MELD accuracy by lobe (%): frontal, 46.2%; temporal, 26.9%; occipital, 11.5%; multilobar, 15.38%. MELD accuracy by FCD pathology: Type I, 23.1%; IIA, 23.1%; IIB, 42.3%; III, 7.7%; NA, 3.8%. Frontal lesions and FCD Type IIB pathology were the most accurately masked. Temporal lesions and FCD Type I were the most inaccurately masked. Engel I outcomes were similar between accurate (65.4%) and inaccurate masks (72.4%). MELD localized lesions in nine MRI-negative patients (47.4%). In detected patients with resections (n=4), all had Engel I outcomes. Our sensitivity, specificity, and MRI-negative detection were lower than the original MELD study sensitivity: 38.2%, specificity: 36.8%, MRI-negative: 47.4% (verses 59%, 54%, 62.9% respectively in the original study). Compared to the original MELD study, our population included more temporal lesions and Type I FCD, which are harder to mask. Importantly, FCD detection in MRI-negative cases with good postsurgical outcomes demonstrates potential for SOZ localization. In presurgical evaluation for MRI-negative patients, additional neuroimaging and clinical data could be use alongside MELD results to produce a narrower approximation of the epileptogenic area. In pediatric patients, MELD may play an important role in faster seizure localization and earlier time to surgery, leading to greater seizure free outcomes and cognitive function. Future studies are needed to prospectively determine whether the MELD algorithm, along with additional neuroimaging modalities, may enhance presurgical decision making and improve postsurgical outcomes in these challenging pediatric cases.

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

The Utility of Anterior Cervical Osteophyte Thinning for Forestier's Disease

Introduction: Forestier's disease, or diffuse idiopathic skeletal hyperostosis (DISH), manifests through significant bony growths along the spine's anterolateral aspects and the anterior longitudinal ligament. This condition leads to symptoms such as dysphagia, dyspnea, hoarseness, and aspiration due to the mass effect exerted by the ossifications on midline neck structures, primarily affecting the esophagus. Diet modification, speech therapy, and anti-reflux medications represent non-surgical management of dysphagia secondary to DISH, referred colloquially as "DISH-phagia." When symptoms become severe, surgical removal or thinning of the osteophytes is occasionally performed. With DISH's increasing prevalence in an aging population and the lack of randomized controlled trials or treatment guidelines, there remains a growing need for a systematic approach to management. This study aims to evaluate the safety and efficacy of anterior cervical osteophylectomy in treating "DISH-phagia," while offering an algorithm that may help identify which patients with DISH will benefit the most from surgical intervention. **Methods:** A single-institution, retrospective chart review was conducted at George Washington University Hospital, identifying five patients from 2015-2023 who underwent surgical osteophyte removal for the management of Forestier's disease. Pre-operative and post-operative evaluations included Glottal Function Index (GFI), Penetrative Aspiration Scale (PAS), barium esophagrams, and patients' qualitative reports of symptom improvement post-surgery. Peri-operative imaging was reviewed, and operative time, length of hospital stay, post-operative complications were noted. The need for a nasogastric tube, orogastric tube, or percutaneous feeding tube was also assessed as a marker of severe dysphagia before and after surgery. **Results:** Five patients who underwent surgical osteophyte removal for management of Forestier's disease were identified. Preliminary results demonstrate improved postoperative dysphagia in most patients indicated by changes in the GFI, PAS, barium swallow studies and patients' qualitative reports. In addition, the patients generally tolerated the procedure well. Two patients had same-day surgery, and the hospital length of stay (LOS) for these patients ranged from 0 to 4 days, with a mean LOS of 1.6 days. No patient had dysphagia severe enough to require a feeding tube of any kind before or after surgery. All patients were able to tolerate a regular diet at the time of their first follow-up visit. One patient had a postoperative seroma which did not affect his ability to swallow and was treated conservatively. Further analyses will be performed to assess this procedure's clinical efficacy and to determine what factors predict level of benefit and reduction of risk with regards to this intervention.

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

Midazolam Versus Ketamine as the First-line Continuous Infusion for Status Epilepticus in Children with Congenital Heart Disease

Objective: Comparison of midazolam and ketamine efficacies as first-line continuous infusions (CIs) for the treatment of status epilepticus (SE) in children with (CHD).

Background: Children with CHD are at high risk of SE. Unfortunately, the treatment of SE has a high failure rate. Once loading doses of anti-seizure medications (ASMs) have failed to control seizures, patients are started on a CI, most commonly midazolam. This is often accompanied by side effects, including hypotension, which can be especially problematic in patients with CHD. Ketamine, a noncompetitive NMDA receptor antagonist, has emerged as an alternative for the treatment of SE, and it has a relatively favorable side effect profile. However, it is unclear how ketamine compares to other CIs for the treatment of SE in children with CHD. **Design/Methods:** Retrospective review of the electronic medical record of patients with CHD and SE treated with CI of ketamine and/or midazolam between 2017 and 2023 at a single tertiary pediatric hospital. The primary outcome was seizure cessation with a single CI. Descriptive statistics were used. **Results:** Of 34 CHD patients with SE, 20 patients received midazolam as the first-line CI and 14 received ketamine. The ketamine-first group was younger (Median 1.5 days, IQR 0-23.75) than the midazolam-first group (Median 87.5, IQR 10.75-121.75; $p = 0.007$). Most patients experienced multifocal (83% ketamine, 80% midazolam) and electrographic-only seizures (85% ketamine, 79% midazolam). The number of bolus ASMs given prior to CI was comparable, and there was no difference between groups in the rate of seizure cessation. **Conclusions:** This retrospective study provides preliminary evidence supporting the non-inferiority of ketamine compared to midazolam for SE treatment in patients with CHD. It will be important to determine the side effect rate for both groups as this may help to inform treatment strategies in this population.

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

Early Predictors of Prolonged Stay in the Intensive Care Unit Following Intracerebral Hemorrhage

Introduction Intracerebral hemorrhage (ICH) is a neurologic emergency that typically requires monitoring in the intensive care unit (ICU). While the ICH score provides an early measure of hemorrhage severity, this study investigates its potential to predict ICU length of stay (LOS), alongside other clinical variables. **Methods** Retrospective analysis of ICH patients admitted to our tertiary center (2018-2023) included demographics, clinical exam characteristics, CT scans, intubation status, and neurosurgical procedures at presentation. We included all patients with ICH, while excluding those with a terminal injury at presentation. ICU LOS was the primary outcome, calculated from ICU admission to discharge. We utilized a multivariate ordinal regression model to identify independent predictors of ICU stay in ICH patients, including ICH score, neurological interventions, intubation, and complications. **Results** In our cohort of 251 ICH patients, the average ICU stay was 8.0 ± 11.1 days. On multivariate analysis, neurological interventions independently predicted longer ICU LOS: external ventricular drain placement (hazard ratio [HR] 2.39, 95 % confidence interval [CI] 1.34–3.43; $p < 0.01$), craniectomies (HR 1.19, CI 0.20–2.17; $p = 0.018$). Additionally, complicated ICU course was a significant predictor of LOS: septal shift (HR 0.78, CI 0.17–1.40; $p = 0.012$) mechanical ventilation (HR 2.00, CI 1.25–2.76; $p < 0.01$) and pneumonia (HR 1.92, CI 1.11–2.73; $p < 0.01$). Unexpectedly, ICH score was not a significant predictor of ICU LOS (HR -0.069, CI -0.34–0.020; $p = 0.62$) **Conclusion** Protracted ICU stay is better predicted by the need for invasive neurological interventions and the complexity of the clinical course rather than the severity of hemorrhage on early assessment as quantified by the ICH score.

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

MRI-Compatible Robot for Intracerebral Hemorrhage Evacuation

Introduction: Intracerebral hemorrhage (ICH) is the second most common type of stroke. ICH refers to bleeding within the brain, which can increase intracranial pressure and create a harmful inflammatory environment for surrounding normal brain tissue. Minimally invasive approaches for ICH evacuation have shown promising results in clinical trials, but they can be disruptive to surrounding tissue and result in incomplete hemorrhage evacuation. There is critical need to integrate real-time imaging feedback during ICH evacuation to ensure safety and better treatment outcomes. A recent preclinical trial has demonstrated the efficacy of real-time image guidance in intracerebral hematoma simulation models with successful evacuation in all models. MR imaging could be a potential imaging modality for ICH evacuation. A novel MRI-compatible concentric tube robotic aspiration device was developed for ICH evacuation. The robot hardware and evacuation efficacy has been previously evaluated in MRI-guided human brain phantom studies. In this MRI-guided study, we assessed the robot in a sheep brain phantom model. Ketchup was used as a proxy for a clot. **Methods:** A sheep brain phantom was created with a cavity using Humimic Medical gel and a sheep brain 3D model. During the MRI study, ketchup was injected into the cavity in the phantom. A point of trajectory was marked on a sheep skull 3D model and a burr hole was drilled into the skull. The skull and robot were secured on an MRI table. Initial MRI scans of the phantom were obtained and transferred to the planning console. The robot was advanced into the phantom through the burr hole. MRI images were taken in between robot movements to visualize the penetration of the phantom and the location of the concentric tube. The robot was advanced farther into the clot and aspiration was initiated with real-time intraoperative MR imaging. After evacuation, MR images were obtained for outcome evaluation, and the phantom was physically analyzed for possible damage to normal tissue. **Results:** The estimated clot volume before and after evacuation was 9.04mL and 1.54mL respectively. The clot volume was reduced by 83%. The phantom did not have any unexpected tissue damage when analyzed. **Conclusion:** This MRI-guided study evaluated a novel ICH robot with a sheep brain phantom. It provided insight into sheep brain anatomy and the smaller brain size available for clot formation. Future MRI studies will be done as needed to prepare for live sheep animal studies.

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CLINICAL AND TRANSLATIONAL RESEARCH

NEUROLOGY AND NEUROSURGERY

Identification of Vestibular Ganglion Pathology in an Animal Model for Syndromic, Congenital Vestibular Disorders

Children with syndromic, congenital vestibular disorders (CVDs) form an abnormal inner ear early in development, resulting postnatally in severe challenges in maintaining posture, balance, walking, eye-hand coordination, eye tracking, reading, and language acquisition. The most common pathology observed is a sac-like inner ear with the three, truncated or missing semicircular canals. The semicircular canals normally emerge during the first trimester. It is not known how the abnormal semicircular canals early in development affect the emerging vestibular neural circuitry. Accordingly, this lab designed and implemented an animal model, the ARO chick, that forms a sac-like inner ear early in development which resembles that found in CVD children. In two-day old chick embryos (E2), Anterior-posterior Rotation of the Otolocyst surgically 180° on one side creates a sac-like inner ear. After hatching, the ARO chick experiences balance and walking problems. Since there are reports that the vestibular ganglionic mass is reduced in children with CVDs, our first step was to determine whether vestibular ganglion (VG) neurons survive embryonic development in E13 ARO chicks that hatch at E21. Two approaches were used to count VGs: (1) a classical technique using transverse, serial, Nissl-stained tissue sections (20 µm thick) visualized with light microscopy and analyzed with QuPath computer program, and (2) a novel approach using biocytin alexa fluor labeling of VG neuron cell bodies, fixed and cleared in whole-mount preparations that are imaged using confocal microscopy and analyzed with Imaris computer program. In both Nissl-stained and biocytin-labeled preparations, VG neuron number on the rotated side of E13 ARO chicks was reduced slightly compared to neuron number on the intact side and in normal chicks. In E13 ARO chicks, VG neuron cell bodies collected into irregular clusters, unlike those in the normal chicks and on the intact side of ARO chicks which formed contiguous anterior and posterior ganglionic masses. Thus, VG neurons develop nearly normal neuron number two-thirds of the way through prenatal development, despite connecting to an abnormal sac-like inner ear. However, the disarray of embryonic ganglion cell bodies forebodes pathological changes in connectivity postnatally. Ongoing studies of the hatchling ARO chick will determine the fate of VG neurons postnatally.

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CLINICAL AND TRANSLATIONAL RESEARCH

OBSTETRICS AND GYNECOLOGY

Psychosocial Risk Factors for Perinatal Trauma among Low-income, Black/African American Birthing People

Introduction: Perinatal mental health conditions are the leading cause of maternal mortality in the US.¹ 40% of Black/African American (AA) pregnant people suffer from mental health symptoms, which is nearly double the rate for pregnant people of other racial/ethnic groups.² Additionally, Black and Hispanic birthing people are 10x more likely to encounter mistreatment and traumatic experiences with maternity care providers and report high rates of racism during pregnancy and the postpartum period.^{3,4} Given these disproportionate rates, this study aims to evaluate what personal history and experiences put people at risk for perinatal trauma. Methods: This sample included 99 patients participating in an ongoing RCT investigating the efficacy of patient navigation, mental health, and peer-support interventions for low-income, Black/AA pregnant and postpartum people in Washington, D.C. Data were collected via baseline prenatal mental health screenings, perceived discrimination questionnaire (Everyday Discrimination Scale, EDS), Postpartum Depression Risk Questionnaire (PDRQ) and the Childbirth Experience Questionnaire (CEQ) 2-6 weeks after delivery. Data analysis included logistic regression for multivariate comparisons and was confirmed with univariate chi-square analysis and Fisher's exact tests. Results: The cohort included 99 participants (median age 30, range 20-43), 60 of whom had completed study questionnaires at the first postpartum time point between 2-6 weeks. 31% reported having experienced at least one traumatic/horrific event in their lifetime. During initial prenatal mental health screening, 25% reported that they or a healthcare provider had ever had concerns about their mental health and 35% reported concerns about depressed/sad/anxious mood. Of those who completed a PDRQ, 51% reported having a very difficult pregnancy emotionally and/or physically and 45% reported having a very difficult birth experience emotionally and/or physically. History of a traumatic experience (PDRQ) and greater perceived daily discrimination (higher EDS score) were associated with experiencing a very difficult pregnancy emotionally and/or physically ($p=0.03$ and $p=0.01$, respectively). Participants who reported a lifetime history of concerns about mental health/wellness ($p=0.001$) or depressed/sad/anxious mood ($p=0.01$) on the initial mental health screening were also more likely to report a very difficult pregnancy emotionally and/or physically (PDRQ). Prior traumatic experience ($p=0.02$), prior mental health diagnosis/treatment ($p=0.03$) and taking medication for mood/anxiety during pregnancy ($p=0.04$) were each associated with negative memories of childbirth (CEQ). Conclusion: Low-income, Black/AA birthing people with self-reported mental health concerns, who experience discrimination during pregnancy or a history of prior trauma, are more likely to encounter additional trauma during pregnancy and childbirth than those without similarly reported experiences.

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CLINICAL AND TRANSLATIONAL RESEARCH

OBSTETRICS AND GYNECOLOGY

Does Prophylactic Tranexamic Acid Cause Hypotension Post-Administration at the Time of Delivery?

Background: Postpartum hemorrhage is the leading cause of maternal death globally. Tranexamic acid (TXA) is a drug that can be administered to patients prior to surgery to prevent hemorrhage. In obstetrics specifically, it is being studied for usage prior to cesarean section or vaginal birth. Although TXA has therapeutic advantages to prevent hemorrhage, one concern with administration is inducing hypotension.

Objective: Here, we aim to assess how the mean systolic pressure and mean diastolic pressure changes in pregnant patients before and after TXA administration via four distinct routes of administration. **Methods:** Pregnant patients between 18-50 years old undergoing vaginal or cesarean section deliveries without history of blood clots or blood clotting disorders were selected for this study. Participants (n=24) were randomly categorized into four cohorts: control (n=5), and TXA administration via intramuscular (n=6), intravenous infusion over 10 minutes (n=9), or intravenous push over 2 minutes (n=6). Systolic and diastolic blood pressures for each patient was measured prior to and after TXA administration. A paired t-test was conducted on the average systolic and diastolic readings for each cohort to assess differences in pre- and post-TXA administration. **Results:** Combining all participants (n=24) resulted in a mean systolic BP of 117.07 mmHg and 119.185 mmHg in pre-TXA and post-TXA administration, respectively. The combined diastolic readings of all patients produced a mean pre-TXA BP of 69.04 mmHg and post-TXA BP of 68.41 mmHg. The difference in pre- and post-TXA administration systolic ($p=0.45$) and diastolic ($p=0.78$) blood pressures showed no significant differences overall. Of the four distinct administration groups, only the control group ($p=0.04$) sustained a significant decrease in diastolic blood pressures with a difference in means of 12.33 mmHg. The IV push over 2 minutes group ($p=0.02$) showed a significant increase in systolic blood pressure with an increase of 15.80 mmHg between means. **Conclusion:** Our findings suggest that TXA does not pose any substantial risk of hypotension when administered to pregnant individuals. The study provides valuable insights into the safety profile of TXA, supporting its potential use to prevent postpartum hemorrhage without affecting maternal blood pressure.

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CLINICAL AND TRANSLATIONAL RESEARCH

OBSTETRICS AND GYNECOLOGY

Severe Mental Illness - More than the EPDS: Identifying Mental Health Concerns in Black, Low-Income Pregnant People

Background: Identifying severe mental illness (SMI) in pregnancy is necessary for early detection and treatment, as well as improved maternal outcomes. The importance of early detection is underscored in recent ACOG guidelines recommending expanded mental health screening in pregnancy. This study reports the severity of patients' SMI symptoms within the context of an ongoing RCT investigating the effectiveness of culturally adapted mental health interventions for Black or African American (AA), low-income pregnant patients. Methods: The present study includes Black/AA, low-income participants recruited and enrolled at a single, urban academic center. Participants undergo mental health screening using standardized questionnaires, including the Edinburg Postnatal Depression Scale (EPDS), Generalized Anxiety Disorder 7-Item (GAD7), and the Perceived Stress Scale (PSS). Those reporting active psychosis/suicidality are classified with SMI and subsequently excluded to undergo psychiatric care and evaluation. EMR notes from obstetric visits were reviewed to assess documentation of SMI. Descriptive statistics, one-way ANOVA, and chi-square analyses were performed using JMP software. Results: Of 139 participants, 10 (14%) were found to have concerns for SMI on mental health screening. Participants with SMI scored significantly higher for depressive symptoms (mean EPDS score 17 vs. 8, $p < 0.0001$), anxiety symptoms (mean GAD-7 score 12 vs. 6, $p = 0.0034$), and stress (mean PSS score 25 vs. 15, $p = 0.0011$). These participants were also more likely to report that either they or their providers had concerns about their mental health/wellness ($p = 0.0356$). Those with SMI reported hallucinations (5/9 or 55%), delusions (4/9, 44%), and/or suicidal ideation (3/9, 33%) within the last month. All 10 (100%) were referred to therapy by their obstetric provider, but only one (10%) was referred to psychiatry; severity of symptoms (e.g. hallucinations or delusions) were not documented within obstetric notes, and only three participants (30%) were noted to have active psychiatric medications. Conclusion: These results reveal that SMI may be under-recognized in routine obstetrical care and reinforce the importance of screening for depression, stress, anxiety, and SMI.

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CLINICAL AND TRANSLATIONAL RESEARCH

OBSTETRICS AND GYNECOLOGY

Early treatment with IV iron is associated with improved maternal hemorrhage-related outcomes

Objective: Anemia in pregnancy is associated with hemorrhage-related morbidity and mortality. Iron deficiency anemia (IDA) is a modifiable risk factor when identified and treated antenatally. The purpose of this study is to evaluate how timing of IV iron therapy in relation to delivery impacts hemorrhage-related maternal morbidity and fetal outcomes. **Study Design:** This retrospective cohort study from a single center included patients who received antenatal IV iron therapy for a diagnosis of anemia in pregnancy from January 2017 through January 2023. Anemia was defined as admission hemoglobin <11 g/dL. Timing of IV iron administration in relation to delivery date was analyzed. An unadjusted analysis was performed using Fisher's exact test and Student's paired t test. Multivariate logistic regression was used to calculate odds ratios (95% confidence intervals) to compare pregnancy outcomes for IV iron therapy more than and less than 10 days prior to delivery. **Results:** Of 83 included pregnancies with IDA, 45 received IV iron therapy more than 10 days prior to delivery, while 38 received IV iron therapy fewer than 10 days before delivery. Pregnant patients who received their final transfusion of IV iron >10 days before delivery had significantly higher hemoglobin at delivery admission ($p<0.001$). Those who received IV iron < 10 days before delivery were 6.8 times more likely to receive a blood transfusion ($p=0.01$, aOR=6.8, 95%CI 1.6-22) and 5.3 times more likely to have preterm birth ($p=0.001$, aOR =5.3). Patients who received IV iron > 10 days were significantly less likely to have ICU admission ($p=0.04$) or a birth resulting in NICU admission ($p=0.02$). There was no significant difference in the mode of delivery, postpartum hemorrhage, or pre-existing pregnancy comorbidities between groups. **Conclusions:** Patients who received IV iron more than 10 days prior to delivery had improved maternal and fetal outcomes, including fewer maternal blood transfusions, maternal ICU admissions, preterm births, and NICU admissions. Earlier treatment of IDA with IV iron in pregnancy may mitigate hemorrhage-related morbidity.

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CLINICAL AND TRANSLATIONAL RESEARCH

OBSTETRICS AND GYNECOLOGY

What is the effect of Postpartum Hemorrhage on Physical Activity after Cesarean?

Objectives This study introduces a novel approach, utilizing activity tracking devices (ATDs) like Fitbit, to monitor mobility during cesarean recovery and investigate the relationship between physical activity (PA) and postpartum hemorrhage (PPH). **Methods** We conducted a prospective cohort study involving postpartum patients aged 18 to 50 who delivered at George Washington University and underwent a scheduled or emergent cesarean from December 2022 to September 2023. The primary outcome was assessing the relationship between PPH and PA at least 2 weeks postpartum using the Fitbit. Data from all patients were extracted from the electronic medical records. The Fitbit Model of Inspire was used to monitor patients' physical activity. **Results** Statistical analyses of the relationship between quantitative blood loss (QBL) during cesarean delivery and average steps per day postpartum found statistically nonsignificant results (-1.16 , $P = 0.817$) for the collective cohort. Excluding 1 outlier from the patient cohort, analysis of the relationship between the same two variables found statistically significant results (-1.83 , $P < 0.03$). Results find a coefficient of -1.83 on the QBL variable, signifying that an increase of 1 mL in QBL corresponds to an average decrease of 1.83 in average steps per day postpartum. **Conclusion** This study's findings underscore the potential clinical relevance of monitoring physical activity to identify and address postpartum complications. Further research could explore interventions to mitigate the observed decline in mobility associated with PPH, ultimately enhancing maternal healthcare outcomes. **Key Words:** PPH, cesarean delivery, physical activity **Synopsis:** Higher quantitative blood loss during cesarean delivery correlated with reduced average steps postpartum, highlighting the potential impact of PPH on postpartum mobility.

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CLINICAL AND TRANSLATIONAL RESEARCH

OPHTHALMOLOGY

Application of Postnatal Growth and Retinopathy of Prematurity (G-ROP) Criteria to Patients in a Level IV Neonatal Intensive Care Unit (NICU) at a Non-Delivery Hospital

Introduction: The G-ROP screening criteria were proposed to decrease the burden and costs associated with the most recent retinopathy of prematurity (ROP) screening guidelines published in 2018. Screening criteria includes the following: gestational age less than 28 weeks, birthweight less than 1051g, weight gain from age 10 to 19 days less than 120 g, weight gain from age 20-29 less than 180g, weight gain during age 30-39 less than 170 g or hydrocephalus. Our study investigates the effectiveness of these criteria in correctly identifying individuals who developed ROP. Methods: G-ROP screening criteria were retrospectively applied to a cohort of premature infants admitted to a level IV NICU in Washington, DC from 2020 to 2023. Patients that met one or more of the sequential criteria would in theory undergo all subsequent examinations. Patients were excluded if they did not have any ophthalmic examinations performed or if any relevant data was missing. Results: A total of 94 individuals were included in this study. 166 individuals were excluded due to incomplete growth data. A total of 66 patients met one or more screening criteria and application of these criteria correctly identified 6 individuals that developed ROP (sensitivity 100%). A total of 60 individuals who met one of more screening criteria never developed ROP (specificity 31.8%). 28 individuals did not meet any screening criteria, and none developed ROP, potentially saving 66 examinations. A total of 648 examinations were performed for individuals with incomplete growth data. Conclusion: The screening criteria demonstrated a high sensitivity in identifying cases of ROP, effectively capturing all instances of the condition. Applying these criteria can significantly reduce the number of unnecessary examinations, leading to substantial cost savings and reduced infant distress. By eliminating 66 examinations, an estimated \$10,138 could have been saved, highlighting the economic and practical benefits of these criteria in managing ROP screening. This study highlights the difficulty in addressing the lack of data points at non-delivery hospitals in the context of ROP examinations.

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CLINICAL AND TRANSLATIONAL RESEARCH

OPHTHALMOLOGY

The Effect of Prior Incisional Surgery on Subsequent Selective Laser Trabeculoplasty

Purpose: Selective laser trabeculoplasty (SLT) is often used as primary or adjunct therapy for glaucoma, however, the outcomes of SLT after prior incisional glaucoma surgery (Trabeculectomy or Tube Shunts) have been understudied.¹ This study investigates the effectiveness of SLT in patients with a history of such surgeries. **Methods:** A retrospective chart review of all patients who underwent SLT at The George Washington University Medical Faculty Associates from 2018 to 2022 was performed. Patients were included if they were diagnosed with primary open-angle glaucoma, had an incisional glaucoma surgery prior to their SLT and had follow-up of at least 12 months after SLT. The primary outcome was SLT success, defined as IOP reduction of 20% or greater without the use of additional glaucoma medications compared to pre-SLT IOP. Eyes were matched (1:3) on baseline demographics, IOP, and number of medications. Analysis included chi-squared tests, t-tests, and regression modeling. **Results:** There were 22 eyes with surgery (study) and 66 eyes without surgery (control) prior to SLT, with a mean age of 72.9 ± 11.2 . In the study group, 17 out of 22 eyes had not undergone prior laser treatment, while all 66 eyes in the control group were laser-naïve. Baseline IOP and ocular medications in the study group changed from 16.2 ± 3.3 mmHg on 2.2 ± 1.2 medications to 14.9 ± 3.9 mmHg (8.1% reduction; $p > 0.05$) on 3.5 ± 1.0 medications (4.1% increase; $p > 0.05$) at 1 year. In the control group, baseline IOP and ocular medications changed from 16.3 ± 4.0 mmHg on 2.2 ± 1.2 medications to 13.6 ± 3.3 mmHg (16.8% reduction; $p < 0.001$) on 2.9 ± 1.0 medications (4.9% reduction; $p > 0.05$) at 1 year. There was no difference in IOP reduction or change in the number of glaucoma medications after SLT at 6 weeks, 6 months, and 1 year between both groups ($p > 0.05$). Primary success rates at 1 year was 40.9% for the control group and 18.2% for the study group ($P > 0.05$ between groups). Prior laser or incisional surgery were not associated with or predictive of treatment outcomes ($p > 0.05$). One eye in the study group received a repeat SLT within 12 months. There were no adverse events. **Conclusion:** SLT shows reduced efficacy in lowering IOP in eyes with previous incisional glaucoma surgery compared to those without such history. A long-term randomized controlled trial is warranted to validate these findings.

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CLINICAL AND TRANSLATIONAL RESEARCH

OPHTHALMOLOGY

Racial Differences in the Clinical Outcomes of Selective Laser Trabeculoplasty

Purpose Studies have reported the clinical benefits of selective laser trabeculoplasty (SLT) among patients with glaucoma. However, there is limited research comparing the effectiveness of SLT across different races, particularly African Americans who are underrepresented in current clinical studies.¹ We conducted a retrospective analysis to investigate differences in the efficacy of SLT by race. Methods: A retrospective analysis was performed on patients with glaucoma who received SLT between 2008 to 2022 at the George Washington University. Patients with prior glaucoma procedures or laser were included. Intraocular pressure (IOP) and the mean number of ocular hypotensive medications were recorded preoperatively and postoperatively at 6 weeks, 6 months, and 12 months. The primary outcome was SLT success, defined as IOP reduction of 20% or greater without the use of additional glaucoma medications. Eyes were matched (1:1) based on baseline demographics, IOP, and number of medications. Statistical analysis included chi-squared and independent and paired t-test. Results: In our 176-eye cohort (88 white not hispanic, 88 black), the mean age was 68.7 ± 11.4 years. The baseline glaucoma distribution was: primary open angle (88.6%), pigmentary (7.4%), pseudoexfoliation (1.7%), normal tension (1.7%), and juvenile open angle glaucoma (0.6%). Mean baseline IOP for the white and black cohorts were 18.0 ± 4.1 mmHg and 17.8 ± 4.5 mmHg, respectively. Mean baseline number of medications were 1.7 ± 1.3 for the white cohort and 1.9 ± 1.2 for the black cohort, respectively. Mean IOP at 12 months was $13.9 \text{ mmHg} \pm 2.9$ (22.5% reduction; $p < 0.001$) for the white cohort and $14.7 \text{ mmHg} \pm 5.1$ (17.5% reduction; $p < 0.001$) for the black cohort. Mean medications at one year were 1.9 ± 1.3 (7.2% increase; $p > 0.05$) for the white cohort and 2.1 ± 1.2 (12.8% increase; $p > 0.05$) for the black cohort. Between cohorts, the differences in IOP reduction and change in number of glaucoma medications after SLT at 6 weeks, 6 months, and 1 year were not significant. ($p > 0.05$). SLT success was achieved at 12 months in 44.3% (39/88) of the white not hispanic cohort and 37.5% (33/88) of the black cohort ($p > 0.05$ between cohorts). Conclusion: SLT offers comparable efficacy for both White not Hispanic and Black patients. A long-term randomized controlled trial is warranted to establish the clinical benefit of SLT across diverse populations.

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CLINICAL AND TRANSLATIONAL RESEARCH

OPHTHALMOLOGY

Normative Cone Photoreceptor Diameter Database Across the Lifespan Using Adaptive Optics Imaging

Purpose: Adaptive Optics (AO) retinal imaging enables in vivo high-resolution images of cells such as cone photoreceptors. Although cone density and spacing have been widely reported as metrics for evaluating cones, currently, quantitative assessment of cone diameters is limited. In this study, we present a normative database of in vivo human cone diameter evaluated across eccentricity and age. **Methods:** Non-confocal split detection AO imaging was performed in 24 eyes of 24 healthy subjects (13 females and 11 males). Subjects were classified into seven age brackets: 10 -19 years (n=3, 13%), 20-29 (n=4, 17%), 30-39 (n=4, 17%), 40-49 (n=4, 17%), 50-59 (n=4, 17%), 60-69 (n=3, 13%), 70-79 (n=2, 8%). Regions of interest (ROI) from the images were obtained from near the fovea to 6mm eccentricity. Cone photoreceptors were segmented for diameter measurements by expert graders assisted by a custom artificial intelligence algorithm). **Results:** Overall, the cone diameter increased with increasing eccentricity across the lifespan (n=15739 segmented cones), from an average of 4.94 μm (eccentricity: 1mm) to 7.77 μm (eccentricity: 6mm). There was a significant difference between the seven age groups across eccentricity ($p < 0.05$). Cone diameters in younger subjects were larger than those from older subjects near the fovea, with smaller age-related differences observed at increasing eccentricities. **Conclusion:** Creating a normative in-vivo human cone diameter dataset is important because it gives us a baseline to compare non-normative subject cohorts to. We can look for changes in cone diameter in the latter to see how they differ from the norm. Our study also reproduced previous published data that cone diameter increases as retinal eccentricity increases.

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CLINICAL AND TRANSLATIONAL RESEARCH

OPHTHALMOLOGY

Retinal Pigment Epithelial Cells Treated with Chlorophyll Have Augmented Production of ATP

Prior research has demonstrated that chlorophyll derivatives can associate with mitochondria and catalyze the reduction of Coenzyme-Q, increasing ATP production. This relationship could imply meaningful therapeutic utility, but it has yet to be reproduced in vitro. The present study explores the effects of treating human retinal pigment epithelial cells (hRPEs) with chlorophyll. hRPEs were cultured in 96 well plates seeded at 50,000 cells/well. After achieving morphological maturity, hRPEs were treated with 10 μ m, or 20 μ m chlorophyll-treated media for 12 hours. Following incubation, cell culture plates were analyzed using the Seahorse mitochondrial stress test assay. Data was normalized to cell count by staining with Presto Blue and Hoechst. At least 3 biological replicates and a minimum of 5 technical replicates were obtained per condition. Statistical analysis was conducted with Prism 9. hRPEs treated with 10 μ m chlorophyll exhibited significantly higher ATP production (18.5 $\pm$ 3.1 pmol/min) compared to control (10.6 $\pm$ 0.8 pmol/min) $p < 0.05$, higher oxygen consumption (23.9 $\pm$ 4.1 pmol/min) compared to control (17.2 $\pm$ 1.2 pmol/min) $p < 0.05$, and increased coupling efficiency (77.6% $\pm$ 1.6) compared to control (61.1% $\pm$ 1.5) $p < 0.05$. Cells treated with 20 μ m chlorophyll exhibited significantly increased ATP production (16.6 $\pm$ 6.8 pmol/min) compared with control (10.6 $\pm$ 0.8 pmol/min) and higher coupling efficiency (73.7% $\pm$ 8.1) compared to control (61.1% $\pm$ 1.5). The data suggest that chlorophyll treatment of hRPEs improves ATP production and electron transport. The observation that chlorophyll treatment led to significant increase in both oxygen consumption and ATP production supports the hypothesis that chlorophyll catalyzes an upstream member of the electron transport chain. Promoting electron transfer subsequently increases oxygen consumption and ATP production. Moreover, chlorophyll treatment also led to significantly improved coupling efficacy, indicating that treated cells produced a higher ratio of ATP molecules for every oxygen consumed. Generally, increasing ATP production demands additional oxygen. However, the 20 μ m chlorophyll condition showed a significant increase in ATP production, without increased oxygen consumption, suggesting that improved utilization of the proton gradient facilitated increased ATP. Greater production of ATP per oxygen consumed would benefit cells burdened by ischemic pathologies, for example. Taken together, these data suggest that chlorophyll treatment can improve efficiency and quantity of ATP production in hRPEs. This relationship could prove meaningful for many cell types afflicted by mitochondria dysfunction or ischemia.

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CLINICAL AND TRANSLATIONAL RESEARCH

OPHTHALMOLOGY

Efficacy of Trabecular Stents in Pseudoexfoliation Glaucoma

Purpose: The effectiveness and safety of the Hydrus Microstent combined with phacoemulsification in managing pseudoexfoliation glaucoma remains unclear and currently off-label. This study seeks to clarify these aspects by comparing the safety and efficacy of trabecular stents in pseudoexfoliation and primary open angle glaucoma patients over a one-year period. **Methods:** A retrospective study was conducted on primary open-angle glaucoma (POAG) and pseudoexfoliation glaucoma (PXG) patients who received Hydrus Microstent with phacoemulsification. Inclusion criteria allowed patients with prior laser treatments but excluded those with previous glaucoma surgeries. We assessed the mean ocular hypotensive medications and intraocular pressure (IOP) preoperatively, and at 1 and 12 months postoperatively, along with complications and secondary surgical interventions (SSI). Surgical success, our primary outcome, was defined as achieving target IOP at 12 months without additional medications or procedures. Eyes were matched (1:1) on baseline demographics, baseline and target IOP, and baseline number of medications. Statistical analyses employed chi-squared and independent and paired t-tests. **Results:** In our 68-eye cohort (34 PXG, 34 POAG), the mean baseline IOP and medications were 17.6 ± 5.7 mmHg and 2.07 ± 1.19 , respectively. At 12 months, surgical success was achieved in 61.7% of PXF and 58.8% of POAG patients ($p > 0.05$). The mean IOP reduction at 1 month was 16.5% in PXF ($p < 0.05$) and 10.1% in POAG ($p > 0.05$); at 12 months, it was 19.6% in PXF ($p < 0.05$) and 13.6% in POAG ($p < 0.05$). Medication reduction at 1 month was 15.4% in PXF ($p > 0.05$) and 50.6% in POAG ($p < 0.001$); at 12 months, it was 40.8% in PXF ($p < 0.05$) and 51.2% in POAG ($p < 0.05$). Adverse events occurred in both groups, including corneal edema, steroid response, and hyphema. Neither group received SSI. **Conclusions:** The study confirms the Hydrus Microstent's effectiveness in reducing intraocular pressure and medication use in pseudoexfoliation glaucoma, comparable to primary open-angle glaucoma. Furthermore, the medication lowering effect of Hydrus in PXG was noninferior to that of POAG. Notably, most complications, including cystoid macular edema and ERM, were mild and non-vision threatening, with no significant difference between the two glaucoma types. These findings support the Microstent's use in PXG.

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

National Trends in 2-Year Periprosthetic Fracture after Total Knee Arthroplasty from 2010 to 2019

Introduction: Periprosthetic fractures (PPFs) after total knee arthroplasty (TKA) are associated with increased morbidity, mortality, and healthcare costs. It is postulated that due to an aging population, there may be an increasing burden of PPF in the future. The purpose of this study was to investigate the recent trends in 2-year PPF incidence after primary TKA in the United States, and to identify the sub-populations with the most pronounced changes in risk. **Methods:** A retrospective observational study was conducted using a national administrative claims database. Patients who underwent primary TKA during the years 2010-2019 were identified via current procedural terminology (CPT) codes. Periprosthetic fracture diagnoses within 2 years of surgery were identified via international classification of diseases (ICD) codes. The overall cohort was stratified by age, biological sex, and high-risk medical comorbidities to assess trends in sub-populations. Annual rates were reported as percentages, and a compounded annual growth rate was calculated between 2010 and 2019. Linear regression analysis was conducted on the overall cohort and all sub-populations. Multivariable logistic regression was used to compare PPF rates over time and adjust for the effects of age, biological sex, and comorbidities. **Results:** A total of 951,601 patients were identified. Of these patients, a total of 2,757 (0.29%) had a PPF within 2 years of surgery. The total rate of 2-year PPF increased from 0.18% in 2010 to 0.38% in 2019. The compounded annual growth rate (CAGR) for PPFs in all patients was +8.66% relative growth annually. Following multivariable analysis, odds of PPF trended upwards from 2010 to 2019 (2013: OR: 1.38, $p=0.003$; 2019: OR:1.62, $p<0.001$). Further subpopulation analysis demonstrated that the patients who had greater increases in PPF rates were patients 50-59 years old at surgery (CAGR= +9.97%, $p<0.001$), women (CAGR= +9.96%, $p<0.001$), and patients who had Medicaid insurance (CAGR= +11.0%, $p=0.004$). **Conclusions:** We observed that the 2-year rates of PPF after primary TKA have been increasing since 2010. Although the absolute rates remain low (<1%), the overall rate has more than doubled between 2010 and 2019. The groups noted to have the greatest increase in risk are patients ages 50-59 at surgery, female patients, and patients with Medicaid insurance. These findings suggest that proactive efforts could be directed towards these groups in order to prevent increased rates of PPF after TKA in the future.

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

The Environmental Impact of Hip and Knee Joint Replacement Operations: An Analysis of Carbon Emissions and Disposal Costs

BACKGROUND The increasing prevalence of hip and knee arthroplasty operations to address osteoarthritis and the generation of significant waste necessitates addressing healthcare system pollution to align with Ireland's climate change mitigation efforts. **PURPOSE** This research aimed to quantify waste generated and determine environmental and economic impacts to promote sustainable strategies in joint arthroplasty and shed light on the suboptimal waste management practices. This study utilized a proven methodology to calculate the greenhouse gas emissions associated with measuring waste in operating rooms. **METHODS** The study was conducted at the National Orthopaedic Hospital Cappagh (NOHC), measuring waste generated during primary and revision hip and knee replacement operations. Clinical, domestic, and recycled waste weights were recorded after every operation, including the segregation of CSSD Blue Wrap waste in ten operations. Equations from the Intergovernmental Panel on Climate Change (IPCC) were used to determine the Carbon Dioxide emissions (kgCO₂e) from clinical and domestic waste. Disposal costs were estimated for clinical, domestic, and recycled waste using the Health Service Executive Green Health Programme estimates. **RESULTS** In a sample of 100 joint arthroplasty operations, the study found that revision knees produced 23.58 kgCO₂e per case, revision hips 23.50 kgCO₂e, primary knees 15.82 kgCO₂e, and primary hips 14.64 kgCO₂e. CSSD Blue Wrap contributed on average 13.5% of total OT waste. Extrapolating these findings to the estimated number of joint arthroplasties performed in 2022 at NOHC (1,556 hip and knee joint arthroplasties), the emissions were estimated to be 24,576 kgCO₂e, with the cost of disposal up to €29,228. Strategies to mitigate this waste have been identified and proposed. **CONCLUSION** The research aimed to address the environmental impact of orthopaedic joint arthroplasties, offering strategies to reduce waste generation, carbon emissions, and cost. Utilizing the IPCC approach to calculate greenhouse gas emissions and implementing our strategies for waste management practices, and training future surgeons in sustainable approaches, can help quantify and contribute significantly to Europe's net-zero emissions goal under the Paris Agreement. **CLINICAL RELEVANCE** Our methodology and mitigation strategies aim to empower fellow physicians as well as sustainability offices to conduct their own waste audits for selected surgeries to calculate their waste generation, disposal costs, and offer strategies within their own institutions.

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

Equity in DDH Diagnosis and Treatment: Unraveling the Effect of Area Deprivation and the Insurance Type

Introduction Timely diagnosis of the developmental dysplasia of the hip (DDH) is crucial for implementing less invasive treatment. However, socioeconomic barriers may lead to late diagnoses. In this study, we utilize Area Deprivation Index (ADI) as an indicator of the socioeconomic challenges experienced by patients and their families. The primary objective is to investigate if the age at which DDH is diagnosed and the treatment protocol are influenced by the ADI or the insurance type. **Methods** Newly diagnosed DDH patients (age less than 10) from 2020 to 2023 were identified at our tertiary care pediatric center. Patients were then categorized into four groups based on ADI percentile: (1) 1-10th percentile, (2) 11-20th percentile, (3) 21-40th percentile, and (4) 41-100th percentile. They were also categorized into 2 groups depending on the insurance type. Age of diagnosis and treatment protocol (non-operative vs. operative) were collected and compared between the different ADI groups and insurance groups. Operative treatment was defined as open reduction with or without Femoral/ pelvic osteotomy. **Results** 327 patients satisfied the inclusion criteria and had available ADI scores for analysis. The average age at diagnosis was notably lower in Group 1 compared to all other ADI groups ($p < 0.05$), and considerably lower for patients with commercial insurance compared to those with public ($p = 0.0002$). The rate of surgical treatment was markedly lower in Group 1 compared to Groups 2 and 3 (both $p < 0.05$), and notably lower for those with commercial insurance compared to public ($p = 0.0005$). Groups 2-4 showed no significant differences in average age at diagnosis or surgical treatment rate. **Conclusion** The study results demonstrate that socioeconomic factors play a significant role in the diagnosis timing and consequently the treatment course of DDH patients. Specifically, patients residing in areas with lower levels of deprivation tend to be diagnosed at a younger age and undergo surgical treatment less frequently. Level of evidence Level III; retrospective comparative study

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

No Difference in 10-Year Surgical Complication Rates Following Primary Total Hip Arthroplasty in Patients With Solid Organ Transplant: A Matched Cohort Analysis

INTRODUCTION As the life expectancy of solid organ transplant (SOT) recipients increases, more patients are undergoing elective total hip arthroplasty (THA). Although previous literature has demonstrated no difference in 2-year implant survivorship, there is limited data observing long-term revision rates in this population. Therefore, the purpose of this study was to compare 90-day, 2-year, 5-year, and 10-year implant survivability following primary THA in patients with and without prior SOT. **METHODS** A retrospective cohort analysis of patients undergoing elective THA was conducted using a national administrative claims database. Those with a history of SOT were propensity-matched to a control of patients without SOT, based on age, gender, Charlson Comorbidity Index (CCI), and obesity using a 1:4 ratio. Kaplan Meier analysis was used to compare the cumulative incidence rates of revision arthroplasty and a Cox Proportional Hazard Ratio was used to compare hazard ratios between matched cohorts and unmatched cohorts. **RESULTS** After matching, 1,050 patients were included in the SOT cohort, 4,098 patients in the matched control cohort, and 10,000 patients in the unmatched control cohort. There was no significant difference in the 10-year cumulative incidence and risk revision surgery in THA patients with a history of SOT, when compared to the matched control [HR: 0.94; 95% CI: 0.64-1.38; $p=0.737$] and unmatched control [HR: 0.98; 95% CI: 0.68-1.41; $p=0.912$]. There were no significant differences in the cumulative incidence and risk of all-cause revision at different time periods (90-days, 2-years, and 5-years) or for various indications for revision surgery within 10 years (periprosthetic joint infection, mechanical loosening, dislocation/instability, periprosthetic fracture, and articular wear) when SOT was compared to both matched and unmatched controls ($p>0.05$ for all). **CONCLUSION** Patients with SOT undergoing THA do not have an increased risk of revision surgery or implant-related complications when compared to a matched cohort and the general population. As such, surgery should not be excluded or delayed in this patient population.

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

The Association Between Oral Bone-Mineral-Density Reducing Medications and the Risk of 2-Year Implant-Related Complications Following Total Knee Arthroplasty

INTRODUCTION Certain medications interfere with the bone remodeling process and may potentially increase the risk of complications after total knee arthroplasty (TKA). As patients undergoing TKA may be taking these bone mineral density (BMD) reducing medications, it is unclear as to whether and which medications impact TKA outcomes. Therefore, the purpose of this study was to observe the impact of various BMD reducing medications on 2-year implant-related complications following TKA. **METHODS** A retrospective analysis of patients undergoing primary TKA was conducted using a national administrative claims database. Patients were identified if they were taking any known BMD reducing medication and were compared to control patients. To control for confounders associated with taking multiple agents, multivariable logistic regression analyses were conducted for each 2-year outcome (all-cause revision, loosening-indicated revision and periprosthetic fracture (PPF)-indicated revision) with the output recorded as odds ratios (OR). **RESULTS** In our study, 502,927 of 1,276,209 TKA patients (39.4%) were taking at least one BMD reducing medication perioperatively. On multivariable analysis, medications associated with a higher likelihood of 2-year all-cause revision included first- and second-generation antipsychotics (FGAs & SGAs) (OR: 1.42 and 1.26, respectively), selective serotonin reuptake inhibitors (SSRIs) (OR: 1.14), glucocorticoids (1.13), and proton pump inhibitors (PPIs) (OR: 1.23) ($P < 0.05$ for all). Medications associated with a higher likelihood of 2-year PPF included SGAs (OR: 1.51), SSRIs (OR: 1.27), aromatase inhibitors (AIs) (OR: 1.29), and PPIs (OR: 1.42) ($P < 0.05$ for all). **DISCUSSION AND CONCLUSION** Of the drug classes observed, the utilization of perioperative PPIs, SSRIs, glucocorticoids, FGAs, and SGAs were associated with the highest odds of all-cause revision. Our findings suggest a relationship between these medications and BMD-related complications; however, further studies should seek to determine the causality of these relationships.

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

Data-Driven Preoperative Hemoglobin Strata that Maximize the Likelihood of Blood Transfusion following Single-Level Lumbar Fusion Are Also Predictive of Major Complications and Deep Infections

STUDY DESIGN Retrospective cohort study **OBJECTIVE** To determine data-driven preoperative hemoglobin strata specific to single-level lumbar spine fusion that maximize the likelihood of 90-day blood transfusion, and evaluate whether these strata are associated with increased risk of 90-day major complications and 2-year deep infection. **SUMMARY OF BACKGROUND DATA** Optimizing patients undergoing single-level lumbar spine fusion helps reduce the use of blood transfusions which are associated with an increased risk of major complications and deep infection. Current hemoglobin thresholds for anemia severity were published in 1968 and are not surgery specific. **METHODS** A retrospective cohort analysis was performed using a national database to identify patients undergoing primary single-level lumbar fusion with recorded hemoglobin values 30 days before surgery. Stratum-specific likelihood ratio (SSLR) analysis defined sex-based hemoglobin strata associated with the risk of 90-day postoperative blood transfusion. Each stratum was propensity-score matched to the highest identified hemoglobin stratum. Incidence rates and risk of 90-day major complications and 2-year deep infection between strata were observed. **RESULTS** For 90-day blood transfusion, SSLR identified three female [Strata, Likelihood ratio (5.0-10.9, 2.41; 11.0-12.4, 1.35; 12.5-17.0, 0.78)] and three male hemoglobin strata (5.0-11.9, 2.95; 12.0-13.4, 1.46; 13.5-13.9, 0.71). Increased risk of 90-day major complications was associated with two female (11.0-12.4 [RR: 1.52; <0.001], 5.0-10.9 [RR: 3.40; p<0.001]) and one male stratum (5.0-11.9 [RR: 2.02; p<0.001]). Increased risk of 2-year deep infection was associated with one female (5.0-10.9 [RR: 3.67; p<0.001]) and one male stratum (5.0-11.9 [RR: 2.11; p=0.005]). **CONCLUSION** SSLR analysis established single-level lumbar fusion-specific hemoglobin strata that maximize the likelihood of 90-day blood transfusions and predict the risk of 90-day major complication and 2-year deep infection. We recommend using these thresholds during preoperative optimization, noting the sequential increase in risk of complications starting with a hemoglobin of less than 13.5 in males and 12.5 in females.

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

Does Socioeconomic Status Correlate with Outcomes of Pediatric Musculoskeletal Infections?

Introduction Musculoskeletal (MSK) infections are prevalent among pediatric populations. Previous research has indicated that socioeconomic status (SES) significantly influences the outcomes of these infections, though there is limited understanding of this relationship in pediatric cohorts. The Area Deprivation Index (ADI), which gauges disadvantage at the neighborhood level, stands as a key marker for SES. The main objective of this study is to investigate if ADI influences the disease progression and the specific causative organisms of pediatric MSK infections. **Methods** A single-center retrospective cohort analysis was conducted using patient charts from a large, urban children's hospital. ICD-10 codes were utilized to identify pediatric patients (aged 0-18 years) with a diagnosis of osteomyelitis, septic arthritis, cellulitis, or myositis who were treated between 2017 and 2022. Patient data, including infection type, culture results, and treatment timeline were collected. Each patient's address was inputted into the Neighborhood Atlas[®] mapping website to determine ADI. The highest value of ADI indicated a lower-resourced area. Patients were stratified based on ADI, and data was compared using Mann-Whitney U test for continuous data and Chi-square/Fisher's exact test for binary and categorical data. **Results** A total of 121 patients were included. Categorization based on ADI revealed 25 in the 1-10 ADI percentile group, 36 in the 11-20 group, 38 in the 21-40 group, and 22 in the 41-100 group. There was no significant difference between ADI and the type of MSK infection, infectious organism, or clinical course. Additionally, there was no significant difference between the median ADI for each type of MSK infection. **Conclusion** The study demonstrates that ADI does not significantly influence the incidence of MSK infection type, causative organism, or time to definitive treatment in pediatric populations. Developing insight into the epidemiological factors impacting pediatric MSK infections can help pediatric orthopaedic surgeons address health inequities and provide personalized care.

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

Data-Driven Body-Mass Index Threshold Associated with Increased Risk of 2-Year Periprosthetic Joint Infection Following Total Shoulder Arthroplasty

Introduction: Body-mass index (BMI) is a modifiable risk factor for medical and infectious complications following total shoulder arthroplasty (TSA). Previous studies investigating BMI were limited to the conventional classification system, which may be outdated for modern day patients. Therefore, the purpose of this study was to identify BMI thresholds that are associated with varying risk of 90-day medical complications and 2-year prosthetic joint infection (PJI) following TSA. **Methods:** A national database was utilized to identify 10,901 patients who underwent primary, elective TSA from 2013 to 2022. Patients were only included if they had a BMI value recorded within one month prior to TSA. Separate stratum-specific likelihood ratio (SSLR) analyses, an adaptive technique to identify data-driven thresholds, were performed to determine data-driven BMI strata associated with varying risk of 90-day medical complications and 2-year PJI. The incidence rates of these complications were recorded for each strata. To control for confounders, each BMI strata was propensity-score matched based on age, sex, hypertension, heart failure, chronic obstructive pulmonary disease, and diabetes mellitus to the lowest identified BMI strata for both outcomes of interest. The risk ratio (RR) and 95% confidence interval (CI) were recorded for each matched analysis. **Results:** The average age and BMI of patients was 70.5 years (standard deviation [SD] $\hat{A}\pm 9.8$) and 30.7 (SD $\hat{A}\pm 6.2$), respectively. SSLR analysis identified two BMI strata associated with differences in the rate of 2-year PJI: 19-39 and 40+. The same strata were identified for 90-day major complications. When compared to the matched BMI 19-39 cohort, the risk of 2-year PJI was higher in the BMI 40+ cohort (RR: 2.7; 95% CI 1.39 $\hat{A}$ 5.29; $p=0.020$). After matching, there was no significant difference in the risk of 90-day major complications between identified strata (RR: 1.19, 95% CI: 0.86 $\hat{A}$ 1.64; $p=0.288$). **Conclusion:** A data-driven BMI threshold of 40 was associated with a significantly increased risk of 2-year PJI following TSA. This is the first TSA study to observe BMI on a continuum and observe at what point BMI is associated with increased risk of 2-year PJI following TSA. Our identified BMI strata can be incorporated into risk-stratifying models for predicting both PJI and 90-day major complications to minimize both.

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

Beyond Words: Embracing Migration Percentage as the Universal Measurement for Hip Displacement in Children with Cerebral Palsy by Radiologists and Orthopedic Surgeons

Migration percentage (MP), which quantifies hip displacement, is a radiographic measurement employed in hip surveillance for children with cerebral palsy (CP) to ensure standardization. In 2018, our institution implemented updated hip surveillance guidelines aimed at enhancing the quality of care for CP patients. This study aims to evaluate the utilization of MP and other indicators of hip displacement in radiographic impressions by both radiologists and orthopedic surgeons, before and after the introduction of the revised guidelines. A retrospective review identified CP patients who underwent hip surveillance imaging for hip displacement beginning in 2016, using an institutional hip surveillance database. Radiographic impressions for these patients were collected between 2016 and 2019. Only patients with both radiology and orthopedic impressions for the same image were included. The cumulative incidence of MP in the impressions was documented and compared between orthopedic surgeons and radiologists. Furthermore, we compared the inclusion of MP before and after the guidelines were implemented in 2018 within each group. Additionally, we examined the inclusion of specific descriptors, such as "Shenton's line," "acetabular index/acetabular angle," "acetabular dysplasia," "subluxation," "dislocation," "coverage," and "normal/good/well/nicely," within the impressions. Statistical significance was assessed using Fisher's Exact Test. One hundred children were identified from the database that had images containing both orthopedic and radiology impressions related to hip displacement. A total of 251 x-rays were analyzed. Only one radiology impression (0.40%) and 33 orthopedic impressions (13.15%) incorporated MP ($p < 0.001$). When comparing the inclusion of MP before and after 2018, radiology impressions showed no significant change, with 0 (0%) inclusion before 2018 and 1 (0.94%) inclusion after 2018 ($p = 0.874$). Orthopedic impressions demonstrated an increase in MP inclusion, rising from 12 (8.28%) before 2018 to 21 (19.81%) after 2018 ($p = 0.013$). "Acetabular dysplasia," "subluxation," "coverage," and "normal/good/well/nicely" were included more frequently than MP for orthopedic surgeons. Radiologists most frequently included the terms "coxa valga" and "subluxation". This study supports the existing literature that MP is not commonly included in radiology impressions and instead other nonspecific terms are used to describe hip displacement. Our research also extends this conclusion to orthopedic surgeon interpretations. Implementing extensive education on MP measurements for both radiologists and orthopedic surgeons is a crucial component of successful hip surveillance in children with CP. At our tertiary, academic institution, there is a lack of routine measurement of migration percentage for hip surveillance in children with cerebral palsy by both radiologists and orthopedic surgeons.

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

The Creation of Data-Driven Preoperative Hemoglobin A1c and Same-Day Glucose Strata to Stratify Complication Risk Following Total Hip Arthroplasty

Introduction In patients undergoing total hip arthroplasty (THA), Hemoglobin A1c (HbA1c) is the gold standard marker to screen glycemic control preoperatively, and glucose levels are used to observe glycemic control perioperatively.^{1,2} Previously established thresholds for these markers are either non-specific for THA or had poor power in predicting complications.³ Thus, the purpose of this study was to identify data-driven strata for both preoperative HbA1c and same-day glucose levels that maximize differences in the likelihood of 90-day complications following THA. **Methods** Patients who underwent THA from 2013 to 2022 were identified using a national, multicenter database.⁴ Stratum specific likelihood ratio (SSLR) analysis was performed to determine separate strata for HbA1c and same-day glucose levels that optimized the likelihood of 90-day complications following THA. Each stratum was propensity-score matched based on age, sex, hypertension, heart failure, chronic obstructive pulmonary disease, and obesity to the lowest respective HbA1c or glucose strata. The risk ratio (RR) with respect to the lowest matched stratum was observed. Propensity matching is recorded as risk ratios (RR), 95% confidence intervals (95% CI), and p-values. P-values < 0.05 were considered statistically significant. **Results** In total, 18,728 patients were identified with a mean age of 67 $\pm$ 12 years. Our SSLR analysis identified three data-driven HbA1c strata (4.5-5.9, 6.0-6.9, and 7.0+) and two same-day glucose strata (60-189 and 190+) that predicted 90-day major complications. No strata were identified that optimized differences in the likelihood of 90-day wound complications. For HbA1c, when compared to the propensity-matched lowest strata (4.5-5.9), the risk of 90-day major complications sequentially increased as the HbA1c strata increased: 6.0-6.9 (RR: 1.21; p=0.041), 7+ (RR: 1.82; p<0.001). For same-day glucose, when compared to the matched lowest strata (60-189), the risk of 90-day major complications was higher for the 190+ strata (RR: 1.5; p<0.001). **Discussion** Contrary to existing single HbA1c thresholds, our results support the use of multiple HbA1c strata to predict the risk of experiencing a major complication within 90 days of a THA. Additionally, we identified a single cut-off level for glucose of 190 that can be used as the maximum target blood glucose level perioperatively. These results can be incorporated into risk stratification models for surgical decision-making and can be used in the development of future clinical practice guidelines.

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

Predicting Complications following Patella Fracture Repair Using the 5-Item Modified Frailty Index

INTRODUCTION: Several studies have condensed the original 11-item modified frailty index (mFI-11) to the 5-item mFI (mFI-5) for easier use in clinical practice. Higher mFI-5 scores have been shown to predict adverse outcomes in various orthopaedic procedures. The purpose of this study was to evaluate the utility of the mFI-5 in a population of patients undergoing surgery for patella fractures. **METHODS:** The NSQIP database was queried to identify patients ages 50 or older who underwent surgery for patella fractures between 2006-2019. The mFI-5 was calculated based on the following 5 comorbidities: diabetes, CHF, hypertension, COPD, and dependent functional status. Frailty scores were stratified based on number of comorbidities: non-frail, mFI-5 = 0; pre-frail, mFI-5 = 1; frail, mFI-5 = 2; and severely frail, mFI-5 = 3. Bivariate and multivariate analyses were used to compare the complication rates among the mFI-5 scores. **RESULTS:** A total of 2,917 patients with an average age of 67 years were included. Following adjustment, as the mFI-5 increased from a score of 0 to a score of 1, patients had an increased risk of readmission (OR 2.94, $p < 0.001$), reoperation (OR 2.15, $p = 0.005$), urinary tract infection (OR 3.49, $p = 0.017$), and discharge to a non-home location (OR 1.41, $p = 0.007$). Similar risks were seen when comparing patients with a score of 2 or greater to patients with a score of 0, except that those with a score of 2 or greater also had an increased risk of mortality (OR 4.40, $p = 0.034$), wound (OR 3.37, $p = 0.009$), pulmonary (OR 8.69, $p = 0.01$), and sepsis complication (OR 5.58, $p = 0.049$), bleeding requiring transfusion (OR 4.56, $p = 0.013$), and length of stay > 7 days (OR 2.48, $p < 0.001$). **DISCUSSION and CONCLUSION:** Increasing mFI-5 scores were significantly associated with increased morbidity and mortality following surgery for patella fracture. Consideration of the mFI-5 as a readily available tool for risk stratification for this population is warranted and may help ensure appropriate pre- and postoperative care is met to ultimately improve patient outcomes and reduce costs for both the patient and the hospital.

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

Higher 2-Year Cumulative Incidence of Mental Health Disorders Following Irrigation and Debridement in Primary Lumbar Fusion

Introduction: Spinal fusion is an operation used to treat spinal diseases. Surgical site infection (SSI) following lumbar fusion (LF) is a postoperative complication. SSI is treated with irrigation and debridement (I&D), requiring readmittance following discharge or prolonged hospital stays which are deleterious to patients' mental health. The long-term relationship between treating SSI with I&D and patients' mental health remains understudied. Methods: A retrospective cohort analysis was performed using the Mariner dataset from the PearlDiver Patient Records Database using Current Procedural Terminology and International Classification of Diseases procedure codes. Included patients underwent LF with minimum 2- year follow-up and were followed for 2 years. 445,480 LF patients were included, of which 2,762 I&D. Patient demographics between cohorts were conducted using univariate analysis utilizing Pearson Chi-square and Student t-test, where appropriate (Table 1). 2-year cumulative incidence (CI) between LF and I&D cohorts was performed using Kaplan- Meier analysis (Figures 1-3). Cox proportional hazards were utilized to observe significant differences in CI rates (Table 2). Results: 2 year CI depression (HR: 1.72; 95% CI: and stress (HR: 1.35; 95% CI 1.02-1.79; P=0.035) rates were who I&D to those who did not. There was no statistically significant difference in 2-year CI anxiety rates between cohorts ((HR: 0.92; 95% CI: P =0.719). Conclusions: 16.8% of patients developed new-onset depression 2 years following I&D compared to 10.3% for those who underwent LF. Patients undergoing I&D following LF were significantly more likely to experience depression and stress. Mental health services should be available to patients following surgery to mitigate negative mental health outcomes.

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CLINICAL AND TRANSLATIONAL RESEARCH

ORTHOPEDIC SURGERY

A Comparison of Google Web Search to ChatGPT for Reverse Total Shoulder Arthroplasty-Related Questions

The introduction of machine-learning artificial intelligence (AI) chatbots, specifically Chat Generative Pre-trained Transformer (ChatGPT) by OpenAI, has seen a steady increase in usage since its launch in November 2022, including for patients and providers. ChatGPT was shown to provide heterogeneous questions and responses in comparison to Google web search related to hip and knee arthroplasty but this has yet to be examined for reverse total shoulder arthroplasty (RTSA). Therefore, the purpose of this study is to compare answers from popular search questions related to RTSA in Google web search and ChatGPT to assess the accuracy and appropriateness of both search engines as a means to enhance patient education and communication. An input of "reverse total shoulder arthroplasty" was entered into a Google web search using a clean-installed Google Chrome browser. The first 20 frequently asked questions (FAQs) and answers were recorded along with their respective website source and categorized by topic according to Rothwell's Classification Criteria. Questions were pulled from the Google heading titled, "People also ask." The following statement was entered into ChatGPT: "Perform a google search with the search term "reverse total shoulder arthroplasty" and record the 20 most FAQs related to the search term." Each question was recorded and individually inputted into ChatGPT along with the term, "Provide a source." The first 20 FAQs and their respective answers and sources were collected and classified using Rothwell's Classification Criteria. In general, Google web search of FAQs were generally comprised of fact-type topics (in 50% of the FAQs). Similarly, ChatGPT FAQs were also typically comprised of fact-type topics (in 45% of the FAQs). 40% of the sources provided by ChatGPT were unable to be validated, and an additional 20% of the ChatGPT-provided sources were irrelevant to the question at hand. ChatGPT was unable to provide sources for responses to 25% of the FAQs. Additionally, 10% of the sources ChatGPT provided could not be verified. Our study reveals significant discrepancies in RTSA information between Google web search and ChatGPT, particularly in classification, source types, and reliability. Google provided diverse, mostly academic responses focused on RTSA facts, whereas ChatGPT, despite also focusing on fact-type questions about RTSA, frequently offered unverifiable sources. This inconsistency underlines the need for enhanced reliability and accuracy in ChatGPT's RTSA-related content. Ensuring ChatGPT's utility for public RTSA education necessitates ongoing monitoring and improvements in its response quality and source credibility.

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CLINICAL AND TRANSLATIONAL RESEARCH

OTOLARYNGOLOGY

The Impact of A Surgical Checklist Phone Application On PreOperative Compliance: A Quality Improvement Study

INTRODUCTION Access to proper surgical care is hindered by challenges such as noncompliance with pre-operative conditions, paperwork clearance, and timely arrival for surgery, particularly among lower socioeconomic populations and non-English-speaking patients. These barriers contribute to healthcare disparities and suboptimal patient outcomes. This study aims to evaluate the impact of the Surgical Preoperative Checklist app in improving pre-operative compliance by comparing retrospective data with prospective data following the implementation of the resource. **METHODS** Retrospective data from patients who underwent surgery before the implementation of the Surgical Preoperative Checklist app was analyzed to identify existing healthcare disparities and compliance issues. Subsequently, patients scheduled to undergo various surgical procedures were recruited based on the type of surgery they would receive. Prospective data on pre-operative compliance, including adherence to conditions, paperwork clearance, and timely arrival for surgery, is being collected following implementation of the app. The app provided timely reminders, a hotline for support, and language assistance. **RESULTS** As of the current stage of the project, the developed app is ready for deployment into the clinical setting. The delays experienced during app deployment and the IRB approval process highlighted the significance of early and efficient engagement with relevant stakeholders to minimize bureaucratic hurdles. The project's implications extend beyond the immediate study outcomes, serving as valuable lessons for future research endeavors, emphasizing the need for careful planning, clear communication, and contingency strategies to navigate institutional roadblocks effectively. Although prospective analysis is still being conducted, retrospective data showed significant disparities and noncompliance with pre-operative conditions among lower socioeconomic populations and non-English-speaking patients. Following the implementation of the Surgical Preoperative Checklist app, a substantial improvement in pre-operative compliance is expected. This improvement in compliance will result in more efficient care, increased patient satisfaction, reduced last-minute cancellations, and enhanced throughput. **CONCLUSION** Despite encountering significant roadblocks in the form of institutional bureaucracy and approvals, the project remained steadfast in its commitment to creating a user-friendly application that can improve patient outcomes and access to surgical care. By learning from the challenges faced and leveraging the support of stakeholders, the project aims to make a lasting impact in enhancing the pre-operative experience for families and promoting equitable healthcare delivery for all. The pursuit of this project not only addresses the immediate needs of lower socioeconomic populations but also contributes to the broader goal of equitable healthcare for all individuals, regardless of their economic status or language proficiency.

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CLINICAL AND TRANSLATIONAL RESEARCH

OTOLARYNGOLOGY

Efficacy and Benefits of a Novel Headset Device in Facilitating Optimal Bilateral CI Symmetry

Intro: Cochlear implants (CI) can provide vast quality of life improvement on various platforms. In bilateral CI surgery, the achievement of symmetric receiver-stimulator (R/S) placement is crucial for optimizing outcomes. Traditional methods defer to marking for incision sites and can create concerns, such as aesthetics, due to difficulty with aligning. This study aimed to evaluate the efficacy and benefits of a novel adjustable headset device in facilitating optimal bilateral CI symmetry. Methods: Comprehensive chart review of patients undergoing bilateral CI surgery at a tertiary, stand-alone children's hospital from 2017-2023 with and without headset alignment device. Symmetry was verified by measuring the angle of the implants to the patients' eye sockets in degrees on postoperative x-ray imaging. Symmetric was defined as 0-6 and asymmetric was degree >6. Statistical analysis was used to identify factors associated with successful symmetrical placement. Results: Of the 48 bilateral CI cases, 15 (31.3%) patients utilized the headset alignment device. The results prove to be statistically significant, with greater bilateral cochlear implant symmetry when surgical staff utilize the alignment device ($p=.0013$). Although not statistically significant, average time of surgery was shorter in those utilizing the device ($p=0.2869$; 171.6, 188. respectively). Conclusion: Utilization of this novel, non-invasive device shows promising results in optimal placement for bilateral CI patients and improved outcomes for both providers and families through expedited surgical times, functionally, and aesthetics.

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CLINICAL AND TRANSLATIONAL RESEARCH

OTOLARYNGOLOGY

Understanding Racial and Ethnic Disparities in Perioperative Pain Management following Routine Pediatric Tonsillectomy

Background: Hispanic and Latino (H/L) children are underrepresented in pain management studies, demonstrating an increasing need to understand disparities in pain management in this rapidly growing minority population. Our study aims to evaluate and understand factors that contribute to the racial and ethnic differences in the peri-operative experience following routine pediatric tonsillectomy. Hypothesis: We hypothesize ethnicity, socioeconomic status, use of an interpreter in healthcare settings, culture, and home situation among certain demographic patients will greatly influence pain perception and management. Methods: A retrospective chart review of patients receiving routine tonsillectomy from a tertiary hospital from October 2017 to March 2020 was performed. Demographic (age, race, ethnicity, and median household income) and perioperative data, including pain severity and medication management were obtained. Descriptive statistics and multiple linear regression using GraphPad Prism were conducted to identify factors associated with higher post-operative pain scores. Results: Of 3997 included patients, 47% were female, 31% self-identified as H/L, and the mean age at time of surgery 80.4 months (SD 48.7). Surgical indications included sleep-disordered breathing (88%), tonsillitis (7.3%), or both (5.1%). Overall, H/L patients were less likely to be asked to score their postop pain ($OR=0.5791$, $\chi^2=42.3$, $p<0.0001$). However, H/L patients who did report pain scores were more likely to receive post-operative narcotics after controlling for gender, age, and insurance status ($p<0.0001$). The median amount of narcotics administered normalized by body mass index and minutes spent in the post-anesthesia care was 0.17 morphine equivalents in H/L patients compared to 0.19 morphine equivalents in non-H/L patients. Although, normalized narcotic dose did not vary by ethnicity, H/L patients with access to an interpreter in the postoperative anesthesia care unit received lower narcotic equivalents ($p<0.01$). Conclusion: Disparities in perioperative pain management following routine pediatric tonsillectomy exist. H/L are less likely to have comprehensive evaluation of their pain in the recovery unit which may influence their overall pain management. Access to an interpreter in recovery may serve to mitigate this issue. Further understanding of factors driving differences in pain management may improve patient satisfaction, quality of care, and aid in creation of more standardized protocols.

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CLINICAL AND TRANSLATIONAL RESEARCH

OTOLARYNGOLOGY

Evaluation of Cochlear Implantation in Children with Cochlear Nerve Deficiency

There is a lack of clarity regarding which children will have effective outcomes post cochlear implantation (CI) when there is imaging evidence of an absent or hypoplastic cochlear nerve. Our study evaluated the preoperative candidacy and postoperative performance of CI recipients with absent or hypoplastic cochlear nerves. A retrospective case review was performed to identify children with cochlear nerve absence or deficiency who underwent CI evaluation. High-resolution three-dimensional T2-weighted magnetic resonance imaging in the oblique sagittal and axial planes were used to identify absent or hypoplastic cochlear nerves. CI candidacy was determined by test results from the auditory brainstem response and behavioral audiometry. Neural response telemetry (NRT) and behavioral audiometry were used to measure audiological performance after cochlear implantation. Seven children underwent cochlear implantation with imaging evidence of an absent or hypoplastic cochlear nerve. Based on aided behavioral test results indicating speech awareness thresholds of greater than 25 dB HL, all children were deemed candidates for CIs. Two patients experienced post-implantation facial nerve stimulation, prompting further re-programming of implant. Evaluation of auditory rehabilitation status indicated significant and appropriate benefit from CI in all seven patients who underwent our candidacy screening and testing. Due to developmental delays, one patient's performance was determined from post-CI NRT findings and demonstrated sound awareness through exhibited behavioral responses. Our experience with CIs for children with absent or hypoplastic cochlear nerves demonstrates that CI can be a viable option in select patients who satisfy pre-operative audiological criteria. Radiological identification of a hypoplastic or aplastic cochlear nerve does not preclude auditory innervation of the cochlea. CI recipients in this subgroup must be counseled on difficulty in predicting post-implantation language /speech outcomes, and cautioned about facial nerve stimulation.

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CLINICAL AND TRANSLATIONAL RESEARCH

OTOLARYNGOLOGY

Thyroid Surveillance in Pediatric PTEN Hamartoma Tumor Syndrome (PHTS): A Case Series

Introduction: PTEN hamartoma tumor syndrome (PHTS) comprises a spectrum of disorders resulting from PTEN gene mutations, sharing clinical manifestations, notably an elevated predisposition to differentiated thyroid carcinoma. Consequently, early thyroid ultrasound surveillance is common, often followed by surgical intervention upon the detection of suspicious findings. Our primary objective is to characterize the natural history of thyroid abnormalities in pediatric PHTS and develop a surveillance protocol for our patients. **Methods:** A retrospective analysis spanning from 2009 to 2023 was conducted at our institution, identifying 29 children (aged 0-18) with pathogenic mutations in the PTEN gene. **Results:** Our analysis revealed that 86% (n=25) of patients exhibited macrocephaly, 52% (n=15) experienced developmental delay, and 36% (n=4) had a history of benign masses. Among the cohort, 22 patients underwent thyroid ultrasound (US) screening, revealing abnormal findings in 55%. The median age at diagnosis was 14 years (range: 8-18), with an initial diagnosis typically occurring at 5 years (range: 1-18). Thyroid abnormalities encompassed single nodules, multiple nodules, and those with diffusely abnormal morphology. Seven patients underwent fine-needle aspiration (FNA), all of which yielded benign results. Additionally, four patients opted for prophylactic thyroidectomy due to challenges in keeping up with the ultrasound surveillance of notably abnormal thyroid sonograms, aiming to preclude any potential malignant progression. Notably, none of our patients were diagnosed with thyroid cancer. **Discussion:** Clinicians should carry a high suspicion for PTEN in children presenting with macrocephaly, developmental delay, vascular malformations, or a suggestive family history, particularly when thyroid abnormalities are present. Recommending regular thyroid ultrasound screenings starting at age 10, with the screening frequency tailored based on abnormality to every 1-2 years, and annually from age 18 is imperative. Suspicious nodules should undergo FNA, and for select patients, prophylactic thyroidectomy may prove beneficial.

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CLINICAL AND TRANSLATIONAL RESEARCH

PHARMACOLOGY

Xylazine in Fentanyl Mixtures: A Growing Concern in the Opioid Crisis and the Use of Oxytocin for Reversing Respiratory Depression

The opioid epidemic in the United States has resulted in devastating consequences, with over 500,000 Americans losing their lives since 1999, affecting countless families and communities. Synthetic opioids, particularly fentanyl, play a significant role in the escalation of opioid overdoses. However, recent concerns have emerged regarding the prevalence of the veterinary tranquilizer xylazine in fentanyl mixtures, which is not counteracted by naloxone. With 100,000 annual deaths in the United States from opioid overdoses in the United States, and the presence of xylazine-laced fentanyl in 48 out of 50 states, where approximately 23% of fentanyl powder contains xylazine, further research to counteract the effects of combined xylazine with fentanyl are needed. In this study, two groups of male Sprague Dawley rats ($n=8$) received a combination of intraperitoneal (IP) fentanyl (0.5 mg/kg) and xylazine (1 mg/kg). 10 minutes post-injection, group one was given IP Oxytocin (100 nmol/kg) while group two received IP saline. Respiratory function was quantified using a whole-body plethysmography system in unrestrained and freely moving animals. In untreated animals, fentanyl and xylazine decreased respiratory frequency by 80%, and tidal volume decreased 25%. These drugs also induced an increase in apnea and hypopnea occurrence. In animals given oxytocin, breathing frequency was 20% higher, and the occurrence of apneas was 75% lower compared to untreated animals. These results indicate oxytocin is a promising treatment to mitigate opioid-induced respiratory depression in emergency and/or clinical settings. Further exploration of oxytocin's effectiveness and implementation strategies could pave the way for improved interventions and better outcomes in combating the detrimental effects of the opioid crisis and the growing prevalence of xylazine.

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CLINICAL AND TRANSLATIONAL RESEARCH

PHARMACOLOGY

Kidney Effects of Sodium-glucose Cotransporter-2 Inhibitors in a Pediatric Population

INTRODUCTION Sodium-glucose co-transporter-2 inhibitors (SGLT2i) have transformed care for adult patients with type II diabetes (T2D), heart failure (HF), and chronic kidney disease (CKD). In adult trials, most participants experience an acute drop in glomerular filtration rate (GFR) after starting SGLT2i. Despite this, use of SGLT2i is strongly associated with improved long-term kidney outcomes. There is a paucity of data describing the use and impact of SGLT2i in pediatric patients, especially with regards to kidney function and disease. The objective of this study was to observe the short-term effects of SGLT2i on kidney function of pediatric patients. **METHODS** We performed a retrospective study of patients aged 0-25 years who were prescribed Empagliflozin or Dapagliflozin at our institution between December 2021 and December 2022. Data was collected from patient medical records. Laboratory data, including serum creatinine at baseline, 2-week, 1-month, and 3-month intervals, were collected. We used the CKiD Under 25 formula (creatinine only) to estimate GFR. Our primary outcome was the change in eGFR from baseline to 3-months after starting the medication. **RESULTS** Of the 42 patients prescribed an SGLT2i in the past year, 17 patients had available lab data to be included in our analysis. Baseline diagnosis was HF in 53% (n= 9), Glycogen Storage Disease Type 1B in 29% (n=5), and T2D in 24% (n=4) of participants. One patient was diagnosed with CKD and received a kidney transplant 2 years prior to beginning Empagliflozin. Mean (Standard Deviation) baseline age was 17 (5.6) years and eGFR was 121 (46) mL/min/1.73m². With this population in mind, 24% (n= 4) of patients experienced an increase in GFR, while 76% (n= 13) of patients experienced a decline in GFR between their baseline and 3-month interval measurements. In total, 59% (n= 10) experienced a decline in GFR greater than 5%, and 41% (n= 7) experienced a decline in GFR greater than 10%. **CONCLUSION** Among pediatric patients at our center who received an SGLT2i prescription in the past year, most patients experienced an acute decline in GFR within 3-month follow up kidney function panels. This data suggests SGLT2is may have similar clinical effects in youth to what was observed in large trials in adults. We are undertaking future analyses to study changes in blood pressure and hemoglobin over the same interval, along with safety and tolerability assessments.

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CLINICAL AND TRANSLATIONAL RESEARCH

PSYCHIATRY

Obsessive Thoughts and Psychotic Features Following Glioblastoma Treatment in an Elderly Patient: A Case Report

Psychiatric manifestations following glioblastoma multiforme (GBM) treatment, particularly those involving obsessive thoughts and psychotic features, are not commonly documented, posing challenges in diagnosis and management. Both GBM and its standard treatment modalities, including maximal safe resection followed by radiotherapy and chemotherapy, have direct impact on brain functioning. Existing research has focused mainly on the cognitive and neurological sequelae in GBM patients and highlights psychiatric symptoms as a primary manifestation of brain cancer; however, little attention has been given to the psychiatric impairment some GBM survivors experience after treatment. Here, we report the case of an 80-year-old woman with a history of GBM and no past psychiatric history. She developed obsessive thoughts, hallucinations, anorexia, and dysgeusia after undergoing a craniotomy of the right frontotemporal lobe, followed by radiotherapy and chemotherapy for treatment of glioblastoma. Certain symptoms, like anorexia, were initially attributed to chemotherapy but failed to resolve, even when nausea, vomiting, and other chemotherapy-induced symptoms had subsided. The patient was referred for psychiatric, palliative care, and integrative medicine evaluation after the onset of symptoms, and has shown improvement in obsessive thoughts, though certain psychotic features including hallucinations have been difficult to manage, despite antipsychotic treatment. This case highlights the importance of a holistic approach when caring for patients with GBM, and the need for timely recognition of psychiatric disorders in patients following GBM treatment to ensure appropriate treatment and enhanced quality of life.

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CLINICAL AND TRANSLATIONAL RESEARCH

PSYCHIATRY

Memory Complaints after COVID-19: a Potential Indicator of Primary Cognitive Impairment or a Correlate of Psychiatric Symptoms?

Cognitive impairment and symptoms of psychiatric disorders have been reported frequently as features of post-acute sequelae of SARS-CoV-2 infection. This study aims to investigate subjective memory complaints in COVID-19 survivors and determine if these are more strongly associated with objective cognitive impairment related to sequelae of SARS-CoV-2 infection or with symptoms of psychiatric conditions. A total of 608 COVID-19 survivors were evaluated in-person 6 to 11 months after hospitalization, with 377 patients assigned to a "no SMC" group and 231 patients assigned to an SMC group based on their Memory Complaint Scale scores. Follow-up evaluations included an objective cognitive battery and scale-based assessments of anxiety, depression, and post-traumatic stress symptoms. We found the perception of memory impairment in COVID-19 survivors to be more strongly associated to core symptoms of psychiatric conditions rather than to primary objective cognitive impairment. Univariate analysis indicated significant differences between the "no SMC" and SMC groups, both for the psychiatric symptom evaluations and for the cognitive evaluations ($p < 0.05$); however, the psychiatric symptoms all had large eta-squared values (ranging from 0.181 to 0.213), whereas the cognitive variables had small/medium eta-squared values (ranging from 0.002 to 0.024). Additionally, multiple regression analysis indicated that only female sex and depressive and post-traumatic stress symptoms were found to be predictors of subjective memory complaints. These findings may help guide clinical evaluations for COVID-19 survivors presenting with memory complaints while also serving to expand our growing understanding of the relationship between COVID-19, subjective memory complaints, and the risk of cognitive decline.

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CLINICAL AND TRANSLATIONAL RESEARCH

PSYCHIATRY

Demographic and Medical Correlates of Caregiver Reported Benefits and Burdens of Continuous Glucose Monitor (CGM) Use Among Racially Minoritized Youth with Type 1 Diabetes (T1D)

Introduction Due to racialized health inequities in T1D research and technology distribution, little is known about T1D technology experiences in racially minoritized youth and their caregivers. This study examines demographic and medical correlates of CGM benefits/burdens among racially minoritized families. **Methods** Fifty-seven youth aged 10-15 (Mean age = 12.9 ± 1.7 years, 58% male, 42% female, Mean T1D Duration = 5.2 ± 3.4 years, Mean HbA1c = $10.6 \pm 2.0\%$, Mean CGM Wear-time = 69%, Mean CGM Time in range = 29%, 39% pump use, 56% two-caregiver household, 32% public insurance, 56% Black/African American, non-Hispanic, 26% Hispanic/Latinx/a/o, 5% white, non-Hispanic, 5% Mixed Race, 4% MENA/SWANA, 4% Another race/ethnicity) who reported <75% CGM use and their caregivers. Demographic and medical variables were caregiver reported or obtained from the electronic health record. Caregivers completed the Benefits and Burdens of CGM (Ben/Bur) form. Mann-Whitney U tests or Spearman's Rank Correlation tests were used. **Results** The highest rated benefit was "CGM makes taking care of diabetes easier" (Mean Ben = 4.4 ± 1.1) and burdens were "CGM sensor readings cannot be trusted" and "CGM is painful to wear" (Mean Bur1 = 2.2 ± 0.95 ; Mean Bur2 = 2.2 ± 1.0). Increased CGM wear time and shorter T1D duration was associated with increased CGM burden ($\rho = 0.37$, $p = 0.02$; $\rho = -0.30$, $p = 0.03$). Race/ethnicity, insurance, age, gender, CGM use duration, CGM time in range, and HbA1c were not associated with Ben/Bur. **Conclusion** In a sample of racially minoritized families, those with shorter T1D durations may still be working through the emotional adjustment process, which may exacerbate caregiver perceptions of CGM burdens. This study is limited by a lack of prior research on the psychometrics of Ben/Bur in a racially minoritized sample. Future studies should examine whether the increased burden from higher CGM use is a risk factor for negative psychosocial outcomes.

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CLINICAL AND TRANSLATIONAL RESEARCH

RADIOLOGY

Effects of Preoperative Breast MRI on Surgical Management in Women Aged 40 Years and Younger with Breast Cancer

Evaluating the use of preoperative breast MRI on the management of breast cancer can help guide surgical decision making for young female patients newly diagnosed with breast cancer. A retrospective chart review of the George Washington University database between January 2015 and December 2020 identified 125 women age 40 or below diagnosed with breast cancer. Of the 125 women, 23 were excluded from the study as they were lost to follow up due to care transfers. The management impact of pre-operative MRI was examined and variables collected include age, race, family history, genetic predisposition, breast density, method of detection, initial imaging findings, initial biopsy results, preoperative MRI findings, additional biopsies, additional biopsy results, and surgery type. Patient ages ranged from 22 to 40 (mean 34.5), 69 (67.6%) had a family history of breast cancer, 81 (79.4%) had dense breasts (30 extremely dense and 51 heterogeneously dense), and 82 (80.4%) had the cancer detected due to clinical symptoms with the remaining during surveillance due to high risk. Of all women included, 55 (53.9%) had additional findings on MRI warranting biopsy of which 25 (45.5%) were biopsy proven cancer. 39 (39.4%) patients had lumpectomy and 59 (59.6%) had mastectomy. 1 (0.01%) patient did not undergo surgery due to widespread metastasis. The use of preoperative MRI identified additional carcinoma in 25 (24.5%) out of 102 patients. 24 (96%) in the ipsilateral breast, and 1 (4%) in the contralateral breast. Overall, this data indicates that the use of preoperative MRI for the treatment of breast cancer in young patients increases the detection of occult breast cancer prior to definitive therapy in 24.5% of patients, critically important information for optimal management. We recommend that all young women with newly diagnosed breast cancer undergo pre-operative MRI to further optimize patient care.

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CLINICAL AND TRANSLATIONAL RESEARCH

RADIOLOGY

Dual-Energy Subtraction Radiography: A Method to Improve Pulmonary Nodule Detection

Purpose: This literature review compared the accuracy and sensitivity of dual-energy subtraction radiography (DESR) to conventional radiography (CR) in the detection of pulmonary nodules. We hope to showcase DESR as a potential imaging aid in the detection of pulmonary nodules for current and future clinicians. **Methods:** The authors searched Pubmed/MEDLINE using the terms "Dual-energy subtraction radiography," and "Dual-Energy Chest Radiography." Only studies involving the diagnosis of pulmonary nodules and those comparing DESR to conventional plain-film chest radiography were included. The following data was recorded: Reader Type (Resident or Attending Physician or Both), Number of radiographs, Number of nodules, Diameter size of nodules (range in mm), and Energies used (Kvp). The quantitative outcomes analyzed were the mean difference of Receiver Operating Characteristic Area under the curve (ROC AUC) and difference in sensitivity between DESR and CR. **Results:** A total of 23 studies were analyzed. A total of 2070 patients were included in the study, 747 of which had control radiographs without any nodules present. A total of at least 2275 nodules were identified among the 1323 patients that contained pulmonary nodules. The mean/median of nodule size ranged from 4 mm to 27 mm. The average sensitivity for pulmonary nodule detection in the DESR group was 0.575 (95% CI: 0.491 - 0.659) and the average sensitivity in the CR group was 0.439 (95% CI: 0.385 - 0.493) The mean difference for the sensitivity of DESR to CR was 0.136 ($p < 0.001$), and the effect size was large. The mean difference for DESR ROC AUC compared to conventional radiography ROC AUC was 0.06 (95% CI: 0.034 - 0.085). This means that, on average, there is a 6% increase in the ability of physicians to identify if a lung nodule is present or not when DESR is used instead of CR. **Conclusion:** DESR showed superior sensitivity and ROC AUC values compared to CR in detecting pulmonary nodules. This shows how DESR is superior to CR in discriminating between classes (higher ROC AUC) and more effective in identifying true positives (higher sensitivity). DESR may enhance radiologist capacity to detect pulmonary nodules.

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CLINICAL AND TRANSLATIONAL RESEARCH

RADIOLOGY

Prostate MRI PIRADS scores in Caucasian and African American men: Comparing incidence of abnormal results in a 1024 patient cohort.

The study's purpose is to determine if there is a difference in the PIRADS (Prostate Imaging and Reporting System) scores of prostate MRIs of Caucasian and African American men being evaluated for prostate cancer. PIRADS is a standardized imaging scoring system used to assign degree of suspicion for lesions identified on prostate MRI. This was a retrospective IRB-approved study that reviewed the MRI exams of 1,024 males from March 2020 to December 2022 seen at George Washington University Hospital, who identified as either Caucasian or African American. These patients were being evaluated for prostate cancer based on elevated PSA or other biomarkers, family history or other clinical suspicion. The PI-RADS Version 2 was developed in 2016 as a radiology tool to standardize and assess the risk of prostate cancer on MRI exams. The multiparametric prostate MRI scans were read by one of three board-certified radiologists and given a corresponding PIRAD score of ≤ 2 (very low suspicion), 3 (equivocal suspicion), 4 (high suspicion) or 5 (very high suspicion). Of the cohort, 548 identified as Caucasian with average PIRADS ≤ 2 , 188 (34%), 3, 173 (32%), 4, 127 (23%) and 5, 60 (11%). 476 African American patients were analyzed with average PIRADS ≤ 2 , 153 (32%), 3, 151 (21%), 4, 99 (21%) and 5, 73 (15%). Overall, the average PIRADS score for each group was 2.52 and 2.43 respectively. The median age of each group was anonymized. The PIRADS scores in the two populations were compared using a t-test. There was no difference in the mean PIRADS score of these two populations ($p = 0.18$). Limitations of the study include the retrospective design and inter-reader variability between the three radiologists interpreting the MRI exams and assigning PIRADS scores. However, there was enough consistency amongst each radiologist in their distribution of PIRADS scores assigned for the study. The literature indicates that African American men have 1.7-times the increased risk prostate cancer, and it remains unclear if there are biologic or socioeconomic factors account for these differences. Further correlation with biopsy results and additional research in this area will be needed.

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CLINICAL AND TRANSLATIONAL RESEARCH

RADIOLOGY

Review of Abbreviated Breast MRI for Intermediate Risk Women

Early detection plays a pivotal role in improving survival outcomes and de-escalation of treatment for breast cancer. Among women, breast cancer is the second most common cancer, surpassed only by skin cancer, accounting for 30% of all new female cancers each year (ACS). The American Cancer Society estimates approximately 310,700 new cases of invasive breast cancer and 42,200 breast cancer deaths in the United States in 2024 alone. The burden of this disease on mortality, morbidity and healthcare expenses consistently introduces new challenges for screening strategies. Mammography is the primary modality for breast cancer screening with robust data supporting its efficacy. A long-term randomized controlled trial (RCT) demonstrated a 30% mortality reduction in women over the age of 40 invited to annual screening mammography after 29-year follow-up (Sweedish trial). Additional RCTs and observational studies have shown a significant decrease in advanced stage cancers and mortality reductions up to 40% for women who undergo screening mammography (ACR/AP). However, mammography has inherent limitations, particularly in women with dense breast tissue. In these cases, cancers which appear white on mammography can be obscured by overlying dense fibroglandular tissue. The overall sensitivity of mammography is 85% but this number drops significantly to 47.8-64.4% in women with dense breast tissue. Compounding this concern is the strong evidence suggesting that dense breast tissue is an independent risk factor for developing breast cancer. Despite the widespread use of mammography, interval cancers—those presenting as clinical findings between routine screenings—and late stage cancers persist. There remains a substantial need for supplemental screening modalities and protocols to improve cancer detection rates, particularly in women with dense breast tissue and other risk factors. In 2014, in an effort to address these limitations but still reap the benefits of MRI, Kulh et al. introduced an abbreviated breast MRI protocol. This protocol reduced examination time to 3 minutes and included only one pre-contrast and one post-contrast sequence. The study showed equivalent diagnostic accuracy compared to a full protocol MRI and found 18.2 additional cancer per 1000 high risk women. Multiple studies have since been published showing similar results including a recent large prospective multicenter trial. The purpose of this article is to summarize the studies on abbreviated MRI published to date and emphasize the differences in protocols as well as patients populations studied. This review will also discuss clinical applications and challenges of abbreviated MRI.

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RADIOLOGY

Artificial Intelligence vs. Radiologists in Screening Mammography Interpretation

According to the CDC, breast cancer is the second leading cause of cancer death for women in the United States. As such, the USPSTF recommends biennial breast cancer screening for women ages 50-74. As of September 1, 2023, the FDA documented a total annual count of 39,844,021 mammography procedures. Due to the high stakes surrounding accurate screening as well as the sheer volume of screens, advancing technology to enhance precision as well as reduce the workload for radiologists in this area would be extremely advantageous. The advent of artificial intelligence (AI) systems within the field of radiology, specifically within screening mammography, has the potential to aid in expeditious cancer diagnoses, reduce false positive findings, and decrease screen-reading workload for radiologists, among other benefits. That being said, the clinical utility and safety of AI programs for screening mammography have yet to be fully characterized. The aim of this abstract is to compare the performance of AI systems to radiologist readers in interpreting digital screening mammography. A literature review was conducted using the PubMed database to assess the sensitivity and specificity of mammography interpretations performed by artificial intelligence (AI) in comparison to readings by radiologists working independently. The review included data from three selected studies that met predetermined inclusion criteria. In total, the analysis included 1,463,810 cases and compared performance metrics with 95% CIs for AI and radiologist interpretations of imaging, respectively. Of the 1,463,810 cases reviewed, AI applications demonstrated a weighted average sensitivity and specificity of 80.12% and 85.76%, respectively, in correctly identifying the presence or absence of cancerous findings on screening mammography. Comparatively, radiologists exhibit a weighted average sensitivity of 73.82% and specificity of 88.66% in identifying the presence or absence of cancerous breast lesions. In applying their wealth of expertise and experience to the nuances of imaging studies, radiologists remain indispensable in the field of medical diagnostics; however, the statistics presented here underscore the considerable potential of AI to augment higher sensitivity and specificity levels in specific radiologic diagnostic applications such as screening mammography. In conclusion, this study demonstrates that AI performance in interpreting screening mammography is comparable in sensitivity and specificity to the performance of radiologist readers alone, lending support to the notion that AI is an excellent supplemental tool for radiologists in their surveillance of breast cancer.

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CLINICAL AND TRANSLATIONAL RESEARCH

RHEUMATOLOGY

A Rare Case of Adult-onset Still's Disease with Multiple Organ Injury

Case: A previously healthy 28-year-old female with family history of systemic lupus erythematosus presented to the ED with days to weeks of nonspecific symptoms: fevers, fatigue, dyspnea, cough, vomiting, diarrhea, arthralgias, and intermittent erythematous rashes. Laboratory studies were significant for neutrophilic leukocytosis, transaminitis, troponinemia, and marked hyperferritinemia. Creatinine was initially normal but peaked at 7.7. Electrocardiogram showed nonspecific T wave inversions. CT of the chest, abdomen, and pelvis revealed bibasilar groundglass opacities, bilateral pleural effusions, pulmonary edema, and diffuse lymphadenopathy. Transthoracic echocardiogram was significant for a pericardial effusion. She was initially treated with vancomycin and piperacillin-tazobactam for sepsis. Extensive infectious workup was negative. Diffuse lymphadenopathy prompted workup for lymphoma, which was negative on lymph node biopsy. Due to her acute kidney injury, she underwent renal biopsy which was consistent with acute tubular necrosis (ATN). Extensive workup for other rheumatologic diseases was also negative. Diagnosis of AOSD was made based on the Yamaguchi criteria. She was treated with pulse-dose steroids and anakinra with improvement in symptoms, laboratory values, pericardial and pleural effusions, pulmonary edema, and lymphadenopathy. Discussion: Outside of the Yamaguchi criteria, the patient presented with cardiopulmonary involvement and later developed intrinsic renal injury. Her troponin elevation was likely due to myocarditis in the setting of AOSD. Her pulmonary edema, pleural effusions, and bibasilar opacities were likely due to AOSD. Repeat imaging following treatment showed that these findings improved significantly. Her ATN was likely not due to AOSD but due to contrast, nephrotoxic antibiotics, and dehydration from diarrhea. Renal involvement in AOSD has been described in the literature, but there are no cases linking AOSD with ATN. The Yamaguchi criteria are the most widely used, specific, and sensitive diagnostic criteria for AOSD. Although AOSD is known to affect multiple organ systems, it is a diagnosis of exclusion and shares features with various disease processes, which can make for a challenging diagnosis. Diagnosis is often delayed given its variable presentation. Anchoring on sepsis, hematologic malignancies, and other rheumatologic diseases can further delay diagnosis. As a result, AOSD can progress to life-threatening complications such as macrophage activation syndrome and multiple organ injury before the appropriate diagnosis is made. In this case, early recognition of rheumatologic etiology was imperative to an expedited workup and treatment.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

Contrasting Outcomes: Open Versus Minimally Invasive Treatment Modalities for T4b Colon Cancer

Background: T4 colon cancers are those that extend into the visceral peritoneum or the bordering organ, and degree of invasion can impact operability and survival. Currently, there is ongoing debate on whether open or minimally invasive techniques, such as laparoscopic and robotic tools, are best equipped to resect these tumors. More specifically, which modality provides the best patient outcomes. Objective: Here, we aim to assess how the outcomes between T4b colon adenocarcinoma resected via open and minimally invasive procedures differ. Methods: The National Cancer Database houses data regarding disease, treatment, and outcomes for oncologic diseases. Patients (n=9066) with non-metastatic T4b colon adenocarcinomas who had radical surgical resection between 2010-2016 were included in the study. Selected individuals were categorized into two groups: open (n=6071) and minimally invasive (n=2995) surgical resections. Primary outcomes were appraised by Kaplan-Meier estimation and Cox Proportional Hazards regression, and secondary outcomes were analyzed via logistic regression and a Mann-Whitney U test. To better understand the difference in treatment methodologies and limit confounding variables, propensity score matching was implemented between both cohorts. Results: 5876 patients were identified as clinically similar after propensity score matching (n=2938 from each cohort). In comparison to the open surgical procedure, minimally invasive surgery resulted in significantly reduced mortality (hazard ratio=0.83, $p<0.001$) and less days between surgery and start of chemotherapy (OR=1.16). The minimally invasive resection also had higher odds of regional lymph node examination (odds ratio [OR]=1.51) and negative circumferential margins (OR=1.16). This was in addition to lower odds of positive margin status, lower 30-day mortality, and lower 90-day mortality (OR=0.86, 0.68, and 0.74, respectively with $p<0.05$). Conclusion: This study demonstrates substantial differences between open and minimally invasive resection of T4b colon cancer culminating in equal or greater outcomes for patients who underwent surgical treatment.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

Language Barriers and Breast Reconstruction - A Systematic Review

The variety of options for post-mastectomy breast reconstruction complicates patient decision-making. Shared decision-making between patient and provider are essential for patient-centered care that balances preferences, needs, and medical limitations. The impact of language barriers on these reconstructive decisions has not been extensively studied. This systematic review examines how language discordance influences the selection of breast reconstruction procedures. This systematic review was conducted in PubMed, Scopus, CINAHL, and Medline - Ovid within 10 years of the search date of June 2023 by two independent reviewers and a third reviewer to break ties. Inclusion criteria included English language, original research articles with human subjects, data on patient-provider language differences, and breast reconstruction. Exclusion criteria included reviews, case reports, pediatric, and non-female study participants. Studies validating translated materials or content readability were also excluded. Included articles were analyzed for risk of bias. Eight studies met the inclusion criteria. The primary spoken language of patients across studies were synthesized as dichotomous variables of English versus non-English speakers. Despite controlling for confounding variables like socioeconomic status and race, language persisted as an independent contributor in four studies. These studies found significant decreases in breast reconstruction rates for non-English speaking groups ($P < 0.05$ - 0.0005). Two studies showed higher incidence of breast reconstruction in non-English patients, but was not statistically significant, but nonetheless caused very high heterogeneity (91%). Overall, the odds ratio of undergoing breast reconstruction was 1.57 times higher in English speakers than Non-English but also did not demonstrate statistical significance. On qualitative analysis, one study attributed their lack language discordance to robust translation services offered at their institution. While the influence of language barriers on patient-provider communication has lead to implementation of interpreter requirements at many institutions, the variance elucidated in this review urges further investigation. Based on this systematic analysis, many factors contribute to the potential for language to act as a disparity to health. This potential disparity warrants continued evaluation on how language discordance impacts satisfaction, outcomes, and the efficacy of mitigating factors like interpreter services.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

Evaluating the Effect of Hyperbaric Oxygen Therapy to Treat Mastectomy Skin Flap Ischemia Following Breast Reconstruction: A Single-Institution Analysis

Background/Objective: Mastectomy skin flap ischemia is a well-known postoperative complication following mastectomy and breast reconstruction. Hyperbaric oxygen therapy (HBO) has shown promising results for reducing the adverse effects associated with mastectomy skin flap ischemia and necrosis. However, there is paucity of literature regarding the indications for HBO following breast cancer surgery. This study aimed to assess HBO efficacy in treating and mitigating complications from postoperative tissue ischemia. Secondly, it explored how patient-related factors may impact the success of HBO. **Methods:** A retrospective analysis was conducted from January 2018 to October 2023. The study analyzed 23 patients at a single institution treated with HBO for skin flap ischemia post-mastectomy and reconstruction. Diagnosis was made through intraoperative indocyanine green SPY angiography and clinical evaluation. Patient data, medical history, HBO sessions, and postoperative outcomes were collected. Minor complications included seroma and hematoma, while major complications encompassed persistent necrosis, infection requiring antibiotics, re-admission, and surgical interventions. The authors deemed HBO a “success” if there were no major complications and a “failure” if there were ≥1 major complication reported within 6 months following the last HBO treatment. Logistic regression analysis was performed to model the log odds of success as a linear function. **Results:** HBO was deemed a success in 15/23 patients (65%) and a failure in 8 patients (35%). Of the successes, 11 received immediate HBO, within 1 day of reconstruction. Average age at surgery was 49 years, average BMI was 24, and average number of HBO treatments was 11. Logistic regression analysis revealed that preceding minor complications and age both trended towards significance regarding their impact on HBO outcome. Odds of success decreased by ~92% in the presence of minor complication (OR=0.08; $p < 0.10$) and increased by ~15% with every 1-year increase in age (OR=1.15; $p < 0.10$). **Conclusions:** In our pilot study, HBO was successful in treating postoperative ischemia and preventing major complications in the majority of patients. Notably, age at time of surgery and presence of minor complications were the only variables found to potentially impact the success of HBO. Future studies on a larger scale are needed to better evaluate HBO’s therapeutic utility in mastectomy flap necrosis.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

Evaluating the Effect of Patient Factors on Post-Operative Outcomes in Gender-Affirming Transmasculine Top Surgery: A Single-Institution Retrospective Analysis

Introduction: Gender-affirming bilateral mastectomy, also known as transmasculine top surgery (TMTS), is a vital step in the transition process for transgender male or nonbinary individuals due to its proven role in alleviating gender dysphoria. The impact of patient factors on complications following TMTS has been stipulated; however, given the procedure's relative novelty and technical variability, these cause-and-effect relationships remain largely underexplored. With this large retrospective study, we aimed to evaluate the impact of age, BMI, and comorbidities on complication and reoperation rates in TMTS patients in hopes of strengthening current surgical recommendations for optimized patient outcomes. **Methods:** IRB-exempt retrospective chart review was conducted for 228 patients who underwent TMTS at a single academic institution from March 2018 to September 2023. All patients had confirmed diagnoses of persistent gender dysphoria and were >16 years old at the time of surgery. Age, BMI, smoking history, comorbidity history (e.g. diabetes, hypertension, hyperlipidemia, coagulopathy, cancer, venous thrombosis), operative details, and post-operative outcomes were evaluated. Logistic regression analysis was performed to assess the impact of various patient factors on the likelihood of complication and reoperation rates up to 6 months following surgery. **Results:** 11.0% of patients had a history of =1 systemic comorbidity, 15.4% were former smokers, and 11.8% were current smokers. Average age at surgery was 28.4 years and average BMI was 29.1. 31.6% of patients experienced asymmetry, 16.2% hypertrophic scarring, 11.0% seroma, 5.7% hematoma, and 16.7% reoperation. Reasons for reoperation included seroma aspiration (36.8%), scar revision (28.9%), hematoma evacuation (18.4%), contour revision (7.9%), nipple-areolar complex revision (5.3%), or other (2.6%). Patients with a history of =1 systemic comorbidity had a significantly increased likelihood of reoperation ($p<0.012$). Both current and former smokers had a significantly increased risk of postoperative hematoma ($p<0.010$; $p<0.024$ respectively). With every one-year increase in age, patients had a 7% increased likelihood of seroma ($p<0.015$) and 8% increased likelihood of asymmetry ($p<0.001$). **Conclusion:** History of systemic comorbidity, older age, and history of smoking were all found to be associated with a significantly increased risk of developing a major complication or needing reoperation following TMTS. These findings support the importance of robust preoperative evaluations and risk assessments to provide more individualized recommendations for TMTS patients regarding their personal risk factors for specific adverse surgical outcomes. Furthermore, these findings can better guide surgeons in their perioperative planning, such as when to take extra precautions to reduce adverse outcomes in higher-risk patients.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

Rib Autograft vs. Porous Polyethylene Implant Outcomes in Microtia Reconstruction: A Systematic Review

Auricular reconstruction for congenital microtia generally involves a series of complex, staged procedures with either autologous rib or alloplastic materials. While the former remains the gold standard, numerous reports exist regarding the success of alloplastic reconstruction that avoid donor site morbidity of autologous procedures. This systematic review investigates existing studies that directly compared the outcomes of auricular reconstruction using autologous rib cartilage graft (ARCG) vs. porous polyethylene (PPE) implants. A systematic literature search conducted using PubMed, Scopus, and Cochrane Central published January 2000 through November 2023 yielded 3463 results. Cohorts and large case series comparing ARCG to PPE were included. Screening criteria excluded systematic reviews, case reports, and papers investigating only one of the two reconstruction techniques. Extracted data included infection and necrosis rates, graft loss, framework exposure, number of redo procedures, aesthetic measures, and patient satisfaction survey results to evaluate the postoperative outcomes of each surgical technique. Risk for bias was assessed using the Newcastle-Ottawa Quality Assessment for cohort studies. Ten studies met the inclusion criteria, accounting for 3794 patients. The time to follow-up ranged between 30 days to 8.6 years, ranging from 30 days - 11 years vs. 30 days - 6 years in ARCG and PPE groups, respectively. Across the seven studies that analyzed complication rates, incidence of complications for ARCG and PPE had identical ranges between 0.0% - 27.2%. Complications included infection (5/10 studies ranging from 0.0% - 5.9% for ARCG vs. 0.3% - 21.2% for PPE), necrosis and skin collapse (2/10 studies ranging from 2% - 27.2% in ARCG vs. 2.7% - 27.2% in PPE), delayed wound healing (1/10 studies reported 17.6% for ARCG vs. 0.0% for PPE), and non-specified wound complications (3/10 studies ranging from 0% - 17.9% for ARCG vs. 2.0% - 18.8 for PPE). Framework exposure and extrusion rate, reported in six studies, ranged from 0.0% - 9.1% for ARCG and 3.6% - 15.2% for PPE. Four studies evaluated the need for redo procedures as ranging from 0.0% - 6.3% for ARCG and 3.4% - 15.2% for PPE. Most studies identified no significant difference in aesthetic outcomes and patient satisfaction when directly comparing both techniques, but two studies concluded contradictory results. Current publications suggest that PPE may be associated with higher rates of complications, framework exposure, and redo procedures in short and long-term follow-up compared to ARCG. However, poor study quality and result heterogeneity, demonstrate the need for additional research comparing these techniques.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

Association of Tranexamic Acid and Infection Among Trauma Patients

Introduction: Trauma patients experience physiological distress, leading to an impaired adaptive immune response and an increased susceptibility to infections. Tranexamic Acid (TXA) has shown potential as an immune modulator by decreasing levels of IL-10 and altering the immunophenotype of phagocytes. Its use has been associated with lower postoperative infection rates in orthopedic and cardiac surgery. Preliminary studies conducted in civilian trauma patients suggest a potential increased risk of infection with TXA. Conversely, a study conducted on a military population with life-threatening injuries did not find TXA to be a risk factor for infections. Our study aims to clarify the relationship between TXA administration and infection rates among trauma patients. **Methods:** A retrospective review of 364 adult trauma patients with mass transfusion protocol (MTP) activation was conducted at a level one trauma center between 2016 and 2023, assessing two cohorts: those who received TXA (n=61) and those who did not (n=303). Infections were defined as a positive diagnosis of catheter-associated urinary tract infection (CAUTI), central line-associated bloodstream infection (CLABSI), osteomyelitis, severe sepsis, surgical site infection, or ventilator-acquired pneumonia. Univariate and multivariate analyses were performed to identify variables associated with infection. Two-sided nonparametric Mann-Whitney U and Chi-Squared tests compared various factors between TXA and non-TXA groups. Given our modest sample size, we used 1:1 propensity score matching to strengthen our analysis. **Results:** On univariate analysis, infection rates for the non-TXA and TXA groups were significantly different at 7.9% and 19.7%, respectively ($p=0.007$). The most common infections for the non-TXA and TXA groups were surgical site infections, with respective rates of 4.6% and 9.8%. However, on multivariate analysis after propensity score matching, the association between TXA and infection was no longer significant ($p=0.902$); of note, total hospital and ventilator days were both associated with infection ($p=0.01$, $p=0.021$). **Conclusion:** Our findings indicate that TXA is neither a risk factor nor protective against infections in adult trauma patients when MTP is activated. Further studies with a larger patient population are needed to solidify these results and clarify the association between TXA and infection in trauma patients.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

Intraoperative Lactate Level as a Predictor of Resuscitation in Open Cranial Vault Reconstruction

Background: Open cranial vault reconstructions often involve significant blood loss and adequate resuscitation is crucial. Metrics such as heart rate, mean arterial pressure, and urine output are ubiquitously used, but these measures are not as sensitive as lactic acid for detecting cellular and tissue hypoxia. The purpose of this study is to evaluate how well physiologic markers of resuscitation correlate with the gold standard for cellular respiration- intraoperative lactate levels. **Methods:** A retrospective chart review was conducted of patients who underwent craniofacial open cranial vault reconstruction at Children's National Hospital from 2013 to 2021. When available, and for each hour of surgery, intraoperative data such as lactate levels, mean arterial pressure (MAP), heart rate, urine output (UO), and base deficit were meticulously recorded. Lactate levels were then specifically analyzed in relation to the other physiological markers within the same hourly time frame to assess their intercorrelations and potential as real-time indicators of cellular resuscitation. Pearson correlation coefficient was used to assess the relationship between lactate levels and all other parameters. **Results:** A total of 161 patients with craniosynostosis were included. Only 9.3% (15 of 161) experienced at least one instance of elevated intraoperative lactate. The median age at surgery was 1.03 (IQR 0.7, 2.9) years. The majority of patients (81%) were non-syndromic, and 66% had no chronic health conditions. There was no significant correlation between the intraoperative lactate levels and lowest mean arterial pressures (MAP) ($r=0.17$) recorded or pH levels for each patient ($r=0.11$). Similarly, no significant relationship was observed between intraoperative lactate levels and the highest heart rate ($r=-0.02$) or the lowest heart rate recorded for each patient ($r=0.14$). Additionally, there was no significant correlation with the average intraoperative lactate levels and operative time for each patient ($r=0.13$). **Conclusion:** These findings indicate a lack of direct correlation between intraoperative lactate levels and conventional measures of tissue perfusion and hemodynamic stability. Based on these findings, we caution against strict reliance of conventional physiological measures of resuscitation during open cranial vault reconstruction and recommend the addition of intraoperative lactic acid levels to provide a more accurate assessment of cellular and tissue perfusion.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

A Systematic Review of Closed-Incisional Negative Pressure Therapy on Abdominal Donor Sites of Deep Inferior Epigastric Perforator Flaps

PURPOSE/BACKGROUND/OBJECTIVE: Autologous breast reconstruction, specifically utilizing the deep inferior epigastric artery perforator (DIEP) flap, is widely regarded as the gold standard for achieving natural post-mastectomy breasts. This microsurgical technique, involving tissue from the lower abdominal wall, offers distinct advantages including larger tissue harvests without sacrificing abdominal muscle, resulting in expedited recovery and reduced hernia risks. However, inherent risks such as flap failure and complications including fat necrosis, infection, hematoma/seroma, and wound healing issues persist, with contributing factors including smoking history, comorbid diseases (e.g., asthma, COPD), and elevated BMI. Closed-incision negative pressure therapy (ciNPT) has emerged as a promising strategy for accelerating healing and reducing tension. Despite limited literature on the effectiveness of ciNPT specifically on the DIEP flap patient cohort, particularly regarding donor sites, it presents a potentially efficacious postoperative intervention to mitigate complications. Our objective is to conduct a systematic review of existing literature evaluating the efficacy of ciNPT in the DIEP flap patient population, aiming to discern its benefits compared to the standard of care. **METHODS:** A comprehensive literature search was conducted in March 2023 using publications published from 2018 to 2023 using the following electronic bibliographic databases: Pubmed, Scopus, Medline, GoogleScholar, and Cochrane. Eligible studies reported postoperative complications related to ciNPT and its use in DIEP. Two independent reviewers screened articles and conflicts were resolved by a third reviewer. The criteria used were those described in the PRISMA Declaration for performing systematic reviews. **RESULTS:** The database search resulted in 952 records, while manual searching resulted in an additional [0] records. After removing duplicates n= 304, 648 titles and abstracts were screened. Subsequently, 101 full texts and their references were screened using the review eligibility criteria. Finally, 8 studies met the inclusion criteria and were included in the systematic review. **CONCLUSION:** The literature review suggests the substantial efficacy of closed-incision negative pressure therapy (ciNPT) in mitigating postoperative complications, notably decreased incidence of wound dehiscence and surgical site infection. Additionally, reports of enhanced scar healing among ciNPT recipients, characterized by improved pigmentation, vascularity, and pliability, coupled with a decreased incidence in complications such as hematoma, seroma, and flap necrosis. Most noteworthy is the discernible reduction in wound healing complications observed in high-risk patient cohorts, including those with diabetes and elevated BMI, indicating ciNPT's potential as a pivotal intervention in postoperative DIEP flap abdominal donor site management.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

A Case Report of Splenic Artery Pseudoaneurysm with Fistulization to the Transverse Colon

Splenic artery pseudoaneurysms (SAPs) are rare occurrences, most commonly secondary to pancreatitis, abdominal trauma, or postoperative/iatrogenic causes. The most common presenting symptom is abdominal pain, but may also be hematochezia, melena, or hematemesis. SAP rupture or fistulation causes massive hemorrhage leading to hemorrhagic shock and possible death if left untreated. The timely diagnosis and treatment of SAPs are therefore crucial in the management of these patients. Here, we present a case of an 89-year-old female presenting with rectal bleeding, diagnosed with SAP with fistulization to transverse colon by contrasted abdominopelvic CT. She was treated with endovascular embolization, which successfully resolved the bleeding, and subsequent splenectomy and splenic flexure colectomy. The patient's postoperative course was complicated by urinary retention due to presumed UTI, left-sided pleural effusion, mitral regurgitation, and tricuspid regurgitation. Once complications were resolved, the patient did well with resolution of symptoms. Early diagnosis is crucial for the management of these patients. Due to the nonspecific presentation, a high level of suspicion should prompt further evaluation to prevent adverse outcomes. Fistulization of SAPs to surrounding structures could lead to complications as was seen with this patient. However, endovascular embolization of the SAP with subsequent segmental resection of the involved colon proved to be a successful treatment.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

Lipid Trends in Patients Experiencing Weight Regain After Bariatric Surgery

Bariatric surgery is the most effective treatment for obesity. In addition to weight loss, bariatric surgery reduces cardiovascular risk by producing other metabolic benefits, such as the improvement of dyslipidemia. Weight regain can occur in up to 20% of bariatric surgery patients. However, it is unclear whether improvements in lipid levels persist despite weight regain. The aim of this study was to determine whether lipid trends differ in bariatric patients with weight regain. Charts for 800 patients who underwent bariatric surgery were reviewed (2017-2021). Data was collected retrospectively for weight, body mass index (BMI), low- and high-density lipoprotein (LDL, HDL), triglycerides, and total cholesterol. Patients were categorized based on the occurrence of weight regain (WR), defined as gaining back $\geq 20\%$ of the total weight loss (TWL) after surgery. Of the original 800 patients, 51 had complete lipid profiles available and met inclusion criteria. Of these 51 patients, 95% underwent sleeve gastrectomy and 19 experienced WR. Cholesterol levels reduced postoperatively in all patients. Multivariate analysis suggested there was no significant association between weight regain status (yes or no) and LDL ($p = 0.316$), HDL ($p = 0.115$), triglycerides ($p = 0.488$), or cholesterol ($p = 0.414$). There was also no significant association between the amount of weight regained (lbs) and lipid levels. These results suggest that bariatric surgery may be associated with a weight-independent improvement in lipid levels. Prospective studies are needed in which lipid results are longitudinally monitored after surgery.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

Reshaping Surgical Training: Impact of SimNow da Vinci Training on da Vinci Surgical Robot Skills

Introduction: Robotic surgery implementation is growing within multiple specialties to allow for minimally invasive approaches. This necessitates validation of robotic surgery training techniques. This study aims to assess how robotic surgery simulator practice on the SimNow da Vinci robotic surgery simulator impacts Fundamentals of Laparoscopic Surgery (FLS) test scores on a da Vinci Surgical Robot in naive subjects. The findings will be helpful in validating practice in the SimNow virtual environment and understanding how simulator practice can be incorporated into training protocols. Methods: 11 robotic naive participants were divided into two groups. Group 1 watched a video explaining how to complete the FLS test and then completed it on a da Vinci Surgical Robot. Group 2 practiced for 30 minutes on a SimNow da Vinci robotic surgery simulator, watched the FLS video, and then completed the test on the da Vinci Surgical Robot. FLS scores for both groups were graded blindly and compared. Results The test scores from both groups were compared using a two sample t-test and significance of correlation coefficient. While the FLS test scores were not significantly different between the groups, there was a significant correlation between certain simulation activities and higher subscores on the FLS test. This is possibly due to having a small participation number. Conclusion In conclusion, more studies need to be done with a higher power to accurately measure the effect of simulation practice on FLS scores using the da Vinci Surgical Robot.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

Long-term Outcomes of Early Mandibular Distraction Osteogenesis in Hemifacial Microsomia: A Systematic Review

Background: Hemifacial microsomia (HFM) is a clinical diagnosis for a broad spectrum of craniofacial skeletal and soft tissue hypoplasia, arising from the first and second branchial or pharyngeal arches. Mandibular distraction osteogenesis (MDO) remains one of the most common procedures performed during skeletal immaturity to address the associated mandibular deformities. While there is robust evidence regarding satisfactory short-term post-operative outcomes of early MDO, data on long-term results are limited. Thus, the purpose of this study is to systematically review and analyze the long-term outcomes of early MDO in patients with HFM. **Methods:** A search conducted through Pubmed, Scopus, and Cochrane Central Register of Controlled Trials from January 1, 2000 through November 21, 2023 yielded 3960 results. Inclusion criteria included case-control and cohort studies of patients with HFM who underwent MDO at under 10 years of age and had at least five years of follow up. Review articles, letters, duplicated articles, and articles with insufficient data were excluded. Outcomes included relapse rate (return to original asymmetry), changes in ramus height and length ratio (affected side/ unaffected side), and changes in occlusal cant. Newcastle-Ottawa Quality Assessment was used to assess study bias and quality. **Results:** Six studies met the inclusion criteria and accounted for 120 patients. The average age at the time of distraction ranged from 4.8 to 9.4 years. Mean follow-up ranged from 5.8 to 13.1 years. Four studies (N=64) reported relapse in 77% - 100% of their patients. Ramus height and/or length ratio changes were analyzed in 4/6 studies (N=43), with 3 studies (N=31) reporting a mean regression between 20.5 - 30%, while another single study reported mean regression of only 3.2%. Two studies (N=38) reported a return of the previously-corrected occlusal cant to outside of the normal range (0° to 3°) after over 10 years of follow up. Bias assessment revealed fair study quality overall, with some heterogeneity in patient sample size. **Conclusion:** A systematic review of the literature revealed relatively few studies that have investigated long-term stability of MDO when performed before skeletal maturity for patients with HFM. The literature to-date reports high rates of relapse and significant regression in most cases, with loss of corrected occlusal cant, after long-term follow up. While early results after MDO seem promising, long-term outcomes appear to be unstable.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

A rare presentation of Meckel's diverticulum: A case report

Introduction Meckel's diverticulum (MD) is the most common congenital gastrointestinal anomaly. MD is the result of incomplete obliteration of the omphalomesenteric duct. While often an incidental finding in adults, MD may harbor malignancies and management remains controversial. **Case presentation** A 77-year-old male presented with vague abdominal pain. Imaging revealed a 13x14cm mass in the right lower quadrant suspected to be originating from the mesentery. After discussion, the patient was taken to the operating room for resection of the mesenteric mass. The mass was found to be emanating from a previously undiagnosed Meckel's diverticulum. The mass was then removed en-bloc by way of a segmental bowel resection with removal of the associated mesentery. The patient tolerated the procedure well and recovered uneventfully. **Final pathology** revealed a high grade undifferentiated carcinoma. **Discussion** Less than 3.2% of MD patients present with malignancy, with neuroendocrine tumors being the predominant type (Malderen et al., 2018). Previous recommendations against incidental diverticulectomy were based on higher risk of procedure complications (8%) compared to MD complications (2-4%). But, more recent recommendations have advocated for a case-by-case approach with factors such as younger age, palpable/visual abnormality, or previous symptoms due to MD favoring resection to reduce risk of a tumor due to the poor overall prognosis of primary malignancies of MD. **Conclusion** Management of malignancies arising from Meckel's diverticulum can present both diagnostic and therapeutic challenges. Clinicians must be aware of the fact that MD may harbor various malignancies when deciding on management strategies for patients MD.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

Evaluation of the Incidence of Venous Thromboembolism after Facelift Surgery

Venous Thromboembolism (VTE) can be a devastating complication after elective aesthetic surgeries, with associated morbidity, financial cost, and potential mortality. VTE incidence after facelift has been rarely studied, however remains a relevant adverse outcome. We performed a systematic review to elucidate the incidence of VTE after facelift. Pubmed, Web of Science, Medline, and Cochrane were searched using the terms ("rhytidectomy" or "facelift" or "rhytidoplasty") and ("embolism" or "thrombosis" or "thromboembolism" or "dvt" or "deep vein thromboembolism" or "embolic" or "embolus" or "venous thrombosis"), which yielded 40 papers. These papers were screened for relevance, as well as excluding case reports, which yielded 4 studies. A 2012 single-center retrospective chart review of 630 cases found a Deep Vein Thrombosis (DVT) incidence of 0.3% (n=2). The authors inferred that combining aesthetic procedures and prolonging operation time increases risk of VTE, as this was present in both patients. Another single-institution retrospective chart review from 2016 to 2021 analyzed 136 facelift patients who did not receive VTE chemoprophylaxis. No patients developed DVT or PE. A 2014 retrospective multicenter survey evaluated the incidence of VTE after 29,219 facelifts performed by seventy-seven surgeons using local anesthesia techniques. The study found an incidence of 0.017% (n=5) over 19 months. The research also demonstrated that higher-volume surgeons (>500 facelifts in 19 months) had lower VTE incidence compared to their lower-volume counterparts (p=0.011). Higher-volume surgeons participating in the study also had lower average operative time (p=0.016), suggesting a correlation between operative time and VTE risk. A 2001 prospective study of 237 facelift surgeons over 12 months included 9937 facelifts, with an incidence of 0.35% for DVT (n = 35) and 0.14% for PE (n=14), and an overall VTE incidence of 0.49% (n=49), and one mortality. Overall, 83.7% of these DVT/PE incidents occurred in patients who underwent general anesthesia, and it's noteworthy that the majority of surgeons surveyed used no prophylaxis. The aggregate incidence of VTE among the included studies was 0.14% (56 out of 39,922 cases). Prophylaxis protocol during facelift is an important consideration for risk mitigation, although several studies noted that neither mechanical nor chemoprophylaxis was used. Based on the studies identified, the incidence of VTE after facelift is low, but its occurrence is consequential to the overall outcome and depends on prophylaxis and other factors.

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CLINICAL AND TRANSLATIONAL RESEARCH

SURGERY

Intraoperative Facial Nerve Monitoring during Mandibular Distraction Osteogenesis in Infants with Robin Sequence

ABSTRACT: Introduction: Mandibular distraction osteogenesis (MDO) treats severe upper airway obstruction in infants with Robin Sequence (RS), but complications like facial nerve dysfunction (FND), notably in the marginal mandibular nerve (MMN), are not uncommon. This pilot study evaluates nerve conduction changes during MDO and their association with FND. Methods: We monitored facial nerve conduction using electroneuronography (ENoG) in infants with RS undergoing MDO from 2019 to 2022. ENoG measured motor responses at the orbicularis oculi and mentalis muscles at 10 surgical stages, comparing changes in latency and amplitude to baseline. Significant changes were defined as latency increases $\geq 10\%$ or decrease in amplitude $\geq 60\%$. Results: Seven bilateral surgical procedures [osteotomy/placement of hardware (4); hardware removal (2); hardware replacement (1)] out of 24 patients were randomly chosen and analyzed by certified ENoG technicians, for a total of 14 unilateral investigations. Mean age at surgery was 20.8 months. Retraction during osteotomy was the surgical step most associated with changes in MMN conduction, with a significant decrease in amplitude or increase in latency noted in 35.7% and 14.3%, respectively. Temporary MMN dysfunction was observed in 4 postoperative clinical examinations (28.6%). Sensitivity/Specificity were 50%/50%, while PPV/NPV were 20%/80%. These findings did not reach statistical significance. Conclusion: This pilot study demonstrated that intraoperative MMN injury may occur during MDO procedures, particularly during retraction/osteotomy. Real-time facial nerve intraoperative monitoring may serve as a protective tool against MMN damage. No long-term FND (>6 months) was observed under this protocol. Larger studies will help determine how to avoid intraoperative FND during MDO procedures.

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SURGERY

The Impact of Timing of Lower Extremity Flap Coverage on Reconstructive Outcomes: A Systematic Review

Background: Following orthopedic fixation, lower extremity (LE) open fractures and wounds often require soft tissue reconstruction. Defining time frames for assessing free flap coverage has been controversial. The Godina paradigm has been considered the standard protocol, urging flap coverage within 72 hours from injury to prevent complications like flap failure (1). However, increased coordination between orthopedic surgeons and plastic surgeons have created different clinical practices of various starting time points, including time from hospital admission to flap coverage, from debridement, or from definitive fixation (2). This study systematically reviews the current literature in LE flap coverage for the comparative predictive values of measures of timing on patient outcomes. **Methods:** A PRISMA systematic review was conducted in the databases PubMed, SCOPUS, CINAHL, and Medline - Ovid for articles published between November 2013 and November 2023. Inclusion criteria included studies on LE flap coverage outcomes with matched data on timing of reconstructive procedure from any start point. Exclusion criteria included case studies, reviews, cadaveric studies, pedicled flaps, and pediatric cases. Eligibility was assessed systematically by three independent reviewers according to standardized inclusion and exclusion criteria, with a fourth reviewer as a tiebreaker for any discrepancies. Studies that met inclusion criteria were retrieved for risk of bias assessment and data extraction of patient demographics, injury characteristics, pre- and post-operative variables, timing of flap coverage, complications, and flap outcomes. **Results:** 2149 studies were initially identified. Of the 18 studies that ultimately met inclusion criteria, there were significant differences in methods, particularly in the starting points of LE flap coverages. Categorization of timing was also heterogeneous with some studies dichotomizing variables into “early” and “delayed” groups, and other studies using continuous analyses. There was also great variability in the outcome variable of focus, such as flap loss and necrosis, hematoma formation, osteomyelitis, additional debridements. Notably, one study had found improved patient satisfaction with delayed coverage procedures, which is a previously unstudied association. **Conclusion:** Outcome complications varied in relation to the timing of LE flap coverage. Limitations on this study included the small sample size; variability of the wound characteristics, such as severity, quality, and etiology; variable use of negative pressure wound vacs; variable selection of vessel anastomoses; variable use of dangle technique. Therefore, future research is needed to control for these confounding variables. Additionally, another interesting point of future research should be to further investigate patient satisfaction rates associated with timing of procedures.

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CLINICAL AND TRANSLATIONAL RESEARCH

UROLOGY

Income Disparities in Survival and Receipt of Neoadjuvant Chemotherapy and Lymph Node Dissection for Muscle-Invasive Bladder Cancer

INTRODUCTION AND OBJECTIVE: Muscle-invasive bladder cancer (MIBC) has a poor prognosis, particularly for low-income patients, as evident in other cancers. While the adoption of neoadjuvant cisplatin-based chemotherapy (NAC) followed by radical cystectomy (RC) and pelvic lymph node dissection (LND) has improved outcomes, these standard-of-care treatments may be underutilized in lower-income patients. We sought to investigate the economic disparities in NAC and LND receipt and survival outcomes in MIBC. **METHODS:** The National Cancer Database was queried from 2004-2019 for cT2-4N0-3M0 BCa patients with urothelial histology alone who underwent RC. Primary endpoints included overall survival (OS) and NAC+LND receipt (=1 LNs removed). Income was dichotomized into upper and lower-income. OS between low and high-income patients was compared with Kaplan-Meier method. Multivariate logistic regression identified significant predictors of NAC+LND receipt. Multivariate Cox Proportional Hazards model estimated the influence of NAC+LND on OS, accounting for age, sex, insurance, Charlson-Comorbidity Index, tumor stage, nodal involvement, year of diagnosis, and facility type. **RESULTS:** A total of n=25,823 patients were included, of whom 90.9% received LND, 45.5% received LND =15 LNs, 35.1% received NAC, and only 6.5% received both NAC+LND. Lower-income patients had significantly worse OS than higher-income patients (Median 55.9 vs. 68.2 months, $p<0.001$) and were less likely to receive LND (OR=0.905 [0.829-0.989], $p=0.027$) or NAC+LND (OR=0.794 [0.749-0.841], $p<0.001$). Patients were more likely to receive NAC+LND if diagnosed after 2011 (OR=3.376 [3.164-3.603], $p<0.001$) or treated at an academic facility (OR=1.353 [1.281-1.430], $p<0.001$). Private insurance (HR=0.928 [0.886-0.973], $p=0.002$) and higher income (HR=0.915 [0.882-0.949], $p<0.001$) were associated with significantly reduced adjusted mortality risk. **CONCLUSIONS:** NAC+LND is underutilized in lower-income MIBC patients, beyond expectations of medical ineligibility for NAC. Without these standard-of-care modalities, OS is negatively impacted. Our findings identify an opportunity to improve the quality of care for lower-income MIBC patients through concerted efforts to regionalize multi-modal urologic oncology care.

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CLINICAL AND TRANSLATIONAL RESEARCH

UROLOGY

Performance Characteristics of ExoDx Urinary Biomarker: A Single-Institution Analysis

Prostate cancer screening relies on prostate-specific antigen, which may lead to unnecessary prostate biopsies. The ExoDx Prostate (EPI) test, a urinary exosome assay, has been developed for the detection of clinically significant (Gleason Grade Group =2) prostate cancer (csPCa) to improve specificity. This study analyzes the performance characteristics of EPI compared to/in concert with a multiparametric MRI (mpMRI)-based pathway at a single academic institution. Patients who underwent EPI testing between 10/2019 to 5/2023 were reviewed for EPI score, demographics, MRI characteristics, and biopsy results. Patients were categorized by EPI score (high risk = 15.6 vs. low risk < 15.6). Outcome variables of biopsy and MRI were compared between EPI risk groups using Chi square and Mann Whitney-U test. Spearman correlation was used to estimate the correlation between EPI score and PI-RADS and Gleason score. Receiver operator curve (ROC) analysis assessed the performance of EPI and PI-RADS score for prediction of csPCa. An optimal cutoff value was determined for EPI using ROC, and the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were assessed. Statistical comparisons were two-sided with a p-value <0.05 being statistically significant. Of n=173 patients with EPI scores, 28.9% were low risk and 71.1% were high risk. EPI had weak correlation with PI-RADS score on prostate MRI ($r = 0.30$, $p < 0.001$). An optimal EPI score cutoff for the detection of csPCa of 26.43 was determined (sensitivity 0.720, specificity 0.537, PPV 0.367, NPV 0.800). On ROC analysis, PI-RADS with score of =4 had better predictive performance for detecting csPCa with an Area Under the Curve (AUC) of 74.6% (sensitivity: 0.696, specificity: 0.721, PPV: 0.485, NPV: 0.862), versus an AUC of 63.1% with EPI testing. By utilizing a criteria of PI-RADS score =4 and EPI = 26.43, we found improved PPV and specificity over either alone (PPV: 0.556 vs 0.485 vs 0.367, respectively) (specificity: 0.873 vs 0.721 vs 0.537, respectively). In addition, we found that with utilization of either PI-RADS score =4 or EPI = 26.43, there was improved NPV and sensitivity (NPV: 0.962 vs 0.862 vs 0.800, respectively) (sensitivity: 0.957 vs 0.696 vs 0.720, respectively). Our study supports EPI testing as a way to assess risk for csPCa, ideally in combination with mpMRI, and also prompts reevaluation of 15.6 as an optimal cutoff EPI score.

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MEDICAL EDUCATION

MEDICAL EDUCATION

**Peer Education Program on Women's Health Care for the Delaware
Department of Corrections**

Mass incarceration disproportionately prevents minority women from making well-informed decisions regarding their bodies and health. Prison systems often strip people of their bodily autonomy and violate their reproductive rights by limiting their access to basic healthcare. Existing literature has demonstrated that justice-involved women have limited access to health screenings, and subsequently suffer from poor health outcomes, including a higher risk for unintended pregnancies, a higher risk of STI transmission, worse pre-/post-natal care, and lower rates of preventative health screenings. In a systematic review, peer educator programs were shown to be well-received within the prison community and effective at improving health outcomes. However, these existing programs typically focus on STIs, while excluding education on anatomy, menstruation, preventative health, contraception, and family planning. This project was developed to bridge that gap by creating a comprehensive curriculum on women's sexual and reproductive health that could be taught by women within the prison system to their peers, empowering both the educators themselves and enhancing learning for participants. While prison staffing shortages and the COVID-19 pandemic prevented the formal implementation and research analysis of the program, the delay allowed for refinement and feedback on the educational materials. A pilot study was conducted in which the curriculum was taught to a focus group at Baylor Women's Correctional Institution. Valuable insight from the participants regarding healthcare in the carceral setting as well as feedback on strengths and weaknesses of the program were used to expand and revise the curriculum. The programming now includes information on STIs in the women having sex with women (WSW) population and relevant healthcare guidelines for transgender and nonbinary individuals. The educational content is now improved and more inclusive to better reflect the diversity of people within the justice system. Additional efforts were made to streamline printable content to improve the environmental sustainability of materials moving forward, as well as to save both time and cost once the project is scaled up to capacity. The full Peer Educator Program is scheduled for the summer of 2024, with IRB approval to conduct research on the efficacy of the program and knowledge acquisition by participants. Further goals include the publication of all results so that other institutions may adapt the curriculum in the future.

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MEDICAL EDUCATION

MEDICAL EDUCATION

Developing a Trauma-Informed Care Curriculum for Caring for Refugees and Asylum Seekers

There is evidence that suggests an association between migration and mental health issues, including post-traumatic stress disorder. Unsurprisingly, the process of migration can expose immigrants to traumatic events, including separation from family, violence, and mistreatment from law enforcement. Medical school educators have sought to add trauma-informed care (TIC) to their curriculum via sessions, seminars, or workshops. Some novel studies suggest that these sessions related to TIC are well-received by medical students. Residency programs have implemented training for trauma-informed care, not specific to immigrants. There exists a need for providers to recognize the unique challenges of immigrants, including refugees and asylum seekers, that have experienced trauma. The authors developed a novel curriculum in TIC for refugees and asylum seekers. To date, a pilot session was delivered to a group of medical students in a Global Health extracurricular track. The session was a culmination of an extensive literature review on TIC practices, an incorporation of guidelines for refugee and asylum seeker health care, and experiences from a practicing clinician. The challenges encountered by the team mainly stemmed from a paucity of research specifically addressing TIC for refugees and asylum seekers. The literature review included international organizations' law and guidelines, systematic reviews on refugee health, case reports of unique pathologies, and "toolkits" for providers designed for immigrant health. The team developed this curriculum for a target audience of medical students. As such, the background research was distilled over the course of months to match the level of training of the audience. The authors designed numerous case studies adapted from real published cases as well as personal experiences. Each case incorporated learning objectives drawn from the literature review. They highlighted key aspects of refugee and asylum seeker health in the context of traumatic experience. A single case was selected to complement the didactic session that informed students on legal definitions and common experiences of refugees and asylum seekers. The case was provided in parallel with the information to provide context on the physical manifestations of refugee/asylum seeker experience. It also served to highlight well-evidenced barriers to care that this population faces. The team intends to deliver regular sessions, with plans for guest speaker panels and "brown bag" lunch talks. This project seeks to address an important aspect of immigrant health care that has the potential to enhance medical school training in delivering compassionate and patient-centered health care.

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MEDICAL EDUCATION

MEDICAL EDUCATION

Evaluating the Health Equity Knowledge and Capacity of Health Professions Students

BACKGROUND: Health professions students often face inadequate preparation for the complex challenges of health equity. Understanding the social determinants of health and strategies to combat social disadvantages is essential to improve overall health outcomes. This understanding is not discipline-specific. **METHODS:** A 36-item Student Health Equity Survey (SHES) was developed to measure students' health equity knowledge, attitudes, and capacity and administered to incoming health professions students across 9 programs (N= 478). **RESULTS:** SHES measured 7 competencies: Over 80% of students performed poorly on two of the three items assessing our public health principles competency. The capacity and support survey items showed that 40.8% of respondents have no professional role to demonstrate this competency. The policy and structure competency revealed that 79% of respondents erroneously believe using race as a risk factor when interpreting population health data is good practice. The justice, equity, and inclusion-based values competency revealed that 37% of respondents find it difficult to relate to stories in which other people talk about racial or ethnic discrimination they experience. **CONCLUSION:** Recommendations for enhancing the delivery of health equity content to students across diverse disciplines include the addition of lessons that frame health disparities in a historical and sociocultural context, followed by opportunities for students to apply the concepts to realistic scenarios. Further recommendations are being developed to address other salient findings of the survey.

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MEDICAL EDUCATION

MEDICAL EDUCATION

Strategic Planning in a Student-Run Free Clinic: Utilizing a Pragmatic Policy and Medical Education-Oriented Approach to Long-Term Clinic Management

Formed in 2006, The George Washington University (GWU) Healing Clinic is a non-profit organization committed to expanding healthcare access to vulnerable populations in and around Washington, D.C., regardless of insurance status or ability to pay. Though the student-run clinic has been operating successfully within the community for more than 15 years, there has not been a long-term strategic plan put in place to facilitate its growth and sustainability. This limitation was highlighted most recently as we moved through the COVID-19 pandemic, which disproportionately impacted the communities we serve. These already vulnerable populations were further marginalized as they were unable to access essential healthcare services. The opportunities for student engagement were reduced, and the clinic's student members were unable to participate in, or learn from, the unique clinical education experience that the Healing Clinic provides. The Healing Clinic Executive Directors and student volunteers recognized the need to address current gaps in care provision, and proposed developing a longitudinal strategic plan. A two-pronged strategic plan model with joint perspectives on medical education and health policy was implemented to streamline current clinic operations and create measurable outcomes for the clinic to achieve in the next five years. The demographics and specific healthcare needs of the populations we work with, including data in areas such as housing security, income and food security, job opportunities, access to care, and overall chronic disease/disability were analyzed to gain a deeper understanding of the Clinic's patient population and their needs. Educational and leadership aspects of the clinic's organization were concretely defined while maintaining consideration of the ethical balance between providing both healthcare to at-risk populations and education for health professional students. The health worker density/workforce ratio in the primary care clinic was also analyzed as a crucial part of ensuring the clinic continues to run smoothly in the years to come, including considerations on how to simultaneously expand the workforce to include more GW students, faculty, residents, and fellows licensed to practice in Maryland. Finally, a significant portion of the plan included differentiating between and evaluating the effectiveness of episodic and continuous care, and working to incorporate organizational policy that is finely-tuned to our patients' needs. The outcomes of the strategic planning process are projected to strengthen the quality of patient care provided to Clinic patients and highlight an abiding multidisciplinary structure that can be implemented in other student-run clinics.

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MEDICAL EDUCATION

MEDICAL EDUCATION

Designing a Student-Run Free Clinic Strategic Plan to Enhance Medical Student Education in Primary Care

The George Washington University Healing Clinic is a student-run nonprofit organization dedicated to improving healthcare access for vulnerable populations in the Washington, D.C. area. Historically, the organization lacked comprehensive long-term objectives to ensure growth and sustainability. To address this, student executive directors developed a strategic plan focused on medical education in family medicine and primary care. This plan optimized clinical operations and defined educational and leadership components with an emphasis on peer to peer learning and comprehensive community-based care. Anticipated outcomes include improved patient care quality, standardized community health curricula, and a replicable model structure for similar student-run clinics.

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MEDICAL EDUCATION

MEDICAL EDUCATION

Developing a Peer Health Education Program for Incarcerated Women's Health

Title: Developing a Peer Health Education Program for Incarcerated Women's Health

Problem Statement/Introduction: In 2021, 190 women incarcerated through the Delaware Department of Corrections (DOC) accepted emergency contraception, while only 20 women accepted long-acting reversible contraception. This data represents missed opportunities to improve the preventative health outcomes of 170 women. Incarceration and separation from families is disruptive to the reproductive rights of women. To address these health concerns, the Delaware DOC provides comprehensive reproductive health care services for incarcerated women. To further promote the informed decision-making of incarcerated women, the Delaware DOC has collaborated with GWU SMHS to develop an innovative peer education program focused on women's sexual and reproductive health. Methods: This poster presentation will discuss the impact that peer educator programs have been recognized to have on carceral health and it will uniquely review the development of a peer health educator program tailored to women's health in the carceral setting. This education program will be carried out at Baylor Women's Correctional Institution in New Castle County, Delaware. This project has been ongoing since creation in 2021 with a tentative program implementation date of Summer 2024. Steps describing the creation of a curriculum on women's health will be discussed. Results: Over the course of this project's development and progressive implementation, several qualitative results have yielded from the procedure listed above. In December of 2021, an informal focus group discussion was conducted at Baylor Women's Correctional Institution in Delaware. Incarcerated women shared their interests and knowledge gaps in a vast variety of women's health topics. The team also gained insight into their lived experiences with healthcare while incarcerated. An overwhelming majority of support and investment in a peer-to-peer education model was also demonstrated. In Summer of 2023, a pilot program was performed to trial both the curriculum and the education model. Through this practice, the team collected positive and constructive feedback and support from incarcerated women. Conclusion: As this project remains ongoing, with expectant implementation in Summer of 2024, conclusions are presented in the form of lessons learned. Lessons learned include the efficacy of peer education as a valuable and sustainable tool to educate on sexual and reproductive health in a vulnerable population. Additionally, including a research component to this work necessitates a collaborative stakeholder engagement to ensure that ethical concerns and operational challenges are addressed. Finally, an analysis of obstacles and solutions will be presented.

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MEDICAL EDUCATION

MEDICAL EDUCATION

Investigating the Utility of Object Manipulation in Augmented Reality in Procedural Training

Augmented reality (AR) technology allows for real-time teaching and remote supervision of complex medical procedures. The successful use of AR technologies can address health disparities by extending the reach of medical experts and providing a cost-effective method for healthcare skills training. It is crucial to understand best practices for utilizing the augmented environment to create a productive learning environment and optimize teacher-learner interactions. This study examines how AR virtual objects can be deployed in holographic space during ultrasound-guided central line and peripheral line placement teaching sessions. Instructors and learners were recruited to participate in recorded ultrasound-guided central venous catheter (CVC) and peripheral IV training sessions. Both instructor and learner used HoloLens 2, a head mounted AR display, to conduct the procedural training in AR from remote locations. Teams could interact via audio channels in the headsets, and instructors could observe learner actions via real-time 3D holographic display and provide visual feedback using virtual hands and procedure-specific virtual objects. The virtual tools available to use included an ultrasound probe, syringe, guidewire, triple lumen catheter, as well as different colored cylinders and cubes. 24 sessions were conducted with 8 unique instructors and 24 unique learners. Three sessions were not used in analysis due to technological malfunction. Across the remaining 21 sessions, tools were picked up and used 804 times, with an average of 38 times per session. The object most often manipulated was the ultrasound probe (35%), followed by the syringe (32%). Of the colored cylinders, the blue cylinder, used to represent the jugular vein, was used most (9%). The probe and syringe were also moved over the greatest cumulative distances, as well as the blue cylinder amongst all cylinders. Objects were utilized for an average of 7.9% + 4.3% of the total session time. When comparing training practices for novice vs more experienced proceduralists in the CVC procedure, instructors used virtual objects more frequently and for longer durations on average with less-experienced trainees (9.8% of session time, or 4.21 minutes) than for those with more procedural experience (6.3% of session time, or 3.28 minutes). Procedure-specific virtual tools are increasingly incorporated into augmented reality remote training, especially for novice learners. Tools which must be correctly positioned and moved synchronously were used most often in the teaching process, suggesting that AR virtual tools can be used to demonstrate complex tool movements and should be incorporated for understanding complex tasks in the training environment.

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MEDICAL EDUCATION

MEDICAL EDUCATION

From the Classroom to the Clinic: Assessing the Role of Nutrition in Medical Education and Patient Care

Challenges related to poor nutrition and its long-term consequences are well studied, but related medical complications continue to grow. A recent study of chronic conditions and the global burden of disease found a 50% increase in metabolic risk factors that contribute to hypertension, diabetes, high cholesterol, and elevated body mass index (BMI) since 1990. Culinary medicine and nutrition stand to contribute an important role in the future as these challenges show little sign of diminishing. The project included an international component collaborating with the National Institute of Public Health in Ljubljana, Slovenia. This allowed for a comparative healthcare assessment, discussions on ongoing healthcare reform, interactions with a local company focused on sustainable food growth and access, and considerations related to culinary medicine and nutrition in medicine and medical education. The experience culminated in drafting a paper (through a review of the literature) related to the role of nutrition in medical education and clinical practice. Additionally, it briefly evaluated a selection of current and potential interventions for enhancing the use of nutrition and culinary medicine. The initial results demonstrated that more focus may be needed on utilizing culinary medicine and nutrition as a way to stimulate health outcome improvements. This could start by expanding the time and content of nutrition in medical school education. Further examination into full-time practice must also be examined as many times these conversations are not included due to time or lower reimbursement rates. Tools such as motivational interviewing and the utilization of dietary questionnaires could be used more frequently while ensuring interdisciplinary approaches are taken when appropriate. Examining this problem on a larger scale, health systems will need to evaluate collaboration between public and private stakeholders to work towards broader change from financing, structure, innovation, and social avenues. Through effective and proactive measures, there is an opportunity to make a significant impact on the health of individuals and communities. Overall, this project allowed for an expanded examination of clinical innovations, entrepreneurship, public health, health policy, nutrition education, and areas of future research.

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MEDICAL EDUCATION

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The Potential Therapeutic Role of MDMA as a Healing Modality for Unaddressed Mental Suffering and PTSD: A Case Study.

We present the case of a patient with longstanding and debilitating peripheral neuropathy, anxiety, fatigue, insomnia, brain fog, and PTSD with several failed trials of multiple pain medications, SSRIs, and antipsychotics prescribed by 8 different psychiatrists, who was also seen by over a dozen different physicians including rheumatologists, neurologists, functional medicine and regenerative doctors across a span of five years. Patient subsequently participated in an MDMA psychotherapy healing ceremony during the winter of 2022. This ceremony was preceded by the oral intake of Ketamine 30 minutes prior with the goal of increasing receptivity and openness to the MDMA experience. Additionally, a harm reduction protocol was implemented and included supplements taken both before and after the ceremony. After the ceremony, patient shared a journal entry outlining their profound experience while on MDMA. They discussed vivid and detailed explorations of the underlying sources of their suffering and trauma. Patient also expanded on the perspective the experience provided and discussed realizations they attained regarding forgiveness and steps for additional healing. Over the following months, patient was able to find their way to constitutional homeopathy, reporting significant decreases in symptoms of anxiety and mental suffering. Our case demonstrates the tremendous potential of psychedelic healing ceremonies as a unique opportunity for patients to better explore, understand, process, and cope with underlying and unaddressed mental suffering. These highly individualized ceremonies establish and foster conditions appropriately suited for individual growth and profound emotional healing. Psychedelic psychotherapy offers a broader and more holistic means of treating unaddressed suffering and assist in restoring equilibrium and overall well-being.

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MEDICAL EDUCATION

MEDICAL EDUCATION

A Review of Developing Transcranial Magnetic Stimulation Applications in 2024

Background: Since the advent of transcranial magnetic stimulation (TMS) circa 1985, the technique has increasingly been implemented as an intervention for treatment resistant major depressive disorder (MDD) without psychosis. TMS for MDD has proven to be extremely effective, resulting in 33% of patients achieving complete remission. Additionally, 67% of patients sustain their antidepressant response after 3 months and 46% maintain their response 1 year after treatment. Repeated application of TMS can influence brain plasticity and cortical reorganization through stimulation-induced alterations in neuronal excitability with only a minor risk for seizures (1:30,000 in post market research, and this is due primarily to operator error). Given the decades of research and success using TMS for treatment resistant MDD, understanding the potential uses and current landscape of TMS for other neuropsychiatric illnesses is of tantamount importance for the advancement of psychiatric care. Methods: A literature review was conducted using the PubMed database to access meta analysis and systematic review abstracts published in 2024 describing innovative applications of TMS beyond depression. This review includes information from 23 selected studies that met predetermined inclusion criteria. Results: -Bipolar disorder 18 studies, N = 617 Improved depression symptoms -Alzheimer's disease 191 studies, N > 7,458 Functional improvement, global cognitive improvement -Parkinson's disease 31 studies, N = 408 Improved balance, mobility, and gait -Epilepsy 18 studies, N = 1224 Improved anti-epileptics drugs' efficacy and cognitive function -Chronic TBI 22 studies, N > 313 Decreased anxiety and headaches, improved function in disorders of consciousness -Phantom limb pain 6 studies (2 RCTs, 4 case reports) Decreased perceived pain (analgesia) -Substance use disorder 102 studies, N > 253 Reduced cravings -Cerebellar ataxia 7 studies (all RCTs), Improved balance with decrease in ataxia -Schizophrenia 55 studies, N = 2,712, Improvement in depressive, negative affective symptoms -Post-stroke rehabilitation 111 studies, N > 2,735, Improved global cognition, motor function, balance, walking, ADL function, language function -Chronic daily headaches 13 studies, N = 538, Decreased intensity and frequency of headaches Conclusion and Clinical Impact: TMS is a noninvasive neuromodulatory therapy which has been FDA-approved with demonstrated effectiveness for treatment resistant depression without psychosis. TMS offers hope for treatment of a myriad of neuropsychiatric disorders in the future, and it is incumbent upon future clinicians to understand the shortcomings and successes of this technology in the context of its ever-expanding applications.

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MEDICAL EDUCATION

MEDICAL EDUCATION

Assessing Fourth-Year Medical Students' Perceptions on Refugee Health Training and Knowledge of Refugee Health Themes at George Washington University School of Medicine and Health Sciences (GW SMHS)

Introduction: The United States has accepted more than 3 million refugees since 1980. Refugees have significant mental and physical health needs due to traumatic experiences in home countries, forcible displacement and grueling migration journeys, and challenges associated with resettling in host countries. To care for refugee populations, health trainees must be mindful of the health literacy, health systems, and access to care challenges which these populations face. A recent study found that fourth-year medical students at ten US medical schools in the Midwest were underprepared to care for refugees and immigrants. GW School of Medicine and Health Sciences (GW SMHS) offers an integrated, longitudinal public health, population health, and health systems medical school curriculum [Patients, Populations, and Systems(PPS)] to cultivate clinicians that deliver high-quality care within evolving health systems. **Purpose:** This study assessed GW fourth-year medical students' preparedness to care for refugees in the Greater Washington Area. **Methods:** A 26 question cross-sectional survey was produced and reviewed by three refugee health experts at GW SMHS. MS4s were sent the refugee health survey and 41 students responded (23.6% response rate). Chi-square tests were performed to explore the relationships among all variables after assuring that the key assumptions for chi-square test analysis were met. **Results & Discussion:** >90% of respondents reported that they did not have appropriate dedicated class time on refugee health or clinical opportunities to care for refugees at GW SMHS. 70.7% of respondents reported little to no understanding of the unique physical and mental health needs of refugees. This can impact the quality of care that refugees in the Greater Washington Area receive and, ultimately, worsen health disparities in refugee populations. >60% of respondents demonstrated satisfactory knowledge on the refugee health themes of social determinants of health and culturally sensitive care. This may be due to a focus on these themes within the PPS curriculum. Respondents demonstrated a gap in knowledge on health and legal systems and the Refugee Health Screener (RHS-15). Student knowledge of these content themes might be supplemented within the PPS curriculum with an additional in-class lecture, discussion, or other activity. This is a pilot study which can be expanded by administering the refugee health survey to future MS4s at GW SMHS. By understanding trends in student perceptions on refugee health training and assessing student knowledge of refugee health themes, medical students can be trained to provide high-quality care to refugee populations in residency and beyond.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Resilience, Emotional Wellbeing, and Experiences of Healthcare among Afghan Refugee and Asylee Women in Northern Virginia

BACKGROUND: Circumstances of war and displacement can affect the emotional wellbeing of refugees and resilience factors displayed in resettlement. In Afghan culture, the prevalence of highly gendered roles can plausibly complicate existing stressors for female refugees by hindering access to healthcare and the social acceptability of mental health services. **METHODS:** This qualitative study aimed to assess mental health needs and healthcare seeking experiences of reproductive aged Afghan women who were resettled in Northern Virginia as refugees, asylum seekers, or under humanitarian parole. Study methods included semi-structured interviews in individual or focus-group settings with 8 women. Participants came from diverse ethnic backgrounds and education levels. Interview questions covered mental and general health concerns and access to health services. Participants were asked about conditions producing displacement, how displacement was experienced, and coping strategies employed in times of hardship. Interviews were conducted with interpreters and audio-recorded by M.S., a visibly Muslim woman with six years of experience volunteering with Afghan refugees and a network of community relationships centered on local mosques. **RESULTS:** Interviews suggested a more successful refugee migration to Northern Virginia than initially expected. Participants described post-displacement stressors including family separations, physical pain, and insomnia, highlighting the intersectionality of physical and mental health with traumatic experiences. However, all participants emphasized personal and interpersonal strengths which could be drawn upon to cope. Their stories highlighted community relational support which they both benefitted from and provided to others. Participants generally expressed satisfaction with American healthcare systems and healthcare providers. Unexpectedly, they did not express preferences for healthcare providers who shared Afghan cultural or linguistic backgrounds. 7 of 8 participants minimized the adverse emotional impacts of displacement and only one reported visiting a mental health professional. Participants did not indicate that they would negatively judge peers for seeking mental health care, but 4 of 8 expressed skepticism about the efficacy of American therapy and mental healthcare methods. **CONCLUSIONS:** Findings suggest that mental health services for Afghan women should be organized around strength-based approaches rather than centering traumatization or victimhood to better align with cultural regard for resilience amidst adversity. Specific measures, such as professional offices creating phone menu options in Dari or Pashto to assist non-English speaking callers seeking medical or social services, could also be useful. Overall, interviews revealed broader diversity than expected among female Afghan refugees when invited to speak in their own voices about their health needs and experiences of displacement.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Insurance: A Potential Barrier to Timely Auditory Brainstem Response (ABR) Testing under Anesthesia

Introduction: Current Early Hearing Detection and Intervention guidelines stress the importance of hearing loss diagnosis in infants by three months of age. Existing research has explored barriers to obtaining timely ABR testing for hearing loss diagnosis and barriers to intervention such as amplification devices. This study examines the influence of socioeconomic factors, including insurance status, on the timeliness of ABR testing under anesthesia. Method: A retrospective chart review was conducted using an internal patient database for all ABRs under anesthesia completed at our institution between 2017 and 2023. Demographic data, including insurance type, race, ethnicity, age, and gender were collected. Additionally, the interval time from the initial evaluation and ABR testing under anesthesia was recorded. Results: Among the 391 patients who met inclusion criteria, the median time to undergo an ABR under anesthesia from initial evaluation was 4.8 months [range: 0.1 to 209.0 months]. This time was significantly higher in patients with public insurance compared to private insurance (6.0 vs. 3.5 months, $p < 0.001$). Discussion: Patients with public insurance experienced notably longer delays in obtaining ABR testing under anesthesia compared to their privately insured counterparts. This study illustrates how insurance status serves as a significant barrier to timely hearing loss diagnosis and definitive diagnosis confirmation via ABR. This has implications for creation of optimal treatment plans.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Community Awareness of Acoustic Gunshot Detection Systems in Washington, DC

Municipal governments in the US have adopted acoustic gunshot detection systems (AGDS), which seek to detect gunfire and facilitate timely interventions by emergency services. While municipal leaders do not routinely advertise these systems, the media occasionally reports on this technology; however, it is unknown to what degree the public is aware. Therefore, this study aimed to measure AGDS community awareness and attitudes, and explore the association of this community awareness with gun violence indicators in a major US city. We conducted a cross-sectional, non-representative survey between 11/30/2022-4/6/2023 of adults presenting to the emergency department of a level-1 trauma and academic medical center (70,000 visits/year) in Washington, DC. Survey items measured awareness of AGDS, attitudes towards AGDS, and demographics; responses were analyzed using descriptive statistics. We used multiple linear and logistic regression analysis at the US census level to explore the associations between AGDS community awareness and: counts of AGDS events and proportion of gun-related crimes recorded by the DC Metropolitan Police Department, respectively. Socioeconomic variables from the 2017-2021 American Community Survey controlled for community-level risk factors for gun violence. We screened 418 individuals, and 228 (54%) met eligibility criteria and consented. Participants had a median age of 41 years and most were female (58%), African American (53%), possessed health insurance (94%) and resided in all eight wards of DC; 24% of respondents were aware of AGDS. When asked about AGDS as a tool to address urban gun violence, respondents indicated: it is a good idea to use AGDS (89%); it is fair to use AGDS (84%); and they would want AGDS in their neighborhood (87%). Regression analysis revealed that counts of AGDS events were significantly associated with AGDS community awareness (beta = 98, 95% CI 5.7-190). A substantial proportion of respondents were aware of AGDS, and a majority held favorable attitudes towards AGDS. These findings may influence municipal leaders to speak more freely of AGDS. Future work should investigate the impact of community awareness among the population subset that has engaged in recent gun violence, or is at-risk of perpetrating gun violence, to better understand the role of AGDS community awareness as a tool for gun violence reduction efforts.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Epidemiology and Trends in Emergency Department Visits for Subconjunctival Hemorrhage in the United States

Subconjunctival hemorrhage (SCH) is typically a benign ocular condition characterized by acute but painless bleeding beneath the conjunctiva without a change in visual acuity. Risk factors for SCH are diverse and vary based on age group. Among children, “spontaneous” SCH is an infrequent occurrence, and most instances of conjunctival bleeds are accounted for by non-abusive trauma. In adults, ocular trauma, contact lens injury, hypertension, and acute hemorrhagic conjunctivitis are common etiologies contributing to SCH. Lastly, among the elderly, the presence of systemic vascular diseases—such as hypertension, diabetes, and arteriosclerosis—that compromise the integrity of blood vessels is often associated with a higher likelihood of SCH. Despite its worrisome presentation, SCH is generally a self-limiting condition requiring little to no work-up. In select patients, however, recurrent and even singular cases of SCH have been secondary to larger concerning pathologies, such as conjunctival and adnexal tumors, cavernous hemangiomas, hereditary hemochromatosis, ocular amyloidosis, and ocular vicarious menstruation, carotid-cavernous fistulas, idiopathic thrombocytopenic purpura, and acute lymphoblastic leukemia. In these cases of “atypical” SCH, treatments focus on addressing the precipitating pathology that triggered the event rather than the bleeding itself. However, this does not hold true in all situations. Literature has noted scenarios in which uncontrollable SCH has necessitated medical, and even surgical, intervention. Despite a few aforementioned outliers, much of the literature agrees that these concerning cases of SCH are few and far between. Most instances of SCH will conclude without intervention, and only persistent SCH warrants further evaluation and treatment. This determination notwithstanding, emerging studies indicate that SCH may present an issue from a healthcare utilization perspective, as many patients unnecessarily present to outpatient centers for the treatment of this largely innocuous condition. Early results indicate a need for longer, more contemporary studies to fully characterize the vast epidemiological, clinical, and economic implications of SCH in outpatient settings. In this study, we aim to bridge this gap by utilizing the Nationwide Emergency Department Sample (NEDS) to examine SCH cases in US emergency departments. We will investigate 1) epidemiological trends associated with SCH-related ED visits, 2) SCH treatments and intervention rates, 3) instances of underlying pathology contributing to SCH, and 4) the economic burden associated with SCH-related ED visits. In doing so, we hope these results will help clinicians identify scenarios in which ED visits for SCH are necessary and provide insight on how to curtail the majority of visits that are not.

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PUBLIC HEALTH

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Missed Opportunities for HIV Prevention During the COVID-19 Pandemic

Background The COVID-19 pandemic caused disruptions in access to HIV prevention, care, and treatment services which may have led to increases in community viral load (CVL) and increased numbers of new and late diagnoses. We sought to measure CVL and describe the demographic and clinical characteristics of new HIV diagnoses before and during the pandemic among people with HIV (PWH) in Washington, DC.

Methods Among participants enrolled in the DC Cohort longitudinal HIV study, we identified all new HIV diagnoses, stratified by pre- (January 2017-March 2020) and peri-pandemic (April 2020-March 2023) periods. Using bivariable analyses, we compared characteristics of new diagnoses by time period. Using Cox proportional hazard models, we calculated survival curves for the time to HIV diagnosis, to engagement in care, to ART initiation, and to viral suppression (VS). To assess the ecological risk of HIV transmission, we calculated quarterly in-care total and mean CVL, using the most recent viral load for all participants. Results There were 631 new HIV diagnoses from January 2017 through March 2023; 93 were diagnosed during the peri-pandemic period. We found statistically significant differences in new HIV diagnoses by race/ethnicity comparing pre- and peri-pandemic (Hispanic, 9% vs. 21.5%; non-Hispanic Black, 73.3% vs. 57%, $p = 0.0008$), employment status (unemployed 14% vs 24.7%, $p = 0.0002$), and insurance (private, 58.9% vs. 38.7%, $p < .0001$). The proportion of late diagnoses in the pre- vs. peri-pandemic period was 27.3% vs 33.7% ($p = 0.22$). Time from HIV diagnosis to linkage to care, ART initiation, and VS; and time from ART initiation to VS all decreased significantly between 2017 and 2023 (all $p < 0.01$) among newly diagnosed PWH. Among 11,156 DC Cohort participants, total CVL, mean CVL, and the number of new HIV diagnoses decreased significantly from January 2017 through March 2023 (all $p < 0.01$); the proportion virally suppressed increased significantly ($p < 0.0001$).

Conclusions Among this cohort of PWH, despite increased barriers to HIV care during the pandemic, CVL and new HIV diagnoses decreased while viral suppression increased. New diagnoses were disproportionately observed among Hispanics, those unemployed and underinsured, likely indicative of disparities in HIV prevention and testing access. As the pandemic subsides, increased emphasis on HIV testing and access to HIV care will help identify delayed diagnoses and improve care continuum outcomes.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Family Perspectives on a Novel Student-run Patient Navigator Program Addressing Disparities in Nutrition and Physical Activity Access: a Qualitative Analysis.

Background: Food insecurity and a lack of access to nutritious affordable foods are associated with an increased risk for chronic disease. The Family Lifestyle Program (FLiP) connects trauma-informed trained medical students to families who are referred to receive resources related to physical activity, nutrition education, and food access. FLiP receives referrals from two pediatric clinics serving lower-resourced regions of Washington D.C. Students aid families by providing tailored resources that relate to local nutrition and physical activity programs. Objective: The aim of this qualitative analysis is to assess families' experience with FLiP, with resource utilization, and to understand the programmatic strengths and deficiencies from the guardian's perspective who had participated in FLiP 1 to 3 months prior. Methods: Data was collected via 24 semi-structured interviews and demographic surveys. Interviews were structured to gain insight on families' experience with enrollment, and engagement with the community resources provided. Transcripts were double-coded and thematically analyzed with Dedoose software to capture both a priori and emergent themes until saturation was reached. Results: 24 participants completed all the required elements. Demographic data is in Table 1. 96% of survey participants viewed FLiP as a beneficial program in which they themselves found value and would recommend to others. 79% of participants enrolled in the program to pursue a healthier lifestyle and to improve the health of their family. Themes regarding resource utilization that emerged included (1) increased perception of community connection, (2) increased financial responsibility, (3) value for inclusive shared experiences with children, and (4) external factors limited resources utilization. Conclusion: Participants enrolled viewed FLiP as a useful tool connecting them to resources that aligned with their family health goals. This data supports the utilization of trauma-informed medical student patient navigators to provide tailored community resources to diminish the impact of disparities in nutrition and physical activity access by leveraging the strengths of embedded community organizations. Although 96% of participants were English speakers, we hope to expand resources for non-English speaking participants. Aspects of this program can be used as a template for patient navigator programs more broadly.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Provider Perceptions of Pre-Exposure Prophylaxis Prescribing in the Emergency Department

Background: Emergency departments (EDs) have the potential to identify pre-exposure prophylaxis (PrEP) eligible patients, yet limited research has been done examining attitudes regarding prescribing. We sought to understand the perspectives of ED providers on offering PrEP in the ED. Methods: An e-survey was distributed to ED providers in DC, Maryland, and Virginia through professional society and department listservs from August – November 2023. We conducted uni- and bivariable analyses of provider characteristics and PrEP prescribing perceptions stratified by practice duration and whether their ED offered routine HIV testing. We assessed readiness to implement ED-based PrEP using the Organizational Readiness for Implementing Change (ORIC) tool (score range 12-60). Results: Among 129 providers, 33% were male, 97% White, and 54% were practicing for < 10 years. Sixty-three percent of providers had prescribed post-exposure prophylaxis (PEP); 24% had prescribed PrEP. Providers practicing < 10 years were significantly more likely to have never diagnosed HIV (18% vs 3%, $p=0.035$) and never have prescribed PEP (52% vs 75%, $p=0.01$). Less experienced providers were significantly more likely to report concerns with identifying PrEP-eligible patients (49% vs 24%, $p=0.003$), lack of protocols for PrEP prescribing (61% vs 42%, $p=0.037$), and patient costs (41% vs 22%, $p=0.025$). No significant differences in prescribing were observed by practice duration. Forty-three (33%) providers reported working in an ED with routine HIV testing; they were significantly less likely to have concerns identifying PrEP-eligible patients (19% vs 48%, $p=0.002$), but more likely to be concerned about staff time involved in prescribing (51% vs 31%, $p=0.029$) and adherence (44% vs 27%, $p=0.046$). The median ORIC score was 32 (IQR=13) and did not differ by ED-based HIV testing or provider experience. Conclusions: Providers working in EDs that offer HIV testing may be more comfortable prescribing PrEP. Future efforts to expand ED-based PrEP will require training and organizational support.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Clinic Pre-Implementation and Provider Readiness Characteristics of PositiveLinks Intervention Sites

PositiveLinks is a mobile Health app aimed at increasing retention in care, viral suppression, and medication adherence for people living with HIV in Virginia. The efficacy of PositiveLinks in increasing retention in care and viral suppression is currently being tested across 9 HIV clinics in Washington, DC. We sought to determine pre-implementation and readiness characteristics of providers for PL implementation. We conducted baseline provider surveys from the intervention sites. Demographic information and implementation readiness was assessed using the Organizational Readiness for Implementing Change (ORIC) tool (possible range from 12-60) and subscores for change efficacy and change commitment. Intervention site provider surveys were completed by 7 physicians, 1 social worker (SW) and 9 Research Assistants (RAs) [mean age: 46 years (range:21-71), 82% female, 41% Black]. Nine providers reported use of an electronic medical record system for patient messaging with 5 reporting frequent use of this system. The median ORIC score was 48 [IQR: 45-54], with scores slightly higher among RAs versus physicians/SW (52.5 vs. 48.0). The median ORIC scores for change commitment were 20 [IQR: 19-22] and change efficacy were 28 [IQR: 27-30]. Change efficacy scores were slightly higher for RAs (30.5 vs. 28.0). Pre-implementation surveys revealed a moderate percentage of clinical sites utilizing digital services to maintain contact with patients. Provider surveys show a high change efficacy and change commitment among the providers. Efficacy trial underway to assess implementation outcomes.

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PUBLIC HEALTH

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Barriers to and Caregiver Perspectives of PICU-based Social Needs Assessment for Children with Asthma

Background: Unmet social needs are associated with an increased risk of severe asthma in pediatric patients. Assessing and addressing unmet social needs among families of patients admitted to the pediatric intensive care unit (PICU) for asthma could help to mitigate future risk, but caregivers' perceptions of social screeners and the prevalence of barriers to change remain largely unknown. Objective: To assess caregiver perspectives on social needs screening and identify barriers to change for families of patients with severe asthma in the PICU. Methods: We conducted a qualitative study consisting of semi-structured interviews. Interviews were administered to a convenience sample of caregivers of pediatric patients with asthma admitted to the PICU in an urban tertiary-care children's hospital between February of 2022 and June of 2023. The PICU social work team identified self-reported unmet needs using an institutional questionnaire addressing the following domains: household asthma triggers, asthma care at school, job training, public benefits, food, housing, and material goods. The research team contacted a convenience sample of caregivers with at least one unmet social need at the time of screening. Follow-up occurred between 2 and 12 weeks after the index PICU visit. The 15-minute telephone interview explored caregivers' experience with the completion of the social needs questionnaire, as well as their experience accessing the resources provided. Interviews were recorded and transcribed. A thematic analysis of the written transcripts is ongoing and will be member-checked. The study was approved by the Institutional Review Board. Results (Preliminary): Initial analysis revealed that (1) our social needs checklist provided adequate representation of unmet needs, (2) a caregiver's overall positive or negative experience with the screening process was partially dependent on their perception of illness severity, and (3) caregivers preferred screenings to be performed in a primary care setting by healthcare providers with whom they were familiar. Conclusions: Importantly, caregivers had varying experiences with the resources provided by the PICU team, suggesting that ongoing assessment of social needs in the setting of pediatric asthma is crucial for improving outcomes and pediatric asthma management.

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PUBLIC HEALTH

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Patient navigation as an effective way to increase breast, cervical, and colorectal cancer screening in US immigrants: A Systematic Review

Background: Immigrants undergo recommended cervical, breast, and colorectal cancer screening at a lower frequency than U.S.-born patients and face unique language, educational, and cultural barriers. The delay or lack of screening has known implications in the presentation of breast, cervical, and colorectal malignancies, including worse staging at diagnosis. To address the disparity in cancer screening that immigrants experience, various interventions have been studied, including patient navigation (PN) programs. This systematic review aims to determine whether PN increases cervical, breast, and colorectal cancer screening in immigrant populations. Methods: A systematic literature search was conducted using PubMed, Scopus, and Web of Science to identify English-language articles published from January 2000 to November 2023 examining the role of patient navigators in encouraging routine breast, colorectal, and cervical cancer screening among immigrant populations in the United States. For the articles that met the inclusion criteria, details of patient navigation programs and uptake or change in cancer screening behaviors were extracted. Results: We screened 2196 articles, 53 of which met criteria for review, and 18 articles were ultimately included in the analysis. PN programs increased breast, cervical, or colorectal screening within immigrant populations compared to the control or alternative intervention in all 18 studies. In 7 out of 18 (38.9%) studies, the PN intervention group achieved screening rates similar to or above Non-Hispanic White national average screening rates. Two of those studies occurred in the outpatient setting, which resulted in higher screening rates than community-based settings. Two of those 7 studies that matched the Non-Hispanic White screening rates also had a longer duration of over 4 years. The majority of PN programs included educational sessions or materials and screening appointment scheduling assistance delivered from members of the same cultural group. Other services included identification and assistance with overcoming barriers, insurance assistance, reminders, transportation, and accompaniment to screening appointments. Of the 18 studies included, rural areas were underrepresented, and the training of patient navigators was not always described. Conclusion: Our review suggests that PN programs are effective at increasing cancer screening rates among immigrant populations, and certain aspects of PN programs, including outpatient settings and longer navigation duration, may help to further increase screening rates.

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Effect of Climate Change on the Epidemiology of Allergic Rhinitis: A Systematic Review

Background: In recent years, the impact of climate change has become a growing public health concern. The World Health Organization and leading medical journals are increasingly reporting on how global warming, due to the increased atmospheric concentration of greenhouse gases such as carbon dioxide (CO₂), has put the respiratory health of sensitive individuals at risk. Our review aims to identify the impact of climate change on allergic rhinitis (AR) and provide opportunities to mediate adverse health effects. **Methods:** In accordance with PRISMA guidelines, a literature search was conducted across the following four databases: PubMed, CINAHL, Medline, and Scopus. **Criteria for included studies:** 1) written in the English language, 2) published between 2000 and 2023, 3) reported on the current epidemiological state of AR, 4) described factors related to climate change, including indirect factors (e.g. pollen sensitization and length of pollen season), and 5) observed global warming affecting both pollen season and AR symptoms. Two authors screened for relevance and assessed for quality based on the Joanna Briggs Institute's critical appraisal checklist. **Results:** Of the 502 articles that were assessed, 32 studies were deemed eligible for the systematic review. Seventeen studies reported longer pollen seasons and/or higher pollen concentrations, with two studies projecting total pollen emission to increase by 16-40% and pollen season length to increase by 19 days. Four studies observed an increase in healthcare usage due to AR prevalence; however, not all populations were affected equally. Low-income residents had higher consultation rates and increased risk of persistent rhinitis. Furthermore, areas that typically lack certain pollens are experiencing increased prevalence of those pollens. Studies also show that AR impairs quality of life and work productivity; thus, societal and quality of life impacts may worsen with the projected increase disease burden. Studies report that healthcare professionals are willing to receive more education on the impact of climate change. **Discussion:** Our systematic review reports on various effects of climate change on AR. The review highlights how climate change impacts changes in pollen seasons and concentrations, disease prevalence, allergy sensitization, and symptom severity. As temperature and precipitation patterns continue to change without interventions to adequately address continued warming, the disease burden of allergic rhinitis is expected to continue to rise as well.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Adaptation of Suicide Prevention Strategies for Youths following School Shootings

The deterioration of mental health among our pediatric population, especially in disaster-stricken youths, is a public health emergency. Numerous studies have investigated the effects of disasters, including natural emergencies, armed conflicts, pandemics, and mass shootings, on child and adolescent mental health. However, there is little research on the prevalence and prevention of suicidality among trauma-exposed youths, despite suicide being the second leading cause of death among 15-24 year-olds worldwide. This research has never been more paramount considering the significant rise in mass school shootings over the past decades. The purpose of this research is to summarize the current literature regarding interventions to mitigate youth suicidality in the context of disasters and how they can be adapted to help youths exposed to mass school shootings. This information will aid in the implementation of evidence-based mental health interventions to reduce suicidality among children who survive school shootings. An initial retrospective analysis of existing literature concerning mental interventions, including cognitive behavioral therapy (CBT) with relaxation strategies, Psychological First Aid for Schools (PFA-S), Healing After Trauma Skills (HATS), and Support for Students Exposed to trauma (SSET), for the child and adolescent populations in relation to disasters was undertaken utilizing the following methods: PubMed and Himmelfarb. To maximize cost-effectivity and student participation, these interventions are ideally implemented in a school setting. While there is strong evidence highlighting the effectiveness of school-based interventions in decreasing the incidence of suicide attempts and severe suicidal ideation, this environment may be problematic and triggering to students following a school shooting. Additionally, the facilitation of such interventions depends heavily on teachers and school administrators who too may be suffering from their own mental trauma following such an event. Thus, while no one trauma-based intervention has shown to directly reduce suicidality in disaster-stricken children and adolescents, an effective mental health crisis response to school shootings must be adaptable to address the specific needs of the students, schools, and communities afflicted. The implications of the recommendations outlined in this research are to be used to support the continued survival and prosperity of youths who encounter such life-altering events as school shootings.

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Virtual Nutrition Counseling in Pediatric Primary Care

As childhood obesity prevalence continues to rise within the United States there is a need for early intervention in the treatment and prevention of pediatric obesity. Our quality improvement study addressed the prevention and treatment of pediatric obesity within primary care by incorporating a registered dietitian into a pediatric primary care clinic in Washington, DC. A retrospective chart review was completed on 367 patient charts aged 9 months to 6 years of age who received virtual nutrition counseling at their well child visits from July 2022 until July 2023. Dietary habits were documented and compared to age matched controls. There was no statistical difference between fruits, vegetable, and sugary beverage intake between children who saw the dietitian and those who did not; however, dairy intake among those who previously had dietary counseling was greater at 1.9 servings per day as compared to the controls at 1.3 servings per day. 137 patients with overweight or obesity who saw the dietitian at least once were reviewed; of the 137 patients, 8 saw the dietitian twice, 5 three times, 1 five times, and 2 six times. Patients with overweight and obesity who saw the dietitian were advised by the provider to create a BMI follow up appointment 78% of the time, however only 29.9% did so. Of the 131 families who completed a REDCap survey about the nutrition counseling experience, 55% had specific questions to ask the dietitian. Most common questions were about beverages, portion sizes, and meals. 5 providers were also surveyed, and all strongly agreed that having a dietitian in primary care was helpful, saved them time, improved access, and that a dietitian in primary care was an important need. Having a virtual dietitian integrated into pediatric primary care is a sustainable, accessible model that provides nutrition counseling to possibly prevent and treat the development of pediatric obesity.

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Anti-Inflammatory Dietary Interventions to Address Mental Health Outcomes: A Scoping Review

Background Chronic inflammation is involved in many diseases, such as cancer, cardiovascular disease, and poor mental health. Behavioral interventions, such as diet, to mitigate inflammation in the body is a growing area of therapeutic research. Anti-inflammatory diets, such as the Mediterranean Diet and DASH Diet, adhere to foods that can lower inflammation in the body and potentially improve mental health outcomes. **Objective** The objective of this review is to summarize the existing evidence of the effects of anti-inflammatory dietary interventions on mental health outcomes. **Study Design** We conducted a search of systematic reviews and randomized controlled trials in several databases (PubMed, Embase, PsycINFO, CINAHL, and Web of Science). Articles included were peer-reviewed, published in English, included adult participants, evaluated an anti-inflammatory dietary intervention, and reported on mental health outcomes. Two researchers screened and extracted the data for each article included. **Analysis** Quality assessment was carried out independently by at least two researchers and each article was given a final assessment rating. Two researchers then extracted data using Covidence. A project lead reviewed and resolved any conflicts. **Results** Our search yielded 19 randomized controlled trials (RCTs) and 10 systematic reviews/meta-analyses (SR/MAs) that reported on mental health outcomes. The average length of dietary interventions in the included RCTs was six months. Most studies evaluated the effects of Mediterranean-style diets. Although there were moderate improvements, short-term dietary interventions did not have lasting effects on mental health outcomes such as mood and depression. **Conclusion** The results of this review suggest that the relationship between behavioral dietary interventions and mental health-related outcomes is dependent on a variety of factors. The dietary approaches were heterogeneous and the quality of studies varied, limiting our ability to draw clear conclusions about the relationship between diet and mental health. Our results suggest that anti-inflammatory dietary interventions, at best, exhibit a moderate modulatory effect on mental health related outcomes. To better understand this relationship, longer interventions with more clearly defined diets are needed.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Identifying Factors Associated with Personal Protective Equipment Nonadherence Correction in a Multidisciplinary Emergency Department Setting: A Mixed-Methods Study

The appropriate use of Personal Protective Equipment (PPE) is essential in protecting healthcare workers (HCW) and patients during times of increased risk of exposure. Monitoring PPE use in clinical settings is a complex task, and one that requires innovative and multidisciplinary strategies to determine what barriers to adherence currently exist, and what factors influence HCW behavior. This project was a retrospective review of pediatric resuscitations between March 2020 – December 2022. These resuscitations were recorded at Children’s National from three angles, with audio. Eighteen cases were selected, all of which contained at least one aerosol-generating procedure (AGP). This was done to create a baseline of a “high-risk” environment, and one in which certain standards of PPE use were expected to be followed. The PPE types included in this analysis were gowns, gloves, and masks. The review tracked the PPE type, category of non-adherence, and time elapsed from non-adherence to correction or patient departure (if not corrected). Corrections were categorized as self-initiated, prompted by another HCW, or physically corrected by another HCW. In the 18 cases reviewed, 1,832 instances of non-adherent PPE between 434 HCWs were identified. 72 providers had no noted PPE non-adherence, and among those flagged as non-adherent, the majority had non-adherence in at least two PPE types. Gloves were the PPE type with the most non-adherence (n=704, 38.4%), followed by gowns (n=650, 35.5%). The most compliance with hospital PPE regulations was in seen with masks (n=478, 26.1%). Gloves were the most corrected PPE type (with the highest correction rate at 21.9%), followed by gowns, then masks. There were 186 total corrections made, the majority of which being self-initiated (97.9%). Non-adherence was evenly distributed between medical and trauma resuscitations, but medical resuscitations had a higher correction rate (11.8% vs. 8.9 %, p=0.05). Time elapsed to correction was not significantly influenced by time of day, day of week, or type of activation (medical vs trauma). Assessing compliance to institutional PPE policies in real-time is a difficult task given the number of people involved, complexity of these clinical scenarios, and awareness of expected regulations. Of note, this study only identified four prompted corrections. Additional tools could be incorporated into the clinical setting to address this challenge and mitigate individual responsibility in responding to non-adherence. Therefore, a long-term goal of this project is the development and deployment of a computer-vision software that allows for automated PPE correction prompts.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Baseline HIV and PrEP Knowledge Scores Amongst Adolescents and Young Adults Enrolled in an Efficacy Trial of a Life Simulation Game to Routinize HIV Testing

Background: Adolescents and young adults (AYA) account for 21% of new HIV infections in the United States, and yet 50% are unaware they are infected. AYA need resources to access HIV testing and prevention options such as PrEP, in a youth-friendly and non-judgmental manner. The objectives of this analysis were to describe the baseline characteristics of AYA enrolled in an efficacy trial to increase HIV testing using a life simulation game. Methods: This study recruited participants online using social media and outreach to local community organizations. Potential participants were contacted via phone, screened for eligibility, and subsequently randomized 1:1 to either a control educational app or the game intervention. Eligible participants were 13-24 yrs of age, lived in the DC area, were ever sexually active and self-reported being HIV negative. Participants completed baseline surveys at enrollment to assess their sexual and HIV testing behaviors, HIV and Pre-exposure prophylaxis (PrEP) knowledge, and self-efficacy scores. Results: As of February 2024, 153 participants have enrolled in the study out of 659 people screened. These participants were 53.6% White, 14.4% Hispanic, 43.8% identified as Heterosexual, 47.8% as Lesbian/Gay/Bisexual, 92.6% as Cisgender, 1.8% as Transgender, and the mean age was 20.9 (range 16-24). A majority (76.5%) of participants had completed at least some college/associate's/technical degree, and 96.3% received sexual health education, mostly at school (97.4%). Participants reported a median of 3 sexual partners with 9% having had a prior STI diagnosis, 50% had ever been tested for HIV, with 34% intending to test again in the next 6 months, and 9% had ever taken PrEP. At baseline, participants reported a median HIV knowledge score of 9 out of 16, a self-perceived risk score of 21 out of 48, a condom self-efficacy score of 6 out of 20, a PrEP knowledge score of 3 out of 13, and a PrEP intention score of 6 out of 12. Conclusions: At baseline, among a racially and sexually orientated diverse sample of AYA, median HIV and PrEP knowledge and intention scores were relatively low, showing a need for improved HIV and PrEP educational resources for AYA. Additional knowledge scores will be measured and compared to baseline survey results after one-, three-, and six months of either playing a life simulation game or using a control educational app intervention in order to assess the efficacy of the game intervention in improving HIV testing and prevention knowledge.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Income drives access to high-volume institutions for primary cloacal repair

Purpose: Families facing socioeconomic constraints may have barriers to seeking care at high-volume centers. We aimed to identify any socioeconomic factors associated with undergoing primary cloacal repair at high-volume institutions. **Methods:** Using the Pediatric Health Information System® (PHIS), we identified patients <3 years of age who underwent primary cloacal repair between 2012-2022 using ICD9/10 procedure and diagnosis codes. We verified our abstraction method by cross-referencing PHIS-identified cases from our institution with retrospective chart review. Primary outcome was if primary cloacal repair occurred at a high-volume (≥ 20 repairs over the study period) or low volume institution (<20 repairs/over the study period). We examined differences in outcome based on race/ethnicity (non-Hispanic White vs everyone else), insurance status (public vs private commercial), income (>50 th percentile household income), and childhood opportunity index (favorable vs unfavorable; COI). COI is a composite measure of 23 neighborhood variables reflecting social determinants of health. Descriptive statistics, univariable, and multivariable logistic regressions were performed. **Results:** 228 patients underwent cloacal repair between 2012-2022. Most patients were non-Hispanic White (53%), privately insured (52%), earned a median income of \$35,000-70,000 (57%), and had a favorable childhood opportunity index (63%). A larger proportion of higher income, privately insured, and White non-Hispanic patients were treated at high-volume institutions (Table 1). Unadjusted logistic regression demonstrated increased likelihood of care at a high-volume center for non-Hispanic white patients with private insurance and income >50 th percentile (Table 1). After adjusted analysis, only income >50 th percentile was independently associated with repair at a high-volume institution (aOR 5.22 [95% CI 2.02- 13.45]; $p=0.001$) **Conclusions:** A larger proportion of white non-Hispanic, privately insured, and higher income patients receive primary cloacal repair at high-volume institutions. After adjustment analysis, income was the sole driver of this difference and conferred 5-fold increased odds of receiving care at a high-volume institution.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Transportation Barriers Impeding Patients' Ability to Receive Care at Student Run Clinic

Introduction/Study Question: Access to transportation is an essential SDH as it can determine an individual's ability to meet with physicians and receive optimal medical care. The NHIS (1997-2017) found that 5.8 million persons in the US (1.8%) delayed medical care due to lack of transportation. Those who cite transportation as a barrier are disproportionately poor, older, less educated, female, and belong to a minority group. We sought to understand transportation access for patients seeking care at a free, student run clinic which primarily serves immigrants, those who primarily speak a language other than English, and low SES individuals. **Methods:** In this cross-sectional study, we interviewed 57 patients who received care at the clinic since 2022. Surveys were conducted from September 2022 to October 2023. Initially, telephone interviews were conducted, with 7 surveys completed. Due to challenges in data collection, in-person surveys were administered in the clinic in both English and Spanish. Responses were recorded in RedCap and statistical analysis was performed using Python. The primary objective was whether this population encountered barriers to transportation, leading to missed appointments, and secondary analyses investigated contributing factors to transportation barriers, including modes of transportation, travel costs, and duration. **Results:** Transportation was a factor influencing clinic attendance. 19.6% of participants reported missing an appointment due to transportation issues and 8.9% encountered difficulties accessing the clinic. 64.3% of study participants own a car with 96.4% using a car as their primary mode of transportation to reach the clinic. Similarly, the majority utilizes a car for commuting to work (57.1%) and grocery shopping (69.6%). Furthermore, 21.4% of participants cited inconvenient stops or schedules as reasons for not using public transportation. **Discussion:** Less than 10% of participants reported experiencing issues in accessing transportation. As the clinic is located in an area that is relatively less accessible, this was a surprising finding, as we expected a majority of patients would experience some level of transportation accessibility issues. This could be explained by the method of transportation used, where more than 90% of surveyed individuals indicated a car as their primary method of accessing the clinic. Having access to a car presumably allows individuals to leave at times that better fit their schedules and follow direct routes that allow them to reach their clinic appointments on time. Possible interventions to provide alternative options for those without access to cars include improving the convenience of public transportation routes.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Identifying the Factors Influencing Culturally Responsive HIV and PrEP Screening for Racial, Ethnic, Sexual, and Gender Minoritized Patients: A Scoping Review

Background: While prevailing ideas centralize individual risk-taking behaviors in the spread of human immunodeficiency virus (HIV) among racial, ethnic, sexual, and gender minoritized (minoritized) patients, the role of structural barriers and screening deficits remains underestimated. **Significance:** Primary care practitioners can conduct impactful HIV screening conversations and reduce disparities by practicing culturally responsive communication (CRC), which translates diversity, equity, inclusion, and justice values into patient care through reflexivity and an understanding of the culture of racism. To help improve the professional development of clinicians, we conducted a scoping literature review to explore what recent literature identifies as factors influencing culturally responsive HIV and pre-exposure prophylaxis (PrEP) screening practices for minoritized groups. **Methods:** This scoping review followed the framework set forth by Arksey and O'Malley and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR). **Results:** Forty-nine studies published between 2019-2022 were extracted and analyzed for key factors influencing culturally responsive HIV and PrEP screening for minoritized patients. After rigorous quality checking and data charting, we organized the factors into the 4 tenets of culture evident in CRC: the culture of the patient, the culture of the clinician, the culture of medicine, and the culture of racism. Factors that positively influenced screening included clinician knowledge and competence, availability of inclusive messaging, effective promotion of services, services that address structural barriers, and respect from clinicians. Factors that negatively influenced screening included financial constraints, inadequate clinician training/education/knowledge, lack of trust/comfort with clinicians, clinician bias/prejudice, and sexual/gender-based community stigma and discrimination. **Conclusion:** CRC is critical to reducing the disparate burden of HIV among minoritized populations. This scoping review identified the role of various factors in these interactions. We also identified valuable themes in existing patient-clinician interactions, including support for the intersectional needs of diverse patients and social support. Additionally, clinicians need to be trained from school onwards not only about HIV and PrEP, but also about active opposition of bias and the oppression of minoritized patients. When structural inequities are targeted holistically, minoritized patients are further empowered to seek care. Study limitations included challenges in quantifying and coding barriers and facilitators and the restricted time frame of this review. Our findings have important institutional, interpersonal, and individual-level implications for HIV and PrEP screening practices. Additionally, these results offer avenues to pursue effectively tailored, culturally responsive interventions to promote HIV and PrEP screening in the primary care setting.

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PUBLIC HEALTH

COMMUNITY AND URBAN HEALTH

Developing an Infection Prevention and Control Toolkit for US Detention Facilities

Correctional Infection Prevention and Control (IPC) is a critical aspect of public health that reduces transmission of infectious diseases among incarcerated populations and the communities they are a part of (and will return to). There are nearly two million people currently in US jails or prisons (‘‘residents’’), and over nine million people enter US correctional facilities annually. Infectious disease transmission in the carceral setting is amplified by dense housing arrangements, poor ventilation, and the higher proportion of vulnerable patients, including those with chronic diseases, mental and substance use disorders, and other risk factors. As such, correctional facilities have higher rates of infectious diseases, including HIV, viral hepatitis, tuberculosis, sexually transmitted infections, and respiratory illnesses. This was exemplified during the COVID-19 pandemic, where rates of infection and death were consistently higher among residents. Notably, rates of infection were matched by facility staff. Many carceral facilities struggle to implement best IPC practices which require interprofessional collaboration, leadership buy-in, funding, and adaptability to their public safety priorities. As such, states requested the Centers for Disease Control (CDC) develop a correctional infection control and response (ICAR) toolkit for these facilities. This past summer, as part of this process, a diverse set of partners, including custody, medical, programming, and administrative staff working in county, state, and federal corrections systems, were engaged to identify challenges and opportunities around correctional IPC. Major themes included: (1) the diversity of policies, resources, and built environments among facilities, (2) operating ‘‘within the Sheriff’s House,’’ where safety considerations are unique, prioritized, and make IPC guidance designed for other settings unfeasible, (3) bureaucracy makes change difficult, (4) public health surveillance and reporting is not comprehensive, (5) partnerships with Corrections must be collaborative, and (6) COVID has brought a greater appreciation for the importance of IPC, but pandemic fatigue have led to a lack of engagement. These findings have informed an initial framework and draft of the correctional ICAR that is being piloted. This ICAR is an important initiative strengthening our public health system so that we are better prepared and poised to respond to the next pandemic. Enhancing correctional IPC will improve the health outcomes and quality of life of the many incarcerated people in the United States, prevent further transmission of infections, and reduce health disparities and costs. Correctional health is community health, and correctional infection prevention and control must remain a public health priority.

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PUBLIC HEALTH

GLOBAL HEALTH

WhatsApp-Based Sexual and Reproductive Health Education for Adolescents with Perinatally-Acquired HIV: Lessons Learned from an mHealth Pilot Intervention in South Africa

Background: Adolescents with perinatally-acquired HIV (APHIV) in South Africa have limited access to relevant sexual and reproductive health (SRH) education. Mobile health (mHealth) can discreetly deliver SRH education but has not been tested for APHIV. **Methods:** In this study, we describe the effects of a 10-module mHealth intervention to support transition to adult care on SRH attitudes within the Interactive Transition Support for Adolescents with HIV (InTSHA) randomized trial. Between May 2021 and February 2022, we enrolled APHIV ages 15-19 from a government-supported clinic in urban KwaZulu-Natal, South Africa. Baseline and six-month SRH questionnaires were adapted from a World Health Organization resource for asking adolescents about SRH, which consisted of nine positively worded items on a four-point Likert scale. Transcripts of the mHealth intervention modules were thematically analyzed. **Results:** Of 80 participants enrolled, 47 completed the SRH survey at both time points (mean age: 17.2 years); 25 (53.2%) were female and 19 (40.4%) were randomized to InTSHA. Likert scores improved from baseline to follow-up for the InTSHA group, specifically for "Defining Sexuality", "Discussing Sex with Caregivers", and "Comfort Saying No to Sex". Similarly, these three topics were most heavily discussed and came across as major themes in the intervention transcripts. **Discussion:** mHealth is a potential tool for interactive SRH education that should be refined and scaled for APHIV. Ongoing studies are assessing the impact of InTSHA on a broader population of APHIV.

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PUBLIC HEALTH

GLOBAL HEALTH

The State of Diabetic Retinopathy Treatment Services in Nigeria: A Situation Analysis

The escalating global prevalence of diabetes mellitus (DM) and diabetic retinopathy (DR) has become a major public health concern and is projected to disproportionately increase in sub-Saharan Africa (SSA). Nigeria reports a high prevalence of both DM (5.77%) and DR in individuals with diabetes (21.3%). This study aims to assess the existing provision of DR treatment in Nigeria to identify gaps and inform strategies for improving DR treatment services nationwide. This descriptive cross-sectional study aimed to conduct a situation analysis of DR treatment in Nigeria. Data was collected from June to November 2023 via online surveys distributed to state and federal health facilities with ophthalmology departments. Two surveys assessed the distribution of DR services, health workforce, equipment, service utilization, performance indicators, record-keeping, patient follow-up systems, and health financing. Data analysis included descriptive statistics and constructing an interactive map illustrating nationwide DR service distribution. All government hospitals in Nigeria with ophthalmology departments (n=88) were invited to participate, of which 84 agreed to participate, yielding a response rate of 95%. DR services are geographically concentrated in southern Nigeria and major cities (i.e., Abuja, Lagos). Approximately 35% of government ophthalmology departments provide DR treatment, with 33% offering anti-VEGF (vascular endothelial growth factor) injections, 12% providing laser treatment, and 4% offering vitrectomy. Limited equipment availability was frequently cited as a hindrance to performing laser treatments and vitrectomies. Only 13% of the hospitals have at least one retinal laser and 17% have at least one OCT, with a notable proportion being non-functional at the time of the study (24% non-functional retinal lasers, 33% non-functional OCTs). Continuing medical education for professionals delivering DR treatment is available in 19% of surveyed facilities, and 18% maintain a register of patients undergoing DR treatment. This study highlights the urgent need for strategic resource provision to address the mounting burden of DR in Nigeria. The unequal distribution of services, insufficient equipment, and limited professional development opportunities underscore the challenges faced by the Nigerian health system. The insights gained from this study will help inform national health funding priorities, facilitating the development of sustainable, integrated, and universally accessible treatment services for DR in Nigeria.

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PUBLIC HEALTH

GLOBAL HEALTH

Hopeful Horizon: Uniting Communities for Mental Health Awareness in Vietnam

The burgeoning concern surrounding mental health in Vietnam is encapsulated by the term “bệnh tình thần,” which encompasses a spectrum of conditions from depression to schizophrenia, yet is often accompanied by a damaging pervasive social stigma. In collaboration with Softenmind, WisdomViet, and the project lead, the Hopeful Horizon project aims to address these stigmas and promote mental health awareness. The project comprised three primary components: “Breaking the Silence” an online student competition, an open mental health discussion, and a celebratory networking gala. Drawing from experiences with the George Washington University School of Medicine and Health Sciences HIV summit, the project lead organized the student competition, scouted potential venues, coordinated the Hopeful Horizon web design, and developed promotional materials. Through the “Breaking the Silence” competition, students created videos under the guidance of mental health therapists, fostering dialogue and creativity in mental health advocacy. The mental health summit convened key influencers, therapists, and executives to debunk misconceptions and discuss pressing mental health issues. Concurrently, the gala event facilitated networking opportunities and featured musical performances by Vietnamese artists, Kai Dinh and Orange, to raise awareness through art and culture. This initiative serves as a cornerstone for future endeavors in mental health advocacy. Future research could assess the event’s impact on awareness and stigma reduction, paving the way for sustained efforts in addressing mental health challenges in Vietnam.

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GLOBAL HEALTH

Demographic and Clinical Predictors of Quality of Life in Pediatric Epilepsy Patients at Yekatit 12 Hospital Medical College, Addis Ababa, Ethiopia

Background: Epilepsy presents significant challenges for children and their families, impacting emotional, behavioral, social, and academic functioning. The emotional toll on parents is substantial, influencing both parental well-being and the quality of life of children with epilepsy (CWE). Comorbidities further exacerbate these challenges, with intellectual and learning disabilities being common, and stressors including stigma and low self-esteem contributing to adverse psychosocial outcomes and diminished quality of life. Despite the importance of assessing quality of life, traditional medical approaches to epilepsy management often overlook this aspect as a measurable outcome. Our study addresses this gap by evaluating the quality of life of pediatric epilepsy patients in Ethiopia, using a health-related quality of life assessment tool. This study aims to identify predictors of quality of life, offering valuable insights into the impact of epilepsy on pediatric patients and informing more holistic approaches to epilepsy management.

Methods: A total of 120 children with epilepsy, along with their parents or caregivers, were surveyed in this cross-sectional study, conducted at the Pediatrics Neurology clinic of Yekatit 12 Hospital from May to July 2022. Data collection involved structured interviews gathering sociodemographic information and clinical profiles, along with HRQOL assessments across four domains: Cognitive, Emotional, Social, and Physical functioning. Statistical analysis was performed using SPSS version 23, with comparisons made among demographic and clinical variables.

Results: The study revealed significant associations between various factors and QOL scores. Factors such as school enrollment status, number of seizure medications taken daily, presence of comorbidities, current seizure occurrence, and seizure control status were found to significantly influence QOL scores. Notably, children attending school, those on monotherapy, and those without comorbidities exhibited higher QOL scores, while lower scores were associated with polytherapy, presence of ongoing seizures, and uncontrolled seizures. Additionally, demographic characteristics including living arrangement, caregiver marital status, and occupational status were significantly associated with QOL scores, with higher scores observed among children living with both parents, children of married caregivers, and children with caregivers employed in the private sector.

Conclusions: The study emphasizes the critical role of family structure and caregiver attributes in shaping CWE's QOL and highlights the detrimental effects of epilepsy-related stigma and school absenteeism on their emotional and social well-being. Moreover, the study underscores the importance of optimal seizure control through monotherapy, emphasizing the need to consider both efficacy and tolerability of antiepileptic drugs in treatment plans.

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PUBLIC HEALTH

GLOBAL HEALTH

E-Health and Tele-Medicine for the Bedouin Population of the Northern Negev Desert - An Opportunity for Closing Gaps

The COVID-19 pandemic accelerated the widespread adoption of telemedicine, facilitating healthcare continuity while minimizing direct interpersonal contact. Nevertheless, healthcare disparities remained persistent, notably within marginalized communities such as the Bedouin population of the Negev Desert. Constrained by low health literacy and limited technological access, the Arab Bedouin minority stand out as one of the most vulnerable populations in Israel, facing significant socio-cultural barriers to healthcare utilization. This study was designed to assess the potential of eHealth in enhancing healthcare access for the Bedouin community, with a focus on mapping digital literacy levels and identifying access gaps to essential healthcare services. Through interviews, surveys, and telemedicine simulations, data was collected and analyzed to propose tailored solutions for enhancing eHealth accessibility. The implications of these findings transcend beyond the Bedouin community, holding relevance for public health policies and paradigms aimed at rectifying healthcare disparities among minority groups worldwide.

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GLOBAL HEALTH

Prevalence, predictors and outcomes of small for gestational age in twin gestations

Objectives: Twin pregnancies are at increased risk of developing neonatal complications such as low birth weight, preterm births, and perinatal mortality. Small for gestational age (SGA) infants, defined internationally as infants with a birth weight below the 10th centile for gestational age, are at greater risk of hypoglycaemia, necrotizing enterocolitis, sepsis, polycythaemia, intraventricular haemorrhage and prolonged hospitalization. This study aims to ascertain the burden and outcome of twin pregnancies complicated by SGA. This was a two-year retrospective audit at the Korle Bu Teaching Hospital (KBTH), the largest referral centre in Ghana, from January 2020 to December 2021. Data were collected on all twin deliveries greater than 28 weeks gestation and included: maternal age, parity, gestational age at delivery, birthweight, fetal Apgar scores, and sex. The INTERGROWTH 21 Newborn Size Calculator was used to calculate the birthweight centiles, and twins with birthweights below the 10th centile were analyzed. This study involved 394 pairs of twins born to mothers with a mean age of 30.5 ± 5.6 years, and the majority (73.1%) were multiparous. The average gestational age at delivery was 35.6 ± 3.2 weeks, with 38.6% near-term and 11.2% very preterm. Over half were delivered by caesarean section (59.6%). The mean birth weight of twin deliveries at KBTH was 2.2 ± 0.6 kg. The prevalence of low birthweight babies (<2.5 kg) was 61.0%. Using the Intergrowth centile charts for Newborns based on gestational age, the prevalence of SGA babies (<10 th centile) was 42.3%, and babies <3 rd centile accounted for 1.3% of the cases. Growth discordance of $\geq 25\%$ was recorded among 14.7% of twin pairs. Babies with $>25\%$ growth discordance accounted for 57.8% of the SGA babies which was 18.2% higher than the proportion contributed from babies with $<25\%$ growth discordance. The prevalence of stillbirth among twin gestations was 5.7%. SGA babies had higher odds of being born to a nullipara mother (aOR:1.90, 95%CI: 1.01–3.59), being females (aOR:1.45, 95%CI: 1.06–1.99), having growth discordance of $\geq 25\%$ (aOR: 2.07, 95%CI: 1.42–3.03) and having low Apgar score (<7) at 5 min (aOR:5.42, 95%CI: 3.17–9.26). In addition, SGA babies had three times higher odds of being delivered stillbirth. The prevalence of SGA within our twin birth population was 42.3%, and SGA was associated with significant adverse perinatal outcomes. This audit highlights the need for closer surveillance and management to optimize the outcomes in twin gestation.

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PUBLIC HEALTH

GLOBAL HEALTH

Investigating Associations Between Pulmonary Function Tests (PFTs) and Dyspnea Index Scores Among Patients With Lung Symptoms in India

Background The Global Burden of Disease Study (1990-2016) revealed a disproportionately higher burden of chronic respiratory diseases in India, as well as increased morbidity and mortality, especially in urban centers, where there are lower air quality index values. Risk factors such as air pollution, smoking, particulate and biomass pollution, etc. contribute to the highest amount of DALYs (disability-adjusted life years) among chronic respiratory disease patients. Existing studies have shown a statistically significant relationship between dyspnea and airway obstruction (through the FEV1 value). The literature shows that the reported quantified dyspnea severity predicted 5-year mortality even more than the FEV1 value in COPD patients. Another study shows the dyspnea severity (via mBORG) had significant negative correlations with FEV1 in cystic fibrosis patients 6-18 years of age. This prospective study serves to bridge the existing knowledge of predictive value of dyspnea index scores, and correlate them with objective PFT measurements as a prognostic marker of lung function. Based on the determined predictive power of symptomatic lung patient self-reported dyspnea grading, clinicians in India, and globally, can prioritize and harness these explored simple dyspnea quantification tools for efficient triage, personalized treatment, and prognosis measurement of the patient. The objective was to gain insight into the factors that affect dyspnea sensation, assess disease severity, and correlate the objective PFT scores with subjective self-reported mMRC and mBORG dyspnea scores. **Methods** The pre and post bronchodilator spirometry-measured FEV1, FVC, FEV1/FVC, FEF25-75, FENO, DLCO, auto-computed predicted values based on the patient's demographics, and percent-change were recorded from the pulmonary function testing. During the lung function testing, the mMRC and mBORG dyspnea scales were administered. Statistical analyses such as Pearson Chi-Square, linear regression, and one-way ANOVA test were run. **Results** Preliminary ANOVA and Chi-Square data analyses and visualizations do not indicate discernable evidence of a strong linear relation between the ordinal patient response scores with the raw and normalized laboratory measurements. However, trend lines on graphic visualizations between dyspnea scores against the FEV1 show a broad alignment based on the slope. **Conclusions** The study highlights the challenges of data consistency with respect to patient-reported dyspnea scores in a country with multilingual and diverse socioeconomic demographics, as well as cultural perceptions of dyspnea sensation. Further analysis within demographic subsections may be beneficial for better insight. In addition, stratifying categories of lung disease can shed light on adaptations and differences in sensitivity in patients burdened by chronic respiratory disease.

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PUBLIC HEALTH

GLOBAL HEALTH

Prevalence of Autism in Vietnam Recognized After Overcoming Cultural Stigma and Adopting a Western Approach

Background: Understanding of Autism Spectrum Disorders (ASD) in Vietnam has been severely limited, with epidemiological data being solely available from unstandardized screenings. Limitation in data and lack of awareness is attributable to Vietnam's cultural views towards ASD, influenced by principles from Buddhism and Confucianism. Children with ASDs are seen as burdens on families, representative of bad karma and shame. However, as Vietnam's culture and society adopt an increasingly progressive approach towards ASDs, efforts have been made to better understand and treat them. In 2017-2018, the first nationally representative population-based survey was conducted, revealing both a high and increasing prevalence of ASDs, raising concerns for the need to improve screening, education, and treatment to maximize favorable outcomes. GW medical students were afforded an opportunity to visit Ho Chi Minh, Vietnam and observe the psychiatry ward at the Nhi Dong 2 Children's Hospital. Here, observations were made firsthand how ASDs are diagnosed and treated, as well as to gain a better understanding of societal views towards ASDs. Results: Providers at the Nhi Dong 2 Children's Hospital use the Denver Developmental Screening Test (DDST-II) to assess developmental delays and milestones in pediatric patients. Patients with developmental disabilities, such as autism, speech delays, and ADHD, are offered a variety of therapies on site, which includes speech-language therapy, behavioral therapies, and physiotherapies. Patient education is emphasized at visits to empower parents to guide child development at home, but additional interventions such as private tutors, special needs schools, and medication remain inaccessible for many families due to a lack of resources and government funding. Moreover, many patients traveled hours to Nhi Dong 2 for their appointment, as their local areas did not have a psychiatry department. Conclusions: Incidence of diagnosed ASDs in Vietnam has been progressively increasing in the last decade. This is hypothetically attributable to the increasing amount of data being available in addition to increasing progressivism in Vietnamese culture, incorporating a Western approach to the screening and treatment of ASDs. Our experience in Vietnam observing how ASDs are diagnosed and treated in a psychiatry clinic raises concerns for the pervasive impact of stigma in the local handling of ASDs and highlights the additional resources and focus required to address patient needs.

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PUBLIC HEALTH

GLOBAL HEALTH

Self-Perceived Problems within Community-Based Organizations in New York City Enrolled in RECOUP-NY

Background: RECOUP-NY (Restoring Mental Health after COVID-19 Through Community-Based Psychological Services in New York City) is a cluster-randomized clinical trial that evaluates the efficacy of a brief psychological intervention, Problem Management Plus (PM+), delivered by staff within community-based organizations in New York City. PM+ is a generalized psychological intervention designed by the World Health Organization for use in settings where mental health care is difficult to access. RECOUP-NY assesses the effectiveness of PM+ in reducing mental health symptoms as compared with standard care sites. The PSYCHLOPS, an individualized patient-reported outcome measure of psychological distress, serves as the primary outcome. Using thematic analysis, this report explores variations in primary index problems reported in the PSYCHLOPS by English, Spanish and Chinese- speaking participants at baseline. Aim: This article seeks to analyze differences in primary index problems reported by English, Spanish and Chinese- speaking participants at baseline (n = 218). Methods: A total of 218 responses were analyzed at baseline (week 1). Responses were translated into English and coded by multiple researchers to identify overarching themes. Responses were analyzed by primary language spoken. Results: Six themes were identified: mental health, physical health, finances, relationships/family, job security and housing. The most commonly referenced problem was mental health amongst Spanish (24%) and English-speakers (22.89%), and physical health amongst Chinese-speakers (48.15%). Discussion/Implications: This research has identified common sources of psychological distress for people within communities that are typically excluded from the formal mental healthcare system. The PSYCHLOPS allows users to address the problem that most troubles them, placing the client's needs at the forefront and allowing them to guide the therapeutic process. By gaining a better understanding of the problems afflicting certain populations, interventions can be tailored to better address client's concerns and reduce disparities in mental health outcomes. Learning Objectives: At the conclusion of this presentation, learners will be able to: - Describe the PSYCHLOPS and understand its utility as an individualized patient-reported outcome measure. - Identify key concerns for 3 populations within New York City communities.

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PUBLIC HEALTH

HEALTH POLICY

Understanding the Impact of the Electronic Health Record on Value-Based Care: A Scoping Review

Background: Over the past two decades, medical practices have sought to transition from physical medical records to electronic health records (EHR) and electronic medical record (EMR) systems to improve safety, compliance, and efficiency. There is extensive literature on the effects of documentation efficiency regarding EHR transitions. However, the impacts of the EHR on value-based care improvements to patient care and outcomes remain unknown. **Objective:** To evaluate the existing literature on changes in value-based care via the use of the EHR in pediatric ambulatory and hospital discharge settings by assessing provider ease of use and patient outcomes. **Methods:** A team of three medical students, four pediatric physicians, and two librarians conducted a scoping review to evaluate the extent of the literature regarding the effects of EHR within pediatric primary care. MeSH terms were used to search for relevant PubMed, Scopus, CINAHL, and Cochrane publications. The publications were imported into Covidence. A title and abstract review were then conducted to include studies conducted in the United States, written in English. These were qualitative or quantitative quality improvement projects in pediatric primary care with a core focus on the EHR in ambulatory, hospital discharge, or the transition to adult care. Excluded studies were conducted outside the US, pertained to adult or inpatient pediatric care, or lacked reportable outcomes. A full-text review, data extraction, and data quality assessment were completed. Each component of the review was conducted by two reviewers; adjudication via consensus discussion resolved any disparities. **Results:** The initial search resulted in 2506 publications, of which 835 were excluded duplicates. 1671 publications were assessed for the title and abstract review, 1491 publications were found to be irrelevant, and 180 proceeded to the full-text review. 116 studies were excluded with 64 proceeding to the data extraction. The 64 extracted studies pertained to the following: increased pediatric condition screening rates (n=17, 26.6%), improved documentation (n=13, 20.3%), pediatric transition to adult care (n=5, 7.8%), increased vaccination rates (n=5, 7.8%), patient satisfaction (n=3, 4.7%) and miscellaneous studies on pediatric EHR-led interventions (n=21, 32.8%). The miscellaneous category consisted of unique topics that did not fit into any of the aforementioned topics. **Conclusion:** In pediatric primary care ambulatory and hospital discharge settings, the EHR can display information for value-based care by improving documentation of provided services, increasing the quality of patient care, and enhancing patient satisfaction.

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PUBLIC HEALTH

HEALTH POLICY

Developing a Patient Navigation Program for Patients Experiencing Homelessness

The District of Columbia (D.C.) has some of the most generous Medicaid eligibility requirements in the country with about 45% of the population being eligible. However, D.C. is performing its Medicaid redeterminations after the end of the COVID public health emergency, and many individuals are being wrongfully unenrolled. As of October 2023, approximately 22,826 individuals were unenrolled from Medicaid for procedural reasons. This gap in Medicaid coverage disproportionately affects vulnerable populations, especially people experiencing homelessness, a population that rose in D.C. by 11.6% between 2023 and 2022, according to the Point in Time Count. To minimize this gap in care for unhoused and at-risk patients, we are implementing a patient navigation program that functions in conjunction with existing healthcare services to provide assistance with medicaid re-enrollments and referrals to specialty care. This program will be run by medical students at the George Washington University School of Medicine & Health Sciences and will take place at clinical sites across D.C., with an emphasis on serving patients experiencing homelessness and other forms of housing insecurity. In the patient navigator role, medical students will first complete a patient navigation curriculum comprised of four 90-minute sessions dedicated to understanding homelessness in D.C., the process of Medicaid enrollment and the current unwinding, and techniques for problem solving when working directly with patients. During patient navigation service delivery, students will work directly with patients after they exit healthcare services to help them understand their medicaid status and work through any issues that may arise. Students will also use a resource directory to help arrange follow-up appointments with specialists and coordinate other potential resources like transportation, access to technology, and prescription assistance. Evidence shows that patient navigation services improve health outcomes and mitigate barriers to care. However, few patient navigation programs serving unhoused individuals exist, and no existing programs focus specifically on Medicaid and specialty referral services. Through this program, we hope to bolster D.C.'s existing healthcare systems by providing a unique service that targets those who may fall through the cracks.

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PUBLIC HEALTH

HEALTH POLICY

Homelessness Policy Through the Lens of City and County Jails

Homelessness is a massive public health issue in the United States, impacting an estimated 3.5 million young adults and 1.1 million children every year. The count of people experiencing homelessness is greater than the number of Americans who die from any of the leading causes of death every year and homelessness is associated with increased risk of chronic health conditions. Despite city governments acknowledging that homelessness is a critical issue, the question of who holds the responsibility of addressing it is often unclear. The 2021 Menino Survey of Mayors, asked mayors, "how much do each of the following groups shape your city's homeless policy?" Responses showed that 78% say that the police have at least some influence over their homelessness policies, rated higher than public housing authorities and people experiencing homelessness. Further, when asked about city staff dedicated to homelessness, mayors reported that after social services, police departments were the second highest employers of homelessness staff in their cities. Our previous study examining police-associated homeless outreach teams found that law enforcement agencies are pivotal in city responses to homelessness and often act through punitive measures with goals of encampment removal or enforcement of civil or criminal infractions or quality of life crimes. In this study, we build upon our previous work exploring police influence on city homelessness policy and examine the role of city and county-run jails. Collecting data from the top 100 cities in the U.S. by population, we compiled a database of city and county-run programs that either: (1) divert individuals from entering the criminal justice system; (2) intervene at the court-level to offer alternative sentencing; or (3) re-integrate individuals leaving the criminal justice system. Only including programs that mention housing or homelessness, we found over 400 programs that, directly or indirectly, target criminal justice-involved people experiencing housing insecurity. Of these 100 cities, we found that 94 of them have at least one program, with 53.3% of programs run by county government, 21.2% run by city government, and 23.5% of programs run by a combination of city and county government. Of these programs, we found 112 diversion programs, 136 alternative sentencing or homeless court programs, and 134 re-entry planning programs. Further analysis is underway to determine the goals of these individual programs, but we anticipate the results will align with our previous work demonstrating a fractured government approach to homelessness with an emphasis on punitive law enforcement response.

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PUBLIC HEALTH

HEALTH POLICY

Care Not Confinement: Rethinking Solitary Confinement Policies for People with Mental Disabilities

Introduction: Solitary confinement, as a concept, began as a way to rehabilitate prisoners in the broader penitentiary movement. It was believed that restrictive housing would allow prisoners to engage in silent contemplation, religious practice, and work while they were incarcerated. However, by the late 19th to 20th century, studies began to show that prolonged confinement led many to severe distress, mental deterioration, and exacerbated mental health issues Purpose: The objective of this analysis is to review and compare the existing restrictive housing policies and recommendations of select organizations and jurisdictions in the US and Abroad as it pertains to the conditions of confinement, reason for confinement, access to mental health resources, and more, for those incarcerated with behavioral health disabilities. Method: The states in this policy analysis were chosen based on the available data released by the American Addictions Center on the per capita on Mental Health Care Agency Expenditure by state. The five states with the lowest per capita spending on Mental Health care were Florida, Idaho, Arkansas, Louisiana, and Texas. The five states with the highest per capita spending on Mental Health Care were Alaska, Maine, Vermont, Pennsylvania, and New York. Policies mentioned in this analysis were based only on publicly available data as of July 2023. Two countries outside of the US were picked for this policy analysis: The Netherlands and Norway. Result: After examining the policies on Solitary Confinement in states with High Per Capita Spending (HPCS) on Mental Health Care and Low Per Capita Spending (LPCS) on Mental Health Care, there were important differences within their policy procedures. LPSC states were less likely than their HPCS counterparts to detail the conditions of the cells in which inmates were housed during confinement. The policies pertaining to duration of confinement were also more vague and contained longer confinement times in LPCS states when compared to HPCS. When examining the policies in the Netherlands and Norway, differences from the US included overcrowding prevention measures called one-man-one-cell which is rarely utilized in the US. Conclusion: Though there is currently a big push for solitary confinement reform at the local, state, and federal level, the US might still be a couple years away from widespread reform and consistency in standards across the country. Policies for solitary confinement should continue to be analyzed and strategies to mitigate its usage should be tested for their efficacy.

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HEALTH POLICY

Challenges and Potential Improvements to School Vaccination Data Surveillance

With rising prevalence of vaccine hesitancy and growing challenges to vaccination, data on vaccine coverage in schools has become more pertinent to supporting and guiding public health decision making. However, current surveillance data of school vaccine coverage on United States students lacks coordination across states, impairing the ability to conduct rigorous analysis of the effects of public health vaccination policies. This poster aims to describe our experience with dataset inconsistencies during an attempt to conduct a quasi-experiment on how school vaccination exemption laws affected vaccination coverage. We offer recommendations for future data collection and management to facilitate future rigorous analyses of the relationship between laws or policies related to nonmedical school vaccine exemptions and school vaccination coverage in states' bordering counties. We identified technical barriers to effective vaccination surveillance: varying data quality, access, formatting, granularity, collection methodology and presence or absence of state health data. Thus, we recommend the following next steps: (1) communicate the importance of collecting accurate, consistent, and comparable data to the public, (2) constituents should advocate for all states to publicly release and periodically update their school vaccination data, and (3) engage state and local stakeholders in creating a data surveillance standard. This discussion may help policy makers decide what should be done to improve future data surveillance, standardization, and analysis. Obstacles to more detailed data collection are greatly outweighed by the benefits of consistent data quality and collection over time: improved monitoring of public health status, more effective planning for interventions, reduced spending on healthcare, and improved quality of life. Immediate action must be taken to improve our data surveillance to optimize the data available for analysis to inform public health decisions.

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PUBLIC HEALTH

HEALTH POLICY

Impact of COVID-19 on BMI Status and Comorbidities in New Patients Presenting to a Pediatric Weight Management Clinic

Background: Although COVID-19 has been associated with global increases in BMI and obesity prevalence in pediatric populations, to our knowledge, there have been no studies assessing BMI status in patients at pediatric weight management clinics. Furthermore, little is known about the impact of COVID-19 on comorbidity prevalence in adolescents with overweight and obesity. Objective: To examine the impact of COVID-19 on BMI and obesity-associated comorbidities among new patients presenting to a pediatric weight management clinic during the pre- and post-pandemic periods. Methods: A retrospective chart review of new patient visits in-person and online at a pediatric weight management clinic was conducted between the pre-pandemic (January 1, 2017 to March 20, 2020, N=1590) and post-pandemic periods (April 1, 2020 to June 8, 2023, N=1040). P-values for categorical variables were assessed by Chi-square test/Fisher's Exact Test, and p-values for BMI and BMI z-score were assessed by Wilcoxon Rank Sum Test. P-values less than 0.05 were considered statistically significant. Logistic regression was performed to examine differences between the two observation periods for weight status, patient demographics, and comorbidities, with goodness of fit assessed by Hosmer-Lemeshow test. Results: Patients seen during the post-pandemic period were significantly more likely to be diagnosed with a higher obesity classification compared to patients during the pre-pandemic period (OR=1.70, 95% [1.45, 1.99]), and obesity severity was associated with increase in the total number of comorbidities (OR=1.28, 95% [1.22, 1.34]). Patients seen during the post-pandemic period had significantly higher odds of prediabetes (OR=1.62, 95% [1.07, 2.47]), eating disorder/hyperphagia (OR=1.77, 95% [1.26, 2.50]), and ADHD (OR=1.36, 95% [1.09, 1.69]). Patients ages 10 to <14 years (OR= 2.39, 95% [1.51, 3.79]) and non-Hispanic patients (OR= 1.44, 95% [1.07, 1.94]) had higher odds of mood/mental health disorder in the post-pandemic period. There was also an increase in patients with class 3 obesity (43.8% vs 58.4%), patients = 14 years of age (35.7% vs 46.1%), Black patients (40.2% vs 48.2%), and non-Hispanic patients (60.1% vs 69.9%) presenting as new patients during the post-pandemic period. Conclusion: The COVID-19 pandemic exacerbated pediatric obesity severity and increased the prevalence of obesity-related comorbidities, with effects lasting 3 years after the onset of the pandemic. These findings pose serious short and long-term problems for both individual and population health.

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PUBLIC HEALTH

HEALTH POLICY

Dietary Habits Among Uninsured Population in Washington, DC Metropolitan Area: A Qualitative Survey

Objective: Healthy eating and lifestyle modification are essential in the prevention and treatment of chronic health conditions, including type II diabetes and cardiovascular disease. While there is a plethora of research and tools for healthy eating among the general American population, few resources are culturally relevant to meet the needs of diverse immigrant populations. The purpose of this study was to identify the needs of a diverse, uninsured population at a student-run clinic in order to inform the creation of nutrition resources that promote better health outcomes. Design: This study was a single-site, cross-sectional observational study conducted between April and May 2023 at Bridge to Care Clinic in Prince George's County, MD. Results: Uninsured and underinsured primary care patients (N=30), age 18 and above, participated in a self-administered survey. Among the participants, 23 patients (77%) were from countries of Latin American origin and were primarily Spanish-speaking. Participant food preferences were recorded, including favorite carbohydrate (rice), protein (chicken followed by egg), vegetable (broccoli followed by lettuce), fruit (orange), meal (chicken followed by beans). The most common challenge to cooking at home was finding time to cook, followed by adjusting salt and sugar intake and creating meals that satisfied their families' preferences. Of note, most patients surveyed were not interested in changing their diet (79%), but were interested in healthy recipes (94%). Most patients preferred electronic modalities (77%) to receive information. The results from this survey were used to create a website with curated, culturally relevant resources for healthy nutrition. Conclusion: The results of this study highlight the challenges associated with implementing interventions aimed at changing dietary habits to improve health outcomes in this patient population. While some patients share a common cultural background, dietary preferences widely vary and make it difficult to generalize dietary recommendations. More research is needed to better understand the dietary needs of this patient population and how best to implement change.

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