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ORAL PRESENTATIONS (VIA ZOOM)

Note: recordings not available until March 18 2022

Rodney Bruno | Time from Decision for Cesarean Delivery to Incision by Race and Ethnicity
Project Advisor | Julianne Lauring MD
House | Blackstone | Michael C Ennis MD
Presentation 9:00-9:15
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Abstract

Identifying and reducing inequities in the delivery of care is crucial to improving health disparities in obstetric outcomes. This study sought to evaluate the effect of race/ethnicity on time from decision for cesarean delivery to incision following implementation of a case classification system. A retrospective cohort study was performed to identify women who had cesarean deliveries from 10/1/2020 to 3/31/21 at a single, tertiary care institution. Medical records were reviewed for demographics and cesarean delivery case classification. Case classification was divided into STAT cesarean delivery (within 10 minutes), level A (within 30 minutes), level B (within 60 minutes), or scheduled/unscheduled other. The “decision to incision time” was determined from the time the case surgical order was placed to the case start time. There were 565 women that had a cesarean delivery during the study period, with 13.6% identifying as Black/African American, 29.0% as Hispanic/Latina, and 57.3% as White. Hispanic women were more likely to need interpreter services than other race/ethnicity groups. There was no statistically significant difference in “decision to incision time” by race/ethnicity. Within the total cohort, 51.8% of cesarean delivery cases went within the goal time according to case classification, which also did not differ by race/ethnicity. Race and ethnicity did not seem to impact cesarean delivery “decision to incision time” or case

classification. Only half of cesarean deliveries went within the goal time, further evaluation to improve workflow and improve this metric for all patients is needed.

Charles Ogagan Jr. | Assessment of a New Ventriculogallbladder Shunt Technique Utilizing an Exemplary Case
Project Advisor | Brittany Owusu-Adjei MD
House | Blackstone | Michael C Ennis MD
Presentation 9:30-9:45
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Abstract

Introduction Surrogates who are required to make goals-of-care decisions for incapacitated patients often face inadequate support, which can lead to decisional conflict, long-term psychological distress and decisions incongruent with patient preferences. Shared decision-making is a recommended approach to improve goals-of-care decisions, especially when facilitated by decision aids (DAs). We sought to develop the first goals-of-care DAs for critically-ill patients in the NeuroICU setting.

Methods First, we created and iteratively revised a pilot DA for traumatic brain injury (TBI) using significant stakeholder input. Second, we adapted disease-specific content to create DAs for intracerebral hemorrhage (ICH) and large hemispheric acute ischemic stroke (AIS). We created DAs in both paper-based and digital-based formats. Third, we conducted field-testing in the UMass and Yale neuroICU waiting rooms, where a convenience sample of surrogates rated DA usability (System-Usability-Scale) and acceptability (Acceptability-Scale).

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Results We developed goals-of-care DAs for surrogates of critically-ill patients with TBI, ICH and AIS, according to international DA standards and shared decision-making principles. Field-testing across the full sample (n=58) revealed average usage time of 24.3±8.3 min, and very high usability (mean SUS score=86.3±24.4/100) and acceptability (78.4%/100%), including comprehensibility, suitability, length, amount and balance of information. Testing within the TBI-cohort (n=18), stroke-cohort (n=20) and digital-cohort (n=20) resembled the full sample results.

Conclusions We developed novel goals-of-care DAs for surrogates of critically-ill NeuroICU patients, which met international DA standards and showed very high usability and acceptability. Our methodology may serve as an example for development of other DAs in the neuroICU or other areas in neurology.

Christine Grech | Death and Dying: Perceptual change of healthcare workers during the COVID19 pandemic

Project Advisor | Nagpal Vandana MD

House | Brightwood | Jacqueline Wu MD

Presentation 9:45-10:00

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Iha Kaul | To Cut or Not to Cut: Developing a Survey to Assess, Comfort, Knowledge, Attitudes and Behaviors of Medical Students towards the Genitourinary Exam and Neonatal Circumcision

Project Advisor | Jennifer E Fantasia MD

House | Brightwood | Eric Churchill MD MPH MSc

Presentation 10:00-10:15

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Abstract

There continue to be gaps in medical student comfort and knowledge with the male genitourinary system. With no required rotations in urology, medical students often must elect to find information that reflects up to date physical exam techniques and evidence-based practice for the male GU exam. At UMass Medical School, students are provided a single standardized patient session in which they are guided through the male genitourinary exam, including a digital rectal exam. Outside of this, exposure is variable. Almost 50% of medical students at UMass will pursue a primary care specialty requiring them to be adept at the male physical exam. Circumcision is

another topic in the GU system in which the evidence is limited and controversial. Personal attitudes may influence medical student attitude towards future counseling for patients regarding neonatal circumcision. This project seeks to survey the literature and develop a survey that assesses personal attitudes that influence knowledge and clinical comfort in male genitourinary care and circumcision counseling for UMass Medical Students.

Annie McClements | Shared Decision-Making and the Initiation of Buprenorphine in the Emergency Department: A Literature Review

Project Advisor | Elizabeth Schoenfeld MD MS

House | Brightwood | Eric Churchill MD MPH MSc

Presentation 10:15-10:30

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Abstract

Opioid use disorder (OUD) is a significant cause of mortality and healthcare cost in the United States. Emergency Departments (ED) are an integral site for addressing OUD on both an individual and a population level. EDs serve as the first point of contact for many people who use opioids and can offer life-saving harm-reduction interventions including medications for opioid use disorder (MOUD). However, the stress on ED providers limits the time and tact available for productive conversations around initiating MOUD. Shared decision-making and decision aids are used in the ED to help streamline challenging conversations and to empower patients to be involved in their recovery and care. This literature review seeks to evaluate if shared decision-making improves access to MOUD in emergency departments for patients with OUD. Fifteen scholarly papers met inclusion criteria. Through evaluation of these papers three themes arose: 1) while emergency medicine providers are crucial in the initiation of MOUD, they face many barriers to initiating care in the emergency department; 2) shared decision-making offers a viable option to address provider-based barriers to care; 3) decision aids may further streamline initiation of MOUD. Ultimately, this review supports shared decision-making for initiation of MOUD as a strategy to address barriers and improve patient engagement and outcomes.

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Bronwyn Wada-Gill | Behavioral Health Integration into Primary Care Practices within Western Massachusetts

Project Advisor | Phoebe Walker

House | Brightwood | Samuel H Borden MD

Presentation 10:30-10:45

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Abstract

Franklin County is the most rural county in Massachusetts and has a high rate of behavioral health needs. Behavioral health is a crucial component to maintaining good physical health. Therefore, mental health disorders, substance use disorders, and lack of access to psychosocial resources are some of the most common causes of morbidity and disability. Mental illnesses, such as depression and anxiety can prevent people from participating in healthy behaviors such as physical activity, nutrient-rich dietary intake, and social engagement. In turn, physical health problems highly correlate with the development of mental health conditions. The connection between psychological and physical health is inextricably linked.¹

The Franklin County and North Quabbin region have been experiencing the devastating effects of substance use disorder, with a higher fatal opioid overdose rate in 2018 than the principal city of Boston.² For this reason, the Franklin Regional Council of Governments (FRCOG), Baystate Franklin Medical Center (BFMC), and other key community stakeholders have made it a top priority to improve behavioral health care access through integration efforts into local primary care practices.

This capstone project will review behavioral health integration efforts into regional primary care practices and suggest next steps for the future of this effort.

Peter Cruz-Gordillo | Unmasking Oncogene Addiction to EGFR:

A Lesson in Intrinsic Resistance

Project Advisor | Michael J. Lee Ph.D.

House | Burncoat | David Hatem MD

Presentation 10:45-11:00

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Abstract

The rationale behind targeted molecular therapy in cancer, oncogene addiction, is that tumors rely on driver oncogenes to

control their proliferation and survival. While there have been clinical success stories using targeted therapies, even tumors that are initially sensitive invariably develop resistance. In the case of Triple Negative Breast Cancer (TNBC), despite extensive evidence pointing to its driver oncogene status, inhibitors of the Epidermal Growth Factor Receptor (EGFR) are considered clinically inefficacious. Yet it remains unclear why patients exhibiting the same dysregulated status of a driver oncogene react to targeted therapy, as in the case of EGFR-mutant non-small cell lung cancer, while others are intrinsically resistant (i.e., TNBC).

Emerging data reveals that drugs can induce resistance by rewiring inherent epigenomic, transcriptional, and translational regulatory mechanisms. Unfortunately, a major limitation in designing efficacious treatments is our inability to predict whether cell types can rewire in response to drug exposure. Therefore, it is necessary to elucidate mechanisms of growth and survival in cells that have undergone rewiring. I found that EGFR inhibition induces rewiring in TNBC, which results in a resistant growth state that bypasses the EGFR-MAPK pathway. Additionally, I found that a tRNA-modifying complex masks the full oncogene addiction status of EGFR in TNBC by stabilizing the protein abundance of a pro-survival protein. Importantly, this happens solely in the context of EGFR inhibition. Taken together, this work highlights potential therapeutic strategies for TNBC and strategies that can be used to improve our understanding of targeted therapy resistance mechanisms in other cancers, especially intrinsic resistance.

Zachary J. Michaels | Effects of the UMass Disability Interstitial on Medical Students Attitudes, Clinical Skills, and Comfort

Regarding Patients with Disabilities

Project Advisor | Linda M. Long-Bellil PhD JD

House | Burncoat | David Hatem MD

Presentation 11:00-11:15

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Abstract

The World Health Organization reports that many physicians have had limited experience during medical training in treating patients with disabilities, and as a result, many are unable to meet the full range of health care needs or deliver care in a sensitive and appropriate manner for these patients. The purpose of this review is to assess the impact of the interstitial on attitudes and competencies of medical students for treating

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patients with disabilities, and to see if there is room for improvement on the curriculum.

Medical Students at UMass Medical school were given pre and post surveys, before and after a required three-day course on disability, using a validated instrument. Questions were broken up into subscales to assess different types of comfort and attitudes regarding people with disabilities. Pre and post survey scores were compared and analyzed using Paired T-Tests and Wilcoxon Ranked Signs Tests with SPSS software.

Results of this study found that overall, the interstitial curriculum was effective in improving overall survey scores. However, on further analysis, we found that this improvement was driven by a sole subscale; “comfort working with people with disabilities in a clinical setting.”

Therefore, while the curriculum is effective in improving clinical comfort, there may be changes required to meet all its aims. Further, it may be warranted to look outside of the 3-day interstitial to accomplish these aims, as studies show it may take months, not days, to “retrain” the mind away from preconceived notions that may represent implicit biases

Mark Liu | Cell-autonomous tir-1 expression induces degeneration of *C. elegans* GABAergic motor neurons
Project Advisor | Alexandra Byrne PhD
House | Burncoat | Peggy W Wu MD
Presentation 11:30-11:45
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Abstract

Axon degeneration associated with disease or traumatic injury is frequently observed in the general population, and there are currently few clinical approaches to prevent or treat this condition. Wallerian degeneration, a specific type of axon degeneration, progresses via a stepwise fashion that is genetically regulated. One therapeutic goal is to identify the genes responsible for regulating axonal degeneration and modulate these processes accordingly. The genetic tractability and well-characterized nervous system of the roundworm *Caenorhabditis elegans* make it an ideal model organism to study these genetic mechanisms. *C. elegans* contain the gene tir-1, a homolog of dSarm and Sarm1, positive regulators of motor neuron degeneration in *Drosophila melanogaster* and mammals respectively. This study investigates whether tir-1

overexpression autonomously promotes axon degeneration in *C. elegans*. If so, this model may be used to identify the downstream tir-1-dependent mechanisms of axon degeneration. By comparing axon integrity in animals that overexpress tir-1 specifically in either GABAergic neurons or the epidermis, it was found that neuron-specific overexpression of tir-1 can induce axon degeneration in vivo. Understanding the genetic mechanisms that regulate axon degeneration will ultimately contribute to the design of effective therapeutics for axon degeneration in the context of neurodegenerative disease or axonal injury.

Lindsay V. Walsh | Opioid Overdose Recognition: Preparedness Among U.S. Allopathic & Osteopathic Medical Students
Project Advisor | Stephanie P. Carreiro MD
House | Burncoat | Peggy W Wu MD
Presentation 11:45-NOON
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Abstract

Opioid overdose deaths remain a major public health issue in the United States (U.S.). As a result, medical students should be properly educated to recognize and manage opioid overdoses. In this study, we aimed to assess baseline knowledge of and attitudes toward the management of an opioid overdose as well as naloxone administration among allopathic and osteopathic medical students training at 4-year accredited U.S. institutions. Results showed that perceived competence in managing an opioid overdose and/or administering naloxone may differ by both sex and year in medical school. Furthermore, participants’ overwhelming support of formal training on opioid overdose education coupled with varied self-reported perceptions of patients with opioid use disorder support the argument for improving hands-on substance use disorder education for all incoming first-year medical students. As both learners and caregivers, medical students are in the unique position to address and reduce stigma associated with treating this unique patient population.

Collin McCloskey Leibold | Worcester's Summer Fitness in the Parks Program
Project Advisor | Elizabeth Erban MD
House | Kelley | Philip O Fournier MD
Presentation NOON-12:15
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Abstract [Leibold]

Introduction Worcester's Summer Fitness in the Parks program offered free fitness classes in City parks in 2019 and 2021 in response to physical activity being described as a priority area for public health efforts in the Greater Worcester area. This paper describes program planning, participation rates, and demographic characteristics of participants. Methods The program was funded by the Blue Cross / Blue Shield Foundation. Worcester Department of Public Health received the funds and contracted with the YWCA of Central Massachusetts to carry out the program. Students and faculty from the UMass Chan School of Medicine assisted with data collection and analysis. All stakeholders participated in iterative planning process for the following year. Results In 2019, 84 classes were held for a total of 392 participant-classes. 2 of 10 classes achieved a goal of > 5 participants (median) per class. The program was not held in 2020 due to the COVID-19 pandemic. In 2021, 73 total classes were held for a total of 384 participant-classes. 5 of 8 classes achieved a goal of > 5 participants (median) per class. The difference in classes meeting the goal of > 5 participants per class was not statistically significant. Discussion Strengths of the program include a strong group of community stakeholders and adequate data collection on participation rates. Limitations include short lead-time, interruptions due to the pandemic, and inability to address whether the program increased physical activity levels among participants or the broader community. Future directions include improving outreach efforts and finding creative ways to assess the effect of the program on levels of physical activity.

Richa Chhaya | Opioid Prescribing in Benedict Internal Medicine Primary Care: Establishment of an Epic Based Opioid Registry and Results of Pilot Intervention to Improve Prescribing Patterns

Project Advisor | Jeevarathna Subramanian
House | Quinsigamond | Zoon Wangu

Presentation 12:15-12:30

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Abstract

The opioid crisis is an epidemic that continues to plague the United States. One of the key factors that still plays a role is excessive opioid prescribing by physicians. In 2016, the CDC published prescribing guidelines for providers, yet prescription opioids remain one of the drivers of the epidemic. This

capstone project was designed to evaluate opioid prescribing for non-malignant pain in the UMass Memorial healthcare system, specifically in The Benedict Internal Medicine Primary Care Clinic. Working with IT analysts and the Opioid Task Force, we created an electronic registry in EPIC that can be updated in real time for any group of patients with desired measures accounted for. We also sought to carry out an intervention for the PCPs of the highest risk patients (defined as taking >60 MME) with the goal of improving the prescribing patterns of these PCPs. We measured key outcomes such as signed controlled substance agreements and up-to-date urine toxicology screens. These outcomes were compared between the pre intervention and post intervention groups. The baseline data appeared promising in that there was a decrease in the median MME value prescribed to patients in the practice, and an increase in frequency of up to date signed CSAs, however due to multiple limitations we cannot determine at this time if these changes can be attributed to our pilot intervention. Ultimately, we hope that the implementation of this real time electronic registry further supports these trends to promote safe opioid prescribing in the UMass health system.

William Coughlin | Max Brödel and Frank Netter: the Hands that Shaped American Medical Illustration

Project Advisor | Janice F. Lalikos MD

House | Quinsigamond | Luu Ireland MD MPH

Presentation 12:30-12:45

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Abstract

For centuries, practitioners of the art of medicine have shared a synergistic relationship with artists of a more traditional sense. Medical illustration in the simplest of forms has likely existed as long as medicine and illustration have existed individually and counts among its artists illustrious names like the great Leonardo da Vinci. While much is owed to artists and anatomists on a global scale, the history of medical illustration in the United States owes itself largely to the slightly more recent contributions of two men, Max Brödel and Frank Netter. In this paper, we will explore the lives and works of these two artists and discuss the similarities and differences in their artistic process and in their resultant illustrations.

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Peter Makhoul | The impact of Syrian refugees on patient demographics and type 2 diabetes across five public health centers in Lebanon

Project Advisor | Pierre Zalloua MD

House | Quinsigamond | Diane Blake MD

Presentation 12:45-1:00

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Abstract

Background The war in Syria triggered the influx of a large number of refugees into neighboring countries, particularly Lebanon. In 2019, the Syrian population made up 13.33% of the total population in Lebanon. This shift in demographics influenced many sectors in the country, including the healthcare system. The purpose of this study is to analyze the impact of Syrian refugees on the Lebanese healthcare system across five public health centers (PHCs) and the prevalence of type II diabetes (T2D) in these patients.

Methods Patient data was collected across five PHCs from different regions in Lebanon. Comparisons between Lebanese and Syrian patients were analyzed for demographics, relative number of patients, and prevalence of T2D.

Results We found that the number of patients admitted to PHCs has increased over the last few years, in both Syrian and Lebanese populations, putting more strains on an already threatened sector. In addition, the increase in Lebanese patients is significantly higher after 2015, and it parallels the surge in Syrian immigrants. The prevalence of T2D was found to be increasing over the years among the two populations, with a statistically significant increase in the Lebanese population after 2015. However, the prevalence of T2D was found to be statistically lower than the reported national prevalence in both groups, possibly due to inadequate rates of screening.

Conclusions There has been an increase in admissions to PHCs as well as rates of T2D in Lebanon and in the Syrian population. Inadequate screening could be the reason behind the lower prevalence of T2D in our study compared to the reported national prevalence.

Brandon Sepe | “Exercise and Heart Health through Tennis”:

An Initiative to Promote Cardiovascular Health and Access to Fitness Opportunities in the Worcester Community

Project Advisor | David Hatem MD

House | Tatnuck | James Ledwith MD

Presentation 1:00-1:15

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Abstract [Sepe]

This Capstone Project involved conceptualization, curriculum creation, and planning of publicly-available instructional tennis sessions for the Worcester community to promote cardiovascular health while fulfilling a need for more frequent exercise, increased interest in fitness, and increased access to fitness opportunities. Due to COVID-19, these “Exercise and Heart Health through Tennis” sessions have yet to begin, but are planned to involve participation from post-bariatric surgery patients from the UMass Memorial Medical Center Weight Center. These participants will engage in a tennis curriculum incorporating elements of cardiovascular exercise and technical skills instruction, with sessions expected to be led by UMass Chan Medical School and MCPHS University students at a local tennis club. Participants will fill out an “entry” and “exit survey” at the beginning and end of each session to gauge baseline self-reported fitness levels and access to fitness opportunities and to help determine if the program positively impacted participants’ views on fitness. “Entry survey” results are expected to show a majority of participants will report inadequate access to fitness opportunities and low levels of routine fitness. Comparison of “entry” and “exit survey” responses is expected to show statistically-significant increased interest in organized fitness, interest in the sport of tennis, and self-reported energy levels following program participation (p-value 0.05). If observed, these expected results would demonstrate that “Exercise and Heart Health through Tennis” sessions would address a need for more frequent fitness, increase participants’ interest in exercise, and help to fulfill a need for increased access to fitness in the Worcester community.

Jordan L. Smith | Exploiting Cancer Cell Plasticity to Design

Novel Strategies for Pediatric Cancer Treatment

Project Advisor | Wen Xue PhD

House | Tatnuck | Thomas Halpin MD

Presentation 1:15-1:30 | MD PhD

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Abstract

Background Hepatoblastoma (HB), the most common primary pediatric liver tumor, is without targeted therapeutics. The combination of surgical resection with adjuvant chemotherapy has improved mortality for children with early-stage disease; however, most children present with un-resectable tumors, and poor five-year-survival rate (<27%). Further, pediatric

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[Smith, cont.] chemotherapeutics have significant morbidity including deafness, renal failure, cardiac injury, and secondary malignancy. Filling the unmet clinical need for targeted therapeutics will require a clear model of HB and an understanding of what initiates and maintains HB tumors.

Methods Many pediatric tumors express abnormal stemness markers. In HB patient tissue, YAP1, a stemness transcription factor, is active in upwards of 80% of HB cases. However, it is unknown if YAP1 drives cancer-cell stemness/plasticity in HB, and if inhibiting YAP1 will have therapeutic benefit in vivo. To determine the role of YAP1 in HB tumor stemness and survival, we designed a novel conditional mouse model that allows for monitoring of luminescent tumors in real-time. We delivered doxycycline-inducible YAP1S127A and constitutively active β -Catenin directly to the liver via tail-vein injection to drive patient-like HB tumors.

Results We show induction of >90% tumor reduction with inhibition of YAP1 alone, even in the presence of other active oncogenes (constitutive β -Catenin Δ N90). Mice have long-term survival following YAP1 withdrawal (230+ days). We find that inhibiting YAP1 induces a cell fate switch in HB tumors. A small proportion of YAP1 inhibited cells undergo apoptosis, and the remainder therapeutically re-differentiate to functional hepatocyte-like cells “hb-Heps”. YAP1 withdrawal induces loss of stemness transcription signatures, and induction of differentiation by modulating transcription factor occupancy to reverse the fate of cancer cells to mimic normal tissue.

Conclusions Tumor reduction, and loss of oncogenic stemness signatures following YAP1 withdrawal in murine HB supports potential therapeutic benefit of YAP1 targeted therapies in pediatric HB.

Trent Taros | Student-led Simulation-based Scrub Training Curriculum for Pre-Clinical Medical Students
Project Advisor | Melissa Fischer MD
House | Tatnuck | Christine O MacGinnis DO
Presentation 1:30-1:45

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Abstract

Entering the operating room (OR) can be a daunting process for medical students, with stringent guidelines, safety issues and high stakes for both patients and learners. High fidelity simulation allows learners to practice vital skills without endangering patients. Student-led teaching allows for greater flexibility in scheduling, while also substantially lowering the perceived stigma of asking questions. Four students in the University of Massachusetts Medical School (UMMS) simulation interest group developed a two-part, 60-minute scrubbing and OR etiquette curriculum. Components included an online slideshow and a hands-on simulation session in the Interprofessional Center for Experiential Learning and Simulation (iCELS). Students' experience was evaluated by anonymous pre- and post-event surveys utilizing a 4-point Likert scale. Learner satisfaction and perceived helpfulness were both high, and significant increases were seen in interest in surgical shadowing, interest in medical simulation, confidence in ability to scrub and perceived relevance of scrub training. All of these results are exciting, and taken together the training can be considered a huge success, and should encourage the further development and attendance of student-led simulation-based events in the future.

POSTERS, SLIDE SETS, AND PRE-RECORDED PRESENTATIONS

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BLACKSTONE HOUSE

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Katherine Cooper | The role of clinician assistants in addressing perinatal depression

Project Advisor | Nancy Byatt DO MBA MS

House | Blackstone | Cynthia Ennis DO

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Abstract

Background Upwards of one in seven individuals experience perinatal depression and many individuals cannot access treatment. In response, perinatal depression is increasingly being managed in the obstetric setting. This study aimed to characterize experiences of clinicians and clinician assistants to inform the extent to which clinician assistants can help address depression in obstetric settings.

Methods This cross-sectional analysis used data from an ongoing cluster randomized control trial: The PRogram In Support of Moms (PRISM). Participants included clinicians (physicians, certified nurse midwives, nurse practitioners) and clinician assistants (medical assistants, nursing assistants). Baseline data regarding practices and attitudes of clinicians and clinician assistants toward addressing depression in the obstetric setting were described. Logistic regressions were used to examine the association of clinician time to complete work and depression management.

Results Clinician assistants experienced significantly fewer time constraints than did clinicians. However, having adequate time to complete work was not significantly associated with increased depression management in clinicians. Clinician assistants reported feeling that addressing depression is an important part of their job, despite variation in doing so.

Conclusion Clinician assistants are interacting with perinatal women extensively and are a vital part of obstetric care workflows. Clinician assistants report that they want to address depression and have time to do so. Thus, clinician assistants may be poised to help address the mental health needs of perinatal individuals.

Adrian Fanucci-Kiss | Emotion Recognition in Adolescents with Autism Spectrum Disorder

Project Advisor | David M Cochran MD PhD

House | Blackstone | Michael C Ennis MD

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Abstract

The Reading the Mind in the Eyes Test (RMET) is a theory of mind (ToM) task requiring subjects to attribute emotional states to eye region photographs. Compared to typically developing (TD) adolescents, research shows those with autism spectrum disorder (ASD) have worse RMET performance. However, there has been conflicting evidence on the impact of emotional valence (i.e., positive valence such as “happy” or negative valence such as “sad”) on RMET task performance in ASD. Additionally, it remains unclear whether the language complexity of the adult (RMET-A) or child (RMET-C) RMET version is optimal for adolescents. The present study investigated the effects of emotional valence and language complexity on RMET performance in a population of TD adolescents and adolescents with ASD. In order to do so, the valence of each eye region stimulus from the RMET-A and -C was first classified. Our results are consistent with previous investigations finding adolescents with ASD to demonstrate impaired ToM compared to TD. When less complex emotional language was used (RMET-C), individuals in both groups performed best when identifying negative emotions, however with more complex language (RMET-A), identification of negative emotions in the ASD group suffered the most drastic decrease in accuracy. Further work to establish validated valence classifications for stimuli across both RMET versions is necessary in order to best utilize the RMET in investigations concerning emotional valence.

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Kathryn Hiller | Women in Orthopedics at UMass Chan Medical School: Increasing Exposure, Mentorship, and Networking

Project Advisor | Amna Diwan MD

House | Blackstone | William J. Durbin MD

[View Presentation](#)

Abstract

Despite a modest increase in recent years, orthopedic surgery demonstrates the lowest percentage of women comprising the workforce and orthopedic residencies when compared to other specialties. While the cause of the gender gap is multifactorial, two major contributors relate to exposure to orthopedic surgery and to mentorship within the field. The purpose of this project was to create a multifaceted approach to increase exposure and mentorship at UMass Chan Medical School via the creation of a panel discussion, a Flexible Clinical Experience, and a resource guide with a goal of forming a community of women in orthopedics at UMass Chan. A survey was distributed to those who attended the panel event and analyzed qualitatively. Twelve students attended the panel event and 8 responded to the survey. All respondents were from the first- or second-year medical school classes. Following the event, there was an increase in the number of students who reported they were likely to pursue a career in orthopedic surgery, all expressed interest in participating in a formal mentorship program, and most reported a change in their perceptions of the field of orthopedics. No students participated in the Flexible Clinical Experience. The resource guide was distributed to students who attended the panel event and members of the Orthopedic Surgery Interest Group. This approach represents steps to increase exposure and mentorship at an institution. The hope is that from these efforts, a more structured group will form to engage more students at UMass Chan and in the community.

Arden Marin | Development of a Comprehensive Clerkship Guide for Third Year Medical Students at the University of Massachusetts Medical School

Project Advisor | Nancy Skehan MD

House | Blackstone | William J Durbin MD

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Abstract

In recent years, burnout has been universally recognized as a common problem for medical students that needs to be addressed. Burnout is caused by particularly high levels of

stress in both medical school and throughout a medical career . At University of Massachusetts Medical School, students have identified lack of communication regarding clerkship information, particularly around expectations and logistics, as a top contributor to stress . The creation of a comprehensive document to be distributed to students at the start of their clerkship year can address this concern and provide students with the information they need before beginning each rotation. Course documents were collected from clerkship leadership and a survey was distributed to medical students requesting logistical information based on clerkship site. A comprehensive clerkship guide was created by combining the two sets of data. Future directions for this project include eliciting more survey responses from students in order to increase the robustness of the guide as well as instituting a plan for regular revision of the guide to account for changes in clerkships over time.

Sheikh Moinul | Pregnancy, Hypertension and Subclinical Myocardial Injury

Project Advisor | Lara C Kovell MD

House | Blackstone | William J Durbin MD

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Abstract

Maternal death rates are rising due to factors including sedentary lifestyle, obesity and advancing maternal age. Hypertensive disorders of pregnancy are one of the major contributing factors to maternal death rates. This prospective cohort study will use high-sensitivity assays to compare blood levels of troponin (hs-trp), C-reactive protein (hs-CRP), and pro-brain-natriuretic peptide (pro-BNP) between pregnant women with and without hypertension. The objective of this study is to determine whether systolic blood pressure between mid-pregnancy and post-partum is associated with subclinical cardiac injury and strain among pregnant women without established CVD.

Stephanie Ng | Examining Mindfulness and its Role in Medical Education Through Writing

Project Advisor | Linda Cragin MS

House | Blackstone | Cynthia Ennis DO

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Abstract

With increasing rates of medical student burnout, this project is concentrated on the positive effects of incorporating mindfulness into the student path, specifically targeting [Ng,

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cont.] reflective and creative writing as an outlet to assemble and express the cumulative pre-clinical and clinical experiences.

Alexandra Palmer | Expressed Emotion and Neurodevelopmental Disorders: A Review
Project Advisor | Isha Jalnapurkar, MD
House | Blackstone | Hugh Silk, MD
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Abstract

Expressed emotion (EE) is a measure of familial attitude towards a relative with psychiatric illness that is based on the free speech of a family member. The scoring of EE is based on the extent to which speech is critical, hostile, and emotionally overinvolved. EE was first investigated as a predictor of patient relapse in schizophrenia and has since been associated with poor outcomes in a variety of psychiatric disorders. The purpose of this review is to provide an overview of the existing research on EE in families with children with neurodevelopmental disorders (ND). In this review, we examine the data of 15 studies of EE in families of children with ND. These studies suggest that high EE is present in the families of many children with ND and points to a strong association between high EE and externalizing behaviors. While EE appears to be largely stable over time, the literature also suggests that EE is reflective of the individual relationship a parent has with each of their children. This variability supports the notion that EE may be a function of both caregiver state and trait. The potential modifiability of EE may translate to a strong argument for the benefit of intervention, and further, may make this construct less stigmatizing to parents. These conclusions indicate a need for further research investigating interventions to modify expressed emotion in families of children with ND.

Jacob Paulson | Introducing Light Therapy to the UMass SOM Community: Uptake and Attitudes
Project Advisor | Jessica Kilham MLIS AHIP
House | Blackstone | Hugh Silk MD MPH FAAFP
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Abstract

Lack of adequate sun exposure has been linked to a number of mood disorders, particularly Seasonal Affective Disorder. As a school in the Northeastern United States, the University of Massachusetts Chan Medical School community experiences heavy cloud cover and limited sunlight during the winter months. Light therapy devices have demonstrated efficacy in

multiple clinical trials in the treatment of SAD. This project secured funding for the purchase of several light therapy lamps, and organization of a pilot program in the UMass SOM library. These lamps were free to use and were available within the library without checkout. Students using these lamps were encouraged to submit their feedback via QR code-linked redcap survey, and a focus group was performed to evaluate student attitudes towards light therapy. Student feedback was overwhelmingly positive with 95% of respondents expressing interest in expanding the program. Subjective feedback and focus group results illuminated the student body's concern with the institution's overall investment in the mental well-being of its students, and identified light therapy as one potential tool in a vital effort to support the mental health of the school at large.

Anni Rong | Association of nutrition status and hospital-acquired infections in elderly orthopedic trauma patients
Project Advisor | Sadeq Quraishi
House | Blackstone | William J. Durbin MD
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Abstract

Background Poor nutritional status is linked to suboptimal outcomes following elective surgery. Trauma patients do not typically have an opportunity for preoperative nutritional optimization and may be at risk for malnutrition with its related complications. Our goal was to investigate whether nutritional status is associated with development of hospital-acquired infections (HAIs) in elderly, orthopedic trauma patients.

Methods We performed a retrospective analysis of data between 01/01/2017 to 08/30/2018 from the Massachusetts General Hospital Geriatric Inpatient Fracture Trauma Service (GIFTS). Admission nutritional status was assessed using the Mini Nutritional Assessment (MNA) and HAIs were validated through the American College of Surgeons National Surgical Quality Improvement Project database. To investigate whether nutritional status is associated with HAIs, we performed a multiple variable logistic regression analysis, controlling for age, sex, Charlson Comorbidity Index, glomerular filtration rate, and type of anesthesia.

Results 461 patients comprised the analytic cohort. Multiple variable regression analysis demonstrated that each unit increment in MNA score was associated with a 13% reduction in risk of HAI (OR 0.87; 95%CI 0.79-0.97). Furthermore, adjusting for timing of perioperative antibiotics, perioperative transfusions, or development of pressure injury during hospitalization results did not materially change these results.

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Conclusion [Rong] Our results demonstrate that malnutrition is highly prevalent in elderly orthopedic trauma patients and that nutritional status may influence the risk of developing HAIs in this cohort of patients. Further studies are needed to determine whether optimizing perioperative nutritional status in elderly orthopedic trauma patients can reduce infectious complications and improve overall health outcomes.

GROUP | Andrew Cauley, Brennan Dagle, & Alex Schryver |

UMMS Community Garden

Project Advisor | Olendzki Barbara RD MPH LDN

House | Blackstone | William Durbin MD

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Paolo Tavares | Effect of early prophylactic ACE inhibitor administration in respect to the onset and progression of left ventricular dysfunction and fibrosis in Duchenne Muscular Dystrophy patients.

Project Advisor | Meghan Doherty MD

House | Blackstone | Cynthia Ennis DO

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Abstract

Duchenne Muscular Dystrophy (DMD) is an X-linked associated mutation in the dystrophin protein gene. The disease results in fibrofatty replacement of skeletal and cardiac tissue. Cardiac involvement of the disease begins with preclinical stages that may demonstrate left ventricular dilation and/or dysfunction on imaging, but eventually follows a typical course eventually leading to cardiac fibrosis and dilated cardiomyopathic related heart failure. Most fatalities associated with DMD can be contributed to cardiac etiologies. Current recommendations based on previous research studies suggest the administration of angiotensin converting enzyme inhibitors (ACEi) starting at the age of ten years of age to combat and slow the progression of both cardiomyopathic and fibrotic changes. The aim of our study was to investigate the current treatment recommendations and observe if earlier intervention with ACE inhibitors and related drug classes (angiotensin receptor blockers) result in an increased delay of left ventricular fibrosis and/or dysfunction. Utilizing magnetic cardiac imaging records, we retrospectively observed both left ventricular dimensional patterns as well as the presence and progression of fibrosis in the subendocardial tissue in DMD patients. We hope to either confirm current treatment recommendations or possibly shed some light if more aggressive pharmacological therapy provides short- and long-term cardiac benefits to DMD patients.

Charles Yi | What do you mean?: Understanding How Comfortable Healthcare Providers Feel Working With Medical Interpreter Services During the Pandemic

Project Advisor | Lisa M Morris MS

House | Blackstone | Hugh Silk MD MPH FAAFP

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Abstract

As the severity of the COVID-19 pandemic increased, many healthcare services switched to virtual modalities through phone and video. One such service was medical interpreting. Many prior studies and stories have shown poor communication with LEP (limited English proficiency) patients can result in distrust of the medical system, unsatisfactory medical management, poor healthcare outcomes, and malpractice lawsuits. The purpose of this study is assessing the working relationship between healthcare providers and medical interpreter services and how the COVID-19 pandemic has impacted accessibility, level of comfort, and utilization of interpreter services within the UMass medical system. Providers were anonymously surveyed from May - September 2018 initially. With the onset of the pandemic, providers were, once again, anonymously surveyed from June - September 2021 and during November 2021. The hope of this project is to determine if there may be benefit to developing additional educational materials to improve the working relationship between providers and medical interpreters.

[BRIGHTWOOD HOUSE](#)

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Emily Adler | Beyond Mentoring: What Student-Doctors Learned from an Intervention Program with Teen Mothers Experiencing Homelessness

Project Advisor | Judith Savageau MPH

House | Brightwood | Samuel H Borden MD

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Abstract

Objectives Our goals were twofold: to support adolescent mothers and educate future physicians.

Methods Medical students were trained by a professional parenting coach to deliver an evidence-based, parenting, and mental health curriculum for 18 adolescent mothers experiencing homelessness. Data were collected from surveys, focus groups, individual interviews, and hair cortisol samples

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[Adler, cont.] from an intervention and comparison shelter for these mothers to assess stress levels, parenting attitudes, and lessons learned before and after the programming.

Results Findings from participant surveys, focus groups, and interviews showed that adolescents in the intervention group felt more prepared to be supportive caregivers than the adolescents in the control group. Hair cortisol levels did not significantly change over time in either the control or intervention group; further studies are warranted with larger samples. A focus group with medical students revealed newfound sparked passions and confidence in advocating for young mothers.

Conclusions This pilot study can be used to inform future interventions and medical school curricula. Furthermore, we hope that by training and inspiring the next generation of physicians, our cohort will continue to advocate for this diverse population, a group often overlooked in medical education.

GROUP | Mary Bassaly, Heloise Dubois, & Olivia Nuelle |

Creation of Medical Interviewing in Spanish Elective

Project Advisor | Maria Garcia MD MPH

House | Brightwood | Elizabeth Eagleson MD FACP

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Abstract

This capstone project details the creation and implementation of the Medical Spanish Pilot Elective that has been sustainable and growing since its creation in 2019. Through the review of Medical Spanish materials from various sources and outreach to different members of faculty and staff, we created the pilot elective that was successfully delivered in fall of 2019 with 7 sessions and 19 medical and nursing students enrolled. The curriculum mirrored the anatomy and DCS curriculum of first year medical curriculum with PowerPoints that included pertinent questions and vocabulary which was taught by Spanish-speaking faculty who volunteered to teach. Each session included a breakout session with Spanish speaking standardized patients, many of whom were volunteers from the Graduate School of Biomedical Sciences. We developed surveys to evaluate the students before and after the elective in the fall as well as an anonymous feedback link for ways to improve the elective. Overall, the results from our student designed elective show that self-perceived confidence intervals improved in all categories in the pre-survey compared to the post survey. Students reported improved confidence in their communicating with a Spanish speaking patient, interviewing a Spanish speaking patient, and in their medical Spanish

vocabulary. We successfully gained OEE approval for the spring continuation of the elective, and passed on student leadership for the Spring 2020 elective.

Deirdre Buckley | Rescreening Following Positive Testing for Sexually Transmitted Infections (STIs) in the Department of Pediatrics

Project Advisor | Zoon Wangu MD

House | Brightwood | Eric Churchill MD MPH MSc

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Abstract

Background Given increasing case numbers of STIs at the national, state, and local levels, this quality improvement project was developed to assess whether UMass patients ages 15-24 years who test positive for a sexually transmitted infection (including gonorrhea, chlamydia, or trichomoniasis) are being rescreened at 3 months post-treatment according to guidelines from the United States Centers for Disease Control & Prevention (CDC).

Methods Chart abstraction and data analysis were completed to evaluate rates of rescreening and an anonymous online survey was administered to evaluate clinician knowledge of CDC rescreening guidelines to inform an intervention aimed at improving appropriate rescreening. 100 patients who met inclusion criteria and who tested positive for chlamydia, gonorrhea, or trichomoniasis in 2018 were included. Each was then evaluated for tests of reinfection and/or STI diagnoses within a year of the positive test.

Results Of 100 patients, 88% tested positive for chlamydia, 6% for gonorrhea, 6% were positive for both, and none were positive for trichomoniasis. 51% of patients did not receive any subsequent testing after their positive test. Of those who were ever retested, 47% tested positive for an STI when rescreened. The clinician survey yielded a 7% response rate with only 38% reporting that they rescreen their patients for STIs 3 months after an initial positive test. 67% did not know if guidelines differed between cisgender and transgender patients and 67% did not know if they differed between women who have sex with women and heterosexual women.

Conclusion A large percentage of patients who test positive for an STI are not being rescreened in the UMass Department of Pediatrics. While no one clear pattern emerges for a setting or follow-up approach leading to low rates of rescreening, inconsistency in follow-up is an area for future intervention. Additionally, there is variable clinician comfort and knowledge about rescreening guidelines particularly as they vary by gender identity and sexual behavior.

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Colby Cayton | RECOVERS: Reproductive Education and Contraception Options Via Existing Recovery Systems
Project Advisor | Katherine M Callaghan MD
House | Brightwood | Eric Churchill MD MPH MSc
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Abstract

Substance use has been associated with numerous negative outcomes on a woman's health. Unplanned pregnancies in women with opioid and other substance use disorders are due, in part, to alarmingly low rates of effective contraception use. The establishment of a contraceptive clinic on-site at an opioid treatment facility is a novel model of delivering reproductive health care to women with behavioral health needs, as well as to women supporting friends and family with behavioral health needs. The goal of this study is to provide robust contraceptive and reproductive health counseling services embedded within an Opioid Treatment Program (OTP) to increase LARC uptake in women with opioid use disorder (OUD). Ultimately, we hope this reduces the number of unintended pregnancies for women with OUD or at risk for OUD, as well as reduces the number of infants treated for Neonatal Abstinence Syndrome (NAS). A survey was created and administered to garner baseline data on knowledge of contraception before a contraception was established on site at an OTP. 31 respondents completed the survey. The majority did not desire pregnancy, though only 35% reported using contraception. Most had heard of LARCs. From the data gathered, the majority of respondents were women of reproductive age who were not using contraception regularly. Though participants were not using contraception regularly, most reported that they did not desire to become pregnant. The most commonly used contraception reported was condoms. Due to COVID and loss of funding, this project was not able to be continued.

Lauren Cralle | Addressing Experiences of Bias in Clinical Training for Medical Students Entering Hospitals and Clinics for the First Time
Project Advisor | Jules Trobaugh MA MFA
House | McAdoo | Brightwood | Elizabeth Eagleson MD FACP
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Abstract

For decades, researchers and physicians alike have acknowledged the implications of bias in medicine particularly as it relates to race, gender, sexual orientation. The discussion

of bias in healthcare has become a critical component of medical education from the studies of undergraduate pre-meds at university to medical students beginning clinical training to resident physicians at major institutions. Even attending physicians are privy to the lessons of bias training and challenging their own implicit biases through in-house educational conferences and online training modules. Through various studies we have seen how implicit bias can affect patient care, disproportionately affecting black, Hispanic, gender nonconforming, queer, and other minority patients. Medical education initiatives, such as the D.R.I.V.E. initiative at the University of Massachusetts Chan Medical School, are aimed at building future physicians that are culturally competent and able to combat the biases they find in themselves and others, including colleagues. As medical students transition from pre-clinical to clinical training, they are thrust from the shelter of the classroom to the challenges of hospitals where often times the bias that they were shielded from as closely supervised students is more apparent. They may be bystanders to microaggressions from attending physicians or victims of patient biases. With this in mind, we aimed to provide a manner for students to cope with this difficult transition by creating an open forum of discussion and providing resources to combat these biases. We hoped that by allowing students to debrief and process their experiences, they would be better able to handle bias moving forward.

Christine Donohue | Culinary Medicine in Continuing Medical Education
Project Advisor | Barbara C Olendzki RD MPH LDN
House | Brightwood | Elizabeth Eagleson MD FACP
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Abstract

Proposal for a culinary medicine CME course. This course is designed to increase dietary counseling provided to ethnic minority and underinsured patients. Combines hands on experiential learning with didactic and dedicated practice of motivational interviewing and SMART goal creation.

GROUP | Megan Yuen & Olivia Hall | The Effects of Breastfeeding on Maternal Mental Health: A Systematic Review
Project Advisor | Tiffany A Moore Simas MD MPH MED
House | Brightwood | Elizabeth Eagleson MD FACP
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Abstract [Yuen & Hall]

Background Breastfeeding has many positive effects on the health of infants and mothers, however, the effect of breastfeeding on maternal mental health is largely unknown. The goal of this systematic review was to 1) synthesize the existing literature on the effects of breastfeeding on maternal mental health, and 2) inform breastfeeding recommendations.

Materials and Methods A literature search was conducted in electronic databases using search terms related to breastfeeding (e.g., breastfeeding, infant feeding practices) and mental health conditions (e.g., mental illness, anxiety, depression), resulting in 1110 records. After reviewing article titles and abstracts, 339 articles were advanced to full-text review. Fifty-five articles were included in the final analysis.

Results Thirty-six studies reported significant relationships between breastfeeding and maternal mental health outcomes, namely symptoms of postpartum depression and anxiety: twenty-nine found that breastfeeding is associated with fewer mental health symptoms, one found it was associated with more, and six reported a mixed association between breastfeeding and mental health. Five studies found that breastfeeding challenges were associated with a higher risk of negative mental health symptoms.

Conclusion Overall, breastfeeding was associated with improved maternal mental health outcomes. However, with challenges or a discordance between breastfeeding expectations and actual experience, breastfeeding was associated with negative mental health outcomes. Breastfeeding recommendations should be individualized to take this into account. Further research, specifically examining the breastfeeding experiences of women who experienced mental health conditions, is warranted to help clinicians better personalize breastfeeding and mental health counseling.

GROUP | Megan Hansen & Dina Roche | Addressing Structural Determinants of Health in St. Anne's Free Medical Clinic Through Implementation of Case Management Services

Project Advisor | Jane Lochrie MD

House | Brightwood | Samuel H Borden MD

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Abstract

St. Anne's Free Medical Program in Shrewsbury, MA provides free medical care to uninsured and underinsured people in the Worcester area, and is a member of the Worcester Free Care Collaborative, a group of student-run free clinics that provide care throughout the city of Worcester ("St. Anne's"). However, prior to 2019, patients had little access to case management

services to help them with housing, food, insurance, and other concerns that intimately influence health.

The goal of our project was to address the structural determinants of health in Worcester and Shrewsbury, MA by implementing medical student-run case management services and track the utilization of these services at St. Anne's Clinic in order to address various barriers to health that the patients of that clinic face and to improve delivery of case management services at the clinic in the future. We worked with existing leadership at St. Anne's Free Medical Clinic in order to establish case management services at the clinic in August 2019.

Since its inception, we have trained and built a team of medical students trained in case management at St. Anne's Free Medical Clinic. We have collected data in order to better understand the patient population and their needs, which allowed case management leadership to implement population-specific strategies to address structural determinants of health. Additionally, we surveyed medical students who completed training in case management at Worcester free clinics to understand their perceptions of the impact of training as a case management volunteer on their medical education.

Meghan Harrington | Addressing Foster Care in Western Massachusetts: Expanding the Provision of Care Packages to Children at UMass Medical School's Regional Campus

Project Advisor | Ian Goodman MD

House | Brightwood | Elizabeth Eagleson MD FACP

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Abstract

The foster care system is widely utilized in the United States, with Massachusetts being one of the first states to adopt its practice. Entering the foster care system may represent a difficult transition time for children, particularly for those who are newly placed in a foster home after hospitalization. At UMass Medical School, a student interest group called Kelley Backpacks aims to ease this transition time by providing backpacks filled with comfort items to children being discharged from the hospital into foster care. With UMass gaining a satellite campus at Baystate Medical Center in 2017, there existed an opportunity to expand this student group to Springfield to serve another geographically distinct population. This capstone project assessed the need for such a program at Baystate, garnered student interest and funding, and launched a pilot program, called Baystate Backpacks.

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Molly Rose Ingemi | Exploring Community Health Through Viticulture: An immersive education experience for third-year medical students

Project Advisor | Rebecca Blanchard PhD MEd
House | Brightwood | Eric Churchill MD

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Abstract

Medical education has come a long way in teaching students about the social determinants of health. However, solutions to social issues are not easily taught in the classroom as social dynamics affecting the health of the community can be complex and multifaceted. Instead of the traditional didactic method, medical students may benefit from explicit training in creative thinking in order to build a skill set that is useful in addressing complex problems faced by patients. Here we propose a novel approach to teaching medical students to be innovative problem solvers through an immersive experience at a local vineyard. Concepts from viticulture, or the study of cultivating grapes into wine, will be used to analogize common community health topics. Through this experience, medical students will have the opportunity to learn about a subject outside of medicine and practice thinking creatively about community health.

Alexander Kaplan | Improving the Sexual and Gender Minority Advocacy Curriculum

Project Advisor | Carol A Bova PhD RN ANP
House | Brightwood | Elizabeth Eagleson MD FACP

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Abstract

Sexual and gender minorities (which include lesbian, gay, bisexual, asexual, transgender, gender non-binary, two-spirit, queer, and intersex individuals) experience significant health disparities that prevent them from receiving quality medical care. Although these health inequities exist, studies have indicated deficits in medical and nursing education in regards to LGBTQIA+ care and communication. Upon extensive literature review, there were no outlines, plans, or syllabi for medical and nursing students to address SGM advocacy in rural and urban settings. Creating curricula addressing advocacy for queer and gender diverse patients is essential as having awareness of public policies, resources, and support services allow medical professionals to promote health services and foster improved therapeutic relationships with LGBTQIA+ patients.

The overall aim of this capstone was to improve the SGM advocacy curriculum by (1) evaluating the existing curriculum in the LGBTQIA+ Population Health Clerkship (PHC, a two-week curriculum where second-year medical and nursing students integrate into the community and learn about disparities faced by a marginalized group and their health needs) through survey administration to a group of students that took the PHC and a separate group of students that did not take the PHC (PHC-naïve group) and (2) making modifications to the curriculum based on themes distilled from both surveys.

Leo Kuwama | Advocacy Curriculum Integration into the PURCH Population Health Clerkship Experience

Project Advisor | Blanchard, Rebecca PhD MEd
House | Brightwood | Samuel H Borden MD

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Abstract

Purpose Healthcare professionals hold a unique position that allows them to have exposure to social, economic, and political factors that ultimately impact health outcomes. This position makes healthcare professionals an excellent population to engage in health advocacy. However, current literature notes that healthcare professionals lack preparation to engage in these health advocacy initiatives despite widespread interest.

Implications The students enrolled in the University of Massachusetts Chan School of Medicine's (UMMS) Population-based, Urban and Rural Community Health (PURCH) Track partake in a two-week Population Health Clerkship (PHC) to address the lack of preparation to engage in health advocacy. This study aims to evaluate the PHC in terms of how they incorporate the six health advocacy competencies: communication, self-reflection, facilitation, decision-making, trustworthiness, and humility.

Methods A survey was distributed to all UMMS PURCH students and community organization faculty who participated in the 2021 PHC to assess the current state of the PHC with respect to exposure to opportunities to practice each of the health advocacy competencies. Results: The study demonstrated that the PURCH PHC experience currently provides students opportunities to practice all six health advocacy competencies.

Conclusion The current state of the PHC gives students the opportunity to practice and demonstrate all six HACs; however, [Kuwama, cont.] there is still room for improvement to expand these opportunities. Successful implementation of any changes to the PHC will require ample communication between the

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faculty and students about any positives or unforeseen consequences to the changes. Given the value of this PHC for students and community members, this effort will only continue to improve.

Jessica Ma | Examining the Association Between Rural Residence & Post-COPD Hospitalization Outcomes, in Medicare Fee-For-Service Beneficiaries, 2013-2015
Project Advisor | Peter K Lindenauer MD MSc MHM
House | Brightwood | Jacqueline Wu MD

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Abstract

Chronic obstructive pulmonary disease (COPD) refers to a group of chronic progressive diseases, including emphysema and chronic bronchitis, that cause airflow limitation and shortness of breath. COPD is a serious public health problem in the U.S., both in imposing a significant resource burden on our strained healthcare system, as well as a high mortality and morbidity burden on patients. In this study, we utilized a cohort of over 240,000 Medicare beneficiaries hospitalized for COPD, and examined the association between patient residence (rural vs. urban) and post-COPD hospitalization outcomes, specifically 1-year and 30-day mortality and re-hospitalization. We also utilized patient residence to understand the social determinants of health factors within their communities. We found that residence in rural counties adjacent to metropolitan areas was associated with a modestly higher risk of both death (30-days and 1 year) and of all-cause re-hospitalization within 30 days. Though we found patients with rural residence had clinical and community factors that would suggest more severe COPD and therefore increased mortality and re-hospitalizations, our study found minimal differences. The challenges rural patients face may translate into greater disease burden and lower quality of life, and this may not be adequately captured in the outcomes we measured in the claims data. The reduced access to pulmonologists, lower likelihood of post-discharge services, increased patient-reported disability, and greater number of days of patient-reported poor physical health, support this notion that COPD patients living in rural areas do experience increased disease burden.

Theodore Medling | Do Reported Health Benefits of Moderate Alcohol Use Influence Drinking Behavior in Patients with Heart Disease?

Project Advisor | Quinn R Pack MD MSc
House | Brightwood | Eric Churchill MD MPH MSc

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Abstract

Background Media reports frequently cite observational studies and meta-analyses to promote the reputed cardiovascular benefits of moderate alcohol consumption, however it is unclear whether public opinion or drinking behavior align with these reports. [cont on next page]

Methods We administered an anonymous, single-center, 35-question, cross-sectional survey among patients hospitalized for acute cardiac illnesses from June to September 2019 who were eligible for cardiac rehabilitation. We assessed patient opinions toward alcohol use, perceptions of alcohol's health impact, and role of media in forming these beliefs. We hypothesized that drinking habits are associated with beliefs about the health benefits of alcohol consumption.

Results Of 300 patients approached, 290 (97%) completed the survey. Most (69%) reported having heard moderate alcohol use is heart healthy from one or more sources including: TV (61%), family/friends (33%), newspapers (21%) and internet (10%) although only 19% reported believing these reports. In total, 12 (4%) patients reported intentionally increasing alcohol intake due to the reported beneficial health effects. There was a strong association between binge drinking and increasing alcohol use to improve cardiac health [OR 8.8 (95% CI 2.7, 29)].

Conclusion Among patients hospitalized with heart disease, a majority report having heard that moderate alcohol use is heart healthy, particularly from media, although many fewer believed it to be true. Binge drinkers often reported increasing their alcohol use for heart health benefits. Given the known cardiotoxic effects of alcohol, particularly in large doses, strategies aimed at population-based education regarding the unhealthy cardiovascular impact of alcohol use is needed, especially among binge drinkers.

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GROUP | Ryan Payne & Patrick Joslin | Teaching Medical Students Physical Diagnosis Using an In-House Instructional Video: An Analysis Evaluating the Utility of a Video Produced Specifically for The University of Massachusetts Medical School Physical Diagnosis Curriculum
Project Advisor | Stephanie Clegg MD
House | Brightwood | Jacqueline Wu MD
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Abstract

Background Physical diagnoses (PD) begins in the first year at The University of Massachusetts Medical School (UMMS). The current UMMS PD exam videos are an amalgamation of examples from other institutions; they can be difficult to navigate and do not always correlate with the current expectations for the UMMS PD exam.

Objectives Identify areas for improvement in the current PD exam videos through surveying current UMMS students and create a single video that demonstrates the techniques of the first year UMMS physical diagnosis exam. The resulting video is intended for first year students to use as a resource to learn PD and study for the UMMS PD exam.

Methods The data for this project was collected via a Google Forms survey posted on the class Facebook pages of current second, third, and fourth year UMMS medical students (Classes '22, '23, '24).

Results Fifty-three UMMS students completed our survey. Fifty-nine percent of the students surveyed, responded that they would find a UMMS specific PD exam video "very helpful." Further, 98% of the students responded that a UMMS specific PD exam video would be helpful. Additionally, 73% responded saying they would use a UMMS specific PD video to study for the first-year PD exam. The student's responses aided in the creation of an example PD exam video.

Conclusion Based on the results of the survey, it appears as though there is a need for a more robust UMMS specific PD exam video. A UMMS specific example PD exam video was created.

Kimberly Reimold | Assessing the Need for Medical Respite for People Experiencing Houselessness in Springfield, Massachusetts
Project Advisor | Jacqueline A Spain MD
House | Brightwood | Samuel H Borden MD
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Abstract [Reimold]

Introduction Medical respite care is defined as acute or post-acute care for patients experiencing houselessness who are too ill or frail to recover on the streets but who are not ill enough to be treated in a hospital. This project explores the need for and feasibility of medical respite in Springfield, Massachusetts.

Methods The National Institute for Medical Respite Care's online toolkit was reviewed and summarized, including a separate literature review for other systematic review articles. Data on medical respite programs in the National Institute for Medical Respite Care Directory were described using summary statistics. Interviews were performed with community stakeholders.

Results There were 41 toolkit resources, including 1 systematic review and 1 white paper. 135 medical respite programs were listed in the online directory, with 33% of the programs established in the last 5 years. The majority of programs are operated by nonprofit operating agencies, located either in a homeless shelter or stand-alone building. Funding was typically from multiple sources, with 13% of programs funded solely by hospitals. Interviews with Baystate Health and Community Support Options highlighted the financial barriers to opening medical respite in Springfield.

Discussion Community Support Options and their Friends of the Homeless shelter is the frontrunner to operate and serve as home to a medical respite in Springfield. Despite positive findings in the literature surrounding medical respite, difficulties predicting financial impact of a respite make rallying funders challenging.

GROUP | Anthony Foscolos & Simone R. Thibault | Impact of Intersectional Identities on Perception of Learning and Work Environment at a Massachusetts Academic Health Science Center
Project Advisor | Jules Trobaugh MA MFA
House | Brightwood | Jacqueline Wu MD
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Abstract

Background A more diverse healthcare workforce provides better care for a diverse patient population. However, LGBTQIA+ and BIPOC individuals face disproportionate barriers to enrolling and thriving in an academic healthcare setting due to individual and institutional biases. It is imperative to assess institutional attitudes toward diverse identities and create interventions to better support these individuals.

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Materials and Methods A survey was created to assess institutional attitudes toward individuals based on their actual or presumed identities and was validated through cognitive interviews. The final survey was distributed electronically to all learners, faculty and staff at the institution. All responses were collected anonymously, and all data was deidentified.

Results Results were stratified by identification as LGBTQIA+ and/or Underrepresented in Medicine (URiM) and compared to a group of participants representing individuals of majority identity. 90% of survey respondents, regardless of identity, believed this is a place that values individuals of diverse identities. A significantly higher number of LGBTQIA+ and/or URiM identifying respondents reported awareness of derogatory language and discriminatory content and were more likely to report awareness of an individual's grades/evaluations being affected by their identity. The confidence that the institution adequately addresses incidents of mistreatment related to identity was 63% overall, and 48% for LGBTQIA+ respondents.

Conclusion There is a need for increased institutional resources and support for LGBTQ+ and URiM individuals and the current reporting system must produce more direct interventions to effectively curtail mistreatment. The data reveals opportunities for intervention to reduce the impact of bias in grading and evaluations.

[BURNCOAT HOUSE](#)

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Rachel N Anderson | Evaluating a Comprehensive Interdisciplinary Human Trafficking Training Program and Protocol in the Emergency Department Using Multiple Virtual Modalities

Project Advisor | Payal Modi MD
House | Burncoat | Matthew E McGuiness MD Med

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Abstract

Objective The aim of this project was to educate emergency department providers on how to recognize and respond to human trafficking based on existing evidence-based models in a virtual platform in order to increase their confidence in caring for trafficked patients.

Method A multiple session virtual interdisciplinary human trafficking education program was implemented for providers in a large academic emergency department with a focus on trafficking identification, support, trauma informed care, and an ED-based care pathway. Participating providers completed

pre- and post-surveys regarding experiences and knowledge caring for trafficked patients.

Result Of the 379 providers who completed the pre-survey, 136 completed the post-survey. Only a small percentage of participants (21%) had received prior human trafficking training. In the pre-survey, a majority (89%) of respondents had never asked patients about trafficking in the past 3 months. Mean confidence scores for all six patient care tasks increased significantly after the training. After the training session, more participants were aware that their ED had a human trafficking protocol, felt comfortable describing the role of healthcare providers in recognizing and responding to human trafficking, had a comprehensive understanding of what human trafficking is, and thought they had previously treated a patient who was being trafficked.

Conclusion Based on our study, a virtual interdisciplinary human trafficking education program increased providers' knowledge and confidence in caring for trafficked patients. Research is ongoing to assess knowledge retention and increased screening for trafficking.

Matthew Beth Urhoy | Utilizing Point of Care Ultrasound in Helicopter Emergency Medical Services
Project Advisor | John P Broach MD MPH MBA FACEP
House | Burncoat | Sharmilee B Korets MD

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Abstract

Ultrasound plays a versatile role in the care of patients in clinics and in hospitals. The mobility of ultrasound also allows it to be used in the prehospital setting to detect or exclude extremely time sensitive, life-threatening conditions, like intra-abdominal bleeds or hemo/pneumothoraces. Providing such imaging technology to air medical services would allow for improved detection of such pathologies and improve the quality of patient care. In order to implement ultrasonography in air care, providers must first be trained. This study established a curriculum to teach helicopter critical care providers in the theory and application of point of care ultrasound (POCUS). Subjects were trained using a combination of didactic teaching sessions and practical teaching sessions. Subjects were tested formally with a written exam on their knowledge of ultrasound application and on the pathophysiology that could be detected. Subjects were also tested with a practical exam on their ability to perform the scans with the correct views and settings. This study is currently under active investigation, but the limited collected data suggests achievement of sufficiency of POCUS by the helicopter critical care providers.

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Sarah Blackwell | Factors Affecting Student Comfort

Performing Pelvic Exams Under Anesthesia

Project Advisor | Tiffany Moore Simas MD MPH MEd; Julia

Johnson MD

House | Burncoat | Peggy W Wu MD

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Abstract

It is common practice for medical students to perform pelvic exams under anesthesia (EUA) as part of their medical education. In recent years, there has been renewed conversation regarding student performed EUA. Explicit consent for such an exam is currently mandatory in eight states, though literature suggests that 72-100% of women surveyed expect to be consented for a student-performed exam. Furthermore, students report anxiety and unease prior to performing these exams. Our aim was to investigate medical students' experience with performing EUA and elucidate specific factors that either increase or decrease student comfort with the exam. Students at the University of Massachusetts Chan Medical School were sent an anonymous survey that included questions about gender identity, interest in OB/GYN, number of EUA performed, level of supervision, student comfort with the exam, comfort in the student role, and their view on whether patients should be explicitly consented for student EUA. Respondents reporting discomfort with performing EUA were invited to comment on contributing factors. Statistical analysis included chi-squared test, analysis of variance, and inductive analysis of the qualitative data. Reported comfort in the student role was associated with increased comfort performing the exam ($p=0.001$), while male gender was associated with decreased comfort level ($p=0.009$). Most respondents believe student-performed exams should be explicitly added to the consent form.

Sarah Carbone | Combatting Loneliness in Worcester, MA

Seniors during the Covid-19 Pandemic

Project Advisor | Michael Hirsh MD

House | Burncoat | Sharmilee Korets MD

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Abstract

Background The widespread social distancing measures that were required at the start of the Covid-19 pandemic, placed many individuals at risk of experiencing loneliness, a state shown to be associated with increased morbidity and

mortality. Elderly individuals are disproportionately vulnerable to experiencing loneliness, especially those that live alone.

Objectives

-To provide companionship to seniors in the Worcester community at risk of experiencing loneliness due to quarantine measures including the closure of the Worcester Senior Center (WSC).

-To provide wellbeing check-ins to these seniors in order to ensure that their essential needs were met, including food security, medication requirements, and healthcare needs.

Methods Volunteers from the UMass community were paired with registered members of the WSC who were at high-risk of developing loneliness. Volunteers made regular telephone calls to their senior buddy to provide social support throughout the Covid-19 pandemic.

Results Between March 2020 and November 2021, a total of 426 telephone conversations took place between the pairs of volunteers and seniors. There were no emergent safety concerns identified.

Conclusions This collaboration between the UMass community and members of the WSC provided valuable outreach to a vulnerable population during the Covid-19 pandemic. If implemented in other communities in the future, additional data should be collected in order to properly assess the efficacy of the service provided.

Andrea Chin | Prevalence of Essential Tremor in Rural Gujarat, India

Project Advisor | Anindita Deb MD

House | Burncoat | Lisa Gussak MD

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Abstract

Objective With India's diversity, existing epidemiological surveys about neurologic disorders like essential tremors (ET) cannot be accurately extrapolated, presenting a need for population-based surveys for localized data.

Background Worldwide crude prevalence rates of ET range from 0.4-8.6% across multiple studies, affecting about 1% of the general population and 4-5% of individuals over 65 years old. Despite these rates, the number of studies estimating prevalence of ET is surprisingly low, with none amongst rural Indian communities.

Methods We utilized a pre-validated questionnaire to screen every household in 10 selected villages of Anand in rural Gujarat for movement disorders including ET. Participants who screened positive underwent videography and clinical

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examination by neurologist to confirm the diagnosis of ET based on 2019 MDS Tremor Task Force criteria.

Results 18,896 individuals were screened from 5,990 families in the region. 54 participants screened positive, underwent formal neurologic evaluation, and 17 were diagnosed with ET. The crude prevalence of ET in this population was calculated as 89.96 per 100,000 (0.09%).

Conclusions Our study indicates the rural Gujarat crude prevalence of ET is lower in comparison to other studies globally. A reason for our lower prevalence could be that we utilized updated criteria to diagnose ET (excluding ET plus syndromes). Importantly, our study is the only assessment done in a village-based Indian population. Further studies of ET prevalence utilizing new definition criteria will help improve awareness and treatment of this condition for the rural Indian population and generate understanding of ET prevalence throughout India and worldwide.

Max Lee Deng | Development of the Prior Auth podcast as a vehicle for educating listeners about the US healthcare system
Project Advisor | Darshak M Sanghavi MD
House | Burncoat | Lisa Gussak MD
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Abstract

Health policy has become a central focus of political discourse as both the global pandemic and the nationally rising costs of care place a great deal of stress on the US healthcare system. However, as a result of the complexity of the current system, few Americans feel confident in their foundational knowledge. The rise of podcasting as a new medium with broad reach, especially among the younger segments of the population, provides an opportunity to address this gap via the creation of the Prior Auth podcast. To develop the infrastructure necessary to produce an ongoing podcast, a prototypal episode was created and iterated upon based on feedback from an initial test audience. This initial development process was centered on maximizing respondent satisfaction with length, audio quality, structure and organization, tone, and level of content.

Fiona Dore | Use of medical chaperones by colon and rectal surgeons in outpatient practice
Project Advisor | Jennifer S. Davids MD
House | Burncoat | Lisa Gussak MD
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Abstract [Dore]

Background The purpose of this study is to determine the frequency and motivations for medical chaperone use during anorectal exams by colon and rectal surgeons in the outpatient setting. **Study Design** This cross-sectional study examined factors impacting chaperone use via an anonymous online survey distributed via the American Society of Colon and Rectal Surgeons email list. Routine chaperone use was defined as $\geq 90\%$. **Results** Of 1,380 emailed board-certified colon and rectal surgeons, 402 (29.1%) completed the survey in November 2019. Median years in practice was 14, and 72.3% were male. Overall, 65.2% reported routine use of chaperones during anorectal exams. Over half (56.3%) felt chaperones should be mandatory and were more likely to report routine use than those who did not (85.7 vs. 39.1%; $p < 0.001$). Only 23.7% reported that their institutions had formal chaperone policies. The most common reason for use was medicolegal (91.8%), and the most common barrier was chaperone availability (56.7%). When chaperones were used, 42% did not document use in the medical record. On multivariable analysis, increased odds of routine chaperone use were independently associated with: being ≤ 10 years in practice, routine chaperone use during fellowship, and chaperones being routinely available. **Conclusion** Half of surgeons felt that chaperones should be mandatory, suggesting lack of consensus among the cohort. Despite expressing legal concerns, one-third did not use chaperones and nearly half who used chaperones did not document their use. Efforts to improve chaperone availability, documentation of chaperone use, and knowledge of policies are necessary.

Benjamin Helfand | Delirium in Older Adults: Recognition during COVID-19
Project Advisor | MD PhD
House | Burncoat | Lisa Gussak MD
Presentation MD PhD
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Peter Jordan | Defining Mental Illness and Patient Experiences with Providers

Project Advisor | Mary Flynn MD

House | Burncoat | Lisa Gussak MD

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Abstract

Nearly two thirds of people with a diagnosis pertaining to mental health will never seek proper help from a health professional⁷ and despite changing attitudes towards disease like anxiety, depression, etc. the stigma remains. The COVID-19 pandemic fueled a sharp rise in the number of worldwide cases of depression and anxiety by 53.2 and 76.2 million cases respectively¹⁷. The healthcare system and healthcare providers are not free of mental illness-related stigma, and stigma creates barriers to access and quality care. To this end, we interviewed patients to identify feelings and reactions to being diagnosed with a mental illness. The goal of storytelling is to lessen stigma perpetuated by physicians and the community/family while humanizing a dehumanizing diagnosis by sharing patients' awareness/self-definitions. Six 15-45 minute interviews were conducted between October 2021 and November 2021 in UMass Family Medicine offices. Patients were asked questions from Table 1 and then provided consent to be interviewed (Appendix A). Transcriptions of the interview and associated photographs were assembled into a poster/photo gallery. Reflection and identification of common themes in the interviews offers peers and providers suggestions for change in their approach to patient care. By providing real patient quotations any healthcare provider may have encountered in the UMass system, we hope to amplify the voices and experiences of those in our Worcester community through storytelling and photography. Through this process, we hope to reduce healthcare provider burn out by maximizing empathy for patients' experiences and reducing implicit biases.

James Joseph | Accuracy of emergency physicians' self-estimates of CT scan utilization and its potential effect on an audit and feedback intervention: a randomized trial

Project Advisor | Martin A Reznick MD MBA

House | Burncoat | Sharmilee B Korets MD

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Abstract

Computed Tomography (CT) utilization varies within and across institutions, resulting in potential patient safety implications. Accordingly, multiple national campaigns have attempted to

standardize and reduce CT utilization. Audit and feedback (A&F) has been established as an effective strategy to modify clinician behavior. We sought to test an A&F intervention to reduce CT ordering by Emergency Physicians. We employed a prospective, multi-site, randomized trial to examine the effect of A&F on CT ordering. We obtained 12 months of baseline CT ordering per 100 patients treated for every attending physician from 4 EDs. Attending physicians were assigned to receive A&F or no A&F. All subjects received a didactic training describing CT cancer risk and best practices. Those randomized to A&F were shown a de-identified distribution of all subjects' baseline CT ordering rates, asked to estimate where on the curve they fell and then shown their actual baseline ordering rate. We then obtained CT ordering rates for all subjects for 6 months post-intervention. We examined pre-post changes within each group to examine the effect on post-intervention ordering while controlling for pre-intervention ordering. Our A&F intervention failed to reduce CT ordering. The subjects' self-perception being predominated by over-estimation likely contributed to the failure, although other potential causes such as unmeasured perception of high stakes for under-ordering CTs also may have contributed. A&F may be ineffective if subject misperceptions of their behavior is opposite of the desired behavioral change, so assessing baseline perception compared with actual behavior before initiating a feedback intervention may be prudent.

Sumner Kilmarx | Validation of the Prognostic Ability of Novel Imaging Methods in Heart Failure & Transplant Patients

Project Advisor | David D'Alessandro MD

House | Burncoat | Christine Macginnis DO

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Abstract

It has been theorized that microcirculation perfusion itself can be used as an endpoint for adequate hemodynamic support. Current standards of hemodynamic monitoring are invasive and may not sufficiently represent nutrient delivery at the capillary level. The Functional Capillary Distribution (FCD) calculated from the proECMO technology measures capillary flow within peripheral tissues such as the hand or foot and has shown strength as a perfusion marker. The proECMO technology has demonstrated effectiveness in prognosticating ECMO patients, but its applicability to different patient populations remains to be investigated. [cont on next page] [Kilmarx cont] This research proposal was a single center observational study of patients who underwent LVAD

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implantation or heart transplant. Patients were evaluated peri-operatively and had their results correlated with clinical outcomes to evaluate what link, if any, existed between microvasculature perfusion and patient outcomes.

Amanda Lee | Racial and Sociodemographic Disparities in Telehealth Access and Utilization During the COVID-19 Pandemic

Project Advisor | Tiffany A Moore Simas MD MPH MEd House | Burncoat | David Hatem MD

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Abstract

When the United States entered lockdown due to the COVID-19 pandemic in March 2020, Centers for Medicare & Medicaid Services (CMS) extended health coverage for Medicare and Medicaid patients to include telehealth visits. Telehealth is not new, but licensing restrictions, issues with HIPAA compliance, and lack of reimbursement were major barriers that hindered its success. Telemedicine is playing a central role in healthcare delivery during the COVID-19 outbreak and will likely be incorporated as a routine medium after the pandemic ends. However, there is a lack of research exploring how access and quality of care differ between racial, ethnic, and socioeconomic groups.

This study describes the rate of telehealth utilization among prenatal and postpartum patients stratified by race/ethnicity and investigates racial/ethnic disparities regarding access to telehealth and in-person visits during the COVID-19 pandemic at UMass Memorial Medical Center (UMMC) department of OB/GYN. It was found that there are significant differences between race and ethnic groups for telehealth visit utilization and in-person visits during the COVID-19 pandemic. The results suggest that telehealth utilization is associated with socioeconomic status and that traditionally marginalized racial groups are more likely to opt for in-person appointments. It is unclear if these disparities are attributed purely to financial constraints or external factors. As such, further investigation in the form of interviews needs to be initiated to determine the root cause of these disparities so that they can be addressed. Taking proactive steps to mitigate disparities in telehealth utilization will ensure more equal access to healthcare when another pandemic occurs.

Samuel Lee | Violence Against Prehospital Providers
Project Advisor | Stacy Weisberg MD MPH FACEP FAEMS
House | Burncoat | Peggy W Wu MD

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Abstract

The prevalence of violence against prehospital providers has reached a crisis level. Prior literature consists only of small local surveys but research on a larger scale remains to be seen. The objective of this study is to describe prevalence of violence in New England and to assess how socioeconomic status correlates with prehospital violence. Methods: Prehospital providers (EMT and paramedic level) across thirteen services in New England were administered an electronic survey through REDCap. Respondents retrospectively recalled violence encountered from January - December 2020. Zip codes and reports of violent assaults were taken by the Worcester EMS department and cross referenced against median annual income. Results: There were 375 respondents. 85.5% reported being verbally threatened or abused by patients and 78.4% reported physical battery by patients. 91.3% believed their personal safety was at risk. 86.8% required police involvement with a violent patient. 96.5% wanted additional training for combative patients. 51.1% believe they have not been adequately trained to de-escalate agitated patients. Total assaults and median annual income by zip code were negatively correlated with correlation coefficient -0.55. Conclusions: An overwhelming majority of prehospital providers across New England face physical and/or verbal violence. Major barriers to reporting include disbelief in systemic change. Prehospital providers are highly desirous of more comprehensive training and improved restraint systems. Socioeconomic status may play a role in increased violence that needs to be addressed to enact systemic changes.

Katherine Lynch | Surveying Attitudes and Access to Healthy Diet in Pregnant Women with Chronic Hypertension, Gestational Hypertension, Prior Hypertensive Disorders of Pregnancy, or At-Risk for Hypertension

Project Advisor | Lara C Kovell MD
House | Burncoat | Sharmilee B Korets MD

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Abstract

Hypertensive disorders of pregnancy are both common and of proven consequence for maternal-child health outcomes. Adoption of a heart healthy diet, specifically the Dietary

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Approach to Stop Hypertension (DASH), has been proven to provide blood pressure control in adults. Adherence is a major factor in the effectiveness of the DASH diet. Barriers to healthy eating specific to pregnant women have not been well defined in the literature. It was hypothesized that multiple socioeconomic and personal lifestyle barriers to healthy eating exist in this population, and that there would be interest in specialized intervention to aid in the implementation of a healthy diet in pregnancy. Pregnant women aged 28-50 (n=33), with chronic hypertension, current or prior hypertensive disorders of pregnancy, or those at risk for hypertension were recruited from the UMass Memorial OB/GYN clinic. Participants completed an electronic survey assessing barriers to healthy diet, knowledge of healthy eating, and interest in dietary intervention strategies. Time, finances, and cultural and family dietary restriction were identified as common barriers. Respondents reported awareness of what composes a healthy diet but reported struggles in practical implementation and meal ideas. Interest was high in interventions like meal and ingredient delivery, personalized diet plans, and guided recipes. These interventions address the most identified barriers to healthy dieting and may indicate the potential for improved adherence with their utilization. Future study utilizing this survey data is needed to assess adherence with implementation of these dietary interventions.

Jacob Maalouf | An Integrative 3D-printed Biomaterial Scaffold to address Articular Cartilage loss in Osteoarthritis
Project Advisor | Jie Song PhD
House | Burncoat | David Hatem MD
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Abstract

Osteoarthritis is a disease process that affects millions and is characterized by chronic loss of articular cartilage, a material which notoriously lacks regenerative capacity. While pain control, physical therapy, and surgical joint replacement are the current standards of care, an area of particular interest remains in capturing the ability to regenerate cartilage. In this project, we propose and demonstrate a proof-of-concept design for an integrative, 3D printed construct using computer aided design, and printed with a biodegradable synthetic polymer with proven osteoconductive properties. One end of this graft is designed to integrate with subchondral bone marrow, while the other is designed to integrate with a synthetic hydrogel loaded with chondrocytes to replicate articular cartilage. While there is room for design optimization, as well as future animal

experimentation, this integrative osteoconductive scaffold design represents a proof-of-concept that has clinical and translational potential for addressing a sustainable, safe, and economical solution to address articular cartilage degeneration in osteoarthritis.

Ben Maxner | Developing a Curriculum to Improve Cardiology Fellows' Training in Pregnancy and Cardiovascular Disease
Project Advisor | Lara C Kovell MD
House | Burncoat | Matthew E McGuinness MD Med
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Abstract

Introduction Exposure to pregnant women with cardiovascular disease (CVD) during cardiology fellowship training is limited and without a standard curriculum in the United States. The authors sought to evaluate a dedicated curriculum to teach management of CVD in pregnancy to improve general cardiology fellowship training.

Methods The authors developed a dedicated CVD in pregnancy curriculum for the general cardiology fellows at a large academic medical center in the fall of 2019. Fellows' knowledge was assessed via a board-style examination and exposure, attitudes, and skills related to the care of pregnant women with CVD were evaluated with a needs assessment questionnaire before and after the curriculum.

Results Of the 17 fellows who participated in the curriculum, 12 completed the needs assessment pre-curriculum and 9 post-curriculum. The mean (SD) number of pregnant women with CVD cared for by each fellow in the inpatient and outpatient settings were 0.75 (1.29) and 0.56 (0.73), respectively. After the curriculum, all fellows reported awareness of available resources to treat pregnant women with CVD, while a majority disagreed that they receive regular exposure to pregnant patients with CVD in their training. The authors observed significant increases in fellows' confidence in their knowledge of normal cardiovascular physiology of pregnancy, physical exam skills, and ability to care for pregnant women with valvular disease and arrhythmias from pre to post-curriculum. A total of 15 fellows completed the board-style exam pre-curriculum and 15 post-curriculum. Fellows' performance on the board-style examination improved slightly from before to after the curriculum (64.0% to 75.3% correct, p=0.02).

Conclusions A dedicated curriculum improved cardiology fellows' knowledge and skills to recognize and treat CVD in pregnancy and improved attitudes towards caring for this patient population.

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GROUP | Lauren Nguyen & Eileen McNicholas | Screening for Malnutrition in the Elderly: A Virtual Training Session for Health Promoters in the Dominican Bateyes
Project Advisor | Michele Pugnaire MD
House | Burncoat | Lisa Gussak MD

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Abstract

Since 2010, the Dominican Republic Batey Health Initiative (DR BHI) has served marginalized 'batey' communities, where Haitian migrant cane-cutters reside on the sugar cane plantations of the eastern DR. In 2020, the DR BHI partnered with local non-profit organizations to support training of health "promotoras," local community health workers (CHW) based in the bateyes, with the goal of creating a longer-term, sustainable "Train-the-Trainers" program. With the COVID-19 pandemic and suspension of foreign travel, initial plans for "in-person" training were redesigned to a combined virtual and in-person distance learning model. Our partner organization provided facilities and technology to support promotora training, while DR BHI trainers from UMass Chan, joined remotely, in real-time.

The training session addressed malnutrition in the elderly, a substantial batey subpopulation, which had previously not been included in prior trainings which focused on childhood malnutrition. The program included a presentation and discussion of malnutrition in the elderly, followed by "hands-on" skills practice led by the authors and facilitated by DR-based physician partners. Pre, post and post-post surveys were used to assess the training program. Outcomes indicated that the health promotoras were engaged and enjoyed the training, with increased knowledge of and comfort assessing malnutrition in the elderly. Operational issues of technology, transmission quality; trainee attendance, and local partner participation, met expectations for successful program implementation. This outcome supports the feasibility of combined virtual and in-person education for safely training CHWs under pandemic conditions. As such, this model may be of interest to CHW training in other global health settings worldwide.

Leslie Panella | Developing an echocardiographic database to assess changes and maternal-fetal outcomes associated with pregnancy and hypertension
Project Advisor | Lara C Kovell MD
House | Burncoat | Sharmilee B Korets MD

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Abstract

Objective To develop a database of women who have had echocardiograms during pregnancy, and collect both echocardiogram, blood pressure, maternal and fetal outcome data to be used in studies determining the short- and long-term effects of hypertension in pregnancy. We will examine the effects on future cardiovascular disease, identify predictors of serious pregnancy complications like preeclampsia, study outcomes for newborn and NICU stays, and establish interventions that prevent hypertensive disorders of pregnancy.

Methods In this retrospective chart review, we grouped women who had echocardiograms during pregnancy from 2009-2018 into a normotensive group, chronic hypertension group, and gestational hypertension group. We identified comorbid conditions, hypertensive medications, blood pressures throughout pregnancy, fetal outcomes, new diagnoses (such as preeclampsia, pulmonary embolism, bleeding, CAD/MI, heart failure, cardiomyopathy, or placental abruption) and echocardiographic variables. Data analysis was not completed as data collection is still ongoing.

Results Data was collected from 25 women identified as having echocardiograms during their pregnancy. Two of the study subjects were in the chronic hypertension group, none were in the gestational hypertension group, and the rest were in the normotensive group. Three of the patients had cardiomyopathy, three had a history of cardiac surgery, and three were on hypertensive medications during their pregnancy. Echocardiographic data was collected from 23 out of 25 women, and indications for the echocardiograms included previous history of cardiomyopathy, palpitations, syncope, dyspnea, and tachycardia.

Tamanna Patel | Pronation on Weightbearing Radiographs does not Correlate with Pronation from Weightbearing CT Scans

Project Advisor | Scott Ellis MD
House | Burncoat | Lisa Gussak MD

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Abstract

Introduction In hallux valgus (HV), first metatarsal pronation is increasingly recognized as an important aspect of the deformity. The purpose of this study was to compare pronation in HV patients determined from the shape of the lateral head

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of the first metatarsal on AP weightbearing radiographs with pronation calculated from weightbearing CT (WBCT) scans.

Methods Patients were included in this study if they had preoperative and 5-month postoperative WBCT scans and corresponding weightbearing AP radiographs of the affected foot. Pronation of the first metatarsal on WBCT scans was measured using a 3D CAD model and the alpha angle and categorized into four groups on radiographs. Association between pronation groups on radiographs and WBCT scans was determined using Spearman correlation coefficients (rs) and by comparing mean WBCT pronation of the first metatarsal between plain radiograph pronation groups.

Results Agreement between the two observers' pronation on radiographs was good (k=0.634) and moderate (k=0.501), respectively. There was no correlation between radiographic pronation and the 3D CAD model (rs<0.15). Preoperatively, there was weak correlation between the alpha angle and the radiographic pronation groups (rs=0.371, P=0.048) although this relationship did not hold postoperatively (rs=0.330, P=0.081). There was no difference in mean pronation calculated on WBCT scans between the plain radiographic groups.

Conclusion Pronation of the first metatarsal measured on weightbearing AP radiographs had moderate interobserver agreement and was only weakly associated with pronation measured from WBCT scans. These results suggest that first metatarsal pronation measured on weightbearing radiographs is not a substitute for pronation measured on WBCT scans.

GROUP | Hayden Peirce & Rose Healy | Evaluating Medical School Curriculum on Serious Illness Communication

Project Advisor | Jennifer Reidy MD
House | Burncoat | David Hatem MD

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Abstract [GROUP | Hayden Peirce & Rose Healy]

In 2017, the Massachusetts Coalition for Serious Illness Care launched a collaborative to determine the educational exposure students have to serious illness communication at the four Massachusetts medical schools (UMMS, TUSM, BUSM, HMS). The first step was to come up with five core competencies that represent the foundational knowledge, skills and inspiration we hope medical students graduate with to engage in goal oriented conversations with seriously ill patients. At UMass Chan, led by Dr. Jen Reidy, we were responsible for designing a method for all four schools to perform a curriculum mapping process, creating a mapping tool in RedCap, and aiding

in the Coalition's larger meetings to discuss the educational opportunities we experienced. The data presented here is only from UMass Chan. Using a list of 23 keywords/phrases agreed upon by the coalition, course databases (OASIS at UMMS) were queried. Curriculum Mapping was performed in a "two pass" method to add courses to the list and fill out the RedCap form. Thirteen courses were found to be related to serious illness communication; 7 were required, 3 were selective, 3 were not required. Students spent an average of 23 hours engaged in this work, and most of the hours were in the pre-clerkship and post-clerkship years. Our goal is to foster conversation on serious illness communication training and serve as a baseline. It is the goal of this project to be repeated in several years' time to determine if more educational opportunities have been implemented at the four medical schools.

Manasa Raman | Commercial Sexual Exploitation Curriculum Development for Medical Students

Project Advisor | Jennifer S Bradford MD

House | Burncoat | Matthew E McGuinness MD Med

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Abstract

Commercial Sexual Exploitation (CSE) "refers to a range of crimes and activities involving the sexual abuse or exploitation of a [person] for the financial benefit of any person or in exchange for anything of value (including monetary and non-monetary benefits)" (Office of Juvenile Justice and Delinquency Prevention). CSE can lead to many adverse health outcomes including injuries secondary to domestic violence, STIs/STDs, psychiatric conditions, unwanted pregnancy, and substance use, and CSE disproportionately affects those in poverty, immigrants, racial minorities and members of the LGBTQIA+ population (Barnert, Iqbal, Bruce, Anoshiravani, Kolhatkar, Greenbaum, 2018 and Platt, Grenfell, Meiksin, Elmes, Sherman, Sanders, Mwangi, Crago, 2018). Currently, there is limited educational curriculum on sex trafficking that exists for medical students throughout the country (Talbot, Dutcher, Pougner, Calvin, Roe-Sepowitz, Kling, 2020). A curriculum on CSE was developed for third year medical students in the University of Massachusetts Chan Medical School (UMass Chan). The one-hour session was developed with the input of survivors and providers that work closely with this population to provide an authentic representation of the survivor narrative. The session was split up into 3 components: a power-point introduction, a standardized case simulation, and a reflection period and was created to be delivered virtually. The pilot session will take

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place in March 2022. Benefits of the curriculum include catering to various learning styles, a safe-space to talk to mental health providers, and its ability to be implemented in other medical schools throughout the country. Future directions include incorporating student feedback, students interviewing actual survivors, and simulating how to perform a physical exam in trauma-informed manner.

Carol "Kaia" Renneburg | Autophagy: A Druggable Pathway to Diminish Glycation-Derived Proteotoxicity in Human Eye-Derived Cell Lines

Project Advisor | Eloy Bejarano-Fernandez PhD
House | Burncoat | Lisa Gussak MD

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Abstract

Age-related Macular Degeneration (AMD) and cataracts are associated with the accumulation of high levels of advanced glycation end products (AGEs) as people age and are leading causes of blindness and high health care costs across the globe. To date, there has been little success in pharmacologic attempts to mitigate the collection of these cytotoxic compounds in human tissues. This work explores the stimulation of autophagy as a potentially protective pathway that can lead to clearance of these compounds from human cell lines that typically experience low turnover. In particular, Rapamycin was chosen for this work as it has been found in previous studies to inhibit a protein that prevents autophagy, and thus it was thought that exposing cells to Rapamycin could stimulate autophagy and lead to the breakdown of AGEs. These studies demonstrate first that Rapamycin does stimulate autophagy in human eye-derived cell lines. Second, both pre-treatment with Rapamycin and co-incubation with Rapamycin prior to exposure to a toxic glycosylating agent resulted in diminished accumulation of AGEs in these cell lines. As the decrease in the buildup of these toxic compounds can be induced via autophagy, this research is essential because it draws attention to this pathway as a potential therapeutic target for pathologies related to physiologic aging.

GROUP | Maimuna S. Ahmad & Delia T. Sanders | STEM Start: Engaging Worcester Girls in Science and Technology

Project Advisor | Lynne Geitz PhD
House | Burncoat | Jennifer Moodie MD

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Abstract

"STEM Start: Engaging Worcester Girls in Science and Technology" is a now three generation legacy project originally established at UMass Chan in 2017 with the goal of encouraging engagement in STEM subjects and establishing mentorship with young women at Worcester East Middle School (WEMS). The foundational design of the STEM Start after school program rested on in-person, hands-on sessions geared towards science and engineering projects. With the COVID-19 pandemic, however, STEM Start's recent predecessors were required to transition to a virtual lesson format. Their success with an online-based session inspired this paper's authors to formally construct a sustainable curriculum that could be used in times of social distancing and times of traditional in-person lessons. We recognized the need for an accessible, flexible curriculum with set course materials that would be ready-to-use in all settings by future STEM leaders, including a pre-recorded video of our pilot lesson. This project outlines the development of a complete 1-year curriculum for intended use by subsequent STEM Start leader cohorts. These authors led in-person sessions from 2018-2019 at WEMS which provided the foundational experience and test-piloting of many aspects of the lessons put forth in this project, however, each lesson is ultimately a combination of original design by these authors, inspiration from previously well-received lessons, and careful research into quality age-appropriate science topics. WEMS' director of science was instrumental in providing guidance and feedback on the in-person sessions held previously, and the curriculum presented now, with the topics serving as a compliment to her students' science curriculum in school. A well-received assessment of the lessons was performed through qualitative and quantitative feedback from the students in a pre and post survey of the pilot lesson for the established curriculum held at WEMS in December 2021. We were successfully able to create an engaging and exciting curriculum that will be able to be delivered uninterrupted, with the flexibility of video, virtual lesson, or in-person engagement, for many years to come.

Daria Santoro | Empiric Antibiotics for Traveler's Diarrhea:

Developing a Survey to Assess Patterns of Use and Disposal at the UMass Memorial Family and Pediatric Travel Clinic

Project Advisor | John Ryan MD
House | Burncoat | Lisa Gussak MD

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Abstract [Santoro]

Prescribing antibiotics for the treatment of Traveler's is a standard of care in pediatric travel clinics, but the patterns of use and disposal of these prescriptions is not well characterized, and the impact of these prescriptions on the environment is not understood. This project aims to address how empiric antibiotic prescriptions for the prevention of TD are utilized and managed after they are prescribed to children. By surveying patients at the busy and diverse UMass Memorial pediatric and family travel clinic, we hope to gain a better understanding of prescription usage behaviors, as well as the demographics and features of travel associated with prescription use. This information could ultimately inform and guide relevant adjustments to our clinic practices to ensure our patients are appropriately educated on how to manage and dispose of empiric TD prescriptions.

GROUP | Terence B Lee Jr & William Weir | UMMS Takes

Care: Implementing an Annual Event Series to Promote Wellness and Foster Tri-School Collaboration

Project Advisor | Michael Hirsh MD

House | Burncoat | Matthew E McGuinness MD Med

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Abstract

Medical, biomedical doctoral and nursing students exhibit elevated rates of burnout, anxiety and depression relative to the general population. To address the accumulating evidence of disproportionate psychological distress in this population, institutions of medical education have begun to implement programs designed to increase access to counseling, decrease the stigma surrounding mental health and provide opportunities for reducing stress. To build on this existing research, we decided to conduct exploratory research on the wellness needs of our students at all three schools at the University of Massachusetts T.H. Chan Medical School (UMMS): School of Medicine (SOM), Graduate School of Nursing (GSN), and Graduate School of Biomedical Science (GSBS). We created a week of wellness-themed events held at the beginning of two academic years to promote community building, offer opportunities for reducing stress, familiarize students with resources on campus and evaluate student response to these events. The first iteration of UMass Takes Care took place during the week of September 16th, 2019 and all events were conducted entirely in person. The second iteration of UMMS Takes Care took place between September 29, 2020 and October 2, 2020, and was entirely virtual due to the COVID-19

pandemic. Survey data indicated that the perception of events by participants across both wellness weeks was overwhelmingly positive. The sparse negative comments that were received primarily focused on low participation due to inconvenient event start times or not enough advertising.

KELLEY HOUSE

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GROUP | Brian Argus & Taryn Ryan | A Team-Based Learning

Approach to Doctoring and Clinical Skills

Project Advisor | Susan Hogan MD MPH

House | Kelley | Nidhi Chojar MD

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Abstract

Undergraduate medical education is undergoing a shift in teaching style towards small group learning. The doctoring and clinical skills (DCS) course, which already utilizes a small group format, during the first year at the UMass T.H. Chan School of Medicine provided a setting to trial a team-based learning (TBL) teaching approach. In our study, we redesigned a DCS session to incorporate the tenets of TBL within the current structure of the DCS course to achieve the following aims: 1. Improve student communication with peers both during the exercise and while offering feedback 2. Develop students' abilities to construct questions, gather information, and formulate differential diagnoses for environmental and occupational exposures 3. Engage students with their peers and faculty in a professional manner 4. Align learning activities with their current coursework in Infections and Host, Blood, and Defense Sources. Following the session, students were given a survey comparing this type of format to a normal DCS session. Results of the survey were overwhelmingly positive, with 92% of students reporting they desired more sessions of this format. Students also reported that this session was more engaging than a typical session. Overall, this study's results indicate a successful TBL session and student desire for the restructuring of other sessions in favor of this method.

Kara M Banson | An Investment in Foster Parents: Creating Resources to Promote Retention, Resilience, and Rewarding Parenting

Project Advisor | Heather Forkey MD

House | Kelley | James B Broadhurst MD

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Abstract [Banson]

The Foster Children Evaluation Services (FaCES) Clinic is the first health care checkpoint for children entering foster care in Worcester County. As a medical hub, the FaCES clinic provides primary care, mental health, and educational services for children who have been abused and/or neglected. Additionally, FaCES works to support foster parents as they have the greatest opportunity to positively impact a child, especially during the COVID-19 pandemic. The trauma coach program includes a team of trauma trained current and former foster parents who provide one on one support. The project's objectives were to 1. increase awareness of the trauma coach program among the UMass Memorial community and North Central region, a geographic area that is under resourced and overwhelmed with caseloads. 2. create practical resources for foster parents that enhance their ability to access behavioral crisis services.

Alice Berenson | Breastfeeding Patterns Among Women with Twin Gestation by Chorionicity

Project Advisor | Gianna Wilkie MD
House | Kelley | Gary Blanchard MD

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Abstract

Introduction Breastfeeding significantly reduces morbidity and mortality of neonates. Rates of breastfeeding in twin gestations according to chorionicity have not been studied. This study sought to compare rates of breastfeeding or pumping for mothers of twins by pregnancy chorionicity.

Methods A retrospective cohort study was performed to identify twin gestations that delivered at our medical center between October 1, 2017 and December 31, 2020. Medical records were reviewed for sociodemographic data, clinical characteristics, documentation of a breastfeeding plan, and breastfeeding success at hospital discharge and six-week postpartum visit.

Results We identified 363 women with twin gestations, 278(77%) with dichorionic-diamniotic twins, 83(23%) with monochorionic-diamniotic twins, and 2(1%) with monochorionic-monoamniotic twins. Demographics were similar across groups; however, monochorionic twins were more likely to have a preterm birth ($p < 0.001$) and at least one twin require NICU admission ($p = 0.03$) when compared to dichorionic twins. Women with dichorionic-diamniotic twins had higher rates of direct breastfeeding at time of hospital discharge as compared to women with monochorionic-diamniotic twins (65.1% vs 51.8%, $p = 0.04$). These same women

were equally likely to be pumping at hospital discharge regardless of chorionicity (82.3% vs. 84.3%, $p = 0.73$).

Conclusion/Implications Breastfeeding intent during pregnancy and success rates at the postpartum visit among mothers of twins does not vary based on chorionicity. Lower rates of direct breastfeeding among monochorionic-diamniotic twins at maternal hospital discharge can likely be attributed to more preterm deliveries and higher NICU admission rates. Interventions to promote breastfeeding for twin gestations should include resources focused on pumping especially in monochorionic twin gestations.

Lindsey A Brown | Allergic Contact Dermatitis Secondary to Cyanoacrylate Use in Minimally Invasive Post-Surgical Patients: A Case Series

Project Advisor | Philip A Cohen MD
House | Kelley | Nidhi Chojar MD

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Abstract

Dermabond and other cyanoacrylates are commonly used for incision closure during surgery; however allergic contact dermatitis (ACD) can be an adverse effect of use, and is being increasingly reported after orthopedic, plastic, and reconstructive surgery. In this study, we conducted a retrospective chart review of 2 cases of ACD after Dermabond use during minimally invasive procedures. Two patients presented to their provider after developing a rash within 10 days of their procedure. Both patients presented within 3-7 days of the surgery. One patient reported a previous reaction to skin glue; however, this was not denoted in the EMR at the time of the procedure. Both patients were treated with multiple therapies, including antihistamines, topical and oral antifungals, and topical steroids, denoting difficulty in making the diagnosis of ACD after minimally invasive surgical procedures. Surgeons and primary providers should be aware of the potential for ACD to Dermabond, especially among patients who have had previous exposure to Dermabond or other cyanoacrylate products that are common in household and cosmetic glues. Dermabond, cyanoacrylates, and skin glue should be included in the EMR allergy database to alert providers to possible sensitization and help prevent future reactions.

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Erin Caffrey | Improving Survivor Experiences in the Emergency Department

Project Advisor | Rachel Davis-Martin PhD

House | Kelley | Philip O Fournier MD

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Abstract

Incidence of sexual assault in the U.S. is vastly underreported, with many individuals abstaining from treatment in the aftermath of trauma. When individuals do present to the Emergency Department for evaluation, data shows that the care received can influence the survivor's perception of the event, with patient-centered, trauma-informed care aiding a path toward healing. The proposed Improving Survivor Experience in the Emergency Department (ISEED) initiative aimed to develop, implement, and evaluate a sustainable student-led system to provide clothing to these survivors in the UMass Memorial University Campus ED, with the goal of reducing trauma by embracing in-house, patient-centered care. While implementation was not feasible secondary to the global pandemic, a framework was designed and potential limitations explored. Following community-based clothing collection, descriptive data obtained from Sexual Assault Nurse Examiners would serve as a reflection of both patient and provider satisfaction, while driving improvements. Given the increase in sexual violence as a result of conditions exacerbated by the pandemic, future directions should not only focus on additional characterization of these traumatic events, but design and implement initiatives to expand availability to trauma-informed care for survivors in the ED as well as the community.

Erica Christenson, MBA | Syndrome of the Trepined: A rare challenge in head & neck reconstruction

Project Advisor | Phillip Fournier MD

House | Kelley | Phillip Fournier MD

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Abstract

Syndrome of the trephined (ST), also known as "sinking skin flap syndrome," refers to the rare, reversible event of neurological deterioration following craniectomy, typically occurring in the weeks to months following operation. The mechanism underlying syndromic onset is poorly understood. Changes to cerebrospinal fluid flow, alteration of temperature-related perfusion, and scarring at the intracranial surgical site have all been proposed. Patients present with a variety of symptoms related to paradoxical increased intracranial pressure.

Sometimes falsely attributed as a consequence of the initial cranial insult, ST is more specifically a symptomatic process resulting as direct consequence of the craniectomy procedure. With timely identification and subsequent cranioplasty, the associated neurological dysfunction can be corrected. A 59-year-old female was seen with regards to a wound of the temporoparietal scalp, with exposed cranial implant. She had suffered a traumatic brain injury and underwent craniectomy after a motor vehicle accident 10 years prior. Her injury was complicated by necrosis of her cranial bone flap after reimplantation and at least 10 subsequent attempts to reconstruct her wound. When delayed cranial reconstruction was attempted on two separate occasions, she suffered severe ST and required hospitalization for symptoms of impending herniation. Ultimately, she required revision and replacement of titanium mesh and latissimus dorsi free flap for soft tissue coverage of the titanium mesh. This case presents a unique surgical challenge in that chronic infection was perpetuated by the replacement of implant material in the wound. Soft tissue reconstruction alone was not possible given the patient's severe ST. Free tissue transfer was required in order to bring vascularized myofascial tissue to prevent recolonization of the newly implanted mesh and allow the cranial wound to heal.

Amberly Diep | Developing a MCAT Tutoring Curriculum & Program for Underrepresented Students in Medicine

Project Advisor | Mariann Manno MD

House | Kelley | Phillip Fournier MD

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Abstract

For underrepresented in medicine (URIM) students who want to pursue medicine, having a low MCAT score has been identified as a barrier by 90% of students in a study conducted by Figueroa (2014). Davis (2013) states that MCAT scores are a better predictor of medical school admission compared to undergraduate GPAs, it is important to prioritize MCAT performance, especially in URIM students have on average lower scores than their white counterparts (Jolly, 1992).

At UMass Medical School, there already exists such an interventional effort to increase the diversity in student admissions. The Baccalaureate MD Pathway program exists for students attending public undergraduate institutions who are also URIM. The program extends over the course of 2 academic years where students reside and take classes on campus for 1 month each summer. Modeled after interventional efforts from

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other medical schools such as MEdREP (Pisano, 1983), the BaccMD program includes a physics class, reading/writing class, practice MMIs with feedback, a drafted autobiography, and a research-based presentation and report addressing health disparities in Worcester. Students are expected to learn time management strategies, efficient study habits, public speaking skills, teamwork, and professionalism throughout their time with the program. An intensive education program has been shown to increase the probability of college students and recent graduates who are URIM to be accepted into medical school (Cantor, 1998). However, one area of improvement that will greatly benefit students while they're in undergraduate and gap year(s) is a robust MCAT tutoring program.

It has been shown at other medical institutions that an MCAT review course increases the total MCAT score and thereby, increasing the chances of being accepted into medical school (Medina, 1987). This course consisted of six 5-hour class sessions that review the fundamental concepts outlined by the MCAT. It also included problem-solving and test-taking techniques. Students were provided with workbooks containing notes and self-correcting exercises. All students were required to spend 20 hours per week on average, reviewing content information. Verbal scores in particular tend to be better indicators of performances in clinical and postgraduate tests (Veloski, 2000). Thus, it is imperative that there be a time and space dedicated for students and tutors to focus on the CARS section of the MCAT.

Khoi Do | Affinity maturation of broadly neutralizing antibody lineages targeting the receptor-binding site of influenza viral hemagglutinin

Project Advisor | Aaron G. Schmidt
House | Kelley | Phillip Fournier MD

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Abstract

When exposed to influenza virus, whether through vaccination or infection, the human humoral immune system generates antibodies against viral surface proteins, the hemagglutinin (HA) and, to a lesser extent, neuraminidase (NA). In a process known as affinity maturation, antibodies with high affinity and specificity are selected targeting these viral antigens. Current seasonal influenza vaccines elicit antibodies targeting HA and NA. However, influenza rapidly mutates to escape the elicited immune response and annual vaccination is therefore required; understanding the nature of the humoral response may lead to

the design of a more effective, long-lasting influenza vaccine. (Webster et al., 1982) Here, we describe broadly neutralizing antibody lineages targeting the conserved viral HA receptor-binding site (RBS) from a single donor. Through biochemical and biophysical characterization, we show how both high affinity and breadth developed. The existence of antibodies found in this study suggest that antibodies with polygenicity, high viral antigenic affinity and specificity, and broadly neutralizing capabilities may not be so rare and further suggests that vaccines that can select for these antibodies may be the key to enhance the efficacy of current vaccines against influenza.

Emily Gentile | Healing Patients and the Planet: Medical Students Organize for Climate Action and Advocacy

Project Advisor | Matthew Masiello MD
House | Kelley | James B Broadhurst MD

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Abstract

Climate change is the single greatest threat to public health in the 21st century. Climate change impacts health both directly and indirectly, and threatens the ability of our healthcare system to care for patients with disruptions in supply chains and more frequent and severe national disasters. Medical students have a unique role to play in the climate crisis, and are increasingly using their voices to advocate for climate action locally, nationally, and internationally. At the onset of this scholarly project, no formalized infrastructure existed for medical students to learn about the intersection between climate and health at UMass Chan. The goal of this project was to create a robust, student driven climate action organization that performs educational, research, community service, and advocacy projects and allows students to participate at a wide range of levels of engagement. Surveys were created to identify student interest in the topic and results guided the development of events. Students indicated interest in participating in climate-related service opportunities, educational sessions, and advocacy events, and 92% of respondents believed that they would not be prepared to care for patients in the changing climate upon graduating from medical school. Nine major advocacy and education events were conducted and student feedback was collected after each event. Based on survey data, students are overall interested in climate and health and would like to learn more about hospital sustainability, climate and health policy, and individual climate action in the future.

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Andrew Johnson | The Development of a Transfusion Medicine Curriculum as an MS4 Elective at the University of Massachusetts Chan Medical School
Project Advisor | Patricia Miron PhD
House | Kelley | Gary Blanchard MD

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Abstract

Transfusion medicine is a field of medicine that oversees the usage and storage of blood and blood products as well as their application in the management of numerous disease entities and medical conditions. As it stands, blood transfusions are one of the most commonly performed procedures in American hospitals. Despite the commonality of these procedures and the widespread use of blood products in clinical practice, there is little formal training in transfusion medicine during undergraduate or graduate medical education. To combat this lack of education, a transfusion medicine elective was created at the University of Massachusetts T.H. Chan School of Medicine to be available to MS4 students. The goals of this course design were two-fold. Primarily, the goal was to institute formal education in transfusion medicine in a context that would allow for clinical integration of the theory discussed. This would allow students entering fields that commonly order blood products such as general medicine, obstetrics, pediatrics and neonatology, surgery and anesthesia, and trauma and acute surgery a greater degree of education than was previously offered. The second goal of this project was the implementation of a fourth-year elective within the field of pathology that met the criteria of a clinical elective as defined by the student handbook. The current requirements surrounding fourth year electives pose a significant issue for students planning on pursuing careers in medicine that fall outside of the clinical atmosphere. As it stands, a student that is planning on a career in pathology receives limited experience in pathology as much of the fourth year sacrificed to meet clinical graduation requirements. The curriculum was designed incorporating relevant topics in the existing curricula for pathology and anesthesiology residents in conjunction with commonly tested material in medical school. At this time there is no reportable data as to the efficacy and utility of the elective because due to its novelty, only one student has participated in the elective. Future aims for this project are to have the elective offered in upcoming years and to gather data to evaluate the effectiveness and usefulness of the elective through the use of retrospective pre-post surveys.

GROUP | Ryan Payne & Patrick Joslin | Teaching Medical Students Physical Diagnosis Using an In-House Instructional Video: An Analysis Evaluating the Utility of a Video Produced Specifically for The University of Massachusetts Medical School Physical Diagnosis Curriculum
Project Advisor | Stephanie Clegg MD
House | Kelley | James Broadhurst MD

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Abstract

Background Physical diagnoses (PD) begins in the first year at The University of Massachusetts Medical School (UMMS). The current UMMS PD exam videos are an amalgamation of examples from other institutions; they can be difficult to navigate and do not always correlate with the current expectations for the UMMS PD exam.

Objectives Identify areas for improvement in the current PD exam videos through surveying current UMMS students and create a single video that demonstrates the techniques of the first year UMMS physical diagnosis exam. The resulting video is intended for first year students to use as a resource to learn PD and study for the UMMS PD exam.

Methods The data for this project was collected via a Google Forms survey posted on the class Facebook pages of current second, third, and fourth year UMMS medical students (Classes '22, '23, '24).

Results Fifty-three UMMS students completed our survey. Fifty-nine percent of the students surveyed, responded that they would find a UMMS specific PD exam video "very helpful." Further, 98% of the students responded that a UMMS specific PD exam video would be helpful. Additionally, 73% responded saying they would use a UMMS specific PD video to study for the first-year PD exam. The student's responses aided in the creation of an example PD exam video.

Conclusion Based on the results of the survey, it appears as though there is a need for a more robust UMMS specific PD exam video. A UMMS specific example PD exam video was created.

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Jessica Kahan | Cadaver-Based Training: Widespread Use Among Plastic Surgery Residency Programs

Project Advisor | Giorgio Giatsidis MD PhD

House | Kelley | Nidhi Chojar MD

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Abstract

Since the implementation of duty-hour restrictions, there has been concern that residents have had decreased operative volume. However, fresh cadavers have been shown to improve surgical competency and confidence in residents. This study aimed to assess current usage of cadaver-based training in residency education, identify possible barriers to its implementation, and understand possible solutions to improve access. The online survey queried U.S. plastic surgery program directors and focused on characteristics of residency programs and their use of cadavers both within and outside of their institutions. Forty-one (42%) of 98 program directors completed the survey, and most of the programs (95%) offered cadaver-based training to residents at their home institutions. Less commonly used were courses elsewhere (47%), virtual courses (37%), and the use of other modalities to learn surgical skills (46%). Of the program types, independent programs offered the fewest number of topics taught on cadavers and rated more barriers highly. The highest rated barrier for all programs besides the write-in “other” was low priority/interest from residents, which could be due more to how the courses are integrated into their schedules than the perceived benefits of the courses themselves. This could be addressed by introducing a shared cadaver curriculum that is worked into resident didactic time. However, opinions among program directors are split in this regard, and any common curriculum would need to allow flexibility for each program to cater towards its unique needs and interests.

Rosemary Kelley | Leukocytosis and Thrombocytopenia

Following Endovascular Repair of Complex Aortic Aneurysm

Project Advisor | Aaron Scott DO

House | Kelley | James B Broadhurst MD

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Abstract

Complex aortic aneurysms include thoracoabdominal, juxtarenal, and pararenal aortic aneurysms. Endovascular repair of a complex aortic aneurysm is an alternative to open surgery in which components of a multi-branched stent graft are inserted through the femoral or brachial artery. Both open

and endovascular aortic aneurysm repairs are widely accepted methods of treatment and are associated with similar outcomes in terms of mortality, spinal cord injury, renal failure, and stroke. A known complication of endovascular repair of aortic aneurysms is a systemic response termed the post-implantation syndrome, characterized by fever, anorexia, leukocytosis, and coagulopathy. The etiology of this syndrome is poorly understood and is thought to be related to postoperative renal insufficiency, direct damage to vascular endothelium, manipulation of thrombus in the aneurysm, and/or platelet activation by the graft material. It has been noted that patients undergoing endovascular repair of a thoracic aortic aneurysm (complex) as opposed to endovascular abdominal aortic aneurysm repair experience an extreme response characterized by significant leukocytosis and thrombocytopenia. Since this initial characterization of 48 patients who underwent elective endovascular thoracic aortic aneurysm repairs in 2009, there have been few studies re-evaluating the inflammatory and coagulopathic response to complex endovascular procedures. The purpose of this retrospective review is to further characterize the magnitude of inflammatory and coagulopathic response after endovascular aortic repair in a larger number of patients.

GROUP | Terence B Lee Jr & William Weir | UMMS Takes

Care: Implementing an Annual Event Series to Promote Wellness and Foster Tri-School Collaboration

Project Advisor | Michael Hirsh MD

House | Kelley | Gary Blanchard MD

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Abstract

Medical, biomedical doctoral and nursing students exhibit elevated rates of burnout, anxiety and depression relative to the general population. To address the accumulating evidence of disproportionate psychological distress in this population, institutions of medical education have begun to implement programs designed to increase access to counseling, decrease the stigma surrounding mental health and provide opportunities for reducing stress. To build on this existing research, we decided to conduct exploratory research on the wellness needs of our students at all three schools at the University of Massachusetts T.H. Chan Medical School (UMMS): School of Medicine (SOM), Graduate School of Nursing (GSN), and Graduate School of Biomedical Science (GSBS). We created a week of wellness-themed events held at the beginning of two academic years to promote community building, offer

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opportunities for reducing stress, familiarize students with resources on campus and evaluate student response to these events. The first iteration of UMass Takes Care took place during the week of September 16th, 2019 and all events were conducted entirely in person. The second iteration of UMMS Takes Care took place between September 29, 2020 and October 2, 2020, and was entirely virtual due to the COVID-19 pandemic. Survey data indicated that the perception of events by participants across both wellness weeks was overwhelmingly positive. The sparse negative comments that were received primarily focused on low participation due to inconvenient event start times or not enough advertising.

Joseph LiCausi | PSA: Educating the Worcester Community about Public Health Issues through Local Programming

Project Advisor | Joseph Sabato MD

House | Kelley | Phillip Fournier MD

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Abstract

We identified a need to educate and inform the Worcester, Massachusetts community about an ongoing public health threat caused by the novel coronavirus SARS-CoV-2. To address this need we created a public service announcement (PSA) about COVID-19 signs and symptoms, testing, local resources, and preventative actions including social distancing and masking. The PSA was filmed and made available through Worcester Community Cable Access Television (WCCA-TV). To estimate the potential audience size for the PSA we analyzed publicly available cable subscriber data. Using this data we determined a potential audience size of greater than 30,000 individuals. We also analyzed changes in COVID-19 testing rates in the Worcester community and found a 2.4% increase in testing rates among residents in the two-week period following publication of the PSA. Overall, this project demonstrates that PSAs are an easy and efficient method for distributing public health information to a large audience.

Guyu Liu | Proposed Methodology for Adeno-associated Viral Capsid Engineering

Project Advisor | Miguel Esteves PhD

House | Kelley | James Broadhurst MD

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Abstract

The goal of this project is to engineer novel viral capsids with enhanced tropism for CNS and/or other systems for future

therapeutic applications by in vivo screening/ directed evolution of new AAV capsid libraries using mainly AAV9 as a scaffold. Highly complex AAV capsid libraries will be made for in vivo selection/directed evolution in mice and non-human primates (NHP). The results will theoretically generate novel capsids with desired tissue tropisms and special properties such as low immunogenicity. The resulting new AAV vectors can be used for various therapeutic applications.

GROUP | Margaret Ruddy & Rachel Padillo | Evaluation of Parental Leave Policies and Associated Financial Implications at University of Massachusetts Chan Medical School
Project Advisor | Susan Hogan MD MPH
House | Kelley | Gary Blanchard MD

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Abstract [GROUP | Margaret Ruddy & Rachel Padillo]

Background As the age of matriculating medical students increases and more women than ever before are attending medical school, more students are likely to consider becoming parents during medical school. However, medical school presents many unique strains on parents. We aim to evaluate the resources available to medical students at University of Massachusetts Chan Medical School (UMass Chan), including financial resources, and provide suggestions for improvement in the support future physicians and future parents receive during medical training at UMass Chan.

Methods A survey was provided to UMass Chan medical students to assess their interest in becoming parents in medical school as well as perceived challenges and support for those starting a family. The survey was completed by a convenience sample; students were not required to complete the survey but offered the opportunity. Interviews were subsequently conducted with survey participants who became or considered becoming parents during medical school. Inquiries were made with both the Financial Aid Office and the Office of Student Affairs to have administrative insight.

Results A total of 54 medical students responded to the survey. When surveyed about interest in having children, 96% responded 'yes' and 28% were interested in having children in the next 2-4 years. During individual interviews, participants described the interplay of rigid medical school schedules, finances, and emotional readiness with the decision to become parents. The Financial Aid Office outlined that students who take a leave of absence for any length of time do not qualify for financial aid. Student Affairs outlined two major options for student parents interested in taking time off: to take a leave of

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absence or decelerate, however, the Dean of Student Affairs emphasized that the needs of individual students are considered on a case-by-case basis.

Conclusion The majority of our survey participants are interested in having children, some of whom hope to in the next 2-4 years. While we appreciate the work that the administration has done thus far to support student parents, there are still aspects that could be improved upon. We offer the following recommendations to increase awareness of policies that benefit student-parents and provide more timely scheduling communication during third year rotations.

Tara Patel | Addressing barriers to abortion care in Mexico: how providers' opinions impact access
Project Advisor | Susan Hogan MD MPH
House | Kelley | Nidhi Chojar MD

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Abstract

Abortion laws in Mexico are among the more restrictive in the world, each state determines the instances for which it is legal. At the time of this study, abortion for all causes was legal only in Mexico City, where access to care was still very limited. In the southern state of Chiapas, abortion is legal in very few instances. This study aimed to identify how physician's personal opinions may serve as a barrier to care for women in two states in Mexico; one 12 years after legalization and another with some of the strictest abortion laws in the country. A survey regarding provider's opinions around abortion and their knowledge of abortion laws in their state was validated and sent to over 300 physicians at both public and private hospitals across two states in Mexico with the help of the Ministry of Health. We found that Obstetricians in Chiapas were more conservative in their views and their willingness to perform an abortion than other physicians. Physicians with less knowledge of abortion law were less likely to provide and agree with abortion. Obstetricians were less like to provide medical abortions than surgical abortions. These results indicate that a lack of education surrounding abortion care is correlated with a refusal to provide the service. Our study illustrates that legalization alone is not enough to make abortion care accessible in Mexican states.

QUINSIGAMOND HOUSE

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GROUP | Maimuna S. Ahmad & Delia T. Sanders | STEM Start: Engaging Worcester Girls in Science and Technology
Project Advisor | Lynne Geitz PhD
House | Quinsigamond | Diane Blake MD

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Abstract

"STEM Start: Engaging Worcester Girls in Science and Technology" is a now three generation legacy project originally established at UMass Chan in 2017 with the goal of encouraging engagement in STEM subjects and establishing mentorship with young women at Worcester East Middle School (WEMS). The foundational design of the STEM Start after school program rested on in-person, hands-on sessions geared towards science and engineering projects. With the COVID-19 pandemic, however, STEM Start's recent predecessors were required to transition to a virtual lesson format. Their success with an online-based session inspired this paper's authors to formally construct a sustainable curriculum that could be used in times of social distancing and times of traditional in-person lessons. We recognized the need for an accessible, flexible curriculum with set course materials that would be ready-to-use in all settings by future STEM leaders, including a pre-recorded video of our pilot lesson. This project outlines the development of a complete 1-year curriculum for intended use by subsequent STEM Start leader cohorts. These authors led in-person sessions from 2018-2019 at WEMS which provided the foundational experience and test-piloting of many aspects of the lessons put forth in this project, however, each lesson is ultimately a combination of original design by these authors, inspiration from previously well-received lessons, and careful research into quality age-appropriate science topics. WEMS' director of science was instrumental in providing guidance and feedback on the in-person sessions held previously, and the curriculum presented now, with the topics serving as a compliment to her students' science curriculum in school. A well-received assessment of the lessons was performed through qualitative and quantitative feedback from the students in a pre and post survey of the pilot lesson for the established curriculum held at WEMS in December 2021. We were successfully able to create an engaging and exciting curriculum that will be able to be delivered uninterrupted, with the flexibility of video, virtual lesson, or in-person engagement, for many years to come.

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Hussein Antar | Disaggregating Race Data for Individuals of Middle Eastern and North African (MENA) Descent
Project Advisor | Wissam Deeb MD
House | Quinsigamond | Erin Barlow MD

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Abstract

Disaggregating Race Data for Individuals of Middle Eastern and North African (MENA) Descent

Rachel T. Duong | Adapting Compassionate Care in the Age of Electronic Medical Records

Project Advisor | Brian Skehan MD PhD
House | Quinsigamond | Luu Ireland MD MPH

[View Presentation](#)

Abstract

Background Healthcare provider burnout has facilitated a movement to examine the notion of compassion in healthcare. The fast-paced medical world is challenging how care providers forge and sustain the human connection with patients. In the age of the electronic medical record (EMR), providers juggle short patient visits and are weighed down by the increasing burden of documentation. This project aimed to improve UMass EMR documentation of psychosocial information, focusing on the inpatient pediatric setting.

Methods The author conducted a literature review on psychosocial data in EMRs and elicited feedback from physicians, nurses, social workers, patient advocacy groups, patient families, providers at outside institutions, and the UMass Epic team. Suggestions and changes to EMR formatting and psychosocial fields were compiled to generate a request that was submitted to the Epic Information Services team.

Results The EMR request targeted the UMass Epic Pediatric Admission Navigator, which includes intake documentation that admitting providers complete. The current navigator includes some basic prompts for “Social History” that are not tailored to patient age and the format is not user-friendly. The proposed update includes formatting changes, new and edited psychosocial information fields that are easily located, incorporated into note writing templates, and be edited by multiple providers over time.

Conclusions Centralization of existing and future psychosocial patient data could allow providers to more effectively engage with a nuanced, contextualized patient snapshot that complements the respective medical history. There needs to

be a consistent, directed effort to continue quality improvement initiatives of the EMR so holistic psychosocial information is available, accessible, and utilized to inform patient care.

Emily Stabnick Eiel | Resident physician grit and wellbeing through the COVID-19 pandemic

Project Advisor | Jennifer S. Davids MD
House | Quinsigamond | Luu Ireland MD MPH

[View Presentation](#)

Abstract [Eiel]

Physician burnout was considered an epidemic even before the start of the COVID-19 pandemic. Recent studies have demonstrated how the pandemic has led to even higher levels of burnout¹ but few have addressed how to predict or prevent pandemic-related burnout. As grit has previously been identified as protective against burnout, this study aimed to determine whether grit could be used to predict physician wellbeing while working through the pandemic. A survey including questions about COVID-19 involvement, the Grit-S scale, and the Neuro-QoL wellbeing scale was distributed to all resident and fellow physicians in one hospital system approximately one year after the rise of the COVID-19 pandemic. Analyses revealed that physician grit was a significant positive predictor of wellbeing, even when controlling for specialty, sex, and level of training. Trainees’ level of involvement in COVID-19 care was not associated with psychological wellbeing or reconsideration of one’s medical career/specialty choice. However, worse psychological wellbeing was associated with more serious reconsideration of one’s career. Therefore, measuring grit can help predict who may be at risk for worse wellbeing and thus at risk for failure to complete training rather than just looking at those who have been most visibly on the front lines of the pandemic. Future work must be done to develop measures specific to physician wellbeing in pandemic-related work environments and assess implications for trainees.

GROUP | Anthony Foscolos & Simone Thibault | Impact of Intersectional Identities on Perception of Learning and Work Environment at the University of Massachusetts Chan Medical School

Project Advisor | Jules Trobaugh MA MFA
House | Quinsigamond | Luu Ireland MD MPH

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Abstract [Foscolos & Thibault]

Background A more diverse healthcare workforce provides better care for a diverse patient population. However, LGBTQIA+ and BIPOC individuals face disproportionate barriers to enrolling and thriving in an academic healthcare setting due to individual and institutional biases. It is imperative to assess institutional attitudes toward diverse identities and create interventions to better support these individuals.

Materials and Methods A survey was created to assess institutional attitudes toward individuals based on their actual or presumed identities and was validated through cognitive interviews. The final survey was distributed electronically to all learners, faculty and staff at the institution. All responses were collected anonymously, and all data was deidentified.

Results Results were stratified by identification as LGBTQIA+ and/or Underrepresented in Medicine (URiM) and compared to a group of participants representing individuals of majority identity. 90% of survey respondents, regardless of identity, believed this is a place that values individuals of diverse identities. A significantly higher number of LGBTQIA+ and/or URiM identifying respondents reported awareness of derogatory language and discriminatory content and were more likely to report awareness of an individual's grades/evaluations being affected by their identity. The confidence that the institution adequately addresses incidents of mistreatment related to identity was 63% overall, and 48% for LGBTQIA+ respondents.

Conclusion There is a need for increased institutional resources and support for LGBTQ+ and URiM individuals and the current reporting system must produce more direct interventions to effectively curtail mistreatment. The data reveals opportunities for intervention to reduce the impact of bias in grading and evaluations.

Alec K. Gramann | Investigating the role of BMP signaling in melanoma initiation and progression

Project Advisor | Craig J. Ceo PhD

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Abstract

Neural crest identity and neural crest factors have previously been shown to be important in the initiation and progression of melanoma. However, it is unclear what pathways or mechanisms regulate acquisition of this neural crest identity. Recently, the melanoma oncogene GDF6 was shown to

promote expression of neural crest factors and repress melanocyte differentiation factors in both melanocyte development and melanoma through activation of canonical BMP signaling. Given this potent regulation of neural crest and melanocyte factors, we hypothesized BMP signaling may be important in acquisition of neural crest identity during melanoma initiation. Here, we show that BMP signaling is active in 65% of primary melanomas in humans and 90% of melanoma initiating lesions in a zebrafish melanoma model. We further show that activation of BMP signaling within our zebrafish model increases the development of melanoma initiating lesions by 2-fold compared to controls and causes an acceleration in median melanoma onset to 12 weeks compared to 17 weeks in controls. Additionally, we found suppression of BMP signaling results in the opposite effect, with fewer melanoma initiating lesions development and delayed median onset of melanoma. These results suggest a role for BMP during melanoma development and indicate the potential of BMP signaling as a therapeutic target for patients with melanoma.

Sean Hamill | Schizophrenia Spectrum Disorders in Multiple Sclerosis

Project Advisor | Raffaella Umeton MD

House | Quinsigamond | Diane Blake MD

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Abstract

The true prevalence of comorbid schizophrenia in multiple sclerosis (MS) remains unclear due to conflicting findings from prior research. Schizophrenia can result in decreased quality of life and poor compliance with disease-modifying therapies (DMTs). The relationship between these disorders is an important area of investigation in order to optimize clinical management. This retrospective study assessed the prevalence of psychotic disorders among patients with MS at a single large academic medical center. The study aimed to determine any temporal association between the diagnosis of MS and schizophrenia, as well as whether the clinical progression of MS differs between patients with and without comorbid psychotic disorders. Finally, we investigated whether the DMTs utilized for MS differ between these patient populations. Utilizing electronic medical record and billing data, prevalence of psychotic disorders within the MS patient population was calculated and data about disease onset and progression was collected. Matched controls were randomly selected from the remaining cohort for comparative analysis. Out of over 2200 patients with MS seen at this center, eleven cases of comorbid

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psychotic disorder were identified. The time between initial symptom onset to diagnosis of MS did not differ between cases and controls. Expanded Disability Status Scale scores were worse among cases compared with controls. Patients with comorbid schizophrenia were also found, on average, to be on, less efficacious DMTs compared with controls. Further research into the choice of DMTs in this population, as well as efficacy of treatment, is needed to better serve these patients.

Jannifer Ho | FLI: Creating a First-Generation / Low-Income Student Support Group at UMASS
Project Advisor | Maria Garcia MD MPH
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Abstract

First generation college students can be defined as students with parental education levels below the baccalaureate level. These students can often face unique challenges in higher education, particularly in medical education. Being the first in their family to navigate this career path can be daunting, inducing feelings of isolation and imposter syndrome. Students who grew up in low-income households may face similar challenges to first generation college students. These students may have had less resources for the application process, from preparing for standardized tests to the application costs. One method of supporting these student populations is through a student support group. By starting a First-Generation / Low-Income Student Support Group at UMASS, students from these backgrounds may receive additional guidance and have access to a community of peers with similar past experiences. The aims of the group are to create an environment that celebrates the unique challenges that FLI students have overcome, to foster a community and network of students that have shared experiences and struggles, and to connect students with faculty for mentorship and guidance. Additionally, to better understand the size of these student populations and therefore the potential reach of this student group, we studied the current demographics of medical students at UMass to identify the proportion of students who are first generation college or low-income.

GROUP | Lauren Nguyen & Eileen McNicholas | Screening for Malnutrition in the Elderly: A Virtual Training Session for Health Promoters in the Dominican Bateyes
Project Advisor | Michele Pugnaire MD
House | Quinsigamond | Erin Barlow MD
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Abstract

Since 2010, the Dominican Republic Batey Health Initiative (DR BHI) has served marginalized 'batey' communities, where Haitian migrant cane-cutters reside on the sugar cane plantations of the eastern DR. In 2020, the DR BHI partnered with local non-profit organizations to support training of health "promotoras," local community health workers (CHW) based in the bateyes, with the goal of creating a longer-term, sustainable "Train-the-Trainers" program. With the COVID-19 pandemic and suspension of foreign travel, initial plans for "in-person" training were redesigned to a combined virtual and in-person distance learning model. Our partner organization provided facilities and technology to support promotor training, while DR BHI trainers from UMass Chan, joined remotely, in real-time.

The training session addressed malnutrition in the elderly, a substantial batey subpopulation, which had previously not been included in prior trainings which focused on childhood malnutrition. The program included a presentation and discussion of malnutrition in the elderly, followed by "hands-on" skills practice led by the authors and facilitated by DR-based physician partners. Pre, post and post-post surveys were used to assess the training program. Outcomes indicated that the health promotoras were engaged and enjoyed the training, with increased knowledge of and comfort assessing malnutrition in the elderly. Operational issues of technology, transmission quality; trainee attendance, and local partner participation, met expectations for successful program implementation. This outcome supports the feasibility of combined virtual and in-person education for safely training CHWs under pandemic conditions. As such, this model may be of interest to CHW training in other global health settings worldwide.

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Alexandra Rabin | Utility of CSF immune proteomics to predict clinical phenotype in multiple sclerosis

Project Advisor | Dalia Abou-Zeki MD

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Abstract

Multiple sclerosis (MS) is the most prevalent demyelinating disease in younger patients. However, there are currently no standard criteria to comprehensively measure disease progression nor predict clinical phenotype. Identification of additional biomarkers could allow us to better classify and treat newly diagnosed MS patients, with the goal of limiting severe disability and simultaneously limiting potential side effects from over-treatment. Our project seeks to better understand the relationship between disease phenotype and expression of immune-modulating cytokines and chemokines. We hypothesize that expression of certain immune proteins in the CSF correlates with the extent of disease presentation or progression. The protein expression in the CSF of 15 patients was analyzed using the Olink proteomics assay, and clustered with respect to individual patients' disease subtype, extent of disability, and MS-related symptoms. We found that the patients with Extended Disability Status Scores (EDSS) of 1-1.99 appeared to cluster based on expression of 95 CSF Proteins, and the patients with EDSS of 2-2.99 and 3-3.99 appeared to cluster together; however, the differences between groups were not significant. There was no clustering by patient age, disease subtype, nor MS-related symptom profile. This study has redemonstrated the immense heterogeneity underlying CSF profiles in multiple sclerosis, and the need for future studies with technology-driven approaches to better elucidate trends in protein expression in MS.

Kian Samadian | The Health Systems Science Elective: A Pilot in the Incorporation of Health Systems Science as a Pillar of the Undergraduate Medical Education Curriculum

Project Advisor | Mitchell Gitkind MD

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Abstract

Objective There has been a recent movement to incorporate health systems science as a third pillar of the undergraduate medical education in addition to the traditional pillars of basic science and clinical sciences. The purpose of this study was to pilot a curriculum at the University of Massachusetts Medical

School to assess the feasibility and utility of this content for medical students.

Methods A curriculum was developed to include core domains of health systems science, such as evidence-based medicine, patient safety/quality improvement, healthcare finance, pharmaceutical policy, clinical informatics, and medical malpractice. The structure and content of each of the ten sessions were determined by the presenting faculty experts in those domains. Students voluntarily enrolled in the elective and were required to complete assessments at the beginning and end of the course as well as after each session.

Results Thirty-two students enrolled in the elective, thirty of which were first- and second-year medical students. Twenty students attended at least seven of the sessions and completed both the pre- and post-course assessments required to receive credit. In the end, there was a noticeable improvement in each HSS domain for each session, and the individualized comments offered not only constructive feedback but revealed that students were receptive to the content.

Conclusions This elective suggests that a new curricular model including health systems sciences is practical, useful, and desired, and it may serve as a trial for the integration of health systems sciences into the core undergraduate medical education.

Haley Schachter | Development of the Navigator Needs Assessment, a Tool for Outer Cape Health Services Navigator Program

Project Advisor | Andy Lowe

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Abstract

Background Navigator Programs are community health programs that bridge vulnerable populations to resources, and support development of client life-skills. This type of program is widely used across many different community settings. Outer Cape Health Services (OCHS), located in rural Outer Cape Cod, developed their navigator program in 2016. They currently use the self-sufficiency matrix (SSM) to assess client progress. Purpose: The SSM is burdensome to complete, difficult to interpret, and error-prone. As a result, OCHS Navigator Program work flow is inefficient and client scores are not reliable. They will benefit from a tailored assessment form.

Methodology Using a mixed-methods approach and staff feedback, the Navigator Needs Assessment (NNA) was developed to replace the SSM. The Research Electronic Data

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Capture system (RedCap) web application and database was used to format and administer the online measure, develop alert systems and staff calendars, collect client data, and analyze the results.

Results Of the 106 patients in the 2017-2019 sample, 71% improved from baseline to three months. All OCHS Navigator Program (OCHS-NP) staff, (n=6, 100%) reported that housing, mental health, and substance use challenges were the most concerning or most needed social determinants of health (SDOH). 83% of staff responded as unsatisfied with the current structure of the SSM.

Conclusions The OCHS-NP is impacting their rural community and requires an assessment tool tailored for their unique community needs. The Navigator Needs Assessment (NNA) form was developed to replace the SSM. We expect an increase in client self-sufficiency and Navigator satisfaction when comparing the NNA to the SSM.

Julia B Sherman | Effects of the COVID-19 Pandemic on Firearm Injuries and Community Firearm Ownership
Project Advisor | Michael P Hirsh MD
House | Quinsigamond | Erin Barlow MD

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Abstract

Beyond the enormous human toll of COVID-19, we have yet to fully grasp the social and economic consequences of the pandemic. This study assesses the effect of the COVID-19 pandemic on firearm related violence by comparing rates of firearm related injuries and fatalities during the pandemic year 2020 to the two years prior, 2018 and 2019, within a single hospital system. It also examines sociodemographic and clinical factors of those injuries as well as turnout for the Goods for Guns program, an annual event that allows participants to anonymously surrender firearms in exchange for monetary gift cards. A total of 140 firearm injuries were identified from 2018-2020. Patients identified were predominately male, non-Hispanic white, and carrying public insurance. In 2020, firearm related injuries were observed at a similar rate to the prior years though resulted in fewer fatalities. Firearm related injuries in 2020 on average required a longer length of hospital stay and were more likely to result in readmission. There were fewer firearms surrendered at the Goods for Guns program in 2020. The findings of this study may ultimately have important public health implications, furthering our understanding of the determinants that underlie firearm related violence and how these can be addressed through injury prevention programs.

Hannah Swartz | Efficacy of a Nutrition Curriculum in Improving Resident Knowledge and Attitudes Surrounding Adult Malnutrition: An Extension Study
Project Advisor | Kate Saunders MS RD CNSC
House | Quinsigamond | Zoon Wangu MD

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Abstract

Malnutrition affects a significant number of hospitalized adult patients, and negatively impacts outcomes by increasing morbidity and mortality, length of stay and total cost of hospitalization. Nutrition interventions can improve outcomes for malnourished patients. However, physicians are offered limited opportunities to gain foundational knowledge about nutrition. Studies show that medical education continues to lack sufficient and meaningful teaching in regards to nutrition and nutrition-related interventions. An initial study piloted an educational curriculum for general surgery residents regarding the identification and treatment of malnutrition within the hospital. Post-tests from participants demonstrated improved knowledge following the nutrition curriculum and increased likelihood of the resident to document nutrition status in the chart. Based on this initial study, the nutrition curriculum was then expanded to target internal medicine residents with speciality specific information. This expansion project was well received, with plans to continue the curriculum on a yearly basis.

Alexandre Wenk-Bodenmiller | Expanding the Reach of the Worcester Healthy Baby Collaborative and its Safe Baby Project

Project Advisor | Sara Shields MD MS
House | Ionete | Quinsigamond | Erin Barlow MD

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Abstract

Despite a decline in the United States' infant mortality rate over the last three decades, the rate of infant death in the United States is second highest among the 34 high-income countries of the OECD. Infant mortality rate (IMR) is the number of infant deaths under one year of age per 1,000 live births. The IMR of the City of Worcester, Massachusetts is lower than the overall US rate; however, at 4.0 for the period of 2015-2017, the statewide IMR of Massachusetts is significantly lower than the IMR of 5.7 of the City of Worcester during the same period. Furthermore, there are significant disparities seen not just between different racial groups in Worcester but also in

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comparing the city's Black and Hispanic IMR to those same groups in the state as a whole. The Worcester Healthy Baby Collaborative has been working for over two decades to reduce the disparity among IMR in Worcester. The WHBC collaborates with community groups, churches, health centers, and volunteers to develop community-driven solutions to reduce the city's IMR. The goals of this Capstone Project were to provide continuing support for the WHBC's Safe Baby Project, develop resources to reach Worcester's language-diverse populations, and to improve the web presence of the WHBC.

Timothy D. Winn | Education Status of Patients in the Foster Children Evaluation Services Clinic
Project Advisor | Heather Forkey MD
House | Quinsigamond | Zoon Wangu MD
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Abstract

Adult health and wellbeing are linked to educational attainment, especially for maltreated children, yet little data exists to describe the educational status of children in state [Winn, cont.] custody. This study aimed to create a dataset using patients' medical records at a foster children's medical clinic over an academic year and assess the quality of using the medical record to create such a dataset. A chart review was performed, and descriptive statistics were calculated. Educational instability was apparent in up to one-quarter of patients, though actions to increase educational stability and attainment were noted to occur between medical evaluations. Some basic education data was routinely documented in the medical record, such as current attendance at school. Other education data was inconsistently or infrequently recorded, such as academic support plans, absenteeism, and discipline. This study created a dataset for education advocates at a foster child medical clinic for future advocacy work. The data collected at future medical evaluations could be improved by implementing forms to distribute at the first evaluation and provider education.

Jing Xu | Review of Current Machine Perfusion Therapeutics for Organ Preservation
Project Advisor | Paulo Martins MD PhD
House | Quinsigamond | Luu Ireland MD MPH
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Abstract [Xu]

Because of the high demand of organs, the usage of marginal grafts has increased. These marginal organs have a higher risk of developing ischemia-reperfusion injuries, which can lead to posttransplant complications. Ex situ machine perfusion (MP), compared with the traditional static cold storage, may better protect these organs from ischemia-reperfusion injuries. In addition, MP can also act as a platform for dynamic administration of pharmacological agents or gene therapy to further improve transplant outcomes. Numerous therapeutic agents have been studied under both hypothermic (1–8°C) and normothermic (35.5–37.5°C) settings. Here, we review all the therapeutics used during MP in different organ systems. The major categories of therapeutics include vasodilators, mesenchymal stem cells, antiinflammatory agents, antiinfection agents, siRNA, and defatting agents. Numerous animal and clinical studies have examined MP therapeutic agents, some of which have even led to the successful reconditioning of discarded lung grafts. More clinical studies, especially randomized controlled trials, will need to be conducted in the future to solidify these promising results and to define the role of MP therapeutic agent in solid organ transplantation.

Christine Yao | Complication rates following induction therapy for renal transplantation: A retrospective comparison between Thymoglobulin and Alemtuzumab
Project Advisor | Paulo N Martins MD PhD FAST FEBS FACS
House | Quinsigamond | Diane Blake MD
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Abstract

The effect of Alemtuzumab in the clotting system after induction for kidney transplantation has not been reported yet. To assess the incidence of adverse effects following induction therapy for kidney transplantation with special attention towards thrombocytopenia, we performed a single-site retrospective analysis of 103 renal transplant recipients (2017-2019) at the University of Massachusetts. We compared complication rates as well as pre-operative and post-operative laboratory values for any significant differences between Alemtuzumab and Thymoglobulin using chi-squared analysis of independence and two-sided t-tests. We found that there was no significant difference between the induction therapies regarding complication rates and types. However, the rates for moderate to severe post-operative thrombocytopenia were significantly higher in the Thymoglobulin group (53%) as

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compared to the Alemtuzumab group (17.2%). Given the limited population size, there was no conclusive evidence to suggest that the degree of thrombocytopenia correlated with the rate of coagulopathic complications. Further studies including multiple sites or the inclusion of a greater number of patients may better assess the nature and consequences of the post-induction thrombocytopenia.

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GROUP | Alec Allain & Emily Van Court | Creating a Sustainable and Robust Pre-Medical Advising Program at Bard College at Simon's Rock

Project Advisor | Mariann Manno MD
House | Tatnuck | James Ledwith MD

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Abstract

For undergraduates applying for medical school competent pre-medical advising is a necessity, both for the application process and the years proceeding. Current literature on the topic stresses the importance of pre-medical advising in class planning and all aspects of a pre-medical program, as well as acknowledges the difficulty in sustaining an advising system [Allain, cont.] with limited institutional resources. This project looks specifically at the pre-medical advising at Bard College at Simon's Rock, a small liberal arts school. A needs assessment was distributed throughout the school and found that 77.8% of the responding students did not feel that the current pre-medical advising was adequate. When the specific strengths and weaknesses of the program were identified, students reported needed more support for the MCAT, AMCAS, the application timeline, interviews, research opportunities, clinical opportunities, finances, gap years, and connecting with alumni. In order to further support the program, based on the identified needs of the students, a website containing information for pre-medical students was created. This website included application timelines, MCAT resources, connections within the Alumni network, and more.

GROUP | Andrew Cauley, Brennan Dagle, & Alex Schryver | UMMS Community Garden

Project Advisor | Olendzki Barbara RD MPH LDN
House | Tatnuck | Stacy Weisberg MD MPH

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GROUP | Nayha Chopra-Tandon MPH & Victoria Fleming | The Lonely Among Us: The Effect of Social Deduction Games on Daily Life in the Time of Covid-19

Project Advisor | David Chiang MD PHD
House | Tatnuck | Pang-Yen Fan MD

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Abstract

During the past few years, specifically 2020 and 2021, there was a notable increase in video game players and the gaming industry as a whole. All types of gaming, including traditional singer-player games and multiplayer social deduction games saw an increase in playtime and watch time. In order to understand and further explore this phenomenon of online socially connected gaming, a questionnaire with varied question and response types was created and disseminated in a convenience sample to friends, family, and members of the online gaming community. Following the questionnaire, an informal livestream for open points of discussion with members of the gaming community was conducted. The study found that respondents spent an increased amount of time playing video games compared to before March 2020 and socializing with others virtually, and an equal or lesser amount of time with their friends and family in person. Ways of coping with isolation during Covid-19 included online socialization, phone calls, and video games. An optional free-response question indicated that participants were frustrated, lonely, and psychologically stressed during the shelter-in-place period of time. The results of this study suggest that video games have a potentially beneficial role in both social interaction and in reducing or managing isolation, and further research into this field is an important and under-utilized area of study for health and wellbeing.

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Nolan B. Condrón | Concomitant Meniscotibial Ligament Reconstruction Decreases Meniscal Extrusion following Medial Meniscus Allograft Transplantation

Project Advisor | Brian J. Cole MD MBA
House | Tatnuck | Thomas Halpin MD

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Abstract

Purpose To compare meniscal extrusion (ME) following medial meniscus allograft transplantation (MMAT) with and without meniscotibial ligament reconstruction (MTLR).

Methods Ten cadaveric knees were size-matched with meniscus allografts. MMAT was performed via bridge-in-slot technique. Specimens were mounted in a testing system and ME was assessed via ultrasound anterior, directly over, and posterior to the medial collateral ligament at the joint line under 4 testing conditions: 1) 0° flexion and 0 newtons (N) of axial load, 2) 0° and 1000 N, 3) 30° and 0 N, and 4) 30° and 1000 N. For each condition, 'mean total extrusion' was calculated by averaging measurements at each position. Next, MTLR was performed using two inside-out sutures through the "skirt" of the remnant allograft meniscotibial ligament and secured to the tibia using anchors. The testing protocol was repeated. Differences in ME between MMAT alone versus MMAT + MTLR were examined. Within-group differences between the measurement positions, loading states, and flexion angles were also assessed.

Results 'Mean total extrusion' was greater following MMAT alone (2.56 ± 1.23 mm) compared to MMAT + MTLR (2.14 ± 1.07 mm; $P = .005$) in the loaded state at 0° flexion. ME directly over the MCL was greater following MMAT alone (3.51 ± 1.00 mm) compared to MMAT + MTLR (2.93 ± 0.79 mm; $P = .054$). Posterior to the MCL, in the loaded state at 0°, ME was greater following MMAT alone (2.43 ± 1.10 mm) compared to MMAT + MTLR (1.96 ± 0.99 mm; $P = .010$). No significant differences in ME were appreciated under other conditions. In all conditions, ME was greater in the loaded state versus the unloaded state.

Conclusion Following MMAT, the addition of MTLR significantly reduced overall ME when compared to isolated MMAT during loading at 0° of flexion in a cadaveric model.

Christopher DiTullio | The Standardization and Optimization to Support Atrial Fibrillation (SOS-AF) Care in the UMass Memorial and University Emergency Departments

Project Advisor | Chad E Darling MMD
House | Tatnuck | Christine O MacGinnis DO

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Abstract

Background Atrial Fibrillation (AF) is a common, irregular heart rhythm associated with adverse outcomes. Emergency Department (ED) management is highly variable and lack of a standardized approach negatively impacts overall quality and efficiency of care. The goal of this project was to implement a quality improvement project and study its' impact on clinical outcomes following treatment of ED patients with AF.

Methods Our team performed a before and after study of our intervention at a tertiary care institution with an Emergency Medicine training program between Dec 2017 and July 2019. Our intervention was implemented in Sept. 2018 and included clinical decision support (CDS) embedded in the electronic health record, ED provider education, and email reminders. Data collected during Sept. 2018 was not analyzed due to ongoing implementation and provider education. Patients were included if they presented to the ED with AF as the principal problem as defined by ED diagnosis and provider documentation. Our primary outcomes, obtained by structured chart review in the before and after periods, included admission rates and ED length of stay (LOS) of AF patients treated before and after implementation. Data was recorded in a customized RedCap database.

Results The study sample consisted of 363 patients presenting to EDs with AF. 171 and 166 patients comprised our pre- and post-implementation groups, respectively. For all patients presenting with AF, admission rates decreased from $53.58\% \pm 11.86\%$ to $37.42\% \pm 10.42\%$ ($p = 0.003$). LOS of these patients in the system was observed to be 32.19 ± 12.11 hours post intervention compared to 37.89 ± 10.88 hours ($p = 0.13$) previously. Hospital admission trends decreased most significantly in the months immediately following the intervention, and then began to up-trend towards pre-implementation rates. A secondary outcome included rates of attempted ED cardioversion, which increased from 16.32% to 21.16% ($p = 0.38$). Additionally, the rate of inclusion of CHA2D2-VASc increased from $10.52\% \pm 0.52\%$ to $17.61\% \pm 0.9\%$ ($p = 0.11$).

Conclusion Implementation of a simple education and CDS program led to decreased admission rates of this patient population. The generalizability of our results is limited by our single center design, and we were underpowered for some of our secondary outcomes. Further research includes optimizing our intervention through provider feedback and additional analyses of secondary outcomes related to quality measures and patient-centered care.

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Hallie Geller | Comparison of Primary Humoral Immunodeficiencies in Pediatric-Onset Autism Spectrum Disorder (ASD) and Pediatric-Onset Anxiety Disorder (ASD) and Pediatric-Onset Anxiety Disorder (ASD)
Project Advisor | Kyle Williams MD PhD
House | Tatnuck | Pang-Yen Fan MD

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Abstract

Objectives Over the past decade there has been a growing interest in the association between chronic inflammation, immune dysregulation, and psychiatric illness. Recent studies add to the increasing evidence that immune system dysregulation and specifically primary humoral immunodeficiencies (PID) plays a role in the etiopathogenesis of psychiatric conditions. Few studies have identified specific markers of immune dysfunction in populations with psychiatric diseases.

Methods A multisite Research Patient Data Registry from a large regional hospital network was used to query electronic medical records. A retrospective review of prospectively collected data was undertaken to identify individuals treated at one or more of five hospitals in the network diagnosed with PID, with or without any of eight preselected psychiatric disorders. Queries were based on ICD-9 and ICD-10 codes to investigate the association between PID and psychiatric disorders.

Results 138 patients with pediatric-onset autism spectrum disorder (ASD) and PID and 27 patients with pediatric-onset anxiety and PID were identified. The three most prevalent PIDs in both anxiety and ASD populations were hypogammaglobulinemia, IgA deficiency and CVID. Rates of hypogammaglobulinemia and CVID differed significantly in the study populations compared to the general pediatric population.

Conclusions Prevalence of certain PIDs is significantly higher in the pediatric-onset ASD and anxiety compared to the general population. This suggests a relationship between PID and psychiatric illness that has not yet been well-described. Further research is needed to understand this association and elucidate the mechanistic relationship between immune dysregulation and psychiatric illness.

GROUP | Hayden Peirce & **Rose Healy** | Evaluating Medical School Curriculum on Serious Illness Communication
Project Advisor | Jennifer Reidy MD
House | Tatnuck | Timothy E Gibson MD

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Abstract [Peirce & Healy]

In 2017, the Massachusetts Coalition for Serious Illness Care launched a collaborative to determine the educational exposure students have to serious illness communication at the four Massachusetts medical schools (UMMS, TUSM, BUSM, HMS). The first step was to come up with five core competencies that represent the foundational knowledge, skills and inspiration we hope medical students graduate with to engage in goal oriented conversations with seriously ill patients. At UMass Chan, led by Dr. Jen Reidy, we were responsible for designing a method for all four schools to perform a curriculum mapping process, creating a mapping tool in RedCap, and aiding in the Coalition's larger meetings to discuss the educational opportunities we experienced. The data presented here is only from UMass Chan. Using a list of 23 keywords/phrases agreed upon by the coalition, course databases (OASIS at UMMS) were queried. Curriculum Mapping was performed in a "two pass" method to add courses to the list and fill out the RedCap form. Thirteen courses were found to be related to serious illness communication; 7 were required, 3 were selective, 3 were not required. Students spent an average of 23 hours engaged in this work, and most of the hours were in the pre-clerkship and post-clerkship years. Our goal is to foster conversation on serious illness communication training and serve as a baseline. It is the goal of this project to be repeated in several years' time to determine if more educational opportunities have been implemented at the four medical schools.

Annie Hien | Regulation of Translation and Synaptic Plasticity by TSC2

Project Advisor | Joel Richter PhD
House | Tatnuck | Thomas Halpin MD
Presentation MD PhD

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Abstract

Mutations in TSC2 cause the disorder tuberous sclerosis (TSC), which has a high incidence of autism and intellectual disability. TSC2 regulates mRNA translation required for group 1 metabotropic glutamate receptor-dependent synaptic long-term depression (mGluR-LTD). Abnormal mGluR-LTD underlies some behavioral deficits in several mouse models of autism, but the identity of mRNAs responsive to mGluR-LTD signaling in the normal and TSC brain is largely unknown. Using Tsc2^{+/-} mice to model TSC autism, we performed RNA-sequencing and ribosome profiling to identify differentially expressed genes following mGluR-LTD in the normal and Tsc2^{+/-} brain.

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Ribosome profiling revealed that RNA-binding targets of Fragile X Mental Retardation Protein (FMRP) have increased RNA levels in Tsc2^{+/-} mice. In the normal mouse brain, induction of mGluR-LTD caused a rapid increase in the steady state levels of hundreds of mRNAs, many of which are FMRP targets. These results suggest a molecular basis for bidirectional regulation of synaptic plasticity by TSC2 and FMRP, the most common single gene causes of intellectual disability and autism.

Nichita Kulkarni | Relationship between obesity and socioeconomic status in Indian states

Project Advisor | Ben Gerber MD MPH

House | Tatnuck | Stacy Weisberg MD MPH

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Abstract

The burden of obesity as a chronic disease is increasing across the globe, with over 600 million adults found to be obese in 2015. India has seen an increase in the deaths caused by noncommunicable diseases from 2009-2019, with a 40% increase in deaths caused by ischemic heart disease and 28% increase in deaths caused by stroke. Understanding the factors influencing the prevalence of obesity in India is vital to decreasing the rates of certain noncommunicable diseases and preventable deaths. This study analyzed the relationship between the rates of obesity and socioeconomic status in the twenty-nine states in India in recent years as well as the effects of gender on this relationship using data from a nationwide survey across two sets of years, 2015-2016 and 2019-2021. Two indicators of socioeconomic status characterizing wealth and education were utilized. The results of a multivariable regression analysis showed that one indicator of socioeconomic status used in this project, wealth as quantified by net state domestic product per capita, displayed a positive relationship with rates of obesity across all states in India in the years 2015-2016 and 2019-2021, after adjusting for gender. This analysis validates previous research and expands upon the conclusion that socioeconomic status and obesity are positively and significantly correlated using more recent years of data.

Sam Lauffer | Broadcasting COVID-19 Health Information for Visually Impaired People (VIPs)

Project Advisor | Heather-Lyn Haley PhD

House | Tatnuck | Christine O MacGinnis DO

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Abstract [Lauffer]

Although several local and national organizations support the needs of Visually-Impaired People (VIPs) during the COVID-19 pandemic, few local programs provide both up-to-date news and connect with listeners to assess outreach. As a result, VIPs may not be aware of changes to daily life, as well as basic information about the coronavirus, while community partners miss the opportunity to advocate for their listeners. This project partnered with local organizations to improve access to coronavirus-related health information and administer a community assessment of health and listening behavior. Up-to-date segments regarding the COVID-19 pandemic were developed and broadcasted starting in June 2020. Community members were engaged in in-person activities as well as telephone surveys after two months of air time. Results showed 67% of individuals who chose to participate in the survey regularly tuned into news segments from Audio Journal or another source. This project confirms the interest among the blindness community of Central Massachusetts to engage with up-to-date science news. Methodology for the recording of news segments from home for future volunteers was also reported. Future directions include creation of materials and presentations that will educate providers about the unique needs of VIPs to continue fostering the relationship between VIPs and providers in the Worcester community.

GROUP | Megan Trilokekar-Fernandez & Diana Liu | "Am I What I Eat?" Optimizing Nutritional Wellness in Medical School.

Project Advisor | Barbara C Olendzki RD MPH LDN

House | Tatnuck | Stacy Weisberg MD MPH

House | Tatnuck | Christine MacGinnis DO

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Abstract

Medical students suffer from increased rates of anxiety and depression compared to the general population, which can be exacerbated by poor nutritional habits. Given the rigor of medical school, students may not always find the time to eat in a nutritionally balanced manner. The purpose of this project was to address how to eat in a nutritionally balance manner while on a budget in order to maintain mental and physical wellness. Surveys were distributed to peers regarding grocery budgets, food item preferences, and habits around eating. Although survey data demonstrated that many medical students perceived healthy nutritional habits, data also revealed that many medical students relied heavily on less

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nutritious pre-prepared meals. Informed by this data the three-video series “Am I What I Eat?” Optimizing Nutritional Wellness in Medical School was created. The first video addressed the influence of nutrition deficiencies on mental and physical well-being; the second addressed budgeting, reading nutrition labels, and meal planning; and the final addressed a week’s worth of meal prepping. The recipes, associated nutritional facts, and videos were all posted to the Center of Applied Nutrition’s website, so that future UMass Chan graduate students from all three schools will be able to easily access synthesized information and practical advice.

Gabrielle Luiselli | Ependymal and Choroid Plexus Cell Barrier Dysfunction in a Mouse Model of Idiopathic Normal Pressure Hydrocephalus

Project Advisor | Mark Johnson MD PhD

House | Tatnuck | Timothy E Gibson MD

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Abstract

Introduction Idiopathic Normal Pressure Hydrocephalus (iNPH) is the most common form of hydrocephalus in adults over the age of 60. Characteristic signs and symptoms include dementia, ataxic gait, urinary incontinence, and increased size of the cerebral ventricles. The pathophysiology of iNPH is poorly understood. We previously used whole-exome sequencing of DNA from iNPH patients to identify a role for CWH43 deletions in the etiology of iNPH. Mice harboring CWH43 deletions displayed ventricular enlargement and gait impairment, and studies of these mice revealed a role for Cwh43 in regulating the membrane trafficking of GPI-anchored proteins in ependymal and choroid plexus cells. This study was designed to examine the effect of CWH43 mutation on the barrier function of ventricular and choroid plexus epithelia.

Methods To assess the integrity of the ventricular ependymal cell layer, a fluorescent 70 kD dextran was injected into the lateral ventricle of CWH43^{-/-} mice or wild type mice. The brains were then fixed, sectioned, and examined using fluorescence microscopy to visualize the degree of dextran permeation into the brain parenchyma. To interrogate the permeability of the blood-CSF barrier, the level of albumin (a serum protein) in the cerebrospinal fluid (CSF) of CWH43^{-/-} mice and wild type mice was quantified using mass spectrometry.

Results Influx of 70 kD dextran from the CSF into the brain parenchyma of CWH43^{-/-} mice was increased when compared to wild type mice. In addition, mass spectrometry

revealed a 2.4-fold increase in albumin in the CSF of CWH43^{-/-} mice when compared to wild type mice.

Conclusion Deletions in CWH43 lead to disruption of the normal barrier functions of the ventricular ependyma and choroid plexus in a mouse model of iNPH. Studies are underway to examine the relationship between this phenomenon and the signs and symptoms of iNPH in mice and in humans.

GROUP | Shafik M. Mutaawe & John Romano | Student and Provider Perspective on the Implementation of an EMR at the Worcester Evening Free Medical Service Program

Project Advisor | James J Ledwith MD

House | Tatnuck | James Ledwith MD

House | Tatnuck | Christine Macginnis DO

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Abstract

Objective Exposure to electronic medical record (EMR) use is limited for the pre-clinical medical student. The authors evaluated the effect of early EMR exposure on level of student proficiency in a volunteer setting during pre-clinical years, as well as provider responses to use of an EMR in this volunteer setting.

Methods Medical students volunteering at the free clinics were asked to complete a pre-exposure survey evaluating their baseline proficiency completing selected tasks in an EMR and post-exposure surveys to determine if their proficiency increased with additional EMR use. Providers were surveyed separately to determine the impact of EMR use on student mentoring and provider retention.

Results As a result of the COVID-19 pandemic directives, no data was collected. The authors expected that with increased use of the EMR, student proficiency on selected tasks within the EMR would increase. We also expected that providers would not find the EMR to have a negative impact on student mentoring or volunteer retention. Anecdotal feedback collected from student volunteers and providers supported these expectations.

Conclusion Although survey data was not able to be collected, anecdotal evidence demonstrated that EMR use in the free clinic setting did not negatively impact provider retention or the mentoring process. Students also endorsed increased proficiency with repeated EMR use. Further investigation is needed to determine if early EMR exposure carries benefit into the transition from pre-clinical to clinical years.

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Ariana Perry | Urban Health Scholars Pathway
Project Advisor | Linda Cragin MS
House | Tatnuck | Stacy Weisberg MD MPH
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Abstract

The goal of MassAHEC's new Urban Health Scholars Pathway (UHSP) is to encourage student interest in primary care for culturally and linguistically diverse, traditionally underserved populations who reside in urban communities. UHSP also hopes to equip students with the skills and knowledge necessary to [Perry, cont.] serve this population. The pathway is supported by the MassAHEC Network, a HRSA funded grant that UMass Chan Medical School has retained since 1977 to promote student interest in serving underserved and vulnerable populations. By the end of the pathway, students will be able to describe populations with disparate health outcomes and strategies to achieve health equity, discuss how a team approach to health care in the patient centered medical home can be employed by physicians to achieve better outcomes, and describe how population and community demographics and determinants of health must be considered as dimensions of problem solving and care delivery.

Eric Schmidt | ALS-linked PFN1 variants exhibit loss and gain of functions in the context of formin-induced actin polymerization
Project Advisor | Daryl A. Bosco PhD
House | Tatnuck | Pang-Yen Fan MD
Presentation MD PhD
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Abstract

Profilin-1 (PFN1) plays important roles in modulating actin dynamics through binding both monomeric actin and proteins enriched with polyproline motifs. Mutations in PFN1 have been linked to the neurodegenerative disease amyotrophic lateral sclerosis (ALS). However, whether ALS-linked mutations affect PFN1 function has remained unclear. To address this question, we employed an unbiased proteomics analysis in mammalian cells to identify proteins that differentially interact with mutant and wild-type (WT) PFN1. These studies uncovered differential binding between two ALS-linked PFN1 variants, G118V and M114T, and select formin proteins. Furthermore, both variants augmented formin-mediated actin assembly relative to PFN1 WT. Molecular dynamics simulations revealed structural changes that allow for heightened flexibility in the context of

the ternary actin-PFN1-polyproline complex during actin assembly. Conversely, PFN1 C71G exhibited loss-of-function phenotypes in the context of actin assembly. Perturbations in actin dynamics and assembly can therefore result from ALS-linked mutations in PFN1. However, ALS-PFN1 variants may dysregulate actin polymerization through different mechanisms that depend upon the solubility and stability of the mutant protein.

Sahil Shah | Analysis of Vascular Changes in Stroke Patients via OCT Angiography
Project Advisor | Shlomit Schaal MD PhD
House | Tatnuck | Timothy E Gibson MD
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Abstract

Optical coherence tomography angiography (OCTA) is a revolutionary technology that has allowed clinicians to noninvasively image blood vessels in the eye to better inform disease monitoring and management. Although studies have investigated its utility for a variety of pathologies such as coronary artery disease, very few have analyzed how changes to blood vessels in stroke patients can be analyzed. This project is a retrospective cohort study analyzing OCTA imaging of ocular blood vessels in the eyes of stroke patients and comparing them to age matched controls to quantify changes in vessel architecture and blood flow. Images were stratified into three separate vascular layers: superficial, deep, and choriocapillaris. Each image was divided into 11 zones and underwent qualitative analysis of changes in image pixel shading, contrast, and complexity to serve as methods to analyze ocular blood vessel architecture and blood flow. Results suggested across all zones, controls had increased blood flow and decreased architecture compared to stroke patients, however when looking at individual zones and layers there are variable results between stroke patients and controls. It is unclear how these changes translate into clinically relevant findings at this time, however the future direction of this project may serve to eventually develop a quantitative parameter that can be used for disease monitoring and management and inform efforts to prevent stroke occurrence in the future.

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Nolan Shen | Imputation of PaO₂ from SaO₂ in the respiratory component of the Sequential Organ Failure Assessment (SOFA) Score in Asian population
Project Advisor | Peter C. Hou MD
House | Tatnuck | Stacy Weisberg MD MPH
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Abstract

The Sequential Organ Failure Assessment (SOFA) score is validated to measure the severity of illness over time in critically ill patients. Pao₂/Fio₂ ratio is an essential sub-score for calculating SOFA score, and arterial blood gas is needed for its calculation. ABG is less favored due to the need for line placement, risk of infection, and availability of obtaining an ABG in acute settings. Pulse oximeter has many advantages with [Shen, cont.] regard to access and timeliness of results and is readily available in the ED and ICU. It is known that skin pigmentation and sensor type can affect SpO₂ readings, thus affecting the accuracy of imputed PaO₂ values, and prior studies predominantly focused on a patient population with lighter skin pigmentation. Previous studies on mostly Caucasian cohorts have shown that the nonlinear imputation of Pao₂ from Sao₂ outperforms linear and log-linear imputations. For our analysis, 12 participating hospitals from China were used for patient recruitment, and a standardized case report form was utilized for data collection through RedCap. Skin pigmentation was graded on a 1-5 scale with reference photos included on the CRFs. We seek to develop a nonlinear imputation method for estimating SaO₂ from SpO₂ in a critically ill Asian cohort. We anticipate higher accuracy in nonlinear imputation methods when compared to linear imputation when adjusted for skin pigmentation in the Asian cohort of critically ill patients.

GROUP | Stephanie Trimboli & Rebecca Toohey | Challenges and opportunities of managing trichomoniasis and bacterial vaginosis in pregnancy
Project Advisor | Matthew Chico MPH PhD
House | Tatnuck | Samuel H Borden MD
House | Tatnuck | Stacy Weisberg MD MPH
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Abstract

Bacterial Vaginosis and Trichomoniasis are two causes of vaginitis with a significant global burden. In the pregnant population these conditions can result in adverse birth outcomes including prematurity, low birth weight, and mortality. Despite this there are not clear guidelines if

screening and treating during pregnancy is beneficial. In this project we performed a systematic review using PubMed and Scopus to address this question. We screened over 2,000 papers and included 11 clinical trials in our results which showed disparate conclusions on if treatment provided benefit. Ultimately further research is necessary to elucidate the nuances of how to treat these conditions.

Brittany Tran | Creating an Effective Public Service Announcement about Hands-Only CPR
Project Advisor | Virginia Mangolds PhD FNP-C ENP-C
House | Tatnuck | Christine O MacGinnis DO
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Abstract

Over 475,000 Americans per year will suffer from sudden cardiac arrest, with 350,000 of these arrests being outside of a hospital. Initiation of bystander hands-only cardiopulmonary resuscitation (CPR) has been shown to double or triple survival rates from cardiac arrest. However, due to barriers in access and knowledge of CPR, the national survival rate from out of hospital cardiac arrest is only 8-10%. In Massachusetts and Worcester city, the survival rate for out of hospital cardiac arrest is estimated to be 3-4%, which can be attributed to flaws in the 911 dispatch emergency system, barriers to CPR access and knowledge, and ethnic and socioeconomic disparities in cardiac arrest outcomes. With limited research available on the creation and implementation of effective public service announcements (PSA) about CPR, this Capstone project researched previous CPR PSAs, along with data regarding national, Massachusetts, and Worcester cardiac arrest statistics. From November 2019-February 2020, common themes from the PSAs and statistics from the cardiac arrest research were incorporated to develop an effective PSA about how to perform hands only CPR, as means of providing accessible public education to improve the Worcester city out of hospital cardiac arrest survival rate. The PSA was aired on Worcester Community Cable Access TV (WCCA-TV) starting on November 4, 2020, to provide Worcester viewers information regarding sudden cardiac arrest statistics, activation of the 911 emergency response, and initiation of hands-only bystander CPR.

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Charlotte Walmsley | Extensive Convergent Evolution of BRCA2 Reversion Mutations Under Therapeutic Pressure by PARP Inhibition

Project Advisor | Alison Schram

House | Tatnuck | James Ledwith MD

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Abstract

The evolution of cancer cells occurs much like the branching of a tree; early mutations in specific “driver” oncogenes lead to a variety of cancer cell lineages, each a distinct “branch”. In my early research career, I set out to study these “cancer trees” from a variety of perspectives: western blotting at the lab bench to genomic analysis at the Broad Institute. The summer between my first and second years of medical school, I completed a summer research fellowship at Memorial Sloan Kettering Cancer Center for students interested in pursuing careers as a physician scientist in the field of oncology. It was here that I luckily stumbled into my capstone project. As a fellow at MSKCC, I studied the prevalence and detection methods of a unique type of cancer resistance mechanism known as BRCA reversion. My mentor, Alison Schram, and I drafted a manuscript for publication that is included below.

As a lead-in to my project, I will start with a few key ideas. First, the BRCA1 and BRCA2 proteins are required for effective DNA repair. Loss of BRCA1 or BRCA2 function - in familial cancer syndromes with germline BRCA mutations for example – causes cells to become dependent on another DNA repair pathway mediated by a protein known as PARP. Thus, cancer treatments that knock out PARP function (PARP inhibitors) are effective in treating patients harboring BRCA1/2 alterations. PARP inhibitors have shown substantial survival benefits (88% significant response rate) in patients with prostate cancer. Olaparib, a type of PARP inhibitor, even received a “breakthrough” designation by the FDA to treat prostate cancer patients. However, it is still very early in the process of development and many unresolved questions remain about the use of PARP inhibitors.

This project addresses 2 major questions: 1) How effective is a blood test for detecting BRCA reversion mutations in cancer cells? 2) How widespread are these BRCA reversion mutations across the body? To answer these questions, we analyzed the DNA before and after PARP inhibitor therapy of one patient’s cancer cells at many different metastatic tumor sites around the body to identify DNA changes. Our DNA analysis revealed ten unique BRCA2 reversion mutations, all new, starting after he received the PARP inhibitor. In contrast to current literature,

the majority of the BRCA reversion mutations were not identified in blood samples.

GROUP | Megan Yuen & Olivia Hall | The Effects of Breastfeeding on Maternal Mental Health: A Systematic Review

Project Advisor | Tiffany A Moore Simas MD MPH MEd

House | Tatnuck | Timothy E Gibson MD

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Abstract

Background Breastfeeding has many positive effects on the health of infants and mothers, however, the effect of breastfeeding on maternal mental health is largely unknown. The goal of this systematic review was to 1) synthesize the existing literature on the effects of breastfeeding on maternal mental health, and 2) inform breastfeeding recommendations.

Materials and Methods A literature search was conducted in electronic databases using search terms related to breastfeeding (e.g., breastfeeding, infant feeding practices) and mental health conditions (e.g., mental illness, anxiety, depression), resulting in 1110 records. After reviewing article titles and abstracts, 339 articles were advanced to full-text review. Fifty-five articles were included in the final analysis.

Results Thirty-six studies reported significant relationships between breastfeeding and maternal mental health outcomes, namely symptoms of postpartum depression and anxiety: twenty-nine found that breastfeeding is associated with fewer mental health symptoms, one found it was associated with more, and six reported a mixed association between breastfeeding and mental health. Five studies found that breastfeeding challenges were associated with a higher risk of negative mental health symptoms.

Conclusion Overall, breastfeeding was associated with improved maternal mental health outcomes. However, with challenges or a discordance between breastfeeding expectations and actual experience, breastfeeding was associated with negative mental health outcomes. Breastfeeding recommendations should be individualized to take this into account. Further research, specifically examining the breastfeeding experiences of women who experienced mental health conditions, is warranted to help clinicians better personalize breastfeeding and mental health counseling.

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Julia Zautcke | Examination of the Effects of a School-Based, Supervised Asthma Therapy Program on Pharmacy Refill Data
Project Advisor | Michelle K Trivedi MD
House | Tatnuck | James Ledwith MD
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Abstract

School-supervised administration of asthma therapy is an evidence-based intervention that has been shown to decrease asthma morbidity. We are investigating the implementation and feasibility of the community-based asthma intervention by four pediatric practices independent of research staff. The purpose of this study is to investigate the effectiveness of the intervention using pharmacy refill data. Four pediatric practices were randomized into the AsthmaLink (intervention) group or the Enhanced Usual Care (EUC/control) group, with two practices in each group. The participants in the AsthmaLink group received supervised administration of daily inhaled corticosteroids (ICS) at school from their school nurse. Those in the EUC group received a workbook detailing strategies towards increasing adherence to daily asthma medication. Health outcome information, specifically pharmacy refill history data, will be obtained at baseline and at regular three month intervals after enrollment to monitor how often and how many inhalers (both rescue and ICS) were filled by participants.

Additionally, information on dates and dosage of any course of [Zautcke, cont.] oral steroids will be obtained for each participant. This project is currently ongoing with data gathering expected to be completed December 2022-January 2023. As such, the following results are those that are expected to occur. It is expected that a total of 72 child-caregiver dyads will be enrolled. We anticipate that we will find a statistically significant pre- vs. post-intervention reduction in asthma rescue medication (beta agonist) refills and oral steroid courses amongst those enrolled in the AsthmaLink group, with a statistically significant increase in the amount of ICS refills after enrollment as compared to baseline. We furthermore predict that there will be an initial decrease in beta agonist refills and oral steroid courses in the EUC group similar to the intervention group at the 3 month interval post-enrollment, albeit non-statistically significant. However, we believe this change will only occur soon after enrollment, and levels will return to baseline activity for the 6- and 12-month intervals. The pharmacy refill data from these two groups will evidence that when children receive their daily asthma controller inhaler in school, they have less reliance on their rescue inhalers and oral steroids courses. Additionally, it will prove that adherence, evidenced through statistically significant increase in ICS refills, naturally improves with medication administration while in school.

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