33rd Annual

EVMS Research Day

Virtual Program
Friday, October 15, 2021

Support for research travel and publications for trainees at Eastern Virginia Medical School are made possible by funding mechanisms managed by EVMS Research and Student Affairs. Of special note, we would like to highlight the following resources:

EVMS Community Faculty Designated Student/Resident Research Award Fund
Specifically created as a funding mechanism for student and resident professional travel to present research findings, up to eight $1,000 awards are offered per fiscal year. To qualify for funding, applicants must have a publication-quality manuscript ready for submission to a professional journal within three months of travel. Through this fund, made possible by a Community Faculty donor, over 40 students and residents have been able to present their research at national conferences in a wide variety of specialties and areas of research.

Student Affairs Award-Travel and Publication Fees
Students are able to utilize a new EVMS funding source for travel and publication fees, administered by Student Affairs. Travel awards of up to $1,500 per student are given to support attendance at a conference to present research findings. This travel award can be used to cover the conference registration fee for either virtual or in-person conferences, so actual travel is not required. Additionally, through this mechanism, students are able to apply for separate funds to cover manuscript publication fees for submission to professional journals.

For more information about these awards or the application process, students and residents can email ***EVMSResearch@evms.edu***.

33rd Annual EVMS Research Day
October 15, 2021
Timeline of Virtual Events

Connection information and more on the Research Day Website:

https://www.evms.edu/research/research_day/

Oral Presentations *(click here to join or join directly on the website)*

Opening Remarks

12:00-12:15 PM Dr. Eva Forgacs-Lonart, EVMS Research Advisory Committee Co-Chair
Dr. Paul Harrell, EVMS Research Advisory Committee Co-Chair
Dr. Alfred Abuhamad, EVMS Interim President, Provost, and Dean
Dr. William Wasilenko, EVMS Vice Dean for Research

Keynote Speaker

12:15-1:15 PM Dr. Janice Clements
Professor, Molecular and Comparative Pathobiology, Mary Wallace Stanton
Professor of Faculty Affairs, Vice Dean for Faculty, Johns Hopkins School of Medicine
Subject: The Forty Year Pandemic: Emergence, Therapy, Cure? of HIV

Platform Presentations

Viewers may submit questions using the chat feature – Include Speaker's name first

1:15-1:29 PM Diana Bohannon, Biomedical Sciences Graduate Student
Title: Induction of Type-1 to Type-2 Pericyte Transition In Vitro
Mentor: Woong-Ki Kim, PhD

1:30-1:44 PM Vincent Chan, MD 2024 Student
Title: Examining the Role of Cannabinoid-2 Receptor Activation in Bacterial Clearance
Mentor: Nagaraja Nagre, PhD

1:45-1:59 PM Kendra Walker, MD 2024 Student
Title: Clinical and Biological Features and Treatment Outcomes of Children with newly Diagnosed Acute Myeloid Leukemia and Hyperleukocytosis
Mentor: Hiroto Inaba, MD, PhD

2:00-2:14 PM Mekenzie Wilson, MD 2023 Student
Title: Impact of COVID-19 Lockdown on Overdose Emergency Response Calls in Norfolk, Virginia
Mentor: David Mu, PhD

2:15-2:29 PM Seifeldin Sadek, MD, Reproductive Medicine Fellow
Title: PGE2 Regulates the Plasminogen Activator Pathway in Human Endometrial Endothelial Cells: Differences between Normal and Heavy Menstrual Bleeders
Mentor: David Archer, MD

Short Break, Switch to Breakout Session Links

2:30-2:40 PM

Continued on page 4

"Live" Poster Question & Answer (Q&A) Virtual Breakout Sessions

2:40-4:40 PM in 20-minute periods (in 7 different concurrent "Room" links)

Over 150 pre-recorded video poster presentations from EVMS students, residents, and fellows are available for viewing prior to Research Day. After watching a presentation, viewers should make a list of any questions about the research and then attend these live virtual sessions to ask their questions of the poster presenters. There will be six different 20-minute Poster Q&A periods occurring in seven different Zoom virtual meeting spaces concurrently ("Rooms" A-G), for a total of 42 different breakout sessions. Multiple presenters have been assigned to each session space. Assignments and room links can be viewed on the ***Research Day website***.

Room A (*click here to join*) Meeting ID: 949 6465 0181 Passcode: 962522

Room B (*click here to join*) Meeting ID: 915 4358 5332 Passcode: 435018

Room C (*click here to join*) Meeting ID: 997 1225 8680 Passcode: 131686

Room D (*click here to join*) Meeting ID: 929 9471 6893 Passcode: 322338

Room E (*click here to join*) Meeting ID: 924 2353 7085 Passcode: 538836

Room F (*click here to join*) Meeting ID: 936 3544 7620 Passcode: 993751

Room G (*click here to join*) Meeting ID: 980 5545 5607 Passcode: 117598

Short Break; Switch Back to Large Session Link
4:40-4:45 PM

Presentation of Poster Awards and Closing Remarks (*Click here to join*)

4:45-5:00 PM

Awards from the Vice Dean for Research and Vice Dean for Academic Affairs
Dr. Eva Forgacs-Lonart, EVMS Research Advisory Committee Co-Chair
Dr. Paul Harrell, EVMS Research Advisory Committee Co-Chai

EVMS Biomedical Sciences Programs Poster Awards
Dr. Anca Dobrian, Director, EVMS Biomedical Sciences Graduate Programs

2021
KEYNOTE LECTURE

The Forty Year Pandemic: Emergence, Therapy, Cure? of HIV

Janice E. Clements, PhD

Professor, Molecular and Comparative Pathobiology
Mary Wallace Stanton Professor of Faculty Affairs
Vice Dean for Faculty, Johns Hopkins School of Medicine
Baltimore, Maryland

POSTER PARTICIPANTS

Biomedical Sciences

Residents/Clinical Fellows

Summer Scholars from Other Institutions

Medical Students

** Oral Presentation

Medical Students (cont.)

**** Oral Presentation**

Medical Students (cont.)

**** Oral Presentation**

Abstract Title: Impact of Spaceflight Stress Exposure on Neural Communication

Author: Adkins, Austin M.
Co-Investigators: Vu H. Pham, Neural Engineering and Nanoelectronics Laboratory, Department of Engineering, Norfolk State University Hedi Xia, Department of Mathematics, University of California, Los Angeles Emily M. Hildinger, Sleep Research Laboratory, Department of Pathology and Anatomy, EVMS Bao Wang, Department of Mathematics, University of Utah Hargsoon Yoon, Neural Engineering and Nanoelectronics Laboratory, Department of Engineering, Norfolk State University Stanley Osher, Department of Mathematics, University of California, Los Angeles Richard A. Britten, Radiation Oncology, EVMS Laurie L. Wellman, Sleep Research Laboratory, Department of Pathology and Anatomy, EVMS Larry D. Sanford, Sleep Research Laboratory, Department of Pathology and Anatomy, EVMS

Abstract

INTRODUCTION:
Previous studies between our labs have found that rats can express differences in the amplitudes of local field potential (LFP) activity between brain regions, and differences in activity between regions during both rapid eye movement (REM) and non-rapid eye movement (NREM) sleep after foot shock stress. We are continuing our work on recording and analyzing LFP as an index of neural communication between brain regions (basolateral amygdala (BLA), hippocampus (HPC) and prelimbic cortex (PrL)) in the context of stressors that astronauts will experience during space travel. These include microgravity (mG), space radiation (SR), and periods of social isolation (SI). Each can have significant effects on the brain, altering structure and impairing executive functions, and each also have the potential to impact sleep, exacerbating the effects of stress. In this study, we examined LFP activity across stressors to assess changes in neural communication that may reflect alterations in the ability to adaptively cope with additional stress. We also examined the relationship of LFP activity to temporal perception. The data may help to develop countermeasures against threats to mission success and crew health.

METHODS:
Rats were surgically implanted with depth electrodes for recording LFPs in BLA, HPC, and PrL; screw electrodes for recording cortical EEG; and dataloggers for recording core body temperature. Rats were then divided into groups and subjected to SI (visual barriers between cages) or only individually housed (as a control group). Following recovery, we utilized the well-established food entrained anticipatory activity (AAT) paradigm. AAT is a non-circadian regulated index of temporal perception using a timed presentation of a food treat over the course of days. Overtime, animals will begin to show increased activity prior to a timed food event, and this increase can continue even after food is no longer presented. In our studies, we measured motor activity as an index of AAT, and recorded EEG and LFP activity. Following AAT, rats were also exposed to our fear conditioning paradigm to assess differences in stress responses. For training (ST), the rats were placed in a chamber with a grid floor and presented with 20 footshocks (0.8 mA; 0.5 s duration, 1.0 min interstimulus interval). One week following ST, rats were re-exposed to the context of the stressor (CTX) in the absence of footshock for assessment of fear memory recall. Two weeks following CTX, rats were again re-exposed to the same context for assessment of extinction learning (EXT). Recordings were acquired using amplifier (Grass model 78D) and recording (Power1401-3 hardware and Spike2 software, Cambridge Electronics Design) systems. Recordings were then processed through a cross-correlation algorithm implemented on MATLAB software. Processed datasets were then uploaded to a trained neural network and outputs assessed using a neural network approach (developed by our colleagues at NSU and UCLA) to determine phenotypic differences.

RESULTS:
A well-defined dataset was established and validated for neural network training and evaluation. SI appears to alter LFP activity between BLA, HPC, and PrL during AAT and following fear conditioning compared to the control group.

CONCLUSIONS:
Preliminary data suggest differences between SI and control groups in the cross-correlations of LFPs between BLA, HPC, and PrL during AAT and following fear conditioning. Correlation of these data with changes in sleep, stress responses (stress-induced hyperthermia), and motor activity will be crucial to further our understanding of these alterations, and their potential effects on stress processing and temporal perception.

Abstract Title: Induction of Type-1 to Type-2 Pericyte Transition In Vitro

Author: Bohannon, Diana G
Co-Investigators: Woong-Ki Kim, Microbiology and Molecular Cell Biology

Abstract

INTRODUCTION:
Blood-brain barrier (BBB) homeostasis is maintained through a delicate and crucial interplay among endothelial cells, pericytes (PCs) and astrocytes within the neurovascular unit. As the environmental sensors and regulators of the BBB, PCs have become of particular interest for a more proper understanding of how environmental changes, such as those that occur during aging or disease, impact BBB homeostasis. BBB breakdown is a nearly ubiquitous pathology known to contribute to neurological diseases and states of cognitive decline. Our lab has previously identified a subset of PCs which are closely associated with regions of BBB breakdown. Understanding the origin of these uniquely positioned PCs will help elucidate the mechanisms by which they are formed and also direct future studies which will attempt to target this subset of PCs to improve or maintain BBB homeostatic stability. We hypothesize that these type-2 pericytes (PC2) which are commonly associated with BBB breakdown, transition from homeostatic type-1 pericytes (PC1) due to changes in environmental conditions and are not of a distinct cellular origin.

METHODS:
Commercially available primary human brain microvascular pericyte cells (Cell Systems), which were found to be >95% platelet-derived growth factor receptor beta (PDFRB) positive and alpha smooth muscle actin (SMA) negative PC1-like cells, were plated into 24 well plates with serum-free media (Cell Systems) without passaging. Plated cells were allowed to adhere and grow to 85-90% confluency over 4 days. The growth media was then replaced with growth media treated with a range of physiological doses of human recombinant proteins interleukin 1 beta (IL-1β; 0 - 50 ng/mL), vascular endothelial growth factor (VEGF; 0 - 100 ng/mL), or transforming growth factor beta 1 (TGF-β1; 0 - 100 ng/mL) or human amyloid beta 1-42 (Aβ42) (0 - 50 ng/mL), or patient bronchial alveolar lavage derived HIVgp120 (0 - 20 ng/mL) in replicates of 4 wells per dose. Treatments were applied for 72 h before cells were washed, fixed, permeabilize, and stained with PDGFRB conjugated to AF594, SMA conjugated to AF488, and DAPI nuclear marker. Stained wells were then imaged under a Zeiss 880 confocal microscope to obtain 10 randomized images per well. Nuclei were counted using ImageJ software, and the number of PDGFRB+ SMA+ PC2-like cells were counted manually and normalized by the number of cells per frame. Statistical analysis was performed using GraphPad Prism 7.

RESULTS:
BBB homeostatic regulatory factors IL-1β (1, 5, 10, 20ng/mL), VEGF (20, 50, 100ng/mL), and TGF-1β (1ng, 10ng, 20ng/mL) each showed a significant increase in the percent of SMA+ cells at the doses indicated compared to 0ng/mL carrier treated control wells. Additionally, cells in 10 and 20ng/mL HIVgp120 treated wells showed a significant increase in the percent of SMA+ cells compared to control wells. As predicted, some treatments and doses showed cellular growth or death indicated by changes in the number of nuclei compared to control wells, which was accounted for by calculating the percent of PC2-like SMA+ amongst remaining cells instead of raw counts. Interestingly, Aβ42 treated cells showed no change in the percent of SMA+ cells nor in cell number at physiologically relevant dosages.

CONCLUSION:
This data suggests that SMA+ PC2-like cells can transition from SMA- PC1-like cells in vitro under several proposed conditions. These results support our in situ findings in humans, macaques, and mice which indicate an increase in the percent of PC2, but not a change in the overall number of PCs, under various conditions of neurological disease and cognitive decline. Collectively, this suggests that PC1 transition into PC2 due to environmental changes within the neurovascular niche, but further in vivo investigation of this phenomenon is needed to confirm these findings.

Abstract Title: Sleep fragmentation in a mouse model of NASH exacerbates fibrosis and induces phenotypic changes in liver macrophages in an age-dependent manner

Author: Fisher, Ravin
Co-Investigators: Sezgi Arpag-McIntosh, Department of Physiology Anca Dobrian, Department of Physiology

Abstract

Introduction:
Sleep dysregulation is known to impact on metabolism, immunity and inflammation. NASH is a chronic metabolic condition characterized by liver fibrosis, steatosis and inflammation and with high risk of progression to hepatocellular carcinoma. The goal of our study was to determine the effect of 2-week sleep fragmentation (SF) on liver fibrosis and inflammatory milieu at different stages of disease progression using DIAMOND (diet-induced animal model for NASH disease) mice that closely recapitulate human disease history and histopathology.

Study design and methods:
The DIAMOND mice are a stable isogenic cross between C57Bl/6J and 129SI/Sylm strains. When fed a 40% kcal fat diet and 4% fructose water (HFD), starting at 8 weeks of age, male mice develop progressively fatty liver and NASH. We examined 3 time points in the disease development, after 18, 26 and 40 weeks of diet that correspond to steatosis and early fibrosis, advanced fibrosis and necrosis and, bridging fibrosis and occasional hepatocellular carcinoma, respectively. Male mice at each of the 3 time points were randomly assigned to either a 2-week SF protocol (daily for 6hrs, every 2 min), or controls (n=5-6/group). We characterized the liver macrophage (LMF) spatial and phenotypic profile in SF and control (no SF intervention) mice using F4/80 and galectin-3 markers to differentiate between macrophages of different functional phenotypes and Clec4 as a marker for Kupfer resident macrophages. Recent studies showed that F4/80+ Gal3+ MF have a pro-fibrotic phenotype, while F4/80+Gal3- MF are more pro-inflammatory. LMF that surrounded lipid droplets (lipid crown-like structures, LCS) were quantitated separately from the isolated parenchymal LMF. Fibrosis was determined using SiriusRed staining. Gene expression was measured in livers of SF and control mice at different time points using the NanoString platform and a myeloid gene expression panel. miRNA expression in the liver was measured using the mouse miRNA panel with the Nanostring platform. In-silico analysis was performed to analyze validated genes that may be impacted by the change in miRNA expression between SF and control groups. Data was analyzed using t-test between SF and control groups for each time point and null hypothesis was rejected for a p-value<0.05.

Results:
Following 2 weeks of SF, liver fibrosis was increased by 20-25% in 18 week HFD mice, by 25-35% in 40 week HFD mice and was not changed in 26 week HFD mice, compared to their respective age-matched controls. SF had the greatest impact on numbers and phenotype of LMF in younger mice (18 weeks on diet) in early stages of fibrotic changes and steatohepatitis. The total number of MF was double in SF mice ($p<0.01$) and the percent of MFassociated with LCS was increased 4-fold in SF mice compared to age matched controls ($p<0.01$). The majority of LMF co-expressed Clec4 indicating that these cells are Kupfer cells rather than newly recruited monocyte/ MF. Similar phenotypic changes were also found in the 26 week HFD mice after SF but no changes in liver fibrosis. No significant changes in MF numbers or phenotype were found in mice with advanced disease (week 40) in response to SF albeit they displayed exacerbation of liver fibrosis. A ~2.7-fold increase in Col1a and Col3a gene expression was found in 18wk HFD mice following SF but not in the older 40wk HFD mice. Similarly, an increase in 18 pro-inflammatory cytokines and chemokines was found in young but not old mice after SF compared to controls. Interestingly, a 4-fold increase in expression of Trem2 along with a 2.2-fold decrease in PPARg was found in SF young mice. Overall, the gene expression profile of SF vs control mice supports the fibrotic changes in young mice but not in older animals. I

Conclusion:
Collectively, our r results indicate that SF has a larger impact on LMF in younger mice and suggests that changes in MF phenotype may underlie the early fibrotic changes. Also, galectin-3 expressing Kupfer cells are the single most impacted LMF population following SF. Therapeutic approaches are currently aiming to inhibit galectin-3 in NASH. Our study underscores the utility of a therapeutic approach targeted towards inhibition of galectin-3 and immune MFinfiltration early in the disease progression or in younger individuals with pathological sleep.

Abstract Title: Extracellular and Intracellular Cholesterol in B cells Modulates B Cell Activation Thresholds

Author: Gauronskas, Phillip Joseph
Co-Investigators: 1. Shelby Ma, Microbiology and Molecular Cell Biology\Biomedical Sciences PhD 2. Alina Moriarty, Microbiology and Molecular Cell Biology\Biomedical Sciences PhD 3. William Coles Keeter, Microbiology and Molecular Cell Biology\Biomedical Sciences PhD 4. Tayab Waseem, Microbiology and Molecular Cell Biology\Biomedical Sciences PhD 5. Carlos Hernandez-Fernando, Yale School of Medicine\Comparative Medicine 6. Elena Galkina, Microbiology and Molecular Cell Biology\Professor

Abstract

INTRODUCTION:
Atherosclerosis is a chronic inflammatory disease that develops largely from the overaccumulation of modified low-density lipoprotein (LDL) and formation of atherosclerotic plaques within medium to large-sized arteries. Monocytes infiltrate these blood vessels, differentiate into macrophages and eventually become overburdened with modified LDL. These processes result in overaccumulation of intracellular desmosterol and an anti-inflammatory signaling cascade within these cells. Nevertheless, the highly pro-inflammatory atherosclerotic environment overtime dominates and drives cholesterol-loaded macrophages to a pro-inflammatory phenotype. 24-Dehydrocholesterol Reductase (DHCR24) is a crucial enzyme necessary for both the Kandutsch-Russell and Bloch Biosynthesis pathway for cholesterol synthesis. DHCR24 regulates intracellular desmosterol levels by converting it into cholesterol. B cells display subset-specific roles in atherosclerosis with B1 and Marginal zone B cells being atheroprotective and follicular and Innate response activator B cells playing a pathological role. There are currently no studies that investigate the role of intracellular desmosterol within B cells. Here we show for the first time using a cre-lox mouse model of CD19-driven B cell-specific overexpression of DHCR24 in a low density lipoprotein receptor deficient mice (*Dhcr24fl/flCd19cre/+Ldlr-/-)* amplifies B cell activation thresholds when compared to *Dhcr24fl/flCd19+/+Ldlr-/-, Dhcr+/+Cd19+/+Ldlr-/- and Dhcr24fl/+Cd19cre/+Ldlr-/-* B cells. We also show that *Dhcr24+/+Cd19+/+Ldlr-/-* B cells from mice given 16 weeks of HFD polarize lipid rafts on their membranes similar to *Dhcr24+/+Cd19+/+Ldlr-/-* from mice on chow diet, when stimulated with anti-IgM F(ab')2 abs, or pretreated with acLDL.

METHODS:
Lipid Rafts - Splenocytes isolated from *Dhcr24+/+Cd19+/+Ldlr-/-* mice placed on high-fat diet (HFD) for 12 weeks or chow diet were cultured in advanced RPMI-1640 containing 10% FBS and 1% penn/strep. Cultured cells were either left untreated (non-stimulated) or treated with 10 µg/mL acLDL at room temperature. After 15 minutes, splenocytes with or without acetylated LDL (acLDL) pretreatment were then stimulated for 10 minutes at RT with 25 µg/mL anti-IgM F(ab')2 abs, washed and fixed in 4% ice-cold PFA. Cells were then stained with cholera toxin subunit B conjugated to fluorescein (CTB-FITC), and anti-CD19-BV421. Cells were then acquired using the Amnis ImageStreamX Mk II Imaging Flow Cytometer for further downstream analysis using IDEAS software. Lipid raft polarization was quantified using the H. Var. Std. feature, which was then expressed as percent changes relative to non-stimulated controls and compared across groups using either unpaired T-tests, or ANOVA, followed by Holm-Sidak post-hoc tests (significance level set at $p < 0.05$).
Calcium Flux - Whole splenocytes from *Dhcr24fl/flCd19cre/+Ldlr-/-* and *Dhcr24fl/flCd19+/+Ldlr-/-, Dhcr+/+Cd19+/+Ldlr-/- and Dhcr24fl/+Cd19cre/+Ldlr-/-* controls were loaded with 5 mM of Fluo-3 AM and stained for CD19 antigen. A baseline was established by running samples for 40 seconds prior to stimulation via 25 µg/mL of anti-IgM F(ab')2. Calcium flux was then quantified by measuring area-under-the-curve (AUC) of the linear time function of Fluo-3 AM intensity, and comparisons made via one-way ANOVA, followed by Holm-Sidak post-hoc tests (significance level set at $p < 0.05$).

RESULTS:
Endogenous B cell-specific overexpression of DHCR24 in *Dhcr24fl/flCd19cre/+Ldlr-/-* mice significantly increased calcium flux signaling thresholds ($p < 0.001$) compared to B cells from Dhcr24fl/flCd19+/+Ldlr-/-, Dhcr+/+Cd19+/+Ldlr-/- and Dhcr24fl/+Cd19cre/+Ldlr-/-control mice. Lipid raft polarization on B cells was slightly dampened in *Dhcr24+/+Cd19+/+Ldlr-/-*mice, when pretreated with acLDL ($p < 0.01$), as opposed to with anti-IgM alone ($p > 0.001$).

CONCLUSION:
The results from these studies suggest that activity of DHCR24 and uptake of acLDL might regulate a threshold of B cell activation. This suggests that cholesterol homeostasis in the intracellular and extracellular environment might influence B cell functions.

Abstract Title: The Use Of Re verse Phase Protein Array (RPPA), Principal Component Analysis (PCA), And Cancer Scape Pathway Mapping To Identify New Tumor Vulnerability And Actionable Drug Targets Against High-Grade Malignant Human Cancer Cell Lines

Author: Howell, Andrew Palmer
Co-Investigators: 1. Andrew Howell, Leroy T. Canoles Jr. Cancer Research Center, Department of Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA 23501 2. Julia Wulfkuhle, Center for Applied Proteomics and Molecular Medicine, School of Systems Biology, George Mason University, Manassas, Virginia 20110 3. Natalie Stahr, Leroy T. Canoles Jr. Cancer Research Center, Department of Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA 23501 4. Rosa Gallagher, Center for Applied Proteomics and Molecular Medicine, School of Systems Biology, George Mason University, Manassas, Virginia 20110 5. Emanuel Petricoin, Center for Applied Proteomics and Molecular Medicine, School of Systems Biology, George Mason University, Manassas, Virginia 20110 6. Amy Tang, Leroy T. Canoles Jr. Cancer Research Center, Department of Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA 23501

Abstract

INTRODUCTION:
There will be 1,898,160 new cancer cases and 608,570 cancer related deaths in the United States in 2021. Lung, pancreatic, colorectal, and breast carcinomas are the major leading causes of cancer-related fatalities globally. These cancers are often associated with oncogenic EGFR/HER2/K-RAS pathway activation. The EGFR/HER2/K-RAS pathway is a major tumor-driver whose uncontrolled activation is associated malignant tumor growth, multidrug-resistance, early tumor relapse, and systematic metastasis. Despite more than 40 years of intense research, oncogenic K-RAS activation remains an undruggable target in clinical oncology. Seven-In-Absentia (SINA) homologues (SIAH) are extraordinarily evolutionarily-conserved E3 ubiquitin ligases that play a critical gatekeeper role downstream of the EGFR/HER2/K-RAS pathway. SIAH is a major tumor vulnerability that is ideally positioned to become an attractive target for novel, targeted therapy development. Prior studies have shown that tumor growth was abolished in malignant tumor cell lines such as MiaPaCa, MDA-MB-231, MDA-MB-468, A459, and HeLa following SIAH inhibition; however, the underpinning molecular mechanisms that give rise to this striking anti-K-RAS and anticancer phenotype remain unclear.

METHODS:
To delineate the molecular mechanism(s) of why anti-SIAH2PD targeted therapy is so effective in impeding and eradicating incurable and metastatic tumors, we conducted reverse phase protein array (RPPA)-based kinomic analysis to delineate how major cancer signaling pathways and oncogenic K-RAS-dependent signaling networks are rewired and remodeled in response to anti-SIAH2 targeted therapy. Roughly 300 proteins/phosphoproteins were quantititatively measured by the RPPA platform to identify new tumor vulnerabilities and actionable targets, compensatory signaling network activation/inhibition in response to anti-SIAH targeted therapies in five highly malignant cancer cell lines. Doxycycline (DOX)-inducible Tet-ON MiaPaCa, MDA-MB-231, MDA-MB-468, HeLa and A459 cell lines were amplified from single cell and DOX-induced SIAH2PD expression was confirmed. Each of the cell lines was then subjected to one of four experimental conditions: Tet-ON control cells without DOX induction (**group A**), Tet-ON control cells with DOX induction (**group B**), Tet-ON-SIAH2PD cancer cells without DOX-induction (no SIAH2PD inhibitor) (**group C**), Tet-ON-SIAH2PD cancer cells with DOX-induction (SIAH2PD inhibitor) (**group D**). Reverse Phase Protein Array (RPPA) in conjunction with Principal Component Analysis (PCA) was conducted to quantify fold-changes of proteins/phosphoproteins in response to SIAH inhibition. The ratios of **D/C/B/A, D/C**, **D/B**, **C/A,** and **B/A** were calculated using GAPDH normalized data.

RESULTS :
Supported by statistical analyses, we identified 20 unique phospho-proteins that were either up- or down-regulated in response to SIAHLoss-of-function. Many have known roles in controlling and regulating cell growth, cell death, NFκB signaling, stress response, DNA damage, and cell attachment pathways, supporting a tumor eradication phenotype in the absence of SIAH function in these cancer cell lines.

CONCLUSION:
Cancer landscape (CScape) functional protein pathway mapping has categorized the synergistic feedforward, feedback, and compensatory signaling pathway activation/inactivation in response to SIAH blockade in these EGFR/K-RAS-driven malignant cell lines. Further validation analysis will be conducted to gain better insight into the global cancer pathway alterations to reveal the molecular mechanism(s) of why SIAH inhibition works so effectively to shut down malignant tumor growth.

Abstract Title: The Existence of GlycoRNA in Benign and Malignant Prostatic Cell Lines
Author: Jones, Esther B
Co-Investigators: Spencer Moen, Dept. of Microbiology and Molecular Cell Biology Dr. Aurora Esquela Kerscher, Dept. of Microbiology and Molecular Cell Biology

Abstract

INTRODUCTION:
Prostate cancer is the 2nd most common cancer diagnosis afflicting men in the United states - In 2021 alone, it is estimated that 248,530 men in the United States will be diagnosed with prostate cancer, with approximately 34,130 of those men succumbing to complications caused by this disease (ACS, 2021). To combat this statistic, researchers have looked into the use of post-translational modifications (PTMs) of glycosylated biomolecules, specifically glycoproteins, as potential biomarkers - in doing so, scientists have shown success in diagnosing, treating and providing accurate prognoses for patients who suffer from colon, pancreatic, and prostate cancer. More recently, it was discovered that RNA molecules were also capable of glycosylation; however, the significance of this phenomenon is not yet understood. As it is known that the presence of relatively aggressive and metastatic malignant prostate cells can lead to poor prognoses in patients, our lab wanted to investigate the existence and potential significance of glycoRNA as it pertains to various prostate cell lines.

METHODS:
Prostate cell lines (RWPE-1, DU145, LNCAP, C4-2, PC3N, & PC3ML) were grown, in culture, and either left untreated or were treated with Ac4ManNAz for 48 hours prior to harvest.
Once harvested, cells were lysed and RNA classes (small/large) were isolated and collected (RNA purification kit).
Proteinase K and DNase were added to samples for protein and DNA digestion, further purifying RNA yields.
After protein and DNA digestion, biotinylated DBCO was then added to the RNA samples to facilitate visualization.
RNA samples were then further purified using silica column filtration.
A nanodrop was then used to determine relative RNA concentrations and purity for each sample.
Samples were prepared and loaded into 1% formaldehyde agarose gels for electrophoresis.
Gels were then imaged and transferred onto membranes for glycoRNA visualization via northern blot analysis.

RESULTS:
Results from our northern blot imaging show a presence of banding in all prostate cell (RWPE-1, DU145, LNCAP, C4-2, PC3N, & PC3ML) small RNA samples that were treated with Ac4ManNAz for 48hrs prior to harvest. Large RNA classes (>200 nts) that were isolated from the same cell lines, however, did not show a presence of banding when visualized via northern blot analysis. Similarly, RNA samples from cells that were left untreated showed no banding when processed and visualized. While all Ac4ManNAz-treated prostate cell line samples containing small RNA classes observed banding after northern blot analysis, we observed a relative decrease in band intensity when comparing benign/less aggressive malignant prostate cell lines to more aggressive cell lines. Currently, we are further investigating glycoRNA existence through use of glycotransferase inhibitors, kifunensine and NGI-1, in hopes of better understanding glycopatterns of the observed RNA.

CONCLUSION:
Based on the findings gathered from northern blot visualization of purified RNA isolated from various prostate cell lines, it is concluded that small RNA classes are capable of glycosylation while large RNA classes do not appear to have this capability. Furthermore, we also observed that as we move from benign or relatively less aggressive cell lines to more aggressive, metastatic prostate cell lines, the relative concentrations of glycoRNA decrease, indicating a downregulation of glycoRNA production in our aggressive, metastatic prostate cells.

Abstract Title: AAV-PCSK9 mouse model of hypercholesterolemia does not serve as a useful model of metabolic syndrome

Author: Keter, W. Coles
Co-Investigators: Nigeste M. Carter, Microbiology and Molecular Cell Biology/Biomedical Sciences Jerry L. Nadler, New York Medical College Elena V. Galkina, Microbiology and Molecular Cell Biology/Biomedical Sciences

Abstract

INTRODUCTION:
Atherosclerosis is the major etiological culprit that leads to cardiovascular disease, which remains the leading cause of mortality in the United States. Atherosclerotic models include germline deletions of either apolipoprotein E (*ApoE*) or low-density lipoprotein receptor (Ldlr) in C57BL/6 mice. We previously established the *Ldlr-/-* mouse on a custom high-carbohydrate, high-cholesterol diet (DDC) to model atherosclerosis, glucose intolerance, and insulin resistance. An emerging model to study atherosclerosis utilizes a single injection of adeno-associated virus (AAV) that expresses a gain-of-function mutation of proprotein convertase subtilisin/kexin type 9 (PCSK9), which degrades hepatic LDLR, leading to elevated plasma cholesterol and advanced atherosclerosis when paired with high-fat diet. Therefore, we investigated whether this model recapitulates the metabolic deficiencies seen in the *Ldlr-/-* model of atherosclerosis and metabolic disease.

METHODS:
Male C57Bl/6 mice (n=10 per group) received i.v. injection of either AAV-PCSK9 (PCSK9-DDC) or saline (B6-DDC) and were placed on DDC diet for 20 weeks, with a third group of age matched chow-fed mice (B6-Chow) as an additional low fat diet control (chow diet). *Ldlr-/-* mice fed DDC for the same Insulin tolerance and glucose tolerance tests (ITT/GTT) were performed at 19 weeks post-injection. Age-matched *Ldlr-/-* mice, from a separate project, with 20 weeks DDC feeding underwent ITT/GTT testing. Digested adipose tissue from B6-Chow, B6-DDC, and B6-PCSK9 was analyzed by flow cytometry for immune cell content.

RESULTS:
Despite elevated plasma cholesterol and advanced atherosclerosis in the PCSK9-inejcted DDC fed BL/6 mice compared to DDC fed BL/6 mice, both groups showed similar profiles of insulin resistance and impaired glucose clearance compared to BL/6 mice fed chow diet. Surprisingly, PCSK9-injected DDC fed BL/6 mice displayed higher levels of basal glucose prior to the ITT in comparison with DDC fed BL/6 mice; however, these values were more comparable after a longer fasting period prior to the GTT between both groups. Similar to the results from the ITT/GTT experiments, BL/6 mice fed DDC and PCSK9-injected DDC fed BL/6 mice displayed comparable increases in the total number of CD45+ immune cells relative to total tissue weight when compared to BL/6-Chow adipose tissue. Additionally, there were similar increases in proinflammatory Ly6C+ cells both by proportion of total CD45+ cells and by absolute number normalized to tissue weight.

CONCLUSIONS:
Overall, the addition of elevated circulating levels of total cholesterol due to AAV-PCSK9 expression in DDC fed BL/6 mice has minimal effects on the development of additional glucose intolerance when compared to DDC fed BL/6 mice, indicating that the AAV-PCSK9 model on DDC diet does not serve as a better murine model of atherosclerosis and associated metabolic syndrome. However, DDC feeding alone is sufficient to induce substantial adipose tissue inflammation, which drives insulin resistance, making this DDC diet-induced obesity model suitable for studying insulin resistance in the absence of advanced atherosclerosis.

Abstract Title: Pharmacological activation of cannabinoid-2 receptor attenuates inflammation in a mouse model of ventilator-associated pneumonia

Author: Lockett, Janette
Co-Investigators:

Abstract

INTRODUCTION:
Acute respiratory distress syndrome (ARDS), a common cause of respiratory failure in critically ill patients is characterized by the acute onset of non-cardiogenic pulmonary oedema and widespread inflammation. Mechanical ventilation (MV) is a life-saving intervention for ARDS patients, however, prolonged ventilation can cause ventilator-associated pneumonia (VAP), which may lead to uncontrolled inflammation, progressive lung cell injury, and high mortality and morbidities. As it is imperative to countermeasure the inflammation in VAP, we sought to explore the potential of the Cannabinoid-2 receptor (CB2R) in mitigating VAP-induced lung inflammation.

METHODS:
To activate CB2R, a selective synthetic agonist, HU308 (5 mg/kg) was intraperitoneally (i.p.) administered to C57BL/6J mice. VAP was induced by intratracheal administration of PA (strain PA01, 3 x 107 CFU/ml) to mice followed by injurious MV using the FlexiVent rodent ventilator. Mice were euthanized and total cell number and protein content in the bronchoalveolar lavage fluid (BALF) were determined. VAP-induced BALF cytokines TNF-α and IL-1β levels were measured by ELISA. Inflammatory signaling in BALF cells was analyzed by western blot.

RESULTS:
VAP induced a significant increase in BALF and inflammatory cells. Interestingly, HU308 treated mice had significantly lower protein content and cell number in the BALF. HU308 blunted the release of inflammatory cytokines, TNF-α and IL-1β. Additionally, VAP-induced robust activation of nuclear factor- kβ (NF-κB) was significantly reduced by HU308 treatment echoing the decreased inflammatory cytokine production by CB2R activation.

CONCLUSION:
Activation of CB2R by the selective synthetic agonist, HU308, attenuated VAP-induced lung inflammation in mice.

Abstract Title: Investigating the role of self-antigens in activating B cells in atherosclerosis using transgenic B cell receptors mouse models

Author: Ma, Shelby
Co-Investigators: Shelby Ma 1 Marion Mussbacher2 Aleksandr Zyskin Alina Moriarty 1 William Coles Keeter1, Elena Galkina1 1. Microbiology and Molecular Cell Biology, EVMS 2. Institute of Pharmaceutical Sciences, Department of Pharmacology and Toxicology, University of Graz

Abstract

INTRODUCTION:
Atherosclerosis is an inflammatory disease of the large and medium size arteries that is characterized by deposition of oxidized low density lipoproteins (oxLDL) within the vessel. While specific self-antigens are not well characterized, antibodies against LDL, oxLDL, and ApoB show that the immune response, specifically B cells, is involved in atherogenesis. The role of B cells in atherosclerosis is B cell specific: FO B cells are proatherogenic, while B1 and MZ B cells serve as protective. Additionally, although production of natural antibodies (NAB) has been shown to be atheroprotective, it is unknown whether the B cell receptor (BCR) recognizes oxLDL. In addition, it is currently unknown if atherosclerosis alters the status of anergic B cells.

METHODS:
We took an advantage of two transgenic mouse models. Ars/A1 mouse model generates only anergic B cells due to constant BCR stimulation and the other produces unresponsive BCRs (MD4). To induce atherosclerosis, MD4 and Ars/A1 transgenic mice along with WT were injected with PCSK9-AAV and feed a high-fat diet (HFD) for 28 weeks. Chow fed mice were utilized as homeostatic controls. BCR-induced B cell activation was investigated via Ca2+ flux and plasma was collected to measure oxLDL specific IgM using an in-house ELISA. B cell subsets were analyzed using flow cytometry.

RESULTS and CONCLUSION:
Our results show that MD4 B cells can respond to anti-IgM induced B cell activation but Ars/A1 anergic B cells do not. In addition, when measuring plasma concentrations of IgM specific oxLDL, we found differences ARs/A1 anergic mice, BCR-transgenic MD4 mice and WT mice in atherosclerotic conditions but also when comparing chow diet to HFD conditions in all 3 strains. Interestingly, Ars/A1 B cells in homeostatic conditions appear to produce high amounts of IgM specific oxLDL. These results suggest that the transgenic BCR can recognize oxLDL potentially as a self-antigen and produce natural protective Abs.

Abstract Title: Understanding Markers of Cancer Vulnerabilities to Metformin

Author: Martin, Stephen D
Co-Investigators:

Abstract

INTRODUCTION:
Metformin, one of the most frequently prescribed diabetes medications, is safe, cheap, and has been used globally for many years. Numerous published studies have implicated an anti-cancer effect of metformin, thereby making it the focus of drug repurposing efforts. However, there is a paucity of mechanistic studies which identify the molecular parameters of cancers indicative of vulnerabilities to metformin. Consequently, the first two objectives of our study are (**I**) identification of the markers revealing cancer vulnerabilities to metformin and (**II**) characterization of the molecular mechanism of how the identified markers functionally influence cancer vulnerabilities to metformin. Furthermore, in view of the rising interest in the functional roles of the secretome, the third goal of our study is to detect and analyze any functional roles of the secretome in mediating how the identified markers modulate cancer vulnerabilities to metformin.

METHODS:
RAS biology is complex partially due to the fact that there are three major RAS genes - H-, N- and KRAS. To avoid such complexity, we obtained the isogenic/RAS-less mouse embryonic fibroblast (MEF) cell lines maintained at the National Cancer Institute. These MEFs are derived from NRAS- and HRAS-null mice and the KRAS gene has been floxed (removable by ER-Cre recombinase). Proliferation is dependent on the expression of either the endogenous KRAS gene or, if it has been removed through tamoxifen treatment (which activates the Cre recombinase), the expressed KRAS transgene. Dose responses of metformin were conducted with these MEF cells and IC50 values were determined using the GraphPad PRISM software.

RESULTS:
The KRAS G12D mutant has been observed to increase MEF sensitivity to metformin treatment and cisplatin treatment.

CONCLUSION:
In light of the fact that KRAS mutations occur in 20-40% of lung adenocarcinomas, we are expanding this study into human lung cancer cells. Additionally, we are investigating whether the secretome of KRAS-mutant cells would sensitize other cells containing wild-type KRAS alleles to metformin and identifying the molecules that are mediating the activity of metformin sensitization by a KRAS mutant. As championed in a recent editorial of the American Journal of Clinical Oncology, it is time to take a serious stab at repurposing metformin as a cancer therapy.

Abstract Title: Tangled up in Vesicles: How the proinflammatory obese adipose endothelium may shift the malignant phenotype of prostate cancer cells in vitro

Author: Mathiesen, Allison
Co-Investigators: 1. Ryan Huyck M.S., physiological sciences, EVMS 2. Bronson Haynes PhD, physiological sciences, EVMS 3. Anca Dobrian PhD, physiological sciences, EVMS

Abstract

INTRODUCTION:
Obesity is known to contribute to prostate cancer (PCa) aggressivness. Adipose tissue is a rich source of extracellular vesicles (EV) which are known to contribute to pro-oncogenic effects in various malignancies. Our lab has demonstrated that EV isolated from obese adipose tissue alter the malignant phenotype of PC3-ML metastatic PCa cells in vitro; causing an increase in proliferation, reduction in invasion, and suppressed expression of MMPs. Adipose tissue is a heterogeneous tissue that contains adipocytes, immune cells and a significant number of vascular cells. Our lab is interested to determine the functional and molecular contributions of vascular endothelium of obese adipose tissue to the pro-oncogenic effects of the obese adipose environment. Endothelial cells (EC) from human AT in pro-inflammatory conditions are known to produce EV that propagate dysfunctional features in naïve recipient EC and may contribute to metastatic progression in PCa cells *in vitro*. The goal of this study was to determine molecular and phenotypic changes of PCa cells in response to EV produced by human adipose tissue endothelial cells (HAMVEC) exposed to pro-inflammatory conditions mimicking the state of chronic inflammation in obesity.

METHODS:
Naïve PC3ML cells were exposed to EV harvested from HAMVEC treated with pro-inflammatory cytokines (EV_PIC) in order to mimic the obese AT environment. Proliferation was assessed via uptake of BrdU and scoring via fluorescent microscopy. Invasion was measured using a Matrigel transwell assay; cells were imaged and number of cells per field counted. RNA was collected from HAMVEC, EV_PIC, and EV_PIC treated PC3ML. EV miRNA cargo and HAMVEC and PC3ML mRNA transcriptome was assessed using NanoString, IPA, and PANTHER platforms

RESULTS:
EV_PIC increased proliferation by nearly 1.4 fold ($p = 0.0005$) in PC3-ML. PC3-ML invasion was reduced with EV_PIC by 1.8 fold ($p = 0.0405$). The mRNA transcriptome of PC3ML treated with EV_C and EV_PIC revealed a molecular signature indicating increased activity of several pro-oncogenic pathways including HIF1α and PI3K/AKT. EV_PIC were found to contain a subset of miRNA that were shared by EV isolated from human obese AT, including miR-21; these miRNAs target genes are key modulators of various pro-oncogenic pathways including tumor cell proliferation and invasion. PANTHER analysis of EV_PIC miRNA cargo revealed that the top pathways targeted include HIF1α and PI3K/AKT.

Conclusions:
MiR-21 has been identified as an oncogene and has been found to promote prostate cancer invasion. PCa cells treated with EV_PIC develop a pro-oncogenic molecular signature consistent with metastatic progression. PC3-ML treated with EV_PIC i*n vitro* demonstrate increased mRNA expression of mesenchymal markers, increased proliferation, and reduced invasion. These functional changes are consistent with establishment of a secondary tumor site *in vivo*. These data suggest that miRNA contained within EV from adipose microvasculature in a pro-inflammatory environment may confer pro-oncogenic properties on PCa cells *in vitro* which may provide insight into the link between obesity and increased incidence of prostate cancer.

Abstract Title: Effect of extracellular vesicles on coronary endothelium proliferation and barrier function

Author: Miller, Noel E
Co-Investigators: Nigeste Carter, Physiological Sciences, EVMS Dr. Ruben Colunga-Biancatelli, Center for Bioelectrics, ODU Dr. Anca Dobrian, Physiological Sciences, EVMS

Abstract

INTRODUCTION:
Coronary endothelium is key for re-vascularization of the myocardium following an ischemic event. Failure to mount an angiogenic response may compromise myocardial function and could precipitate fatal post-infarction events. Our lab showed that autologous and heterologous extracellular vesicles (EV) released by endothelium have angiostatic effects on the human coronary endothelial cells *in vitro*. The goal of this project was to further investigate functional changes of HCAEC in response to EV produced by coronary and adipose tissue endothelial cells (HAMVEC) in a physiologic or pro-inflammatory environment. Functional changes such as increased permeability of the endothelial monolayer and increased proliferation are key to support angiogenesis. Therefore, we measured proliferation and barrier function of the HCAEC following treatment with autologous and heterologous EVs. In addition, we are currently investigating the expression and localization of two endothelial junctional proteins that have key role in regulation of barrier function - VE-cadherin and connexin-43.

METHODS:
To mimic the pro-inflammatory environment in vivo, HCAECs and HAMVECs were treated for 6 days with a combination of TNFa, IFNg, and TGFb (5nM each). These pro-inflammatory cytokines (PIC) were reportedly increased in circulation in chronic inflammation related to obesity and, at comparable levels with the ones used in vitro. EVs were isolated from culture media of PIC-treated cells (EV-PIC) or from media of untreated control cells (EV-C) using differential ultracentrifugation. EV concentration and size distribution were determined by nanoparticle tracking analysis using the NanoSight 300 instrument. HCAEC were cultured to confluence and treated with EV-C or EV-PIC at a concentration of 105EV/cell for 24 hours. Barrier function was assessed using the electric cell-substrate impedance sensing (ECIS) with an ECIS Model 1600R instrument. Barrier function was determined by assessing trans-endothelial electrical resistance normalized to time point 0. Proliferation was measured using an anti-BrDU AlexaFluor488 antibody and DAPI for nuclear staining. The number of nuclei that showed green and blue fluorescence was divided by the total nuclei to show percentage of proliferating cells. Statistical analysis to determine differences between treatment and control conditions was done using Kruskal-Wallis non-parametric test. The null hypothesis was rejected for a p-value of<0.05.

RESULTS:
Coronary endothelial cells treated with EVs showed a dramatic ~2-fold reduction in the trans-endothelial resistivity, which indicated an increase in monolayer permeability. The reduction was sustained over a 24-hour period, which was the entire duration of the experiment. This robust increase in permeability was statistically significant ($n=3$, $p<0.01$) and occurred regardless of EV's cell of origin (autologous or heterologous). Interestingly, the EV-PIC and EV-C from prolonged cytokine treatment (6days) of the cells or naïve, control cells, respectively had comparable effects on the magnitude of increase of monolayer permeability. Preliminary experiments indicate that the effect is likely dependent on the concentration of EVs applied to the cells. Currently, the semi-quantitative evaluation of VE-cadherin and connexin-43 expression is ongoing using immunohistochemistry and fluorescence microscopy. Also, EVs from both cell types induced a decrease in proliferation of HCAEC measured by BrDU incorporation following EV treatment for 24 hours. A decrease in proliferation by 30-50% was measured for all EV-treated cells, which was statistically significant ($n=3$, $p<0.05$). No significant differences were found between EV-C and EV-PIC.

CONCLUSION:
Exposure of coronary endothelial cells to EVs from autologous or heterologous sources in vitro leads to a significant increase in monolayer permeability and a decrease in cellular proliferation. The previously observed angiostatic effect of the vesicles may be attributed in part to a reduction in cellular proliferation. The changes in permeability will be further investigated as it may support a role of endothelial vesicles in vascular leakage. Prevention of vesicle production and/or uptake during ischemia-reperfusion of an injured myocardium may be a promising therapeutic approach to support robust angiogenesis and formation of a patent vasculature.

Abstract Title: A Sleepy-Leaky Gut: The Effects of Sleep Fragmentation on Small Intestine Inflammation

Author: Moriarty, Alina
Co-Investigators: Shelby Ma, Microbiology and Molecular Cell Biology Laurie Wellman, Pathology and Anatomy Larry Sanford, Pathology and Anatomy Elena Galkina, Microbiology and Molecular Cell Biology

Abstract

INTRODUCTION:
Atherosclerosis is a chronic inflammatory disease responsible for over 25% of annual global deaths. The progression of atherosclerosis extends across the lifespan and has been extensively linked to insufficient sleep. It is well known that adequate sleep is vital for overall health; however, today's fast-paced society often neglects the importance of sleep. Therefore, it is no surprise that poor sleep quality is strongly associated with increased risk of mortality due to a cardiovascular event. Accumulating evidence demonstrates the role of the intestinal inflammation and leaky gut in the acceleration of atherosclerosis. Furthermore, it has been established that high fat diet feeding and sleep fragmentation can independently alter the local immune landscape of the gut and reduce intestinal barrier function. Reduced barrier function results in the leaking of bacterial products, such as gram-negative lipopolysaccharide (LPS), from the gut into the circulation where they prime immune cells, towards a pro-atherogenic, inflammatory phenotype.

METHODS:
Eight-ten-week-old female Apoe-/- mice were randomly assigned to a sleep fragmentation (SF) group, activity control (AC), or home cage (HC) group. Mice in the SF and AC groups were housed in commercial sleep fragmentation chambers equipped with a mechanical sweeper. The bar in the SF group was active during the light period to fragment sleep. To account for the forced activity of stepping over the motorized bar, the bar in the AC group was active during the dark period. Female *Apoe–/–* mice were fed a high fat diet (HFD) and were sleep fragmented for 12 weeks. Following 12 weeks of HFD feeding and SF, small intestines were collected and flow cytometry was used to investigate the intestinal immune composition. Finally, intestinal barrier function was assessed by measuring circulating levels of LPS and FITC-Dextran following oral gavage.

RESULTS:
Twelve weeks of HFD-feeding and sleep fragmentation increased the presence of intestinal neutrophils but decreased the presence of Ly6Clow monocytes in small intestines. We also observed increased levels of circulating LPS following SF in *Apoe-/-* mice. Unexpectedly, we detected reduced amounts of FITC-dextran in the plasma of HFD fed SF vs control *Apoe-/-* mice, suggesting that in contrast to the small intestines, colonic permeability is not changed after the sleep fragmentation regiment.

CONCLUSION:
Our data suggests that sleep fragmentation supports HFD-induced intestinal inflammation by increasing the pro-inflammatory neutrophil content and decreasing the content of Ly6C low monocytes. Neutrophils are known to degrade the intestinal barrier through the production of reactive oxygen species. Intestinal Ly6C low monocytes help maintain strong barrier functions. Here, we observed an increase in circulating LPS abundance following SF in *Apoe-/-* mice. Altogether, these data suggest that SF contributes to systemic inflammation and likely the activation of the innate immune system, at least partially, through the increase of circulating LPS derived from inflammation in small intestines.

Abstract Title: Neurotensin May Regulate Vascular Permeability In The Ovarian Follicle

Author: Pearson, Andrew C.
Co-Investigators: Diane M. Duffy, Ph.D.

Abstract

INTRODUCTION:
Neurotensin (NTS) is a small protein which has been implicated as a mediator of ovulation. NTS is produced by the granulosa cells of mammalian ovulatory follicles. NTS expression increases in the follicle in response to the ovulatory surge of luteinizing hormone (LH). Neutralization of NTS activity in the macaque preovulatory follicle decreases the success of follicle rupture and oocyte release. Histological analysis of NTS-neutralized follicles also revealed disruption of the follicular vasculature and extravasation of red blood cells. Red blood cell extravasation in response to NTS neutralization suggests a role for NTS in the regulation of vascular permeability.
Appropriate regulation of ovarian vascular permeability is a critical component of the ovulatory cascade. In response to the luteinizing hormone (LH) surge, ovarian blood vessel permeability increases. Generally, vascular permeability is controlled by changes in cell-cell junctions between the vascular endothelial cells of the ovary. Adherens junctions (AJs) are a class of cell-cell junction composed of transmembrane cadherin proteins which are bound intracellularly to the actin cytoskeleton with the assistance of catenin proteins. The extracellular domain of cadherins bind to cadherins on adjacent cells to form AJs. In typical vascular endothelial cells, the primary AJ cadherin is vascular endothelial (VE) cadherin. The specific hypothesis for this study is that NTS reduces permeability in ovarian microvascular endothelial cells via an increase in VE-cadherin-based AJs.

METHODS:
Ovarian microvascular endothelial cells from cynomolgus macaques (mOMECs) and human IVF patients (hOMECS) were enriched from follicle aspirates. Permeability of mOMEC monolayers was measured using a transwell permeability assay. mOMECs from 5 animals (n=5) were grown to confluence on 0.4mm pore-containing polycarbonate membrane cell culture inserts. mOMECs were treated for 1 hour with a range of NTS doses, thrombin, or a cyclic AMP (cAMP) analog. The media was then replaced with 2.5% streptavidin horseradish peroxidase (SHRP)-containing media, which was allowed to diffuse between the cells of the monolayer for 20 min. The amount of SHRP which flowed through the monolayer was then measured.
Immunofluorescent (IF) staining and western blot analysis using an anti-VE-Cadherin primary antibody was performed on confluent mOMECs, hOMECs, and human umbilical vein endothelial cells (HUVECs). RNA samples isolated from mOMECs (n=4) either untreated or treated for either 3 hr or 12 hr with 10mM NTS were analyzed via next generation RNA-sequencing. The transcriptomes of these cells were then queried for junctional protein expression levels.

RESULTS:
To identify the effect of NTS on mOMECs, permeability of mOMEC monolayers in response to Thrombin is known to increase permeability of vascular endothelial monolayers and served as a positive control which significantly increased permeability at 1 U/mL. Increased cAMP is known to decrease vascular permeability and 10mM cAMP analog significantly decreased permeability in mOMEC monolayers.
Immunofluorescent and western blot detection of VE-cadherin protein identified little to no expression of VE-cadherin in mOMECs. To validate the antibody used, HUVECs and hOMECs were also tested. HUVECs showed junctional staining of VE-cadherin via IF, and protein expression via western blot. hOMECs however, did not express VE-cadherin. This is consistent with what was seen in mOMEC experiments.
While RNA-seq data revealed VE-cadherin mRNA expression in mOMECs was below threshold detection levels in control and NTS treated cells, N-cadherin and E-cadherin expression was present. The AJ proteins alpha- and beta-catenin were also expressed. Tight junction (TJ) proteins TJP1 and TJP2, along with numerous claudins, were expressed in mOMECs.

CONCLUSION:
NTS decreases vascular permeability in cultured mOMECs. The involvement of the AJ protein VE-cadherin, however, is not supported by these data. Expression of other proteins involved in AJ and TJ regulation of permeability suggest atypical regulation of vascular permeability in ovarian microvasculature. The mRNA and protein expression of these candidate proteins will be further investigated in future experiments to identify permeability regulating mechanisms in the forming vasculature of the ovulatory follicle.

Abstract Title: Optimization of PCR array gene expression data using individual quantitative PCR to determine mitochondrial processes linked to Alzheimer's Disease.

Author: Pflanzer, Haley Kimberly
Co-Investigators:

Abstract

INTRODUCTION:
Alzheimer's Disease (AD) is an irreversible, neurodegenerative disease characterized by the aggregation of β-amyloid plaques and neurofibrillary tangles. Current research reveals the possibility that mitochondria could significantly contribute to the onset of dementia. Utilizing PCR array analysis, our lab previously demonstrated the expression of 89 specific genes linking mitochondria dysfunction to Alzheimer's Disease that could then be incorporated into a mathematical model. In this work, I used autopsy confirmed control and AD samples to conduct individual qPCR analysis to confirm expression changes for genes of interest (GOIs) identified in the array analysis and determine data trends between the two experimental models. The differences in gene expression between control and AD brain samples were investigated to determine a pattern of genes expressed in pathways demonstrating a link between mitochondria dysfunction and Alzheimer's Disease.

METHODS:
Isolation of total RNA from AD and control frozen brain samples (10 AD, 10 control) using RNeasy Plus Universal mini-Kit. The quantification and quality of brain RNA recovered was assessed by nanodrop produced A260/A280 and A260/A230 ratios, as well as Aligent Bioananalyzer-NANO 6000 chip analysis. Based on RIN score, sample pooling of combined RNA solutions was created using equal concentrations of 5 AD samples combined into one stock AD solution and 5 control samples combined into one stock control solution. Individual qPCR assays were performed on 17 select GOIs resulting from prior mitochondria biogenesis array analysis formed from RT2 Array Profiler. qPCR for each of the 17 genes was done in triplicate. Gene expression changes between control and AD GOIs were determined using BioRad and Qiagen software. The qPCR data was compared to prior PCR array results. To assess PCR product quality, aliquots of the qPCR reaction were evaluated by generation of heat denaturing curves and/or performing agarose gel electrophoresis. Specific genes of interests were input into Ingenuity Pathway Analysis (IPA) software to discover linked pathways.

RESULTS:
Of the Eighty-nine mitochondrial biogenesis genes, assessed by RT2 PCR array analysis, 17 genes of interest were identified primarily by the magnitude of their gene expression changes. This group of GOIs was further assessed by individual qPCR analysis. Of the 17 GOIs, 53% showed significant down or upregulation in their expression after initial qPCR analysis. A subset of 9 genes were confirmed to be significantly up or down regulated ranked from highest to lowest cycle threshold difference between AD and control gene expression, ranging from +3.31 to -3.09. This list was further refined by continued qPCR analysis, which resulted in a final list of seven genes: SOD2, GAPDH, FIS1, DMN1L, BNIP3 and MFN2, OPA1. When input into IPA software, linked associations between these genes and their roles in mitochondria dysfunction was revealed.

CONCLUSION:
This study confirmed that qPCR demonstrates that almost 80% of gene expression changes seen in array analysis is confirmed by qPCR and more than 50% of genes identified in our RT2 PCR array analysis have significant up or down regulation. The expression of SOD2, GAPDH, FIS1, DMN1L, BNIP3 and MFN2, OPA1 genes produced the largest difference in gene expression between the AD and control samples. Multiple of these genes have demonstrated sharing the same pathways that have been linked to causing dysfunction of mitochondria processes such as fission, fragmentation, autophagy, depolarization, and leading to an overall contribution to neuronal cell death and Alzheimer's Disease. Plans to further this research include inputting data from the qPCR confirmed GOIs in a developed mathematical model to identify possible strong therapeutic targets and studying the altered expressions of these specific genes, through RNAi knockdown experiments, in Ntera-2 cells to assess their role in mitochondria dysfunction and overall progression of Alzheimer's Disease.

Abstract Title: LNCaP prostate cancer cells carrying miR-888 or miR-891a CRISPR-deletions show modulated neuroendocrine transdifferentiation.

Author: Routon, Katherine E
Co-Investigators: N/A

Abstract

INTRODUCTION:
Prostate cancer (PCa) is the most prevalent malignancy in U.S. men and the 2nd leading cause of male cancer-related deaths. Androgen inhibitors (flutamide, bicalutamide) are used as first line therapies for PCa patients to reduce tumor load since prostate cells rely on androgens for growth. By 18-36 months, many patients develop drug resistance (despite suppressed testosterone) and relapse frequently involves more aggressive disease and metastasis. Although there have been significant clinical advances, Castration-Resistant Prostate Cancer (CRPC) remains a lethal disease and patients have a mean survival of 2-3 years. New therapeutic targets for CRPC are needed. A clinical association has been made for CRPC patients initially treated with androgen deprivation therapies and disease progression to highly aggressive cancer involving histopathological features of small-cell carcinoma, tumor acquisition of neuroendocrine (NE) characteristics and down-regulation of Androgen Receptor (AR). Therefore, a genetic link between the process of tumor cell NE transdifferentiation and late-stage PCa likely exists. We hypothesized that the miR-888 cluster of seven non-coding microRNA (miRNA) genes acts to promote tumor progression to aggressive PCa and NE transdifferentiation - and could be a novel drug target for CRPC. Our lab identified the miR-888 cluster as elevated in patients with high-grade PCa compared to low-grade and non-cancer patients. Overexpression of miR-888 cluster members (i.e., miR-888, miR-891a) in non-aggressive human PCa cell lines promoted prostate cell proliferation, invasion and xenograft tumor load. Multiple miR-888 cluster members (i.e. miR-888) are predicted to target and suppress the androgen receptor. Results from a previous rotation project (Megan Golliher Sage, Arooba Ayaz) indicated that overexpression of miR-888 or miR-891a via lentiviral vectors accelerated NE transdifferentiation in a LNCaP cell culture assay. The overall aim of this project was to investigate if LNCaP cells carrying CRISPR-deletions for miR-888 or miR-891a exhibited the reciprocal phenotype and would lead to slowed or blocked NE transdifferentiation.

METHODS:
In an established LNCaP cell culture assay, hormone-sensitive LNCaP cells cultured under androgen starvation conditions undergo NE transformations as early as 5-10 days and subpopulations of thriving "castration-resistant" cells appear ~4 months. Using this assay, LNCaP cells deleted for the *mir-888* or *mir-891a* genes (CRISPR generated, Charlotte Chambers) and control LNCaP cells were grown in phenol-free RPMI media supplemented with 10% charcoal-stripped fetal bovine serum. Cells were photographed (Zeiss Axio Imager) and harvested at 0 day and every week for 8 weeks. Total RNA (mirVana kit) and protein lysates were isolated and the expression of NE markers (neurotensin (NTS), secretagogin (SCGN), synaptophysin (SYP)) was measured using qRT-PCR and western blot. Imaging was observed for neuron-like morphology.

RESULTS:
Imaging showed that control LNCaP cells began to elongate and project spindly processes by week 1 following androgen depletion, and this neuron-like morphology became more pronounced over time. LNCaP cells with deleted miR-888 or miR-891a showed at least a 1-week delay in acquiring neuronal characteristics. This is the opposite observation seen for miR-888 or miR-891a overexpression lines, as they developed more pronounced spindly processes versus controls by week 1-2. qRT-PCR indicated that the miR-888 and miR-891a knockout cell lines had little to no expression of NE markers SCGN and SYP, while control LNCaP cells had increasing NE marker expression throughout the time course. In contrast, miR-888 or miR-891a overexpression lines showed increased NE marker expression compared to control cells. Western blot analysis is in progress.

CONCLUSION:
LNCaP cells carrying deletions for miR-888 or miR-891a showed slowed NE transdifferentiation compared to controls based on our cell imaging and qRT-PCR results. This is the opposite result to what we previously observed for the miR-888 and miR-891a overexpression LNCaP lines, which exhibited accelerated NE transdifferentiation. Thus, the miR-888 cluster influences the NE mechanism in human prostate cancer cells. Future studies are needed to verify these findings. Our work promises to identify novel candidates for anti-miRNA therapies that extend CRPC patient survival.

Abstract Title: Does neurotensin modulate granulosa cell production of inflammatory mediators during ovulation?

Author: Sage, Megan A. G.
Co-Investigators: 1. Diane M. Duffy, Ph.D., Department of Physiological Sciences

Abstract

INTRODUCTION:
Orchestrated by circulating pituitary hormones, the mid-cycle peak in estrogen levels triggers a surge in luteinizing hormone (LH) that initiates the process of ovulation. 40 hours later, an oocyte will be released from the ovulatory follicle and progesterone levels will begin to rise. It is known that an influx of immune cells into the follicle is required for follicular rupture to occur. Neurotensin (NTS), a 13-amino acid peptide, is essential in the follicle for ovulation to occur, but the mechanisms behind its involvement have yet to be uncovered. Granulosa cells (GCs) produce NTS in response to the LH-surge and express NTS receptors. However, the downstream effects of NTS signaling on GCs are unknown. GCs have been found to mediate immune system processes involved in ovulation, including through the release of inflammatory cytokines and immune cell recruitment through the release of chemokines. Therefore, due to the essential roles of NTS and inflammation in ovulation, we hypothesize that NTS mediates granulosa cell immune involvement during ovulation by modulating the production of pro-inflammatory cytokines and chemokines.

METHODS:
Follicular aspirates containing granulosa cells (GCs) were obtained from human patients undergoing *in vitro* fertilization (IVF) at the Jones Institute. GCs were isolated, seeded onto fibronectin-coated wells, and cultured for one week to return them to an LH-responsive state. Culture media was replaced with serum-free DMEM/F12 for one hour and then treated with an ovulatory dose of hCG (20 IU/mL) and/or NTS (0.5-50 μM). Cell culture supernatant was collected after 24 hours, cells were lysed for total protein quantitation via BCA assay, and progesterone (P4) levels in culture media were assessed via ELISA. A literature search was conducted using PubMed to generate a list of cytokines and chemokines produced by human GCs in response to the ovulatory LH surge that could be regulated by NTS. Culture supernatant was analyzed for the selected analytes using the V-PLEX Assay Platform (Meso Scale Discovery, Rockville, MD) in accordance with manufacturer protocols and guidelines. Measured analyte levels were normalized using total protein concentration. Statistical significance was determined using Prism GraphPad 8 to analyze the data via one-way ANOVA with repeated measures and Student's two-tailed t-test ($p < 0.05$).

RESULTS:
GCs that failed to show increased P4 after hCG were excluded from further study, as increased P4 in response to hCG is characteristic of normal GC function. A comprehensive literature search of GC immune involvement during ovulation resulted in the selection of cytokines IL-1β, IL-2, IL-6, IFN-γ, TNF-α, and GM-CSF as well as chemokines IP-10, MCP-1, and MIP-3α as candidates for NTS regulation. NTS and hCG treatments were compared to the basal group to determine their effect, and the hCG alone treatment was used to represent the changes in analyte production that would occur during ovulation due to LHCGR signaling. hCG treatment increased TNF-α and decreased IL-6 and GM-CSF. Of chemokines, hCG decreased IP-10 and MCP-1 while increasing MIP-3α. NTS was tested to uncover effects of NTS signaling independent of the other processes downstream from LHCGR signaling. The effect of NTS on all chemokines and cytokines was variable across the three concentrations tested, with a general trend of at least one NTS dose yielding an increase in analyte concentration relative to basal. The combined 50 μM NTS + hCG treatment, included to test the effect of increased NTS in tandem with the activation of LHCGR-induced ovulatory signaling, also demonstrated varied effects across analytes. Although there were trends, none of the changes between experimental groups were found to be statistically significant. Three additional cytokines-IL-1β, IL-2, and IFN-γ-were tested for but not detected in any experimental groups, and thus were determined to not be produced by the human GC lines tested in this culture model.

CONCLUSION:
Analysis of cytokine and chemokine production by GCs in response to hCG and/or NTS found that there was detectable production of TNF-α, IL-6, GM-CSF, IP-10, MCP-1, and MIP-3α, but not IFN-γ, IL-1β, or IL-2. Of the detected analytes, although hCG and/or NTS treatment had an effect on their production, none of these effects were found to be statistically significant. An increased sample size or information on the diagnoses of patients may allow us to uncover a consensus in the changes of these cytokines and chemokines in response to hCG and/or NTS.

Abstract Title: Stat4-Dependent Myeloid Cell Activation's Role in the Induction of Alzheimer's Disease-Like Pathology in Type 2 Diabetes-Associated Atherosclerosis

Author: Stahr, Natalie A
Co-Investigators: Stahr, Natalie, Keeter, William, Moriarty, Alina, Adkins, Austin M, Hildinger, Emily M, Sanford, Larry D, Nadler, Jerry, New York Medical College Galkina, Elena

Abstract

INTRODUCTION:
Alzheimer's Disease (AD) is a chronic, progressive neurodegenerative disease characterized by cognitive decline. Increased risk for cardiovascular disease (CVD) and diabetes elevates the risk for AD, although it is not clear how CVD-altered immunity in T2D-associated atherosclerosis affect neuroinflammation or what mechanisms regulate myeloid cell activation in conditions of T2D and atherosclerosis. To test how atherosclerotic conditions affect development of neuroinflammation and AD-like symptoms, we used an atherosclerotic mouse model, low density lipoprotein receptor-deficient (*Ldlr-/-*) mice and tested the influence of advanced atherogenesis and insulin resistance on cognitive functions. Immune response is involved in atherogenesis and T2D. IL-12 is one of the major cytokines that is involved in AD pathology, T2D, and atherogenesis and activates the transcription factor STAT4. STAT4 plays a role in differentiation of Th1 cells, inflammatory neutrophil and macrophage functions and evidence suggests that it is also expressed in the brain. Here, we hypothesize that T2D-associated atherosclerosis induces IL-12/STAT4-dependent immune response and supports myeloid cell activation, thus orchestrates AD-like pathologies.

METHODS:
14-16 week old *Ldlr-/-* and myeloid cell-specific Stat4-deficient *LysMcreStat4fl/flLdlr-/-* mice were fed a high cholesterol, high carb diet (DDC) or chow diet (CD) for 30 weeks prior to behavioral tests. To evaluate the impact of atherogenesis on development of AD-like symptoms, mice were subjected to the Open Field Test (OF), the novel object recognition test (NOR) and the Y Maze Spontaneous Alternation Test (YMSAT). YMSAT implies reference memory and working memory. Mice are placed in the center of a Y-shaped maze and allowed to roam for 8 min. Percent correct alternations was then calculated manually as number of correct alternations divided by total number of arm changes, where mice with worse memory would be more likely to make incorrect alternations (lower percentage). Next, we used OF that assays general locomotor activity levels, anxiety, and willingness to explore. Mice are placed in a 16-inch by 16-inch empty container and allowed to roam freely for 8 min and percent time spent in center (attributed to decreased anxiety) was calculated. For the NOR, two identical caps from 15mL conical tube were placed in opposite corners of the open field and the mice were allowed to roam for 8 minutes. 24 hrs later, the test was repeated, replacing one of the caps with a 1.5mL tube. Mice would be expected to interact more with the novel object (NO) if they remembered the other object from the previous trial. Recordings from the tests were processed using Ethovision vision tracking software. Data were analyzed using mixed-effects analysis in Prism with Sidak's multiple comparison test, one-way ANOVA, or unpaired t-test.

RESULTS:
In order to separate potential implication of gender-dependent effects in behavioral tasks, male and female mice were evaluated separately for data analysis. We tested how expression of STAT4 in myeloid cells is involved in behavioral characteristics of aged mice with atherosclerosis using the OF and the NOR. Our preliminary data show that *LysMcreStat4fl/flLdlr-/-* and *Ldlr-/-* mice have no significant differences in the percent duration spent in the center in the OFT. For the YMSAT, there was no significant difference in percent correct alternations between the groups. Interestingly, in the NOR, male *LysMcreStat4fl/flLdlr-/-* mice interacted with the NO significantly more ($p<0.05$) than with the familiar object, while *Ldlr-/-* mice did not. Chow-fed *Ldlr-/-* mice did not show a significant difference for any of the behavioral tests when compared to the DDC-fed groups.

CONCLUSION:
Our current behavioral data support the idea that DDC fed atherosclerotic *Ldlr-/-* mice may experience cognitive and memory declines that are associated with early AD as seen in the NORT. Importantly, the preliminary data suggest that STAT4 expression under LysMcre promoter in myeloid cells or microglia and neurons may support this cognitive decline. Future studies will be focused on investigation of the inflammatory status of brains of *Ldlr-/-* mice with and without atherosclerosis, identification a cell type responsible for the phenotype observed in *LysMcreStat4fl/flLdlr-/-* mice, and mechanisms that are involved in STAT4-dependent regulation of memory and cognitive functions.

Abstract Title: Analyzing the Initial Resident Recruitment Season After an Expedited Interdepartmental Program Merger

Author: Young, Shakira
Co-Investigators: 1. Gary Ohanian, MD, Department of Family and Community Medicine 2. Ismail El Moudden, PhD, HADSI

Abstract

Background:
In the summer of 2020, two separate family medicine residency programs at EVMS merged. This presented a unique challenge as both residency programs (Ghent Family Medicine and Portsmouth Family Medicine) were independent from each other yet were within EVMS' Department of Community and Family Medicine. Both residency programs had separate leadership structures and residency funding streams as well as residents and faculty that generally operated in separate cultural silos. Additionally, the merger took place a few months before the formal residency interview season, which could have impacted resident recruitment. Taking into consideration that the interview season became virtual due to the pandemic, we aim to understand how a residency merger with these circumstances affected its current residents, core faculty as well as applicants. The results of this project will be used to help better understand the impact of the merger between Ghent and Portsmouth Family Medicine.

METHODS:
The first round of Qualtrics surveys were distributed electronically to all individuals who interviewed with the newly-merged EVMS Family Medicine residency program during the 2020-2021 application season. These surveys primarily utilized a Likert scale and were anonymous; respondents' demographic information (gender, ethnicity, and medical school type) was also collected. Collaboration with HADSI is currently ongoing to analyze and compare survey data, including primary descriptive analysis and comparison analysis.

RESULTS:
A total of 132 surveys were distributed to EVMS Family Medicine's 2020-21 interview season's unmatched applicants. We received 61 respondents to the survey for which data analysis is currently ongoing. Preliminary results of primary descriptive analysis include applicants responding positively to the features the merged program now offers, as well as a hypothetical preference for the new merged program than either of the former separate programs, if they were still in existence. Additional data points are being analyzed and will include scrutiny on the data's possible statistical significance specific for the collected demographic information.

CONCLUSION:
Data analysis is ongoing, but initial review showed that the applicants who did not match with EVMS Family Medicine reported not being overly concerned by 1) the fact that the program was recently merged, nor 2) any features of the merged program that were considered potentially off-putting by program leadership. While each residency merger has its own specific features and reasoning, as the prevalence of residency program mergers increase, it would be helpful to have established guidelines and protocols for leadership to use when navigating this process. From this project, we hope to provide feedback to EVMS Family Medicine program leadership regarding the residency merger process and the completed virtual residency interview season, while helping to direct future residency interview seasons.

Abstract Title: Associations between hidradenitis suppurativa and dermatological comorbidities: insights from the National Inpatient Sample

Author: Adawi, Waleed
Co-Investigators: 1 - Isabelle Brown, EVMS, MD Class of 2024 2 - Kala Perkins-Holtsclaw, MD, Department of Dermatology, EVMS

Abstract

INTRODUCTION:
Hidradenitis suppurativa (HS) is a rare chronic, inflammatory condition characterized by the development of painful sinus tracts and is associated with numerous comorbidities. Several studies demonstrate an association of HS with pyoderma gangrenosum and acne conglobata, but there has been no broad-spectrum investigation into the dermatologic comorbidities associated with HS using nationally representative data.

METHODS:
We analyzed the 2016 - 2018 National Inpatient Sample, a cross-sectional sample of 20% of all U.S. hospitalizations, for adult patients with and without HS. Compared to the general inpatient population, associations of HS with 25 dermatological conditions were determined using multivariable logistic regression, adjusting for age, race, sex, and insurance type.

RESULTS:
Overall, 90,879,561 total hospitalizations were identified, with 62,785 having a diagnosis of HS. As seen previously, HS was more likely to affect females and Black patients. The prevalence of having any of the 25 dermatological conditions was higher in patients with HS (24.60%, 95% confidence interval [CI]: 23.82-25.42%) than without (5.30%, 95% CI: 5.26-5.33%). In multivariable logistic regression models controlling for age, sex, race, and insurance type, HS was associated with having any dermatological condition (adjusted odds ratio [aOR] 7.17, 95% CI: 6.86-7.50). Specifically, HS was associated with 18 of the 25 dermatological conditions, with acne conglobata (aOR: 78.75, 95% CI: 8.44 - 734.46), pyoderma gangrenosum (aOR: 51.27, 95% CI: 42.50 - 61.86), and pilonidal cysts (aOR: 39.15, 95% CI: 32.48 - 47.18) having the greatest association with HS.

CONCLUSION:
Our research highlights the association between HS and several dermatological conditions not previously reported. While this study validates the complexity of the HS disease process, more research into HS pathology and etiology is strongly warranted.

Abstract Title: Managing the gap in General Academic Pediatrics (GAP) regarding food insecurity

Author: Akande, Oluwatobi
Co-Investigators: 1. Oluwatobi Akande, EVMS/MD2024 2. Heidi Flatin, CHKD/MD 3. Ana Pitocchi, CHKD/MD 4. John W. Harrington, CHKD/MD

Abstract

INTRODUCTION:
In 2019, children were found to be food insecure in 2.4 million or 6% of US households with children. Our study was to determine the prevalence and average age of FI among children 12 months-6 years old in the General Academic Pediatrics (GAP) clinic. In addition, determine parental awareness of the Supplemental Nutrition Assistance Program (SNAP) and interest in receiving information about alternative food resources in the community.

METHODS:
Parents were provided a questionnaire at well visits that incorporated the commonly used Hager 2-item screener for food insecurity. If the screen was positive or family identified as food insecure, follow up questions were asked by the research assistant about the child and the number of siblings, as well as questions focusing on SNAP, community resources and direct assistance from GAP.

RESULTS:
21 families completed affirmative questionnaires for FI with most documenting they were either worried that their food would run out before getting money to buy more or had bought food that did not last. The average age of FI positivity was 2.84 years. Most parents (19/21) were aware of SNAP and about half (10/21) were actually receiving the SNAP benefits. An additional 2 families were receiving benefits from the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). Almost all of the participants (20/21) requested to receive further information of either local food resources or contact information for the SNAP assistance program. Every family that filled out the questionnaire stated that they would accept grocery bags of non-perishable food if it was available.

CONCLUSION:
Overall, the levels of food insecurity in GAP during the time of the study from May 2021 to July 2021 was about 4.5%, which was consistent with the decline seen in the clinic after December 2020, where a high of 11% had drifted down to 5%. We believe the extra benefits provided by SNAP and other food assistance programs during the COVID19 pandemic likely impacted the decline in food insecurity seen in GAP.

Abstract Title: Skin Cancer Screening Practices Among Dermatologists: A Survey Study

Author: Algarin, Yanci A
Co-Investigators: 1. Vishal A. Patel, Department of Dermatology, The George Washington School of Medicine and Health Sciences 2. Catherine McCullum, Department of Dermatology, The George Washington School of Medicine and Health Sciences

Abstract

INTRODUCTION:
The United States Preventative Task Force (USPTF) has concluded the benefit of skin cancer screenings is inconclusive. A systematic review found that implementing skin cancer screening increased detection of in situ and thin melanoma, increased incidence of non-melanoma skin cancer detection, and decreased rates of thick melanoma. But only one of the studies reviewed found a reduction of melanoma mortality. Evidence is unclear for the exact benefits of preventative skin cancer screening.

Objective:
This study intends to discover the current skin cancer screening practices and recommendations of dermatologists.

METHODS:
A 25 question "Skin Cancer Screening Survey" was developed and sent to the American College of Mohs Surgery.

RESULTS:
124 Dermatologists completed the survey. Majority of physicians (77.4%) said they perform routine skin cancer screening exams. 37.9% of respondents noted they recommend screenings to all their patients, while 27.4% of participants recommend screening only for patients with a risk factor. Most of the respondents (52.4%) stated they do not follow any specific guidelines regarding routine skin cancer screenings. Majority selected that they usually perform full body skin exams (69.4%). Of those who answered that they do not follow guidelines, most noted following the American Academy of Dermatology guidelines (48.5%). 42.7% of respondents were aware of the USPTF recommendations regarding routine skin cancer screening.

Discussion:
The results demonstrate variability in real world practice of skin cancer screening exams. There is imperative need for evidence based uniform guidelines to drive accurate and unbiased preventative practice behaviors in the US.

Abstract Title: Gestational Diabetes: Understanding the Disease and Innovations in Diagnosis and Treatment

Author: Ali, Ayan M.
Co-Investigators:

Abstract

INTRODUCTION:
Gestational diabetes mellitus (GDM) is a clinical complication of pregnancy that is still not completely understood. As many as 15% of all pregnant women are affected by this obstetric condition. Although there are methods available to screen, diagnose and manage GDM, there is still much debate over which of these methods is superior. Furthermore, the access obstetric patients may have to these resources could be limited despite their perceived availability. Research is still being conducted to assess management of GDM and determine which treatment method is superior. With respect to access and barriers to care, several interventions have proven effective in increasing access to diabetic care and could be applied to GDM patients on a larger scale.

Main Body:
There is a general consensus that GDM's etiology stems from hormones produced by the female reproductive system along with the endocrine system. During normal pregnancy, insulin sensitivity decreases significantly in peripheral tissues. This is believed to be caused by placental hormones including estrogen, progesterone, and human placental lactogen (hPL). There have been several studies conducted to narrow down the exact hormones that induce insulin resistance, but there have been differing (and sometimes contradictory) conclusions. Much of these physiological responses to pregnancy are considered normal in a patient without chronic glucose resistance. In a pregnant patient without GDM, pancreatic β-cell hyperplasia and hypertrophy occur in response to increased metabolic demands. GDM occurs when pancreatic β-cells are unable to produce enough insulin to overcome maternal insulin resistance.

Insulin is the current first-line treatment for GDM. Current research is being done to compare treatment with subcutaneous insulin versus oral metformin. Other studies have compared insulin, metformin, and glyburide in their treatment efficacy and side effect profile. These studies had similar conclusions that oral glucose-lowering agents should only be considered when first-line treatment (insulin) is not a feasible option. Additionally, these studies offer further insight into the benefits and risks of different treatment options and when alternatives to insulin should be considered.

Socioeconomic factors also play a major role in the risk and health outcomes of women who develop gestational diabetes. There are undeniable gaps in care relating to the prenatal and postpartum period and these gaps can lead to missed opportunities for intervention and risk reduction. Interventions geared towards high risk populations have showed promising results that could be applied to GDM patients on a grander scale. Ensuring equitable care can limit the disparities that exist among historically underserved populations.

Conclusion :
GDM is a pregnancy complication that continues to affect pregnancy and fetal outcomes. Although the etiology of GDM is still somewhat unclear, there are several studies that have worked to clarify the physiology of the disease. Based on the studies mentioned, the future of GDM research could go in several directions. Future research could amplify its focus on pharmacological and socioeconomic management methods. With respect to pharmacologic treatment, it appears that the current standard of care (insulin) is still favorable compared to oral agents like metformin and glyburide. Larger and more long-term studies could be conducted in the future to assess the effects of insulin versus other pharmacologic treatments.

More socioeconomic interventions could also be applied to treat GDM patients. Incorporating patient coordinators, interpreter services, and diabetic educators to encourage glycemic control and coordinate patient follow-up could be valuable social interventions in GDM care. Future interventions could also address systemic socioeconomic factors that predispose patients to chronic disease. Much like pregnancy care and women's healthcare in general, the causes and treatments for GDM are multifactorial. There is a great deal of room for future research in this field and this research has the potential to significantly impact patient outcomes.

Abstract Title: A Recommendation for a Hispanic/Latinx Community-Based Educational Intervention to Address Health Disparities in Malignant Melanoma

Author: Alnaif, Sarah
Co-Investigators: Sarah Hermak, EVMS\Medical School

Abstract

INTRODUCTION:
When compared to non-Hispanic White patients, there is overwhelming evidence that malignant melanoma in Hispanic/Latinx patients has a higher mortality rate, due largely to more advanced stages, thicker tumors, and regional and distant metastases present upon diagnosis. Educational interventions have been used previously within dermatological settings to successfully increase awareness and screenings in an effort to reduce mortality. The objective of this study is to implement an educational community-based intervention to modify the knowledge, behavior, and confidence within the Hispanic/Latinx community of Hampton Roads regarding malignant melanoma to address this disparity in prognosis through early detection and prevention.

METHODS:
A brief Spanish- and English-language educational intervention and take-home patient literature were created, drawing from validated sources such as the American Academy of Dermatology (AAD) and the Skin of Color Society (SOCS). The topics covered include susceptibility to melanoma, sun-safe behaviors, and guidelines regarding when to see a dermatologist for suspicious lesions. To test the efficacy of this educational intervention, the study will compare a pretest to two posttests completed immediately following and three months after the intervention. A convenience sampling method will be used for participant acquisition in community centers, health fairs, and primary care clinics in Hampton Roads, VA. Eligibility criteria include Hispanic and/or Latinx individuals aged between 18-89 years old. Through RedCap, surveys and educational intervention will be completed on provided tablets or on the participants' own devices.

RESULTS:
This study is designed to collect data from a diverse range of ages and backgrounds within the Hampton Roads Hispanic/Latinx community. The aim is to modify the knowledge, behavior, and confidence regarding melanoma and its prevention among the Hispanic/Latinx population.

CONCLUSION:
Through providing melanoma education that is both culturally and linguistically appropriate, it may be possible to increase knowledge, behavior, and confidence regarding malignant melanoma. Study findings will inform more comprehensive community-based educational programming as well as targeted efforts to improve access to clinical services to address disparities in mortality related to malignant melanoma.

Abstract Title: An uncommon presentation of an uncommon tumor: central neurocytoma presenting with lower extremity paresthesia

Author: Ambardar, Shiva R.
Co-Investigators: Chirag Patel, EVMS Lauren Jutras, MD, EVMS Department of Radiology Robert Post, MD, EVMS Department of Radiology

Abstract

INTRODUCTION:
Central neurocytomas (CN) are very rare central nervous system tumors, composing <0.5% of primary brain tumors. Due to their rarity, diagnosis and management are debated. Generally, these tumors are diagnosed in the lateral ventricles of young adults, adjacent to the septum pellucidum. Patients generally present with symptoms of increased intracranial pressure (ICP), and sometimes with visual disturbances and impaired cognitive function. Focal neurological deficits (FNDs) are uncommon. The differential diagnosis includes ependymoma, subependymoma, and subependymal giant cell astrocytoma.

Case Information:
Here we present a case of a 23-year old female with past medical history of mild Covid-19 infection in January 2021 who presented to the emergency department with a 6-month history of progressive, intermittent headaches with associated photophobia, morning nausea and vomiting, and left lower extremity numbness and paresthesia. She had delayed care due to insurance concerns, but presented due to new onset paroxysmal numbness in her legs. ROS was positive for photophobia, nausea, vomiting, headaches, and intermittent LLE numbness and paresthesia. The patient denied visual disturbance, weakness, slurred speech, or other symptoms. Vital signs in the emergency department were only remarkable for HR of 107. Physical exam was unremarkable except for mild limping due to paresthesia on the left side. Labs were also unremarkable. In the emergency department, non-contrast head CT showed a large heterogeneous intraventricular mass causing obstructive hydrocephalus most consistent with central neurocytoma. Subsequent MR Head also showed an approximately 7cm intraventricular mass, consistent with the same. The mass was resected and a external ventricular drain placed. Intraoperative pathology was additionally consistent with neurocytoma. After an ICU stay, the patient gradually improved clinically and became ready for discharge. She had some left-sided upper limb weakness compared to right at time of discharge, but planned to get PT/home health on an outpatient basis.

Discussion:
In CNs, the most common presenting sign is headache. One study showed that focal neurologic deficits occurred in only 7.7% of CN patients. This may be secondary to the large size of the CN; this one measured approximately 7cm while the median is 4.2cm according to one study. There is a additionally a paucity of information regarding CN's optimal diagnosis and management, so this case report could help contribute in that regard. This patient was diagnosed with intraoperative pathology and treated with surgical resection and an external ventricular drain, followed by a VP shunt.

CONCLUSION:
Here, we showcase a CN which presented with FNDs, namely new lower extremity numbness, along with more typical signs of increased ICP. CNs are very rare at baseline, and this case report aims to shed light on an uncommon presentation of CNs. It is important for clinicians to be aware that CN should be included on the differential diagnoses for focal neurologic deficits.

Abstract Title: Graves' Autoantibodies Exhibit Different Stimulating Activities in Thyroid and Orbital Cells Not Reflected by Clinical Assays

Author: Azam, Asma M
Co-Investigators: 1. Christine Krieger, NIH\NIDDK 2. Susanne Neumann, NIH\NIDDK 3. Joanna Klubo-Gwiezdzinska, NIH\NIDDK 4. George Kahaly, Johannes Gutenberg University\ Department of Medicine

Abstract

INTRODUCTION:
Graves' Disease (GD) is an autoimmune disease and the most common form of hyperthyroidism (GH). GH is caused by TSH receptor (TSHR)-stimulating autoantibodies (TSAbs) which over-stimulate the TSHR on thyrocytes and orbital fibroblasts. Graves' orbitopathy (GO, thyroid eye disease) is an extrathyroidal manifestation of GD, which occurs in about 25% of patients, and is characterized by proptosis, inflammation, and increased hyaluronic acid (HA) secretion in orbital tissue. Although clinical studies have shown a correlation with TSAb titer measured as TSHR binding or stimulation of cAMP production in engineered cells and eye disease, predicting which patients will develop GO is still beyond our current capabilities. Clinical assays take advantage of the cAMP-protein kinase A pathway in engineered human embryonic kidney (HEK) cells that overexpress TSHR but are not the cells targeted in Graves' disease. The intention with this study is to compare the efficacy of antibody stimulation on human thyrocytes and orbital fibroblasts.

METHODS:
We compared signaling stimulated by purified immunoglobulins (IgGs) from sera of 50 patients with GH (GH-Ig) and 50 patients with GO and GH (GO-Ig). We characterized the ability of these antibodies to stimulate: 1) cAMP production in engineered HEK293 cells stably overexpressing TSHR; 2) thyroglobulin (TG) secretion by normal human thyrocytes; and 3) HA secretion by Graves' orbital fibroblasts (GOFs) grown in primary culture.

RESULTS:
Our studies demonstrated that IgGs isolated from patients with GH and GO differ with respect to their TSHR-mediated signaling. There was a positive correlation between IgG stimulation of cAMP production in the HEK293 cells and TG secretion by thyrocytes and HA secretion by GOFs.
Using a linear regression, we see a correlation between cAMP levels and TG secretion for both GH-Igs ($R2=0.11$, $P = 0.0212$) and GO-Igs ($R2=0.09$, $P = 0.0406$) and between cAMP levels and HA secretion for both GH-Igs ($R2=0.23$, $P<0.001$) and GO-Igs ($R2=0.14$, $P = 0.0073$). However, the correlation between cAMP and TG secretion was stronger than between cAMP and HA.

CONCLUSION:
Our study highlights that IgG-induced TSHR-mediated signaling is dependent on cellular context and differs between thyrocytes and GOFs, and between GH and GO patients. The clinical assay is better correlated with stimulation of thyrocytes than GOFs, which means that GO presence and severity may not be able to be predicted with this assay. These differences could be caused by different IgG populations in these patients and signaling pathways in the affected tissues. Based on these differences, further *in vitro* studies may lead to an improvement of early diagnosis and intervention of GO by introduction of additional biological markers that are specific for GO. Developing assays that target the other pathways involved in GD pathogenesis may be more diagnostically relevant and useful for grading and staging the disease and providing effective treatment.

Abstract Title: Studies of Cytochrome C Oxidase Activity in Different Regions of Autopsy Confirmed Alzheimer Disease Brains

Author: Ball, Phillip
Co-Investigators:

Abstract

INTRODUCTION:
Alzheimer's disease (AD) is the leading cause of dementia and affects more than 6 million Americans. The disease is often characterized by the accumulation of beta amyloid plaques and neurofibrillary tangles but there is also a decrease in cytochrome c oxidase (COX) activity. A recent discovery from our lab has shown a T to C mutation in position 9861 of subunit 3 of COX in AD brains. We seek to confirm the decrease in COX activity in AD brains and to investigate COX activity in AD brains possessing the T9861C mutation (AD+).

METHODS:
After homogenization, mitochondria where isolated from 50-250mg of frozen brain tissue by differential centrifugation. The mitochondria were then lysed, and a protein extract was recovered. This extract was assessed for COX and citrate synthase (CS) enzymatic activity and for protein content. To normalize for mitochondrial functional variation the COX/CS ratio was used for comparison of samples.

RESULTS:
When compared to control brains, all AD brains (AD and AD+) showed a 40.9% decrease in COX/CS. When the AD and AD+ brains were compared separately to controls there was a 46.9% and 33.9% decrease in COX/CS, respectively. We determined COX/CS in different regions of Control, AD and AD+ brains. When all AD brains were tested, the COX/CS shows a 36.1% decrease in the parietal cortex, a 56.5% decrease in the temporal cortex and a 37.1% increase in the caudate. The AD+ brains showed a 21.6% decrease in the parietal cortex and a 34.5% increase in the caudate. The AD brains without the mutation showed a 55.3% decrease in the parietal cortex, a 56.5% decrease in the temporal cortex and a 39.6% increase in the caudate.

CONCLUSIONS:
This data elucidates that there is a decrease in COX/CS activity in AD brains. However, when the AD brains are separated into those with and without the mutation, there is less reduction of COX/CS in AD+ brains. Further study with a larger number of each group of brain samples is required to achieve statistically significant results.

Acknowledgments:
This work was supported by a grant from the Commonwealth Health Research Board of Virginia.

Abstract Title: Effect of calcium channel blockers on the labor curve in pregnant women with chronic hypertension

Author: Baraki, Dana Issam
Co-Investigators: 1. Dana Baraki BS, Obstetrics and Gynecology\MD 2022 2. Thomas Donaldson BS, Obstetrics and Gynecology\MD 2022 3. Carole Barake MD, Obstetrics and Gynecology 4. Elizabeth Seagraves DO, Obstetrics and Gynecology\MFM Fellow 5. Alfred Abuhamad MD, Obstetrics and Gynecology 6. Tetsuya Kawakita MD, Obstetrics and Gynecology

Abstract

INTRODUCTION:|
Calcium channel blockers (CCBs) are a common drug used to manage chronic hypertnesion in pregnant women. They are also used as a tocolytic for preterm labor. We sought to examine the labor curves of women with chronic hypertension according to the use of CCBs during labor to determine if women on these medications had a slower labor course.

METHODS:
This was a retrospective cohort study of all women with chronic hypertension and singleton vertex pregnancies at 34 weeks' gestation or greater who delivered vaginally at a tertiary care center from January 2010 to December 2020. We excluded women with one or no cervical examinations available during labor, prior uterine surgeries, and 5-minutes Apgar score less than 5. We used a repeated-measures regression with a 10th-order polynomial function to discover the average labor curve under the effects of different antihypertensive treatments. Estimates of the median (10th-90th percentile) traverse times between two dilations were computed using interval-censored regression. Traverse times were compared between women receiving CCBs and those who did not receive CCBs. We modeled the course of cervical dilation using a third-order polynomial.

RESULTS:
Of 197 women, 58 (29.4%) received CCBs during labor, and 139 (70.6%) did not receive CCBs during labor. Women who received CCBs during labor compared to those who did not were more likely to deliver at earlier gestational age and to have pregestational diabetes. Women who received CCBs during labor compared to those who did not were more likely to have a longer duration needed for change from 3 to 6 cm (median 15.7 hours vs. 12.1 hours; P =0.01) but had similar duration needed for change from 6 to 10 cm (median 1.4 hours vs. 1.1 hours; P =0.27). Third-order polynomial curves also showed that women who received CCBs compared with those who did not had longer latent labor and similar slopes for active labor.

CONCLUSION:
Women with chronic hypertension who received CCBs during labor compared with those who did not had significantly longer duration of latent labor, but not of active labor. Healthcare providers should be aware that these women may need a longer duration of latent labor.

Abstract Title: A Distinctive Histological Form of Squamous Cell Carcinoma with Perineural Invasion

Author: Bard, Jason T
Co-Investigators: 1. Bard, Jason BS (EVMS) 2. Duran, Stephan MD (Dept of Dermatology, EVMS) 3. Roberts, Alice MD, PhD (Dept of Dermatology, EVMS)

Abstract

INTRODUCTION:
Approximately one million patients have squamous cell carcinoma (SCC) each year, with many different forms in existence. About 5% of these cases display perineural invasion (PNI) annually in the U.S. The disease-specific death rate has been reported as 16% for cutaneous SCC with PNI versus 4% for cutaneous SCC without PNI. Here, we present a unique finding in SCC that we believe may represent distinctive histological features, foreshadowing the potential development of PNI.

CASE PRESENTATION:
An 84-year-old male with Type II skin presented to a Mohs surgeon for evaluation of a fast-growing nodule on the right malar region during the preceding six to eight weeks. The nodule was poorly demarcated and measured approximately 3 cm in diameter. This was associated with paresthesia and a "shooting" pain from the right malar region to the right upper lip and alveolar ridge. A subtle decrease in right upper lip motor function was also noted. A biopsy demonstrated moderately differentiated infiltrative squamous cell carcinoma. However, the pattern was not easily classified because the characteristics ranged from poorly differentiated to well-differentiated throughout the specimen. More significantly, the association of poorly differentiated cells to well-differentiated cells created a repetitive and recognizable pattern highly predictable of PNI. The CT scan did not reveal any sinus invasion. Mohs surgery was undertaken on the patient's behalf. Two excised specimens from the first stage of surgery revealed significant residual tumor penetrating muscle. Perineural and perivascular tumor growth was identified within the fascia of the trigeminal nerve and its artery, in addition to possible growth within perineural lymphatics.

A second stage of Mohs surgery extended the excision to the malar periosteum. Two specimens were excised and indicated the tumor had extended through the infraorbital foramen into the infra-orbital canal. A wide local excision was made, resulting in a bony defect which was reconstructed with an area of de-epithelialized skin.

DISCUSSION:
Classification of tumor invasiveness can be determined by microscopic tumor thickness, tissue level, the character of tumor budding, lymphovascular invasion and PNI. Histologically, perineural involvement has most often been associated with poorly differentiated squamous cell carcinoma. However, growth pattern, as a repetitive structural analogy, has not been associated with perineural SCC in a useful, predictive way.We present findings of an aggressive SCC with potentially unique histology that may represent SCC with affinity for PNI. The recognizable and predictive pattern feature starts with a thin rim of cuboidal cells. Within one or two layers, these cuboidal cells abruptly transition to a well-differentiated, strongly eosinophilic parakeratotic core with only occasional complete orthokeratosis in the most superficial components. The pattern can be reminiscent of the parakeratotic maturation seen in keratoacanthoma. The overall pattern of the tumor proliferations is analogized as having a "fried egg" appearance. In an unpublished study of Mohs surgery for one hundred sequential large perineural SCCs, one of the authors (JW) found the histopathologic patterning present in this case study to be the most predictive feature for perineural involvement, more so than histopathological differentiation.

Because this growth pattern encompasses a range of cell differentiation, past authors who have attributed perineural growth to "poorly differentiated" SCC may have included "fried egg" SCC in their studies, failing to recognize the predictive quality of the fried egg pattern. The "fried egg" SCC is predictive of perineural growth, making recognition of the pattern a key adjunct to tumor management.

CONCLUSION:
This case appears to depict a distinct histological finding of SCC that has not yet been reported, to the best of our knowledge. It displays SCC with PNI consisting of multiple parakeratotic foci surrounded by eosinophilic cuboidal keratinocytes, resembling a "fried egg" pattern. SCC with PNI is typically discovered as an incidental finding, yet this case presents a recognizably associated growth pattern. This observation may allow clinicians to earlier distinguish an affinity for potential perineural involvement in SCC.

Abstract Title: Utilizing a Quality of Life (QOL) Tool to Examine the Presence of Fatigue in Subjects with Diabetes

Author: Bard, Jason T
Co-Investigators: 1. Jason T. Bard, MS2 2. Carolina M. Casellini, MD, Endocrine and Metabolic Disorders 3. Henri K. Parson, PhD, Endocrine and Metabolic Disorders 4. Elias S. Siraj, MD, Endocrine and Metabolic Disorders

Abstract

INTRODUCTION:
Chronic fatigue affects a significant proportion of the aging population, especially individuals with diabetes mellitus. In 2018, about 10% of the U.S. population had diabetes. These individuals may experience a range of health conditions including cardiovascular disease, retinopathy, and neuropathy. This may have a debilitating impact on quality of life (QOL), which includes components such as mood, physical function, and activities of daily living (ADL). Current QOL tools are not specific to problems associated with diabetes and aging, such as pain, cognitive decline, sarcopenia, and depression. The aim of this study is to explore the impact of diabetes and diabetic neuropathy on fatigue and QOL by utilizing the Norfolk QOL-Fatigue (QOL-F), a 35-item validated questionnaire sensitive to physical, cognitive, and emotional aspects of fatigue. We hypothesize the levels of all these aspects of fatigue are increased in patients with diabetes and more specifically, diabetic neuropathy (DN).

METHODS:
Participants were of any gender and race, between the ages of 18 and 79, diagnosed with type 1 or 2 diabetes, and recruited mainly from the Hampton Roads area. Participants were administered the Norfolk QOL-F and Norfolk QOL-DN questionnaires, both in person at the Strelitz Diabetes Center and online through REDCap, a survey interface. The Norfolk QOL-F questionnaire is divided into five domains (problems from fatigue, subjective fatigue, reduced activities, impaired activities of daily life (ADLs), and depression). The Norfolk QOL-DN was used to assess the presence of neuropathy. Informed consent was obtained for all participants. Demographic factors including age, gender, ethnicity, BMI, and duration of diabetes were also collected. Participants with diabetes mellitus (DM) were compared to a healthy control (HC) group.

RESULTS:
A total of 396 DM participants were included and compared to 79 HC participants. DM participants were matched for both gender and age, yet they displayed a significantly higher average BMI compared to the HC (32.23 ± 8.34 vs. 29.02 ± 5.17, $p=0.0011$). DM participants reported statistically significantly higher QOL-F scores compared to HC (52.65 ± 26.83 vs. 25.42 ± 19.32, $p<0.0001$). In addition, these differences were observed on all categories of the QOL-F including subjective fatigue, problems from fatigue, depression, reduced activities, and ADLs ($p<0.0001$). From the QOL-DN, it was learned that participants with DN (n=308) experienced significantly higher QOL-F scores than those without DN (n=88) (59.76 ± 24.49 vs 27.76 ± 18.62, $p<0.0001$). These differences were observed on all the QOL-F subdomains including the previously mentioned physical, functional, and emotional aspects of fatigue.

CONCLUSIONS:
Individuals with diabetes displayed a significant increase in fatigue symptoms compared to healthy individuals, while controlled for age and gender. This was true for all five identified categories of fatigue, including physical, functional (i.e. ADLs) and emotional (i.e. depression) components of the disease. Within the DM group, those with DN experienced a marked increase in all aspects of fatigue. Through these data, it can be inferred the Norfolk QOL-F questionnaire can identify elevated levels of fatigue in patients with a chronic disease such as diabetes. This may be especially relevant to clinicians as they address the main concerns of this patient population, including physical limitations, disruption of their ADLs, and depression.

Abstract Title: The Effect of Omecamtiv Mecarbil (OM) on the Steady-State ATPase and Thin filament Binding Affinity of the M493I Hypertrophic Cardiomyopathy Myosin (HCM) Mutant

Author: Bautista Neughebauer, Abes
Co-Investigators: Jennifer Atherton, Biochemistry Janette Lockett, Biochemistry

Abstract

Introduction:
Cardiac myosin is a class II striated muscle myosin that provides the driving force for the contraction of the heart. β-cardiac myosin is the major isoform in the ventricles of human hearts. Mutations in human β-cardiac heavy chain can lead to cardiac diseases that include familial hypertrophic cardiomyopathy (FHC) and dilated cardiomyopathy (DCM). FHC is a congenital autosomal dominant disease with a prevalence of 1 in 500 individuals, and is the most commonly inherited cardiovascular disorder. It is characterized by myocardial dysfunction early in life, consisting of asymmetric left ventricular (LV) hypertrophy, and aberrant myofibril organization.

The Methionine 493 residue is located on the relay helix adjacent to Phenylalanine 494, the position of bend in the relay helix found in the pre-powerstroke state. M493 makes an unusual hydrogen bond with the reactive sulfhydryl of cysteine 705, on the SH1 helix. This hydrogen bond is therefore essential in connecting the relay helix to the SH1 helix, and is important for the myosin ATPase activity and ultimately the force generation through the powerstroke. The hydrogen bond is disrupted in FHC patients with the Methionine 493 Isoleucine mutation. This mutation results in malignant FHC with a restrictive phenotype that is associated with severe limitations, poor prognosis and sudden cardiac death. The M493I proband died of congestive heart failure at age 46.

Omecamtiv Mecarbil (OM) is a novel small molecule activator of the cardiac muscle myosin reported to directly stimulate the motor activity without altering the intracellular calcium concentration, and is currently in Phase III clinical trials. Instead of altering the physiology of cardiac contraction, it increases cardiac output and efficiency by binding to myosin and targeting motor function.OM facilitates crossbridge formation and therefore increases force generation during the powerstroke, and has potential therapeutic effects for M493I patients.
This study evaluates the steady state ATPase activity and thin filament binding affinity of the M493I mutant protein in the presence and absence of OM.

Methods:
Protein expression and purification. The recombinant human β-cardiac HMM wild type (a truncated version of the β-cardiac heavy chain) and the M493I mutant were produced by using the adenoviral/C2C12expression system. C2C12 cells were infected with the recombinant adenoviral HMM WT (wild type) or HMM M493I virus. Ten days post-infection, cells were collected and homogenized. Protein was purified using FLAG-tag affinity chromatography. Eluted proteins were analyzed by electrophoresis using a 4-20% gradient SDS-PAGE gel to ensure the purity of proteins.

Kinetic analysis. Steady-state ATPase assays measure the overall output of the motor. These experiments were done by the NADH coupled method. In this assay, the actomyosin induced ATP hydrolysis is coupled to a regeneration system. ADP and phosphoenolpyruvate, are converted by pyruvate kinase (PK) to pyruvate, which is subsequently reduced by lactate dehydrogenase to lactate. Simultaneously, one molecule of NADH is oxidized to NAD+. NADH absorbs light at 340 nm, allowing for accurate measurement of ATP hydrolysis based on the amount of NADH consumed. The assays were done with 0.06 μM cardiac myosin HMM and 0-25 μM thin filaments at 25 oC in buffer containing 4 mM Mops, 2 mM MgCl2, 0 mM KCl, 1 mM DTT, 2 mM ATP, 40 units/ml lactate dehydrogenase, 200 units/ml pyruvate kinase, 1 mM phosphoenolpyruvate, and 200 μM NADH in the presence of 0.5% DMSO or 100 μM OM. Steady-state ATPase assays were repeated three times for both the WT and the M493I mutant in the presence and absence of OM.

Results:
The maximum steady state ATPase activity in the absence of OM was 5.1 s-1 for WT and 4.25 s-1 for the M493I mutant. The binding affinity for thin filament (KTF) was 1.9 μM for WT and 0.56 μM for the mutant protein.

In the presence of OM, the maximum velocity decreased to 2.1 s-1 or WT and 2.38 s-1 for the M493I mutant. The KTF decreased by ~ 6-fold to 0.35 μM for WT, and ~ 2.5-fold to 0.23 μM for the M493I mutant.

Conclusions:
Surprisingly, the steady-state ATPase activity was only slightly reduced for the M493I mutant.
The presence of OM reduced the steady-state ATPase rate and the actin binding affinity of both WT and M493I.
Transient kinetic studies are needed to further characterize the kinetic properties of the M493I mutant.

Abstract Title: Characterizing Food Security Within Hispanic Communities of Hampton Roads, Accomack and Northampton Counties

Author: Becker, Katherine Jane
Co-Investigators: 1. Sarah Smallets, University of Virginia Public Health Sciences\Master of Public Health Candidate 2. Erin Madison, MD, Oregon Health and Science University\Pediatric Resident 3. Elizabeth Strauss, EVMS\Doctor of Medicine Candidate 4. Lydia Sa, MPH, EVMS\Office Coordinator, Global Health 5. Alexandra Leader, MD, MPH, EVMS\Director, Global Health

Abstract

INTRODUCTION:
A growing portion of the US population (over 25% by 2050) identifies as Hispanic/Latinx. Food insecurity is a key determinant of health and disproportionately impacts persons of color as compared to whites. This project seeks to identify factors associated with food insecurity in Latinx communities of Hampton Roads with the aim of providing local community stakeholders with knowledge to improve access to healthy foods.

METHODS:
A 54-item survey including questions related to demographics, eating habits, access to food, and motivation for food choices was disseminated through convenience sampling at local health outreach events, clinics, churches, businesses, and a Hispanic radio station. Adults (18-89 years) living in Hampton Roads, Accomack or Northampton counties who are native Spanish speakers or the child of a native speaker were eligible to participate.

This analysis focuses on food insecurity, with the aim of determining if there is an association between participants who report frequent food insecurity and certain demographic characteristics, including health insurance status, gender, zip code, country of origin, and combined household earnings.

RESULTS:
This analysis includes 30 respondents. 13% (n=4) reported experiencing food insecurity frequently and 30% (n=9) respondents reported food insecurity sometimes. 44.83% of respondents were insured (n=13); 55.17% were uninsured (n=16). Survey respondents overwhelmingly identified as female (n=24, 80% female, n=6, 20% male). 41.38% of respondents were Virginia Beach residents (n= 12), followed by residents of Norfolk (n=7, 24.14%) and Chesapeake (n=4, 13.79%). Mexico was the most common country of origin (n=8, 28.57%), followed by Puerto Rico (n=5, 17.86%) and "other country in Central America" (n=5, 17.86%). Approximately half of all participants reported annual combined household earnings >$20,000 (n=16, 53.33%).
Small sample size limited the ability to determine statistical significance; however, cross tabulation indicates that annual combined household earnings and food security may be linked (Fisher's exact p = 0.107).

CONCLUSION:
Food insecurity negatively impacts health; minority populations are at particular risk. Preliminary research suggests that annual combined household earnings may be associated with food insecurity in Hampton Roads. If confirmed by further data and analysis, this observation may inform interventions to reduce food insecurity and enhance health in the local Hispanic/Latinx community.

Abstract Title: Aristolochic Acid Directly Activates Macrophages in Aristolochic Acid Nephropathy

Author: Bennett, Stephanie R
Co-Investigators: 1. Jiaqi Tang PhD, Division of Nephrology and Hypertension, Vanderbilt University, Nashville, TN 2. Andrew Terker MD, Department of Medicine, Vanderbilt University Medical Center, Nashville, TN 3. Ray Harris MD, Department of Medicine, Vanderbilt University Medical Center, Nashville, TN

Abstract

INTRODUCTION:
Aristolochic acid (AA) is a nephrotoxic alkaloid known to cause aristolochic acid nephropathy (AAN). Though AAN is uncommon in the US, the AA induced model of acute kidney injury (AKI) is useful for studying nephrotoxic kidney injury, the cause of approximately 20% of community and hospital acquired cases of AKI. AA is known to cause direct proximal tubule damage through creation of Reactive Oxygen Species (ROS) and induction of apoptosis resulting in tubulointerstitial fibrosis. However, the role of macrophages in this process is poorly understood. It is known that proinflammatory macrophages produce cytokines that exacerbate kidney damage. The aim of this study was to determine macrophage response to AA. We tested the hypothesis that AA directly stimulates macrophage apoptosis, ROS production and inflammatory cytokine production.

METHODS:
RAW cells were cultured and treated with AA or vehicle (Dimethyl sulfoxide). RAW cells were treated with Hydrogen Peroxide as a positive control. Flow cytometry was used to analyze cells undergoing apoptosis and ROS production. Cells were stained with Annexin V, Propidium Iodide (PI), or Dichlorodihydrofluorescein Diacetate (DCFDA) to identify apoptosis, cell death, and ROS respectively. The percentage of macrophages undergoing apoptosis and amount of ROS produced was calculated. Quantitative PCR was used to detect changes in the mRNA abundance of inflammatory cytokines Chemokine Ligand 2 (CCL2) and Chemokine Ligand 3 (CCL3) between cells treated with AA or dimethyl sulfoxide (DMSO).

RESULTS:
AA induced significant ROS formation but did not induce significant levels of apoptosis. The mRNA abundance of CCL2 and CCL3 was significantly increased in the AA treated cells compared to the DMSO treated cells.

CONCLUSION:
This data indicates that AA does not induce programmed cell death in macrophages, but does directly induce a pro-inflammatory phenotype in macrophages that contributes to AKI through ROS formation and production of inflammatory cytokines CCL2 and CCL3.

Abstract Title: Evaluating the Effects of Covid-19 on Themes of Concern in Third-Year Medical Students and Resident Interns

Author: Berger, Jared W
Co-Investigators: James Lau, Medical Student

Abstract

Background:
Transition points in medical education, particularly the transition to clerkships and residency, can be a significant source of stress for trainees (1-3). During these formative periods, both students and residents often have concerns regarding their preparedness and ability to adjust and integrate into the medical team/system. (1-3). Due to the coronavirus disease 19 (COVID-19) pandemic, trainees in 2020 are forced to reach these milestones under unprecedented circumstances that have likely led to the development of new themes of concern. Previous research using a cross-sectional survey studied medical student perceptions during the peak of the COVID-19 pandemic. This research showed that the majority felt their clinical experiences had been significantly disrupted and that they should be allowed to continue clinical education despite the risks (4). These respondents were, however, limited based on the nature of the study which relied on a numerical scale to rate their level of agreement with predetermined statements.

METHODS:
Our research utilized grounded theory qualitative analysis to analyze free-response data from a questionnaire inquiring about concerns of rising third-year medical students and rising interns during the peak of the covid-19 pandemic. The survey question aimed to allow trainees to voice any number of concerns that may have been on their minds as related to their respective transition points in training during the pandemic. Common themes were identified and the frequencies were analyzed between the two cohorts. In addition to the common themes, we found that the rising intern cohort had additional concerns with high enough prevalence to warrant the creation of three additional themes specific to this cohort.

RESULTS:
One-hundred and forty responses were collected from the rising M3 cohort and 142 responses were collected from the rising intern cohort. Six responses from the M3 cohort were either incomplete or unanswered and were excluded from the study. The most prevalent themes among the rising third-year students were: compromised training (52.2%), becoming an infection vector (38.2%), contracting covid-19 (38.2%), optimism or eagerness to face pandemic challenges (20.6%), and PPE access (9.6%). No theme was identified in 12.5% of responses from this cohort. Among the rising intern class, the most prevalent themes were: PPE access (28.9%), optimism or eagerness to face pandemic challenges (26.1%), compromised training (23.9%), health system strain (23.2%), contracting covid-19 (21.1%), inexperience entering the workplace (21.1%), being an infection vector (19.7%), and changing covid-19 guidelines (7.0%). No theme was identified in 7.0% of responses from this cohort.

Conclusions:
The COVID-19 pandemic introduced unprecedented challenges to medical student and resident training. Although the overall themes were similar between rising third-year students and interns, the prevalence of concerns varied between the two cohorts. The most prevalent concern amongst rising third years students was a compromise in training experience while among rising interns, it was access to PPE.

Abstract Title: STOP THE BLEED: Evaluating the Efficacy of Thrombelastography in Monitoring Novel Oral Anticoagulant Associated Coagulopathy

Author: Breeding, Emily L
Co-Investigators: Ishraq Kabir MD, University of Maryland, Trauma/Surgical Critical Care Margaret Trainor, EVMS M4

Abstract

INTRODUCTION:
Novel oral anticoagulants (NOACs) have gained popularity since their introduction as they provide a viable alternative to vitamin K antagonists without needing regular monitoring. As the geriatric population grows, there is an increase in patients on NOACs admitted for traumatic intracranial hemorrhage. Current literature suggests that thromboelastography (TEG) is a reliable technique to measure anticoagulation (AC) status in patients on NOACs. The aim of this study is to determine the efficacy of TEG in detecting NOAC-related coagulopathy in an effort to guide AC reversal in traumatic brain injury (TBI) patients.

METHODS:
A retrospective chart review of 456 TBI patients on AC admitted at Sentara Norfolk General from 2015-2020 was performed. Inclusion criteria comprised patients on NOACs with a TEG performed within 48 hours of presentation, totaling 71 patients. Analysis of results included TEG values, worsening head CT scan within 72 hours, change in GCS score, need for operative intervention, and death.

RESULTS:
TEG results showed 0% high R time, 1.4% high K time, 1.4% low alpha angle, 4.2% low max amplitude (MA), and 4.2% high LY30 in patients on NOACs. A subset analysis on patients with worsening head CTs revealed 0% high R time, 0% high K time, 0% low alpha angle, 4.8% high MA, and 4.8% high LY30. TEG results were not significantly different between patients who received PCC4 vs those who did not. In patients with worsening head CTs, 42.9% received PCC4, whereas 21.9% did not. Patients who received PCC4 had more severe injuries, 25% presented with a GCS <8 (p-value=0.05).

CONCLUSION:
Results of this study suggest TEG is not a reliable test to measure AC status and effective reversal in patients on NOACs at this institution. In addition, worse outcomes were found amongst patients who received PCC4 for NOAC reversal. This may be related to selection bias, as a higher percentage of these patients met severe TBI criteria. Further studies are needed to investigate the best reversal agent for NOACs.

Abstract Title: An Inquiry Into Equity Issues Surrounding COVID-19 Among Black and African American Individuals

Author: Brodnik, David
Co-Investigators:

Abstract

INTRODUCTION:
Black and African American individuals in the US have demonstrated increased risks for COVD-19 infection, hospitalization, and death compared to their White counterparts. Purpose: This study aims to identify and examine equity issues related to COVID-19 by inquiring about first-hand experiences of a small cohort of Black and African American individuals who reside in Norfolk, VA. Furthermore, our goal is to contribute to a grounded theory of barriers to equitable health and well-being for Black and African American individuals in the US when added to the body of disparity-focused literature surrounding the COVID-19 pandemic.

METHODS:
This qualitative study used a phenomenological approach to examine barriers to health and well-being equity for Black and African American individuals through lived experience commonalties during the COVID-19 pandemic. Individuals over the age of 18 were recruited through a purposeful sample. Data was collected through a series of key informant interviews that were recorded, transcribed, and analyzed for key themes. A total of 6 residents participated in the study.

RESULTS:
The preliminary data demonstrated common themes in vaccination decisions, information sources, and inequities. Participants' vaccination decisions were positively influenced by family members, personal research, and life returning to a sense of normalcy. Vaccination decisions of participants' friends and family members were positively influenced by vaccine efficacy and life returning to a sense of normalcy and negatively influenced by governmental distrust, developmental timelines, and long-term effects. Participants' trusted sources of information included governmental health agencies, peer-reviewed articles, and medical professionals, citing expertise as the determining factor. Two participants preferred the trusted source to be a person of color. Participants suggested increasing the quality and availability of preventative healthcare, information resources, and dissemination of information as potential improvements.

CONCLUSION:
Racial and ethnic health disparities continue to persist in the US today for Black and African American individuals. The COVID-19 pandemic has emphasized the severity of these inequities and the resultant outcomes. Future interventions should aim to improve the quality and availability of healthcare and information resources for Black and African American individuals before the next pandemic.

Abstract Title: Regional Variation in Demand for Fellowship Training: An Analysis of Anesthesiology Job Advertisements

Author: Brodnik, David
Co-Investigators: 1. Evan DaBreo, MD, Department of Anesthesiology, University of Virginia 2. Emily Wang, MD, Department of Medicine, Division of General Internal Medicine, Mount Sinai West and Mount Sinai St. Luke's 3. Colin Reinhart, MD, Department of Medicine, Section of Emergency Medicine, University of Chicago 4. Austin Tipold, MD, Department of Emergency Medicine, Vanderbilt University

Abstract

INTRODUCTION:
The goal of this study is to present regional variation in demand for fellowship training in the United States' anesthesiology job market through an analysis of job advertisements. We hypothesized that the demand for subspecialty fellowship training would be consistent on a region-by-region basis as a proportion of all listings within a region.

METHODS:
Anesthesiology job advertisements were collected on a state-by-state basis between October 2019 and March 2020 from the publicly available anesthesiology job site Gaswork.com. Jobs were coded by geographic location, US Census Region and Division, the number of anesthesiologists needed, and required subspecialty fellowship training. Required subspecialty fellowship training included all listings in which fellowship training was explicitly required, preferred, negotiable, optional, or open to several subspecialties. Listings coded as no subspecialty fellowship required included all listings with no preference stated. When available, the number of anesthesiologists needed was taken as the number listed and assumed to be no less than 2 in listings for multiple positions. Statistical analysis included chi-square with p-values less than 0.05 considered significant.

RESULTS:
Between October 2019 and March 2020, a total of 2,652 listings for 3,396 positions were analyzed nationwide. Mountain and East South Central Census Divisions were found to have a statistically significant larger proportion of listings requiring fellowship training, at 42.3% and 33.3%, respectively. Pacific, East North Central and New England Census Divisions had a statistically significant smaller proportion of listings requiring fellowship training, at 18.6%, 19.0%, and 15.7%, respectively.

CONCLUSION:
The long-term demand for anesthesiologists nationwide is predicted to be strong based on estimates by several prior studies. This analysis suggests that demand for subspecialty training may vary by region. While the forces driving this variation in listings remains uncertain, these findings can be useful as an adjunct to other information in career planning and policy purposes.

Abstract Title: Craniofacial Injuries Associated with Standing Electric Scooter Use: A Query of the National Electronic Injury Surveillance System (NEISS)

Author: Brodnik, David
Co-Investigators: 1. Riccardo De Cataldo, EVMS 2. Yifan Guo, MD, Plastic and Oral Maxillofacial Surgery, Children's Hospital of The King's Daughters

Abstract

INTRODUCTION:
Since late 2017, standing electric scooter (e-scooter) use and the resulting injuries have increased exponentially due to the convenience, ease of use, and affordability of e-scooter ridesharing services. To date, no study has specifically evaluated craniofacial injuries associated with standing e-scooter use on a nationwide scale. The primary purpose of this study is to highlight and characterize the incidence, demographics, and craniofacial injuries of standing e-scooter-related trauma in the United States in the past several years.

METHODS:
The U.S. Consumer Product Safety Commission's National Electronic Injury Surveillance System (NEISS) was queried for trends in craniofacial standing e-scooter injuries between 2011 and 2020. Data collected included patient demographics, injury diagnosis, the place of the injury, and disposition. Cases involving electric skateboards, gasoline-powered scooters, mobility scooters, mopeds, or non-riding pedestrians as the patient were excluded.

RESULTS:
786 patients were treated for craniofacial injuries due to standing e-scooter use at hospitals in the United States and its territories between 2011 and 2020. There was a 6.2-fold increase in cases in 2020 compared to 2011. Patient age ranged from 2 to 87 years (average 27.0 years). Subjects were predominantly male (67.7%). The most common craniofacial injuries were lacerations (39.1%), contusions or abrasions (24.2%), concussions (17.1%), and fractures (13.4%). Lacerations most often occurred on the face (69.4%), while common locations of fractures were in the face (69.5%) and head (21.9%). The majority of patients were discharged home (87.3%) with the remainder being admitted to the hospital (10.7%) and leaving without being seen (2.0%). Of the 451 patients age 21 years or older, 95 (21.1%) were riding under the influence of alcohol, and 100 (12.7%) of the 786 patients collided with motor vehicles. Helmet usage was specified in 42 (5.3%) cases.

CONCLUSION:
Standing e-scooter use is associated with an increased frequency of craniofacial injuries over time. In this cross-sectional study, we describe the frequency, type, and distribution of these injuries. They have occurred concomitant with the expansion of e-scooter ridesharing services in the United States. Additional studies are necessary to better understand standing e-scooter-related injuries and potentially provide preventative solutions.

Abstract Title: An Analysis of Qualitative Themes in Yelp Reviews of Anesthesiology Practices

Author: Brodnik, David
Co-Investigators: 1. Alsiddig Elmahdi, EVMS 2. James Lau, EVMS 3. Evan DaBreo, MD, Department of Anesthesiology, University of Virginia

Abstract

INTRODUCTION:
The quality of Anesthesiology-based medical care can be improved through the analysis of patient feedback data that is readily available on online review platforms such as Yelp. Additional medical specialties, including dermatology, radiology, and obstetrics and gynecology, have utilized online reviews to provide guidance towards practice reform. The goal of this qualitative, cross-sectional study is to identify provider-specific and practice-specific themes that differentiate poorly-rated and highly-rated Anesthesiology practices from one another.

METHODS:
This cross-sectional study evaluated patient-generated reviews of Anesthesiologists from the online review platform Yelp. A list of the 1,000 largest cities in the United States was randomized to ensure a diverse sample geographically. Anesthesiology-based providers were analyzed in over 69 highly-populated U.S. cities. Reviews were coded for 35 positive and negative qualitative themes grouped into either generalized, provider-specific or practice-specific categories. An analysis was performed on the frequency of these themes, in addition to the patients' ability to recall the Anesthesiologists' names, as a function of a 1- to 5-star rating.

RESULTS:
A total of 992 reviews were analyzed for the 214 healthcare practices included in the query, with 53.7%, 24.3%, and 22.0%, being private practices, hospitals, and surgery centers, respectively. The average star rating was 3.76 with 47.7% and 7.5% of healthcare practices being rated 5-star and 1-star overall, respectively. Surgery centers were 1.9-times more likely to be 5-star compared to private practices and 1.4-times more likely to be rated 5-star overall than hospitals. The most common negative themes for 1-star reviews were negative interactions with the staff or physician, long wait times, and billing errors. Reviews of 5-star practices most often referenced positive provider-specific themes, while reviews of 1-star practices most often referenced negative practice-specific themes. Patients were more likely to recall the name of the Anesthesiologist if it was a 5-star review.

CONCLUSION:
Online review platforms are becoming an increasingly popular medium that facilitates communication among patients regarding healthcare quality. The utilization of the data from these platforms may provide medicals providers with insight into ways of improving the overall patient-care experience. Positive patient experiences are more likely to be related to provider-specific themes, while negative patient experiences are more likely to be related to practice-specific themes.

Abstract Title: Extreme Heat Events and Health Outcomes: Vulnerability Mapping of the City of Norfolk

Author: Capra, Jack T
Co-Investigators: Lydia Sa, Old Dominion University, Department of Public Health

Abstract

INTRODUCTION:
One of the dangerous effects of climate change is an increase in frequency and severity of extreme heat events (EHE) which disproportionately impact urban areas and historically disadvantaged communities due to factors such as socioeconomic status, lack of greenspace, and lack of healthcare access. Norfolk, Virginia has a complex racial history with resulting inequities that feed into the unequal burden of EHEs, including higher temperatures, mortality, and unequal access to healthcare. To better understand vulnerability to heat-related health outcomes, this project mapped the city of Norfolk, known demographic characteristics related to disparate health outcomes, and environmental factors of interest.

Methods:
With the final goal of assessing patient level disparities of morbidity and mortality related to EHEs, this study geographically characterized the city of Norfolk using qGIS and publicly available data to identify areas of potential heat vulnerability. Census data for factors associated with heat related mortality were acquired and mapped to the city of Norfolk using Zip codes and census tract level geographic data. The Heat vulnerability value was estimated using several variables including greenspace, percent of population with health insurance coverage, percent of population under 65, Income, and percent of population working outdoors. All variables were all normalized to a Z score and added. The only variable given additional weight was occupation which was found to be the most correlated with negative health outcomes in EHE's in the literatureThis mapped data was compared to a previous study to look for any similarities in calculated heat vulnerability using meteorological and historic poverty data.

RESULTS:
The primary results of this project are a combination of qGIS maps and statistical values that stratify the neighborhoods of Norfolk based on heat vulnerability. Major identified areas of interest were East Ocean View, Ballentine Place, Brambleton, and Rosemont. These neighborhoods had increased vulnerability to EHE's compared to the rest of the city due to lower income, reduced greenspace, higher portions of uninsured population, and increased population employed outdoors. 36.7 percent of North Rosemont residents work outdoors, compared to the city average 11.3%.Rosemont and East Ocean view had an average of 1.1 parks per census tract compared to the city average of 2.7. Rosemont, Brambleton, and Ballentine place all had median incomes below $37,000 dollars per year compared to the city average of 54,000. The neighborhoods studied likely face compounding effects of multiple social determinants of health and environmental vulnerability, known to be associated with increased morbidity and mortality during EHEs, and warrant further investigation with clinical data to correlate heat related morbidity and mortality.

CONCLUSION:
The data was consistent previous data in these neighborhoods, however, our data denoted that Downtown was not considered as high risk for negative health outcomes in an EHE due to increased income and lowered portion of population working outdoors; offsetting the increased effects of heating by the urban heat island effect downtown. While downtown was experiencing the hottest temperatures during heatwaves, we believe these temperatures will not produce as many negative health events in the population due to these mitigating factors.

Abstract Title: Get Real Academy Pilot - Implementing Virtual Comprehensive Sex Education for School-age Youth in Virginia under the Context of the COVID-19 Pandemic

Author: Carpenter, Stacey L
Co-Investigators: 1. Rebecca J. Slimak 2. Gay V. Goldsmith 3. Lauren T. Gilgannon 4. Tram H.; Phung 5. Taylor S. Wallace 6. Julie Z. Yi 7. Kelli J. England 8. Amy C. Paulson 9. Matthew C. Herman 10. Hongyun Fu

Abstract

INTRODUCTION:
As one of Virginia's oldest cities, Norfolk has a high concentration of poverty as well as high rates of both teen pregnancy and sexually transmitted infections (STIs). Access to comprehensive sex education (CSE) for school-age youth is limited, due to a range of socioeconomic, cultural, and structural barriers. Abstinence is the primary focus of the sex education curriculum currently available in public schools. We piloted a virtual CSE program to middle/high school students during the COVID-19 pandemic, in collaboration with local public schools and community organizations to involve youth and families in an evidence-based, age appropriate CSE intervention.

METHODS:
The program adopted the Get Real CSE curriculum developed by the Planned Parenthood League of Massachusetts (PPLM) for virtual implementation in May through July of 2021 among middle/high school students, using Zoom video teleconferencing software. The curriculum included 9 lessons for middle school (with age specific contents for each grade: 6th, 7th and 8th), and 11 lessons for high school. Participants were recruited through email, social media, and referrals from school teachers/counselors and community members. Parents were invited to complete an opt-in form to register their child(ren) for the program. Program sessions were delivered by health educators certified by PPLM. Participants who completed all lessons were awarded a certificate of completion and a $35 incentive. A range of program monitoring and evaluation data were collected, using pre and post assessments, student feedback forms, parent feedback forms, and program fidelity logs.

RESULTS:
A total of 144 students participated in the pilot, among which 61% (88/144) had perfect attendance. A higher score in knowledge related to pregnancy and STIs was as reported at post-assessment, relative to pre-assessment for both the high school and middle school programs. The pilot was implemented with high levels of fidelity (scores ranging from 85.7% to 97.8%) and received high satisfaction scores (mean=8.84, Range: 0-10). Ninety-four percent of participants said that they would recommend the program to their peers.

CONCLUSION:
Findings indicate that implementing the virtual Get Real Academy can be a feasible and effective approach to reach school-age youth with a CSE curriculum during the COVID-19 pandemic.

Abstract Title: Radiologic Diagnosis of Craniosynostosis

Author: Chambers, Charlotte W.
Co-Investigators: Emily Glavich, MD, EVMS Department of Radiology

Abstract

INTRODUCTION:
Craniosynostosis is a disease which occurs in infants, characterized by premature fusion of one or more cranial sutures leading to characteristic skull deformities. Prompt diagnosis of this condition is imperative as abnormal calvarial growth interferes with normal brain growth and development in addition to causing physical deformities. This presentation will review the various imaging modalities and imaging techniques used in the diagnosis of craniosynostosis.

Main Body:
The overall incidence of craniosynostosis is estimated to be between 1 in 2100 and 1 in 2500 live births. The most common suture affected is the sagittal suture, comprising approximately half of all craniosynostosis cases. However, craniosynostosis may also occur at the coronal, lamboid, squamousal, or metopic suture, or may occur at multiple sites. Craniosynostosis is usually an isolated defect, though a small number occur from familial syndromes or part of a larger syndrome. Craniosynostosis associated with a genetic mutation or with a strong family history is more likely to involve multiple sutures. The definitive treatment for craniosynostosis is surgery, with surgery at an earlier age associated with better outcomes. It is important to differentiate craniosynostosis from common mimics including metopic ridge and positional plagiocephaly. Positional plagiocephaly is a condition which leads to skull deformities due to external forces and is increasing in incidence since the introduction of the Back to Sleep campaign. Positional plagiocephaly is largely a clinical diagnosis by physical examination of the infant's skull as well as history from the parents. Treatment depends on severity and is largely repositioning of the infant, also called active counterpositioning, and/or use of an orthotic helmet. In particular, craniosynostosis of the lambdoid suture, though less common than other variants of craniosynostosis, may mimic positional plagiocephaly and be difficult to distinguish by history and physical alone.

Sutures close at predictable times in infancy and premature fusion of one or more sutures leads to characteristic patterns of abnormal skull morphology. The normal appearance of cranial sutures is well characterized on various imaging modalities. The gold standard for diagnosing craniosynostosis is computed tomography (CT) of the head. CT allows superior visualization of the sutures compared to plain film. CT can also provide a 3D model of the infant's skull which is used for both diagnosis and surgical planning. However, there are downsides to using CT as the initial imaging modality when there is suspicion for craniosynostosis. First, CT scans are a more expensive method of imaging than plain films. The cost of a CT scan varies greatly, ranging from as little as $200 to thousands of dollars and is dependent on the patient's insurance, the anatomy imaged, whether contrast is given, and the facility where imaging is done. Many infants may require sedation when undergoing CT scan to reduce motion artifact. All sedation and anesthesia are associated with potential risks, and CT studies with sedation may take longer to complete and may be more costly. Furthermore, scans are associated with higher levels of ionizing radiation than plain films. While minimizing radiation is an important principle when treating all patient populations, special consideration is given to infants and children due to potential adverse effects of radiation decades in the future. The radiation dose from a head CT for an infant is approximately 30mGy. Low dose CT has been shown to have similar accuracy in diagnosing craniosynostosis as other computed tomography studies. However, this modality may not be available at all imaging centers. Plain skull radiography is often ordered by referring clinicians as an alternative first line imaging study to CT. Multiple views of the skull are obtained in different projections and different radiographic signs can be used to evaluate the sutures. Cranial ultrasound and magnetic resonance imaging (MRI) have a more limited role in the diagnosis of craniosynsotosis as osseous structures are less well evaluated with these modalities. However novel techniques are being explored to image the cranial sutures and MR provides better resolution of the intracranial structures, which may be useful in the workup of suspected associated intracranial anomalies.

Conclusions:
Currently computed tomography (CT) serves as the gold standard for diagnosis by allowing for superior visualization of the osseous structures of the skull. Low-dose techniques are used to reduce radiation dose and three-dimensional (3-D) reconstruction aid in surgical planning. Plain skull radiography is often used as an alternative first line imaging modality due to decreased cost, easier image acquisition, and decreased radiation dose, but has decreased sensitivity and specificity. Some alternative protocols are being investigated for the use of cranial ultrasound and magnetic resonance (MRI) in the diagnosis of craniosynostosis.

Abstract Title: Examining the role of cannabinoid-2 receptor activation in bacterial clearance

Author: Chan, Vincent S
Co-Investigators: Greg Nicholson, B.S. Physiological Sciences

Abstract

Background:
Pseudomonas Aeruginosa (PA) is an opportunistic bacterial pathogen responsible for a high incidence of lung injury and is the main agent responsible for nosocomial infections such as ventilator-associated pneumonia. Phagocytic clearance of PA by macrophages and neutrophils is an essential step in limiting lung injury and controlling the infection. A potential candidate towards curbing the PA-induced inflammation and for enhancing PA clearance appears to be the cannabinoid-2 receptor (CB2R) that is predominantly expressed in immune cells. In this study, we aimed to test the effect of activating the CB2R via a selective agonist on bacteria (PA) clearance and in regulating PA-induced inflammation.

Methods:
GFP-PA (ATCC-101045GFP) were grown on an agar plate, sub-cultured in 5 mL lysogeny broth media, and injected into mice via intra-tracheal aerosolized spray (50 µL of 3 x 107 CFU). A selective synthetic CB2R agonist, HU308 (5 mg/kg) was also injected into the mice via intraperitoneal injection 1h prior to GFP-PA injection. At 2, 4, and 16h after PA infection bronchoalveolar lavage fluid (BALF) was collected from the mice lung, centrifuged at 1500 rpm for 5 minutes at 23o C, and BALF cells were resuspended in PBS and plated onto microscope slides via Cytospin for imaging. PA-induced inflammation was assessed by measuring the BALF TNF-α and IL-1β levels by ELISA. Bacterial clearance was determined by examining the whole lung bacterial load.

Results:
Pharmacological activation of CB2R resulted in an increase in phagocytosis of GFP-PA by alveolar macrophages at a 2h time point.HU308 treatment significantly reduced the lung bacterial burden. CB2R activation significantly blunted the PA-induced release of TNFα and IL-1β.

Conclusion:
Activation of CB2R by a selective synthetic agonist HU308 improved bacterial clearance and reduced PA-induced inflammation.

Abstract Title: Comparison of Clinical Knowledge Acquisition at Pilot Sites Following Helping Babies Breathe/Essential Care for Every Baby Course Implementation in the Dominican Republic

Author: Chasse, Madeleine
Co-Investigators: Madeline E. Caballero, Wanny Roa, MD, Lydia Sa, MPH, Alexandra Leader MD, MPH

Abstract

Background:
Since 1990, under-five mortality has decreased by almost sixty percent[1], however, the global burden of young deaths is still colossal. In 2019 alone, about forty-seven percent (2.4 million) of under-five deaths occurred in the neonatal period.[2,3] The Dominican Republic (DR) has one of the highest neonatal mortality rates in Latin America despite broad access to care.[4] Helping Babies Breathe (HBB) and Essential Care for Every Baby (ECEB) are evidence-based newborn resuscitation and essential neonatal care training programs that have been implemented in the DR since 2015.[4] This study will examine acquisition of clinical knowledge at the time of HBB/ECEB training implementation at pilot sites in the DR.

Methods:
A group of international clinicians partnered with the DR Ministry of Health to implement the HBB/ECEB training programs utilizing a train-the-trainer model. Knowledge acquisition related to neonatal resuscitation and care was measured at each training pilot site by pre/post knowledge tests related to core course content. Test scores were entered into a Research Electronic Data Capture (REDCap) database for analysis. A Wilcoxon test was used to analyze the impact of intervention on the HBB knowledge and ECEB skill assessments.

Results:
The pre-test mean score for HBB was 7.95 points (N=59), and the post-test mean score was 14.46 (N=48). The pre-test mean score for ECEB was 12.15 (N=59), the post-test mean score was 16.63. HBB post-test knowledge scores were approximately 6 points higher than the pre-test scores. Whereas ECEB post-test knowledge scores were approximately 4 points higher than the pre-test scores.

Discussion:
Analysis for both HBB/ECEB modules there was significantly higher performance on the post-test demonstrating that the HBB/ECEB training modules were effective. Next steps may include comparing the overall performance at each pilot site, follow-up tests to investigate knowledge and skills retention and examination of sustained availability of neonatal care resources.

Abstract Title: An Assessment of Dermatology Resident's Perspectives of Curriculum Inclusivity for American Indian/Alaskan Native Patients

Author: Clawson, Rebecca Candler
Co-Investigators: 1) Co-I-1, Stephan F. Duran, MD, EVMS Dermatology

Abstract

INTRODUCTION*:*
Despite the fact that the American Indian/Alaskan Native (AIAN) population within the United States is growing at a rate greater than twice that of the general population, there remains a disparity in access to medical care and a paucity of research investigating clinical outcomes within this population. In dermatology, AIAN patients have far fewer encounters per capita than white or Asian patients . Among AIAN patients seen by dermatologists, the most frequent diagnoses are cellulitis, urticaria, contact dermatitis, and eczema, but these conditions have not been formally studied in the AIAN population, opening the door for misdiagnosis and inappropriate treatment.

METHODS:
We developed a survey to investigate dermatology residents' exposure to training specific to cutaneous pathology in AIAN patients and assessed their feelings of preparedness to treat this population. We also used a series of seven true/false questions to assess resident knowledge of basic dermatologic and socioeconomic facts within the AIAN population. This survey was distributed via REDCap to dermatology residency program directors across the United States to be forwarded to their respective residents.

Outcomes:
Few (n=14) dermatologist residents completed the survey.
Preliminary results from this survey show that 93% of dermatology residents have not received formal training in recognizing dermatologic conditions in AIAN patients and that no residents reported feeling "very prepared" to treat these patients while six residents (43%) reported feeling either "somewhat unprepared" or "very unprepared".

Our knowledge-based questionnaire revealed that dermatology residents are moderately knowledgeable about the prevalence of different dermatologic conditions as well as socioeconomic disparities affecting AIAN patients. Half (n = 7) of residents were able to answer six or seven of the seven T/F knowledge-based questions correctly.

CONCLUSION:
While limited, our survey suggests that dermatology residents within the United States are not exposed to formal training in identifying cutaneous pathology in the AIAN population. This lack of formal training may contribute to feelings of unpreparedness in treating these patients. Expanding this research to more physicians in a variety of specialties is necessary to further assess discrepancies in medical care that AIAN patients may face. Limitations of this study include the small sample size of respondents.

Abstract Title: COVID-19 and its effect on BMI year over year in both normal BMI patients and already identified at risk population with BMIs >85% pre-pandemic

Author: Contractor, Parth S
Co-Investigators: 1. Dustin Runzo, MD 2024 2. Tamir Abassi, MM2020 3. Rylie Mainevile, MD 2024

Abstract

INTRODUCTION:
The prevalence of childhood obesity had been stabilizing nationally prior to the COVID-19 pandemic. A recent study in Pennsylvania found childhood obesity rates increasing due to the pandemic. There is an incomplete understanding of causal factors in diet and exercise that could be driving this change in childhood obesity trends.

METHODS:
English speaking patients between 4 and 17 years of age who were being seen in the General Academic Pediatric department (GAP) at Children's Hospital of The King's Daughters (CHKD) for pediatric well check visits were enrolled in this study. Patients needed to be seen for greater than 3 years and have a BMI recorded at 3 previous well visits at least a year apart. CDC/WHO BMI% was collected from the chart. Patients over age 8 and parents/guardians were consented and administered a questionnaire that asked about relative changes over the past year in diet, fluid intake, activity level, screen time, and family time.

Results:
Data collection is still in progress. Of the 187 pediatric subjects to date, 48% are female (87/189) and 49% are male (82/187) with 3% (6/187) having no response. Primary racial demographics were 79% Black (148/187), 7% Mixed race (13/187), 6% White (11/187), and 3% Hispanic/Latino (5/187). 42% of subjects are between 4 and 8 years old (78/187); 39% between 9 and 13 (72/187); 20% between 14 and 17 (37/187). BMI percent's were collected from the most recent well visit and two well visits prior to the pandemic. A paired t test revealed a mean BMI% increase of 3.2 from last year to this year as compared to a mean decrease of 3.0 from two years prior to last year ($t(186)=4.61$, $p<0.001$).

Conclusion:
These results correlate with previous studies in predominantly African-American samples that found an increase in BMI % during the pandemic. They indicate that the pandemic has been responsible for a change in childhood obesity trends. We will perform further analysis on questionnaire results to investigate causal factors and differential impact on our population.

Abstract Title: Goals and Requirements for Mentorship in an Academic Pediatric Specialty Practice

Author: De Cataldo, Riccardo
Co-Investigators: 1. Eric Werner, MD, Children's Specialty Group 2. Brittany Langley, MHA, Children's Specialty Group 3. Brad Marino, DHSc, Children's Specialty Group

Abstract

INTRODUCTION:
New-hire physicians may risk burnout as they must manage life and work responsibilities while transitioning into a new environment, often fresh out of training. A physician-physician mentorship program could address many of these issues including career development, work-life balance and adjusting to the attending role. Such mentorship programs must be structured to meet identified local needs.

Methods:
Physicians from Children's Specialty Group (CSG), an academic pediatric subspecialty practice, participated in semi-structured interviews from either a mentor's (≥ 3 years employment at CSG, n=50) or mentee's (< 3 years employment, n=11) perspectives. Responses were recorded, logged into REDCap, and coded and analyzed utilizing Microsoft Excel. The IRB determined this project to be not human subjects research.

Results:
All interviewed participants supported development of a mentorship program but were divided in the degree of formality of the program: either informal (37%) or a semi-formal (54%). Both mentor and mentee participants noted that program design must balance adequate formalized expectations, to maintain accountability and consistency of mentorship advice and availability, while allowing enough flexibility for differing divisional requirements. Overburdening participants with additional, formalized administrative responsibilities was a repeatedly cited concern that could reduce mentorship participation. Mentors cited "Additional time" (76%) as the most common need for them to provide mentorship. Participants recommended implementation of the program and developing metrics to determine its effectiveness with regard to achieving both the mentees and mentors' goals.

Conclusion:
All 61 interviewed participants determined a mentorship program would prove beneficial but appear most divided in the ideal program structure regarding formal requirements and mentor-mentee pairing. This difference in responses highlights the importance of careful consideration of a program structure that functions well within the structures in place at CSG.

Abstract Title: Management of Multiple Rib Fractures in Trauma Patients

Author: Deivert, Kyle
Co-Investigators: 1. Colten A. Yahn MD 2022 2. Alexander P. McNally MD 2021 3. Kyle Deivert MD 2023 4. Tyler Fraga MD 2022 5. Michael T. Martyak, MD, Surgery Dept

Abstract

INTRODUCTION:
Trauma patients have identifiable rib fractures in up to 10% of cases and surgical stabilization of rib fractures (SSRF) has become a common treatment for flail chest. There continue to be questions regarding its value for non-flail chest and multiple displaced fractures versus conservative management alone. The goal of this project was to describe the current practices of this institution, classify injury patterns and their associated morbidities, and determine which patients benefit from each treatment strategy.

METHODS:
Trauma patients presenting to our Level 1 institution with a rib fracture between January 1, 2014 and June 22, 2020 were retrospectively reviewed. Patient demographics, comorbidities, trauma mechanism, injury score, length and details of their hospital stay, prevalence of flail chest, and number of fractures were documented. Operative and progress notes were reviewed to determine the type and extent of therapy received, details of any procedure(s) performed, and any complications including mortality that ensued during their hospital course.

RESULTS:
A total of 1429 patients were reviewed. These patients were 67.7 % male, 69.3% were white, 23.2% black, and the average age was 55.26. The most common mechanism of injury was MVC at 58.6% followed by falls at 32.6%. The mean ISS and GCS were 18.3 and 13.84 respectively. Flail chest was observed in 6.6% of patients and SSRF was performed in 26 patients (1.8%). Within this group, 22 were male, 18 were white, four were black, and the mean age was 49.85. The mean ISS and GCS were 20.62 and 13.46 respectively. 17 (68%) had flail chest. The mean ICU stay was 6.75 days compared to 7.45 with conservative management. The mean ventilation duration was 7.80 days compared to 7.66 with conservative management. 1 (3.85%) was complicated by pneumonia compared to 56 (4.00%) with conservative management. There was 1 (3.85%) mortality and 0 readmissions compared to 64 (4.56%) mortality and 25 (1.8%) readmissions with conservative management. There were 7 patients with flail chest who did not receive SSRF. Five were male and the average age was 54.43. One was complicated by pneumonia. This group's average ISS and GCS were 19.86 and 13.23.

Conclusions:
Rib fixation is a safe procedure with minimal complications. When a patient presents with flail chest, SSRF has shown promising results. In patients with non-flail chest but multiple or significant displaced fractures, SSRF may also be beneficial. More research is warranted to determine which patients benefit from rib fixation. There may be patient subgroups, based off ISS, GCS, and age that receive an increased benefit from rib fixation which would be an important topic for further exploration.

Abstract Title: Improving the Recognition of a "No Hit Zone" in a Pediatric Practice

Author: Dod, Rohan
Co-Investigators: 1. Rohan Dod, MD Program 2. Zachary Yorke, MD Program 3. Carolyn Moneymaker MD, EVMS/CHKD 4. Heidi Flatin MD, EVMS/CHKD 5.Elizabeth Guju MD, EVMS/CHKD 6.Emma Wutschel MD, EVMS/CHKD 7.Leia Lautzenheiser DO, EVMS/CHKD 8. John Harrington MD, EVMS/CHKD

Abstract

INTRODUCTION:
Many parents believe that Corporal Punishment (CP) is a viable method to improve child behavior, despite studies associating CP with aggressive behaviors, poor parent-child relationships, and poor mental health outcomes. CP has been defined as "the use of physical force with the intention of causing a child to experience pain, but not injury, for correcting or controlling a child's behavior". To allow pediatricians and hospital staff to address violence in the hospital and discourage the use of CP outside the hospital, the General Academic Pediatrics (GAP) clinic at Children's Hospital of The King's Daughters established a No Hit Zone (NHZ) where "no adult shall hit another adult, no adult shall hit a child, no child shall hit an adult, and no child shall hit another child". An article written by GAP in 2020 showed only a 30% recognition of the NHZ among parents of children 6 months to 5 years. Plan-Do-Study-Act (PDSA) cycles were implemented to increase the parental recognition of the NHZ in GAP to 50% and test improvement.
Methods:
For each cycle, 10 parents of children 6 months to 5 years of age were asked at the end of their visit if they were aware of the NHZ program at GAP. Patient surveys were conducted to collect baseline data and after each implemented change. Changes included various forms of signage, educational handouts, and staff training. A statistical p-chart was used to monitor improvement over the progression of the cycles.
Results:
Baseline survey data showed that only 10% of parents recognized the NHZ. After the PDSA cycles, the recognition of the NHZ at GAP improved from a baseline level of 10% to 70% among parents of children between 5 months and 6 years.
Conclusion:
The recognition of the NHZ among parents improved dramatically after the implementation of PDSA cycles. There was a notable increase in recognition after pairing the NHZ message with the established "Reach Out and Read" program, showing the potential benefits of linking these programs. In addition to improving awareness among parents, our approach led to an improved understanding of the NHZ among staff members.

Abstract Title: Concentric cardiac remodeling and hypertrophy as predictors of superimposed preeclampsia in women with chronic hypertension

Author: Donaldson, Thomas James
Co-Investigators: 1. Thomas Donaldson, B.S./Obstetrics and Gynecology, MD 2022 2. Dana Baraki, B.S./Obstetrics and Gynecology, MD 2022 3. Elizabeth Seagraves, DO/Obstetrics and Gynecology 4. Carole Barake, MD/Obstetrics and Gynecology 5. Alfred Abuhamad, MD/Obstetrics and Gynecology 6. Tetsuya Kawakita, MD/Obstetrics and Gynecology

Abstract

INTRODUCTION:
Chronic hypertension has been found to be an associated risk factor for development of preeclampsia while also causing chronic change in cardiac architecture. The objective of this study was to analyze rate of preeclampsia in patients with echocardiography detected cardiac remodeling and hypertrophy to determine if echo-detected changes could be utilized as a predictor for preeclampsia development before 34 weeks gestation.

METHODS:
This was a retrospective study of pregnant women with chronic hypertension who delivered singleton pregnancies at 20 weeks' gestation or greater at a tertiary care center. Analyses were limited to women who had an echo during any trimester in pregnancy. Women with severe comorbidities such as cardiac disease, kidney disease, and lupus, or missing information for age, body mass index (BMI kg/m2), and echo were excluded. Geometric cardiac changes on echo were categorized as normal, concentric remodeling, eccentric hypertrophy, and concentric hypertrophy according to the American Society of Echocardiography guidelines. Our primary outcome was superimposed preeclampsia at less than 34 weeks. Outcomes were compared between these four groups. Adjusted odds ratios (aOR) with 95% confidence intervals (95%CI) were calculated, controlling for covariates associated with preeclampsia including age, body mass index, and duration of hypertension.

RESULTS:
Of the 127 women, 43 (34%) had normal geometry, 45 (35%) had concentric remodeling, 6 (5%) had eccentric hypertrophy, and 33 (26%) had concentric hypertrophy. No differences were noted in the maternal demographics among each cardiac geometric category (Table 1). After adjusting for covariates, women with concentric remodeling (aOR 7.00; 95%CI 2.00-24.47) and concentric hypertrophy (aOR 7.22; 95%CI 1.95-26.75) compared to women with normal echo were more likely to develop superimposed preeclampsia at less than 34 weeks of gestation. Of the 6 women with eccentric hypertrophy, there were no cases of superimposed preeclampsia at less than 34 weeks. There were no differences in the overall rate of superimposed preeclampsia or fetal growth restriction among each geometric cardiac parameter (Table 2).

CONCLUSION:
Detection of cardiac remodeling and concentric hypertrophy through the use of echocardiogram can be used to predict the risk of preeclampsia occurring in patients with chronic hypertension prior to 34 weeks gestation.

Abstract Title: COVID19 Pandemic Impact on Pediatric Orthopedic Trauma

Author: Du Plessis, Wihan
Co-Investigators: 1. Catherine Read, EVMS MD 2024 2. Connor Lemos, EVMS MD 2022 3. Jonathan Parker, EVMS MD 2024 4. Brandon Euker, EVMS MD 2024 5. Mukosolu Ndubisi, EVMS MD 2024 6. Dallas Seitz, RN, CHKD Orthopedics 7. Carl St. Remy, MD, CHKD Orthopedics

Abstract

INTRODUCTION:
The COVID19 pandemic has dramatically changed the dynamics of everyday life and the healthcare system, with pediatric and adolescent populations being strongly affected. The risk of orthopedic trauma in this population, as well as a change in the most common mechanisms of injury, is thought to have changed during the pandemic period, as well. Healthcare policy has also changed to combat the spread of COVID19. Understanding the changes caused by COVID 19 in orthopedic trauma allows for greater preparation in the advent of another pandemic, highlights potential previously unseen risk factors in pediatric trauma, and provides insight into the healthcare system's adaptations during the pandemic.

METHODS:
A retrospective chart review was conducted on pediatric patients who presented for an initial visit with a long bone fracture to the CHKD ER between March 2019 and November 2019 or between March 2020 and November 2020. Patients that presented between March and November of 2019 were considered the pre-COVID19 cohort. Patients that presented between March and November of 2020 were considered the COVID19 cohort. Charts that met the inclusion criteria were evaluated for age, gender, injury type, mechanism of injury, and details of treatment, including length of stay and surgery if needed. A two-sample t-test analysis was then used to determine differences between the pre-COVID19 cohort and the COVID19 cohort means and chi-square analysis was used to determine association between frequencies.

RESULTS:
We found 2324 initial ER visits for orthopedic trauma during the study time frame. 1235 of these met inclusion criteria for the study, 719 pre-COVID and 517 during. The most common cause of injury in both time periods was falls. Table 1.1 summarizes injury mechanism findings. The mean ER length of stay (LOS) in hours was 3.025 Pre-COVID and 2.784 during COVID (p=0.011). The mean admission LOS was 1.357 days Pre-COVID and 1.063 during COVID (p=0.401). 10.85% of patients were admitted for surgery Pre-Covid and 16.44% were admitted during COVID (p=0.0041). 93% of patients had follow-up with orthopedic surgery after discharge Pre-COVID and 92% during COVID (p=0.474).

Mechanism	Pre-COV	COV	p-value
Sports	**0.29108635**	**0.22243714**	**0.02014431**
Child abuse	0.01810585	0.01934236	0.87517599
MVA	0.03064067	0.05029014	0.08399257
Fall	**0.43454039**	**0.51450677**	**0.04271147**
Other	0.21866295	0.18762089	0.23534569
Assault	0.00696379	0.00580271	0.80250508

Table 1.1- Frequency of Mechanism of Injury. MVA-Motor Vehicle Accident

CONCLUSION:
Our results show a significant reduction in ER LOS during COVID compared to Pre-COVID. There was no significant difference between LOS in either cohort for admitted patients, however, there was a significantly higher percentage of patients admitted for surgical treatment during COVID than Pre-COVID. Both cohorts also maintained a high percentage of follow-up with orthopedic clinics after discharge from the ED or hospital. While falls are the most common mechanism of injury in both cohorts, there was a significant increase in percentage overall in the COVID cohort compared to the Pre-COVID cohort. Contrastingly, sports-related injuries declined for the COVID cohort compared to Pre-COVID. There were no significant differences in rates of child abuse and assault injuries between cohorts. Together these results suggest adaptation of the healthcare system to the pandemic through reduced ER LOS without a decline in quality of treatment as defined by admission LOS and outpatient follow-up. They also suggest a decline in sports-related injury possibly due to reduced organized youth sports, however other youth orthopedic trauma risk factors appear to have remained consistent.

Abstract Title: Allergists Lead Anaphylaxis Preparedness Virtual Workshops For Early Childhood Professionals Amidst The COVID-19 Pandemic

Author: Duggins, Megan
Co-Investigators: 1. Ruchi Shah MD Cleveland Clinic 2. Mary Grace Baker MD, Mount Sinai 3. Madison Oxford BA, Penn State SOM 4. Michael Marget BA 5. Alice Hoyt MD, Cleveland Clinic

Abstract

Introduction:
The COVID-19 pandemic has redefined online connectivity, specifically within the clinical and medical education setting. It has given physicians the opportunity to reach a greater number of people with the latest medical information, and in this case, anaphylaxis. While food allergy is very common in early childhood populations, many early childhood programs are unprepared to respond to such medical emergencies. We previously provided live workshops on anaphylaxis and epinephrine training. Transitioning to online workshops allowed for ECPs to receive the same training prior to the pandemic.

Methods:
We adapted our previously in-person, case-based anaphylaxis, and epinephrine auto-injector training workshops to virtual workshops. Eight workshops were conducted between September 2020 and June 2021 via Zoom by board-certified allergists in collaboration with a local health department. Some workshops included interpreters to present the material in multiple languages. After each workshop, ECPs were sent a 17-question post-workshop electronic questionnaire via QuestionPro. Questions were multiple choice, true/false, Likert scales, and free text.

Results:
430 ECPs attended the workshops, and 241 completed the post-workshop questionnaire: 97.5% reported satisfaction with the workshop, 91.7% found the demonstration of epinephrine auto-injectors important, and 97.9% and 94.6% reported confidence in their ability to recognize anaphylaxis and properly administer epinephrine, respectively. Reported anxiety related to caring for children with food allergy diminished by approximately 50% after completing the workshop.

Conclusion:
Allergist-led virtual workshops allowed for continued anaphylaxis-preparedness training for ECPs amidst the COVID-19 pandemic. The virtual workshops were accessible to a wider ECP audience compared to previously offered in-person workshops and like in-person workshops, improved confidence in correctly identifying and responding to anaphylaxis.

Abstract Title: Can Mouse Ovarian Follicles Grow and Ovulate In Vitro?

Author: Dulli, Maymona
Co-Investigators: Patrick R. Hannon PhD, Department of Obstetrics and Gynecology, University of Kentucky

Abstract

Introduction:
Ovulation is a complex event, involving multiple cell types and controlled by many factors. A robust yet simple model which permits manipulation of these variables would facilitate the study of ovulation. Mouse follicle culture would retain the relationships between follicle cells and permit control of multiple variables that regulate ovulation. Follicle stimulating hormone (FSH), which is critical for follicular growth, stimulates growth of cultured mouse follicles. Human chorionic gonadotropin (hCG) and epidermal growth factor (EGF), which are known to promote the changes associated with ovulation, can be utilized to stimulate ovulation of cultured follicles.

Methods:
To determine if ovarian mouse follicles grow and ovulate *in vitro*, we dissected antral follicles from mouse ovaries. Follicles were cultured for four days in FSH-supplemented media and photographed daily to monitor growth. To examine ovulation, the best candidate follicles (follicles without excessive stroma, with no attached primary/secondary follicles, and with an initial diameter of 300-500 µm) were selected. Ovulation was initiated by culture in media containing hCG+EGF, and follicles were assessed for oocyte release 18 hours later. Response to hCG+EGF was also assessed by measuring media progesterone levels by an enzyme-linked immunosorbant assay (ELISA) as increased progesterone is a well-established ovulatory response of follicles to hCG+EGF.

Results:
Mouse follicles maintained *in vitro* increased in follicular diameter over the four-day culture period. Follicles with smaller initial diameters (250-300 µm) showed the greatest increase in size (85%). Follicles with the largest initial diameters (500-550 µm) showed the smallest increase in size (25%). For ovulation studies, follicles of similar size and appearance were paired. For each pair, one follicle received hCG+EGF and the other received media only as a control. The ovulation rate of hCG+EGF treated follicles was 28.9%. Increasing the hCG+EGF dosage by 3-fold or 10-fold did not improve ovulation rates. No ovulations were observed in control follicles. Treatment with hCG+EGF increased media progesterone 100-fold over control follicles (Treated follicles 65±31 µg/mL; control follicles 4±3 µg/mL; 2 tail t-test unpaired $p < 0.001$).

Conclusions:
Mouse follicles grew *in vitro* in response to FSH. Follicles with initial maximal diameters of 300-500 µm ovulated and increased progesterone production in response to hCG+EGF. Further refinement of the model, including better follicle selection and improved isolation technique, may increase the ovulation rate. If successfully developed, this model will be a useful tool for studying ovulation and for developing novel, more effective methods of contraception.

Abstract Title: A Tale of two drugs

Author: Elmahdi, Alsiddig A
Co-Investigators: Dr. Zahra Tasneem

Abstract

Introduction:
Methotrexate (MTX) is known to inhibit Dihydrofolate Reductase (DHFR), an enzyme needed to replenish folate in nucleic acid synthesis. MTX therapy can be either low dose (LDMTX) as seen in Rheumatoid Arthritis patients and our patient or high dose (HDMTX) as used in chemotherapy regimens. Supplemental folate is vital when using LDMTX and folinic acid is essential while on HDMTX to prevent bone marrow suppression. MTX's effect on non-immune cells causes several other toxicities including stomatitis and gastro-intestinal symptoms. Less common manifestations of MTX toxicity include an increased risk of lymphoproliferative disorder, skin erosions, as observed in our patient, and skin cancer.

Trimethoprim like MTX, is a folate depleting drug which inhibits DHFR increasing the risk of bone marrow toxicity when added to MTX. In addition, Sulfamethoxazole inhibits MTX renal excretion which further increases the risk for methotrexate toxicity.

Case:
A 70-year-old male with medical history significant for rheumatoid arthritis presented to the emergency department with several days of odynophagia, oral ulcers, skin lesions and epistaxis. He was treated for foot cellulitis with TMP-SMX for one week prior to admission. The patient had been receiving 10 mg SQ weekly injectable MTX for Rheumatoid Arthritis. However, he had not been taking folate

On the exam, the patient was afebrile. He had stomatitis and oral bleeding. Skin exam revealed erythematous papules, plaques with dusky erosions scattered on arms, chest, abdomen, legs and his right foot. His labs showed pancytopenia and eosinophilia. His folate level was 2.88 ng/ml (normal range >3.10 ng/ml). His MTX was held, and the patient was started on intravenous (IV) folate.

He quickly developed worsening anemia and thrombocytopenia and he received supportive platelet and RBC transfusions. His course was notable for neutropenic fever that improved with antibiotics. His hematopoietic cell lines eventually recovered with folate supplementation and his pancytopenia was resolved 9 days post-admission.

Impact/Discussion:
MTX is usually well tolerated in patients taking trimethoprim-sulfamethoxazole prophylaxis (usually as one double-strength tablet three times weekly, such as on a Monday-Wednesday-Friday regimen), but this combination should be avoided when the antibiotic is used in a twice-daily regimen for treatment of an active infection. Significant bone marrow and other toxicities have been observed with use of a daily sulfa antibiotic regimen as seen in our patient.

Conclusion:
Twice daily TMP-SMX is contra-indicated in combination with MTX and folate supplementation is crucial while using MTX.

Abstract Title: Overall Survival and Racial Disparity for Triple Negative Breast Cancer (TNBC) Patients in Hampton Roads, Virginia

Author: Euker, Brandon
Co-Investigators: 1. Brandon Euker, Leroy T. Canoles Jr. Cancer Research Center, EVMS 2. Zakary L. Kolkey, Leroy T. Canoles Jr. Cancer Research Center, EVMS 3. Angela Tang-Tan, Keck School of Medicine of USC 4. Emily L. Breeding, Leroy T. Canoles Jr. Cancer Research Center, EVMS 5. Janet S. Winston, M.D., Pathology Sciences Medical Group, Department of Pathology, Sentara Norfolk General Hospital 6. Billur Samli, M.D., Pathology Sciences Medical Group, Department of Pathology, Sentara Norfolk General Hospital 7. Rick J. Jansen, Ph.D., Department of Public Health, North Dakota State University 8. Michael Danso, M.D. Virginia Oncology Associates 9. Richard A. Hoefer, D.O., FACS, Sentara Cancer Network, Dorothy G. Hoefer Foundation 10. Amy H. Tang, Ph.D., Leroy T. Canoles Jr. Cancer Research Center, Department of Microbiology and Molecular Cell Biology, EVMS

Abstract

Introduction:
Breast cancer is the 2nd leading cause of cancer-related deaths in American women. While improvements in local and systemic therapies have resulted in significantly improved survival, an estimated 43,600 women are expected to succumb to their disease in the U.S. in 2021 alone. Incidence of breast cancer in Norfolk (136 per 100,000 females) is higher than the U.S. average (125.9 per 100,000 females). Triple Negative Breast Cancer (TNBC) represents 15% of all breast cancer diagnosis and is the most aggressive molecular subtype in breast cancer, known for early relapse rate, chemo-resistance, and poor overall survival. We aim to ascertain if there is a difference in overall survival in a local cohort of TNBC patients post standard of care (SOC) therapies in Hampton Roads as compared to the national average and if there is a disparity in overall survival between races.

Methods:
Authentication and validation of the clinical data was completed of a cohort of TNBC patients who received standard of care (SOC) at Sentara and Virginia Oncology Associates. We conducted KM survival analysis and compared the 5-year survival of our local TNBC cohort with that of the national SEER TNBC database.

Results:
We found: (1) our local stage III and IV TNBC patients have much worse survival than their TNBC counterparts with stage III and IV diseases nationally. We detect cancer disparity in our local TNBC cohort, and African American TNBC over-representation in high-grade TNBC patients. African Americans composed only 30% of the local population, but they were 50% of the local TNBC cohort with locally advanced and metastatic diseases (stage II, III and IV TNBC).

Conclusion:
The reality is that the breast cancer mortality rate **in Portsmouth (1st),** Suffolk and Southampton (3rd) and Norfolk (6th) remains the highest in the nation. As such, a synergistic research initiative centered on an innovative concept on a TNBC-driven signaling pathway, EGFR/K-RAS/SIAH, may augment the prognosis and novel treatment strategy to control and eradicate TNBC malignancy. Knowledge of how standard of care treatment effects the local population is the first step to addressing health inequality in TNBC patients.

Abstract Title: Impact of COVID-19 on families of children with autism spectrum disorder

Author: Evans, Virginia Peyton
Co-Investigators:

Abstract

Introduction:
COVID-19 impacted all families, but especially families at risk for social determinants of health including domestic violence, food insecurity, and underlying mental health problems. These issues likely also differentially impacted families of children with autism spectrum disorders (ASD). Children with ASD require consistent daily routines and generally have complex Individual Educational Plans (IEPs) in school that have not been implemented or sustained virtually. Additionally, many in-home behavioral therapies have been suspended. The COVID-19 Exposure and Family Impact Survey (CEFIS) was devised to assess the impact of COVID-19 but has not been normed for specific populations.

Methods:
To assess child and parental stress during the COVID-19 pandemic, 4 surveys and a standard demographics questionnaire were sent via a secure RedCap link to parents/guardians of children diagnosed with ASD between the ages of 2 and 22. Some surveys are age sensitive so 2 links were created for parents of children under and over age 5. Survey questions were presented after completion of a consent form. The surveys used validated scales for safe childhood environments, parental stress, and children's mental health.

RESULTS:
Surveys for children older than five had 38 full responses and 16 partial responses. Varying percentages of participants reported: stay-at-home orders (90.6%), childcare center closures (96.2%), disrupted education (94.3%), worsened ability to care for their child with autism (90.0%), worsened mood (84.5%), and family member death (5.7%). Surveys for children younger than five had 8 full responses and 4 partial responses. Among these responses, 83.3% reported stay-at-home orders, childcare center closures, and disrupted education, 75% reported worsened ability to care for their child with autism, and 83.4% reported worsened mood.

Conclusion:
A large majority of participants reported school closures and stay-at-home orders that appear to have affected families in different ways. Determining patterns in survey responses through ongoing data analysis may reveal the effects of COVID-19 on the well-being of families and the stress levels of parents and their children with ASD. This information could be used to mitigate negative effects of COVID-19 on children and families and to create effective coping strategies for them in the future.

Abstract Title: Understanding, Improving & Tracking of Diabetes Care in the Western Tidewater Region of Virginia

Author: Faber, Nathaniel A.
Co-Investigators: Nate Faber Dr. David Lieb, Internal Medicine\Strelitz Diabetes Center Dr. Carolina Cassellini, Internal Medicine\Strelitz Diabetes Center

Abstract

INTRODUCTION:
Over 34 million people in the United States have diabetes, leading to an average of 17 million hospitalizations and 7.8 million emergency room visits per year. Diabetes disproportionately effects African Americans, obese and overweight people, older individuals, and those who have less than a high school education. Compared to the Virginia averages, the Western Tidewater (WT) region of Virginia has a higher prevalence of diabetes, rate of diabetes-related comorbidities, and rate of diabetes-related hospitalizations. In the present project, Sentara Healthcare and EVMS are collaborating to create an interventional program focused on stemming the diabetes endemic of the WT region through community-based screening events, educational outreach programs, and research into the healthcare outcomes and use of hospital services by persons with diabetes.

METHODS:
The interventional program includes two sub-projects. In sub-project A, we will identify participants in the WT region with diabetes and prediabetes through diabetes screening events and connect them with appropriate primary and specialty endocrine care. The longitudinal healthcare outcomes of participants will be recorded and analyzed. In sub-project B, persons with diabetes who are healthcare "super-utilizers" in the WT region will be identified through electronic medical records and will be enrolled in an educational program with the aim of reducing hospital and emergency room visits. Longitudinal healthcare outcomes and hospital usage of these patients will be tracked.

Projected RESULTS:
We hypothesize that over a four-year period, our intervention will significantly improve access to care, improve diabetes-related care, and reduce rates of hospitalization and complications for people with prediabetes and diabetes in the WT region. Collected data will be compared to data from Greater Hampton Roads Connects and the Centers for Disease Control regarding patients not enrolled in our interventional programs.

CONCLUSION:
Our project presents an opportunity to address major healthcare disparities affecting members of our community. With the information we will gather from this project, we hope to create a lasting, positive impact for persons with diabetes in the WT region.

Abstract Title: A rare case of isolated neurosarcoidosis

Author: Fariscal, Abigail Domingo
Co-Investigators: 1. Aditya Gaddipati, EVMS MD Class of 2023 2. David Spiegel, MD

Abstract

INTRODUCTION:
Sarcoidosis is a multisystem disease characterized by the presence of noncaseating granulomas in organ tissue, most classically in the lungs. Extrathoracic manifestations are less common, but most frequently manifest as skin, lymph node, and ocular involvement. Diagnostic criteria involves compatible clinical and radiographic presentations, histologic findings, and requires exclusion of other diseases. While its effects on the body are diffuse, little is known about its etiology.
Neurosarcoidosis (NS) is a rare complication of sarcoidosis, with a wide variety of nonspecific clinical presentations that make its diagnosis challenging. While NS most typically presents in the setting of multisystem disease, isolated neurologic involvement can occur in rare cases, prompting further investigation. Here, we present a case of neurosarcoidosis without pulmonary features in a patient with no known prior diagnosis of sarcoidosis.

CASE INFORMATION:
A 57-year old female with a past medical history of hypertension, alcohol abuse, and a recent hospitalization ten days prior for a right thalamic ischemic stroke presented to the emergency department due to progressively worsening altered mental status and functional decline. Over the past four days following discharge, the patient had become unable to walk or perform daily activities. She became agitated, combative, and her speech was incomprehensible. Due to her recent stroke, the patient's condition was initially assessed as altered mental status secondary to intracerebral hemorrhage. However, CT scans showed a stable appearance of her previous infarct with mild expected hemorrhagic transformation; no acute changes to explain the symptoms were found. Further lab studies ruled out metabolic abnormalities, infectious processes, or toxic etiology. EEG was unrevealing for seizures. MRI was notable, revealing leptomeningeal enhancement, and suggestive of leptomeningeal carcinomatosis secondary to metastatic disease versus an inflammatory process. Various workups for a primary malignancy consistently produced negative results. However, lymph node biopsy revealed an incidental finding of noncaseating granulomas. The decision was made to treat the patient's condition as neurosarcoidosis. Upon gold standard treatment with steroids, the patient's condition significantly improved.

DISCUSSION / CLINICAL FINDINGS:
Although this patient presented without pulmonary findings classic of sarcoidosis, lymph node biopsy revealing noncaseating granulomas andresolution of symptoms upon steroid treatment were findings most consistent with neurosarcoidosis. While leptomeningeal enhancement on MRI initially raised high suspicion for malignancy due to its strong association, this nonspecific MRI finding has also been previously reported in some cases of NS.
The diagnosis of NS is often quite challenging due to its heterogeneous presentation, and the difficulty in obtaining a confirmatory diagnosis. The difficulty in arriving at a diagnosis of NS is further complicated in patients with no systemic manifestation of sarcoidosis. Therefore, clinicians must be cognizant that this diagnosis is often one of exclusion, rather than direct confirmation. In our case, the diagnosis of NS was fortuitously determined by an incidental biopsy finding while performing workup for primary malignancy. But future presentations may not require similar workup, and may lead to a missed diagnosis. This further highlights the need for better methods and guidelines for identification of NS.

CONCLUSION:
We present a case of isolated neurosarcoidosis presenting in a patient with no known prior diagnosis of sarcoidosis. Even in patients without biopsy evidence, diagnosis of NS-a serious and potentially devastating complication requiring prompt treatment-should still be considered. This case report offers a challenge to clinicians to consider this rare diagnosis, despite an ambiguous clinical picture. Without the development of diagnostic tools with increased specificity to rule in the disease, diagnostic uncertainty will persist. Until this occurs, the management and treatment of patients with isolated NS will continue to be a challenging obstacle that physicians must consider and meticulously work-up to exclude all other possible causes.

Abstract Title: Assessment of a Community Engaged Learning Program on Student Attitudes Towards Music and Movement Arts in Medicine

Author: Feng, Nicole C
Co-Investigators: 1. Sam Y Son, EVMS 2. Erica M Talbot, EVMS 3. Ashlee Malone, EVMS 4. Joshua F Edwards, EVMS 5. Alena Stewart, EVMS

Abstract

INTRODUCTION:
At Eastern Virginia Medical School, Community Engaged Learning (CEL) is a core component of the curriculum that integrates community service with medical education. As a CEL program, Beat of My Heart (BOMH) provides students with opportunities to incorporate music and movement arts into a variety of clinical contexts to improve patient wellness and quality of life. The mission of BOMH is to cultivate students' understanding of humanism and humility in medicine and to provide experiences they may draw upon as they progress in their medical training. The goals of this project were to measure members' changes in attitudes toward the incorporation of arts into patient care, determine if students have become inspired to integrate the arts into their future medical practice, and assess for growth of empathy and communication skills.

METHODS:
Identical pre- and post-surveys were administered at the beginning of the student's participation in BOMH and again at the end of the academic year. All respondents completed the survey using anonymous identifiers. The survey consisted of sixteen questions on a five-point Likert scale from "strongly disagree" to "strongly agree" that assessed students' feelings toward incorporating music and movement arts into medicine, motivation and perceived ability to do so, and their perceived ability to empathize and connect with patients. The Brief Mood Introspection Scale (BMIS) was included in the survey to measure respondents' mood at the time of survey completion to account for possible influence on their opinions and attitudes.

RESULTS:
A total sample of n=12 completed the survey with an attrition of n=2. Due to the small sample size, all variables of interest were checked by the Shapiro-Wilk test of normality, which showed only two variables with a non-normal distribution. According to these results, the appropriate parametric t-test or nonparametric Mann-Whitney U test showed no significant difference in pre vs. post values for any of the variables ("feelings," "motivation," "ability," "connect," *ps*>0.05). Pearson correlations between survey responses and mood showed only moderate associations in the post-survey questions assessing feelings vs. pleasant mood (r=0.62, p=0.03), questions assessing feelings vs. negative mood (r=-0.6, p=0.04), and questions assessing ability to connect vs. mood pleasantness (r=0.64, p=0.03). Respondent mood was generally pleasant and positive based on BMIS scores.

CONCLUSION:
The results suggest that there was no measurable change in participant attitudes in the 2020-2021 academic year and survey responses were not skewed by mood. We suspect the lack of significance was in part due to a small sample size and the effect the COVID-19 pandemic had on members' ability to participate in meaningful in-person activities, particularly given how critical social connection is to experiencing movement and music. Student engagement with the community was unfortunately limited to virtual platforms, such as music bingo with an assisted living community via online video conference. It is also possible that the variety and number of available activities were insufficient. In the future, we hope that BOMH will continue to adapt to the fluctuating restrictions of the ongoing pandemic and optimize opportunities for practical takeaways through lectures, discussion of literature, and collaboration with other EVMS organizations. We plan to continue administering surveys biannually to assess changes in student attitudes and track program progress as new activities are implemented.

Abstract Title: A Quality Improvement Project to Evaluate and Improve Diagnosis and Treatment of UTIs in the Pediatric Urgent Care Setting

Author: Flicker, Kari
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Abstract

Introduction:
Urinary Tract Infections (UTIs) are common across pediatric populations, with 1.5% of children under 2 years old and 6% of females under 6 years old receiving a diagnosis. U.S. guidelines exist for UTI management of children under 2 years old, while European guidelines and other literature aids the management of older patients. The exact definition of a positive urinalysis varies across studies, especially for older children. The Children's Hospital of the King's Daughters (CHKD) Urgent Care Division developed its own guidelines to guide UTI diagnosis and management based on the best available evidence. In reviewing records of suspected UTI patients presenting to CHKD Urgent Care, it was found that UTI diagnosis and treatment as well as provider documentation of exam findings varied widely. Furthermore, a high percentage of urinalyses grew multiple organisms, causing concern for contamination. This project aims to lower the percentage of pediatric patients improperly treated for UTIs by evaluating the efficacy of current CHKD urgent care urinalysis diagnostic criteria.

Methods:
A chart review of 6,548 patients who were seen in CHKD Urgent Care and had a urine culture ordered between April 2018 and April 2020 was completed to analyze clinical findings, associated symptoms, urinalysis results, urine culture results, antibiotic information, patient age, and patient sex. The culmination of these findings was used to evaluate the proper treatment of patients diagnosed with UTIs. Multiple Plan-Do-Study-Act (PDSA) cycles were then performed to improve history and physical exam documentation, adherence to local and national UTI treatment guidelines, and collection of non-contaminated clean catch urine samples.

Results:
Before implementing this study, an average of 48% of CHKD patients diagnosed with UTIs were improperly treated. The current average of misdiagnosed patients, calculated from data collected between January 2020 and April 2021, is 40%. Urinalysis data collected to assess the CHKD urgent care positive urinalysis criteria is currently being analyzed.

Conclusion:
Implementing multiple PDSA cycles can improve overall treatment and diagnosis of pediatric UTIs. Data collected as a part of this project should help clarify the definition of what constitutes a positive urinalysis and further decrease over-treatment of suspected UTIs.

Abstract Title: Evaluating the efficacy of Covid-19 antibody response after vaccination in solid organ transplant patients using a multiplex bead-based assay

Author: Forte, Steven
Co-Investigators: Troy Williams, MD 2022 Lauren Gilgannon, MD 2023 Angela Toepp, HADSI Howard Gebel, Emory Pathology and Laboratory Medicine Robert Bray, Emory Pathology and Laboratory Medicine David Barran, Internal Medicine Homan Sadr, Internal Medicine John Herre, Internal Medicine Thomas McCune, Internal Medicine

Abstract

INTRODUCTION:
COVID-19 vaccinations have been instrumental in stopping the case rate and mortality rate of COVID-19. Unfortunately, preliminary studies have suggested that the rate of antibody production in solid organ transplant patients is far lower than that of the general population. Each transplant center uses a unique immunosuppression protocol, so it is likely that each transplant center has a different rate of antibody production following COVID-19 vaccination. It is, therefore, important to understand each center's rate of successful vaccination. We undertook a study to evaluate our rate of COVID-19 antibody production after completed vaccinations.

Methods:
EVMS institutional review board approved a study of 150 patients recruited from the Sentara Norfolk General heart and kidney transplant centers. These patients were at least 18 years of age, at least 2 weeks from their second COVID-19 vaccination and no longer than 6 months from their most recent vaccination. Each participant completed a one page questionnaire on symptoms of covid, covid swab results, vaccination information, transplant type and date, and immunosuppression at the time of vaccination. The patient's chart was reviewed for the immunosuppression protocols used, HLA, blood type, and donor specific antibodies against their transplanted organs. A novel assay of the multiplex bead based platform commonly used at our program for crossmatching was developed to detect and measure COVID-19 antibodies to the full spike protein, S1 segment, S2 segment, binding domain, and nucleocapsid protein.

Results:
Preliminary results of the first 143 subjects (47 Heart (33%), 96 Kidney (67%), median time since organ transplant: 4.00 years, 57 Pfizer vaccine (41%), 82 Moderna vaccine (59%), 1 J&J (<1%) were included. Positive full spike proteins was identified in 85 patients (59%). Positive antibodies to full spike proteins was identified in 27 heart (57%) and 31 kidney transplant patients had antibodies to the full spike proteins (32%)(P=0.0040). Positive antibodies to full spike proteins was identified in 24 patients who received the Pfizer vaccine (42%), 34 patients who received the Moderna vaccine (41%) and 0 patients who received the Johnson and Johnson vaccine (0%)(NSS). Among the 11 patients who had a positive COVID-19 swab, all responded with positive antibodies to the full spike protein (100%). Of those who did not report a positive COVID-19 swab , 26 kidney transplant patients responded with antibodies to the full spike protein (30%) and 26 heart transplant patients developed full spike antibodies (56%) (P:0.0007). The average time from organ transplant was significantly shorter for individuals who did not respond to the COVID-19 spike protein with difference between median time since transplant varying by three years (P=0.0055). Of those on three or more immunosuppressive drugs, 31 responded with spike antibodies (33%). Of those on less than three immunosuppressive drugs, 27 responded with spike antibodies (54%)(P=0.016).

CONCLUSION:
This data provides further evidence that transplant patients are less likely to respond to COVID-19 vaccination than the general population. The number of immunosuppressive drugs negatively impacts COVID-19 vaccine response rates. Time from transplant positively impacts antibody formation. Response rates between the two mRNA vaccines were not significantly different.

AbstractTitle: Suspected Suicides Amongst Antidepressant Exposures Reported to United States Poison Control Centers,2000-2020

Author: Francis, Matilda
Co-Investigators: 1. Gary Smith, Nationwide Children's Hospital, Center for Injury Research and Policy in The Abigail WexnerResearch Institute; The Ohio State University College of Medicine, Department of Pediatrics; Child Injury Prevention Alliance 2.Henry A. Spiller, MS, D.ABAT, Nationwide Children's Hospital, Central Ohio Poison Center; The Ohio State University College of Medicine, Department of Pediatrics 3. Jaahnavi Badeti, MPH, BDS, Nationwide Children's Hospital, Center for Injury Research and Policy in The Abigail Wexner Research Institute 4. Alexandra R. Funk, PharmD, D.ABAT, Nationwide Children's Hospital, Central OhioPoison Center5. Nichole L. Michaels, PhD, Nationwide Children's Hospital, Center for Injury Research and Policy in The Abigail Wexner Research Institute 6. Motao Zhu, MD, MS, PhD, Nationwide Children's Hospital, Center for Injury Research and Policy in The Abigail Wexner Research Institute; The Ohio State University College of Medicine,Department of Pediatrics

Abstract

Introduction:
Suicide is a leading cause of death in the United States. Antidepressants given their high prevalence, often serve as thesource of exposure in self-poisoning incidents and suicide attempts. This study aims to describe the suspected suicide cases related to antidepressant exposure amongst individuals thirteen years and older reported to National Poison Control Centersi n theUnited States between 2000 and 2020 to identify characteristics and trends.

Methods:
Analysis of 2000-2020 National Poison Data System data concerning suspected suicides due to antidepressant exposure was performed. Numerous variables were analyzed including sex, age, medical outcome, level of healthcare received, management site of call, exposure type, and minor category of antidepressant. First-ranked antidepressant exposures,exposures in which antidepressants were the most likely substance to have contributed to observed clinical effects,were utilized for most analysis, while total antidepressant exposures were examined to assess trends over time. Rates per 100,000 were calculated utilizing US Census Bureau population estimates.

Results:
A total of 744,853 suspected suicide cases were reported between 2000 and 2020 amongst first-ranked antidepressantexposures. The rate per 100,000 of suspected suicide cases amongst the study population and all age groups increasedsignificantlybetween 2000and2019($p<0.0001$);teenagershadthelargestincreaseinrateper100,000andrepresented28.6% of the first-ranked cases. Percentage within each age group of admission to a critical care unit increased with age.As compared to teenagers, individuals in their 50s and 60s were more frequently admitted to a healthcare facility (OR:1.7, 95% CI: 1.5, 1.9; OR: 1.2, 95% CI; 1.1,1.4 respectively). The proportion of serious effect as a medical outcome of antidepressant exposure also increased with age. SSRI's were the most commonly reported minor category ofantidepressant (41.0%), however tricyclic exposures had the largest proportion of serious effects as result of exposure(59.8%).Tricyclic antidepressants were more frequently associated with deaths as compared to SSRIs (OR:42.8 95% CI:37.1- 49.3). Comparing individual generic codes of antidepressants associated with death as a medical outcome,amitriptyline(23.7%)and bupropion(12.8%)were most commonly reported.

***Conclusions*:**
An increase in the rate of suspected suicide cases amongst antidepressant exposures, particularly amongst teenagers,emphasizes the need for increased prevention efforts. However, the nuances in the characteristics of antidepressant-related suicide cases across age groups and minor category of antidepressant, including proportion of serious effects or death as a result of exposure, demonstrate how individualized assessment and treatment of suicide cases are necessary to aid in the prevention of antidepressant-related suicide cases.

Abstract Title: Knowledge, Attitudes, and Practices of EVMS Internal Medicine Physicians Regarding Pre-exposure Prophylaxis (PrEP) for Prevention of HIV: A Needs Assessment

Author: Frawley, Jenna E
Co-Investigators: Madison Cauble, MD Candidate

Abstract

Introduction:
Pre-exposure prophylaxis (PrEP) is a daily medication that is a safe and effective method of preventing HIV-1 infection in people who are at risk for contracting the virus. When taken as prescribed, PrEP has been shown to reduce the risk of sexually-transmitted HIV by more than 90% and by more than 70% among injection drug users.
The rate of HIV transmission in Norfolk exceeds that of many areas of Virginia. In 2019, the rate of new HIV cases per 100,000 people living in Norfolk was 25.8, compared to a rate of 9.6 in Virginia as a whole. A 2015 nationwide statistical estimation showed that approximately 32,000 individuals living in the state of Virginia were potentially eligible for PrEP prescription. While PrEP is generally well tolerated and effective, several studies have shown that its use by physicians is limited. The goal of this study was to evaluate the knowledge, attitudes and prescribing practices among a small group of EVMS primary care providers. The ultimate goal of this assessment is to inform the need for further research into PrEP prescribing practices in the larger Norfolk community.

Methods:
Hard copies of anonymous surveys were distributed to EVMS Internal Medicine physicians and recollected after completion. The knowledge section was graded as a percent correct. We used mode to stratify the "Attitude" responses in terms of positive, negative, and neutral responses. Three items used a reversal score (i.e "5" becomes a "1,""2" becomes a "4") Responses of 1 and 2 represented positive opinions, 3 was neutral, and 4 and 5 were deemed negative. Overall scores were also averaged for each survey, and for the group. The practice section was also analyzed using mode to track the most common responses per item.

Results:
Eight EVMS Internal Medicine physicians were surveyed. Half had more than five years of experience. Five physicians scored a 100% on the knowledge section, with an average of 84%. The most missed question dealt with the effectiveness of PrEP. The mode for seven out of eight attitude questions was 1 and overall average score of the attitudes section was 1.67 indicating a generally positive attitude toward PrEP. The survey showed that most participants (n=6) felt that PrEP is an effective "real world" method of preventing HIV and did not feel that PrEP use would increase the risk of STI or contribute to antiretroviral resistance. Participants also generally disagreed that PrEP encourages risky sexual behavior and felt that their patients would adhere to treatment with adequate counseling. However, three participants felt that patients would be stigmatized by taking PrEP, while two were "neutral" and three "disagreed".Two providers had prescribed PrEP. Five participants stated that they would provide PrEP if indicated, while three would refer to an infectious disease physician. All but one participant estimated that they see at least ten HIV positive patients on a quarterly basis. Still, six participants had not prescribed PrEP or had a conversation about its indications with their patients.

Conclusion:
This needs assessment indicated that most respondents had a good general understanding of PrEP prescribing with the primary knowledge gap involving the effectiveness of PrEP in reducing HIV transmission through sexual contact. Overall, attitudes towards PrEP as a tool in prevention of HIV seroconversion was positive, which opens the door for future education and encouragement for its use. In terms of practice, most physicians appear comfortable prescribing PrEP, with only a few preferring to defer to Infectious Disease. The primary barrier seems to be identifying high-risk patients and initiating the conversation about PrEP. Overall, these results indicate that EVMS Internal Medicine physicians may be underprescribing PrEP. Since EVMS is the leading HIV treatment center in Eastern Virginia, other physicians in Norfolk may have similar knowledge, attitudes and prescribing practices. Limitations of this study include the small sample size and reliance on physician recall. It is also unclear whether data from physicians at this academic institution translates to trends in private practice. This needs assessment highlights an important gap in HIV prevention efforts in our community, and identifies an area to direct further research and education.

Abstract Title: Disparities in Postpartum Long-Acting-Reversible-Contraception Use in Virginia Women: Findings from the 2012-2018 Pregnancy Risk Assessment Monitoring System Data

Author: Gilgannon, Lauren Truwit
Co-Investigators: Stacey Carpenter, EVMS MD2024 Kenesha Smith Barber, VDH Division of Population Health Data Hongyun Fu, EVMS Department of Pediatrics: Division of Community Health and Research

Abstract

Introduction:
Although Long-Acting-Reversible-Contraception (LARC) methods are most effective in preventing unintended pregnancy, consequently, reducing maternal and child health problems, the uptake of LARC methods is significantly lower in the United States, relative to most developed countries. We explored differences in postpartum contraceptive methods and the uptake of LARC, using data from the 2012-2018 Virginia Pregnancy Risk Assessment Monitoring System (VA PRAMS).

Methods:
The 2012-2018 VA-PRAMS (N=4,949) were representative sample surveys of mothers recruited 4-6 months postpartum through existing birth registration records. It collected information about the experiences of mothers before, during and after recent pregnancies. Multivariable logistic regression was used to examine factors related to postpartum LARC use, using STATA16 to adjust for confounding factors and sampling weights.

Results:
At postpartum, 24% of Virginia mothers used no method, 17% used withdraw/rhythm; 19% condoms, 19% birth control pills, 23% shots/injections, and 27% LARC methods. The rate of LARC use increased from 18% in 2012 to 25% in 2018. Receiving greater than a college education (AOR, 1.22; 95% CI, 1.03-1.44), participating in Special Supplemental Nutrition Program for Women, Infants, and Children (AOR, 1.32; 95% CI, 1.10-1.57) and experiencing unintended pregnancy (AOR, 1.67; 95% CI, 1.45-1.92) increased the odds of using LARC postpartum.

CONCLUSION:
Findings reveal a low uptake of postpartum LARC methods in Virginia mothers and highlight the need for targeted intervention. Improving education, access to social programs, and health communication addressing the risks associated with unintended pregnancy will increase postpartum LARC use among Virginia mothers.

Abstract Title: The Get Real Open Call - Enhancing Youth and Community Engagement in an Evidence-based Comprehensive Sex Education Program using Crowdsourcing Approach

Author: Gilgannon, Lauren Truwit
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Abstract

Introduction:
A crowdsourcing open call is a structured process involving soliciting ideas from a broad range of stakeholders and then sharing ideas with the community. Although the approach is proven effective in developing interventions and facilitating consensus, less is known about using open calls to facilitate community engagement.

Methods:
A crowdsourcing open call was organized in 2021 at the Eastern Virginia Medical School to engage community stakeholders in an open dialogue to understand the community's views on providing comprehensive sex education (CSE) to middle and high school students; and 2) to solicit the inputs and ideas (including experience, key messages and intervention strategies) to inform program implementation and strengthen community engagement. Digital methods (email and social media) were used to promote the open call, and submissions were collected online for 10 weeks. Participation was open to youth, parents, teachers, and other community residents. Submissions were evaluated by 18 independent judges representing diverse sub-populations (including youth) for relevance to the open call theme and youth, innovation, inclusivity, feasibility for program use, and overall quality, using a 10-point Likert scale. Demographic data were collected from submitting individuals, and submissions were qualitatively analyzed for emergent themes.

Results:
We received 34 submissions (mean score: 45, range: 32-57), including 26 from youth. Six submissions were identified as gold medalists and 14 as silver medalists, receiving prizes of $200 and $100, respectively. Both gold and silver medalist submissions were publicly disseminated to generate additional dialogue about CSE for youth. Thematic analysis of submissions revealed: 1) the current sex education is largely abstinence-based and outdated; 2) topics surrounding gender/sexuality are overlooked, and support systems are unavailable for sexual/gender minority youth; 3) limited communication about sexual behaviors and protection methods exists between youth and adults; 4) Effective use of social media (e.g. TikTok and Instagram) and other virtual platform will help strengthen youth and community engagement particularly under the context of the COVID-19 pandemic.

Conclusions:
An open call is a feasible strategy to generate insights and collective voices from youth, family and community to support the delivery of evidence-based CSE interventions focused on youth.

Abstract Title: Extraosseous Soft Tissue Uptake on Tc99-MDP Bone Scans: Case and Review (Theodore Hagens, BS, Abigail Winz, MD, Kathy Byun, MD - Department of Radiology)

Author: Hagens, Theodore W
Co-Investigators: 1. Theodore Hagens, BS, Radiology 2. Abigail Winz, MD, Radiology

Abstract

Introduction:
Technitium-99-methylene di-phosphate (Tc99-MDP) bone scans are one of the most widely used nuclear medicine imaging studies, particularly in the diagnosis of osseous metastases or benign bone conditions. However, there are important diagnostic implications in the uptake of Tc99-MDP in the extraosseous soft tissues as well.

Case Information:
A 75-year-old woman with a past medical history of chronic cutaneous Nocardia and disseminated Cryptococcus infections, chronic hypercalcemia, and no known malignancies was brought to the emergency department due to confusion and lethargy with concern for symptoms of hypercalcemia. She was found to have a Ca of 12.9 mg/dL (13.9 mg/dL corrected for albumin). The previous workup for hypercalcemia on prior admission including vitamin D, fractional excretion of calcium, serum protein electrophoresis, and thyroid-stimulating hormone was normal which led to suspicion of a possible unknown underlying malignancy. A Tc99-MDP bone scan was ordered to investigate the possibility of skeletal metastases from an occult malignancy. There was no supporting finding for bone metastasis, but the scan did reveal areas of soft tissue uptake in the lateral right thigh. The cutaneous soft tissue uptake reflected sequela of the patient's known disseminated Cryptococcus and Nocardia infection.

Discussion:
Tc99-MDP undergoes uptake by most tissues in the body, and eventually undergoes filtration and excretion by the kidneys. Therefore, normal extra-osseous uptake may be found in the bilateral kidneys and bladder. Bilateral breast uptake is also a common normal finding in young women. The normal expected distribution of Tc99-MDP is related to the interval between administration and time of imaging. Tc99-MDP concentration in tissues is proportional to the tissue calcium content because the tracer binds to hydroxyapatite crystals and calcium salts. Extra-osseous tracer uptake leads to a wide differential including neoplasm, benign entities, hormonal disturbances, tissue damage due to inflammation, infection, ischemia or trauma, excretory abnormalities involving the urinary system, as well as artifact due to faulty tracer preparation or administration. Helpful differentiating factors include the presence of diffuse vs. focal uptake, and the location of the region of interest. The most common cause of extraosseous radioactivity is due to radiotracer administration error and this should be ruled out first. The presence of extraosseous tracer uptake in the soft tissues further refines the differential. Errors in radiotracer administration can result in radiotracer contamination on the skin or clothes, radiotracer extravasation in the tissues, or inadvertent intraarterial injection. Soft tissue compartmental sequestration of tracer can occur in the setting of deep venous thrombosis or pelvic obstruction. Cutaneous soft tissue tracer uptake can be seen in cases of calciphylaxis and amyloidosis. Infectious causes of soft tissue uptake may include cutaneous infection or abscess formation. Additionally, soft tissue uptake can be seen in the presence of trauma including musculoskeletal stress injuries, hematoma formation, rhabdomyolysis, and interstitial edema due to interruption in lymphatic drainage. A very rare cause of soft tissue tracer uptake can be seen in myositis ossificans due to ectopic bone formation, and the bone scan is extremely useful in the diagnosis of this entity.
When presented with an extraosseous finding on a bone scan, the clinician should first rule out error in radiotracer administration, and then correlate the finding with the patient's medical record and past imaging. This differential and review process can be applied to the findings encountered in our patient.

Conclusion:
While commonly used as a tool for assessing skeletal pathologies, soft tissue uptake on Tc99-MDP bone scan warrants a wide differential diagnosis. Understanding and organizing this differential is vital to the diagnostician's interpretation of this peculiar finding. Routine review of the soft tissues on bone scan should be employed in the radiologist's search pattern. Our case is an example of soft tissue infection from an unusual organism, where the understanding and organizing of this differential was vital to the interpretation of this peculiar finding.

Abstract Title: Solid ovarian teratoma with carcinoid tumor with transformation to small cell neuroendocrine carcinoma in a 68-year-old patient: A Case Report

Author: Hampton, Dallas Justine
Co-Investigators: 1. Daylene Ripley, Department of Gynecological Oncology/North Florida Regional Medical Center

Abstract

INTRODUCTION:
We present the first reported case of a 68-year-old woman with an adrenal metastasis from small cell carcinoma arising in a solid ovarian teratoma that also contained a carcinoid tumor with prior history of the syndrome of inappropriate antidiuretic hormone secretion (SIADH).

Case Information:
The patient initially presented with an adrenal mass that was felt to be from a pulmonary primary given positive immunohistochemistry for neuroendocrine markers and TTF-1. A PET scan was negative for pulmonary findings. However, an ovarian mass was detected and found to contain a small cell carcinoma with identical immunohistochemistry as the adrenal mass. Along with the small cell carcinoma, the solid mature ovarian teratoma also contained a carcinoid component.

Discussion:
The patient's history of smoking, TTF-1 positive stain, and the histology of a pulmonary type small cell carcinoma lead to the original assumption of a pulmonary origin for the adrenal metastasis. This was later proved to be far less likely due to multiple PET scans that showed no proof of pulmonary lesions. To further expound on the uniqueness of this case, the ovarian teratoma was also found to contain a carcinoid component.

CONCLUSION:
Review of the literature returned no reported similar incidences of a mature solid ovarian teratoma with malignant small cell associated with carcinoid tumor. Ovarian teratomas showing foci of carcinoid or small cell carcinoma are rarely encountered, thus, a dual presence with malignant transformation of the carcinoid component makes this a very interesting case.

Abstract Title: Bariatric Surgery Red Flag Patients: Can We Predict Who Advances to Surgery and Worse Post-operative Outcomes?

Author: Hankins, Abby Christina
Co-Investigators: 1. Michael McCormick, EVMS Department of General Surgery 2. Jacob Tatum, EVMS Department of General Surgery

Abstract

Introduction:
Bariatric surgery patients undergo a rigorous evaluation process prior to surgery. The process involves visits with surgeons, dieticians and mental health providers, as well as interactions with office staff. Any staff may raise concerns due to psychological or behavioral reasons and designate patients as "red-flagged", meaning they warrant additional discussion among the staff or additional services. Our objective was to evaluate if red flag patients are less likely to undergo surgery compared to non-red flag patients. Specifically, we look to evaluate if there are certain criteria more likely to predict failure to progress to surgery. In addition, we look to follow red flag patients that progress to surgery to determine if they will have worse post-operative weight loss and compliance with follow up, therefore assisting us in determining early on if surgery is the best weight loss tool for patients with certain psychiatric and behavioral factors.

Methods:
Retrospective chart review was performed on a master list of patients in our bariatric practice identified with appropriate diagnoses and procedures, including a randomized arm of red flag and control patients. Patients must have been age 18-89 and we excluded patients presenting for revisional surgery. Data was collected on age, gender, preoperative weight and BMI, psychiatric history, diet visits attended, reason for red flag, time from initial consult to surgery and weight loss up to three years post bariatric surgery.

Results:
185 control patients and 207 red flag patients were evaluated. 123 control patients (66.49%) and 98 red flag patients (44.93.0%) underwent bariatric surgery (p-value < 0.001). All groups of red flag patients were less likely to progress to surgery and patients with untreated psychiatric issues ($p = 0.0001$) and multiple no shows ($p < 0.0001$) were the least likely to progress to surgery. Failure to comply with dietary guidelines, although significant ($p < 0.02$), seemed less likely to predict lack of progression to surgery. It was found that red flag patients took longer to progress to surgery ($p<0.000005$) due to implementing necessary changes to qualify for surgery. Weight loss among control and red flag groups, as well as subgroups of red flag patients (red flagged for dietary versus non-dietary reasons) showed similar long term weight loss. Follow up among control and red flag patients was severely lacking.

Conclusion:
This study confirms red flag patients are less likely to follow through with bariatric surgery. Psychological and behavioral factors influence patient likelihood to complete the bariatric program and undergo surgery, particularly in patients with untreated psychiatric issues and multiple no shows. It was confirmed that red flag patients, specifically patients flagged for non-dietary reasons, took longer to progress to surgery but long-term weight loss and follow up were similar among all patients. Future efforts will focus on determining if postsurgical outcomes of red flag patients can be determined preoperatively by specific factors, providing a path to an evidence-based protocol to yield personalized standard of care for all patients seeking bariatric surgery.

Abstract Title: Biologic Graft Utilization Trends for Rotator Cuff Pathology: Superior Capsular Reconstruction on the Decline

Author: Hankins, Abby Christina
Co-Investigators: 1. Justin W. Griffin, Orthopedics\Jordan Young Institute 2. John P. Taliaferro, Orthopedics\Tuckahoe Orthopaedics 3. Brian C. Werner, Orthopedics\University of Virginia Sports Medicine

Abstract

INTRODUCTION:
New techniques continue to emerge to address massive, irreparable rotator cuff tears in younger active patients as well as methods to biologically enhance rotator cuff repair healing. Emerging outcome data in the area of bioinductive grafts and superior capsular reconstruction (SCR) may be considered encouraging but there is significant current controversy related to conflicting data and opinions as to the appropriate role for these implants and techniques. Factors influencing surgeon decision-making in this area are unclear, with no recent studies evaluating surgeon preferences, utilization and perception. The purpose of this study was to define trends in graft augmentation and preference and reasons behind surgeon choice.

METHODS:
A 26-question survey was completed by 260 Arthroscopy Association of North America (AANA) surgeons. Surgeon and practice demographics, practice setting, and volume were evaluated with graft preference. Surgeons were queried about SCR and bioinductive graft utilization trends and reasons for change in utilization. Specifically, surgeons were queried and responses analyzed regarding any changes in SCR and biologic graft utilization based on practice setting, volume, years in practice and specialization. Statistical analysis was performed to compare key question responses.

RESULTS:
Overall, decreased SCR utilization was reported in the past 5 years regardless of years in practice or sports certification with 51% of surgeons reporting decreased SCR use, 20% reporting the same use and 29% reporting increased use. Surgeons performing >100 rotator cuff repairs (RCR) per year, performed SCR at a higher rate (86%) than those performing < 50 per year (55%; $p<0.05$). Surgeons in the hospital setting were the only demographic reporting net increased use of SCR over the past 5 years (63%). US surgeons performed SCR more often than international surgeons ($p<0.001$). Fewer than 3% of surgeons utilized SCR in > 70% of their irreparable RCR cases, as compared to 23% reporting they utilized SCR in < 10% of their irreparable cases. Similarly, bioinductive graft utilization was reported to be used in less than 20% of cases by those surgeons in practice greater than 10 years with those performing >100 RCRs per year reporting greatest utilization ($P<0.001$). Surgeons in an academic setting (45%) and international surgeons (30%) performed less biologic augmentation ($p<0.05$). The most commonly cited reasons for decreased use of SCR were suboptimal published outcomes (40%), no perceived patient benefit (40%) and high cost (34%). The most cited reason among surgeons reporting increased use was improved personal patient outcomes (72%).

CONCLUSION:
Arthroscopic surgeons overall report decreased SCR utilization in the past 5 years, aside from surgeons in the hospital setting. Surgeon's personal experience of patient outcome was the strongest predictor of trends in performance, with cost, complications, and published evidence perceived as less influential. Sports medicine certification, years in practice and practice setting did not significantly influence bioinductive graft utilization, while lower volume and international practice were correlated with decreased bioinductive graft usage. This study reveals the uncertain and changing landscape of SCR and biologic augmentation utilization among arthroscopic shoulder surgeons.

Abstract Title: Creating Community Dialogue to Improve Oral Health in Hampton Roads

Author: Haque, Syed Mahdee
Co-Investigators:

Abstract

Introduction:
Oral health is an essential component of overall health and wellness. Oral health is associated with heart disease, respiratory disease, diabetes, HIV/AIDS, and Alzheimer's disease. For pregnant women, oral health is an integral part of a healthy pregnancy and an important health indicator for their future child. Poor oral health is associated with low birth weight, premature birth, and increased incidence of newborn children developing dental caries. In Hampton Roads, approximately 27% of adults reported visiting a dentist in the last year, and as low as 17% of pregnant women went to see a dentist in 2019, suggesting that oral health is often overlooked. This project explores the barriers and challenges families face in receiving appropriate oral health care during pregnancy and early childhood.

Methods:
A qualitative approach was utilized involving focus group discussions and a key informant interview with four-six distinct groups of community partners and stakeholders from the Hampton Roads community. The groups consisted of mothers (n=3), dental providers (n=3), medical providers (n=4), and a Medicaid liaison (n=1). The discussions were hosted on Zoom, audio-recorded, and transcribed. Questionnaires consisting of a series of open-ended questions and further probing questions were developed for each group, to guide the discussions. The transcripts of the discussions were coded and analyzed using the long-table approach.

Results:
Data collected illuminated the following key categories of themes as barriers: lack of knowledge and education, real or perceived affordability of dental care, access to care, and the lack of interprofessional collaboration. Other emerging themes as barriers included community and provider attitudes, stigma, and insurance transparency.

Conclusion:
It is important to understand the barriers of dental service utilization during pregnancy to improve the oral health and overall wellbeing of pregnant women and children in Hampton Roads. Possible interventions include targeted education programs, promoting existing dental health resources and dental benefits including preventative oral health care options, promoting community-based resources, improving access to care, and promoting interdisciplinary collaboration via widespread implementation of best practices developed by interprofessional groups.

Abstract Title: Using Ground-based Spaceflight Analogs to Understand the Impact of Inflight Stressors on Sensorimotor Function

Author: Harris, Ryan Daniel
Co-Investigators:

Abstract

Introduction:
The proposed NASA Mars missions will expose astronauts to long durations of multiple inflight stressors, including social isolation (SI). Such stressors have the potential to impact sleep, further exacerbating the effects of stress. Previous evidence shows SI can impair cognitive and sensorimotor functions. In this study, male Wistar rats were socially isolated, and their sensorimotor performance was investigated. Afterwards, cortical EEG recordings were recorded before and after shock training to determine the resilient (Res) or vulnerable (Vul) phenotype using changes in rapid eye movement (REM) sleep. The analysis of these data will aid in determining how stressor resilience and vulnerability can impact the ability of astronauts to perform mission related tasks under inflight stress they will experience on the NASA Mars missions.

Methods:
Male Wistar rats were surgically implanted with wireless telemetry transmitters for recording cortical EEG. They were then divided into groups and subjected to SI (visual barriers between cages; n = 21) or only individually housed (as a control group; CON; n = 21). Rats then underwent two separate behavioral protocols, Balance Beam (BB) and Bilateral Tactile Adhesive Removal Somatosensory Task (BTARS), to assess gross and fine motor function. BB required the rat to traverse a 2 cm wide by 1 m long beam suspended 90 cm over soft padding for five trials/day across seven consecutive days. Data collected included time to successfully traverse the beam and # of successful trials. BTARS required the rat to remove a 2 cm diameter round sticker their distal radial forelimb for 4 trials (alternating sides)/day across 4 consecutive days. Data collected included time to notice the sticker, time to successfully remove the sticker, and # of successful trials. Three and five days following BB/BTARS, baseline and post-shock sleep respectively were recorded across 4 hours. One rat in the SI group returned a poor EEG recording and was omitted. Percent change in REM sleep was calculated and utilized to further divide the groups into Res (SI-Res, n = 14; CON-Res, n = 14) and Vul (SI-Vul, n = 7; CON-Vul, n = 8). All statistical analyses were analyzed and graphically represented using Prism.

Results:
Rats exposed to SI exhibited differences in overall performance rates in each task compared to CON. For BB, SI rats required more trials to learn the task compared to CON. For BTARS, SI rats required more time to notice the sticker compared to CON. When comparing BB performance in Res and Vul rats, we observed significantly poorer performance by SI-Vul rats compared to CON-Vul.

Conclusion:
SI appears to impair the ability to successfully learn and complete the BTAR and BB tasks, suggesting a potential negative impact on factors that regulate sensorimotor function. Moreover, differences in stress resilience also influence sensorimotor function, as Vul rats had a poorer performance rate compared to Res rats. Furthermore, SI-Vul rats had more difficulty completing the BB task compared to CON-Vul, suggesting there may be compounding negative effects on sensorimotor function that may reflect the ability to adaptively cope with stress. These data further our understanding of the effects that inflight stress may have on sensorimotor performance and possibly aid in developing risk mitigation strategies for future NASA missions and crew health.

Abstract Title: Skin Beauty Attitudes and Sun-Safe Behaviors Among Latinx Communities in Hampton Roads

Author: Hermak, Sarah
Co-Investigators: 1. Sarah Alnaif, BHSc, EVMS 2. Lydia Sa, MPH, EVMS, Division of Global Health 3. Robert Smith, MD, EVMS, Department of Dermatology 4. Alexandra Leader, MD, MPH, EVMS, Division of Global Health* Corresponding author

Abstract

Background:
Hispanic/Latinx individuals are at risk for presenting with more advanced stages of melanoma and have a higher mortality rate, likely due to delayed diagnosis. UV radiation exposure and sun-safe practices are crucial to skin-cancer prevention. Among Hispanic/Latinx individuals who are less acculturated to US norms, the motivations behind sun-safe behaviors include prevention of further skin darkening and skin-aging. Conversely, individuals who are more acculturated to US norms are less likely to sun-protect and report high rates of sun-bathing and indoor tanning, behaviors attributed to wanting more "attractive" and "healthier" looking skin. This study will assess beauty-related attitudes regarding sun-safe behaviors and tanning among the Hispanic/Latinx community of Hampton Roads.

Methods/Anticipated Results:
Data will be collected through a survey on melanoma knowledge and sun-safe behaviors, developed using previous validated surveys and containing questions on skin-related beauty attitudes. Participants will be recruited through convenience sampling at Hispanic/Latinx community centers, health fairs, and primary care clinics in Hampton Roads, VA. Eligibility criteria includes being of Hispanic/Latinx origin and between the ages 18-89 years. The survey question, "A suntanned look is more attractive," will be used to assess beauty attitudes regarding tanning. If true, this may indicate higher rates of tanning and increased risk of developing melanoma. The survey question, "I use sun-protection to prevent skin-aging," will be used to assess beauty attitudes regarding sun-safe behaviors. If true, this may indicate a motivation factor to be used in future education interventions on melanoma prevention. The study will also examine if certain demographic factors such as age affect beauty attitudes as they relate to tanning and skin-aging.

Conclusion:
If beauty attitudes are found to motivate tanning within the Hampton Roads Hispanic/Latinx community, there is a need for future interventions to deconstruct preconceived attitudes that tanned skin is healthier and more attractive. If beauty attitudes are found to motivate sun-protection, more educational interventions should explore skin-aging as an additional, albeit secondary, motivator to sun-protect. Considering the high mortality rates of melanoma within Hispanic/Latinx populations, beauty attitudes may be considered effective motivational factors to support skin cancer prevention.

Abstract Title: Validation of Child-Reported Quality of Life Instrument in Children With Sleep Disordered Breathing

Author: Heshmatipour, Daniel D
Co-Investigators: 1) Dr. Cristina Baldassari, CKHD Otolaryngology 2) Addy Tham BS, CHKD Otolaryngology 3) Stephen T. Boswick, CHKD Otolaryngology

Abstract

Introduction:
Sleep Disordered Breathing (SDB) is characterized by episodes of upper airway collapse during sleep. SDB has been linked to a negative impact on pediatric quality of life (QOL); children with SDB have behavioral problems, poor attention, and cognitive deficits. Caregiver-completed instruments have been developed to assess symptom burden in children with SDB. However, tools to assess the child's perception of SDB on their QOL are lacking. Our primary objective is to validate a disease-specific QOL tool that can be completed by children presenting with SDB.

Methods:
A modified child-completed QOL survey was developed by modifying the standard OSA-18 QOL survey, the most widely utilized QOL instrument for pediatric SDB. Input on the modified survey was obtained from physicians, nurses, and caregivers familiar with pediatric SDB. Children 5 to 16 years of age who presented for evaluation of SDB were recruited from outpatient otolaryngology clinics at a tertiary children's hospital. Children with developmental delay, major medical co-morbidities, and prior surgical treatment for OSA were excluded. Caregivers completed the standard OSA-18 QOL instrument and the Pediatric Sleep Questionnaire, while the children completed the modified OSA-18 QOL tool. Test-retest reliability was assessed by having the children repeat the modified tool one week after baseline.

Results:
The preliminary data set included ten patients with a mean age of 8.92 (SD 3.23). OSA-18 QOL scores for the standard tool showed that the majority (68%) of caregivers indicated a mild impact of SDB on QOL. The remaining caregiver-reported scores fell into the moderate (20%) or severe (12%) range. However, for the modified OSA-18, only 12% of children reported a mild QOL impact; the majority of children classified their QOL burden as moderate (72%) or severe (16%). Child and caregiver responses were different for most diads, with children reporting poorer QOL than the caregiver.

Conclusion:
A discrepancy may exist between caregiver and child reported QOL in children with SDB. Caregivers may underestimate the impact of SDB on children's QOL. If successfully validated, the child-reported OSA-18 instrument may be incorporated into clinical practice to better characterize the child's perception of disease burden.

Abstract Title: Impact of SARS-CoV-2 on Surgical Case Load, Surgical Resident Wellness, and ABSITE Scores

Author: Hughes, Jacob D
Co-Investigators: Jacob D. Hughes, School of Medicine\EVMS Madiha Aziz, Department of Surgery\EVMS Jessica R. Burgess, Department of Surgery\EVMS

Abstract

INTRODUCTION:
The SARS-CoV-2 pandemic has had a profound impact on practically every aspect of our lives and the impact is no different in the medical community. We investigated EVMS surgery resident reported case numbers and EVMS surgery resident ABSITE (American Board of Surgery In-Training Examination) scores to determine the impact of the pandemic on these parameters. We also looked at EVMS surgery resident wellness prior to and during the pandemic to determine the potential psychological impact of the pandemic.

Methods:
We obtained deidentified resident reported case numbers from prior to the pandemic July 2019-March 2020 and mid-pandemic July 2020-March 2021. Cases from the 2019-2020 academic year from April to June (mid-pandemic) were also collected. Unpaired t-tests were used to analyze the resident cases between academic years. Paired t-tests were used to analyze pre-pandemic (July 2019-March 2020) and mid-pandemic (April-June 2020) monthly case averages. We then obtained deidentified ABSITE scores from 2020 (pre-pandemic) and 2021 (mid-pandemic) with scores and percentiles correlated to PGY level. Scores and percentiles were compared between PGY levels using unpaired t-tests. We also created a survey to identify resident perceptions of wellness during the pandemic compared to pre-pandemic. Questions were based on a 5-point Likert scale and data was analyzed to determine changes from pre-pandemic baseline using paired t-tests. All current EVMS surgery residents were asked to complete the survey with 20 of 26 surveys completed.

RESULTS:
Reported case numbers from July 2019-March 2020 and July 2020-March 2021 did not show any statistically significant differences in case numbers at any PGY level. Mean monthly pre-pandemic and mid-pandemic case numbers for the 2019-2020 year showed a 6.36 drop in monthly cases per resident at the PGY-3 level, $p=0.0274$; no other differences were statistically significant. In 2020 and 2021, 25 and 26 EVMS surgery residents took the ABSITE, respectively. Mean ABISTE scores and percentiles per PGY level in 2021 (mid-pandemic) compared to 2020 (pre-pandemic) were slightly lower for each year except for PGY-2 raw scores; no differences were statistically significant to a 95% confidence interval. PGY-1 scores dropped 6.26 points, $p=0.0676$, and PGY-1 percentiles dropped 25.6%tile, $p=0.0522$. 20 of 26 surveys were completed. There was an overall decrease in self-rated resident well-being during the pandemic from a mean of 3.25 to 2.4 or 0.85 points, $p<0.0001$, on a 5-point Likert scale. 60% of residents reported a decrease in time spent on non-work-related activities (-0.85, -1.23 to -0.47 95% CI) and 50% reported a decline in weekly study time for the ABSITE during the pandemic (-0.6, -0.98 to -0.22 95% CI). 90% of residents reported no change in amount of sleep received pre- and mid-pandemic (-0.1, -0.024 to 0.04 95% CI). Residents reported new feelings of sadness (-1.9, -2.45 to -1.35 95% CI), more difficulty with concentration (-2.1, -2.72 to -1.48 95% CI), a greater sense of isolation (-2.2, -2.85 to -1.55 95% CI), heightened anxiety (1.7, 1.07 to 2.33 95% CI), and a decrease in energy (-2.3, -2.95 to -1.65 95% CI).

Discussion:
Resident self-rated well-being dropped from 3.25 (between good and very good) to 2.4 (between fair and good). Our findings show that the SARS-CoV-2 pandemic had an overall negative impact on resident well-being but did not significantly impact the number of cases residents were able to perform. New trainees at the PGY-1 level experienced a slight decrease in ABSITE scores possibly due to the transition to residency during a period of increased stress.

Abstract Title: Pilot study of the efficacy of pyridostigmine for reversal of post injection dysphonia following botulinum neurotoxin laryngeal chemo-denervation in spasmodic dysphonia

Author: Jafri, Saad H
Co-Investigators: John Sinacori MD ENT/EVMS Anne Michalek PhD Communication Disorders/ODU

Abstract

Introduction:
Spasmodic Dysphonia (SD) is a neurologic disorder characterized by involuntary contractions of the laryngeal muscles leading to vocal spasms, breathiness, voice tightness, and other disruptions in phonation. The current standard of care treatment for SD is a localized injection of botulinum toxin (BoNT) into the affected muscles. One downside of this treatment is a 1-2 week phase of extreme breathiness and vocal weakness, known as the breathy phase, while BoNT is at a high concentration. The aim of this pilot study is to investigate the efficacy of pyridostigmine, an acetylcholinesterase inhibitor, as an "as-needed" drug to help with the management of vocal weakness following BoNT treatment.

Methods:
About 10 patients with SD will be recruited from EVMS ENT clinic. They will be administered one 60mg tablet of pyridostigmine 5-6 days after scheduled BoNT injection. They will complete a review of systems and a series of objective and perceptual vocal outcome measures both before and after pyridostigmine administration to assess for any side effects and changes in voice.

Results:
This study is still ongoing. 2 patients have gone through the trial and results are currently being analyzed. More patients are being recruited to gather more substantial data.

Conclusion:
Pyridostigmine has been shown to be effective in cases of BoNT overdose, while having no impact on efficacy of treatment. Expanding on this idea, we plan to investigate pyridostigmine's ability to be useful in lessening vocal handicap after BoNT treatment of SD. The current method of lessening breathy phase weakness is BoNT dose modulation, increasing or decreasing the dose over a series of injections until an appropriate dose that minimizes weakness while maximizing treatment length, is found. The breathy phase of SD BoNT treatment has been shown to negatively affect patient quality of life, and is reported as a primary concern by patients. If pyridostigmine is shown to improve vocal outcomes, further placebo controlled, multi-institutional studies will be carried out to further investigate the drug and its potential to improve standard of care treatment.

Abstract Title: Breast Density and its Impact on Screening Mammograms

Author: Johnson, Katherine
Co-Investigators: 1. Emily Glavich, Radiology 2. Daniel O'Neal, Radiology

Abstract

INTRODUCTION:
Increased breast density is an important risk factor in the development of breast cancer, and is now being factored into lifetime risk assessment. Furthermore, the impact of dense breast tissue is being increasingly recognized for decreasing the sensitivity of screening mammograms, and this could shape future recommendations for mammographic screening guidelines in certain high risk populations. This review poster explores the impact of mammographic breast density by explaining the pathophysiology of breast density, explaining the Bi-RADS classification system for classifying breast density and methods for measuring breast density, understanding the impact of breast density on developing and detecting breast cancer, and exploring the impact on screening guidelines and alternate screening methods that could be used in the future.

Main Body:
Annual mammographic screening is recommended for women over the age of 40, or biannually for women between the ages of 50 to 74. Screening mammography has a sensitivity between 68% and 90% for detecting cancers, however sensitivity is lower in women with mammographically dense breast tissue. Based on the BI-RADS classification of breast tissue density, around 50% of women have heterogeneously dense or extremely dense breast tissue. Therefore, half of the screening population has dense breast tissue, which not only increases risk of developing breast cancer, but also makes screening more difficult. Alternate screening methods are being explored to target this population. Digital breast tomosynthesis has already shown an increase in cancer detection rates and reduction in recall rates compared to traditional two-dimensional digital mammography. Whole breast ultrasound and breast MRI are other emerging modalities that may be beneficial supplemental screening methods in women with dense breasts who are also at increased lifetime risk of developing breast cancer.

Conclusions:
Breast density is being increasingly recognized as an important risk factor in the development of breast cancer and is now being factored into lifetime risk calculators. It is important for radiologists in training to develop an understanding of mammographic breast density and how this impacts current screening methods. Supplemental screening modalities for women with dense breast tissue is an emerging area of interest in breast imaging.

Abstract Title: Maternal and neonatal outcomes in periviable births

Author: Kamano, Elisabeth H
Co-Investigators: 1. Bijan Morshedi, MD1 \ EVMS 2. Elisabeth Kamano \ EVMS 3. Katharine Hopkins \ EVMS 4. Dana Baraki \ EVMS 5. Diego Maurente, MD \ Children's Hospital of the King's Daughters 6. Turaj Vazifedan, DHSc \ Children's Hospital of the King's Daughters 7. Ursula Griffiths-Randolph MD, MPH \ EVMS 8. David Peleg, MD \ Ziv Medical Center Derech HaRambam, Safed, Israel 9. Thomas Bass, MD \ Children's Hospital of the King's Daughters 10. Steven Warsof, MD \ EVMS

Abstract

Objective:
The primary aim of this study is to evaluate the neonatal outcomes with birth weights (BW) < 500 grams and survivability through 1 year of life.

Study design:
A retrospective cohort study was performed on mothers who had periviable births between 1/1/07 - 1/1/19 at our tertiary care perinatal center. Inclusion criteria were a fetal heart beat on hospital admission, the mother must be > 18 years old, and the neonatal BW < 500 grams.

RESULTS:
200 maternal/neonatal dyads were identified from initial chart review, 102 met inclusion criteria. 33/102 (32.4%) survived birth and were admitted to the NICU, 16/33 (48.5%) survived to 1 year of life. Resuscitation was performed on all neonates that survived birth and attempted on only 7/69 (10.1%) that died shortly after birth. For the neonates who survived to 1 year, the avg length of stay (LOS) in the hospital was 155 days (65-241 days) and the avg days intubated was 53 (29-125 days). For the 17 neonates who did not survive to 1 year, their avg LOS was 81 days (1-84 days) prior to death. 23/33 (69.7%) neonates were delivered via cesarean section. The avg BW for the 102 neonates was 455 grams (196-500 grams) and the avg BW for the survivors at 1 year was 472 grams (range 350-500 grams). Of the 16 neonatal survivors at 1 year, 14/16 (87.5%) received magnesium sulfate and 16/16 (100%) received steroids prior to delivery. All survivors received surfactant after delivery and were intubated. At 1 year of life, all 16 surviving neonates had serious comorbidities from prematurity including 2/16 (12.5%) with pulmonary hypertension, 7/16 (43.8%) with intraventricular hemorrhage, 6/16 (37.5%) with sepsis, 2/16 (12.5%) with necrotizing enterocolitis, 13/16 (81.2%) with bronchopulmonary dysplasia, and 16/16 (100%) with retinopathy of prematurity.

Conclusions:
Advances in neonatal resuscitation are allowing for higher rates of survival in infants with BW <500g. For those surviving to 1 year, there will be severe comorbidities that will impact these children. This data will be important in counseling patients presenting in the periviable period.

Abstract Title: Changes After COVID-19 Among People Who Smoke Cigarettes
Author: Kathrotia, Mayuri
Co-Investigators: Dr. Paul Harrell, EVMS Pediatrics: Community Health and Research

Abstract

Introduction:
Adult cigarette smoking remains the leading preventable cause of death in the United States. How COVID-19 has affected cigarette smoking rates in the US is currently unclear. The aim of this study is to assess whether adults with a history of tobacco use modified their tobacco use behavior after COVID-19 pandemic restrictions began in the US. In particular, we examined cigarettes per day (CPD), smoking rates and beliefs, e-cigarette use, motivation to quit, and anxiety levels.

Methods:
From April 2019 - March 2020, 248 adult cigarette smokers were recruited via advertising on Craigslist, newspapers, Internet forums, and flyers. Screening data was obtained from this online questionnaire. For our study, we followed up with these 248 participants through emails, text, and phone calls from June -July 2021. Participants were sent a follow up survey to assess changes in cigarette smoking from their initial screening survey as well as beliefs regarding COVID-19 and cigarettes/ e-cigarettes. To assess mental health concerns, participants completed the Generalized Anxiety Disorder Assessment.

Results:
From the 248 participants that were followed up with, 19 responded. Independent sample t-test and chi-square showed responders did not significantly differ from non- responders in age, p =.42), cigarettes per day (p = *.22*), and race (p = *.24*). However, they were more likely to be female, 63.2% vs. 36.5%, (p =*.02*). A paired t-test showed there was a significant reduction in cigarette smoking among responders (pre-pandemic *M=14.2* CPD*, SD* = 6.6 *to* present-day *11.0* CPD*, SD* = 9.2, *p=.04*). A qualitative assessment showed reasons for this reduction included decreased access to cigarettes/e-cigarettes and beliefs that COVID-19 might negatively impact health. Linear regression revealed baseline cigarette smoking was a significant predictor of follow-up cigarette smoking (p =*.00004*), however, gender, income, level of education, and GAD score were not significant predictors in a multivariate model.

Conclusion:
Participants who completed the follow up survey showed a significant reduction in cigarette smoking since the completion of their pre COVID-19 survey. However, no participants quit smoking. Future research is needed to replicate results and understand how COVID concerns may help people reduce or quit cigarette smoking.

Abstract Title: Role of vibrissae in rat string-pulling behavior following exposure to multiple space flight stressors

Author: Kim, Christine S.
Co-Investigators: 1. Ashley A. Blackwell 2. Jovanna A. Tracz 3. Richard A. Britten Department of Radiation Oncology and Biophysics EVMS

Abstract

Introduction:
Space radiation (SR) is composed of multiple ions that have deleterious effects on sensorimotor function and may interfere with performance on mission-relevant tasks, such as the manipulation of mission controls, tools, and seat egress. String-pulling is a highly organized behavior that involves hand-over-hand reaching and grasping movement to pull in a string (Blackwell et al., 2018). SR (Blackwell et al., 2021) and sleep disruptions (Dingers et al., 1997; Belenky et al., 2003; Williams et al., 2017) impair performance on such sensorimotor tasks. For example, after Silicon radiation exposure, rats exhibited both transient and persistent deficits in string-pulling behavior with evidence of compensation by increased mouth contacts to pull in the string. Rats use vibrissae for object detection, analogous to humans using vision to guide hand movement. Neural systems that support sensorimotor function are highly connected to the barrel cortex, responsible for vibrissae function, and damage to this structure impairs sensorimotor function (Armstrong-James et al., 1992; Erzurumlu et al., 2012; von Heimendahl et al., 2007). It is possible that irradiated rats were able to compensate in string-pulling behavior with mouth contacts through vibrissae sensory information. Therefore, the current study had two goals: 1) to examine the combined effects of SR exposure and repeated sleep fragmentation (SF) on string-pulling behavior and 2) to determine the role of vibrissae in the adaptation of string-pulling behavior following SR and SF.

Methods:
Six-month-old male Wistar rats (n = 9) used in the current study were kept on a treadmill exercise regimen (25 cm/s for 30 minutes 3 sessions/week). Rats were also prescreened using an Attentional Set Shifting task (ATSET) to assess executive function before irradiation (Jewell et al., 2018). After prescreening, high performing ATSET rats were sent to Brookhaven National Laboratory ~9 months of age to be irradiated with 10 cGy of 600 MeV/n 56Iron (Fe). Following irradiation, rats were transported back to Eastern Virginia Medical School where string-pulling behavior was assessed. A string-pulling session consisted of 6 trials and was complete after strings were pulled in or after 20 minutes had elapsed without performance by the rat. Three months post-irradiation, rats were assessed in string-pulling behavior both pre- and post-SF. During SF, rats were placed in a chamber with an electric bar that swept every 2 minutes overnight. This was repeated the following week. After 2 weeks of rest, rats were reassessed in string-pulling and then had their vibrissae shaved bilaterally. String-pulling behavior was evaluated in the two days following vibrissae removal to identify vibrissae contributions to performance. Measures of interest included approach and pull time as well as mouth and hand contacts and misses with the string. Additional analyses are underway using open-source Tracker motion capture software to track body movements during string-pulling behavior and will be presented at the presentation.

Results:
Rats exposed to one low dose of Fe radiation demonstrated a significant increase in approach time after one night of SF [$t(8) = -2.901$, $p = 0.020$, $d = -0.971$]. One week later, upon subsequent SF, no further disruptions in performance were observed. However, rats continued to exhibit increased approach times across testing after the first SF, suggestive of a persistent deficit. After rats' vibrissae were shaved, pull time, while non-significant, transiently increased, and then subsequently resembled pre-shaved performance.

Conclusions:
A single night of SF was sufficient to prolong initial engagement in rat string-pulling behavior 3 months after irradiation 10X that of historical sham rat performance (60s vs. 6s). A persistent increase in approach time after one night of SF suggests sustained altered motivation or attentional processes. While vibrissae are important for object detection, shaving the vibrissae bilaterally only moderately affected pull time in the string-pulling task. Ongoing analyses will assess whether vibrissae removal influenced contacts and misses with the string in Fe-irradiated rats following SF. This work provides a foundation for the effects of SR and SF on rat string-pulling behavior and will provide insight into the role of the vibrissae in the organization of this behavior following multiple space flight stressors.

Abstract Title: Endoplasmic Reticulum Stress Induction in Endothelial Cell Function and Heart Failure with Preserved Ejection Fraction

Author: King, Diamond
Co-Investigators:

Abstract

Introduction:
The role of vascular endothelial cell dysregulation at the basis of heart failure with preserved ejection fraction (HFpEF) pathogenesis and evolution has gained growing consent. HFpEF is the leading cause of heart disease and death in the United States. The scientific premise indicates that a significant number of patients with HFpEF harbor the comorbidities of hypertension and obesity with type 2 diabetes. Hypertension and diabetes are high risk factors for HFpEF, characterized by diastolic dysfunction and inflammation, pulmonary congestion, cardiac hypertrophy and fibrosis, myocardial capillary rarefaction, aortic stiffness, and impaired endothelial function, is the major unmet need in cardiovascular medicine and remains an untreatable cardiovascular disease. Progress in treating HFpEF will require understanding of the pathogenesis mechanism. Thus, there is a critical need to delineate cellular and molecular mechanisms and identify treatable targets to rescue cardiac function and structure in the setting of HFpEF. We hypothesize that the induction of endoplasmic reticulum stress in endothelial cells causes inflammation and therefore endothelial dysfunction, which leads to HFpEF.

Methods:
Murine endothelial cells were cultured until 80-100% confluent, subjected to starvation for 24 hours, then treated in 1 of 4 conditions: 1) Control, 2) cells stimulated with a lipid mixture of cholesterol and fatty acids and palmitic acid, 3) Cells stimulated with N(G) Nitro-L-arginine methyl ester (L-NAME), an endothelial nitric oxide synthase (eNOS) inhibitor, and 4) Combined L-NAME and lipid mixture of cholesterol and fatty acids and palmitic acid. After 24 hours of treatments, cell lysates were obtained and western blot analysis was performed. **Results:** Western blot analysis was successfully performed using antibody for ER stress, inflammation, and apoptosis. Data generation and analysis are still ongoing.

Discussion:
We find that hypertension and metabolic disorder induce endoplasmic reticulum stress and inflammation in endothelial cells in vitro, which leads to endothelial dysfunction, the cause of HFpEF.

Conclusion:
Our data suggest that inhibiting the ER stress in endothelial cells could protect against the development of HFpEF.

Abstract Title: Analysis of Racial Disparities in Pancreatic Cancer Survival, Diagnosis and Treatment in the Greater Hampton Roads Area

Author: Kolkey, Zakary L
Co-Investigators: 1. Amy Tang, PhD. Leroy T. Canoles Cancer Research Center/EVMS

Abstract

Introduction:
Pancreatic cancer is an extremely deadly disease, with a dismal 9% 5-year survival rate and 6-month survival post-diagnosis. Pancreatic cancer disproportionately affects the Black and Jewish populations, however nationally we see lower survival and later stage at diagnosis among the black population when compared to their white counterparts.

Objective:
This study aims to measure the greater Hampton Roads area level of racial disparity in the survival, diagnosis, and treatment of pancreatic cancer in comparison to the national average, and provide explanations to any similarities or differences.

Methods:
This retrospective study uses a cohort of 640 patients diagnosed with pancreatic cancer between 2008 and 2016 within the Sentara Healthcare or Virginia Oncology Associates system in the greater Hampton Roads area. The cohort was stratified into two groups: 191 patients diagnosed eligible for surgical resection, and 449 patients with inoperable disease; and then further separated into a white and black populations. Survival was calculated from date of initial diagnosis to date of last follow-up or death from all-cause mortality. Stage was measured from chart notes on date of diagnosis from each cohort.

Results:
Of the 191 pancreatic cancer patients, 45 underwent surgical resection only, 100 received surgery and adjuvant chemotherapy, and 46 received NACT and surgery. In the operable cohort, 40% of the PDAC patients are African American (AA) and 58% are Caucasians. Thus, pancreatic cancer incidence among black patients was over-represented in Hampton Roads Virginia that has a 30% AA population. Treatment provided and stage of diagnosis for pancreatic cancer are comparable in the two major race groups. The overall survival of our black patients was not worse when compared to the white patients in both operable and inoperable cohorts. The better AA survival statistics may be partially explained by more widespread healthcare coverage in our black population (military bases) as compared to that of the national averages.

Conclusion:
Our PDAC patients of the two race groups still have a lower 5-year survival as compared to that of the national average (SEER data). The underlying factors contributing to the dismal 5-year survival rate and higher incidence are likely multifactorial, possibly explained by unhealthy diet, genetic factors, mutant carriers, social economic status, insurance, and risk behaviors (smoking and drinking) as compared to national averages.

Abstract Title: Impact of Apnea vs. Hypopnea Predominance on Adenotonsillectomy Outcomes in Children with OSA

Author: Kukkala, Saadhana
Co-Investigators: 1. Turaj Vazifedan, CHKD Department of Biostatistics 2. Cristina Baldassari, Department of Otolaryngology

Abstract

Introduction:
While most children with obstructive sleep apnea (OSA) experience improvement in obstruction following adenotonsillectomy, approximately 20% have persistent disease. Data is lacking as to whether apnea vs hypopnea-predominance impacts AT outcomes. Thus, our objective is to assess the impact of baseline apnea versus hypopnea-predominant sleep apnea on polysomnography (PSG) and quality of life (QOL) outcomes in school-aged children with non-severe OSA who were managed with watchful waiting (WW) or adenotonsillectomy (AT).

Methods:
386 children with non-severe OSA between 5 to 9.9 years of age were randomized to WW or AT as part of the multi-institutional Childhood Adenotonsillectomy Trial. Children underwent PSG and completed validated QOL and symptom assessments at baseline and 7 month follow-up. Patients were considered to have apnea-predominant OSA if they had an apnea hypopnea index (AHI) > 2 and more than 50% of the obstructive events were apneas.

Results:
The mean AHI for patients was 6.98 with the majority of patients (51%) having mild disease. 37 children (10%) had apnea-predominant OSA at baseline. Black children were at increased risk for apnea-predominant OSA (p=0.04). Children with apnea-predominance were more likely (p=0.04) to have severe OSA (AHI >10) compared to children with hypopnea-predominance. Baseline PSQ (0.89) and OSA-18 QOL (0.27) scores were similar between those with apnea and hypopnea-predominance. Among children undergoing AT, those with baseline apnea-predominance were more likely (p=0.033) to have a PSQ score > 0.33 at follow-up. At the completion of the study, 91.6% of patients with hypopnea predominance experienced cure of OSA compared to 59.5% of children with apnea-predominance.

Conclusion:
In children with non-severe OSA, only a small portion have apnea-predominant disease. Apnea-predominance may impact symptom resolution and cure rates in children undergoing AT. Further research is needed to assess how apnea-predominance affects AT outcomes in children with severe disease.

Abstract Title: Use of Fluocinolone Acetonide Intravitreal Implant 190 µg (ILUVIEN®) in Patients with Cystoid Macular Edema Secondary to Retinal Vein Occlusion (FACES)

Author: Lamrani, Ryan
Co-Investigators: 1. Wagner AL\Wagner and Kapoor Research Institute & EVMS Ophthalmology 2. Riebling C\Wagner and Kapoor Research Institute 3. Kapoor KG\Wagner and Kapoor Research Institute & EVMS Ophthalmology

Abstract

INTRODUCTION:
The goal of the study is to evaluate the efficacy of Fluocinolone Acetonide treatment on macular edema secondary to retinal vein occlusion, as well as to investigate the safety of the implant in patients with retinal vein occlusion. Given the demonstrated efficacy of the fluocinolone acetonide implant in patients with diabetic macular edema paired with the improvement in macular edema associated with retinal vein occlusion (RVO) from intravitreal corticosteroid, this evidence supported the study conceptually for evaluation of fluocinolone acetonide used to treat RVO.

METHODS:
A retrospective chart review was done of a cohort of 5 patients (3 treated with ILUVIEN® implant and 2 controls) with macular edema secondary to either branch retinal vein occlusion (BRVO) or central retinal vein occlusion (CRVO). Patients were followed for up to 85 weeks. Best corrected visual acuity (BCVA), intraocular pressure (IOP) and central macular thickness (CMT), were recorded clinically at each visit. Number of anti-vascular endothelial growth factor (anti-VEGF) injections and complications were also recorded. A subsection analysis regarding cost-effectiveness of ILUVIEN® in these patients was subsequently conducted.

RESULTS:
The number of anti-VEGF injections was drastically lower in the treatment group than the control group over the course of the trial. Both patients with BRVO treated with ILUVIEN® required no anti-VEGF injections for the entirety of the trial, and the patient with a CRVO only required anti-VEGF injection about half as many times as patients in the control group. Visual acuity remained stable up to 70 weeks after the ILUVIEN® implant injection. Both measures of IOP and CMT stayed stable for all treated patients throughout the entirety of the trial. No complications related to the ILUVIEN® implant were noted. Cost-effectiveness data suggested ILUVIEN® became more cost-effective than anti-VEGF monotherapy after 32.53 weeks.

Conclusion:|
The use of ILUVIEN® implants might be an effective treatment option for patients with macular edema secondary to retinal vein occlusion. While initially more expensive, ILUVIEN® treatment may prove to be more cost-effective than anti-VEGF monotherapy when looking at annual data, given the cutoff threshold for cost-effectiveness was 32.53 weeks in this study. Further investigations with a larger sample size are required to assess the efficacy of the implant.

Abstract Title: POCUS: An opportunity to improve High Value Care Education in the Clinical Learning Environment

Author: Larick, Rayghan S
Co-Investigators: 1. Co-I-1, Barry Knapp MD, Emergency Medicine 2. Co-I-2, Benjamin Goodman MD, Internal Medicine

Abstract

Introduction:
The United States spends more on healthcare than any other country and yet performs the worst among developed nations in population health outcomes. Waste accounts for 34% of US healthcare spending, with unnecessary services identified as the largest contributor. Point of care ultrasound (POCUS) has been identified as an important diagnostic tool with potential cost-saving benefits and may play an important role in reducing low-value diagnostic testing. In response to current healthcare trends, POCUS and high-value-care (HVC) curriculum in graduate medical education has increased in prevalence; however, the presence of formal training in these areas may not translate to significant implementation of these practices in clinical workflow. We aimed to understand the intersection between ultrasound education, use in clinical practice, and promotion of HVC in the clinical learning environment within the Eastern Virginia Medical School (EVMS) Internal Medicine (IM) and Emergency Medicine (EM) residency programs.

Methods:
A needs assessment survey was performed to explore resident perception about frequency of use of HVC principles and POCUS within IM and EM resident workflow in the clinical learning environment.

Results:
72% of EM and 40% of IM residents completed the survey. Preliminary analysis of reveals that 81% of total respondents agree or strongly agree that it is important to consider the cost of a test or imaging study prior to ordering. 81% of EM respondents and 67% of IM respondents were likely or very likely to choose POCUS as an alternative to a more expensive diagnostic test. Residents identified equipment availability, attending and resident time, and adequate number of faculty to teach as barriers to acquisition and use of POCUS skills. Residents proposed education regarding cost of common diagnostic tests and improved faculty comfort with and knowledge of POCUS as solutions to better integrate HVC principles and POCUS into daily workflow.

Conclusion:
Resident physicians provide unique perspectives in understanding barriers and solutions to improving HVC in clinical workflow. Working alongside residency program directors, future directions will focus on faculty development in POCUS education and resident education in cost awareness. Follow up surveys will help us understand potential effects on perception, confidence, and implementation of HVC POCUS principles in residents' current and future practice.

Abstract Title: Effects of CSF1R Blockade on Brain Macrophages and SIV Neuropathogenesis in Acutely SIV-Infected Rhesus Macaques

Author: Leung, Evan Sebastian
Co-Investigators: 1. Jinbum Dupont, F. Edward Hebert School of Medicine MD Program 2. Julian Hattler, EVMS Biomedical Sciences Research MS Program 3. Woong-Ki Kim, PhD, EVMS Department of Microbiology and Molecular Cell Biology

Abstract

INTRODUCTION:
CNS macrophages including perivascular macrophages (PVMs) and microglia are target cells of HIV infection and play a crucial role in the persistence of HIV-associated neurocognitive disorders. CSF1R is an important receptor that is upregulated in macrophages infected with HIV or SIV and is essential for macrophage survival. CSF1R can be inhibited by BLZ945 (Novartis), a CNS-penetrant small molecule that has been shown to eliminate macrophages in mouse models. This study aims to assess the effect of BLZ945 treatment on brain macrophages and SIV infection in the brain.

METHODS:
Rhesus macaques were infected intravenously with SIVmac251 (1000TCID50) and depleted of CD8 lymphocytes with a depleting anti-CD8a antibody. Animals received either no treatment or daily treatments with low dose (10 mg/kg/d) or high dose (30 mg/kg/d) of oral BLZ945 starting from day 10 post-infection (p.i.) until euthanasia at day 35-37 p.i. Brain tissue samples were collected from three untreated SIV-infected controls, three SIV-infected macaques treated with low dose BLZ945, and three SIV-infected macaques treated with high dose BLZ945. Formalin-fixed, paraffin embedded tissue samples from frontal lobe/basal ganglia, parietal lobe/basal ganglia, and pons/ventricle 4/cerebellum brain regions were subjected to immunohistochemistry (IHC) staining and semi-quantitative image analysis using ImageJ software to quantify expression levels of CD163, CD206, and CSF1R (for PVM) as well as P2YR12 (for resting microglia). SIV DNA and RNA viral loads were determined with TaqMan real-time PCR.

RESULTS:
CD163 expression was significantly decreased in the high dose BLZ945 group compared to both low dose and control groups across all three brain regions. CD206 expression was significantly decreased in high dose compared to control groups across all three brain areas. No significant difference in P2YR12 microglia expression was found between any pair of groups. Lower CD163 expression was also significantly correlated with lower viral load in the frontal lobe/basal ganglia ($p=0.04$, $R2=0.46$) and the frontal lobe/basal ganglia combined with parietal lobe/basal ganglia ($p=0.01$, $R2=0.37$). No correlation was found between CD206 expression and viral load in the brain. Preliminary data showed decreased expression of CSF1R in low dose and high dose groups compared to controls.

CONCLUSION:
The reduction in CD163 and CD206 macrophage expression supports the notion that BLZ945 depletes macrophages in the CNS. Additionally, lower CD163 expression was significantly correlated with lower viral load in the frontal/basal ganglia, suggesting decreased viral infection in CNS macrophages after treatment. No significant difference in P2YR12 resting microglia across all groups further indicates the specificity of BLZ945 for CNS macrophages. Future data for CSF1R is expected to confirm the ability of BLZ945 to specifically target and deplete SIV-infected CNS macrophages in rhesus macaques. Taken together, our study suggests viral load-lowering effects of BLZ945.

Abstract Title: Discrimination during pregnancy and adverse pre- and postnatal outcomes - Findings from 2012-2018 Virginia Pregnancy Risk Assessment Monitoring System Data

Author: Li, Elizabeth C
Co-Investigators: 1. Elizabeth C Li, EVMS MD Class of 2023 2. Dr. Hongyun "Tracy" Fu, Ph.D., Department of Pediatrics/ Community Health and Research Division

Abstract

Introduction:
Although the detrimental impact of discrimination and harassment on health outcomes has been widely acknowledged, few empirical studies have employed population-based data to examine the extent to which experiencing discrimination and harassment during pregnancy affects maternal and child health outcomes. This study assessed the prevalence of experiencing discrimination during pregnancy in Virginian mothers and examined its association with prenatal and postnatal health outcomes by using the 2012-2018 Virginia Pregnancy Risk Assessment Monitoring System (PRAMS) Data.

Methods:
The 2012-2018 VA-PRAMS (N=4,927) data were representative sample surveys of mothers recruited 4-6 months postpartum through the existing birth registration records. The surveys asked questions related to mothers' experiences before, during, and after pregnancy. Measures of discrimination included reported harassment or feelings of inferiority due to race/ethnicity, insurance/Medicaid status, weight, or marital status in the 12 months before delivery. We used multivariate logistic regression to examine the association between discrimination and maternal health outcomes, adjusting for confounding factors and sampling weights.

Results:
Overall, 13.03% of Virginia mothers experienced discrimination, with the highest rate being related to weight (5.17%), followed by race/ethnicity (4.48%), insurance status (3.49%) and marital status (3.45%). Mothers who reported experiences of discrimination had high odds of hypertension during pregnancy (AOR:1.77, 95% CI: 1.20 - 2.64) and postpartum depression (AOR: 2.37, 95% CI: 1.73-3.27).

Conclusions:
Findings demonstrated elevated risks for physical and mental health problems among mothers who experienced discrimination/harassment during pregnancy, highlighting the need for implicit bias trainings to reduce discrimination and improve prenatal and postnatal health outcomes for mothers.

Learning objectives:
Assess the prevalence of discrimination and harassment during pregnancy with Virginia mothers
Identify the association between perceived discrimination during pregnancy and both pre- and postnatal health outcomes
Discuss targeted interventions to mitigate the stress endured by pregnant women as a consequence of personal discrimination/harassment

Abstract Title: Impact of COVID-19 on Patient Appointment Attendance at HOPES Free Clinic with Text Message Reminders

Author: Liu, Steven C
Co-Investigators: 1. Renjie Chen, MD Class of 2022 2. Eunice Wu, MD Class of 2022

Abstract

INTRODUCTION:
Patient no-shows and miscommunications create significant problems for the function and logistics of the HOPES Free Clinic. Previously, we demonstrated that reminder texts, compared with the standard reminder phone calls to patients, decreased the amount of no shows at the HOPES clinic. In contrast to phone calls, text messages have the advantage of being asynchronous in nature, meaning that texts sent during working hours will reach their recipients regardless of their ability to answer immediately. However, we made the switch to and saw results from text messaging in pre-COVID times. We had a significant decrease in no shows and were efficiently getting appointment reminders to HOPES clinic patients. Since COVID, HOPES clinic has been significantly impacted, initially with a complete shut down, transitioning to accepting patients through virtual visits and limited in person visits. Furthermore, the impact of COVID has not only limited the potential care for patients, but may also have created reservations on the patients' part towards coming into clinic, resulting in increased potential no shows and cancellations.

METHODS:
ConCoord officially switched to reminder texts in September 2019, which continued uninterrupted until suspension of clinic activities in April 2020, and data was collected on effectiveness of patient communication both before and after the switch via chart review in Practice Fusion, the HOPES clinic EMR of choice. Specifically, data was gathered on clinic date, clinic type (ie Primary Care, Specialty, etc.), appointment type (new or follow-up), longevity of patient's history at HOPES, patient age, patient gender, and whether the patient was able to be reached prior to clinic date in order to confirm the appointment. This data was then correlated with the show, cancel, or no show status of the patient. After COVID and HOPES Clinic began accepting patients again, we continued to collect data on the show, cancel or no show status of patients to determine how COVID has impacted clinic logistics from November 2020 to March 2021.

RESULTS:
Comparing clinic data from before and after the start of the COVID-19 pandemic, we have found that patients no-show rates are stable from 17% to 12% (two-tailed p-value = 0.25), and appointment cancellation rates have also been stable, from 26% to 25% (two-tailed p-value = 0.9), with additionally no significant changes to the overall proportion of patients coming to their scheduled appointments (57% to 63%, two-tailed p-value = 0.33).

CONCLUSION:
Our data pre-COVID showed that reminder texting provided a more effective communication between patients and HOPES Free clinic. We are encouraged by the clinic data since the COVID-19 pandemic demonstrating that the reminder texting system has provided persisting improvements in patient no-show rates. Additionally, more data should be collected from our student volunteers to continue to better quantify the effects of switching from reminder phone calls to reminder texts.

Abstract Title: Clinical Characteristics of Pediatric Patients with Chronic Rhinosinusitis: A Retrospective Review of Patients in the Children's Hospital of The King's Daughters

Author: Liu, Timothy Wu
Co-Investigators: Daniel Trotier, Otolaryngology (Research Student)

Abstract

Introduction:
Chronic rhinosinusitis (CRS) is commonly seen in pediatric otolaryngologic clinics. CRS is defined as inflammation of the nose and paranasal sinuses manifesting as 2 or more symptoms of nasal obstruction/congestion, nasal discharge, change in smell, or facial pressure/pain for 12 weeks or longer. The clinical presentations of pediatric CRS can have multiple etiologies such as anatomical variations, allergic diseases, or immunodeficiencies. Although pediatric CRS is prevalent, the diagnostic approach and treatment algorithm for this disease are not well studied and are constantly evolving. To better establish such a diagnostic approach and treatment algorithm, proper characterization of pediatric CRS is essential. Although more studies are currently being performed to elucidate the nature of adult CRS, research on the characterization of pediatric CRS is still quite limited. The purpose of this study is to better understand the nature of pediatric CRS so that clinicians can better diagnose the various disease subtypes, understand the prognoses, and manage the disease effectively.

Methods:
Appropriate patient charts were identified by querying specific International Classification of Diseases, 9th and 10th Revisions related to CRS. All patients with ages 18 years or younger who have been diagnosed and treated for CRS at the Children's Hospital of The King's Daughters between 1/1/1999 and 7/5/2020 were included for evaluation. Patient charts were analyzed to determine patient demographics, comorbidities, and factors contributing to the development of CRS. Documented diagnoses, clinical presentations, imaging, medications, laboratory findings, and complications were also collected. 254 patients' charts were reviewed, and 26 patients were excluded due to exclusion criteria, resulting in 228 eligible patients.

Results:
Within the sample population, 61% were males and 39% were females; 59.2% were Non-Hispanic Caucasian and 27.6% were African American. The average age of the first diagnosis was 10.3±4.5 years old. In terms of comorbidities, 65.4% had allergic rhinitis, 43% had asthma, 14.5% had atopic dermatitis, 3.9% had immunodeficiency, and 3.1% had cystic fibrosis. 81.1% of patients reported nasal congestion, 59.6% reported having nasal drainage, 28.5% had facial pressure or pain, and 11.8% had a change in sense of smell. 23.2% of patients had nasal polyps identified. 22 patients had allergic fungal rhinosinusitis and 2 patients had fungal ball identified. Regarding complications from the CRS, 9 cases of periorbital infection and 4 cases of intracranial infection were reported. In terms of medication given during the study period, 77.2% of patients had oral antibiotics, 36% had topical antibiotics, 24.1% had intravenous antibiotics, 48.2% had oral steroids, 78.9% had topical steroids, and 27.2% had intravenous steroids. 46.9% of patients had prior adenoidectomy or received adenoidectomy as a part of management for CRS. 56.1% of patients had prior endoscopic sinus surgeries or received endoscopic sinus surgeries as a part of CRS management. 70.2% of patients had nasal endoscopy performed. Diagnostically, 71.1% of patients had one or more paranasal sinus CT scans, with a mean Lund-Mackay score of 9.3±6.3 and 19.7% of patients had tissue biopsy performed on sinus or adenoid tissues.

Conclusion:
In this preliminary study, pediatric CRS has an early childhood onset with a mean Lund-Mackay score of 9, is predominantly without nasal polyposis, and appears to be more frequent in males. The major comorbidities are allergic rhinitis, asthma, and atopic dermatitis, which align with the literature findings that CRS has an immunological and atopic element. Persistent nasal congestion and drainage were the common symptoms that prompted patients to seek care. CT scan was widely used to confirm the diagnosis and offered insights into the severity and anatomical locations of CRS. Common medical management included oral antibiotics, with Augmentin being the most prescribed antibiotics, and topical steroids, which were likely used to treat concurrent atopic diseases such as allergic rhinitis and asthma. Surgical interventions such as adenoidectomy and sinus surgery as second-line management appeared to yield clinical improvement upon review.

Abstract Title: Portsmouth Diabetes Prevention Project: EVMS Connect4Health+ Wellness Coaching during COVID-19

Author: Lukomski, Lydia
Co-Investigators: Rohini Perera. EVMS Margaret Baumgarten MD. EVMS Family and Community Medicine Tierra Langley. EVMS

Abstract

Introduction:
The residents of Portsmouth and Norfolk, Virginia suffer from higher rates of food insecurity, obesity, and diabetes when compared to the national and state averages (Feeding America, CDC). The National DPP is an effective measure for preventing or managing diabetes, but the year-long program has significant barriers, including cost, time commitment, and lack of childcare or transportation (Balk, et al.2015). The EVMS Connect4Health Wellness Coaching program aims to address community diabetes intervention and prevention needs while bypassing these barriers to vulnerable populations. Participants in the program are paired with coaches to conduct motivational interviewing, behavioral goal setting, and goal revision, to improve self-efficacy and create a better lifestyle. Additionally, participants are provided with a weight scale and blood pressure cuff to monitor their health, which is the Connect4Health+ component.

Methods:
Recruitment of participants took place at EVMS Portsmouth Family Medicine and EVMS Ghent Family Medicine. The only requirement is that participants were adult residents of either Portsmouth or Norfolk, spoke English and were not pregnant. The text and call features of Google Voice will be utilized to deliver wellness coaching to participants.

Results:
There are a total of 30 participants who have completed the consent, enrollment and assessment processes. Of these 30 participants, 26 are female and 4 are male. The age group of this cohort ranges from 24 to 75. 80% (N= 24) of participants identify as Black or African-American, 17% (N= 5) of participants identify as Caucasian and 1 participant chose to not identify themself. Out of the 30 participants, 50% (N= 15) are residents of Portsmouth and 50% (N= 15) are residents of Norfolk. Data generation of the project is currently ongoing. Coaches of the program have received assignments of participants and are in the midst of conducting sessions.

Conclusion:
As previous cycles of the project have resulted in positive outcomes, we foresee this happening for this cycle as well. With the incentives of receiving a weight scale and blood pressure cuff, we expect retention rates to be higher than previous cycles. Data collected from this project, will be used to build a program suitable for community implementation.

Abstract Title: LHCGR Mediates Angiogenic Signaling in Ovarian Microvascular Endothelial Cells

Author: Lund, Merete
Co-Investigators: 1. Andrew C. Pearson, Biomedical Sciences/PhD

Abstract

INTRODUCTION:
Angiogenesis within the ovulatory follicle is an important component of ovulation. The luteinizing hormone (LH) surge has been shown to be important for the initiation of angiogenesis indirectly through the activation of paracrine factors which then work on endothelial cells. The stimulation of the Luteinizing Hormone/Choriogonadotropin Receptor (LHCGR) by LH, or by human chorionic gonadotropin (hCG) in experimental models, has not been previously shown to act directly at endothelial cells in the ovary to stimulate angiogenesis. The presence and activity LHCGR on ovarian endothelial cells was explored to determine if there was a potential role for direct stimulation of angiogenesis by hCG during the process of ovulation.

METHODS:
Whole ovaries and ovarian biopsies and were obtained from female cynomolgus macaques. Monkey ovarian microvascular endothelial cells (mOMECs) were isolated from ovarian follicles. Immunostaining and western blotting were performed using a primary antibody against LHCGR on whole ovaries. Utilizing a nested polymerase chain reaction (PCR) approach, the LHCGR mRNA was amplified from mOMECs. mOMEC spent cell culture media was analyzed for cAMP using an enzyme-linked immunosorbent assays (ELISAs) and normalized to total cell protein, assessed by the bicinchoninic acid method. In the sprouting assay, mOMEC-coated polymer beads were added to a fibrin matrix with and without the addition of hCG. Beads were photographed, and the resulting number and length of sprouts were determined. In the proliferation assay, mOMECs were immunostained with an antibody against Ki67 to label actively dividing cells; positive and negative cells were counted, and data were expressed as the percentage of Ki67-positive cells. The proliferation assay was also performed with and without the addition of hCG and modulators of cellular signaling pathways. In the migration assay, mOMECs were placed on culture well inserts with porous membranes. hCG was added to the wells, and the number of cells that migrated across the membrane were counted.

RESULTS:
Ovarian vascular endothelial cells expressed LHCGR mRNA and protein. Immunocytochemical detection of LHCGR was found diffusely in mOMECs. Further, hCG stimulation caused LHCGR staining to localize around the nucleus. LHCGR was also detected via immunostaining in granulosa cells and vascular endothelial cells in ovarian follicles in tissue sections. LHCGR mRNA was detected with a nested PCR approach in four separate mOMEC lines. cAMP increased in mOMEC cultures in response to the addition of 20 IU/ml hCG, a dose comparable to the ovulatory surge of LH. cAMP stimulation with PGE2 served as a positive control. LHCGR agonists stimulated angiogenic actions in mOMECs. hCG increased proliferation in the Ki67 assay in mOMECs. hCG also increased migration in mOMEC significantly as compared to untreated controls. hCG increased the number of capillary-like sprouts after 24 hours and 48 hours in vitro; sprout length was not altered by hCG treatment. In the signaling pathway experiment, dibutyryl cyclic AMP (dbcAMP) was found to increase proliferation, suggesting a pathway involving cAMP. H89 addition was found to prevent the effects of hCG administration, suggesting protein kinase A (PKA) involvement in mOMEC proliferation. U71322 was also found to prevent the effects of hCG, and thus indicated a role for phospholipase C (PLC) in the LHCGR signaling pathway.

CONCLUSION:
LHCGR is present on ovarian microvascular endothelial cells in vivo and in vitro through demonstration of mRNA expression in mOMECs and immunostaining. hCG stimulation of migration, proliferation, and capillary-like sprout formation in vitro supports a possible role for hCG and LHCGR in ovulatory angiogenesis in vivo. A role for the Ga-s and Ga-q pathways in LHCGR signaling, through factors such as cAMP, PKA, and PLC, is also demonstrated, corresponding with previously studied LHCGR pathways in other cell types. In general, new blood vessels are established in steps: degradation of the capillary basement membrane, migration of endothelial cells, proliferation of endothelial cells, tube formation by endothelial cells, fusion and pruning of the vessels, and finally stabilization. The fact that hCG has been demonstrated to induce endothelial cell migration, proliferation, and tube formation in vitro can be directly correlated with key angiogenic events in vivo. While the LH surge in vivo is well-established to initiate follicle rupture and oocyte release, this research demonstrates an additional role in direct stimulation of angiogenesis of the luteinizing follicle, adding to the growing evidence for novel and exciting roles of LHCGR.

Abstract Title: Lentiviral Vector Creation for the Treatment of Alpha-Thalassemia Major

Author: Maddock, Alexander Simon
Co-Investigators: 1. Eva Segura, Molecular Biology Institute\ PhD Candidate, University of California, Los Angeles

Abstract

INTRODUCTION:
Alpha-thalassemia is a hemoglobinopathy characterized by the loss of functional alpha-hemoglobin protein via mutations or deletions of the alpha-hemoglobin alleles on chromosome 16, and is prevalent in around 5% of the world population.(1) Each chromosome holds two alpha-hemoglobin alleles. The severity of alpha-thalassemia depends on the number of alleles disrupted. The most severe cases have all four alleles disrupted leading to alpha-thalassemia major which leads to hydrops fetalis with severe anemia, fetal ascites, and subcutaneous edema. Embryonic fatality occurs without in utero treatment. Even with in utero treatment, which includes blood transfusions and allogenic stem cell transplantation, the risk of complications, toxic side effects, and limited efficacy pose significant challenges in improving the quality of life of these individuals.(2,3) While other hemoglobinopathies (e.g. beta-thalassemia, sickle cell disease) are the targets of numerous gene therapy treatments, alpha-thalassemia currently has a relative absence of lasting and sustainable curative treatments. The combination of untreated severity and absence of effective treatments comprise an unmet need. This project aims to fill that need by creating lentiviral vectors designed for the addition of functional alpha globin genes into patients with alpha-thalassemia major via autologous stem cell transplantation.

METHODS:
We set out to create four novel alpha-globin lentiviral vectors using Ultimate Vector(4), an optimized beta-globin vector created by Dr. Richard Morgan, as a starting point. One vector contained the roughly 450 bp alpha-globin cDNA, dubbed HBA2-cDNA, while a second vector contained the alpha-globin cDNA and a specific alpha-globin intron, dubbed HBA2-cDNAI1. The other two vectors contained the roughly 700 bp full length alpha-globin genes with one also containing additional full length enhancer elements from the GLOBE lentiviral vector (NCT02453477), dubbed HBA2-GLOBELCR, and the other containing partial length enhancer elements from the GLOBE lentiviral vector, dubbed HBA2-HS2. The rationale behind HBA2-cDNA and HBA2-cDNAI1 is the shortened lengths of the lentiviral vectors as beta-globin vectors were shown to have lower insertion efficacy with increased vector length. As the Ultimate Vector was a shorter optimized version of the GLOBE vector, using full length GLOBE vector enhancer elements could provide increased alpha-globin expression efficacy. These four vectors will be compared to determine if a shortened vector length, which is expected to give an increased insertion efficacy, or a longer vector length containing elements which would be expected to give increased expression efficacy will result in the highest mRNA alpha-globin expression after insertion into erythroid specific cell lines.
HBA2-cDNA and HBA2-cDNAI1 were created using PCR-based cloning with SuperFi II DNA Polymerase and Gibson assembly. HBA2-GLOBELCR and HBA2-HS2 were created using PCR-based cloning with SuperFi I & II DNA Polymerase and Gibson assembly along with restriction enzyme-based cloning.

RESULTS:
Upon assembly of the lentiviral vectors, they were sent for whole vector sequencing to verify a lack of mutations or deletions compared to the expected sequence. All four vectors showed proper sequencing and were progressed to the final stage of verification to confirm a lack of contaminants. Contamination with improper and/or incomplete vectors has been observed in previous beta-globin vector creation. A sequential restriction digest targeting different areas of the desired vector can rule out any impurities in the vector solution. These alpha-globin vectors underwent this process and showed no impurities.

CONCLUSION:
As the novel alpha-globin lentiviral vectors have been created, the next steps are to package the vectors into viruses, asses the virus titer values, and characterize the vector copy number and alpha-globin mRNA expression after insertion into erythroid specific cell lines.

The characterization of these vectors will allow for further analysis of insertion efficacy and gene functionality. This project signifies a significant step towards a lasting treatment for alpha-thalassemia major and an exciting future in the development of gene therapy for alpha thalassemia.

DISCLOSURES:
This research experience was sponsored by the American Society of Hematology and conducted at the Eli and Edythe Broad Center of Regenerative Medicine and Stem Cell Research at UCLA.

Abstract Title: Imaging Findings of Bicornuate Uterus at 9 weeks Gestation

Author: Malone, Ashlee
Co-Investigators: 1. H. Tyler Klause MD, Radiology\EVMS 2. Garrison Glavich MD, Radiology\EVMS 3. Kathy Byun MD, Radiology\EVMS

Abstract

INTRODUCTION:
Bicornuate uterus is a rare finding that is a part of a group of congenital defects called Mullerian Duct Anomalies (MDA). These anomalies are typically asymptomatic and not reported. Bicornuate uterus represents around 10% of the MDA's. It has clinical significance due to poor reproductive outcomes. We report on a case of an 18-year-old G1P0 female presenting with vaginal bleeding found to have an intrauterine pregnancy at 9 weeks in one horn of a bicornuate uterus.

Case Information:
An 18-year-old G1P0 at 9 weeks presented to the emergency department with vaginal bleeding that lasted over thirty minutes. The patient reported that she had mild lower abdominal pain and cramping that did not radiate. The patient did not recall any inciting event for the vaginal bleeding, her review of systems was negative, and she did not have pertinent medical history. On exam, she had diffuse pelvic tenderness without specific adnexal tenderness. The cervix was not able to be visualized. On bimanual exam, the cervical os was slightly open. Vitals were within normal limits. Lab workup included CBC, BMP, and urinalysis, all of which were unremarkable. Beta-hCG was 69,336 mIU/mL. Ultrasound demonstrated a uterus with 2 endometrial canals that appeared contiguous at the lower segment. Morphology suggested bicornuate uterus, however it was difficult to definitively discern bicornuate vs septate uterus with the acquired images. A single intrauterine gestational sac was positioned within the left-sided endometrial canal. No yolk sac was definitively visualized. The patient was seen by OBGYN and was deemed stable for discharge with minimal bleeding and resolution of pain. She was discharged with OBGYN follow up and 3D ultrasound imaging, along with strict return precautions.

Discussion:
The Mullerian ducts are responsible for the formation of the uterus and other structures such as the fallopian tubes and cervix. MDAs are rare congenital defects of organogenesis, fusion, or septal resorption. In a bicornuate uterus, there is incomplete fusion of the Mullerian ducts during the embryonic period, resulting in two separate uterine horns and one cervix. Clinically, bicornuate uteri are typically asymptomatic and therefore underreported. It is usually discovered during gestation, as seen in this case. Unlike other MDAs, bicornuate uteri have not been shown to affect fertility, however, women with bicornuate uteri have an increased risk for first and second trimester pregnancy loss, reported as high as 36% to 60%. Bicornuate uterus is also associated with increased risk of preterm birth, malpresentation and intrauterine growth. For diagnosis of bicornuate uteri hysterosalpingography, 2D and 3D ultrasonography, MRI and diagnostic hysteroscopy are all modalities that can be utilized. MRI is considered gold standard, and 3D ultrasound has been increasingly utilized because of its high sensitivity and specificity in diagnosing MDAs. However, 2D ultrasound is more readily available, low cost, and non-invasive, making it one of the first modalities used to evaluate a patient for uterine or pregnancy related anomalies, as in this case with presentation to the emergency department. In the management of bicornuate uterus, Strassman metroplasty has been shown to increase live birth rates up to 80% after surgical repair. However, it is suggested that metroplasty be reserved only for women that have suffered repeated pregnancy loss without any other apparent cause and are not amenable to gestational surrogacy.

CONCLUSION:
There are few cases of bicornuate uteri, which often remain undiscovered until gestation. It is important to report on these cases and their imaging presentation, as diagnosis will cause their obstetric care to differ from that of the general population. Patient education is also important in these cases to prepare them for increased risk of poor outcomes such as pregnancy loss and preterm birth.

Abstract Title: Correlation of VWF levels and Platelet Reactivity in a Canine Model of MCAO: Can VWF Inhibition Improve Thrombolytic Efficacy?

Author: Mandybur, Ian
Co-Investigators: 1. Debra Wheeler, Department of Neurological Surgery\The Ohio State University Wexner Medical Center 2. Ariana Carfora, Department of Neurological Surgery\The Ohio State University Wexner Medical Center 3. Taggart Stork, Department of Neurological Surgery\The Ohio State University Wexner Medical Center 4. Shahid Nimjee, Department of Neurological Surgery\The Ohio State University Wexner Medical Center

Abstract

INTRODUCTION:
Cerebral ischemic strokes are the leading cause of combined death and disability, with 6 million deaths worldwide annually. Von Willebrand Factor (VWF) is a novel and attractive target to exploit for anti-thrombotic therapeutics as it plays a pivotal role in platelet adhesion, activation, and aggregation. We have developed an RNA aptamer that binds to and inhibits VWF (DTRI-031) and designed an antidote (DTRI-025) that fully and rapidly reverses aptamer activity. We utilized a clinically relevant large animal stroke model of middle cerebral artery occlusion (MCAO) to elucidate DTRI-031 efficacy. We hypothesize that DTRI-031 will result in a lower plasma concentration of VWF as well as lower platelet reactivity at various timepoints of thrombosis.

METHODS:
A canine model of MCAO stroke was used to assess DTRI-031 efficacy in thromboembolic stroke compared to vehicle control in vivo. Digital subtraction angiography (DSI) was used to evaluate the microvasculature after MCAO and subsequent treatment with DTRI-031 or vehicle control (PBB). Enzyme-linked immunosorbent assay (ELISA) was used to measure VWF concentrations and platelet function analysis (PFA) was utilized to determine platelet reactivity and aggregation during the experiment.

RESULTS:
After MCAO induction, DTRI-031 administration resulted in a significant decrease in VWF concentration compared to negative control. Platelet function analysis demonstrated reduced platelet reactivity and aggregation in DTRI-031 treated canines compared to negative control.

Conclusion:
Intravenous administration of VWF aptamer DTRI-031 demonstrated significant VWF inhibition and reduced platelet aggregation in the setting of large vessel occlusion stroke compared to negative control (PBB). The findings presented suggest that the use of a drug-antidote combination targeting VWF may lead to the potential replacement of current stroke therapeutic as a superior treatment paradigm in acute ischemic stroke.

Abstract Title: Analysis of Treatments of Anaphylaxis Cases in the Emergency Department at CHKD from 2010-2020

Author: Marfo, Emmanuel
Co-Investigators: 1. Angela Hogan\ Allergy, Asthma and Immunology at CHKD 2. Omar Yamak\ CHKD 3. Jeremy Owens\ CHKD

Abstract

Introduction:
Anaphylaxis is a serious and potentially fatal allergic reaction that has rapid onset, and it can present with broad range of symptoms of severity including respiratory, cardiac, dermatologic, and gastrointestinal. Over the last 20 years the incidence of anaphylaxis appears to be increasing in the United States, the reasons why are poorly understood. Nationally, 17 percent of anaphylaxis cases from the Emergency department were referred to an allergist.

Methods:
Patients aged 0-21 diagnosed with ICD-9/ICD-10 codes for anaphylaxis and symptoms of allergic reactions at CHKD Emergency Department from January 1, 2010- August 31, 2020, were reviewed. Patients that were found to have an alternative diagnosis (e.g., asthma exacerbation, allergic reaction) were excluded. Data collected includes age of patient, race, gender, known allergies, presumed triggers, treatments, +/- admission, and any follow up with an allergist and the data was recoded in REDCap.

Results:
Data of n= 6152, 772 patients were diagnosed with anaphylaxis. Data showed that 48.6 percent (n=375) of the patients received epinephrine prior to arrival to ED, 43.0 percent (n=332) were given Epi in the ED and 88.0 percent (n=679) of patients were given an epinephrine prescription. Also, 56.8 percent (n=439) of the patients were given steroids in the emergency department, and 34.5 percent (n=339) were prescribed steroids. Lastly, 26.4 percent (n=204) patients followed up to see an allergist after anaphylaxis.

Conclusion:
Based on the data, 48.6 percent of people received epinephrine prior to the ED, and 43.0 percent were given an epinephrine at the ED, but only 88.0 percent of patients received a prescription. More than half of patients did receive steroids including a steroid prescription. Recent evidence suggests that steroids are highly unlikely to prevent serious outcomes. Furthermore, most of the patients diagnoses with anaphylaxis did receive epinephrine, but only 26.4 percent were seen for follow up to an allergist. The study highlights the need to standardize treatments of anaphylaxis in the emergency department. Future interventions should aim to assess treatment of anaphylaxis other settings such as Urgent Care.

Abstract Title: A Characterization of Patients Receiving Multiple Biologics for Chronic Inflammatory Diseases

Author: Marshall, Thomas
Co-Investigators: Joseph Han, M.D. EVMS otolaryngology Kent Lam, M.D. EVMS otolaryngology

Abstract

Objective:
Biologics, such as omalizumab, benralizumab, dupilumab, and mepolizumab, are used to treat nasal polyposis, asthma, atopic dermatitis,d urticaria. We aim to characterize the patients receiving multiple biologics for these type 2 inflammatory diseases from a single tertiary otolaryngology practice.

Materials and METHODS:
A retrospective chart review was conducted to identify patients prescribed a biologic between January 2000 and May 2020. Collected data included initial medication prescribed, reason for switching, and clinical progress after switching. The primary outcome measurement was changes in steroid usage.

RESULTS:
From an initial 110 patients, 21 patients provided sufficient datapoints and were included for analysis. Of the patients that switched their biologic medication, fifteen were initially prescribed omalizumab, five were initial prescriptions were mepolizumab, and one was benralizumab. Nine patients were switched to dupilumab, seven were switched to benralizumab, four were switched to mepolizumab, and one patient was switched to omalizumab. Eleven patients were switched to a new biologic because the initial biologic failed to adequately control patient's asthma. Five patients were switched to better control nasal polyps/sinus symptoms. After biologic switching, total steroid usage changed from 56,425 mg to 18,081 mg (p-value=0.071). 33 antibiotic prescriptions were written after initial biologic prescription, and 16 were written after biologic switching (p-value=0.080).

CONCLUSION:
The most common reason for patients to switch their biologic medication was to better control moderate to severe asthma. There was a trend towards significance in decreasing steroid and antibiotic usage after biologic medication switching.

Abstract Title: The Digital Patient Project: Trends in Data Standards for Modeling Human Biological Systems

Author: Martin, Nolan
Co-Investigators:

Abstract

Introduction:
Although numerous computational models of biological systems exist, there remains no complete computational or digital model of the human body and the biophysical processes that occur within. The Digital Patient Project aims to develop a comprehensive digital model of a human for *in silico* testing of healthcare advancements, health prediction, and application of precision medicine. These advanced tasks will require integration of new and existing models of cells, organs, and systems. This review examines the current usage of data standards, markup languages, and ontologies that provide a *lingua franca* for digital models to interact and identifies areas in need of further development.

Methods:
A review of existing efforts in human modeling was performed via electronic search of PubMed, computational modeling project websites, data standard documentation, and software repositories.

Results:
Many data standards exist for the modeling of cells and multicellular systems. However, digital biophysical modeling of organs and organ systems remains a novel concept. Existing organ modeling literature is often limited to conceptual models or proprietary implementations using MatLAB for physiological modeling without including the underlying biological processes of the organ or system being modeled. No standard frameworks for compiling multicellular models into whole organ models were found as of yet. Extensive ontologies exist for clinical and anatomical vocabularies relating to the biophysical function of organ systems.

Discussion:
The information from this review will be used by the Digital Patient Project to familiarize data scientists and modelers with the existing tools and standards for the digital modeling of human beings. Identifying common modeling standards from the outset of the project will ensure that collaborators and the computational models they develop will communicate with one another. Cellular models should leverage existing standards (CellML, FieldML, SBML) and ontologies. Work to date demonstrates that further development is needed to create common frameworks for integrating cellular models into larger organ- and systems-based models.

Abstract Title: Vascular Supply of the Abdomen on Angiography

Author: McCauley, Robert F
Co-Investigators: 1. Daniel O'Neal, MD, Department of Radiology 2. Tyler Krause, MD, Department of Radiology 3. Christopher Dobzyniak, MD, Department of Radiology

Abstract

INTRODUCTION:
Knowledge of the major abdominal arteries is a useful clinical tool in the workup of abdominal pathology. In addition, proper identification of these arteries and potential anatomical variants is a surgical necessity. This educational exhibit utilizes angiography to provide an overview of the major abdominal arteries.

Main Body:
The celiac artery and its branches are the predominant blood supply to the abdominal structures derived from the embryonic foregut. It originates ventrally off the abdominal aorta at the level of the T12 vertebrae. It courses anteriorly to the upper border of the pancreas, where it gives off its first branch, the left gastric artery. The left gastric ascends to supply the distal esophagus, as well as the lesser curvature of the stomach. Immediately distal to the origin of the left gastric, the celiac artery bifurcates into the common hepatic and splenic arteries. The common hepatic courses to the right where it bifurcates into the gastroduodenal and proper hepatic arteries. The gastroduodenal courses inferiorly to supply the pylorus of the stomach, the head of the pancreas, and the proximal duodenum. The proper hepatic artery gives rise to the right gastric artery, then extends to the left side of the common hepatic duct before bifurcating into the right and left proper hepatic arteries, which supply their respective hepatic lobes. In a common variant, the origin of the right hepatic artery is instead the superior mesenteric artery (SMA). On the opposite side, the splenic artery courses leftward along the superior border of the pancreas toward the spleen. It gives off short branches to supply the pancreas, as well as a short gastric artery and left gastroepiploic artery, which supply the fundus and greater curvature of the stomach, respectively. Upon entering the splenic hilum, the splenic artery divides into terminal branches supplying each segment of the spleen.

The SMA and its branches are the predominant blood supply to the abdominal structures derived from the embryonic midgut. It originates ventrally off the abdominal aorta at the level of the L1 vertebrae. It courses inferiorly, passing posterior to the splenic vein then anterior to the left renal vein. Prior to crossing over the uncinate process of the pancreas and third portion of the duodenum, it gives off its first major branch, the inferior pancreatoduodenal artery, which courses superiorly to anastomose with the superior pancreatoduodenal artery providing collateral circulation to the proximal duodenum and head of the pancreas. Once within the small bowel mesentery, the SMA gives off four-to-six jejunal and nine-to-thirteen ileal arteries to the left. On its right side, it gives off the ileocolic, right colic, and middle colic arteries, which supply the terminal ileum and cecum, ascending colon, and transverse colon, respectively. The middle colic artery forms anastomoses with the right colic artery and the left colic artery, a branch of the inferior mesenteric artery (IMA), to supply collateral circulation to the colic flexures. The order in which the middle colic, right colic, and ileocolic branch off the SMA varies significantly. Most commonly, the middle colic artery is the most proximal of three. In rare cases, the SMA and celiac artery arise from a common trunk off the aorta, forming a celiacomesenteric trunk.

The IMA and its branches are the predominant blood supply to the abdominal structures derived from the embryonic hindgut. The IMA originates ventrally off the abdominal aorta at the level of the L3 vertebrae. It courses inferiorly and obliquely to the left giving off its left colic and sigmoid branches which supply the descending colon and sigmoid colon, respectively. The IMA then crosses anterior to the left common iliac artery entering the pelvis as its terminal branch, the superior rectal artery, which supplies the rectum and the portion of the anus superior to the pectinate line. The IMA can present with a significant number of anatomic variants. For example, cases have been reported of the left colic artery arising directly off the abdominal aorta. In addition, the IMA can occasionally be the origin of the left renal artery or an accessory left renal artery.

CONCLUSION:
A proficient knowledge of the abdominal vasculature is an essential skill for physicians in both surgical and nonsurgical specialties. Angiography can be a useful tool for teaching vascular anatomy.

Abstract Title: Immediate versus Delayed Reconstruction of Skin Defects Following Malignant Tumor Resection

Author: McHugh, Claire
Co-Investigators:

Abstract

INTRODUCTION:
After surgical excision of a cutaneous malignancy, a surgeon can proceed with an immediate reconstruction or opt to delay the reconstruction and wait on the final pathology results. Currently, immediate reconstruction is typically used to perform a safe reconstruction of large and complex defects, however, the risk of having a positive margin and the need for re-excision can complicate the treatment course for the patient. A two-stage delayed reconstruction that involves placement of an artificial dermis (ex: Integra) at the time of the surgical excision can offer an alternative procedure that minimizes some risks of a long excision and reconstruction surgery until placement of a skin graft can occur 2-3 weeks later. A literature search was performed to evaluate the currently available information regarding delayed reconstruction using an artificial dermis after excision of a head and neck malignancy and also evaluated if there are any predictive factors for positive margins among different pathologies.

MAIN BODY:
Immediate versus Delayed Reconstruction: A meta-analysis performed by Quimbly et al compared immediate versus delayed reconstruction after resection of melanoma of the head and neck and found that immediate reconstruction had a lower rate of positive margins (6%) compared to delayed reconstruction (12%) and that there was only a 3% chance of local recurrence in immediate reconstruction after 2 years. Parrett et al evaluated immediate reconstruction in head and neck melanoma and found a 5.3% rate of positive margins and 2.6% local recurrence rate after a mean follow-up of 24 months. In the reconstruction of head and neck melanoma, a different study reported a 6% positive margin rate but there was no statistically significant difference in incidence between immediate and delayed reconstruction. Carradino et al examined 8 patient cases that had undergone delayed reconstruction of the scalp with Integra and found that 1/8 had a positive margin (12.5%) but 2/8 had early detection of a tumor recurrence. Similarly, Romano et al performed a retrospective study on 20 patients with malignant scalp tumors who had placement of an artificial dermis, and of the 17 patients that underwent the final reconstruction, three patients (15%) had positive margins. In a study evaluating single-stage reconstruction with Integra, a local recurrence was able to be detected at 20 days post-op in a patient that had Integra placed over a large defect.

Melanoma: Christophel et al reviewed 409 patient cases and found the only predictive factor for a positive margin was patient age with patients less than 55 having a significantly lower positive margin rate (4.63%) than the overall positive margin rate of 11.7%. When considering narrow margins (1-2cm) versus wide margins (>2cm) for excisions of melanoma in the head and neck region, Han et al demonstrated similar disease-specific survival among the two groups and suggested that survival depends on age, breslow thickness, and histological subtype.

Non-melanoma skin cancer: In low-risk basal cell carcinoma lesions that are less than 2cm, excisions with 4-6mm margins have been shown to have negative margins 95% of the time. Similarly, in squamous cell carcinoma, radial margins of 4mm for low-risk lesions and 6mm for high-risk are recommended to achieve oncologic clearance in approximately 95% of cases.

CONCLUSION:
In general, delayed reconstruction seems to have a slightly higher positive margin rate, but it offers an easier clinical path for re-excision if needed, especially in some higher-risk patients. Some studies suggest that utilization of an artificial dermis may help with earlier detection of a local recurrence, which makes it easier for the surgeon to perform a repeat excision and minimize future complications. However, a surgical plan of delayed construction requires a second surgery which carries some additional risks, and some unfavorable outcomes that are sometimes reported include infection, delayed wound healing, and contour deformity.

Next steps: Our proposed study will evaluate patients who have undergone immediate versus delayed reconstruction after excision of a cutaneous malignancy and determine if there are any significant differences in outcomes (such as positive margin rate and reported complications) among 35 different variables including demographics, risk factors such as smoking status, type of malignancy, excision margins, depth of invasion, and location. We decided to extend our study beyond the head and neck region to include the trunk and extremities, and we hope our results can be applied towards making an algorithm for which patients would most benefit from a delayed reconstruction with an artificial dermis based on their demographics, medical history, and tumor characteristics.

Abstract Title: Conversion Disorder to Marburg Variant Multiple Sclerosis - An Unnerving Tale

Author: Mohan, Sudarshan
Co-Investigators:

Abstract

Introduction:
Marburg Variant Multiple Sclerosis (MS) is an exceptionally rare disease with a fulminant and often fatal course. The presentation is classically multifocal and often includes motor and sensory deficits, aphasia, or seizures. We report an interesting case that was initially diagnosed as conversion disorder and rapidly deteriorated in a week leading to intensive care admission.

CASE INFORMATION:
A 22-year-old healthy female presented to the emergency department (ED) with her mother for concerns about refusing to speak for a day. The family reported a recent job loss as a stressor in life. Her labs and non-contrast CT head were unrevealing. The examination did not reveal any neurological deficits. A psychiatric evaluation was performed; she was diagnosed with conversion disorder and outpatient follow-up was recommended. Eight days after the onset of symptoms, she had another presentation to ED after being found unresponsive by her father. She had developed new-onset right-sided weakness in addition to prior complaints. The examination was significant for right-sided hemiparesis, clonus, and hyperreflexia. MRI revealed multiple T2/FLAIR hyperintense lesions involving the periventricular and subcortical white matter and central pons. Cervical MRI revealed an enhancing focus in the dorsal right cervical cord at the level of C3. MS panel showed oligoclonal bands. She was started on a five-day course of high-dose steroids for MS. She developed ophthalmoplegia on day two; plasmapheresis was initiated. Despite treatment, her neurological deficits further worsened, leading to respiratory failure requiring intubation. Repeat MRI revealed significant progression of demyelinating disease with several new and larger lesions in bilateral cerebral hemispheres. She was diagnosed with Marburg Variant Multiple Sclerosis due to characteristic imaging findings and rapid disease progression. High-dose cyclophosphamide treatment was started but was discontinued after five days due to significant leukopenia. She was switched to Rituximab and a follow-up MRI showed disease stabilization with no new lesions.

Discussion:
Multiple Sclerosis usually presents in young women and can be misdiagnosed as a conversion disorder. It is important to perform a thorough workup including MRI so that aggressive demyelinating diseases like Marburg variant MS are not missed. In fulminant MS, usually, high-dose cyclophosphamide is used after steroids and plasmapheresis does not improve the disease. Rituximab should be considered for treatment in refractory cases.

CONCLUSION:
This case highlights two central themes. Firstly, multiple sclerosis may present heterogeneously, and clinical and imaging findings of the disease can be mimicked by some psychiatric, infectious, neoplastic, or metabolic pathologies. As such, clinicians must be cognizant of presenting symptoms and diagnostic criteria and perform a thorough workup. Secondly, rare variants of MS such as Marburg variant continue to raise therapeutic dilemmas. Further contributions to literature are required to discern the appropriate treatment strategy for these rare pathologies and to reduce mortality and morbidity.

Abstract Title: A Drunken Heart: Severe Alcohol Withdrawal leading to Cardiac Arrest

Author: Mohan, Sudarshan
Co-Investigators:

Abstract

INTRODUCTION:
Acute alcohol withdrawal is a common and potentially life-threatening condition with a heterogeneous presentation. In addition to symptoms such as tremors, agitation, hallucinosis, and seizures, alcohol withdrawal can cause arrhythmias. We report a case of a young male without underlying cardiac abnormalities who experienced cardiac arrest secondary to torsades de pointes (TdP) in the setting of severe alcohol withdrawal.

CASE INFORMATION:
A 43-year-old male with a past medical history of alcohol abuse, hypertension, and chronic pulmonary emboli (on warfarin) presented to the emergency department for concerns of abnormal seizure-like activity noticed by his partner. The patient had poor memory of the incident. His vital signs were notable for tachycardia and elevated blood pressure. Initial labs revealed potassium of 3.0 mmol/L (ref. 3.5-5.5), magnesium of 1.5 mg/dL (1.6-2.5), phosphorus of 2.2 mg/dL (2.4-4.7), transaminitis, and elevated lipase. Initial electrocardiogram (ECG) revealed a corrected QT interval (QTc) of 461 ms. The patient scored 20 on the clinical institute withdrawal assessment (CIWA) for alcohol, and was admitted to the intensive care unit. He was started on dexmedetomidine infusion, chlordiazepoxide, and as needed lorazepam therapy. Electrolytes were repleted as per protocol. Six hours after admission, the patient experienced another seizure-like episode and had cardiac arrest secondary to ventricular fibrillation. Advanced cardiovascular life support algorithm was initiated; he was cardioverted for his ventricular fibrillation and return of spontaneous circulation (ROSC) was achieved. Review of telemetry strip prior to arrest was notable for TdP. ECG after ROSC showed a QTc of 617 ms, and repeat labs revealed potassium of 3.2 mmol/L, magnesium of 2.8 mg/dL, and phosphorus of 4.2 mg/dL. The patient's electrolytes were replenished aggressively and his QTc normalized after a few hours.

The patient was evaluated by the cardiology team, who recommended placement of an implantable cardioverter defibrillator (ICD) due to his cardiac arrest and concern for acquired Qtc syndrome. The patient was discharged after placement of ICD on nadolol 80 mg daily.

DISCUSSION:
QT interval prolongation is commonly observed in alcohol withdrawal, and is often the result of acquired long QT-syndrome due to concurrent drug therapy, hypokalemia, or hypomagnesemia. These electrolyte abnormalities should be particularly anticipated in patients with alcohol dependence due to poor nutritional status. Additionally, acute alcohol withdrawal may unmask some compensatory nervous system overactivity in the setting of chronic alcohol use, including increased QT variability or repolarization lability.

CONCLUSION:
Our case highlights the importance of establishing a baseline QTc on admission in patients undergoing alcohol withdrawal. It is vital that they be monitored on telemetry and have aggressive electrolyte replenishment in addition to withdrawal treatment. Further, it should be emphasized among clinicians to screen these patients for QTc abnormalities in appropriate clinical settings as diagnosing an underlying abnormality would enable appropriate preventative measures and reduce risk of severe arrhythmias or cardiac arrest.

Abstract Title: A Preliminary Assessment on the Utility of Universal Lipid Screening Guidelines at CHKD Pediatrics

Author: Mojadedi, Wais
Co-Investigators: Matilda Francis, EVMS\MD24 Shreeyas Kumar, EVMS\Summer Scholars

Abstract

Introduction:
Nearly 1 in 5 children were diagnosed with a pediatric dyslipidemia in 2019. Given the significant prevalence of dyslipidemias, and its high risk of morbidity and mortality, it is necessary to employ a screening protocol to ensure early detection and treatment of such derangements. Currently, however, there is a lack of evidence to suggest that the American Academy of Pediatrics (AAP) guidelines to employ a universal screening panel for all children ages 9-11, regardless of risk factors, is beneficial. This study aims to assess the utility, impact, and value of the current AAP guidelines on universal lipid panels at CHKD Pediatrics.

Methods:
A retrospective chart review was performed on 984 children aged 11-14 currently being followed by General Academic Pediatrics (GAP) at CHKD and CHKD Medical Group. Children who were outside this age range, or who did not receive care at GAP between the ages of 9-11, or who received a diagnosis of a heritable dyslipidemia before the age of nine were excluded from the study. Basic parameters were collected including patient demographics, past medical history, family history, BMI percentile, screening lipid panel results, other related laboratory studies (including comprehensive metabolic panel, HbA1C, TSH, free T4, urinalysis), resultant treatment plan following the lipid profile, and referrals to other services. The data was collected and statistically analyzed to observe trends related to treatment changes guided by the lipid panel results. Additionally, a value-based assessment was performed in order to estimate the cost of universal screening using 2021 Medicare reimbursement levels and a sensitivity analysis.

Results:
Of the 984 patients reviewed, 104 were excluded as per the exclusion criteria for a total of 880 patients included in the study. Of these, 424 patients received a screening lipid panel (48.2%) in accordance with the AAP guidelines, and 136 had at least one abnormal laboratory finding (32.5%). Those with at least one abnormality, 39 patients received a follow-up fasting lipid panel (28.7%), and it was determined that 11.4% of the screenings led to a modification and/or addition to the treatment plan. There was no significant trend observed between the ordering of lipid panels and patient demographics such as gender, family history, or race ($p = 0.94$, 0.07, 0.22, 95% CI, respectively). Additionally, it was observed that children who received a lipid panel had a significantly higher BMI percentile (mean 79.1 vs 68.8, $p < 0.001$, 95% CI), and were of slightly younger age (mean 10.3 vs 10.5, $p = 0.007$, 95% CI). Using the 2021 Medicaid reimbursement schedules for an office visit, lipid panel, and a fasting lipid panel, we estimate a gross total cost of services that did not provide value to the patient at nearly $9989.

Conclusions:
The current guidelines for universal screening of lipid panels in the pediatric setting remains ambiguous due to a lack of literature on the topic. In order to improve outcomes and emphasize value-based care, universal protocols must be assessed to determine net benefit for both patients and the healthcare system. In this preliminary study, we describe the general patterns of lipid screening in children ages 9-11 at two CHKD pediatric centers, and estimate the costs associated with incomplete follow-up, unremarkable lipid panels, and labs that do not impact the treatment plan.

Abstract Title: Area deprivation index and its effect on patient-reported outcome measures and satisfaction following arthroscopic rotator cuff repair

Author: Morgan, Caleb N.
Co-Investigators: 1. Donald Clark, EVMS 2. Kyle Deivert, EVMS 3. Catherine Eccleston, EVMS 4. Samuel Kim, EVMS 5. William Kim, EVMS 6. Justin Zaremba, EVMS 7.Kevin F. Bonner M.D. , Jordan Young-Institute (Senior Author))

Abstract

INTRODUCTION:
Limited studies exist investigating the effect of socioeconomic status (SES) on orthopedic surgery outcomes and patient satisfaction. There is a particular paucity of research investigating this relationship following arthroscopic rotator cuff repair. The aim of this study is to investigate the effect of Area Deprivation Index (ADI) on patient-reported outcome measures and patient satisfaction following arthroscopic rotator cuff repair.

METHODS:
Patients included in this study underwent primary arthroscopic rotator cuff repair performed by two surgeons at a private orthopedic practice between January 2015 and June 2019. Two hundred and eleven individuals (n=211) met inclusion criteria and responded to an online survey assessing patients' perception of surgical outcome and postoperative shoulder function. The survey included a 10 point visual analog scale (VAS) for shoulder pain, expectations, and outcome satisfaction. Patients were also asked to indicate whether they would have surgery again if needed, if they had postoperative complications such as prolonged shoulder stiffness or infection, and if they felt they made a full recovery. The American Shoulder and Elbow Surgeons Shoulder Score (ASES) and Simple Shoulder Test (SST) were included in the survey to quantify patient-reported shoulder function.

Patients' addresses were used to determine the ADI state decile of their residence using an online database. ADI was used as a measure of SES in this study. Patients were then divided into three groups based on ADI state decile. Group one consisted of individuals with the highest SES (ADI deciles 1-3, n=102); group two consisted of individuals with moderate SES (ADI deciles 4-6, n=82); group three consisted of individuals with the lowest SES (ADI deciles 7-9, n=27). All non-parametric ordinal data was analyzed using Kruskal-Wallis tests with pairwise comparison with adjusted p-values. Categorical responses were analyzed using chi-squared tests. Data analysis was performed using SPSS Statistics for Macintosh, version 28 (SPSS Inc., Chicago, Ill., USA).

RESULTS:
There was a main effect on VAS pain scores based on socioeconomic status, $H(2)=6.611$, $p=.037$. Pairwise comparison showed significant differences between individuals in the lowest SES group compared to individuals in the highest SES group ($p=.043$, $r=.17$). There was also a main effect on SST scores, $H(2)=7.46$, $p=.024$ with pairwise comparisons showing a significant difference between individuals in the lowest SES group compared to individuals in the highest SES group ($p=.019$, $r=.19$). A similar trend was seen for ASES scores with a significant main effect, $H(2)=6.53$, $p=.038$. Pairwise comparison indicated significant differences between individuals in the lowest SES group compared to individuals in the moderate SES group ($p=.041$, $r=.17$). There were no significant differences among groups for patient-reported expectations ($H(2)=.106$, $p=.948$) or outcome satisfaction ($H(2)=.404$, $p=.817$). Chi-squared analysis also revealed no significant differences among groups for post-operative complications ($X2\ (2)=.688$, $p=.709$), willingness to have the surgery again if needed ($X2\ (2)=1.254$, $p=.534$), or if they felt they made a full recovery ($X2\ (2)=.727$, $p=.695$).

DISCUSSION AND CONCLUSION:
Individuals with lower SES have significantly lower patient-reported outcomes and shoulder function following arthroscopic rotator cuff repair, specifically higher VAS shoulder pain scores and lower SST and ASES scores. The small effect size may be due to the comparatively smaller sample size of the group with lowest SES. We plan to further investigate this topic with hopes of discovering specific factors leading to these differences and to maximize the power of our study by increasing our sample size.

Abstract Title: Evaluation of Plaque Stability in the Brachiocephalic Arteries of Sleep Fragmented, Atherosclerotic Mice

Author: Ndubisi, Mukosolu
Co-Investigators: 1. Mukosolu Ndubisi 2. Alina Moriarty, Microbiology and Molecular Cell Biology 3. Dr. Elena Galkina, Microbiology and Immunology

Abstract

INTRODUCTION:
Cardiovascular disease (CVD) is the leading cause of death worldwide, accounting for over 25% of all global deaths. Atherosclerosis is the major etiological process responsible for CVD. It is a chronic inflammatory disease of the large and medium sized arteries characterized by the accumulation of fatty lesions within the vessel walls. As the disease progresses, the fatty lesions become increasingly more complex and develop into large, unstable atherosclerotic plaque. A large necrotic core, increased immune cell infiltration and alterations in the collagen networks can identify unstable atherosclerotic plaques that are vulnerable to rupture from the vessel wall. Ruptured plaques result in the severe clinical presentations of atherosclerosis, such as myocardial infarction and stroke. Lifestyle factors, including disturbed sleep, exacerbate the development and progression of vulnerable, rupture prone atherosclerotic plaques. Over 70% of Americans report receiving insufficient sleep. Furthermore, sleep fragmentation (SF) is tightly correlated with an increased risk of mortality due to a cardiovascular event. Therefore, understanding the effect of SF on the development of vulnerable plaques is necessary for future treatment plans for patients with atherosclerosis or sleep disorders.

METHODS:
Eight-week-old female *Apoe-/-* mice were randomly assigned to a sleep fragmentation (SF), activity control (AC), or a home cage group and fed a high fat diet (HFD) for 12 weeks to induce advanced atherosclerosis. Commercial sleep fragmentation chambers equipped with a mechanical bar were used to house the SF and AC groups and a standard mouse cage was used to house the HC group. Mice are nocturnal; therefore, the SF group had the mechanical sweeper moving every 2 minutes during the light period. To account for the forced activity of stepping over the motorized bar, the AC group had the motorized sweeper moving across the cage every 2 minutes during the dark period. Following 12 weeks of HFD feeding and SF, the brachiocephalic arteries were collected and the sections were stained with picrosirius red to detect collagen fibers and counterstained with hematoxylin to detect cellular nuclei. Images were collected using an Olympus BX53 Microscope equipped with a polarizing filter and the percentages of necrotic areas, intra-plaque cellularity, and collagen composition were quantified using ImageJ software.

RESULTS:
Following 12 weeks of sleep fragmentation and HFD-feeding, the BCAs from female *Apoe-/-* mice had an increased percentage of intra-plaque cellularity and necrotic core formation when compared to both AC and HC control mice. Additionally, sleep fragmentation resulted in a decrease in total collagen content throughout the plaques as well as in a shift in the composition and distribution of the collagen fibers. Plaques from the BCA of sleep fragmented female *Apoe-/-* mice had fewer thick collagen fibers and more thin collagen fibers.

CONCLUSION:
This data suggests that sleep fragmentation decreases the stability of atherosclerotic plaques in the BCA of HFD-fed, female *Apoe-/-* mice by increasing plaque cellularity and necrosis while decreasing collagen content. Together these results suggest that sleep fragmentation accelerates the development of rupture prone, vulnerable atherosclerotic plaques in female Apoe-/- mice.

Abstract Title: Improving health outcomes through understanding access to oral health care in Hampton Roads
Author: Nsianya, Michele Chinelo
Co-Investigators: Erica Stephens, Summer Scholars

Abstract

Introduction:
Oral health is essential to overall health, yet it is often neglected. This may lead to conditions such as diabetes, cardiovascular disease, and Alzheimer's. For pregnant individuals, good oral health is an imperative part of a healthy pregnancy. Pregnancy and its physiologic changes cause changes in the oral cavity leading to gingivitis, periodontitis, etc. Despite this fact, only a third of pregnant women in Virginia had seen their dentist in the past year. Moreover, pregnant individuals are prone to sleep apnea, a condition in which airways are blocked at night resulting in lack of oxygen. Untreated sleep apnea can, again, lead to conditions such as heart disease, diabetes, etc. Dental providers can screen for sleep apnea as well as other changes in the oral cavity. This project aims to assess one component of access to oral health care and treatment for pregnancy-related conditions such as sleep apnea for people in the Hampton roads area.

Methods:
Data will be collected on general dentistry practices in the Hampton Roads area to determine if they treat pregnant individuals in addition to screening and treating sleep apnea. Results will be analyzed to determine areas of opportunity as well as barriers to oral health care for pregnant populations and recommendations will be made on steps to improve access oral health care during pregnancy.

Results:
Results suggest most general dentistry practices treat all pregnant women (new or existing) in any trimester, but most restrict based on OB/Gyn recommendation. Moreover, slightly more general dentistry practices do not screen for sleep apnea than those who do. If they do screen, those practices will provide treatment in the form of an oral appliance, refer to a sleep specialist, or recommend a sleep study.

Conclusion:
Results show that pregnant individuals, with permission from their OB/Gyn, can be seen by dentists. However, there are barriers to receiving sleep apnea screening and treatment. They might have to be referred out to sleep specialists or primary care doctors to be screened and treated for suspected sleep apnea and other possible pregnancy-related conditions.

Abstract Title: Imaging Considerations for Pulmonary Embolism in Patients with Post-Surgical Congenital Cardiac Anatomy

Author: Olivares, Philip
Co-Investigators: 1. Garrison Glavich, EVMS Radiology 2. Kathy Byun, EVMS Radiology

Abstract

INTRODUCTION:
The sequela of altered anatomy secondary to post-surgical congenital heart pathology can present diagnostic challenges especially with regards to pulmonary embolism imaging. We report a case of a 29-year-old woman with history of congenital heart defects status post Glenn and Fontan cardiac procedures. She presented to the emergency room due to left sided upper abdominal pain with concern for pulmonary embolism (PE).

Case Information:
A 29-year-old woman with history of dextrocardia and unbalanced left ventricle dominant AV canal defect status post Glenn and Fontan cardiac procedures presented to the emergency department with left sided upper abdominal pain. The patient met criteria for SIRS and was subsequently admitted.
A CTA pulmonary embolism chest was ordered which showed opacified pulmonary vasculature of the left lung and unopacified right pulmonary vasculature. The differential for this included acute pulmonary embolism, chronic pulmonary embolism, and blood mixing artifact from the patient's altered anatomy. The patient was also found to have stage IV hepatocellular carcinoma on subsequent CT abdomen pelvis and MRI imaging. Due to the patient's lack of hypoxia and presumed cause of abdominal pain being from their hepatic mass, the patient was not treated for PE and was discharged once stable with GI consultation and follow up.

The patient had multiple subsequent presentations to the hospital where other CTAs of the chest were performed with only the right lung vasculature being opacified due to the right arm being used as the contrast injection site. It also showed a small possible small filling defect at the right lung base with differential again including acute pulmonary embolism, chronic pulmonary embolism or mixing artifact from the patient's altered anatomy. A cardiac MRI was eventually performed demonstrating artifact as a cause of the right lower lung perfusion defect and no pulmonary embolism on the left. The patient had a subsequent emergency room visit, which entailed a repeat work up of CTA chest and a perfusion scan, with similar findings from previous imaging.

Discussion:
Patients with surgically corrected congenital cardiac anomalies make up a small subset of the general patient population in our community. It is reported in the literature that patients with congenital heart disease that have undergone post-surgical changes can present certain difficulties when it comes to diagnostic imaging. In patient's that have undergone the Fontan procedure, there are known false positive findings and limitations regarding pulmonary embolism evaluation using standard CTA chest and ventilation and perfusion scintigraphy scans. Our own experience corroborates with what has been reported by others in the literature and highlights the importance of understanding the post-surgical changes, it's effect on routine imaging protocols, and the need for protocol modification if possible.

CONCLUSION:
Post-surgical congenital cardiac anomaly patients can present diagnostic challenges with regards to imaging. False negatives are commonly present when imaging with CTA pulmonary and ventilation perfusion scans with regards to pulmonary embolism rule out. Modifying existing CTA protocols or utilizing different imaging modalities such as venous phase (standard timing) CT chest as well as MRI may be more useful in lieu of the more traditional image modalities for pulmonary embolism rule out in these patients.

Abstract Title: Invasive Fungal Infection caused by Curvularia Species in a Patient with Intranasal Drug Use: A Case Report

Author: Pham, Jason
Co-Investigators: Bakri Kulla, MD, Internal Medicine

Abstract

INTRODUCTION:
Invasive fungal infections (IFIs) are uncommon infections that account for approximately 27.2/100,000 cases per year in the United States. One form of IFI is chronic invasive fungal sinusitis (CIFS). These infections progress slowly over weeks or months without a clear diagnostic picture, which can delay necessary intervention. If untreated, invasion into neighboring structures may cause altered mental status, seizures, strokes, proptosis, and intracranial complications.

Case Information:
An afebrile 43-year-old female with a history of polysubstance abuse presented to the ED due to altered mental status, left sided facial droop, right sided hemiparesis, and slurred speech. The patient was somnolent but arousable to stimuli and appeared acutely ill. The patient's mother reported a history of cocaine abuse, which was confirmed on urine toxicology. A CT head and neck with contrast revealed subacute basal ganglia lacunar infarcts and a left sphenoid opacity with scattered hyperintensities and erosive changes. One month prior, she had been diagnosed with a left superior pole kidney mass and a left-sided enlarged periaortic lymph node containing multiple noncaseating granulomas and GMS stains positive for fungal hyphae.

The patient underwent nasal endoscopy with tissue biopsy. Tissue showed necrotizing invasive fungal sinusitis with granuloma formation and foreign-body giant cell reaction. Fungal speciation of the tissue culture showed Curvularia species was placed on IV voriconazole. While the infection stabilized, her neurologic deficits did not significantly improve. She was discharged to inpatient rehabilitation.

Discussion:
CIFS is infrequently diagnosed and its indolent nature with progression over weeks or months can make diagnosis and treatment difficult. The most frequent fungal species identified are the Aspergillus species, but Curvularia species have been found as well. Previous studies have associated intranasal illicit drug use as a potential cause of CIFS, however it is not well documented.

Intranasal use of cocaine causes vasoconstriction due to its sympathomimetic effects to elicit sinonasal tissue ischemia and cerebral vasospasm. With extended use, chronic mucosal inflammation can occur that can result in sinonasal osteocartilaginous necrosis. Necrotic tissue can then serve as a nidus for invasive fungal organisms. Additionally, intranasal cocaine use can induce cerebral vasospasm and platelet aggregation which can precipitate strokes. Our patient showed components of vascular disease in her posterior circulation that can be contributed to vasospastic etiology. However, fungal infiltration was also suspected given her extensive fungal disease. Similarly, her renal mass was also suspected to be a complication related to the underlying fungal infection.

The diagnosis of CIFS is dependent on histopathologic demonstration of fungal invasion of biopsied regions. Imaging modalities including CT and MRI scanning can be suggestive, but are not sufficiently specific or sensitive.

The main forms of interventional modalities include surgical debridement and antifungal therapy to maximize survival. Historically, patients required treatment for 5 to 18 months with amphotericin B or voriconazole. However, studies now suggest that voriconazole may be the drug of choice due to prevalence of Aspergillus species etiology. Overall survival rates are not well documented, but outcomes depend on prompt diagnosis and management. Suspicion for invasive fungal infection should be higher in patients with a history of intranasal drug or inhalant use, particularly if they have symptoms of nasal obstruction, infraorbital swelling, altered mental status or proptosis.

CONCLUSION:
Chronic invasive fungal sinusitis is a potentially fatal infection that can present in immunocompetent individuals. Fungal organisms can colonize necrotic regions, which may be prevalent in intranasal cocaine and unconventional inhalant use. Due to its indolent nature, early diagnosis and management is challenging. Recommended treatment includes surgical treatment and prolonged antifungal therapy.

Abstract Title: Determining Risk Factors Associated with Complications and Readmission in Pediatric Tissue Expander Surgery - an ACS NSQIP-P Analysis

Author: Pham, Jason
Co-Investigators: Victor Yu, Medical Student

Abstract

INTRODUCTION:
Tissue expanders were first used by Dr. Charles Neumann in 1957 for the reconstruction of the ear. Now, tissue expanders are used for a variety of indications for skin and soft tissue including, but not limited to, breast reconstruction, burn management, wound healing, and birth defects.The use of tissue expanders in the pediatric patient population is an established reconstructive tool for indications including congenital nevi, burn scars, and aplasia cutis. Despite the regular use of tissue expanders in the pediatric reconstruction, complications including infection and extrusion are still commonplace. However, risk factors that predispose patients to certain complications remains relatively understudied. The aim of this study is to evaluate the association between certain risk factors and the likelihood of short-term complications or readmission.

METHODS:
A retrospective case control analysis was conducted using the data from the American College of Surgeons National Surgical Quality Improve Program Pediatrics (ACS NSQIP-P) database with data aggregated from 2012-2019. Our study included pediatric patients under the age of 18 undergoing a form of tissue expander placement or removal as identified by the Current Procedural Terminology (CPT) codes 11960 (Insertion of tissue expander(s) for other than breast, including subsequent expansion), 11970 (Replacement of breast tissue expander with permanent implant), 11971 (Removal of breast tissue expander without insertion of implant), and 19357 (Breast reconstruction, immediate or delayed, with tissue expander, including subsequent expansion).The primary outcome of interest of this study is whether patients are more likely to experience complications or readmissions based on certain types of risk factors and location of tissue expander insertion or removal. Patient comorbidities were structured into categories aggregated into groups to account for more rare cases.

The demographic, comorbidities, and perioperative variables were compared utilizing binary logistic regression between patients who had a complication or readmission to those who did not. Continuous variables (i.e. age, total anesthesia time, total operative time) were compared by using a 2-tailed t-test while assuming equal or unequal variances based on the Levene test. Following bivariate analysis, any variable with a p-value < 0.05 was included in a multivariate binary logistic regression model or multivariate linear regression model.

RESULTS:
A total of 472 cases of patients underwent tissue expander insertion or removal. Of this amount, approximately 62 (13.1%) of patients had complications or a readmission. The mean age of all patients was 7.6 ± 5.4 years and 20 (32.3%) were male. Statistically significant associations on bivariate analysis included: ethnicity (Hispanics vs. non-Hispanic), patients with hematologic disorders, patients with SIRS/sepsis/septic shock 46 hours prior to procedure, increased operative time, increased anesthesia time, wound class (clean vs. contaminated/dirty), inpatient setting, and extremity as location of procedure.

On multivariate analysis, patients who had sources of hematologic/SIRS/sepsis/septic shock within 46 hours prior to procedure, contaminated wound class (AOR 2.505, $p<0.05$), or an inpatient setting (AOR 3.793, $p<0.05$) were more likely (AOR 5.546, $p<0.05$) to have an adverse effect. Patients who received a procedure on their extremity were more likely (AOR 3.200, $p<0.05$) to have complications compared to other locations (i.e. breast, scalp, face, etc). Patients who had increased anesthesia or operative time were not statistically significant.

CONCLUSION:
Short term postoperative complications remain prevalent. This data demonstrates that a variety of risk factors, both medical and non-medical, can contribute to the incidence of complications or readmission. It is important to understand that tissue expansion in pediatric patients has risks and knowledge of these risk factors can help guide the plan of care.

Abstract Title: Factors associated with patient adherence to remote monitoring during radiation treatment for head and neck cancer

Author: Phillips, Sarah
Co-Investigators: Adam S. Garden, The University of Texas MD Anderson Cancer Center Eileen H. Shinn, The University of Texas MD Anderson Cancer Center Sanjay Shete, The University of Texas MD Anderson Cancer Center Maria Camero, The University of Texas MD Anderson Cancer Center George Baum, The University of Texas MD Anderson Cancer Center Beth M. Beadle, Stanford University Medical Center

Abstract

Introduction:
Remote patient monitoring (RPM) can improve the early detection and mitigation of cancer treatment-related complications, and may improve health-related outcomes and quality of life. RPM's success may depend, at least in part, on patients' adherence to remote monitoring protocols. However, factors that influence adherence to RPM are largely unknown. Using mobile and sensor technology, daily blood pressure/pulse, weight, and electronic patient-reported outcomes (ePROs) were monitored remotely in head and neck cancer (HNC) patients undergoing radiation treatment (RT) to identify dehydration risk and to enable medical intervention when necessary. In this sample of HNC patients, we evaluated potential factors associated with RPM adherence.

Methods:
Patients completed the MD Anderson Symptom Inventory-Head and Neck (MDASI-HN) and the Functional Assessment of Cancer Therapy-Head and Neck (FACT-HN) at baseline, end of RT, and 6-8 weeks post-RT completion; the MDASI also was completed every 2 weeks during RT. The Patient Activation Measure (PAM) was completed at baseline and 6-8 weeks post-RT completion. A device usability survey measuring perceived usefulness of RPM was completed at the end of RT. Adherence to daily monitoring was recorded objectively. Demographic and clinical data were obtained from patients or the medical record. Longitudinal analysis compared the relationship between demographic, clinical, and patient reported outcome data and monitoring adherence.

Results:
Participants were 80% male, 87% White, and 91% married. As general and HN-specific symptom severity and interference with daily living increased, RPM adherence decreased (p=0.018, 0.043, 0.038, respectively). Mean PAM scores decreased between baseline and 8 weeks post-RT across four "activation" categories: believed patient activation was not important (1% baseline, 8.2% post-RT), lacked confidence and knowledge to take action (7.9% baseline, 8.2% post-RT), began to take action (30.4% baseline, 26.5% post-RT), and took action (60.7% baseline, 57.1% post-RT). PAM scores were not correlated with RPM adherence. Patients reported modest levels of perceived usefulness of RPM: 49.4% of patients reported RPM "mostly or extremely" helped their healthcare providers monitor their illness; 41.4% of patients reported RPM was "mostly or extremely" helpful for early detection of problems related to their health; 39.9% of patients reported RPM was "mostly or extremely" helpful in managing symptoms related to cancer treatment; 46.7% of patients reported RPM "mostly or extremely" gave them a feeling of security during RT. Only the single item indicating perceived feeling of security was positively correlated with RPM adherence (p=0.032).

Conclusion:
Although a benefit of RPM may be early detection and mitigation of symptoms during RT for HNC, the increasing symptom burden experienced during treatment may interfere with RPM adherence. PAM scores indicated that patients may have demonstrated higher levels of patient activation in general, which may account for the non-significant correlation with adherence. Better adherence to RPM may be attributed to patients perceiving a sense of security from daily monitoring and may suggest a potentially important value that patients gain from RPM. Understanding factors that impact patient adherence to RPM may help improve acceptability and clinical utility of RPM in oncology.

Abstract Title: Building the Capacity of Public School Teachers for Comprehensive Sex Education Intervention Using Digital Platforms Under the Context of the COVID-19 Pandemic

Author: Phung, Tram
Co-Investigators: Authors: Tram H.; Phung, Lauren T. Gilgannon, Gay V. Goldsmith; Rebecca J. Slimak; Julie Z. Yi; Stacey L. Carpenter; Taylor S. Wallace; Kelli J. England; Amy C.; Paulson, Matthew C. Herman; Hongyun Fu

Abstract

Introduction:
Access to comprehensive sex education (CSE) for school-age youth is limited in Virginia due to a range of socioeconomic, cultural and structural barriers. We launched a CSE program targeting adolescents in Norfolk, with a major focus on building the capacity of Physical Education (PE) teachers in public schools to implement the Get Real CSE curriculum for long-term sustainability and impact. The curriculum was developed by the Planned Parenthood League of Massachusetts (PPLM),

Methods:
Three Training of Educator (TOE) trainings were conducted between August 2020 and March 2021, using Zoom video conferencing software. Virtual in-depth interviews (IDIs) (N=9) and an online quantitative survey (N=39) were conducted among training participants to learn about their experience with sex education, TOE training, and recommendations. A pilot Get Real program was implemented in May/June 2021, involving certified PE teachers and middle and high school students with parental approval. The process of implementation was carefully designed and documented, using pre- and post-assessment surveys, session summary forms, fidelity forms, attendance logs, and program feedback forms.

Results:
A total of 65 individuals were trained and certified, including 56 PE teachers and 9 program staff. The PE teachers on average had six years of experience in teaching sex education. The vast majority (60%) never received sex education training, or received limited ad hoc training over 10 years ago. Key challenges related to teaching sex education included 1) the stigma associated with sex and sex education for youth; 2) current sex education curriculum is outdated; 2) restrictions about discussing sensitive topics, such as homosexuality, abortion, and masturbation; 3) concerns over potential rejection from parents/guardians over topics related to gender, sexual orientation, and protective methods; and 4) teachers' comfort/confidence level in teaching certain sex education topics. 5) All teachers considered it necessary to provide CSE at public schools. The vast majority of TOE participants (84%) rated the virtual TOE as "good"/"excellent", and considered the **Get Real CSE curriculum a good fit for schools.**

Conclusions:
Virtual capacity building training using digital platforms is a feasible and effective approach to promote school-based CSE for adolescents under the context of the COVID-19 pandemic.

Abstract Title: Video-Based Tracheostomy Care Education for Medical Students
Author: Pu, Serena
Co-Investigators: John Boyle, M.D.; EVMS Otolaryngology Benjamin Rubinstein, M.D.; EVMS Otolaryngology Matthew Bak, M.D.; EVMS Otolaryngology A. Brooke Hooper, M.D; Associate Dean For Clinical Education, Internal Medicine Jonathan Mark, M.D.; EVMS Otolaryngology

Abstract

Introduction:
Tracheotomy is a common otolaryngologic procedure with a high rate of post-operative complications that requires management by a variety of healthcare providers. Non-otolaryngologic healthcare providers have demonstrated a lack of knowledge and confidence in caring for patients with tracheostomies, both of which improve with targeted tracheostomy education programs. Despite this, tracheostomy care is rarely included in pre-residency medical education. The purpose of this study is to evaluate the effectiveness of a tracheostomy care video on third year medical students' knowledge of and confidence in performing tracheostomy care.

Methods:
Prior to beginning clinical rotations, third-year medical students completed a 10-question tracheostomy care knowledge test (100 points total) and 11-question confidence survey (110 points total). Students watched an 18-minute teaching video on tracheostomy care, and then repeated the knowledge test and confidence survey. Students also rated the helpfulness of the video out of 10.

Results:
147 medical students completed the educational module. After watching the tracheostomy education video, the average score on the knowledge test improved from 57.8 to 88.9 points out of 100 ($p<.0001$) and the average rating in overall confidence improved from 12.7 to 49.1 points out of 110 ($p<.0001$). Students considered video helpful, with a rating of 7.4 out of 10.

Conclusion:
Medical students' knowledge of tracheostomy care and confidence in caring for patients with tracheostomies improved after watching the educational video. Tracheostomy education should be included in early medical education so that future physicians of various specialties can better care for their patients with tracheostomies. Internet-published videos are an easily accessible educational resource with great potential for providing healthcare students, patients, caregivers, and healthcare providers with tracheostomy care knowledge.

Abstract Title: Peer Tutoring in Higher Education and Beyond: a literature review

Author: Publico, Pierce Rico
Co-Investigators: 1. Peggy Gesing PhD, Student Affairs Committee 2. Allison Knight PhD, Student Affairs Committee

Abstract

INTRODUCTION:
Peer tutoring is a recognized, supplemental academic resource employed globally by postsecondary schools, professional programs, and more. The benefits of peer tutoring have been widely analyzed in the past, but recent studies have shown to include more advantages than just enhanced academic performance. The Student Affairs Committee at Eastern Virginia Medical School (EVMS) performed a service review of peer tutoring in the higher education and health professions education setting. Along with this review, student researchers conducted a review of the literature on peer tutoring.

METHODS:
PubMed and ERIC were searched to elicit articles published within the last ten years to present (2011-2021) using the following keywords: "peer tutor," "peer assisted learning," "peer teaching," which were at times in conjunction with "medical school," "higher education," and "professional school." Both quantitative and qualitative studies were included in this review. Studies that described peer mentoring or peer reviewing were excluded. 24 articles were originally found during the literature review and 10 articles were used following exclusion criteria.

RESULTS
Ten articles were selected for analysis. Comparisons focused on either new or improved peer-to-peer tutoring programs implemented within higher education curricula. These studies were drawn from various populations (U.S. and Non-U.S.), including First Year undergraduates, Medical students, Dental students, Nursing students, Law students, and First Year postgraduate residents. All ten of these studies included a discussion of the advantages for tutees, these included student satisfaction and enjoyment with their programs, improved knowledge of subject matters, and improved peer engagement within their class. Additionally, tutors were noted to gain teaching and communication skills, increased knowledge of subject matter of tutored courses, and a higher degree in motivation or willingness to continue tutoring services. It was found that a potential weakness for most of these articles was the lack of description about tutors' previous experiences in teaching, styles of teaching and/or communication, and measurements of the consistency of high-yield topic coverage among tutor-tutee pairings. As most of these studies involved a single institution, there are several limitations to consider, such as small sample sizes, inability to be generalized, and confounding differences in sample characteristics.

CONCLUSION:
Peer tutoring is a beneficial resource that impacts both tutors and tutees. By performing a broad literature review on peer tutoring programs, that included undergraduate students, health profession programs, and both in U.S. and non-U.S. settings, common themes were found for both tutors and tutees. These were improved content knowledge and skills, enhanced interpersonal communication, and developing interprofessional relationships. Further analysis on the evaluation of peer tutoring services implemented at EVMS is encouraged.

Abstract Title: An Interesting Case of Rapidly Progressive Primary Lateral Sclerosis

Author: Purohit, Keshin M
Co-Investigators: Dr. Saad Mussarat, EVMS Internal Medicine Dr. Susan Brown, Sentara Neurology Specialists

Abstract

Introduction:
Primary Lateral Sclerosis (PLS) is among the spectrum of progressive motor neuron diseases involving the upper motor neuron (UMN) system. PLS remains a diagnostic challenge due to its rare occurrence and overlap with other motor neuron diseases, especially amyotrophic lateral sclerosis (ALS).

Case:
A 57 year-old African American male presented to the hospital with progressively worsening speech, gait, repetitive falls, and incontinence. His medical history was significant for laryngeal cancer in remission and episodes of alcohol abuse. Approximately one year prior he developed slowing of his speech, which progressively became indiscernible. Within this timespan he developed difficulty ambulating due to ataxic gait, ultimately becoming bed-bound.

Physical examination revealed an alert and fully oriented, cachectic-appearing male. He was unable to ambulate and his speech was garbled and incomprehensible. He had no sensory deficits but had notable hyperreflexia with decreased power (2/5) in bilateral upper and lower extremities. Magnetic resonance imaging (MRI) reported hyperintense subcortical signals in the precentral gyri with associated cortical susceptibility. Symmetric hyperintense signal was revealed in the cerebral peduncles at the expected regions of corticospinal tracts with extension on the right to the posterior limb of the internal capsule. Cumulatively, these findings were suggestive of ALS. As part of the work up, an EMG was also performed. The EMG did not show any fasciculations, fibrillations, or other spontaneous activity to suggest lower motor neuron disease. Lab findings were notable for CPK 684IU/L, ESR>120 mm/hr, TSH 87mIU/L and T4 of 0.6 ug/dL, for which he received levothyroxine. Based on his examination findings and absence of lower motor neuron (LMN) disease he was diagnosed with PLS.

Discussion:
PLS is a rare motor neuron disease, distinguished from ALS by the absence of LMN pathology. In a majority of PLS cases, symptoms follow an ascending progression and appear insidiously over three to five years. Symptoms commonly begin in the lower extremities and progress superiorly with asymmetric severity, culminating in spastic quadriparesis. Corticobulbar dysfunction typically occurs later in the disease course, resulting in permanent dysarthria and dysphagia. Our case is a rare presentation of PLS with rapid progression of symptoms and early onset of corticobulbar dysfunction. Based on chart review for symptoms of weakness, the duration of symptoms was estimated at just under 2 years. In accordance with the 2019 International PLS Conference "Consensus Diagnostic Criteria" this diagnosis was specified as "Probable" PLS.

Conclusion:
It is important to recognize PLS as it has a favorable prognosis and slower progression compared to ALS. The diagnostic certainty criteria for PLS indicates that symptoms should be present for at least 4 years for definite diagnosis. In cases with clear symptomatology and rapid progression of symptoms, it may be appropriate to make a definite diagnosis earlier than 4 years.

Abstract Title: Multiple verruciform xanthomas on the scrotum: an unusual case presentation

Author: Ramos, Vanessa L
Co-Investigators: 1. Stefan Edemobi, department of dermatology/MD student 2. Stephan Duran, MD, department of dermatology/PGY2 3. Robert J. Pariser, MD, department of dermatology/board-certified dermatologist

Abstract

Introduction:
Verruciform xanthoma is a rare variant of cutaneous xanthoma. It typically presents as a solitary papule or nodule primarily on the oral cavity, but it can also be found on the anogenital areas.2 Herein, we report an atypical case of a man with multiple verruciform xanthomas on the scrotum.

CLINICAL PRESENTATION:
A 47-year-old man presented to the dermatology clinic for evaluation of asymptomatic erythematous papules on the scrotum present for over two years. The lesions had had progressively grown since onset and the patient initially thought they were "skin tags." He had no known history of sexually transmitted diseases or prior genital lesions. His past medical history was significant for hypertension, acid reflux, squamous cell carcinoma (SCC) of the tongue, and acoustic neuroma.

On physical examination, there were multiple erythematous exophytic papules and nodules on the scrotum. A shave biopsy was performed on a 1.2-cm pedunculated scrotal lesion. Histology revealed verrucous proliferation of the epidermis with areas of endophytic parakeratosis and numerous foamy histiocytes in the papillary dermis, consistent with the diagnosis of verruciform xanthoma.

DISCUSSION:
Verruciform xanthoma generally appears as a solitary yellowish or erythematous verrucous papule or nodule, primarily on the oral mucosa. Less frequent cases have been reported on the anogenital area (scrotum, penis, and vulva), face, and extremities. Multiples of this lesion are relatively uncommon and are often found in association with an underlying condition such as graft versus host disease, CHILD syndrome, systemic lipid storage disease, necrotizing fasciitis, jaw trauma, and poor oral hygiene. To our knowledge, this is the second case of multiple verruciform xanthomas on the scrotum.

Histopathologically, verruciform xanthoma is typically characterized by hyperkeratosis, papillomatosis, and acanthosis of the epidermis with neutrophilic infiltrate. The presence of lipid-laden foamy histiocytes in the papillary dermis that stain positively by periodic acid Schiff (PAS) method and CD68 antigen is an important distinguishing feature; these cells stain positively by periodic acid Schiff (PAS) method and for CD68 antigen.2

The etiology of verruciform xanthoma remains unclear. It likely reflects a multifactorial reactive process resulting in the degeneration of the epidermis and damaged keratinocytes releasing lipids that are subsequently engulfed by dermal macrophages, forming lipid-laden histiocytes. Localized trauma or irritation had been proposed as a key trigger. Other authors speculate that verruciform xanthomas may be related to immune dysfunction, given its association with some immunocompromised states and autoimmune disorders. Interestingly, the appearance of our patient's verruciform xanthomas occurred contemporaneously with his chemoradiation treatment for SCC, and he likely experienced an immunocompromised state during this time. Likewise, there are two reported cases of verruciform xanthomas developing after chemotherapy and radiation therapy for lymphoma.

Verruciform xanthoma has a benign clinical course. Treatment with simple excision is often curative. Topical imiquimod 5% and shave debulking with fractionated carbon dioxide laser therapy have also been shown to be effective treatments.

CONCLUSION:
Verruciform xanthoma is a benign lesion that more commonly occurs on the oral mucosa. Cases of multiple verruciform xanthomas on the scrotum, as seen in this patient, are rare. More research is needed to understand the pathogenesis and associated risk factors of this neoplasm.

Abstract Title: Granulomatous Foreign Body Reaction in the Setting of Immune Reconstitution Inflammatory Syndrome

Author: Ramos, Vanessa L
Co-Investigators: 1. Robert J. Smith, MD, Department of dermatology/associate professor 2. Alice Roberts, MD, PhD, Department of dermatology/associate professor

Abstract

Introduction:
Foreign body granulomas develop when foreign material is introduced into the skin, causing a type IV hypersensitivity response. These lesions can occasionally occur in the setting of immune reconstitution inflammatory syndrome (IRIS) following the initiation of antiretroviral therapy.

CASE PRESENTATION:
A 58-year-old female with a history of well-controlled HIV on HAART presented with multiple tender nodules over the hands, upper arms, legs, and trunk. The lesions appeared in areas previously traumatized by IV drug use, which she had discontinued a decade prior. The patient denied any new exposures but stated that she received an IM corticosteroid injection for chronic back pain the day before. She had been on various antiretroviral drugs in the past, with the most recent regimen consisting of dolutegravir and lamivudine (initiated six weeks prior). HIV laboratory results showed a CD4 count of 683/mm3 and a viral load of < 20 copies/ml, which had been steady over the last several months.

Two punch biopsies on the right lower leg revealed a granulomatous inflammatory process with multinucleated giant cells in the presence of granular, pigmented material in the deep dermis and subcutis. The material was partially refractile on polariscopic examination. Periodic Acid-Schiff (PAS), Acid- Fast Bacilli (AFB), FITE, and iron stains were negative. Tissue cultures for bacteria, fungus, and AFB all failed to detect any microorganisms. Based on the histopathology, the patient's history, and the distribution of the lesions, it was suspected that the patient had a delayed foreign body reaction to previously introduced foreign material (e.g., intravenous drugs) in the setting of IRIS. Over the next three weeks, the nodules resolved spontaneously.

Discussion:
Although antiretroviral therapy has many advantages, there are a number of cutaneous side effects that can occur, such as hypersensitivity reactions, urticaria, and morbilliform eruptions. Additionally, foreign body granulomas have been described in HIV-infected patients in the setting of IRIS following the initiation of HAART.
IRIS is characterized as a type IV immune response to previously undetected pathogens or foreign material. It occurs secondary to immune cell recovery after the commencement of antiretroviral therapy. These symptoms generally occur within weeks to few months of initiating HAART. Our case is unusual as the patient had been on HAART therapy for several years before she developed this IRIS-related reaction. In addition, it is unclear what triggered this reaction since the patient had received IM steroids in the past without complication, and her HIV labs (CD4 count and viral load) had been consistently steady for many months.

CONCLUSION:
Clinicians should be aware of this atypical clinical presentation occurring in the setting of possible IRIS. Depending on the underlying causal agent, foreign body granulomas may spontaneously regress. Corticosteroid treatment (topical or intralesional) or surgical excision can be used to remove these lesions.

Abstract Title: The Combined Effects of Sleep Disorders and Cocaine on Central and Peripheral Inflammation

Author: Reed, Kirstin M.
Co-Investigators: 1. Ashley M. Carter, EVMS MD Class of 2024 2. Soheil Kazemi Roodsari, EVMS Department of Pathology and Anatomy 3. Yan Cheng, EVMS Department of Pathology and Anatomy 4. Ming-Lei Guo PhD, EVMS Department of Pathology and Anatomy

Abstract

INTRODUCTION:
Sleep disorders and drug addiction are two major public health concerns throughout the world, especially in developed countries. Cocaine abuse can induce sleep problems such as reduced sleep time and quality as well as dysregulated sleep patterns. Conversely, sleep disorders can cause multiple neuropsychiatric problems such as anxiety and depression, which promote drug addiction. Sleep disorders and drug addiction have high comorbidity and could interact with each other to worsen and accelerate the disease course. However, the mechanisms underlying this phenomenon remain unknown. Accumulating evidence demonstrated that both sleep disorders and drug abuse activate microglia and increase neuroinflammation levels, which are precedent to neurological symptoms. In addition, sleep disorders and drug abuse could affect the autophagy pathway, which is closely linked to microglial activation. In this study, we aim to investigate whether sleep disorders and cocaine could induce combined effects on microglia *in vivo* and to identify the possible underlying mechanisms.

METHODS:
We employed chronic sleep fragmentation (SF) and repeated cocaine injections in 3-month-old male wild type C57BL/6 mice. Mice were divided into four groups receiving different treatments (n = 5, ± SF ± cocaine). We utilized a three-week SF regimen (12 h/day) with daily cocaine injections (20 mg/kg) during the third week. Mice were sacrificed for brain removal one day after the last injection, and the striatum, hippocampus, and frontal cortex regions were dissected and separated out. We also collected peripheral organs including sections of the liver, spleen, and intestine. The total protein and RNA were extracted from these tissues. Microglia activation status, neuroinflammation levels, and autophagy flux, and peripheral inflammation were assessed by western blot and qRT-PCR analysis.

RESULTS:
Biochemical results indicated an increase in microglia activation in the hippocampus of mice with SF and cocaine compared to mice receiving only SF, only cocaine, or neither. We also found that the active form of caspase-1 (a protease that initiates the inflammatory response by cleaving the inflammatory cytokine IL1β) was significantly increased in both the striatum and hippocampus of mice with SF and cocaine. Finally, we found additive effects of SF and cocaine on liver and spleen inflammation.

CONCLUSION:
Our data showed that SF and cocaine have combined effects on both central and peripheral inflammation.

Abstract Title: Blood Pressure Quality Improvement through Home Monitoring and the heartBEAT program

Author: Remo, Julianna
Co-Investigators:

Abstract

INTRODUCTION:
In the first phase of its Play-Do-Study-Act (PDSA) plan, the EVMS Primary Care Internal Medicine (PCIM) office improved the number of patients with hypertension who had an in-office blood pressure (BP) measurement that was at goal (<140/90) from 38% to 54% by training staff on how to properly measure BP, and by repeating the BP measurement after the patient had been seated for 5 minutes. Patients with uncontrolled hypertension, which includes 46% of PCIM patients are subject to the devastating consequences of their condition such as kidney failure, heart attacks, and stroke (SPRINT Research Group et al., 2021). This quality improvement project seeks to improve hypertension control in PCIM patients with uncontrolled hypertension and encourage this cohort to build heart healthy habits through the implementation of a personalized coaching system coupled with home BP monitors.

METHODS:
Patients were selected with the following criteria: PCIM patients must have had the diagnosis of hypertension and at least 3 consecutive office BP measurements with systolic BP >140 mmHg and diastolic BP >90 mmHg (18-62 years old) or systolic BP >150 mmHg and diastolic BP >90 mmHg (65+ years old). Patients above the age of 65 with BP measurements 130-150 mmHg/80-90 mmHg were excluded due to increased harm associated with pursuing lower measurements, adhering to the Eighth Joint National Committee guidelines (Amstrong, 2014).

Patients who had an office visit in the past 12 months were systematically informed via phone call and occasionally when they presented for an office visit of the program project goals and requirements. A total of 42 adults chose to participate in the program. Nine chose to use their own BP monitor and manually record results. 33 participants elected to use the provided Omron 10 monitor. Five participants are white and 37 are Black/African-American. Their ages range from 32-66 years old.

At Day 0, patients were re-informed of the project in detail and informed consent was obtained in writing. Then patients were loaned a free Omron 10 monitor by Omron Healthcare Incorporated and were assisted in installing the companion app "Omron connect US/CAN" and syncing the devices. Patients were enrolled in the heartBEAT program. This program is a free 6-month digital health program created by the nonprofit organization BEATDiabetes. The program provides customized reminders for medication, BP monitoring, and exercise, as well as general lifestyle advice and motivation. Patients were instructed to take their BP at least once a day, every day, for the duration of the program. Proper BP measurement technique was explained and demonstrated by the staff. Patients demonstrated verbal understanding and then demonstrated proper technique using the monitor and transferring their measurements. Finally, patients signed an agreement to adhere to the program's requirements. In cases where the patient used their own BP monitor instead of the Omron 10 monitor, individual monitors were calibrated in office to ensure accuracy. If the monitor was found to be inaccurate, it was replaced with a pre-calibrated Omron 10 monitor.

The protocol for the 3- and 6-month follow-up appointments is as follows. Patients will return to clinic and have their BP measured by clinic staff on both the Omron 10 monitor and the calibrated office monitor. All measurement data will be transferred from the Omron 10 monitor or the patient's written record to the provider computer system. Patients will be reminded of proper BP measurement technique and program requirements. Patients will fill out a short questionnaire rating the perceived helpfulness of the heartBEAT program and a personal 7-day health inventory.

RESULTS:
This project is ongoing and no final results have yet been produced.

CONCLUSION:
This project is ongoing and no final conclusions have yet been drawn.

Abstract Title: Conversion of prior Fibular Bone Graft to Total Hip Arthroplasty via the Anterior Approach

Author: Rogers, Joseph David
Co-Investigators: Joseph Gondusky, Jordan-Young Institute

Abstract

INTRODUCTION:
Conversion of prior free vascularized fibular graft (FVFG) to total hip arthroplasty (THA) has been reported for alternative surgical approaches. The anterior approach (AA) for conversion THA is not well documented in the literature, and there are no known studies documenting the use of the AA for conversion of FVFG to THA. The AA presents unique challenges with femoral access. The presence of a FVFG in place is a significant obstacle to safe femoral preparation. In this novel case report, we detail the surgical technique of converting prior FVFG to THA via the AA.

Case information:
The patient is a 41-year-old female of average build (5'10", 82.4 kg, body mass index 26.1 kg/m2). Her medical history is significant for major depressive disorder, anxiety, migraine headaches, and a rare polymorphic blood clotting disorder (MTHFR/eNOS T-786C mutation). She underwent FVFG for left hip osteonecrosis elsewhere. On initial presentation, she reported severe hip pain at 6/10, night pain, and a 6-block walking tolerance. Her pain was localized primarily to the left groin, as well as lateral and posterior aspects of the hip. She expressed difficulty with daily living activities and an inability to sit on the floor without experiencing pain. Physical exam showed no significant limb length discrepancy, and passive range of motion revealed flexion to 100 degrees, internal rotation to 20 degrees, and abduction to 50 degrees. Having failed multiple intra-articular steroid injections and non-operative treatment, she was indicated for conversion THA. She underwent AA conversion THA 11 years and 1 month after prior FVFG. On postoperative day (POD) #1, she was walking 150 feet and performing stair training, weight bearing as tolerated. On initial clinic follow-up one month out (POD #33), appropriate x-ray images were taken, and the patient was doing well with no significant pain or use of assisted ambulatory devices. Upon further follow-up, she continued to progress in ambulatory capacity and walked without issue at follow-up 5 months postoperative.

Discussion:
The term "conversion hip arthroplasty" is used when hips with a prior surgical procedure require THA. Conversion arthroplasty has been reported to have increased complications and worse outcomes relative to primary THA. The AA for total hip arthroplasty has the advantage of supine positioning and live fluoroscopy, and it presents an option for primary, conversion and revision THA procedures. The case presents a typical FVFG conversion scenario. Intraoperatively, the stout fibular graft impeded fibular access, requiring removal with a burr and rongeur. In addition, a trans-osseous wire required removal to safely access the femoral canal for broaching. The patient underwent an uncomplicated surgery with discharge on POD #1 and a pain-free hip now two years post-operative.

CONCLUSION:
Conversion THA presents challenges not encountered in primary surgery. Prior FVFG presents the unique challenge of densely sclerotic graft at the femoral neck that can complicate femoral preparation. This case report attempts to educate the reader about preoperative and intraoperative issues to consider, specifically when performing the surgery through the AA.

Abstract Title: COVID-19 and its effect on BMI year over year in both normal BMI patients and already identified at risk population with BMIs >85% pre-pandemic

Author: Runzo, Dustin Michael
Co-Investigators: 1. Tamir Abassi, EVMS/Medical Master's 2. Parth Contractor, EVMS/MD 2024 3. Rylie Mainville, EVMS/MD 2024

Abstract

Introduction:
Although the prevalence of childhood obesity had been stabilizing nationally prior to the pandemic, a recent population-based study in Pennsylvania published May 2021 showed the rate increasing again. There is an incomplete understanding of the potential causes for how the pandemic has affected the rate of increase of children's BMI.

Methods:
English speaking patients were enrolled between 4 and 17 years of age who were being seen in the General Academic Pediatric department (GAP) at Children's Hospital of The King's Daughters (CHKD) for well checks. Patients needed to be seen at GAP for >2 years and have a recorded BMI for at least 2 visits separated by one year. BMI percentile was collected by chart review. Consented patients over age 8 and parents/guardians were administered a questionnaire that asked about relative changes over the past year in fast food intake, fruit and vegetable intake, water intake, activity level, screen time, and family time.

Results:
Data was collected from 238 pediatric patients; 51% were female (122/238) and 49% were male (116/187). Primary racial demographics were 78% Black (185/238), 8% Mixed Race (20/238), 7% White (16/238), and 3% Hispanic/Latino (6/238). Age ranges were represented by 42% of subjects being between 4 and 8 years old (78/187); 39% between 9 and 13 (72/187); 20% between 14 and 17 (37/187). In general, BMI percentile did increase over time ($p < 0.001$), however, when separated by sex, the increase is significant only for females. The increase in BMI percentile over the pandemic correlated positively with an increase in family time ($R = 0.164$, $p = 0.010$) and an increase in screen time ($R = 0.160$, $p = 0.012$) over the last year. No significant correlations were found between the increase in BMI and the four other lifestyle factors investigated.

Conclusion:
These results of a predominantly African American sample correlate well with the previous population-based study that children's BMI has increased during the pandemic. Two significant factors in this increase were increased time with family and increased screen time. As BMI increase is multifactorial, future studies could focus on investigating other factors that likely may have been affected by the pandemic.

Abstract Title: An Analysis of the Demographics, Etiologies, and Symptoms of Anaphylaxis amongst Pediatric Patients at a Local Emergency Department in Norfolk, Virginia

Author: Schiefer, Levi S
Co-Investigators: 1. Jeremy Owens, CHKD Dept. of Pediatrics 2. Omar Yamak, CHKD Dept. of Pediatrics 3. Angela Hogan, CHKD Dept. of Allergy, Asthma, and Immunology

Abstract

Introduction:
Over the past several decades, the incidence, severity of symptoms, and rate of admission of anaphylaxis cases seen in emergency departments around the United States has been increasing. The rate of presentations for anaphylaxis has increased by two-fold from 2005-2014, and admissions have increased by thirty to forty percent. Studies have historically shown that the leading cause of presentation for anaphylaxis in emergency departments is due to food allergies. Pharmacologic-induced etiologies, including vaccines and medications, are the leading cause for admission. This study attempts to assess the local rates, along with associated demographics, etiologies, and type and severity of symptoms of pediatric anaphylaxis presentations at the emergency department (ED) at the Children's Hospital of the Kings Daughters (CHKD) in Norfolk, Virginia.

Methods:
A list of ICD-9 and ICD-10 codes for diagnoses associated with allergic and anaphylaxis-type reactions, including anaphylaxis, was compiled to ensure any presentations at the CHKD ED for anaphylaxis were included. Inclusion criteria for analysis included presentations of pediatric patients aged 0-21 and a date range from 2010-2019. Each chart that met the above criteria was then screened by multiple, independent investigators to determine if they met the criteria for anaphylaxis. Anaphylaxis was defined by a chart meeting the 2010 NIH Guidelines for Anaphylaxis. Each presentation that met the inclusion criteria and was positive for anaphylaxis was encoded into the Research Electronic Database Capture (REDCap) tool, with information such as patient demographics (including patient age at time of encounter, gender, and race); admission status; inciting trigger for anaphylaxis; and type and severity of symptom being recorded.

Results:
Using the inclusion criteria above, 772 charts positive for anaphylaxis were encoded into REDCap. The most common race was Black or African American at 47.3%, with an additional 44.9% of patients being White. Males made up 55.1% of cases. Nearly a third of patients required admission, at 30.2% of cases. Eight percent of patients were less than 1 year of age, 21% of patients were aged 1-2, 19% of patients were aged 3-5, 24% of patients were aged 6-10, 19% of patients were aged 11-15, and 9% of patients were aged 15-21. A significant majority of anaphylaxis cases were induced by food, at 69%. 16% of cases had an unknown etiology, 12% of cases were due to a drug or vaccine, and the rest were due to an insect sting, exercise, or other cause. The most common symptoms of anaphylaxis were urticaria at 75.2%, mucosal or angioedema symptoms at 57.5%, and general respiratory symptoms such as dyspnea or new-onset cough at 54.2%. The least common symptoms were cardiovascular symptoms such as hypotension or syncope and neurological symptoms such as a decreased Glasgow Coma Scale score or an impending sense of doom.

CONCLUSION:
By analyzing the demographics, admission status, etiology, and type and severity of symptom of pediatric anaphylaxis cases, physicians can better recognize the most common presentations of anaphylaxis in our community, which may differ from a historical or textbook pattern of presentation. Future studies will assess whether any statistically significant correlation exists between patient demographics, type and severity of symptoms, and admission status.

Abstract Title: Telehealth Utilization and No-show Rates during COVID-19 Pandemic in the EVMS HOPES Clinic and Clínica Comunitaria Esperanza

Author: Schmidt, Christian
Co-Investigators: Shambhawi Thakur, EVMS/MD2024 Rohan Sharma, EVMS/MD2024 Lydia Sa, EVMS/Global Health Brynn Sheehan, EVMS/Healthcare Analytics Institute

Abstract

Introduction:
The Health Outreach Partnership of EVMS Students clinic (HOPES) and Clínica Comunitaria Esperanza (CCE) are student-run free clinics that provide medical care to the uninsured and underinsured residents of Hampton Roads. Both HOPES and CCE transitioned to telemedicine from March to October of 2020. This project aims to evaluate the effect of telehealth on no-show (NS) rates in the EVMS HOPES and CCE Clinics during the COVID-19 pandemic.

Methods:
A retrospective chart review of HOPES and CCE was conducted to analyze NS rates while the clinics were utilizing telemedicine during the COVID-19 pandemic (March-October 2020) and NS rates of in-person clinics held during the same months of 2019. This analysis focused on primary care appointments only. Charts explicitly marked as NS and appointments marked as 'pending arrival', but with no affiliated chart, were counted as a NS. A chi-square test of independence was performed to examine the relationship between in-person and telehealth NS rate for HOPES and CCE, respectively.

Results:
392 CCE appointments (in-person=222, telehealth=170) and 190 HOPES appointments (in-person=151, telehealth=39) were analyzed. CCE had an 16% in-person NS rate and a 19% telehealth NS rate. The HOPES clinic had an 23% in-person NS rate and a 21% telehealth NS rate. A chi-square test of independence showed no statistically significant difference between the in-person and telehealth NS rates in either CCE (OR=0.83, 95% CI (0.47, 1.45), p=.60) or HOPES (OR=1.16, 95% CI (0.45,3.29), p=0.91).

Conclusion:
The lack of statistically significant difference in NS rates with the integration of telehealth during the COVID-19 pandemic in both clinics conflicts with findings from other primary care clinics, which reported improvement in NS rates during this period. Unlike HOPES and CCE, those clinics are not safety net clinics. The likely differences in patient access to care and relevant resources (like broadband internet) may explain these conflicting results. Given the complex impacts of COVID-19, it is difficult to account for how the pandemic affected patient attendance in clinic. Further research is essential to evaluate the efficacy of telehealth within the free clinic setting.

Abstract Title: A Retrospective Comparative Analysis of Patients Diagnosed with Diabetes and Hypertension at EVMS HOPES and Clínica Esperanza Student-Run Free Clinics

Author: Sharma, Rohan
Co-Investigators: 1. Shambhawi Thakur, MS, Doctor of Medicine c/o 2024 2. Christian Schmidt, Doctor of Medicine c/o 2024 3. Lydia Sa, MPH, EVMS/Global Health 4. Brynn Sheehan, PhD, EVMS/Healthcare Analytics Institute 5. Alexandra Leader, MD, MPH, EVMS/CHKD/Global Health

Abstract

Introduction:
Health Outreach Partnership of EVMS Students (HOPES) and Clínica Comunitaria Esperanza (CCE) are student-run free clinics established in Norfolk, VA. Each clinic serves a similarly uninsured but culturally and linguistically distinct patient community, with additional differences in immigration status. A comparative analysis of patient characteristics and clinical outcomes of HOPES and Clínica Esperanza patients may facilitate the identification of inequities and preventable gaps in care with the goal of improving healthcare services and population health equity. This study compares the prevalence of hypertension and type 2 diabetes mellitus (T2DM) across the two clinics.

Methods:
A retrospective chart review was conducted for all HOPES patients diagnosed with hypertension (n=455) and T2DM (n=149), and all CCE patients diagnosed with hypertension (n=49) and T2DM (n=31). The point prevalence rate of both conditions was standardized per 100 patients and directly compared to observe possible differences.

Results:
The point prevalence rate of primary hypertension diagnoses at HOPES clinic was 21.3 cases per 100 patients, while the prevalence rate at CCE was 11.3 cases per 100 patients. The point prevalence rate of T2DM diagnoses at HOPES clinic patients was 7 cases per 100 patients, while at CCE the prevalence rate was 7.2 cases per 100 patients.

Conclusion:
The prevalence rate of primary hypertension at HOPES clinic was higher than at CCE, while the prevalence of T2DM was similar across both clinics. The higher prevalence of hypertension diagnoses observed is likely multifactorial and may be related to, among other factors, different diagnostic practices across the two clinics, disparate healthcare and medication access of the patient groups, or more broad differences observed between these two culturally distinct communities. Further analyses must be completed to determine whether the difference in hypertension diagnoses is statistically significant, and to determine whether being a HOPES patient vs. CCE patient is a predictor of disparate health outcomes. Future areas of investigation include comparisons of age and gender, representing important demographic hallmarks for patients with hypertension and T2DM, and comparisons of medications prescribed, which can help discern any difference in treatment preferences and practice patterns by HOPES and CCE clinic providers.

Abstract Title: Early indicators of potential behavioral health concerns in toddlers

Author: Shelton, Morgan G
Co-Investigators: Miranda Teixeira, EVMS\MD2024

Abstract

Introduction:
Early childhood mental health concerns can develop in children of all ages and many risk factors are present from birth (Shonkoff 2003; Zeanah 2018). The Early Childhood Screening Assessment (ECSA) is a validated screen for primary care providers to identify infants from 18 months to five years of age in need of socioemotional assistance (Gleason et al 2016). Our research 1) examines the convergent validity of the ECSA in this age group using demographic and clinical factors and 2) explores associations between demographic and clinical factors and the increased risk of early childhood social emotional (SE) problems as identified by the ECSA test at 18 months.

METHODS:
Data from a nationally representative sample of toddlers with completed ECSA at 18 months were extracted from a national screening platform (CHADIS) used in pediatric primary care settings. Data also included concurrent Family Assessment of Safety and Stress survey, Conflict Tactics Survey, demographics, as well as ASQ-3 for all ages available. Concurrent validity was examined in bivariate associations between the ECSA results and predicted factors. Variables with a significant association were entered into a regression model using SPSS-Statistics26.

RESULTS:
In total, 1416 children had a completed ECSA at 18 months with 7% (n=102) positive. Convergent validity: SE concerns on the ECSA are associated with lower income, less formal education, non-private insurance, being a child of color, caregiver behavior (spanking, parenting stress, and caregiver depression), and developmental delays on the ASQ-3 up to 18 months. Predictive modeling: In a linear regression, caregiver behavior, being a child of color and having a history of failed ASQ-3 tests explain 14% of the variance of the ECSA.

Discussion:
The ECSA demonstrates acceptable convergent validity with expected clinical and demographic variables. Race uniquely explaining some of the variance of the ECSA may indicate additional adverse discriminatory experiences. Other factors predicting variance of the ECSA include a history of developmental delays (ASQ-3) and caregiver behavior. Neither have adequate sensitivity to predict ECSA outcomes. These findings support ongoing promotion of early childhood SE screening in primary care and suggest that early interventions to support caregivers may improve toddlers' outcomes.

Abstract Title: The effect of simulated space radiation exposures on executive function and processing speed in rats as shown by a switch task

Author: Stephenson, Sam D
Co-Investigators: 1) Richard Britten, Radiation Oncology

Abstract

Introduction:
Switching attention between two different cognitive rule sets, task switching, is a complicated process involving diffuse frontoparietal neurological activation. Switching tasks has a performance decrement in which response times or accuracy are impaired following the changes in cognitive attention, known as a switch cost. Switch tasks are highly sensitive to cognitive disturbances and have been shown to be affected by stress, chemotherapy, aging, and many other pressures. Failure of task switching has repeatedly led to cognitive lockup in aviation pilots and this failure has been the sole cause of preventable crashes. Astronauts need to perform at the highest level for successful completion of their mission. Task switching is commonly used to accomplish both routine and mission critical tasks. Unfortunately, astronauts are subject to many of the same outside cognitive influences that have led to cognitive lockup in pilots. When astronauts travel to Mars, they will be subjected to space radiation (SR) which has been shown to induce many types of cognitive dysfunction in rats. We set out to perform the first experiment looking at the effects of simulated space radiation on switch task performance in rats.

Methods:
16 Male Wistar rats: 4 Shams, 6 He4 exposed rats, and 6 Galactic Cosmic Radiation spectrum (GRC) exposed rats were trained and put through a touchscreen switch task. The switch task was a single sensory modality utilizing two sets of lights. Rats were trained to activate the trial by pressing a center light then were presented with a light stimulus on one side of the screen. They had to choose the appropriate response, as fast as possible, to receive an intermittent food reward. This was completed in random blocks of 4-8 trials on one side before switching to the other side. The switch trials were the first trial after switching stimulus-response sides and the repeat trials were all subsequent trials on each side of the screen before switching. This was done for up to 64 trials for three consecutive days.

Results:
Overall the sham animals had an average percent correct of 76.7%, the He4 animals had 72.7%, and the GCR animals had 72.4%. During the repeat trials, the sham animals had an average correct percent of 80% while the GCR and He4 animals averaged 70% with the differences being significant. The average response time on the repeat trials was 1.8s for the shams, 2.0s for GCR, and 2.1s for the He4 animals. During the switch trials, the shams averaged 50% correct, GCR averaged 80% correct which was significantly higher, and the He4 animals averaged 70% correct. The average response time for the switch trials was 1.7s for the shams, 2.7s for GCR, and 2.1s for the He4 animals. The switch costs were 0.1s for the shams, 0.0 for the He4 animals, and 0.7s for the GCR animals. The switch cost for the GCR animals was significantly longer. The response time ratio of the repeat trial time to the switch trial time was 1.0 for the shams, 1.0 for the He4 animals and 1.3 for the GCR animals which was significant.

Conclusions:
We demonstrated that rats exposed to SR will have altered performance on the simplest of switch tasks. Astronauts on the journey to Mars will be exposed to similar radiation. It is expected that astronauts would be affected similarly, or to a greater extent since their switch tasks are immensely more complicated than the task we demonstrated. They are also subject to other stressors such as a high level of risk which can influence switch task performance and potentially compound against each other. It would be useful to add a switch task into NASA's cognitive test battery to monitor this potential performance decrement during spaceflight to prevent potential disasters.

Abstract Title: Minimizing the Disease Burden of Small Bowel Obstructions: Timing of the Gastrograffin Small Bowel Follow Through

Author: Sternick, Molly E
Co-Investigators: 1. Andrew Licata MD, Surgery 2. Ismail El Moudden PhD, Healthcare Analytics Institute 3. Nicholas Bandy MD, Surgery 4. Rebecca Britt MD, Surgery

Abstract

Introduction:
Small bowel obstructions (SBO) account for a significant burden on the global healthcare system. Since the advent of the gastrograffin small bowel follow through (SBFT), significantly fewer obstructions are requiring operative intervention. While it has been proven that SBFT increases the rate of non-operative management, there is no significant data to suggest when SBFT should be performed. Ideally, this would be done at a time that minimizes overall cost and length of stay without increasing readmission rates or mortality.

Methods:
We performed a retrospective chart review of 548 patients who were admitted to a Sentara Facility between 2012 and 2019 with a diagnosis of SBO. All patients between the ages of 18 - 89 were included. Patients were excluded if they did not undergo a SBFT during admission. Patients were divided into two categories with regards to timing of SBFT: before (early) or after (late) 48 hrs from admission. Primary outcomes were length of stay (LOS) and total cost. Secondary outcomes were operative interventions and mortality.

Results:
Of the 548 patients admitted with an SBO, 391 had a SBFT ordered early and 157 late. Comparing early versus late, there were no differences in patients' age, gender, BMI, prior operative history, or prior history of bowel obstructions.

There was a difference between LOS (4 vs 8 days, $P < 0.05$) and total cost ($17,056.19 vs $33,292.00, $p < 0.05$). There was no difference in mortality (1.3% vs 2.6%, $p = 0.239$) or 30-day readmission rates (15.6% vs 15.9%, $p = 0.509$). Patients in the early group did have fewer operations (20.7% vs 31.9%, $p = 0.05$).

Discussion:
Patients that had a SBFT ordered early had a decreased LOS, total cost, and operative intervention without an increase in readmission rates or mortality. This difference existed in both the operative and non-operative groups. This would suggest that there is a benefit in ordering SBFT earlier in the hospital stay to reduce the overall disease burden, and that it is safe to do so with regards to mortality and readmissions. This is supported by other studies that have shown an increase in morbidity in patients that have undergone an operation after 48 hrs. Based on these results, we recommend ordering a SBFT within 48 hrs to reduce LOS, cost, and need for an operation, although further analysis still needs to be conducted with regards to specific patient populations.

Abstract Title: Participant Screening for Ongoing Clinical Trials

Author: Strock, Daniel M
Co-Investigators: 1. Molly Sternick, M.D. Candidate, EVMS Class of 2024

Abstract

Introduction:
Participant recruitment is multifaceted and often a challenge faced by researchers because eligibility criteria differs across studies. The Glennan Center Memory Consultation Clinic has multiple ongoing research studies and clinical trials. Clinic physicians will educate patients interested in research about the possible opportunities; however, many clinical trials have strict inclusion and exclusion criteria. It is not always immediately evident that a patient is eligible to participate in one of the trials, requiring further screening. During our fellowship, we were responsible for screening patients' medical records in relation to each trial's inclusion and exclusion criteria in order to determine which patients met the eligibility requirements for each trial.

Methods:
AllScripts, an electronic medical record software, was used to view patient charts. Separate inclusion and exclusion criteria were used to screen patients for the following clinical trials individually: FOUND: Fasudil for reducing elopement and spatial disorientation (FOUND), Effects of THC-free CBD Oil on Agitation in Patients with Alzheimer's Disease (CBD Oil), and Escitalopram for Agitation in Alzheimer's Disease (S-CitAD). The most recent chart for each patient was reviewed for eligibility requirements and the contact information for patients who met eligibility requirements was recorded in a password protected excel file.

Results:
The medical charts for 557 patients were screened for eligibility.
For the FOUND study, 44 patients were identified as demonstrating wandering behavior. Of those 44 patients, 6 patients met both the inclusion and exclusion criteria and 3 patients were identified as potentially eligible but clarification from physician was needed.

For the CBD Oil study, 73 eligible patients were identified and 23 patients were categorized as potentially eligible but clarification from physician was needed.

For the S-CitAD study,13 eligible patients were identified and 12 patients were categorized as potentially eligible but clarification from physician was needed.

Many patients that were determined to be eligible for S-CitAD by this screener were also determined to be eligible for the CBD Oil study. Only one patient was identified as eligible for all three studies. Each clinical trial had exclusion criterion that participants currently enrolled in another clinical trial were not eligible to participate. We have no data at this time regarding how many of the eligible patients on this screener were successfully recruited for study participation.

Conclusions:
Recruitment for clinical trials requires dedicated time and effort from all members on the research team. Inclusion and exclusion criteria for clinical trials are often complex, and attention to detail when reviewing eligibility requirements is crucial. In the context of this participant screener, only 93 out of 557 patients screened were eligible to participate in these studies. It is also important to note that even if a patient is eligible for a study, it is not a guarantee that they will participate. Clinical trials often extend over several years in order to recruit and enroll the targeted number of participants.

Abstract Title: Role of Neuroinflammation in Neuronal Network

Author: Sun, Madeline
Co-Investigators: 1. Esther Pototskiy, Department of Pathology and Anatomy

Abstract

Introduction:
Unregulated neuroinflammation mediates initiation and maintenance of seizures by inducing neuronal hyperexcitability, interneuron damage, and aberrant post-synaptic formation. Understanding the role of inflammation in the pathophysiology of epilepsy allows for the identification of molecules that could contribute to epilepsy development. CD40 ligand (CD40L), a protein belonging to the tumor necrosis factor (TNF) superfamily, interacts with the CD40 receptor protein and transduces molecular signaling to mediate neurite organization during brain development. CD40L-CD40 interactions have been found to play a role in inflammation and immunity. This research aims to determine CD40 involvement in epileptic neuronal network.

Methods:
Studies were performed on adult male CD40 deficient mice (CD40KO) and its respective wild type (WT). To evaluate seizure susceptibility, successive 35 mg/kg intraperitoneal (i.p.) doses of pentylenetetrazol (PTZ) was given at 5 min up to 6 doses. To test seizure severity, PTZ (75 mg/kg, i.p.) was given as single doses. The severity of seizures and the latency to elicit seizure after PTZ were evaluated using Racine scale. By using a silicone probe chronically implanted in the cortex-hippocampal axis in a group of mice, we were able to evaluate local field potential (LFP) during spontaneous behavior and PTZ induced seizures. NeuroNexus SmartBox, a data acquisition system, was used for real-time processing and recording of spikes and field potentials. Frequency analyses obtained from LFP recordings were then visualized and analyzed by using NeuroExplorer, a signal analysis software, to obtain power spectral density (PSD) and spectrogram analyses. Brain samples were collected afterwards to evaluate the activation of CD40 and neuronal damage using immunohistology from the hippocampus and neocortex.

Results:
We observed an increase of theta (4-12 Hz) activity in all regions and an increase in gamma (around 30 Hz) activity in the most dorsal and ventral channels. Hippocampal oscillatory activity during the awake period showed no difference between WT and CD40KO. However, preliminary assessment of the LFP from different regions of the hippocampus showed a disruptive pattern during the sleep period in CD40KO. CD40KO demonstrated reduction in seizure severity (CD40KO: 0.1 ± 0.14 S.E.M. vs. WT: 2.8 ± 0.54 S.E.M.; p=0.0003) and in latency compared to WT (CD40KO: 4.45 minutes ± 0.51 S.E.M vs. WT: 1.09 minutes ± 0.005 S.E.M. p=0.0008). CD40KO reduced seizure induced gamma activity in the hippocampal region. Data collection and analysis are currently in progress.

Conclusion:
Preliminary data indicate that upregulation of CD40L-CD40 could mediate ictogenesis by influencing inflammatory mechanisms that involve and propagate seizure-induced neuronal damage.

Abstract Title: Inconsistencies in ASQ measurements of infant social and behavioral health

Author: Teixeira, Miranda
Co-Investigators: Morgan Shelton MD 2024

Abstract

INTRODUCTION:
The Ages and Stages Questionnaire-3 (ASQ) is a widely accepted measurement of infant and child development that assesses child achievement of important milestones in fine motor, gross motor, problem solving, personal social behavior and communication. New surveys have been created that focus on specific dimensions of infant/child development with the goal of identifying specific developmental deficits. One of these surveys is the Early Childhood Screening Assessment (ECSA) which was developed to specifically identify children at risk of developing emotional and behavioral disorders. The ECSA has been rigorously validated using the highest standard of validation, diagnostic interviews. Our research examines the question of the concurrent and predictive validity of the ASQ, particularly the personal social scale, in identification of children in need of additional evaluation.

METHODS:
Data was collected from surveys given to caregivers in pediatric clinics from a national screening platform (CHADIS). Data was chosen by children who had an 18m ECSA (n= 1456 patients). Available ASQ developmental screen results from 2 to 24 months of age as well as demographic and adverse social determinants of health factors were extracted from CHADIS. Data analysis was completed in SPSS-26 using T-tests and Chi Square analyses.

RESULTS:
At 18 months, although ECSA and ASQ personal-social scale are associated ($x^2(1)= 4.881$; $p<.027$), a positive ASQ personal social scale only identified 5.75% of children who screened positive on the ECSA. Specificity was 97.94%. Children with a positive ASQ personal social screen had a mean ECSA score of 4.45, which is lower than the clinical cut-off of 9. Additionally, ASQ personal-social predictive validity from between each consecutive well child visit (6 mo, 9 mo, 12 mo, 15 mo, 18 mo) was low. At each time point, fewer than 36.36% of children who screened positive on the ASQ personal-social screened positive at the next well child visit.

CONCLUSION:
Overall, this study shows a limited concurrent association between a widely used measure with a personal social subscale and a validated measure specific for emotional well-being as well as limited predictive validity of the ASQ-3 personal social scale over time. The difference between the ASQ personal social scale and the ECSA may indicate a different focus of the content, but raise important clinical questions. The limited stability of the ASQ personal social scale over time raises additional questions about the validity of that subscale and its clinical utility in pediatric primary care. More research into the long term outcome of patients identified and undergoing treatment as directed by both tests needs to be done as well as further research looking into specific variations of either test.

Abstract Title: Program Evaluation and Assessment of Vital Sign Measurement at EVMS HOPES Ophthalmology Clinic

Author: Thakur, Shambhawi
Co-Investigators: 1. Christian Schmidt, EVMS\MD2024 2. Rohan Sharma, MS, EVMS\MD2024 3. Lydia Sa, MPH, EVMS\Global Health 4. Brynn Sheehan, PhD, EVMS\Healthcare Analytics Institute 5. Alexandra Leader, MD, EVMS\Global Health

Abstract

Introduction:
Uninsured or underinsured patients with diabetes and hypertension are less likely to receive needed care. Uncontrolled diabetes and hypertension can lead to vision changes like blurred vision or complete vision loss. In order to monitor these chronic diseases, it is important to check vital signs regularly, especially in a vulnerable population. HOPES (Health Outreach Partnership of EVMS Students) Clinic, a student-run free clinic, provides medical care to the uninsured and underinsured population of Hampton Roads. This study aims to examine trends in measuring vital signs and describe the services offered at the EVMS HOPES Ophthalmology Clinic.

Methods:
A retrospective chart review of 347 HOPES Ophthalmology appointments from January 2015 to June 2021 was conducted to evaluate the clinical program. The patients' city of residence, measurement of vital signs, reason for visit, diagnoses, services provided, and appointment outcomes of the clinical program were analyzed to better understand the clinic's patient population and services offered. Appointments from Care-A-Van (mobile clinic) and Street Health (healthcare for homeless) were excluded due to significant differences in method of care delivery. Cancelled and no-show appointments were also excluded.

Results:
Of the 179 appointments that met the inclusion criteria, the vital signs were obtained for 113 appointments (63.1%). The most common reasons for all clinical encounters included blurry vision and diabetic eye exams, followed by floaters and hypertension. Of the 63 distinct diagnoses made, the most common were cataracts, presbyopia, and diabetes without retinopathy. A total of 175 services were provided: 61 free custom glasses were given, 48 glasses and 54 medications were prescribed, respectively, and 26 referrals were made.

Conclusion:
Since 2015, HOPES Ophthalmology clinic has served as a safety net clinic for many patients in the Hampton Roads community. Vital signs were not consistently obtained at clinic encounters despite diabetes and hypertension, diseases with known ophthalmologic sequelae, representing primary reasons for clinic visits. This data is a call to action for quality improvement measures in the clinic to enforce vital sign measurement in each encounter with patients who are known to have decreased access to care and identified risk of chronic diseases.

Abstract Title: Incidental Carotid Artery Dissection or Artifact? Understanding Mirror-Image Artifact in Ultrasonography.

Author: Toy, Jason L
Co-Investigators: Abigail Winz, MD, EVMS Department of Radiology\Diagnostic Radiology Resident

Abstract

Introduction:
Medical imaging artifact can create uncertainty while interpreting diagnostic studies, and in some cases lead to misdiagnosis or additional workups. The purpose of this case report is to define mirror-image artifact, the physics underlying its occurrence, and how it can mimic specific concerning diagnoses.

Case Information:
The patient is a 48-year-old woman with no significant past medical history who presented for a thyroid ultrasound. While evaluating the thyroid, an abnormal appearance of the left common carotid artery was observed. The left common carotid artery appeared to have a false lumen concerning for a carotid artery dissection. Despite the ultrasonographic findings, the patient reported no pain, neurologic symptoms, or any other complaints. Additionally, her physical exam was unremarkable. Given the alarming incidental findings and discordant presentation, a confirmatory carotid artery peripheral vascular laboratory (PVL) study was performed, which revealed normal appearing carotid arteries, confirming the presence of mirror-image artifact on the initial thyroid scan.

Discussion:
Artifact describes features of medical imaging which is a misrepresentation of the patient's actual anatomy. Mirror image is an ultrasound artifact that can occur when parallel structures within the scanning plane have strong reflective surface that may causes multiple back-and-forth reflections of the acoustic beam, violating the ultrasound's assumption of a return after a single reflection. These waves have a longer return time to the transducer, creating a more distant duplication of a structure. In certain situations, the mirror image can very closely resemble signs of pathology, such as in this case where a mirror image of an adjacent structure (the internal jugular vein) was projected within the left common carotid artery, giving the appearance of a carotid dissection.

Conclusion:
When interpreting medical imaging, one must always consider artifact when unexpected results are observed, especially when the patient's presentation is inconsistent with the suspected diagnosis. This case highlights the difficulty, as well as importance, of considering artifacts in diagnostic imaging.

Abstract Title: Fine motor deficits exhibited in rat string-pulling behavior following exposure to deep space radiation and sleep fragmentation

Author: Tracz, Jovanna A
Co-Investigators: Ashley A. Blackwell, Department of Radiation Oncology and Biophysics, EVMS

Abstract

Introduction.
As NASA plans for future missions to deep space-beyond the earth-moon system and onward to Mars-it is necessary to mitigate the stressors of human spaceflight. Space radiation (SR) and sleep disturbance have been shown to independently disrupt sensorimotor function; for example, string-pulling behavior is impaired in rats ~3 months following a single exposure to Silicon SR (Blackwell et al., 2020), and in-flight reductions in sleep efficiency have been shown to prolong reaction time (Wu et al., 2018). When experienced in combination, these stressors may further impair performance on mission-critical tasks. However, the combined effect of these stressors on sensorimotor function has not been evaluated. The goal of this study was to identify sensorimotor deficits following exposure to SR and sleep fragmentation to aid the development of materials and methods that counter such deficits, improving both astronaut safety and performance.

Methods.
Male Wistar rats arrived at Eastern Virginia Medical School ~7 months of age. Rats underwent 3 exercise sessions/week for 30 minutes at 25 cm/s per session, running on a treadmill. Rats were pre-screened using (1) an attentional-set-shifting test; a measure of executive function and cognitive flexibility (Britten et al., 2019) and (2) habituation to string-pull testing: a robust assessment of sensorimotor function that involves bimanual hand-over-hand movements and is translatable to humans (Blackwell et al., 2020; Singh et al, 2019). At ~10 months of age, rats were transported to the NASA Space Radiation Laboratory for irradiation (Sham: N=11; 10 cGy Helium: N=24; 10 cGy GCRsim: N=24). String-pull testing was conducted 3 months post-irradiation both pre- and post-sleep fragmentation to evaluate deficits that correspond to late CNS dysfunction. String-pulling behavior was video recorded for offline frame-by-frame analyses using open source programs, including DeepLabCut and Tracker motion capture software. During sleep fragmentation, rats were placed in electronically controlled chambers with a mobile bar that swept the chamber every 2 minutes, allowing for NREM sleep while preventing REM sleep. Parameters for analysis included (1) string approach and pull time as general measures of motivation and (2) string-paw and mouth contacts and misses as measures of movement accuracy (Blackwell et al. 2020). Repeated measures ANOVAs were used to evaluate the main effects of Irradiation, Sleep, and Irradiation by Sleep interactions ($\alpha = 0.05$). Linear trend analysis and Tukey's Honest Significant Difference post-hoc tests were used to evaluate significant effects and interactions. JASP open source statistical software was used to conduct analysis.

Results.
All rats engaged in hand-over-hand string pulling behavior, using both hands and the mouth. Both He- and GCR-exposed rats exhibited late deficits in the string-pulling task prior to sleep fragmentation when compared to sham rats. Following sleep fragmentation, all rats (GCR, He, Sham) exhibited more misses and less contacts relative to pre-sleep fragmentation [$F(1, 47) = 5.143$, $p = 0.028$, $n2p = 0.099$]; however, He- and GCR-exposed rats exhibited significantly more misses across testing when compared to sham [$F(2, 47) = 9.970$, $p < 0.001$, $n2p = 0.298$]. He-exposed rats also displayed an increase in approach time post-sleep fragmentation that was insignificant pre-sleep fragmentation [$F(2, 56) = 3.855$, $p = 0.027$, $n2p = 0.121$].

Conclusion.
Rats exposed to deep space radiation exhibit deficits in fine motor function, as indicated by increased paw-string misses. He-exposed rats also exhibited an increase in approach time following sleep fragmentation; a deficit that was not obvious under normally rested conditions. All rats (GCR, He, Sham) exhibited decreased contacts and increased misses after sleep fragmentation, indicating a negative effect of sleep fragmentation on sensorimotor function. This study extends our previous findings that one night of sleep fragmentation unveils latent cognitive deficits (Britten et al, 2019, 2020) to include string-pulling behavior. This work sets a foundation for future studies to investigate further sensorimotor and cognitive deficits following exposure to multiple space flight stressors.

Abstract Title: Neuro-inflammatory targets in glioblastoma multiforme

Author: Tracz, Jovanna A
Co-Investigators:

Abstract

INTRODUCTION:
Glioblastoma Multiforme (GBM) is generally recognized as the most aggressive known cancer of the central nervous system in both children and adults, with an average life expectancy of only 15 months post-diagnosis (Jovčevska et al., 2019). While the molecular markers of different classes of GBM are diverse, there is evidence that each major class of adult and pediatric high-grade gliomas expresses synaptic genes that permit glioma cells, particularly those resembling normal oligodendroglial precursor cells (OPCs), to form neuron-glioma synapses (Venkatesh et al., 2019). Further, the existence of both neuron-glioma synapses and connections among glioma cells themselves induce neuro-hyper-excitability in functional neural tissue (and thus symptoms such as epileptic seizures in GBM patients). Glioma cells then leverage this integration into functional neural circuits to further proliferate (Venkatesh et al., 2019; Thompson et al., 2015). However, the precise mechanism by which glioma cells communicate both amongst themselves and with other cells in the tumor microenvironment to form neuron-glioma synapses remains unknown. The goal of this project was to determine whether activation of CD40 signaling, which is involved in neural dendritic growth, facilitates neuron-glioma communication in the tumor microenvironment.

METHODS:
To characterize the neuron-glioma synapse and investigate inflammatory ligands present in the malignant synaptic cleft (i.e. CD40), glioma cells (U-87 MC-Luc-2, ATCC) were first cultured independently to establish baseline growth and cytokine expression prior to co-culturing with human cortical neurons (HCN-2, ATCC). To determine rates of cell proliferation and dendritic growth, GBM cells were cultured then analyzed using ImageJ software and sholl analysis over a 7-day period. To establish whether CD40L and CD40 were expressed in this cell line, GBM cells were cultured in chamber slides and stained using immunohistochemistry followed by immunofluorescence microscopy (IHC-IF). CD40, CD40L and luciferase were used at dilutions of 1:500. DAPI was used at a dilution of 1:50,000. 4-well chamber slides were prepared with U-87 cells fixed at day 6, with 50,000 cells/chamber in EMEM media (ATCC, EMEM 30-2003, 10% FBS, 8 ul/100 mL blasticidin; 37 C, 5% CO2).

RESULTS:
The number of GBM cells in an area of 800 um2 increased from 47 to 2327 cells over a 7 day period. Cell proliferation was positively correlated with dendritic growth, as 1) the average dendritic length increased from 108.4 to 288.2 um and 2) the average number of dendrites per cell grew from 1.3 to 6.9 over the same period. IHC-IF revealed that GBM cells expressed both CD40 and CD40L at day 6 post-culture.

CONCLUSION:
A baseline for GBM cell and dendritic growth was established. The presence of both CD40 and CD40L by all GBM cells suggests that CD40 activation could facilitate glioma cross talk even in the absence of immune cells (i.e., tumor associated macrophages) and neurons in the tumor microenvironment. While it has been established that GBM expresses CD40 in vivo, this has been predominantly attributed to the interaction of GBM with peritumoral immune cells, therefore our results revealing that GBM cells express CD40 in isolation challenge this norm. The level of CD40 expression in glioma-neuron cultures will be compared to this baseline level of CD40 expression. Future work will include the addition of CD40 antibodies to the U-87-HCN-2 co-culture to determine the effects of a CD40 blockade on the formation of neuron-glioma synapses.

Acknowledgements:
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Abstract Title: Oral Ulcers Were the Tip of the Iceberg

Author: Tran, Minh Tu
Co-Investigators: Zahra Tasneem, MD, Department of Internal Medicine\EVMS Sami Tahhan, MD, FAPC, Department of Internal Medicine\EVMS

Abstract

INTRODUCTION:
Acute myeloid leukemia (AML) is a hematologic cancer characterized by the abnormal clonal proliferation of myeloid blasts in the bone marrow, blood, and other tissues. Expansion of clonal cells in the bone marrow can impair development of normal hematopoietic cell lineages, resulting in cytopenias. The presentation of AML can vary widely and be characterized by bone marrow disease as well as tissue infiltration. Most patients with AML present with symptoms associated with cytopenias: fatigue, pallor, or weakness due to anemia; bleeding, petechiae, or ecchymoses due to thrombocytopenia; or infection or fever due to leukopenia. We report a case of AML in a patient who presented with infectious oral ulcers with initially normal hematologic findings.

CASE INFORMATION:
A 56-year-old male with Type II diabetes presented to the hospital with 3 weeks of oral ulcers involving the left buccal region with spread to the palate and tongue. He also reported odynophagia, poor oral intake, and 40-lb weight loss. He had not responded to outpatient amoxicillin, fluconazole, and nystatin swish and swallow. On physical exam, he was febrile and tachycardic, and had multiple oral necrotic ulcers with fibrinous debris. Labs were remarkable for white blood cell count of 13.1 K/uL (normal range: 4 to 11 K/uL). Tissue cultures revealed normal oral flora and biopsy showed non-specific inflammation. Serologies were negative for viral, syphilitic, or autoimmune etiologies. His ulcers improved on antimicrobials but he developed a recurrent fever and a progressive worsening pancytopenia. MRI of the jaw was obtained to assess for further infection and showed early osteomyelitis with incidental finding of hematopoietic bone marrow reconversion. Due to his worsening pancytopenia, recurring fevers, and apparent immunosuppression, a bone marrow biopsy was obtained which showed 25% blasts in hypocellular marrow consistent with AML.

DISCUSSION / CLINICAL FINDINGS:
AML is classically suspected based on signs and symptoms of anemia, thrombocytopenia, or leukopenia manifesting as weakness, bleeding, or infection. Peripheral smear findings of myeloid blasts can also suggest AML. Oral presentations of AML have been previously reported, mainly in the dental literature, and commonly manifest as gingival hyperplasia, gingival bleeding, petechial hemorrhage, and ulcerations. Our patient presented with suspected infected oral ulcers that improved on antimicrobials and initially normal hematologic findings. In our case, we postulate that his infections led to a leukemoid reaction and a reactive thrombocytosis that masked his hematologic dyscrasias, delaying his diagnosis. The patient's jaw MRI revealed an incidental finding of bone marrow reconversion from fatty to red marrow indicating increased hematopoietic activity. During normal bone aging, a process of conversion of red marrow to yellow marrow occurs from childhood to adulthood in predictable anatomic patterns. Bone marrow reconversion is the reverse of this natural process and is a response to increased hematopoietic demand. In the setting of new-onset pancytopenia, the finding of bone marrow reconversion in our patient suggested dysfunctional bone marrow activity concurrent with increased metabolic demand. This combination of bone marrow findings was suspicious for a neoplastic process, which was confirmed with a bone marrow biopsy consistent with AML.

CONCLUSION:
This case illustrates an unusual, nonspecific initial presentation of AML as oral ulcers and the challenges of recognizing AML when first-line laboratory tests are normal. It is important to redirect clinical decision-making and have a low threshold for diagnostic bone marrow testing for AML in the appropriate clinical setting with pancytopenia, infections, fever, and suggestive MRI findings.

Abstract Title: Olanzapine-induced anasarca: a case report

Author: Tran, Minh Tu
Co-Investigators: James Rapley, MD, FAPA, EVMS Psychiatry and Behavioral Sciences\EVMS

Abstract

INTRODUCTION:
Olanzapine is a second-generation antipsychotic that is effective in treating bipolar depression in combination with fluoxetine. Olanzapine-induced edema is a rare adverse drug reaction, but only one case report has been previously published describing whole-body edema associated with olanzapine. We report a case of olanzapine-induced anasarca associated with severe, rapid weight gain.

CASE INFORMATION:
A 53-year-old woman with history of bipolar disorder was admitted for malnourishment and failure to thrive in the setting of a bipolar depressive episode. Her home medications included divalproex sodium. She was initiated on olanzapine titrated to 20 mg daily in combination with fluoxetine titrated to 60 mg nightly. On day 29 after initiation of olanzapine, the patient reported swelling of her legs that progressed to her abdominal wall and arms. She reported painful separation of an old healed surgical scar on her right leg due to the distension and leakage of serous fluid from old healed surgical sites on her leg and abdomen.

On exam, the patient's weight had increased by 10 kg (from 48.1 kg to 58.1 kg) over the course of 7 days. She had 3+ pitting edema on her lower extremities, thighs, and forearms and 2+ pitting edema on her abdominal wall. She had a 5-inch linear separation of fibrous scar tissue on her right lower extremity. An extensive work-up revealed normal cardiac, renal, hepatic, and endocrine functions and normal electrolyte, protein, and vitamin levels. Ultrasound of the lower extremities was negative for deep venous thromboses. Echocardiogram showed an ejection fraction of 60% with no evidence of systolic dysfunction, fluid overload, or effusion. Chest imaging showed no effusion or edema.

Based on the negative workup and symptoms onset after starting olanzapine, we suspected the patient's edema was drug-induced. She was not receiving any other new medications known to be associated with edema. Her olanzapine was discontinued. She was diuresed with bumetanide 1 mg daily. She had daily measurements of her weight and leg circumferences and demonstrated gradual improvement in her edema. Her weight stabilized at 58 kg. She was discharged on bumetanide 1 mg daily with instructions for close outpatient follow-up.

DISCUSSION / CLINICAL FINDINGS:
Edema is a rare but well-documented side effect of olanzapine. Previous case reports have described hands, lower extremity, periorbital, and pericardial edema, as well as angioedema. To date, only one previous case report of whole-body edema associated with olanzapine has been published. Cook, Fowler, and Shipman (2020) described edema in the lower and upper extremities and chest of a patient who was initiated on olanzapine as an adjunct to fluoxetine for refractory major depression. Previously reported management of olanzapine-induced edema includes dose reduction, discontinuation, or loop diuretics.

The mechanism for olanzapine-induced edema is unclear but is hypothesized to occur via several pathways due to olanzapine's effect on myriad receptors. Antagonism by olanzapine at α1 adrenergic receptors may induce vasodilation and decreased vascular resistance, promoting extravasation and edema. Antagonism at histamine H1 and serotonin 5HT2 receptors are associated with smooth muscle relaxation resulting in vasodilation. Antagonism of renal D4 receptors can disrupt renal regulation of fluids and may predispose to edema.

In the setting of our patient's malnourishment and frailty, a broad workup ruled out cardiac, hepatic, and renal causes of edema, as well as vitamin-deficiency or protein-deficiency associated edema. Her other medications included fluoxetine, which does not have a previously reported association with edema, and divalproex, which she had been stable on since 2017. The Naranjo Adverse Drug Reaction Probability Score for this case was 7 based on a temporal relationship, improvement with drug withdrawal, and exclusion of alternative causes, deeming it a probable drug reaction.

CONCLUSION:
This case describes a patient who exhibited anasarca and severe, rapid weight gain following initiation of olanzapine-fluoxetine therapy. Evaluation of olanzapine-induced edema involves ruling out cardiac, hepatic, renal, and nutritional causes of edema, as well as cardiac and pulmonary complications. Management of olanzapine-induced edema involves dose reduction or discontinuation and may be augmented with diuresis.

Abstract Title: The Development of a Novel, Searchable Online Database of Medical School Curriculum Content and Competency Objectives

Author: Vishnia, Maya
Co-Investigators: 1. John Hepner, MD Student 2. Levi Schiefer, MD Student

Abstract

Introduction:
A primary goal of undergraduate medical school curricula is to define and facilitate the carrying out of students' educational experience and learning goals that have been set forth by accreditation standards. However, this is often difficult for medical schools to convey to students in an efficient and explicit manner. In an effort to make this process more accessible and transparent, curriculum mapping databases or curriculum inventories (CIs) have begun to be adopted by schools, in order to highlight key aspects from each lecture, lab, or assessment and how they relate to one another. This freedom of access is beneficial not only for institutional curriculum developers, but also for teachers, students, educational researchers or others who have an interest in what, when, and how the students are learning. In years past such databases have been updated with the curriculum content months or years after it was delivered to the students. Currently, efforts are focused on mapping the curriculum content into CI databases in real time with electronic data capture tools such as Research Electronic Data Capture (REDCap) software. This increases the accuracy and accessibility of the content, as well as eliminating any potential sources of bias or oversight.

Methods:
Each learning session (eg, lectures, small groups, clinical skills teaching sessions, labs) from the first and second years of the Medical Doctor (MD) program at Eastern Virginia Medical School (EVMS) was downloaded from the official school academic calendar. Each document or presentation from the learning sessions was then analyzed to capture high-yield keywords, diseases or conditions, therapies or treatments, relevant 2020 AAMC CI keywords and relevant third-year clerkship core competency objectives. Each of these terms was then entered into a custom REDCap database along with the associated documents or presentations, with the goal of updating the database within a week of the learning session being presented to the students.

Results:
The database has already been updated with lectures from the 2020-2021 academic years during May-July 2021. The 2021-2022 academic year is currently being updated live as learning sessions occur by a team of first- and second-year medical students at EVMS. It will go live as a searchable database to other medical students, professors, and other medical educators hopefully in late 2021. This will enable them to search the first and second years of medical curriculum by third-year clerkship core competency objective, AAMC CI keyword, specific session keyword, treatment or therapy, or condition.

CONCLUSION:
Medical students, professors, physicians, and medical educators will be able to access a live-updated searchable database that contains keywords and competency objectives associated with learning sessions from the first two years of the MD program at EVMS.

Abstract Title: Challenges in the Ultrasonographic Diagnosis of Chronic Cholecystitis: A Case Report and Review of the Literature

Author: Vo, Alexander M
Co-Investigators: 1. Alexander Vo, School of Medicine 2. Garrison Glavich M.D., EVMS Department of Radiology 3. Abigail Winz M.D., EVMS Department of Radiology 4. H. Tyler Klause M.D., EVMS Department of Radiology 5. Frances Lazarow, M.D., EVMS Department of Radiology

Abstract

INTRODUCTION:
Chronic cholecystitis is a common biliary disease process characterized by a history of recurrent acute cholecystitis or nonspecific dyspeptic symptoms that occur when gallstones periodically obstruct the cystic duct. In this clinical context, the sonographic demonstration of a diffusely thickened gallbladder (GB) wall, is one of the key findings. However, GB wall thickening can include a broad differential. We present a case report of focal gallbladder wall thickening, initially concerningfor a possible low-grade malignancy, but subsequently proven to be chronic cholecystitis by postoperative pathological examination. The objective of this case report is to highlight the importance of having a thorough understanding of thesonographic and ancillary imaging patterns of chronic cholecystitis, its diagnostic pitfalls and associated differential diagnosis with the goal of improving patient care.

CASE INFORMATION:
A 58-year-old male presented to the emergency department with 6 hours of epigastric pain that he describes as constant, non-radiating, sharp, burning, and severe in nature. He has not had any episodes of emesis, diarrhea, constipation, or recent weight loss. He has had two prior episodes of epigastric post-prandial pain. Physical exam was unremarkable.
Initial computed tomography (CT) angiography exam revealed cholelithiasis without acute abnormality. Right upper quadrant ultrasound revealed an irregular mass-like thickening of the gallbladder fundus. Follow-up Magnetic resonance cholangiopancreatography showed no evidence of choledocholithiasis or cholangitis but redemonstrated a thickened fundal wall without concerning enhancement. Therewas no evidence of surrounding pericholecystic fluid to suggestacute or chronic cholecystitis. The patient was scheduled for outpatient cholecystectomy due to concerns of a low-grade malignancy of the gallbladder wall with pathology showingchronic cholecystitis with focal ulceration.

DISCUSSION/CLINICAL FINDINGS:
Ultrasound and cholescintigraphy are considered "gold standard" imaging techniques for the evaluation of right upper quadrant pain and GB pathology. The typical sonographic findings of chronic cholecystitis include a diffuse symmetric wall thickening (can be focal) in 18% of cases, stones alone in 93%, and a contracted GB with stones in 15%. Less common sonographic findings include wall sonolucency in 4% of casesand a dilated GB in 12%. Pericholecystic fluid is generally absent in chronic cholecystitis due to associated mural fibrosis. A hepatobiliary iminodiacetic acid (HIDA) scan may be used in distinguishing acute or chronic cholecystitis. Generally, delayed visualization of the GB between 1.5-4 hours is seen in acute and chronic cholecystitis. However, an impaired GB ejection fraction followed by cholecystokinin stimulation is typical of chronic cholecystitis. Features of ultrasonography that would be more concerning for a malignant etiology (such as GB carcinoma) include either a diffuse or focal wall thickening that is asymmetric, a discontinuous mucosa, loss of layered pattern in GB wall, a high mean flow velocity and peak systolic velocity on color doppler, and a high shear wave velocity.

Contrast-enhanced CT (CECT) and MRI can also be useful toolsfor the evaluation of focal GB wall thickening. Typical features of chronic cholecystitis on CECT generally show isoattenuationduring both the arterial and venous phase. On contrast-enhanced magnetic resonance imaging (MRI), chronic cholecystitis shows early smooth enhancement, whereas malignant features would show early irregular enhancement.

CONCLUSION:
The sonographic and ancillary imaging findings of chronic cholecystitis can be widely divergent and nonspecific. However, a thorough understanding of the various imaging patterns of chronic cholecystitis on multiple imaging modalities and appropriate differential diagnosis is important to optimal patient care.

Abstract Title: Reducing Caregiver Burden: Group Psychoeducation for Caregivers of Patients with Dementia

Author: Wainwright, Lavinia
Co-Investigators: 1. Dr. Shriti Patel, M.D., Psychiatry and Behavioral Sciences 2. Jennifer Flaherty, Physiological Sciences

Abstract

INTRODUCTION:
Prior research has established that caregivers of adults with Alzheimer's disease (AD) experience higher rates of depression, anxiety, and overall burden. There is also supportive evidence that psychoeducational support groups for these caregivers can reduce caregiver burden and psychiatric symptoms, but there is limited research regarding whether a program delivered virtually can provide benefits equivalent to an in-person program.

METHODS:
Caregivers of people with AD who scored 30 or higher on the Caregiver Burden Inventory (CBI) are enrolled. They are then assigned to either an in-person 11-week psychoeducational program, a virtual but otherwise identical program, or treatment-as-usual (control group). The program involves a weekly session of psychoeducation on Alzheimer's caregiving, which lasts 8 weeks, as well as two interactive workshops. Primary outcome is reduction in caregiver burden, measured by the CBI. Secondary outcomes are reduction in depressive symptoms, anxiety, emotional labilities, and stress, measured by the Center for Epidemiologic Studies Depression Scale (CES-D), State-Trait Anxiety Inventory for Adults (STAI), The Positive and Negative Affect Schedule (PANAS), and The Perceived Stress Scale (PSS-10), respectively. Their responses are collected at the baseline, and then during weeks 5, 9, and 13 of participation. After data has been collected from a minimum of 51 participants, hierarchical regression testing will be used to determine whether there is a difference between groups.

RESULTS:
This is an ongoing study. At the time of this writing, 33 participants have given their consent to participate, 19 of whom have given data through week 9. Week 13 data will be collected in the coming weeks. Preliminary analysis of responses to questionnaires has shown trends of improvement on all scales, but more data is needed for a comparison between groups to meet statistical significance.

CONCLUSION:
Conclusions are limited at this time, due to the ongoing nature of this study. Initial observed trends in questionnaire responses show burden improvement, which is promising regarding program efficacy, but more data is needed for comparison.

Abstract Title: Clinical and Biological Features and Treatment Outcomes of Children With Newly Diagnosed Acute Myeloid Leukemia and Hyperleukocytosis

Author: Walker, Kendra N.
Co-Investigators: 1. Georgios E. Christakopoulos, MD, Department of Oncology, St Jude Children's Research Hospital
2. Hiroto Inaba, MD, PhD, Department of Oncology, St Jude Children's Research Hospital

Abstract

Introduction:
Hyperleukocytosis is observed in 5% to 20% of patients with newly diagnosed acute myeloid leukemia (AML) and is associated with an increased risk of early complications and mortality. While frequently used in patients with AML and hyperleukocytosis, studies on the clinical utility of leukapheresis have not been conclusive. Low-dose chemotherapy has also been used more recently as a cytoreduction method in these patients, but supportive data is limited. The goal of this study is to describe and compare the clinical and laboratory characteristics, early adverse events, and outcomes of children with newly diagnosed AML and hyperleukocytosis according to cytoreductive methods: leukapheresis, low dose chemotherapy (cytarabine), or no intervention.

Methods:
We studied patients with newly diagnosed AML treated on three multi-institutional St. Jude protocols, AML97, AML02, and AML08, between 1997 and 2017. Hyperleukocytosis was defined as white blood cell (WBC) count of 100 x 109/L or higher at diagnosis. The decision of cytoreductive treatment was made as the discretion of the treating physician. Leukoreduction was used in the AML97 and AML02 studies, and cytarabine (100mg/m2/dose every 12 hours) was the first choice in the AML08 study. We reviewed baseline clinical characteristics, laboratory data (complete blood cell counts [CBC], chemistries, coagulation) and adverse effects (grade 3 or higher neurologic, renal, respiratory, and hemorrhagic complications based on Common Terminology Criteria for Adverse Events) from diagnosis to day 14 of protocol-based chemotherapy. Cairo-Bishop criteria was used for laboratory/clinical tumor lysis syndrome. The time from the first CBC to administration of protocol-based chemotherapy was calculated.

Results:
A total of 49 patients were identified: 8 patients in AML97, 19 in AML02, and 22 in AML08. The median age at diagnosis was 10.8 years with a median initial WBC count of 157.6 x 109/L; CNS involvement (CNS 2, 3 or traumatic lumbar puncture with blasts) was seen in 29 (59.2%) cases. FAB M4 or M5 subtype was found in 30 patients (61.2%), 11q23 abnormalities in 15 (30.6%) and inv(16) in 8 (16.3%). In regards to leukoreduction method, 16 patients received leukapheresis (14 patients in AML97/02 and 2 in AML08), 18 cytarabine (all in AML08) and 1 hydroxyurea (in AML08); 14 did not receive leukoreduction (13 patients in AML97/02 and 1 in AML08). Leukapheresis was used more often in patients with higher diagnostic WBC counts (218.7 x 109/L) than those treated with cytarabine (152.9 x 109/L) or without intervention (127.3 x 109/L) ($P<0.001$). The decrease of WBC counts before and after the intervention was more pronounced among patients treated with cytarabine than those with leukapheresis (75% vs. 48.5%, $P=0.03$). When decreases in WBC counts were evaluated from the first CBC to the initiation of protocol therapy, cytarabine treatment was associated with greater decrease in WBC counts from baseline (84.8%) than leukapheresis (46.7%) or no intervention (1.8%) ($P<0.001$). Patients who received cytarabine intervention had a longer median time from the first CBC to initiation of protocol therapy (95.2 hours) compared to those who received leukapheresis (28.1 hours) and no intervention (20.4 hours) ($P<0.001$). No early deaths were observed from the time of diagnosis to 2 weeks after initiation of protocol chemotherapy, and no statistically significant differences were noted in the incidences of neurologic, pulmonary, renal, hemorrhagic events, laboratory/metabolic tumor lysis syndrome among these three groups.

Conclusion:
Low-dose cytarabine treatment appears to be a safe and effective mean of cytoreduction for patients with AML and hyperleukocytosis. Further studies on larger patient cohorts are needed to determine if this approach is preferable among patients treated with contemporary treatment.

Abstract Title: Relative Proportion of T9861C Mutation in Alzheimer's Disease Brain Regions Using a New Allele Specific PCR Assay

Author: Whitley, Jacob
Co-Investigators:

Abstract

INTRODUCTION:
Deficiencies of mitochondrial function are known to have a role in the development and pathogenesis of Alzheimer's Disease (AD). AD brains have been reported to have decreased cytochrome c oxidase (CO) activity compared to controls. We previously identified a T9861C point mutation of mitochondrial DNA (mtDNA) in AD brains which changes amino acid 219 of subunit III of CO from phenylalanine to leucine. T9861C is heteroplasmic and therefore can have a wide range of relative proportions compared to wild type (WT). Previous work was conducted with AD brains containing the T9861C mutation (AD+) in order to determine the relative proportion of mutation compared to WT in different brain regions using a radioactivity-based (32P) single nucleotide primer extension assay. In an effort to create a more sensitive and specific technique to quantify the relative proportion of T9861C in different AD+ brain regions, we developed a new allele specific qPCR assay.

METHODS:
The new allele specific assay incorporates (1) an allele specific primer of 17/18 base pairs whose 3' end terminates with either a T (WT) or C (Mutant) and (2) an allele specific blocker of 19/20 base pairs that contains a T (WT) or C (Mutant) in the middle of the sequence. After optimizing the annealing temperature, we developed a PCR protocol that allowed us to quantify the relative amounts of WT and Mutant mtDNA in multiple regions of multiple brain samples.

RESULTS:
Using appropriate combinations of WT and mutant primers and blockers, this allele specific assay is able to selectively amplify either WT or mutant mtDNA. Using this new assay, we have determined the mutant load in multiple regions (temporal cortex, parietal cortex, and caudate) in AD brains possessing the T9861C mutation.

Conclusions:
This new allele specific assay was fast, sensitive, and was successfully utilized to quantitate mutant and WT alleles in heteroplasmic mtDNA populations.

Acknowledgements:
This work was supported by a grant from The Commonwealth Health Research Board.

Abstract Title: The Impact of 5 Days of Reduced Physical Activity on Glycemic Control in Active Older Adults: Preliminary Findings.

Author: Williams, Troy
Co-Investigators: 1. Hannah Twiddy, Human Movement Sciences\PhD Graduate Student

Abstract

Introduction:
Regular physical activity promotes healthy aging by decreasing the rate of morbidity of many non-communicable diseases and lowering the rate of all-cause mortality. Glycemic control(GC) is the blood glucose response following the consumption of a meal. It is an indicator of insulin resistance and impaired GC has been suggested to lead to cardiovascular disease. Physical inactivity is known to increase postprandial blood glucose levels in young, active populations. However, if this occurs and how quickly in active older adults remain unclear. This study seeks to determine if an acute bout of reduced physical activity impairs glycemic control in an active, older adult population.

Methods:
A total of 11 subjects were recruited, four young(age: 32.67 ± 2.19; BMI: 25.48 ± 1.67) and seven old(age: 74.86 ± 2.13; BMI: 25.84 ± 2.04). Subjects were recruited from the local community and were physically active, performing at least 90 min/week of physical activity. Additionally, subjects were not taking medications that may alter their blood glucose levels. A continuous glucose monitoring system (CGMS) was inserted and blood glucose levels were measured for 3 days while performing regular exercise and for 3 days during removal of exercise. Upon removal of the CGMS, data was extracted from the monitor. Subjects consumed the same type and quantity of foods at the same time each day throughout the active and inactive phase, which was recorded via a food log. Additionally, throughout the study, subjects wore an accelerometer to measure the number of steps and intensity of movement each day. A 2 way repeated measures ANOVA was used to assess differences in steps per day, 24-hour blood glucose, and AUC in the two-hour time span following a meal in Old Active(OA) vs. Old Inactive(OI), Young Active(YA) vs. Young Inactive(YI). P-values of <0.05 were considered statistically significant.

Results:
Both the old and the young adults had a significantly($p<0.05$) reduced total steps per day from the active to the inactive phase(OA: 7196 ± 2334 vs. OI: 3049 ± 978; YA: 8960 ± 912 vs. YI: 4380 ± 689). 24-hour blood glucose in the two-hour time span following a meal was not significantly different($p>0.05$) between the OA(106.8 ± 3.6) and OI(103.8 ± 1.9) phase, but was statistically different($p<0.05$) between the YA (103.5 ± 3.0) and YI phase(108.4 ± 2.1). Likewise, AUC two hours following meals was not statistically different($p>.05$) between the OA(14236 ± 646) and OI(14577 ± 503) phase, but was statistically different($p<0.05$) between the YA(13599 ± 385) and YI phase(14520 ± 497).

Conclusion:
An acute phase of inactivity impairs glycemic control in the young population but not in the older population. However, additional research is warranted due to the small sample size, and preliminary nature of these results. This study is currently ongoing with the goal of enrolling a total of 20 young and 20 old patients. Once additional patients are recruited, this will provide further information in determining the effects of inactivity on metabolic health in older adults.

Abstract Title: The Effectiveness of Procalcitonin in Detecting Lower Respiratory Tract Infections in Solid Organ Transplant Recipients

Author: Williams, Troy
Co-Investigators: 1. Kennedy Rains, Norfolk State University 2. Angela Toepp PhD, EVMS-Sentare Healthcare Analytics and Delivery Science Institute, Norfolk VA, Department of Internal Medicine, EVMS, Norfolk VA 3. Barry Rittmann MD, Department of Internal Medicine, EVMS, Norfolk VA 4. Emily Cunningham MD, Department of Internal Medicine, EVMS, Norfolk VA 5. Elhassan Soultan MD, Division of Infectious Diseases, Department of Internal Medicine, EVMS 6. Patrick Haggerty MD, Division of Infectious Diseases, Department of Internal Medicine, EVMS

Abstract

Introduction:
Procalcitonin (PCT) is the precursor to calcitonin and is synthesized in the thyroid gland. Normally, PCT levels are low in blood serum and rapidly rise when converted to calcitonin. However, during severe systemic inflammation, structures such as blood monocytes, the liver, and other tissues release PCT. PCT is released in response to cytokines such as TNF-α, interleukin-1, and bacterial endotoxins. Clinically, PCT can potentially be used as a biomarker to determine the early onset of bacterial infections. This study assesses the validity of PCT as a biomarker in detecting lower respiratory tract infections in solid organ transplant recipients on immunosuppression therapy(SOT).

Methods:
A retrospective chart review of electronic medical records from a Trauma 1 medical center examining PCT levels in SOT was performed. Students t-test and chi-squared test were used to assess the correlation between infection status and PCT level. P-values of <0.05 were considered statistically significant. A subset analysis was performed assessing patients with kidney transplants. Our criteria for proof of infection includes radiographic evidence of lower respiratory tract infection plus two of the following: documented fever, WBC < 4,000 / > 12,000, or microbiology data.

Results:
Preliminary statistical analyses of 109 charts (heart (n=25), lungs (n=10), kidney (n=48), two or more organs (n=20), liver(n=4), pancreas (n=1)) showed no statistical difference in occurrence of infection based on transplant type (p-value: 0.88). There was also no significant difference in PCT levels in those individuals with infection vs no-infection among kidney transplant patients (infection PCT mean: 3.66 no-infection PCT mean: 2.60 p-value: 0.67). While PCT was found to be higher among those with bacterial infections, it was not statistically significant. Additional research is warranted due to the small sample size, and preliminary nature of these results. This study is currently ongoing with a goal of reviewing 1500 total charts.

Conclusion:
The use of PCT as a biomarker is promising for the early detection of infectious complications among SOT. The threshold for initiating antibiotics is low for SOT patients, therefore using PCT as an additional tool to stratify risk for bacterial infection may aid in improving clinical outcomes as well as antibiotic stewardship.

Abstract Title: Impact of COVID-19 Lockdown on Overdose Emergency Response Calls in Norfolk, Virginia

Author: Wilson, Mekenzie L
Co-Investigators: 1. Mekenzie L Wilson, MD2023 2. Morgan Shelton MS, MD2024 3. Gina R Vivino, MD2023 4. Emily Ayuso, MD2023 5. Sarah E Birk MPH, MD2023

Abstract

Introduction:
Evaluating changes in frequency and location of overdose calls following the COVID-19 lockdown can help identify areas that have been disproportionately impacted by the pandemic. Disrupted access to healthcare and increased rates of substance use are noted as secondary impacts of the pandemic in recent research studies. Emerging COVID-19 pandemic outcomes include opting to self-medicate and increased rates of usage, relapse, and accidental withdrawal. This study collects current data and compares it to pre-pandemic data to provide insights on emerging trends in overdose call data for medical and public health decision-making.

Methods:
Overdose emergency call response location data was collected from the publicly available Norfolk police database. The number and geographic distribution of responses were compared between the day of the first Virginia-wide lockdown, March 30th, 2020, to December 31, 2020, and the same date range in 2019. QGIS 3.16.2 was used to create a heatmap and identify areas of relative change and highlight emerging trends within the region. Statistical comparisons were completed using paired T-test.

Results:
The number of overdose-related calls increased by 192% during the period following the lockdown compared with the same time frame in 2019 (284 vs 97 calls, respectively). There was an average of 9.7 overdose responses per month in 2019, and an average of 28.4 overdose response calls per month in 2020 (t score: 4.00, p-value: 0.002). Following the lockdown, the greatest increase in call frequency occurred during the months of May (38 calls, 422.9% increase), October (39 calls, 333.3% increase), and December (23 calls, 283.3% increase). A heatmap of call locations shows the neighborhoods of Berkely, Military Circle, Ocean View, Old Huntersville & Hunter's Square as areas with the highest increase in call frequency (Figure 1).

Conclusion:
Overall, overdose cases in Norfolk increased from 2019 to 2020, which may have been exacerbated by the impacts of the ongoing COVID-19 pandemic. As the COVID-19 pandemic continues, an exploration into the developing data to include the surrounding southeastern Virginia region allows for preparation and distribution of medical resources to improve health outcomes in areas that are experiencing a surge in overdose emergency response calls.

Abstract Title: @Dermatology - The Continued Growth of Instagram Utilization by Dermatology Residency Programs

Author: Wintringham, Jennifer A.
Co-Investigators:

Abstract

Introduction:
The ongoing COVID-19 pandemic has altered the residency application process for medical students applying in all fields, including dermatology. Restrictions on external auditions rotations, the cancellation of educational conferences, and the transition to virtual interviews have reduced in person opportunities for dermatology applicants to engage with external residency programs. Recent data demonstrate that the first virtual Electronic Residency Application Service (ERAS) match season of 2020-2021 significantly altered the match prospects of dermatology prospects, with 43.0% of students matching at home programs compared to ~26.7% during the prior cycle.1 Over this same period, dermatology residency programs have increased their social media usage, particularly through Instagram. The percentage of academic residency programs with formal Instagram accounts rapidly increased from 7% of programs in 2019 to 45.6% of programs in early 2021.2,3 In anticipation of a second ERAS virtual interview season, we sought to further quantify Instagram utilization by dermatology residency programs.

Methods:
A list of 137 accredited dermatology residency programs was generated from ERAS. Programs not participating in ERAS were excluded. Instagram accounts associated with specific residency programs were located through Google searches, formal residency websites, suggestions via the "similar accounts" feature of the Instagram application, review of followers from other residency program accounts, and dermatology specific hashtags. Instagram feeds were reviewed for type of content, number of followers, number of accounts following, date of creation, use of the story or reels feature, and average number of posts per week. Posts were categorized into 16 different content categories.

Results:
Of the 137 dermatology residency programs, 89 (65%) programs are represented on Instagram through a mixture of department and resident run accounts. Among the 89 programs with Instagram accounts, the median date of creation was 49 weeks prior, with the most recent creation in the preceding 2 weeks. At least fifty-one programs (62.2%) also use additional features of Instagram, such stories and reels. The five most frequently posted content genres were residents, research/awards/conferences, faculty, photos in the clinic or hospital setting, and lectures. Many programs also chose to highlight unique portions of their training, such as strong community involvement, surgery and Mohs, and cosmetics training.

Conclusions:
Overall, the data show a growing number of Instagram accounts among academic dermatology residency programs, with a relative increase of 42.5% new accounts between February 2021 and August 2021. Instagram utilization is increasing among other competitive specialties as well, including otolaryngology, plastic surgery, and orthopedic surgery. 4-6 For these historically competitive specialties, external rotations are critical opportunities for developing professional relationships at programs of interest. Given logistical limitations stemming from the COVID-19 pandemic, exploring residency programs virtually through Instagram may allow insight into the goals, values, accomplishments, and day-to-day activities of residency programs. As programs and applicants alike adapt to the shifting COVID-19 landscape, social media is likely to play an interesting and useful role in the recruitment process.

Abstract Title: Dermatology In The Urgent Care Setting: A Retrospective Analysis Of Patients Seen In The EVMS Dermatology Urgent Access Clinic

Author: Wintringham, Jennifer A.
Co-Investigators: 1. Daniel M. Strock, B.S, EVMS School of Medicine - MD Class of 2024 2. Kala Perkins Holtsclaw EdD, MMath, MEd - Dermatology

Abstract

Introduction:
Access to appropriate and timely care is an ongoing challenge for patients seeking dermatologic care, especially for those with acute concerns. In 2017, the average wait time for a dermatology appointment was 32.3 days, a 46% increase since 2009.[1] Further, there is great racial and socioeconomic inequity in access to dermatologic care. Recent data suggest that patients with private insurance have shorter wait times than patients with Medicaid/Medicare.[2] The Urgent Access Clinic (UAC) was established at Eastern Virginia Medical School (EVMS) in 2016 to meet the need for prompt and appropriate dermatologic care in the Norfolk and Virginia Beach communities. Currently, limited evidence exists on urgent care models of care in dermatology. This retrospective study aims to describe the demographic characteristics and clinical outcomes of patients seen in a dermatology-specific urgent care context.

Methods:
A retrospective chart review was performed on all patients seen in the EVMS dermatology UAC between April 01, 2016 and September 30, 2020. Demographic information (gender, race, ethnicity, insurance status, zip code, age at date of visit), visit site, final diagnoses, and any interventions rendered (medication, procedure, laboratory or diagnostic studies, imaging, and referrals) were recorded in REDCap. Appointment history was reviewed to determine if a follow up appointment was scheduled, attended by the patient, and if pertinent, the reason for non-attendance (cancel vs. no show). Non-dermatologic diagnoses and diagnoses with a Z code were excluded.

Results:
A total of 1088 patients were seen in the urgent care clinic during the study period. Most visits (97%) occurred at the Andrews Hall location in Norfolk, VA. A majority (51.2%) of patients were new to the clinic. There was a female predominance (60%). Zip codes including 23510, 23507, 23505, and 23508 occurred most frequently, reflecting proximity to the clinic. The five most prevalent diagnoses include papulosquamous and eczematous dermatoses (33.1%), neoplasms (21.1%), infections/infestations/bites (21.0%), unspecified rashes (14.5%), and adnexal disorders (11.5%). Visits frequently resulted in medication recommendation or prescription (81.4%), procedural intervention (27.2%), and additional laboratory or diagnostic testing (16.9%). Referrals and imaging were infrequently ordered. Overall, 62% of patients seen in this clinic were seen again by EVMS Dermatology within 1 year, regardless of the diagnosis at the primary encounter.

Conclusion:
Providing an accessible urgent care model at an academic dermatology center can reduce appointment wait times and appears to provide acute, problem-focused care for the Hampton Roads community. Further work is needed to assess patient and provider satisfaction rates with this model of care. Focused evaluation of the data may also reveal opportunities for targeted, neighborhood-specific public health interventions related to dermatologic care. Moving forward, we plan to investigate demographic differences between patients seeking urgent vs. routine dermatologic care as well as identify opportunities for improving follow up appointment compliance.

Abstract Title: A Case of Granulomatosis with Polyangiitis (Wegener's Granulomatosis) Presenting with Bilateral Testicular Ischemia and Necrosis

Author: Woolard, Colin W
Co-Investigators: Dr. Garrison Glavich, EVMS Diagnostic Radiology Program Dr. Abigail Winz, EVMS Diagnostic Radiology Program Dr. Tyler Klause, EVMS Diagnostic Radiology Program Marissa Hodges, Ultrasound Sentara General Hospital Dr. Jose Morey, EVMS/MCR

Abstract

INTRODUCTION:
Granulomatosis with polyangiitis (GPA) is a rare autoimmune disorder that leads to systemic vasculitis of small and medium sized blood vessels usually involving the upper respiratory tract, lungs and kidneys. It often associated with cytoplasmic ANCA (c-ANCA) and proteinase 3 (PR3) and seen in patients between the ages of 45 and 60 years, without significant gender predilection. It commonly presents with throat manifestations as well as recurrent sinusitis and epistasis. GPA in its limited form typically involved the upper respiratory tract however more generalized forms can provoke renal, pulmonary and other systemic pathologies (1) .

Case Information:
A 26-year-old man with a known history of spina bifida, neurogenic bladder, CKD, and a recent diagnosis of granulomatosis with polyangiitis (GPA) with positive c-ANCA and PR3 findings visited the ED due to concern for a 1-2-week hx of fever along with emesis, diarrhea, and jaw spasms for 1 day. The patient was shortly admitted to the ICU for severe sepsis due to bilateral pyelonephritis. Broad spectrum antibiotics were given and 30mg prednisone was continued for his GPA. Shortly after admission this patient had complaints of testicular pain which prompted an ultrasound investigation which showed adequate doppler with unremarkable internal vascularity. However, a mild right sided epididymitis was present. Twelve days later, patient complained of worsening testicular pain, for which ultrasound showed development of multiple bilateral complex intratesticular masses with doppler vascularity noted along the periphery of the testicles and within the testicular tissue between lesions of which at the time presumed to be of an infectious etiology. Testicular incision and drainage with bilateral penrose placement were performed, cultures obtained did not yield growth, and pathology report was consistent with inflammation and necrosis without findings of vasculitis. Repeat ultrasound a week later showed bilateral testicular necrosis resolution of left sided intratesticular fluid collections and 2 persistent right sided intratesticular collections. Spectral and color doppler analysis demonstrated peripheral blood flow without central blood flow. The right orchiectomy pathology report demonstrated no granulomas or definitive evidence of necrotizing vasculitis. We report here a rare case of GPA presenting with potential involvement of gonadal vasculature resulting in bilateral testicular ischemic infarction.

Discussion:
While GPA is classically characterized by necrotizing granulomatous inflammation of the upper and lower respiratory tracts, and glomerulonephritis, it can also lead to unexpected involvement of other systems as demonstrated in this case. GPA affecting the lung is the most frequent manifestation which leads to multiple inflammatory nodules and masses. In this case, we see testicular involvement secondary to a potential mechanism of proximal gonadal vasculitis resulting in bilateral testicular ischemic infarction. Initial ultrasound investigation early in this patient's hospital course demonstrated adequate peripheral and central blood doppler and low suspicion of torsion however over the course of two weeks, this patient developed multiple bilateral complex intratesticular masses which did not yield any growth on cultures however biopsy results were consistent with inflammation and necrosis. While the right orchiectomy pathology report did not demonstrate granulomatous formation, an expected finding of GPA, vasculitis of more proximal segments of arterial feeders of the testicles could lead to these global ischemic findings. Similar cases involving testicular infarction secondary to GPA been reported however this is the first case report to document bilateral testicular involvement (2, 3, 4, 5). Actual incidence of testicular involvement in GPA may be higher than previously anticipated as genital examination may be neglected on routine physical exams.

CONCLUSION:
In conclusion, we describe a rare case of GPA with bilateral testicular involvement where the diagnosis was determined by biopsy, cultures, ultrasound and clinical symptoms. A thorough external genital physical exam is very important in patients with GPA and should be part of a clinician's routine physical examination whether of not specific symptoms are present.

Abstract Title: Incidental Finding of Subcarinal Air Cyst or Tracheobronchial Diverticulum

Author: Wu, Eunice
Co-Investigators: 1. Lauren Jutras MD, EVMS Radiology 2. Kathy Byun MD, EVMS Radiology

Abstract

INTRODUCTION:
Subcarinal air cysts, tracheal diverticula, and bronchial diverticula fall under the category of Paratracheal Air Cysts (PTACs). They are air filled structures near the tracheobronchial tree that share similar etiologies and are commonly associated with smokers and respiratory pathologies. PTACs have a prevalence of 0.75-8.1% (Goo et al, 1999; Buterbaugh et. al, 2008; Bae et al, 2013). Most are asymptomatic and discovered incidentally on imaging.

CASE INFORMATION:
Here we present the case of a 24 year old male with no significant past medical or smoking history who presented after an assault for a facial laceration. Patient was stable on presentation but CT chest imaging conducted for the purpose of ruling out rib fractures and pneumothorax instead showed subcarinal air structures, but no acute concerns. Given lack of respiratory symptoms or other previous medical history, the air filled structure was deemed a non-acute issue, but that, due to the larger size, could be followed up at the patient's discretion in an outpatient setting.

DISCUSSION/CLINICAL FINDINGS:
The most common presentations of PTACs when symptomatic involve the accumulation of secretions within the cysts, which can become infected and result in chronic tracheobronchitis. The expansion of the cyst may also compress the vagus nerve, which, coupled with the secretions may present as cough, dyspnea, dysphagia, dyspnea, and rarely dysphonia or pneumomediastinum if perforated.

In the case we discussed here, despite the lack of factors that would predispose to TDVs or subcarinal air cysts, structurally the cysts seem actually to match an acquired etiology, given the wide communication with the bronchial tree, the subcarinal location, and the multiloculated shape. Patient does not meet criteria for or fit the clinical picture for Mounier-Kuhn syndrome, but it cannot be ruled out, especially as he is still under the average age of diagnosis.

In terms of differential diagnosis, other structures that can appear similar to tracheobronchial air cysts include laryngocele, pharyngocele, Zenker's DV, apical hernia, and lung bullae (Goo et al, 1999; Tanrivermis et al., 2016). To differentiate these structures from each other, various imaging techniques can be harnessed.

CONCLUSION:
Although no treatment was needed for our patient's new findings before discharge, PTACs can evolve into more complicated issues such as recurrent infections and pneumomediastinum, so recognizing this diagnosis is important in longitudinal monitoring and guiding future management.

Abstract Title: A Retrospective Validation of Disease Activity Questionnaire for Chronic Rhinosinusitis

Author: Yang, Banruo
Co-Investigators: 1. Dr. Joseph Han, ENT Department\EVMS 2. Daniel Trotier, ENT Department\EVMS 3. Dr. Robert Campbell, Jr., NIH-NHLBI PRIDE-AGOLD scholar 4. Dr. Jiangtao Luo, Healthcare Analytics\EVMS MHA 5. Dr. Matthew Lelegren, ENT Department\EVMS

Abstract

INTRODUCTION:
Chronic rhinosinusitis (CRS) is a chronic inflammatory disease of nasal mucosa and paranasal sinuses. The diagnosis and evaluation of CRS are based on multiple factors, including subjective symptoms, objective findings of mucosal inflammation on nasal endoscopy and imaging, and clinical history. However, there is need for an organized and singular evaluation tool to measure changes in disease activity and severity of CRS. The goal of this project is to develop a Diseases Activity Questionnaire that consolidates multiple clinical variables and simplifies current assessment of CRS severity.

CRS is one of the most prevalent chronic condition in the United States, affecting approximately 12% of the population. Patients who suffer from CRS report significant poorer general health, vitality, and social functioning while experiencing more bodily pain and mental health illnesses. The health burdens of CRS result in significant healthcare utilization and costs. Treatment protocols by ENTs are subjective. A consolidated CRS Diseases Activity Questionnaire will be highly valuable in patient care because it provides clinicians with a structured framework to manage CRS and help patients to easier gauge the varying severity of their condition.

Methods:
A preliminary weighted composite CRS Diseases Activity Questionnaire was developed by senior rhinologists and epidemiologist investigators at EVMS. The questionnaire consolidates clinical factors that reflect varying levels of CRS severity including Lund-Mackay CT scores, nasal endoscopy findings, subjective symptoms, laboratory data, and clinical history. To validate the preliminary questionnaire, we retrospectively reviewed 199 adult patients who were seen from January 1, 2010 to July 7, 2019. Allscripts and EPIC medical records were reviewed to answer questions on the questionnaire. Clinical impressions of CRS disease activity were provided by one of the senior rhinologist authors. Patient information was de-identified and entered in the REDCap electronic database following IRB approval. Machine learning models were used to validate the accuracy and precision of the questionnaire and identify clinical variables that are most predictive of clinicians' impression of CRS severity using SAS v9.4.

RESULTS:
Logistic regression is the best out of 12 machine learning procedures (75% predictability). The most predictive variables include degree of opacification on CT, race, subjective symptoms (sense in smell, nasal congestion/obstruction, anterior or posterior nasal drainage, and facial pressure within last 4 weeks), use of systemic steroids within last 4 weeks, history of asthma, and middle meatal edema on endoscopy. The CRS Diseases Activity Questionnaire predicts patients with severe CRS disease activity with 70.6% accuracy.

CONCLUSION:
This is the first objective CRS disease activity measurement scale to be developed. Our study identifies several clinical variables that are predictive of the CRS disease activity, with most success at identifying patients with disease activity in the severe category. The study helps narrow the preliminary 21-question questionnaire for the goal of developing a more succinct, i.e., short-form questionnaire without compromising its predictive value. This moderately validated disease activity measure can be used by the FDA to measure health outcome improvements of new drugs developed for CRS. For the next step, we plan to increase validity and precision by increase increasing the sample size and incorporate another subjective clinical impression of another rhinologist.

Abstract Title: Evaluation of the Emergency Department Usage After a Hurricane: Identifying At-Risk Populations

Author: Yeluru, Hemasree
Co-Investigators:

Abstract

Introduction:
Hurricanes have the potential to cause major flooding, power outages, damage to outpatient medical services. During these times of environmental stress, patients potentially utilize the Emergency Departments (EDs) in a different capacity. While there have been several single-center-studies evaluating the effect of hurricanes on an ED, there has yet to be a multistorm analysis across multiple EDs with varying proximity to ocean. We seek to identify storm variables and their effect on daily ED patient volume in the period before and after a hurricane.

Methods:
We utilized the National Weather Service (NWS) database to identify tropical storms and hurricanes that interacted with Coastal Southeastern Virginia between 2008 and 2016. We extracted specific variables for each storm from the NWS: max wind speed, precipitation, storm surge, and storm tide. We then used EPIC EMR to derive the daily ED volume for the 7 days around a storm's arrival (3 days prior, day of storm, and 3 days post storm).

Results:
We identified 7 storms during our study period. They ranged from Tropical Storm to Category 2, wind speed ranged from 9.6mph- 32.6mph, precipitation ranged from .16in- 8.28in, and max wind gusts ranged 21.9mph- 72mph. There was a statistically significant reduction of ED volume on the day of the hurricane($p<0.0001$). When comparing inland EDs to oceanfront EDs, there was not a statistically significant difference in daily volume($p=0.1934$). Average wind speed was negatively associated with ED volume, a 1 mph increase caused a 3 patient decrease per day($p<.015$).

Conclusion:
Environmental factors negatively influence the ED volume during a hurricane. Wind speed has the most significant negative effect on ED volume while ED proximity to the oceanfront was not associated with change in ED volume. Our study was limited by not having hurricanes greater than category 2 in our dataset. Further research is required with high category storms to assess the environmental effect on the ED.

Abstract Title: Improving Recognition of a "No Hit Zone" in Parents of Children 6 Months to 5 Years of Age in an Urban General Academic Pediatrics Clinic

Author: Yorke, Zachary
Co-Investigators: 1. Rohan Dod, EVMS\MD2024 2. Carolyn Moneymaker MD, CHKD 3. Heidi Flatin MD, CHKD 4. Elizabeth Guju MD, CHKD 5. Emma Wutschel MD, CHKD 6. Leia Lautzenheiser DO, CHKD 7. John Harrington MD, CHKD

Abstract

Introduction:
Many parents still believe that corporal punishment (CP), including spanking, is required occasionally to improve behaviors. CP has overwhelming evidence linking it to negative psychological, cognitive, behavioral, and emotional outcomes in children. A No Hit Zone (NHZ) establishes an environment of safety and promotes effective parenting techniques. Prior research has shown that healthcare providers witness CP and can play a positive role in relaying effective parenting techniques in the pediatric clinic setting. The General Academic Pediatrics (GAP) clinic at Children's Hospital of The King's Daughters established a NHZ in support of the aims of the program. GAP recently surveyed their practice and found that only 30% of parents of children 6 months to 5 years had heard about the NHZ at GAP, demonstrating a need to expand parental recognition of the NHZ. Plan-Do-Study-Act (PDSA) cycles were conceived with the goal of increasing parental recognition to 50%.

Methods:
A SMART Aim for the project was established and used to create a Key Driver Diagram to outline our PDSA cycles, methodology, and goals. A baseline survey of 10 parents to assess parental recognition before implementation of the first PDSA cycle served as the control. Parents of children 6 months to 5 years were surveyed on their recognition of the NHZ as they left GAP after the implementation of each cycle. The results were processed using run charts and statistical flowcharts, specifically a Shewhart chart (p-chart).

RESULTS:
The baseline survey showed that only 10% of parents of children 6 months to 5 years had heard of the NHZ. After the utilization of multiple PDSA cycles, we significantly affected parental recognition of the NHZ at GAP ($p < 0.002$). Over an 8-week period, parental recognition increased 60% in parents of children 6 months to 5 years to 70%.

Conclusion:
PDSA cycles were effective in increasing parental recognition of a NHZ. The effectiveness of NHZ recognition appears to not be contingent on a single implementation but requires a diversity of informational points of contact for parents.

Abstract Title: Operative Time Duration As A Risk Factor For The Occurrence Of Adverse Airway Events In Pediatric Cleft Palate Repair - An ACS NSQIP-P Study

Author: Yu, Victor
Co-Investigators: Jason Pham, EVMS, Yifan Guo, CHKD

Abstract

INTRODUCTION:
Airway catastrophe is one of the most feared complications in the immediate postoperative period following cleft palate repair. However, the incidence and risk factors have not been adequately studied.

METHODS:
A retrospective study was performed using data from American College of Surgeons, National Surgical Quality Improvement Program - Pediatric (ACS-NSQIP-P). Patients under 3 years old from 2016-2019 undergoing palatoplasty were included. Medical comorbidities and operative times were hypothesized as risk factors for adverse airway events (AAEs) which are defined as reintubation or prolonged intubation following palatoplasty. Bivariate associations were assessed with Pearson Chi-Squared tests. Significant associations were further examined using multivariable logistic regression models.

RESULTS:
A total of 6,668 patients met inclusion criteria, of whom 107 (1.6%) experienced an AAE (Table 1). Statistically significant risk factors included: age, non-white race, ASA class, operative time >2 hours, pulmonary, cardiac, neurological, and gastrointestinal medical comorbidities (Table 2). A multivariable logistic regression model demonstrated that prolonged operative time >2 hours, pulmonary, cardiac, neurological, gastrointestinal comorbidities, and ASA class as significant risk factors (Graph 1).

CONCLUSION:
AAEs are a rare but devastating group of complications following palatoplasty. Regardless of age and patient race, an increased burden of medical comorbidities and lengthy operative time are at an increased risk of these pulmonary complications. Understanding the scope of these risk factors can provide useful preoperative information.

Abstract Title: Optimizing Anchor Placement for Cone-Shaped Rotator Cuff Tears

Author: Yu, Victor
Co-Investigators: Dr. John Taliaferro, MD, Orthopaedic Research of Virginia Dr. Kevin F Bonner, MD, Jordan-Young Institute

Abstract

INTRODUCTION:
Currently most surgeons address all intra-articular pathology and assess the extent of a rotator cuff tear with the arthroscope in the joint prior to moving to the subacromial space where they initiate footprint preparation, anchor placement, and rotator cuff repair. We present a different approach to rotator cuff repair, where keeping the arthroscope in the joint prior to going to the subacromial space facilitates rotator cuff repair and improves efficiency.

METHODS:
We describe the technique in a series of photographed cases alongside a narrated video demonstration of the procedure.

Results:
Keeping the arthroscope in the joint facilitates footprint preparation and optimizes medial-row anchor placement prior to going to the subacromial space, and offers superior visualization of the greater tuberosity footprint especially when encountering a cone-shaped tear or high-grade articular sided tear. To further enhance viewing of the footprint with the scope intra-articular, proficiency with utilizing a 70-degree scope directed laterally will typically allow the most ideal view achievable.

CONCLUSION:
This is a novel way to approach treatment of "cone shaped" rotator cuff tears, where a smaller full-thickness bursal sided tear expands to a larger articular sided component. This type of tear is commonly encountered and can prove to be challenging to properly prepare the medial footprint, especially as the tear propagates posteriorly on the articular side. Although this technique initially was borne out as a way to optimally visualize and treat "cone shaped" tears and it is now utilized in most supraspinatus tear patterns.

Abstract Title: Role of BCR in Atherosclerosis

Author: Zyskin, Aleksandr V
Co-Investigators: Shelby Ma MS, Biomedical Sciences, PhD W. Coles Keeter MS, Biomedical Sciences, PhD Alina Moriarty MS, Biomedical Sciences, PhD Marion Mussbacher PhD Galkina PhD, Microbiology and Molecular Cell Biology

Abstract

Background:
Atherosclerosis is a disease associated with dyslipidemias that involves the development of lipid-rich plaques in medium and large arteries. While the immune response has been implicated in atherosclerosis, a specific role of B cells and B cell receptors (BCR) are incompletely understood. Follicular zone and innate response activator B cells are proatherogenic and Breg, B1b, and marginal zone B cells are atheroprotective. B1a cells produce natural antibodies (NAbs) against oxidation-specific epitopes (OSEs), including oxLDL which is the main component of plaques. To date, it is unknown if BCRs recognize OSE antigens, such as oxLDL and how this recognition affects B cell functions.

Methods:
Atherosclerosis was induced in two mouse models with transgenic BCRs. MD4 mice express BCRs that specifically recognizes hen egg lysozyme. ARS/A1 transgenic mice have anergic B cells expressing BCRs with dual reactivity for the hapten p-azophenylarsonate (ARS) and self-antigens, including ssDNA. To induce hyperlipidemia and atherosclerosis, MD4, ARS/A1, and C57BL/6 (WT) mice were injected with PCSK9-AAV to knock down hepatic LDLR. After 16 weeks of high-fat diet, plasma was collected and anti-oxLDL IgM was measured using ELISA developed in our laboratory.

Results:
Preliminary data demonstrates that WT B cells constitutively produce detectable levels of anti-oxLDL Abs. Interestingly, data also suggests that MD4 and ARS/A1 B cells are capable of producing anti-oxLDL Abs, with high titers of Abs detected in ARs/A1 plasma under homeostatic conditions. Atherogenesis increases anti-oxLDL Ab levels in WT B cells. In preliminary experiments, we detected relatively low levels of oxLDL Abs in MD4 atherosclerotic mice. In contrast, despite anergy of ARS/A1 B cells, anti-ox-LDL Abs have been detected at levels comparable to WT mice.

Conclusions:
Preliminary data suggests that homeostatic production of anti- oxLDL IgM Abs is at least partially independent of the BCR repertoire. Atherogenesis may induce production of anti-oxLDL Abs in both models of BCR transgenic mice highlighting a potential unique pathway by which BCR-transgenic B cells can generate NAbs. Further studies will focus on investigating mechanisms by which anergic ARS/A1 B cells and BCR transgenic MD4 can produce anti-oxLDL Abs and other NAbs in normal and pathological conditions.

Abstract Title: Patient-Targeted Googling: A Qualitative Study of Psychologists' Perceptions and Practices

Author: Disasi, Kayla
Co-Investigators: 1. Emily Putnam, Community Health and Research/Pediatrics 2. Ann Edwards, Community Health and Research/Pediatrics

Abstract

INTRODUCTION:
Patient-targeted Googling (PTG) refers to any behavior in which healthcare professionals search on the Internet with the goal of obtaining information about their clients. Research suggests that anywhere from 17% to 98% of providers in different fields are engaging in PTG. Overall, the existing PTG literature is sparse and inconsistent regarding the prevalence and ethicality of the practice. PTG is rarely discussed in psychologists' training, and the American Psychological Association (APA) Ethics Code lacks guidance on the topic. There has been limited research specific to psychologists on the topic of PTG. The present study aims to clarify PTG practices, explore PTG attitudes, and understand training and ethical guidance needs of clinical and counseling psychology practitioners and trainees.

METHODS:
Ninety-five participants were recruited to take an online survey, and thirty-six participants were recruited for participation in five virtual focus groups. The focus groups were transcribed using audio-to-text transcription software. Focus group and qualitative survey data were analyzed using NVivio 12 software. A thematic analysis of qualitative survey and focus group data was conducted.

RESULTS:
Perceived rates of psychologists who have ever engaged in PTG ranged from 0% to 90% with a mean response of 55%. A majority of participants reported perceiving PTG as either unethical or were unsure regarding the ethicality of the practice. However, participants identified a comparable amount of justifiable and unjustifiable reasons for engaging in PTG. A variety of related practices were identified that should be done in tandem with PTG including receiving informed consent, self-reflection of clinician intentions and motivations, consultation, and diligent documentation of searches. Most participants reported receiving minimal or no training or guidance surrounding PTG. Many ideas for future training were identified including the updating of APA guidelines to address PTG and social media use.

CONCLUSION:
PTG continues to be an under researched topic and warrants further discussion and research including examination of patient perceptions of PTG. Study results support a call for guidance from APA on the topic of PTG.

Abstract Title: Incorporating Vape Prevention Education in Pediatric Practices
Author: Vanka, Anisha S
Co-Investigators: Ann Edwards, Center for Pediatrics

Abstract

Introduction:
E-cigarettes (vapes) are the most common form of tobacco product used among adolescents (Wang et al., 2019). Teen usage of e-cigarettes has risen dramatically since 2011, resulting in 3.6 million teens reporting use in 2020. (Wang et al., 2020). In addition to their addictive quality, e-cigarettes are especially dangerous as they include many other chemicals with unknown effects (England et al., 2021; Henry et al., 2020; Patten, 2021). Research indicates a correlation with respiratory diseases (Hamberger & Halpern-Felsher, 2020), and other studies found that vaping-associated lung injury is a form of chemical pneumonitis (Butt et al., 2019). Evidence even suggests a correlation between vaping and adverse mental health effects such as those seen with cigarettes (Patten, 2021). To combat teen vaping, a healthcare provider training module was developed and implemented with partnering providers including provider-tailored education, talking points, and parent/teen resources. The goal was to incorporate vape prevention education into patient visits at pediatrics practices. The current study reports preliminary results of an ongoing process evaluation of this effort.

Methods:
Key Informant interviews were conducted with physicians and nurse practitioners within the CHKD Medical Group network regarding their experience in discussing vaping with adolescent patients using provider resources previously instituted by England et al. Questions focused on effective approaches in discussing vaping with teens, challenges the physicians had encountered and possible solutions, and quality improvement suggestions. Qualitative data regarding the effectiveness of those provider resources were gathered and analyzed for themes and patterns.

Results:
Training materials increased providers' vaping knowledge. Physicians who utilized the training and resources developed by England et al. reported more success in answering patient questions and giving patients and families a method to remember information after visits. Participating providers offered suggestions for additional resources, such as a pocket card with scannable QR codes to use when talking with patients.

Conclusion:
Provider confidence in discussing vaping with patients increased due to being more knowledgeable on the subject. Physicians also found more success in connecting with patients and their families.

Abstract Title: Congenital Portosystemic Venous Shunt: A Rare and Interesting Case Report

Author: Columbus, Laura
Co-Investigators: 1. Nirav Patal, Medical Student, VCOM-Virginia 2. Daniel W O'Neal, Radiology, EVMS 3. R. Hampton Andrews, Radiology, EVMS

Abstract

INTRODUCTION:
Congenital portosystemic shunts (CPSS) are rare anomalies with an incidence ranging from 1:30,000 to 1:50,000 live births.(1) These shunts cause portal blood to bypass the liver and drain directly into the systemic circulation. They arise from disturbances during embryological development when certain veins do not properly involute, or parts of the fetal circulation persist post-intrauterine life.(2) Diagnosis is primarily accomplished using Doppler ultrasound, computed tomography, and/or magnetic resonance imaging, but serum arterial ammonia levels may also be useful.(3) Due to the rarity of this anomaly, there is currently no standardized therapeutic treatment algorithm. Multiple factors including patient age, the severity of symptoms, location and degree of shunt, and complications, are considered when determining the appropriate treatment plan which includes endovascular or surgical intervention.(1) Here, we present a case report of an asymptomatic congenital portosystemic venous shunt found incidentally.

CLINICAL FINDINGS:
A 67-year-old female with a history of hypertension presented to the emergency department with hematuria and anteriorly radiating right-sided flank pain which began 4 days prior. A contrasted enhanced CT obtained to workup for renal calculi incidentally revealed congenital portosystemic shunt. The patient was discharged after treating her renal calculi and will have her CPSS continued to be monitored as an outpatient. If the shunt enlarges and/or the patient beings to develop symptoms, she may require medical intervention in some capacity.

DISCUSSION:
Congenital portosystemic shunts are rare and often incidental findings. However, it is important to follow-up and monitor these patients closely to identify and potentially treat any complications that may arise. Radiologic evaluation alongside clinical management should be regularly acknowledged. Similar to a transjugular intrahepatic portosystemic shunt (TIPS) procedure, CPSS causes portal blood to bypass the liver and drain straight into a systemic vein. This can cause an increase in serum ammonia levels as it is not appropriately metabolized by the liver and lead to hepatic encephalopathy. Given the anatomical complexity of these shunts, multiple different classification criteria are currently available. As outlined by Papamichail et al, the three most commonly used classifications are based according to the severity of the hypoplasia of the intrahepatic portal system under shunt occlusion, shunt origin, or shunt ending.(1) Treatment is recommended at the first indication of liver dysfunction, pulmonary hypertension, or any other organ failure.(4)

CONCLUSION:
Patients with CPSS are at high-risk of developing liver and pulmonary vasculature dysfunction and need close monitoring. Radiology plays a key role in the diagnosis and evaluation of and the potential need for intervention of CPSS. There is currently no standardized therapeutic approach to treating these anomalies but with more research and exploration, it will help guide future management.

Abstract Title: Symptom Assessment of Cancer Patients in Palliative Care Medicine Clinic

Author: Goel, Richa
Co-Investigators: Justin Van Klein, MD, EVMS, Natalie B. Simon, EVMS, Marissa C. Galicia-Castillo, MD, EVMS, Lauren W. Mazzurco, EVMS

Abstract

INTRODUCTION:
The Edmonton Symptom Assessment System (ESAS) which is a valid and reliable assessment tool to assist in the assessment of nine common symptoms experienced by cancer patients which include pain, fatigue, nausea, depression, anxiety, drowsiness, appetite, well-being, dyspnea, and other if relevant. The ESAS is completed for each patient visit and scores provide a clinical report of symptom severity over time. An accurate assessment of symptoms allows us to adequately treat patients and trend effectiveness over time. At Sentara Norfolk General Hospital, the palliative medicine clinic was established within the Brock Cancer Center to serve this patient population. In this study, we analyzed the breadth of symptoms associated with a cancer diagnosis. Our study reveals that cancer patients' symptoms extend beyond just pain as demonstrated in the various severity scales for fatigue, nausea, depression, anxiety, drowsiness, appetite, well-being, dyspnea, and other if relevant. Our study was conducted within the Sentara Norfolk General Fellow's Palliative Care clinic located in the Advanced Heart Failure Clinic and Infusion Center clinic. We demonstrate the need for additional supportive services such as medical personnel (ie. medical assistant, registered nurse) to be able to prescribe medications within the Fellow's Clinic, which we can currently not do.

METHODS:
Data were collected from cancer patients from June 2020 to June 2021 visiting SNGH Fellow's Palliative Care clinic located in the Advanced Heart Failure Clinic and Infusion Center clinic.

REDCap was used to note whether an ESAS was completed prior to initial Palliative Care Clinic visit in patients with a cancer diagnosis. Cancer patients were then asked to complete an ESAS which is a valid and reliable assessment tool to assist in the assessment of nine common symptoms experienced by cancer patients which include pain, fatigue, nausea, depression, anxiety, drowsiness, appetite, well-being, dyspnea, and other if relevant. The severity of each symptom is rated from 0 to 10 on a numerical scale; with 0 meaning that the symptom is absent and 10 that it is the worst possible severity.

Study data were collected and managed using REDCap electronic data capture tools hosted at EVMS. REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and intraoperatively with external sources.

RESULTS:
Out of the 274 patients seen in the Sentara Norfolk General EVMS Fellows Palliative Care Clinic, 42 patients were noted to have a diagnosis of cancer. There were 29 (69.04% of the cancer patients seen) patients noted to have completed an ESA prior to palliative care clinic visit. Pain severity was noted as 0 (4, 13.8%), 1 (2, 6.9%), 2 (4, 13.8%), 3 (2, 6.9%), 4 (2, 6.9%), 5 (1, 3.4%), 6 (7, 24.1%), 7 (2, 6.9%), 8 (3, 10.3%), 9 (0, 0.0%), 10 (2, 6.9%).Fatigue severity was noted as 0 (3, 10.3%), 1 (1, 3.4%), 2 (0, 0.0%), 3 (2, 6.9%), 4 (0, 0.0%), 5 (4, 13.8%), 6 (3, 10.3%), 7 (5, 17.2%), 8 (4, 13.8%), 9 (6, 20.7%), 10 (1, 3.4%).

Nausea severity was noted as 0 (13, 44.8%), 1 (6, 20.7%), 2 (0, 0.0%), 3 (1, 3.4%), 4 (5, 17.2%), 5 (0, 0.0%), 6 (1, 3.4%), 7 (2, 6.9%), 8 (1, 3.4%), 9 (0, 0.0%), 10 (0, 0.0%).

Depression was noted as 0 (10, 34.5%), 1 (5, 17.2%), 2 (2, 6.9%), 3 (1, 3.4%), 4 (1, 3.4%), 5 (6, 20.7%), 6 (0, 0.0%), 7 (0, 0.0%), 8 (2, 6.9%), 9 (2, 6.9%), 10 (0, 0.0%).

Anxiety was noted as 0 (7, 24.1%), 1 (6, 20.7%), 2 (2, 6.9%), 3 (1, 3.4%), 4 (1, 3.4%), 5 (3, 10.3%), 6 (3, 10.3%), 7 (4, 13.8%), 8 (0, 0.0%), 9 (2, 6.9%), 10 (0, 0.0%).

Drowsiness was noted as 0 (7, 25.0%), 1 (4, 14.3%), 2 (4, 14.3%), 3 (2, 7.1%), 4 (2, 7.1%), 5 (0, 0.0%), 6 (3, 10.7%), 7 (1, 3.6%), 8 (2, 7.1%), 9 (0, 0.0%), 10 (3, 10.7%). Noted that 1 cancer patient missed this assessment on drowsiness.

Appetite severity was noted as 0 (3, 10.3%), 1 (3, 10.3%), 2 (2, 6.9%), 3 (3, 10.3%), 4 (2, 6.9%), 5 (5, 17.2%), 6 (3, 10.3%), 7 (2, 6.9%), 8 (3, 10.3%), 9 (2, 6.9%), 10 (1, 3.4%).

Well-being severity was noted as 0 (3, 10.7%), 1 (4, 14.3%), 2 (2, 7.1%), 3 (3, 10.7%), 4 (1, 3.6%), 5 (8, 28.6%), 6 (0, 0.0%), 7 (3, 10.7%), 8 (3, 10.7%), 9 (1, 3.6%), 10 (0, 0.0%).

Dyspnea severity was noted as 0 (9, 31.0%), 1 (3, 10.3%), 2 (2, 6.9%), 3 (5, 17.2%), 4 (1, 3.4%), 5 (3, 10.3%), 6 (1, 3.4%), 7 (2, 6.9%), 8 (2, 6.9%), 9 (0, 0.0%), 10 (1, 3.4%)

CONCLUSION:

Our results reveal that ESAS proves to be an efficient assessment tool within the Palliative Care Medicine clinic as demonstrated with the varying severity in each of the categories presented above. At SNGH, the palliative medicine clinic was established within the Brock Cancer Center to serve these patients but the EVMS Fellow's Palliative Care Medicine Clinic does not have the resources to prescribe medications to alleviate symptoms. Our study shows that we need more resources to address the symptoms our patients are presenting with. We demonstrate the need for additional supportive services such as medical personnel (ie. Medical assistant, registered nurse) to be able to prescribe medications within the Fellow's Clinic.

Abstract Title: Appearance of intra-abdominal foreign bodies on multiple radiologic modalities

Author: Kang, Matthew Sung
Co-Investigators: 1. Christian Law, EVMS Medical student

Abstract

Introduction:
Foreign bodies within the gastrointestinal tract or intra-abdominal spaces can present on radiographic imaging from a variety of causes. These can include ingestion, trauma, or iatrogenic causes. Even benign radiodense materials can mimic more serious complications, highlighting the importance of becoming familiar with a variety of presentations. As a radiologist, it is important to recognize intra-abdominal foreign bodies on multiple modalities and differentiate acute pathologic entities from benign or low-risk processes.

Main Body:
After consideration of types of foreign bodies and radiodense objects that might appear on radiographic imaging, a search of the radiographic "Montage" software/database was conducted with keywords including "foreign body," "foreign object," "swallowed," "ingested," and limiting modalities to radiographs, computed tomography, and fluoroscopic studies. Multiple studies were identified that fit our desired criteria of adequately demonstrating intraluminal radiodensities that could affect clinical course. Included images were selected based on resolution, atypical presentation, and those with documented clinical implications through our chart review.

Conclusion:
Multiple relevant studies were identified through this method of reviewing past radiographic studies through the hospital radiology database. As a result of our research, we recognize that this method of searching the database is highly dependent on radiologists utilizing common terms for radiodense foreign bodies, and thus some relevant or novel processes were not identified.

We discovered multiple patients who exhibited repeated episodes of swallowing radiographically evident foreign bodies. Management of individual hospitalizations often involved an early conservative approach with further management dictated by clinical course. This further highlights the importance of identifying associated radiographic signs of obstruction or perforation, as these can appropriately expedite treatment or change clinical decision making. Additionally, we specifically highlighted examples of radiologists appropriately identifying non-pathologic intra-abdominal radiodensities that might otherwise imitate a pathologic process. For example, partially digested radiodense medications could mimic intraluminal extravasation of contrast, as we have depicted with selected images, a potentially critical distinction.

Given the format for our presentation, limited space prevented us from providing a full breadth of foreign bodies within the gastrointestinal tract. Future research considerations could include a more focused review of radiographic signs of obstruction or perforation associated with foreign bodies as discussed above. There is also potential for selecting a single patient to review as a case study that focuses on radiographic diagnoses driving clinical management in the setting of repeated foreign body ingestion.

Abstract Title: Common Post Metabolic Surgery Imaging Findings

Author: O'Neal, Daniel W
Co-Investigators: 1. David Eapen, Medical Student, Trinity School of Medicine 2. Christopher O'Neill, Radiology, EVMS

Abstract

INTRODUCTION:
An estimated 252,000 Americans underwent some form of bariatric surgery in 2018(1). These procedures are known to alter the normal anatomy and are not without complication (2). In this presentation, we explore the radiographic changes seen in patients who have had metabolic surgery.

Main Body:
In 2018 the most common of these procedures was the sleeve gastrectomy, a typically laparoscopic procedure in which a portion of the greater curvature is resected, thereby physically and hormonally regulating appetite and capacity for intake(1). The second most common procedure was the Roux-En-Y gastric bypass (RYGB), which involves disconnecting the antrum of the stomach from the esophagus, attaching the jejunum to the stump, and then connecting the duodenum (attached to the now-defunct stomach) directly to the ileum. Another procedure that has steadily declined in popularity but is still prevalent in metabolic surgery is laparoscopic banding, in which an adjustable band is placed below the gastroesophageal junction, the band being adjusted by saline injections via an attached subcutaneous port. These metabolic surgeries have characteristic imaging findings best seen on fluoroscopy and CT imaging. Our figures demonstrate these findings for the two most common procedures: sleeve gastrectomy and RYGB. Being familiar with the normal findings after metabolic surgery is important in order to evaluate for surgical success and possible complications.

CONCLUSION:
As evidenced by the radiographic studies discussed above, the changes to the gastrointestinal anatomy of a patient who has underwent metabolic surgery is notable, especially considering that nearly 15% of metabolic surgeries performed last year were revisions. Currently, the modalities of choice for ruling out complications are the CT scan with contrast and fluoroscopic studies(3). In addition, insurance coverage of these procedures

Abstract Title: American College of Allergy, Asthma, & Immunology Patch Testing Member Survey: Use of Patch Testing and Effect of Education on Confidence, Attitude and Usage - A Follow-up to the 2002 Survey

Author: Owens, Jeremy
Co-Investigators: 1. Jeremy Owens, Pediatrics/EVMS & CHKD 2. Omar Yamak, Pediatrics/EVMS & CHKD

Abstract

Introduction:
Allergic Contact Dermatitis (ACD) affects approximately 13 million people in the United States and is the fifth most common skin disease impacting children and adults. Patch Testing is the gold standard for diagnosing contact dermatitis. It is a safe, inexpensive procedure which more allergists have been performing over the last decade. The goal of this study is to assess the frequency of use of patch testing amongst allergists and to identify factors that influence use of patch testing in this group as well as to compare current results to those reported in 2002.

Methods:
An electronic survey was sent to all ACAAI members via email.

Results:
Out of 2904 surveys sent, 322 responses were collected for an 11% response rate. 85% percent of responding allergists perform patch testing compared to 57% in 2002. Of the responding allergists that do perform patch testing, 64% percent were fellowship trained, 33% were trained in a workshop. A significant association existed between number of years in practice and both confidence in performing patch tests ($p=0.001$) and perception of clinical utility ($p=0.035$). Those with 11-20 years' experience were more likely to perform the testing. No difference existed in type of training and confidence in patch testing or the perception of clinical utility.

Conclusions:
Years in practice correlated well with confidence in, perception of clinical utility, and likelihood of using patch testing. Those with fellowship training and/or workshop training were more likely to utilize patch testing and feel confident in its utility.

Abstract Title: PGE2 Regulates the Plasminogen Activator Pathway in Human Endometrial Endothelial Cells: Differences between Normal and Heavy Menstrual Bleeders

Author: Sadek, Seifeldin
Co-Investigators: Terry Jacot, Ob-gyn: CONRAD, Diane M. Duffy, Physiological Sciences, David F. Archer Ob-Gyn\ Reproductive Endocrinology and infertility

Abstract

Introduction:
This study seeks to determine if Prostaglandin E2 (PGE2) alters plasminogen activator inhibitor-1 (PAI-1) and tissue plasminogen activator (tPA) in human endometrial endothelial cells (HEEC) and identify any differences between women with normal and heavy menstrual bleeding.

Methods:
HEEC primary cultures were established from two groups of women: heavy menstrual bleeding (HMB, n=4), and normal menstrual bleeding (NMB, n=4). HEEC were cultured with PGE2 at concentrations of 10-7 10-9, 10-11 M and no PGE2 as a control. We used ELISAs to assess the concentration of PAI-1 and tPA in media; total protein was extracted from the cells and determined using the Bicinchoninic Acid protein assay. Differences among experimental groups was analyzed using a repeated measures one-way analysis of the variance for matched samples, Bartlett's test was used to assess homogeneity of variances. We performed n = 8 experiments for PGE2. Unpaired t-test was then used to compare differences between controls of NMB and HMB. Significance was defined as $p < 0.05$.

Results:
There were no differences in patient demographics, the average age in NMB 38.8 and HMB was 42.8 (p=0.18). HMB women had at least one fibroid by ultrasound. HEEC levels of PAI-1 was significantly increased in NMB women at both 10-7M PGE2, and 10-9M PGE2 252.7 ± 68.6 pg/µg, 173.4 ±41.2 pg/µg (p=0.006) compared to control 85.5 ±38.1 pg/µg. There were no differences in PAI-1 levels in HMB at all concentrations of PGE2 146.9 ±57.4 pg/µg, 145.7 ±68.9 pg/µg (p=0.41) compared to control 167 ±32.22 pg/µg. However, PAI-1 control levels were significantly higher in HMB 167 ±32.22 pg/µg compared to NMB women 85.5 ±38.1 pg/µg (p=0.018 (Table 1).

Conclusions:
An increase in PAI-1 is associated with decreased fibrinolysis leading to shift in the relative ratio of PAI-1: tPA. This shift of balance between PAI-1 and tPA governs the amount of free tPA, its activity and fibrinolytic potential, and in turn stabilizing blood clots in the endometrium in NMB women. Further suggesting that the endothelium of HMB women may be dysregulated in their PAI-1/tPA pathway in response to PGE2, which may be a central cause of their heavier menses.

This is the first study to show that endothelial cells isolated from endometrium of women experiencing HMB retain some phenotypic change in the PAI-1/tPA system, in vitro, when compared to those cells isolated from women with NMB. Identifying this pathway is the first step to a potentially new therapy for menorrhagia.

PAI-1 (pg/ug protein)						**tPA (pg/ug protein)**				
	Control	10-7M PGE2	10-9M PGE2	10-11M PGE2	p-value	Control	10-7M PGE2	10-9M PGE2	10-11M PGE2	p-value
NMB (Mean ± SD)	85.5 ± 38	98.4 ± 41	173.4 ± 41	252.7 ± 69	0.006	6.4 ± 3.1	8.3 ± 3.9	6.6 ± 2.6	6.0 ± 2.1	0.27
HMB (Mean ± SD)	167.4 ± 33	180.7 ± 89	145.7 ± 69	146.9 ± 57	0.41	8.3 ± 6.8	6.0 ± 2.9	5.4 ± 1.7	8.3 ± 5	0.33

Abstract Title: Neuroimaging Findings in a Patient with 22q11.2 Deletion Syndrome DiGeorge Syndrome
Author: Winz, Abigail S
Co-Investigators:

Abstract

Introduction:
22q11.2 Deletion Syndrome (DS), also known as DiGeorge Syndrome, is a common genetic disorder, effecting approximately 1 in 4,000. It is a phenotypically heterogeneous disorder with some of the more characteristic features including cardiac abnormalities, thymic hypoplasia and palatal abnormalities. Additionally, there are neuroimaging findings that are commonly associated with 22q11.2 DS including cavum septum pellucidum (CSP) and white matter changes.

Case Information:
The patient is a 33 year old woman with 22q11.2 DS and a past medical history of seizure disorder and psychiatric disorder with psychotic features, who presented to the emergency department after developing acute transient vision loss. She underwent head CT which showed moderate periventricular and subcortical white matter hypointensities and a CSP. Follow up MRI confirmed extensive T2/FLAIR white matter hyperintensities and CSP, with no acute changes. The acute vision loss was subsequently diagnosed as ocular migraine.

Discussion:
CSP and white matter changes are among the most commonly reported neuroimaging findings in patients with 22q11.2DS. Additional common neuroimaging findings in 22q11.2 DS, not seen in this patient, include middle and inner ear abnormalities and gyration abnormalities. CSP and T2/FLAIR hyperintensities have also been reported as having an additional association with psychiatric disorders with psychotic features in patients with 22q11.2 DS, as seen in this patient.

Conclusion:
CSP and white matter changes are common neuroimaging findings in patients with 22q11.2 DS. There are additional clinical implications, including associations with psychiatric disorders, in these patients.

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