MCW
Milwaukee

SCHOLARLY PROJECTS

CLASS OF 2024

Scholarly Pathway & Scholarly Project Leadership Team 2023

Bioethics	Arthur Derse, MD, JD Ashley Pavlic, MD, MA
Clinical & Translational Research	Joseph Carroll, PhD
Clinician Educator	Sean Mackman, MD Kelsey Ryan, MD
Global Health	Kirsten Beyer, PhD, MPH Megan Schultz, MD
Health Systems Management & Policy	Mark Lodes, MD John Meurer, MD, MBA
Molecular & Cellular Research	Joseph Carroll, PhD Alison Kriegel, PhD
Quality Improvement & Patient Safety	Nancy Jacobson, MD Matthew Scanlon, MD
Urban & Community Health	Lauren Bauer Maher, MD, MS Rebecca Bernstein, MD, MS

Staff 2022-2023

Nadine Desmarais
Meaghan Hayes, MEd
Sarah Leineweber
Rachel Sommer, MS

Scholarly Pathways are a required component of the M1 and M2 year of the Discovery Curriculum. Students select an area of concentration through which they enrich and individualize their medical training, while exploring an area of interest. Students can apply to participate during M3 year, of which 32 Class of 2024 students were accepted to participate.

Each Pathway course features a structured curriculum with monthly learning sessions (core), and an experiential component (noncore) that follows an Individual Learning Plan (ILP) guided by a faculty advisor.

Students must complete a faculty-mentored Scholarly Project which meets *Glassick Criteria for Scholarship* by the end of M3 year regardless of M3 Pathway participation. Current M3s and their Scholarly Projects are featured here.

Class of 2024 Scholarship Forum

June 22, 2023

Virtual event via Zoom

Time	*Agenda item*
1:00-1:10	**Welcome and Intro:** Student Emcee Kymarie Kuster
1:10-1:15	Instructions and reminders
1:15-1:50	**Breakout sessions – Round 1**
1:50-2:00	Take a **BREAK**
2:00-2:35	**Breakout sessions – Round 2**
2:35-2:55	**Plenary speaker: Linda Meurer, MD, MPH** – Founding Director of the Urban & Community Health Pathway; Founding member of the Scholarly Pathways program and Scholarly Project requirement
2:55-3:15	**Presentation of Awards**

**See next page for Breakout session schedules and Class of 2024 abstracts*

Last name	First Name	Zoom Breakout Room	Role in Breakout Room	What time?
Adhan	Iniya	**1**	Assessing peer presentations	1:15-1:50pm
Adhan	Iniya	**14**	Assessing peer presentations	2:00-2:35pm
Arnold	Mitchell	**3**	Presenter	1:15-1:50pm
Aughey	Elizabeth	**5**	Presenter	1:15-1:50pm
Avila	Enrique	**11**	Presenter	2:00-2:35pm
Bejarano	Eric	**9**	Presenter	1:15-1:50pm
Benbow	Joseph	**1**	Presenter	1:15-1:50pm
Bendelsmith	Charles	**2**	Presenter	1:15-1:50pm
Bendelsmith	Charles	**11**	Assessing peer presentations	2:00-2:35pm
Berg Luecke	Linda	**18**	Presenter	2:00-2:35pm
Bo	Amber	**8**	Presenter	1:15-1:50pm
Bosco	Julia	**8**	Presenter	1:15-1:50pm
Bowie	Owen	**6**	Assessing peer presentations	1:15-1:50pm
Bowie	Owen	**17**	MODERATOR	2:00-2:35pm
Bych	Brendan	**4**	Presenter	1:15-1:50pm
Cairns	Delaney	**5**	Assessing peer presentations	1:15-1:50pm
Cairns	Delaney	**11**	Assessing peer presentations	2:00-2:35pm
Carrillo	Laura	**11**	Presenter	2:00-2:35pm
Chou	Samantha	**6**	Presenter	1:15-1:50pm
Conway	Brian	**10**	Presenter	2:00-2:35pm
Cooper	Brennan	**5**	Presenter	1:15-1:50pm
de Guzman	Timothy	**2**	Presenter	1:15-1:50pm
de Sibour	Trevor	**8**	MODERATOR	1:15-1:50pm
de Sibour	Trevor	**17**	Presenter	2:00-2:35pm
Dominguez	Elizabeth	**2**	Assessing peer presentations	1:15-1:50pm
Dominguez	Elizabeth	**17**	Assessing peer presentations	2:00-2:35pm
Dong	Athena	**13**	Presenter	2:00-2:35pm
Duarte	Jessie	**2**	Presenter	1:15-1:50pm
Elftmann	Ashlyn	**4**	Presenter	1:15-1:50pm
Elftmann	Ashlyn	**12**	Assessing peer presentations	2:00-2:35pm
Elmir	Ezzeddine	**15**	Presenter	2:00-2:35pm
Flanagan	Leah	**18**	Presenter	2:00-2:35pm
Forest	Gabriel	**8**	Assessing peer presentations	1:15-1:50pm
Forest	Gabriel	**15**	Assessing peer presentations	2:00-2:35pm
Gerdes	Austin	**4**	Presenter	1:15-1:50pm
Gerdes	Austin	**13**	Assessing peer presentations	2:00-2:35pm
Gerlach	Leah	**2**	Presenter	1:15-1:50pm
Gorman	Allyson	**4**	Presenter	1:15-1:50pm
Gorman	Allyson	**18**	Assessing peer presentations	2:00-2:35pm
Hamad	Bushra	**16**	Presenter	2:00-2:35pm
Hammond	Alexander	**16**	Presenter	2:00-2:35pm
Hargreaves	Matthew	**6**	Presenter	1:15-1:50pm
Hargreaves	Mathew	**17**	Assessing peer presentations	2:00-2:35pm
Harter	Joseph	**5**	Assessing peer presentations	1:15-1:50pm
Harter	Joseph	**11**	Presenter	2:00-2:35pm
Henry	Katie	**13**	MODERATOR	2:00-2:35pm
Heschke	Rachel	**3**	Presenter	1:15-1:50pm
Hrudka	Bryce	**6**	Assessing peer presentations	1:15-1:50pm
Hrudka	Bryce	**10**	Assessing peer presentations	2:00-2:35pm
Janquart	Amanda	**3**	Presenter	1:15-1:50pm
Klinewski	Victoria	**4**	Assessing peer presentations	1:15-1:50pm
Klinewski	Victoria	**12**	Assessing peer presentations	2:00-2:35pm
Kodali	Divya	**9**	Presenter	1:15-1:50pm
Korom	Bethany	**2**	Presenter	1:15-1:50pm
Korom	Bethany	**15**	Assessing peer presentations	2:00-2:35pm
Krantz	Julia	**8**	Presenter	1:15-1:50pm
Krantz	Julia	**10**	Assessing peer presentations	2:00-2:35pm
Kubiak	Grace	**9**	Presenter	1:15-1:50pm

Last name	First Name	Zoom Breakout Room	Role in Breakout Room	What time?
Kumar	Shivani	**2**	MODERATOR	1:15-1:50pm
Kumar	Shivani	**10**	Presenter	2:00-2:35pm
Kuster	Kymarie	**15**	Presenter	2:00-2:35pm
LaBorde	Taylor	**1**	Presenter	1:15-1:50pm
LaBorde	Taylor	**12**	MODERATOR	2:00-2:35pm
Lee	Yoon Jin Amy	**14**	Presenter	2:00-2:35pm
Leissring	Morgan	**8**	Assessing peer presentations	1:15-1:50pm
Leissring	Morgan	**13**	Assessing peer presentations	2:00-2:35pm
Li	Anji	**14**	Presenter	2:00-2:35pm
Luna	Lila	**13**	Presenter	2:00-2:35pm
Luzum	Nathan	**6**	MODERATOR	1:15-1:50pm
Luzum	Nathan	**17**	Presenter	2:00-2:35pm
Lyons	Anna	**14**	Presenter	2:00-2:35pm
MacLeod	James	**6**	Presenter	
Maddula	Ragasnehith	**5**	Presenter	1:15-1:50pm
Maddula	Snehith	**10**	MODERATOR	2:00-2:35pm
Malloy	Meghan	**3**	Assessing peer presentations	1:15-1:50pm
Malloy	Meghan	**12**	Assessing peer presentations	2:00-2:35pm
Mathson	Lucas	**2**	Assessing peer presentations	1:15-1:50pm
Mathson	Lucas	**14**	Assessing peer presentations	2:00-2:35pm
Miller	Tessa	**8**	Assessing peer presentations	1:15-1:50pm
Miller	Tessa	**12**	Presenter	2:00-2:35pm
Mitra	Tarini	**3**	Assessing peer presentations	1:15-1:50pm
Mitra	Tarini	**17**	Assessing peer presentations	2:00-2:35pm
Moroz	Stacy	**16**	Presenter	2:00-2:35pm
Morra	Cecelia	**17**	Presenter	2:00-2:35pm
Naas	Christopher	**9**	Assessing peer presentations	1:15-1:50pm
Naas	Christopher	**16**	Assessing peer presentations	2:00-2:35pm
Nakamura	Keith	**1**	Presenter	1:15-1:50pm
Nascimento	Kristin	**8**	Presenter	1:15-1:50pm
Neman	Sophia	**2**	Assessing peer presentations	1:15-1:50pm
Neman	Sophia	**17**	Assessing peer presentations	2:00-2:35pm
Nguyen	Kevin	**17**	Presenter	2:00-2:35pm
Nowak	Madeleine	**9**	Assessing peer presentations	1:15-1:50pm
Nowak	Madeleine	**16**	Assessing peer presentations	2:00-2:35pm
Nwosu	Chiamaka	**12**	Presenter	2:00-2:35pm
O'Donnell	Carly	**6**	Presenter	1:15-1:50pm
Ortmann	Stephen	**8**	Presenter	1:15-1:50pm
Ortmann	Stephen	**14**	MODERATOR	2:00-2:35pm

Last name	First Name	Zoom Breakout Room	Role in Breakout Room	What time?
Pain	Celeste	**2**	Assessing peer presentations	1:15-1:50pm
Pain	Celeste	**11**	Assessing peer presentations	2:00-2:35pm
Palathinkara	Murali	**5**	MODERATOR	1:15-1:50pm
Palladino	Carmine	**9**	Assessing peer presentations	1:15-1:50pm
Palladino	Carmine	**10**	Presenter	2:00-2:35pm
Partovi	Omeed	**1**	Presenter	1:15-1:50pm
Partovi	Omeed	**11**	MODERATOR	2:00-2:35pm
Patel	Mira	**4**	Presenter	1:15-1:50pm
Patel	Kahaan	**18**	Presenter	2:00-2:35pm
Pennington	Nicholas	**9**	Presenter	1:15-1:50pm
Polovneff	Alexandra	**9**	MODERATOR	1:15-1:50pm
Polovneff	Alexandra	**18**	MODERATOR	2:00-2:35pm
Popp	Nicholas	**10**	Presenter	2:00-2:35pm
Potter	Mary	**4**	Assessing peer presentations	1:15-1:50pm
Potter	Mary	**10**	Assessing peer presentations	2:00-2:35pm
Prokhoda	Polina	**12**	Presenter	2:00-2:35pm
Puyleart	Alexis	**3**	MODERATOR	1:15-1:50pm
Puyleart	Alexis	**18**	Assessing peer presentations	2:00-2:35pm
Remmers	Caroline	**6**	Assessing peer presentations	1:15-1:50pm
Remmers	Caroline	**13**	Assessing peer presentations	2:00-2:35pm
Rubin	Micah	**5**	Presenter	1:15-1:50pm
Saltzman	Claire	**6**	Presenter	1:15-1:50pm
Schilthuis	Meghan	**1**	MODERATOR	1:15-1:50pm
Schilthuis	Meghan	**16**	MODERATOR	2:00-2:35pm
Schroeder	Tamara	**13**	Presenter	2:00-2:35pm
Seifert	Elena	**1**	Assessing peer presentations	1:15-1:50pm
Seifert	Elena	**14**	Assessing peer presentations	2:00-2:35pm
Shah	Harini	**4**	MODERATOR	1:15-1:50pm
Sheikali	Adam	**13**	Presenter	2:00-2:35pm
Tendick	Shane	**1**	Presenter	1:15-1:50pm
Thapar	Molly	**18**	Assessing peer presentations	2:00-2:35pm
Tran	Jacqueline	**16**	Presenter	2:00-2:35pm
Untaroiu	Ana	**14**	Presenter	2:00-2:35pm
Valdes	Raquel	**11**	Presenter	2:00-2:35pm
Vallee	Emma	**11**	Presenter	2:00-2:35pm
Vang	Iaong	**3**	Presenter	1:15-1:50pm
Vendiola	Danica	**18**	Presenter	2:00-2:35pm
Wakinekona	Nalani	**9**	Presenter	1:15-1:50pm
Wakinekona	Nalani	**15**	MODERATOR	2:00-2:35pm
Wamuo	Obinnaya	**5**	Presenter	1:15-1:50pm
Wannow	Abigail	**15**	Presenter	2:00-2:35pm
Weiland	Delaney	**9**	Assessing peer presentations	1:15-1:50pm
Weiland	Delaney	**15**	Assessing peer presentations	2:00-2:35pm
White	Michael	**4**	Presenter	1:15-1:50pm
White	Michael	**16**	Assessing peer presentations	2:00-2:35pm
Willow	Edward	**17**	Presenter	2:00-2:35pm
Wong	Jonathan	**3**	Presenter	1:15-1:50pm
Woolfolk	Monet	**9**	Presenter	1:15-1:50pm

Guest Reviewers

Last Name	First Name	Zoom Breakout Room	Time of session within event
Agrawal	Himanshu	**9**	1:15-1:50pm
Beierle	Amy	**18**	2:00-2:35pm
Bernstein	Becky	**2**	1:15-1:50pm
Bernstein	Becky	**12**	2:00-2:35pm
Braun	Michael	**5**	1:15-1:50pm
Braun	Michael	**18**	2:00-2:35pm
Cirillo	Lisa	**6**	1:15-1:50pm
Cirillo	Lisa	**17**	2:00-2:35pm
Clevert	Zandra	**10**	2:00-2:35pm
Corcoran	Kerri	**3**	1:15-1:50pm
Corcoran	Kerri	**15**	2:00-2:35pm
Crawford	Cheryl	**4**	1:15-1:50pm
Desmarais	Nadine	**2**	1:15-1:50pm
Desmarais	Nadine	**12**	2:00-2:35pm
Gary	Chamia	**9**	1:15-1:50pm
Gary	Chamia	**13**	2:00-2:35pm
Glasman	Laura	**18**	2:00-2:35pm
Hayes	Meaghan	**1**	1:15-1:50pm
Hayes	Meaghan	**11**	2:00-2:35pm
Jacobson	Nancy	**4**	1:15-1:50pm
Jacobson	Nancy	**14**	2:00-2:35pm
Jenks	Christina	**8**	1:15-1:50pm
Jenks	Christina	**11**	2:00-2:35pm
Kaupila	Greg	**16**	2:00-2:35pm
Kauppila	Beth	**5**	1:15-1:50pm
Klumb	Jennifer	**9**	1:15-1:50pm
Klumb	Jennifer	**14**	2:00-2:35pm
Leineweber	Sarah	**4**	1:15-1:50pm
Leineweber	Sarah	**14**	2:00-2:35pm
Lodes	Mark	**5**	1:15-1:50pm
Lodes	Mark	**15**	2:00-2:35pm
Mackman	Sean	**1**	1:15-1:50pm
Mackman	Sean	**11**	2:00-2:35pm
Meurer	John	**9**	1:15-1:50pm
Meurer	John	**10**	2:00-2:35pm
Muntz	Marty	**6**	1:15-1:50pm
Muntz	Marty	**15**	2:00-2:35pm
Neist	Johnny	**13**	2:00-2:35pm
Pavlic	Ashley	**8**	1:15-1:50pm
Peters	Amy	**2**	1:15-1:50pm

Last Name	First Name	Zoom Breakout Room	Time of session within event
Peters	Amy	**10**	2:00-2:35pm
Prunuske	Amy	**17**	2:00-2:35pm
Schmidt	Patricia	**3**	1:15-1:50pm
Schmidt	Patricia	**12**	2:00-2:35pm
Schultz	Meg	**3**	1:15-1:50pm
Schultz	Meg	**13**	2:00-2:35pm
Schwab	Alyssa	**6**	1:15-1:50pm
Schwab	Alyssa	**16**	2:00-2:35pm
Sommer	Rachel	**6**	1:15-1:50pm
Sommer	Rachel	**17**	2:00-2:35pm
Spearman	Andrew	**6**	1:15-1:50pm
Spearman	Andrew	**16**	2:00-2:35pm
Van Lone	Sarah	**1**	1:15-1:50pm
Vang	Nalee	**3**	1:15-1:50pm
von Stockhausen	Kaicey	**8**	1:15-1:50pm
Werth	Devika	**1**	1:15-1:50pm
Williams	Jennifer	**8**	1:15-1:50pm

Round 1: Groups 1 – 9 1:15 – 1:50pm		
Group 1	**Faculty Reviewer: Sean Mackman**	**Student Moderator: Meghan Schilthuis**
Taylor	LaBorde	A comparison of faculty and student perception of curriculum and external e-learning resources.
Keith	Nakamura	Comics in medical education: a scoping review
Omeed	Partovi	Using a peer-led roleplay model to help pre-clinical medical students improve interpersonal skills
Molly	Thapar	
Shane	Tendick	The Role of Plastination in Medical Education
Joseph	Benbow	Lunch and learn: Assessing the effectiveness of a lead poisoning education session
Group 2	**Faculty Reviewer: Becky Bernstein**	**Student Moderator: Shivani Kumar**
Charles	Bendelsmith	Determining areas for growth in treating autistic patients in the clinic
Timothy	de Guzman	Neurobiological Effects of Stress on Nicotine Addiction in Menthol Cigarette Smoking African Americans
Jessie	Duarte	Social Factors Associated with Utilization of COVID-19 Relief Funding at an Urban Health Center
Leah	Gerlach	The use of volumetric MRI in classifying Frontotemporal and Alzheimer's dementias
Bethany	Korom	"It's about being healthy"; a novel approach to the socio-ecological model using family perspectives
Group 3	**Faculty Reviewer: Meg Schultz**	**Student Moderator: Alexis Puyleart**
Mitchell	Arnold	Estimating the Impact of the FACES Foundation Cleft Lip and Palate Surgical
Rachel	Heschke	Climate change vulnerability and opportunities for adaptive capacity in patients with heart failure
Amanda	Janquart	Inclusion of mental health impacts from climate change on global professional psychiatry websites
Iaong	Vang	Refugee health curriculum improves healthcare students' confidence in providing cross-cultural care
Jonathan	Wong	Assessing the Impact of Housing Insecurity and Threat of Eviction on Health
Group 4	**Faculty Reviewer: Nancy Jacobson**	**Student Moderator: Harini Shah**
Austin	Gerdes	Use of core medication teaching elements at ED discharge differs by staff role
Ashlyn	Elftmann	Using Design Thinking to Improve the Assessment of Pediatric Patients with Potential Head Injury
Allyson	Gorman	Socioeconomic Disparities in Adaptive Sports
Michael	White	Collaborative care in acute settings: An integrated approach to psychiatric care within an academic emerg
Mira	Patel	Contouring—How Do We Manage This Pivotal but Time-Consuming Workload?

Group 5	**Faculty Reviewer: Mark Lodes**	**Student Moderator: Murali Palathinkara**
Ragasnehith	Maddula	Connected Health Innovation Research Program: A Bridge for Digital Health and Wellness in Cardiology and Oncology
Elizabeth	Aughey	Enacting a comprehensive care management program in primary care for high-risk patients.
Micah	Rubin	Examining Sex Bias in Vascular Surgery Research
Obinnaya	Wamuo	Patient and Provider Factors Associated With Successfully Addressing Medical Needs Using Telehealth
Brennan	Cooper	Effects of CPG Implementation on Antibiotic Prescribing and Resource Utilization for Preseptal Cellulitis
Group 6	**Faculty Reviewer: Lisa Cirillo**	**Student Moderator: Nathan Luzum**
Carly	O'Donnell	Responsive Neurostimulation of the Anterior Thalamic Nuclei in Refractory Genetic Generalized Epilepsy
Samantha	Chou	Investigation SRCP's therapeutic potential in Spinocerebellar Ataxia 3
Matthew	Hargreaves	Sensitivity of PD-L1 immunohistochemistry to storage time of histological sections
James	MacLeod	Anatomy of the Lateral Antebrachial Cutaneous Nerve: Landmarks for Distal Biceps Repair
Claire	Saltzman	Comparison of TMR and RPNI in a Rodent Neuropathic Pain Model
Group 8	**Faculty Reviewer: Ashley Pavlic**	**Student Moderator: Trevor de Sibour**
Julia	Bosco	Drawing on Our Own Experience: Comic Creation as Effective Means to Promote Sharing and Reflection
Kristin	Nascimento	Get Out of My Ethics Room: Teaching Bioethics Through Games
Stephen	Ortmann	Exploring Medical Students' Perception of Artificial Intelligence: A Cross-Sectional Survey
Julia	Krantz	From reactive to proactive: Evaluation of utilization of ethics consults at a pediatric hospital
Amber	Bo	Use of pathology reports via online portals in patients with breast, GI, GU and thoracic malignancies
Group 9	**Faculty Reviewer: John Meurer**	**Student Moderator: Alexandra Polovneff**
Monet	Woolfolk	The Importance of an Antiracist Medical School Curriculum
Grace	Kubiak	Evaluating Barriers to Opioid Use Disorder Treatment: From the Patients' Perspectives
Eric	Bejarano	Clomiphene Citrate and Varicocelectomy: Dual Therapy Impact on Semen Parameters and Pregnancy Rates
Nicholas	Pennington	Case Report: Numbness in Feet Only Clinical Sign Leading to MS Diagnosis
Nalani	Wakinekona	Reporting and Analysis of Race in Vascular Surgery Research
Divya	Kodali	Consensus Quality Measures and Dose Constraints for Breast Cancer from the VA Radiation Oncology Quality Surveillance Program and ASTRO Expert Panel

Round 2: Groups 10 – 18 2:00-2:35pm		
Group 10	**Faculty Reviewer: John Meurer**	**Student Moderator: Snehith Maddula**
Shivani	Kumar	Effect Modification of Early and Late Life Social Support on the Risk of Diabetes among Adults with ACEs
Carmine	Palladino	The effect of primary spoken language and race in overall HbA1C reduction
Nicholas	Popp	Scalp incisions with stairstep pericranial edges: a technical note with early results
Brian	Conway	Quantitative Assessments of Finger Individuation with an Instrumented Data Glove
Group 11	**Faculty Reviewer: Sean Mackman**	**Student Moderator: Omeed Partovi**
Emma	Vallee	Development of hybrid leadership training at a student-run free clinic
Enrique	Avila	Challenging Implicit Bias Among Medical Students During the Pre-Clinical Years: An Interactive Experience
Raquel	Valdes	Eyes on the Future: Inspiring Latino Middle School Youth to Pursue a Career in STEM
Laura	Carrillo	
Joseph	Harter	Enhancing informed consent for newborn circumcision: A call for education and strategies for improvement
Group 12	**Faculty Reviewer: Becky Bernstein**	**Student Moderator: Taylor LaBorde**
Tessa	Miller	Lead poisoning in Milwaukee: A medical and public health update
Chiamaka	Nwosu	Long-Term Opioid Use and Disorder in Women of Reproductive Age and During Pregnancy: Preliminary Review
Polina	Prokhoda	Access to resources, genetic testing, and vision care in individuals with albinism
Natasha	MacFarland	Fostering Organizational Excellence Through Inclusive Leadership; A Practical Guide for Radiology Leaders
Group 13	**Faculty Reviewer: Meg Schultz**	**Student Moderator: Katie Henry**
Tamara	Schroeder	The Relationship between Unmet Social Needs and Access to Care in Adults with Cardiovascular Disease
Lila	Luna	The role of genitourinary erythema in the clinical assessment of pediatric patients with suspected UTI
Adam	Sheikali	Management of Pediatric Renal Trauma
Athena	Dong	Targeting H. pylori, obesity, and Alzheimer's disease using bioactive natural compounds in humans
Group 14	**Faculty Reviewer: Nancy Jacobson**	**Student Moderator: Stephen Ortmann**
Morgan	Leissring	Comparison of person-administered vs automated screening tool for PTSD in a traumatically injured patient
Anji	Li	Optimizing Patient Interactions to Improve Behavioral Health Outcomes
Anna	Lyons	Attribution of symptoms and adherence to adjuvant endocrine therapy among older women with breast cancer
Yoon Jin Amy	Lee	
Ana	Untaroiu	Development of a Clinical Report for Adaptive Optics Scanning Light Ophthalmoscopy Imaging

Group 15	**Faculty Reviewer: Mark Lodes**	**Student Moderator: Nalani Wakinekona**
Ezzeddine	Elmir	Skin Dosimetric Constraints that Predict Wound Complications in Extremity STS Patients Receiving Preop RT
Kymarie	Kuster	Qualitative Analysis of Family Caregiver and Patient Support During the Inpatient Discharge Process
Abigail	Wannow	Improving blood pressure control by providing ambulatory blood pressure cuffs to patients
Group 16	**Faculty Reviewer: Andrew Spearman**	**Student Moderator: Meghan Schilthuis**
Jacqueline	Tran	Vaccines and Use of Immunosuppressive Therapy in a Pediatric Dermatology Clinic
Bushra	Hamad	Factors associated with delayed identification and amplification of congenital sensorineural hearing loss
Alexander	Hammond	Differences in Tenon's Capsule Fascia with Aging and Previous Ocular Surgery
Stacy	Moroz	Patient Satisfaction after Abdominally Based Breast Reconstruction in the Class 3 Obese Population
Group 17	**Faculty Reviewer: Lisa Cirillo**	**Student Moderator: Owen Bowie**
Trevor	de Sibour	Behavioral Intervention Compliance in a Randomized Control Trial for the Treatment of Delayed Sleep-Wake
Nathan	Luzum	Identification Accuracy of Safety-Relevant Environmental Sounds in Adult Cochlear Implant Users
Cecelia	Morra	Trauma-Informed Care Training in Trauma and Emergency Medicine: A Scoping Review of Existing Trainings
Kevin	Nguyen	
Edward	Willow	Associations between socioeconomic status and bispecific LV20.19 CAR T cell therapy outcomes.
Group 18	**Faculty Reviewer: Laura Glasman**	**Student Moderator: Alexandra Polovneff**
Leah	Flanagan	A translational study of epigenetic and neural mechanisms of risk phenotypes for PTSD
Danica	Vendiola	Improved caloric goal documentation in the PICU through modification of electronic health records
Linda	Berg Luecke	
Kahaan	Patel	Assessing the role of Protective Childhood Events in preventing physician burnout

MEDICAL COLLEGE OF WISCONSIN

Default Question Block

Which student's presentation are you reviewing?

If there are 2 presenters, using just one of their names is fine.

First & Last Name

Please rate the following sections of the project presentation using this scale:

Score	Descriptor	Characteristics
1	Exceptional / Oustanding	Exeptionally strong with essentially no weaknesses
2	Excellent / Very Good	Very strong with only some minor weaknesses
3	Good / Average	Strong but with at least one moderate or numerous minor weaknesses
4	Satisfactory / Fair	Some strengths but also some moderate to major weaknesses
5	Marginal / Poor	Very few strengths and major weaknesses
6	Insufficient / Missing	Lacks sufficient information to allow for judging

	1: Exceptional / Outstanding	2: Excellent / Very Good	3: Good / Average	4: Satisfactory / Fair	5: Marginal / Poor	6: Insufficient / Lacking
Clearly defined goal/ question/ objective	◯	◯	◯	◯	◯	◯
Background (rationale & significance)	◯	◯	◯	◯	◯	◯
Study design, including methods and analysis	◯	◯	◯	◯	◯	◯
Results or conclusions	◯	◯	◯	◯	◯	◯
Strengths, weaknesses and/or implications	◯	◯	◯	◯	◯	◯

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Adhan, Iniya

Clinical & Translational Research

Longitudinal assessment of foveal cone topography

Authors: Iniya Adhan, Emma Warr, Jenna Grieshop, Joseph Kreis, Danica Nikezic, Fitore Rrahmani, Heather Heitkotter, Ashleigh Walesa, Katherine Hemsworth, Robert F. Cooper, Joseph Carroll
Project Mentor and Department: Joseph Carroll, PhD; Ophthalmology & Visual Sciences

Purpose:To characterize changes in topography of the foveal cone mosaic over time.
Methods:Individuals with contiguous cone mosaics and no vision-limiting pathology (n= 14,age range =14-64yrs) were imaged at two timepoints. AOSLO videos were acquired in one eye per individual using either a 680 or 775 nm source subtending various fields of view (0.5, 0.75, 1.0deg) at the central foveal region. Raw frames were corrected for static sinusoidal distortion and strip registered to an automatically chosen reference frame to produce a high signal-to-noise image to create a montage. Regions of interest (ROI) were cropped using a calculated scale. Cones were semi-automatically identified within the ROI, and density matrices were derived using a 150 cone square sampling window. Location and value of peak cone density (PCD), location and density of the cone density centroid (CDC), and the area of the 80th percentile isodensity contour were extracted from each density matrix. Differences between timepoints were assessed using the Wilcoxon matched-pairs test.
Results:The mean (± stdev) time elapsed between the two visits was 37.04±5.19 months. Mean (± stdev) PCD was not significantly different between visit 1 (185,703 ± 20,548 cones/mm2) and visit 2 (184,065 ± 23,818 cones/mm2),p=0.95. Absolute PCD differences between visits ranged from 0.19% to 17.0%,with 9 of the 14 subjects having a difference less than 5%. The mean (± stdev) density at the CDC location was not significantly different between visit 1 (184,672 ± 20,178 cones/mm2) and visit 2 (181,826 ± 23,332 cones/mm2),p=0.55. The mean (± stdev) area of the 80th percentile isodensity contour was not significantly different between visit 1 (11,470 ± 2,493 um2) and visit 2 (12,716 ± 3,456 um2),p=0.30.
Conclusions:Normative foveal cone topography appears to be highly reproducible. The data presented here can serve as a foundation to assess changes observed in populations with retinal or systemic diseases that affect the fovea.

Aiken, Matthew

Bioethics & Medical Humanities

Fast Facts and Concepts: Compassion Fatigue and Compassion Satisfaction

Authors: Matthew Aiken, Renee Foutz
Project Mentor and Department: Renee Foutz, MD; Medicine – Geriatrics and Palliative Medicine

Compassion Fatigue (CF) is a stress disorder that can develop when caring for others who are suffering. Often referred to as “the cost of caring,” it can manifest as emotional exhaustion after attending to persons who are experiencing physical and/or emotional pain. In contrast, Compassion Satisfaction (CS) is the emotional fulfillment that is associated with caring professions. When CF becomes out of balance with CS, it can have negative consequences on personal well-being, and potentially lead to decreased quality of care with poor patient outcomes. This Fast Fact will focus on defining both CF and CS, as well as discussing methods for management and prevention of CF.

Anandarajah, Hari — Clinical & Translational Research

Did COVID-19 Surgical Delays Compromise Elective Primary Total Joint Arthroplasty Quality of Care?

Authors: Hari Anandarajah, Marvin Lu, Ryan Hanson, Joseph M. Schwab, Adam I. Edelstein
Project Mentor and Department: John C. Neilson, MD; Orthopaedic Surgery

Background: The COVID-19 pandemic resulted in delays of elective surgeries including primary total joint arthroplasty (TJA). Patients not directly delayed may have sought care in a delayed fashion. It remains unknown if direct and/or indirect delays related to the pandemic compromised TJA quality of care.
Methods: A single institution retrospective study was conducted on 1,711 primary TJA performed April 2019-March 2021. A COVID-19 delay was defined as a greater than 30-day delay in surgery directly related to the pandemic. The associations between COVID-19 delays and 30-day readmission, CMS-defined complications, discharge disposition and length of stay (LOS) were examined using logistic regression models adjusted for age, sex, race/ethnicity, BMI, and ASA score. Next, patients that had surgery before the COVID-19 pandemic were compared with the group of patients that had surgery after the pandemic onset, regardless of delay status.
Results: 1,163 of 1,711 (68.0%) had surgery before the pandemic. 167 of 548 (30.5%) patients undergoing TJA after pandemic onset had a COVID-19 delay (mean 94.9 +/- 52.3 days). Mean age was 65.4 +/- 10.9 years with mean ASA score 2.6 +/- 0.5. No association was found between COVID-19 delays and readmission rate, complication rate, non-home discharge disposition, or LOS. No association was found between occurrence of surgery after the pandemic disruptions and these same outcomes.
Conclusion: There were no declines in quality metrics at a single institution when comparing patients who encountered COVID-19 related surgical delays to patients without these delays. Furthermore, there were no changes in quality metrics for the group undergoing TJA after the onset of the COVID-19 pandemic.

Anumolu, Natalie — Global Health

The Double Burden of COVID-19 and Cancer at the Uganda Cancer Institute

Authors: N. Anumolu, M. Bojang, P. Mulamira, C. Jankowski, K. Lechleitner, Sarah Abunike, Nixon Niyonzima, K. Beyer
Project Mentor and Department: Kirsten Beyer, PhD, MPH, MS; Institute for Health and Equity - Epidemiology

Cancer is increasingly diagnosed in Africa, with more than one million new diagnoses annually. In Uganda, the Uganda Cancer Institute (UCI) is the primary cancer care facility; patients travel long distances to receive care. During the COVID-19 pandemic, cancer care was disrupted on several levels, including prevention, screening, diagnosis, treatment, and follow-up. National lockdowns impeded patient access to UCI and halted cancer screening.
To obtain lessons learned from the COVID-19 pandemic, interviews with key informants (KI) who are health professionals at UCI were conducted to identify perceived barriers to cancer care presented by COVID-19.

This study used qualitative interviews to obtain primary data from professionals working at UCI, Interviews were conducted from April 2022 to January 2023. KI were purposively selected and identified by colleagues at UCI and recruited through email and WhatsApp messaging. Verbal consent was obtained. Thirty to 60-minute open-ended interviews conducted virtually and in person were audio recorded and transcribed verbatim. Transcripts were coded via MAXQDA software and analyzed to identify themes.

Thematic analysis revealed three major challenges to cancer care during COVID-19. First, UCI experienced logistical barriers such as travel restrictions, staff shortages, and insufficient protective gear. Second, staff adapted to national lockdown policy that had inflexibility for chronic health care with modifications to treatment regimens. Third, KI reported a significant mental health burden and reflected on how care should be improved.
As colleagues succumbed to infection, UCI staff organized their own training, discussed treatment plans with colleagues, and continued to care for patients at personal risk. They adapted treatment protocols to their setting, many of which remain standard of care today. Ultimately, resiliency characterized UCI's response to COVID-19.

Armstrong, Stephanie — Clinical & Translational Research

DSC-MRI Fractional Tumor Burden Volume Predicts Overall Survival in Unmethylated New High Grade Glioma

Authors: Stephanie Armstrong, Melissa Prah, Jennifer Connelly, Max Krucoff, Wade Mueller, Kathleen Schmainda

Project Mentor and Department: Kathleen Schmainda PhD; Biophysics

OBJECTIVE: Image maps of Fractional Tumor Burden (FTB), derived from dynamic susceptibility contrast (DSC) perfusion MRI, have demonstrated the ability to provide clinically meaningful information for glioma treatment management. The goal was to determine if presurgical FTB is predictive of overall survival (OS) in high-grade glioma (HGG) classified by WHO 2016 criteria. METHODS: Standardized relative cerebral blood volume (sRCBV) maps were created and co-registered with T1+C images using Horos (Version 4.0.0) and Imaging Biometrics Software (Version 21.05) (Elm Grove, WI). Enhancing tumor volume was determined from calibrated difference (dT1) maps. Tissue-validated sRCBV thresholds were used to create FTB class maps within enhancing lesion. Red regions (sRCBV>1.556) indicate high probability of vascular tumor burden, blue (sRCBV<1.0) indicates avascular (nontumor) tissue and yellow represents a mid-range with a lower probability of tumor burden. FTB volume fractions (FTBv) that capture all vascular tumor tissue (sRCBV>1.0) or only the most vascular tumor (sRCBV>1.566) were then determined. Subjects were separated by MGMT methylation. GraphPad Prism statistical software (Version 9.3.1) was used for Kaplan Meier survival analysis ($p<.05$) at 12 and 24 months with patients stratified by median FTBv. RESULTS: Forty-one subjects (23 males, 18 females) with a median age of 59.45 years were included. Median 12-month and OS of unmethylated groups stratified by FTBv (rCBV>1.0) of 8.33 cc was 10.69 and 15.35 months ($p=.0453$; $p=.0317$). Unmethylated subjects stratified with FTBv (rCBV>1.566) of 7.13 cc had a median survival of 10.69 and 15.20 with short- and long-term survival distinguished at 12 months ($p=.0033$), 24 months ($p=.0002$) and overall ($p=0.0002$). No significant difference in survival was found between the methylated subgroups with FTBv (rCBV>1.0) or FTBv (rCBV>1.566) stratified analyses. CONCLUSION: Presurgical FTBv is predictive of OS in primary unmethylated HGG.

Arnold, Mitchell — Global Health

Estimating the Impact of the FACES Foundation Cleft Lip and Palate Surgical Campaigns in Northern Peru

Authors: Mitchell Arnold, Franklin Ruiz

Project Mentor and Department: Franklin Ruiz, MD; Anesthesiology

Community Partner: Foundation for the Advancement of Cleft Education and Services (FACES)

Introduction: Cleft lip with or without cleft palate (CLP) is a common congenital malformation that significantly affects individuals in low-income countries. The Foundation for the Advancement of Cleft Education and Services (FACES), a non-profit organization based in Portland, OR, annually conducts surgical campaigns in underserved areas of northern Peru, providing free-of-cost surgeries to CLP patients. This study aims to quantify the impact of these surgical campaigns on these patients.

Methods: Patient data, including age, sex, home city, diagnosis, and type of surgery, were analyzed. Surgeries were categorized into five types: cleft lip repair, cleft palate repair, speech surgery, alveolar bone graft (ABG), and lip/nose or palate revision. To estimate the impact, the averted Disability-Adjusted Life Years (DALYs) for each patient were measured using disability weights from the Global Burden of Disease Project. The economic benefit was calculated using the Value of Statistical Life (VSL) method.

Results: From 2016-2022, FACES has performed a total of 181 surgeries for 137 patients in northern Peru. These surgeries included 43 lip repairs, 51 palate repairs, 26 lip/nose revisions, 24 palate revisions, 21 speech surgeries, and 13 ABGs. The total averted DALYs were estimated at 1421.85 years (10.61 per patient). Using the estimated cost per DALY for low-to-middle income countries, these surgeries have generated economic benefits ranging from $1.4-51.3 million over the patients' lifetimes ($10,578-$382,955 per patient).

Conclusion: CLP surgery is a cost-effective intervention that reduces disability and enhances the quality of life for patients in northern Peru, both clinically and socioeconomically. Foundations like FACES play a crucial role in providing accessible surgical options and have the potential to create a significant impact.

Aughey, Elizabeth — Health Systems Management & Policy

Comprehensive care management for high risk patients in the primary care setting

Authors: Elizabeth Aughey, Daniel Winder, Ryan Hanson, Theresa Maatman, Mark Lodes
Project Mentor and Department: Mark Lodes, MD; Director of Population Health

High-risk patients often have multiple chronic health conditions and complex healthcare needs resulting in fragmented and ineffective care.1 Population Health at Froedtert and the Medical College of Wisconsin, implemented a longitudinal care experience in the primary care setting to manage these high-risk patients. High-risk patients were identified by RN Care Coordinator (RN-CC), based on inpatient/emergency department (IP/ED) activity, multiple comorbidities, or via primary care provider (PCP) referral. RN-CCs completed regular check-ins with patients to review recent events and adherence to their last follow-up recommendations.
The patients in the program were compared to a matched control group based on age, sex, race, and number of Elixhauser comorbidities.2 Enrollment started on 1/1/2019 through the end of 2021, with data collected throughout the patient's time in the program. Data was analyzed on medical and prescription (Rx) expenditure using a t-test. ED visits, IP admits, and 30 day readmissions were analyzed with a chi-squared test. All data were analyzed after 6 months and 12 months in the program (matched controlled using the same timeline).
The CCM program reduced medical spending at 6 and 12 months per patient per month (PMPM) (P-value= 0.29, 0.34). Rx costs, IP admits, and 30-day readmits had no statistical change. ED visits were statistically increased for CCM patients (P-value <0.001 for 6 and 12 months). This pattern of lower medical expenditure, despite no change or increased usage of other metrics, likely indicated an intervention group more engaged in their health.

Avila, Enrique — Urban & Community Health

Challenging Implicit Bias Among Medical Students During the Pre-Clinical Years: An Interactive Experience

Authors: Almazan K, Avila EJ, Lockart MN
Project Mentor and Department: Malika Siker, MD; Radiation oncology

Abstract:
BACKGROUND: Implicit bias exists inherently within healthcare leading to poor health outcomes, especially for historically underrepresented patients. Previous research documents the complexity of bias and the importance of detection and mitigation of implicit bias among practitioners to improve health outcomes. Although the literature demonstrates either identification of implicit bias among medical students or implementing training to reduce bias for physicians, these studies have not illustrated the impact of implicit bias training during the pre-clinical years.
METHODS: Voluntarily recruited medical students from the Medical College of Wisconsin Milwaukee and Central campuses participated in virtual interactive small groups sessions surrounding diverse patient clinical vignettes. Participants filled out pre and post surveys consisting of Likert scale and free text questions.
RESULTS: Responses indicate that 85% of medical students agree or strongly agree that it is important to receive training on implicit bias during their medical education, 84% of participants agree or strongly agree that it would be valuable to have formal integration of implicit bias sessions in the medical school curriculum, 78% of medical students do not feel well prepared for caring for patients of different backgrounds. Lastly, the post-survey average for the statement "unconscious bias has a significant impact on patient/can affect many levels of health care" was higher than the pre-survey average yielding statistical significance (p=0.027).
CONCLUSIONS: Findings from our study exhibit the significance of initiating implicit bias training for medical students during the pre-clinical years to reduce bias throughout their academic and professional careers to provide equitable care for vulnerable patient populations.

Babiarz, Christopher — Quality Improvement and Patient Safety

Utilization of point of care ultrasound in patients with suspected ureteral calculi in community EDs

Authors: Chris Babiarz, William Scheels

Project Mentor and Department: Dr. William Scheels, MD; Emergency Medicine

Background and Objectives:
Point of care ultrasound (POCUS), a fast and radiation-free imaging modality, can show hydronephrosis, a common result of renal calculi, with 54-72% sensitivity and 71% specificity. Previous studies also suggest that the incidence of adverse clinical outcomes does not vary according to CT vs POCUS. This study aims to establish the extent at which POCUS is utilized for suspected renal stones in our community vs. academic EDs and evaluate outcomes of patients with suspected renal calculi according to which imaging they received.
Methods:
Identify patients who presented to an academic ED and three community EDs with flank pain suspicious for obstructing ureteral stones from June 2018- Dec 2019 using Epic "SlicerDicer" and collect and analyze clinical data.
Results:
Overall, POCUS was used as the primary imaging modality in just 3% of patients without a significant difference between community centers and Froedtert. At Froedtert, a patient who received a CT scan was admitted 22% of the time vs. 0% of the time if they received a POCUS or both imaging modalities. In the community, a patient who received a CT was admitted 13.4% of the time vs. 6.7% for POCUS vs. 0% for patients who were imaged with both. Adverse clinical outcomes were low across all groups.
Conclusions:
We are underutilizing POCUS for evaluation of flank pain suspicious for ureteral stones in both the community and academic EDs. There are no significant differences in adverse events between CT group, POCUS group, and POCUS & CT group.

Baqai, Benish — Quality Improvement and Patient Safety

Predictors of Discrimination in Medical Settings Among Muslim Women in the United States

Authors: Murrar S, Baqai B, Padela AI

Project Mentor and Department: Aasim Padela, MD, MSc; Emergency Medicine

Minority groups based on immigration status, gender or religion often face discrimination in healthcare settings. Muslim women, especially those who wear hijab, are more likely to experience stereotyping and discrimination in and outside of healthcare, but little is known about the sociodemographic predictors of this discrimination. We examined sociodemographic factors and religiosity as predictors of discrimination in medical settings among Muslim American women. Muslim women (n=254) were recruited from Muslim organizations in Chicago to self-administer a survey on perceived discrimination, religiosity, and sociodemographic characteristics. Many participants reported that they were treated with less courtesy than non-Muslims (25.4%) and that a doctor or nurse did not listen to them (29.8%) or acted as though they were not smart (24.3%). A multivariable regression model revealed that self-rated religiosity was negatively associated with discrimination. Race/ethnicity trended towards predicting discrimination such that Arabs and South Asians reported less discrimination than African Americans.

Bejarano, Eric — Clinical & Translational Research

Clomiphene Citrate and Varicocelectomy: Dual Therapy Impact on Semen Parameters and Pregnancy Rates

Authors: Andrew Watts, Eric Bejarano, Peter Dietrich, MD
Project Mentor and Department: Peter Dietrich, MD; Urology

Various studies have demonstrated the benefit that varicocelectomy has on both semen parameters as well as conception rates. Off-label use of clomiphene citrate has also been shown to improve semen parameters and conception rates. Our study aims to investigate the impact of a varicocelectomy alone versus dual treatment with varicocelectomy on semen parameters.
We conducted a retrospective analysis of male patients presenting with infertility and clinical varicoceles. Patients were included if they had hypogonadism and abnormal semen parameters, defined as testosterone <400 and/or FSH <7.6 and <40 million total sperm, <20 million total motile sperm and/or <10 million total progressive motile sperm. Patients received treatment with microscopic subinguinal varicocelectomy only, or both clomiphene citrate 25mg three times per week and varicocelectomy. We examined two pre-treatment semen analysis, one post-treatment semen analysis, and hormone levels before and after treatment. T-tests were performed to compare the changes in semen parameters from pre-treatment to post-treatment which included total sperm, total motile sperm and total progressive motile sperm. The groups did not significantly differ in pre-treatment testosterone, FSH and estradiol. The post-treatment testosterone and FSH levels were significantly higher in the dual treatment group. There was no difference in spontaneous pregnancies in the varicocele only group (17.6%) and the dual therapy group (16%). Our study demonstrates a significant increase in semen parameters after subinguinal microscopic varicocelectomy over dual therapy, suggesting that combination therapy of varicocelectomy and clomiphene citrate offers no benefit over varicocelectomy alone in patients with clinical varicoceles. Spontaneous pregnancy rates were also similar between groups. Dual therapy was not found to offer any significant advantage for improvement in semen parameters or pregnancy compared to varicocelectomy alone.

Benbow, Joe — Urban & Community Health

Lunch and learn: Assessing the effectiveness of a lead poisoning education session

Authors: Joe Benbow, Lisa Zetley
Project Mentor and Department: Lisa Zetley, MD; Pediatrics

Introduction: Lead poisoning continues to impact the health and development of young children despite decades of knowledge and intervention. Recent U.S. Government legislation targeted at reducing the incidence of lead poisoning indicates its importance amongst current public health goals. Therefore, it is important to ensure that health providers are educated on lead policies to ensure proper treatment and interventions for those affected. This study was developed to increase lead poisoning knowledge amongst care coordinators within Care4Kids (C4K) to improve outcomes for foster children enrolled in the program.
Research Design: Pre- and Post-intervention survey analysis of a lead poisoning educational intervention.
Methods: Care coordinators were recruited via email and notified of the opportunity to voluntarily join a research project about lead poisoning. Participants were surveyed about their care coordination questions and baseline knowledge was measured using pre-intervention tool. A presentation was developed around knowledge gaps, current research, and WI population level data. The intervention was held virtually via an online platform, with opportunity for synchronous and asynchronous viewing. An anonymous post-session survey was then distributed electronically to measure information acquired and increase in comfort level with topic. Results were analyzed using the Mann Whitney U Test.
Results: Quantitative analysis yielded statistically significant (P<.05) results across categories demonstrating increase in lead poisoning knowledge and comfort in coordination of care.
Conclusion: Lunch and learn format was successful in addressing lead poisoning knowledge and care coordination gaps in Care4Kids health care coordinators. Future research could assess similar outcomes in other populations, such as medical students, child welfare case managers and other care coordination providers serving high risk populations.

Bendelsmith, Charles — Urban & Community Health

Determining areas for growth in treating autistic patients in the clinic

Authors: Charles Bendelsmith, David Nelson, Jefferson de los Santos
Project Mentor and Department: David Nelson, PhD; Family and Community Medicine
Community Partners: Autism Society of Southeast Wisconsin (ASSEW) and United Neighborhood Centers of Milwaukee (UNCOM)

Autism spectrum disorder is a behavioral disorder that is defined as people with regimented and structured thinking and can have a great variety of presentations from people who are nonverbal and low functioning to people who are high functioning to the point they may not be diagnosed. There has been a multitude of research that shows that people who are diagnosed early with Autism have significantly improved success throughout life due to increased education, resources and coping mechanisms that can be learned by the child. Unfortunately, we live in a society that is designed for neurotypical individuals, therefore people with autism typically function in society that is unstructured, uncomfortable, and lacks support. The clinic is one such example, where unpredictable schedules, busy waiting rooms, sensory overload and more factors can lead to discomfort to patients with Autism. In this study, physicians were interviewed based on their experience treating patients with autism and areas they think the clinic could improve. Of the physicians interviewed, they rated their comfort treating patients with autism as a 3.6 out of 5 with the most common reason for their discomfort being lack of resources and understanding. Additionally, 85% of the interviewed physicians named that they feel the clinical environment is not designed for neurodivergent patients. Areas for improvement included home visits, having less sterilized patient rooms, and partnering with parents to improve patient comfort. It is clear from these conversations there are several ways that the environment can be improved for our patients with autism.

Bo, Amber — Bioethics & Medical Humanities

Use of pathology reports via online portals in patients with breast, GI, GU and thoracic malignancies

Authors: Amber Y Bo, Yee Chung Cheng, Ben George, Deepak Kilari, Jonathan R. Thompson, Julie M. Jorns
Project Mentor and Department: Julie M. Jorns, MD; Pathology

Context: At our institution, patients can review pathology reports immediately after verification via Epic MyChart. We sought to better understand use of pathology reports among cancer patients, with focus on opinions toward immediate access and barriers to content comprehension and utilization.
Design: 230 oncology patients were interviewed. Data on age, sex, cancer type and initial encounter vs follow-up was collected. Comments were grouped thematically for statistical analysis.
Results: Patients who viewed (178/230; 77.4%) and did not view pathology reports (52/230; 22.6%) via MyChart differed only in perception of helpfulness of the report (Table 1). Of those who did not routinely review reports, eleven (4.8%) reported intended future use. Reasons for use among current/future users (189/230; 82.2%) included: discussion with physician (182/189; 96.3%) or family/friend (171/189; 90.5%) and to do internet searches (116/189; 61.4%).
The reasons among those who did not view reports were lack of computer/internet access (27/41; 65.9%), fear of incomprehension (17/41; 41.5%), fear of bad news and no interest (each 2/41; 4.9%).
Most patients preferred immediate release of reports (196/230; 81.2%); however, some would choose to opt out of immediate release (34/230; 18.8%) due to fear of not understanding the report (11/34; 32.4%) or emotional turmoil upon receiving distressing information (23/34; 67.6%). All who indicated they would opt out of immediate release would prefer accessing reports after their appointment.
Conclusions: Most patients find online review of pathology reports helpful, however, the threat of receiving bad news, misinterpreting the report, as well as physical, social, and technology barriers, deter some patients from use.

Bond, Quamaine — Urban & Community Health

Improving Dermatology Specialty Outreach Services in Remote Areas of Tanzania using Teledermatopathology

Authors: Dr. Karolyn Wanat, Quamaine Bond, Megan Yee, Michael Esson, Nina Punyamurthy, Dr. Stephen Humphrey, Miquela Teske, Helen Lozier

Project Mentor and Department: Karolyn Wanat, MD; Dermatology

Tanzania's healthcare system that is complex and has a shortage of healthcare workers. Among specialty services in Tanzania, dermatologists and pathologists are underrepresented to meet the needs of the population, especially in Bagamoyo. Teledermatology (TD) has been demonstrated to increase access to care in several African countries when developed through partnerships with local providers. Our hypothesis is that TD and teledermatopathology (TDP) services will increase healthcare provider education and improve patient care for dermatological diagnoses. This pilot study is being conducted to evaluate dermatologic care needs, assessing project sustainability, and identify common dermatologic diseases in the population. Our main study objectives include evaluating the feasibility of a secure TDP platform, identifying common conditions seen in Bagamoyo using store-and-forward method, and developing treatment protocols for resident hospitals and eventually countrywide using available local formularies/resources. For these objectives, TDP services will be provided through the use of a secure platform through the Africa dermatology Project (africa.telederm.org) program. A baseline provider and patient survey will be used to assess comfort and current dermatology needs and a 6-month follow-up provider survey will be used to determine changes in comfort and acceptability of the TDP platform. Identifying common dermatological conditions and local formularies will be achieved through a retrospective review of submitted TDP cases, and diagnoses outcomes and to contribute to further development of educational resources and formularies specific to the needs of the population. Through partnership with the Bagamoyo Research and Training Centre staff, educational workshops and material will be provided to optimize diagnostic and management outcomes. The results from this initial study will help inform larger grant applications, clinical trials, and further investigation.

Boren, Benjamin — Clinical & Translational Research

Clinical outcomes of catheter-directed thrombolysis in patients with acute limb ischemia

Authors: Benjamin Boren, Neel Mansukhani

Project Mentor and Department: Neel Mansukhani, MD; Vascular Surgery

Introduction: Catheter-directed thrombolysis (CDT) is a minimally invasive procedure involving endovascular delivery of thrombolytic drugs to treat acute limb ischemia (ALI). While CDT confers better long-term outcomes compared to surgical revascularization, it also poses an increased risk for complications. Despite this, there is limited evidence regarding specific patient populations at risk for complications or those that may experience greater long-term benefits.
Methods: This study was a single-center retrospective review of CDT performed at Froedtert Hospital. Inclusion criteria were any adult patient receiving CDT as a primary therapy for ALI in a lower extremity from 2010-2022. Statistical significance was determined using two-tailed independent T-tests or chi-squared tests for continuous and discrete variables, respectively.
Results: 173 procedures performed on 114 patients were analyzed. The population was 64.7% male and 71.1% Caucasian. 86.7% had a history of prior vascular intervention. The overall technical success rate was 79.2% with a procedural success rate of 52.6%. 72.3% required a secondary intervention at the time of infusion. Limb salvage and mortality at 1 year were 76.9% and 5.2% respectively. By comparing procedures with acute complications to those without, no significant differences in demographics, risk factors, or history were found. The complication-free group had significantly shorter hospital stays, lower runoff scores, lower rates of future intervention, and superior limb salvage rates.
Conclusion: Most patients receiving CDT had complicated histories with prior vascular interventions, and the procedures were typically complex with the use of secondary interventions. Patients without acute complications did have superior long-term outcomes, primarily measured by limb salvage. However, acute complications were not attributable to differences in demographics or risk factors that could serve as predictors of their occurrence.

Bosco, Julia Bosco

Bioethics & Medical Humanities

Drawing on Our Own Experience: Comic Creation as Effective Means to Promote Sharing and Reflection

Authors: Julia M Bosco, Theresa C Maatman

Project Mentor and Department: Theresa C Maatman, MD; Medicine – General Internal Medicine

Problem

Despite widespread psychological distress, medical students and residents are reluctant to utilize available mental health services. With this in mind, educators should seek to provide medical trainees with tools and opportunities to process their stressful experiences outside the confines of mental health services. Research has found that comic creation sessions may suffice.

Approach

Medical trainees attended comic creation sessions and drew "something stressful in medicine." During sessions, participants received an introduction to comics, dedicated drawing time to create a comic, and time to share with their classmates. Following the comic creation, trainees participated in group sharing and discussion. Additionally, following the sessions, participants completed surveys on their experiences. Progressive iterations of surveys were administered to participants in the cohorts.

Outcomes

In total, 277 trainees completed the post-session surveys, 37 in Cohort 1, 102 in Cohort 2, and 138 in Cohort 3. Percentages are reported out of the total respondents per cohort.

Session satisfaction was 35 (95%), 92 (91%), and 123 (89%), drawing was reported as difficult for 14(65%), 59 (58%), and 74 (75%) for Cohorts 1, 2, and 3 respectively. In Cohort 1, 31 (84%) found other students' experiences helpful. In Cohort 2, 87 (85%) and in Cohort 3 91(67%) reported the session facilitated reflection.

Next steps

Since comics were effective in helping medical trainees reflect, sessions were well received by participants, and comics creations are an accessible medium, educators should explore where their implementation would be most beneficial.

Bowie, Owen

Clinical & Translational Research

Seasonal variation in ATP-induced retinal damage in the cone-dominant 13-lined ground squirrel

Authors: Owen R Bowie, Hannah M Follett, Ching Tzu Yu, Chloe Guillaume, Phyllis Summerfelt, Nicole Manfredonia, Dana K Merriman, Joseph Carroll

Project Mentor and Department: Joseph Carroll, PhD; Ophthalmology & Visual Sciences

Purpose: Retinal degeneration through cytotoxic chemical exposure has revealed variable effectiveness in the 13-lined ground squirrel (13-LGS), an obligate hibernator. We sought to examine how time of year (relative to hibernation emergence) influenced the degree of damage to the retina in 13-LGS following intravitreal injection of adenosine triphosphate (ATP).

Methods: Eighteen (9M,9F) 13-LGS in three experimental groups [early-season (N=6), mid-season (N=6), late-season (N=6)], underwent baseline imaging using scanning light ophthalmoscopy (SLO) and optical coherence tomography (OCT). Animals then received a 10 µL intravitreal injection of 0.723M ATP, followed by OCT and SLO imaging at 1, 3, 10, and 21 days. Adaptive optics SLO (AOSLO) was performed among animals without retinal damage after follow-up. Retinal thickness and cone density measures were compared to values from wild-type controls (N=12).

Results: Five animals showed retinal damage post-ATP injection, including 4/6 early-season, 0/6 mid-season, & 1/6 late-season (Fisher's exact test, p=0.065). Axial length differences between early-season & mid-/late-season cohorts were significant (p=0.029; p=0.035). All animals with retinal damage displayed lesions of disrupted retinal lamination on SLO/OCT. AOSLO follow-up imaging on animals without retinal damage showed no photoreceptor disruption. Measurements of retinal and choroidal thicknesses in non-degenerated retinas were within +/- 2SD of control data at 98% of locations measured, consistent with no ATP-induced damage.

Conclusions: The 13-LGS may be more susceptible to ATP-induced retinal damage during the early-season. However, differences in axial length and vitreous volume between groups may impact the effective dose. Future studies adjusting dose based on ocular biometry may help elucidate the impact of time of year on chemical response.

Bui, Tracy — Health Systems Management & Policy

Treatment Determinations According to Race Among Heart Failure Patients Evaluated for Advanced Therapies

Authors: Tracy D. Bui, Nathan Smith, Lyle Joyce, David Joyce, Jenessa S. Price
Project Mentor and Department: Jenessa S. Price, PhD; Surgery – Transplant Surgery

Multiethnic studies of heart disease show that Black patients have the highest incidence of congestive heart failure (HF), a leading cause of morbidity and mortality. For patients with advanced HF, the best long-term therapeutic option is heart transplantation. Left Ventricular Assist Device (LVAD) placement serves as a bridge to transplant (BTT) or as destination therapy (DT) for those who do not meet criteria for HT. Psychosocial risk factors correlate with social determinants of health and are associated with poorer outcomes. This preliminary analysis investigated whether treatment designations differ by race among HF patients who underwent evaluation for LVAD placement as DT or BTT. We utilized INTERagency Registry for Mechanically Assisted Circulatory Support (INTERMACS) data and chart review for all adult HF patients in DT or BTT evaluation at Froedtert Hospital from 1/2018 through 6/2021. We observed a significant difference according to race among those evaluated for DT, with a higher proportion of White patients designated not a candidate. Among those evaluated for BTT, there was a trend towards significance with a larger proportion of White patients designated for BTT relative to non-White patients.
Preliminary findings suggest differences in treatment designations according to race among HF patients evaluated for advanced therapies. We are attempting to elucidate relationships between pre-treatment clinical and psychosocial variables with treatment designation by race. We aim to understand relationships between pre-treatment individual factors and post-operative outcomes across cohorts to optimize equity in access and treatment success for all HF patients.

Bussinger, Bret — Health Systems Management & Policy

The impact of policy on elderly self-inflicted gunshot wounds in Wisconsin

Authors: Bret Bussinger, Steven Hargarten
Project Mentor and Department: Steven Hargarten, MD, MPH; Emergency Medicine

Suicide poses a significant nationwide crisis in the United States, ranking as the tenth-leading cause of death in 2018. Over the span of 2000 to 2017, Wisconsin witnessed a notable 40% surge in suicide rates, with firearms as the prevailing method. While existing research primarily focuses on comprehending this catastrophic phenomenon among young individuals, it is essential to recognize that the elderly experience the greatest impact. This study encompasses a comprehensive literature review and data analysis employing the Wisconsin Interactive Statistics on Health (WISH) system to identify elderly individuals at high risk of suicide and evaluate hospital policies specifically targeted at mitigating self-inflicted gunshot wounds among this demographic. Our findings reinforce prior publications, highlighting the vulnerability of elderly individuals to suicide. Moreover, the incidence of firearm-related deaths increases as the population ages, with individuals aged 75 and above accounting for firearm use in over 76% of cases, predominantly affecting men. No specific policies relating to this matter were identified at Froedtert. This project shows significance in the potential for the healthcare community to further its efforts in safeguarding high-risk and vulnerable populations within our society. Future endeavors should strive to pinpoint the key risk factors and interventions by healthcare professionals that yield the greatest impact in reducing self-inflicted gunshot wounds.

Bych, Brendan — Quality Improvement and Patient Safety

Quantitative Assessment of Longitudinal Changes in Intervertebral Discs

Authors: L Tugan Muftuler, Brendan Bych, Jeffrey A. King, and Jordan A. Gliedt
Project Mentor and Department: L Tugan Muftuler, PhD; Neurosurgery

Intervertebral disc degeneration is the leading cause of chronic low back pain (CLBP). However, there are no objective measures of the disc degeneration process. The current gold standard for grading disc degeneration relies on visual assessment of discs using MRI, which may not adequately capture complex physiological changes in degenerating discs. We studied longitudinal changes in quantitative MRI metrics of disc degeneration over a period of 2 years. Although most subjects did not show visible changes in discs, there were significant losses in disc height and some discs also showed a reduction in diffusion coefficients. Based on this data, a set of quantitative MRI metrics could be more sensitive to physiological and morphological changes in degenerating discs compared to subjective visual evaluation approaches.

Cairns, Delaney — Health Systems Management & Policy

Clinical characteristics & barriers to care for patients with Multiple Sclerosis

Authors: Delaney Cairns, Ashley Zeidler, Ahmed Obeidat
Project Mentor and Department: Ahmed Obeidat, MD, PhD; Neurology

Background: Multiple Sclerosis (MS) is an immune-mediated, progressive disease of the central nervous system with heterogenous clinical presentations. Studies note racial and ethnic variations in symptoms and disease progression. MS is thought to have a more aggressive clinical course, and worse clinical outcomes, in non-white patients.
Objectives: To examine whether clinical characteristics vary due to racial and ethnic influence or based on barriers and access to care. Institutional racism may be a confounding variable when analyzing by race or ethnicity.
Methods: In June 2021 a search was performed in PubMed, Scopus, and Cochrane CENTRAL databases using a combination of keywords and MESH terms: multiple sclerosis, race, ethnicity, access to healthcare, and disease progression. To be included articles needed to be in English, include non-white participants, and measure disease progression. Articles were excluded if they were published before 1985; reviews, abstracts, or comments; not directly addressing racial or ethnic variation; or focused on familial MS, clinically isolated or radiologically isolated syndrome, pregnancy, pediatrics, or non-clinical genetics. The data extraction form and classification of evidence was developed according to the AAN 2017 Clinical Practice Guideline Process Manual.
Results: The search yielded 1341 articles and 963 met screening criteria. Titles were screened and 193 abstracts were thoroughly reviewed. 75 met inclusion and exclusion criteria and were analyzed. Citations of the 75 articles were reviewed and 8 articles were added based on relevance. We found that non-biological factors may strongly contribute to observed variations by race and ethnicity in disease progression. Few studies controlled for demographics or socioeconomic status and noted less variation in disease progression based on race or ethnicity.
Conclusions: Future research should control for non-biological factors when studying racial or ethnic variation of MS.

Callan, Grace — Molecular & Cellular Research

A disrupted weaning reaction correlates with regulatory T cell deficiency in ileocolitis pathology.

Authors: Callan GM, Besserud R, Majnik A, Ziegelbauer J, Chatila TA, Williams CB.
Project Mentor and Department: Calvin Williams, MD, PhD; Pediatrics - Rheumatology

Colonization of the newborn GI tract is essential for prevention of inflammatory pathologies in adulthood. Microbial colonization is initially shaped by maternal milk. At weaning, the introduction of solid food expands the intestinal microbiota and induces a strong immune response, termed the "weaning reaction," resulting in spikes in expression of pro-inflammatory cytokine genes and the induction of anti-inflammatory regulatory T (Treg) cells. Previously,we found that mice with early onset spontaneous ileocolitis had decreased intestinal Treg cells, suggesting a disrupted weaning reaction. In order to understand how the weaning reaction may have been altered in these mice, we compared their tissue cytokine expression and CD4+ T cell populations to healthy controls, using qPCR and scRNAseq, respectively. Pro-inflammatory cytokine expression levels peaked one week later than either control strain, then declined, and rose again as spontaneous ileocolitis developed; therefore, disease-prone mice displayed a disrupted weaning reaction. The CD4+ T cell compartment exhibited increased Th17 cells, reflecting a pro-inflammatory state. Furthermore, we found that thymus-derived Treg cells abnormally expressed pro-inflammatory cytokines. A kinetic disruption in the weaning reaction can be associated with downstream alterations in Treg cell
programming and suppressive function. In turn, loss of regulatory activity may lead to deviation of the nascent adaptive immune responses toward inflammation and away from homeostasis, creating disease susceptibility.

Carrillo, Laura — Global Health

Inspiring latino middle school youth to pursue stem careers through early interactive science-programming

Authors: Laura A. Carrillo, Raquel A. Valdes, Eric B. Desjarlais, Velinka Medic, Judy E. Kim
Project Mentor and Department: Judy E. Kim, MD; Ophthalmology and Visual Sciences
Community Partner: Bruce-Guadalupe Middle School

Background
Given the increasing ethnic and racial make-up of the U.S. and the health disparities present, the need for a diverse healthcare workforce is imperative. To create a more diverse healthcare workforce, efforts must be made to support underrepresented minorities (URM) in medicine and the STEM fields early in their education.
Methods
In response to the 2014 Association of American Medical Colleges (AAMC) Diversity Policy and Programs' ProjectMED competition, the Eyes on the Future (EOTF) program was developed to introduce URM eighth-grade middle school students in the city of Milwaukee to science and medicine via interactive science-based programming and mentorship by Medical College of Wisconsin medical and graduate students. The impact of the program was evaluated using pre- and post-program student surveys.
Results
Twenty-five students participated in the 2022 program. Of these, 24 (96%; 13 boys, 11 girls) completed the pre-program survey and 22 (88%; 12 boys, 10 girls) completed the post-program survey. All respondents identified as Hispanic or Latino/a and 3 respondents in both the pre- and post-surveys also identified as White. Students attended, on average, 4.7 of 5 events. Students showed strong interest in science concepts and STEM careers, with high, positively correlated, and statistically similar pre- and post-program survey responses.
Conclusion
The EOTF program was well-received and represents a step towards addressing barriers faced by URM students. Further research is needed to better understand barriers faced by URM students and maximize their success, while also tracking the long-term impact of early interactive science-based programs.

Cass, Kyle — Clinical & Translational Research

Popliteal Aneurysm Surgical Outcomes

Authors: Kyle Cass, Taylor M. Lewis, Brian D. Lewis, Nastassjia de Bourbon, Peter J. Rossi
Project Mentor and Department: Peter Rossi, MD; Vascular Surgery

Objective: Popliteal artery aneurysms (PAAs) are the most common peripheral artery aneurysm and are often incidental findings. Surgical repair is indicated for symptomatic aneurysms or aneurysms greater than 2 cm in diameter. Open surgical repair (OR) remains the gold standard for treatment but endovascular therapy (ET) has recently gained popularity. The aim of this study was to determine whether differences in outcomes exist between OR and ET.
Methods: We performed a retrospective review of all patients who had non-traumatic, non-iatrogenic PAAs diagnosed at a single academic institution from 2010 to 2020. Patient demographics, popliteal artery bifurcation anatomy, comorbid conditions, and anticoagulation or antiplatelet medication use were recorded. Patency of the reconstruction for both OR and ET over time were compared with Kaplan-Meier analysis. Multivariate analysis was performed on all demographic and clinical variables where differences were detected during univariate analysis.
Results: 149 PAAs were identified, of which 128 had complete imaging available. 64 aneurysms underwent intervention (39 OR, 25 ET). The mean patient age was 68 years, 98% were male, and the mean PAA diameter was 2.96 cm. Patients in the ET group were more likely to have coronary artery disease (CAD), more likely to be prescribed clopidogrel postoperatively, and more likely to have a preoperative ABI greater than 1; there were no other differences in demographics or other factors between the two groups, including popliteal artery aneurysm diameter. Despite a higher incidence of CAD in the endovascular group, there were no significant differences in primary or primary-assisted patency between the open repair and endovascular therapy groups.
Conclusions: We found that open and endovascular repair of popliteal aneurysms demonstrated similar outcomes, despite patients in the ET group having a higher incidence of CAD. Appropriate patient selection for mode of treatment should take int

Chang, Catherine — Quality Improvement and Patient Safety

Effectiveness of BMI-based prophylactic enoxaparin dosing in Bariatric Surgery Patients

Authors: Catherine K Chang, Rana M Higgins, Lisa Rein, William J Peppard, David J Herrmann, Tammy Kindel
Project Mentor and Department: Tammy Kindel, MD, PhD; Surgery

Introduction: Enoxaparin is administered for venous thromboembolic (VTE) prophylaxis in bariatric surgery patients. There is concern whether body mass index(BMI)-based enoxaparin dosing consistently achieves prophylactic targets in patients with severe obesity.
Materials and Methods: This retrospective study included patients who underwent bariatric surgery at an academic medical center from Jan 2015-May 2021 and had an anti-Xa level drawn 2.5-6 hours after ï‚³3 doses of BMI-based prophylactic enoxaparin. The primary outcome was the percentage of patients who achieved a target anti-Xa level. Secondary outcomes were prevalence of VTE and bleeding events within 30 days post-operatively.
Results: Overall, 137 patients were included. Mean BMI was 59.1ï‚±10.4 kg/m2, mean age was 43.9ï‚±13.3 years and 110 patients (80.3%) were female. Target anti-Xa levels were achieved in 116 patients (84.7%), 14 (10.2%) were above target and 7 (5.1%) were below target. Patients with above target anti-Xa levels were significantly shorter in height than those within target range (167.1 vs 159.8 cm, p=0.003). Five patients (3.6%) had a bleeding event; no thromboembolisms occurred. Anti-Xa levels correlated more strongly with enoxaparin dose per unit estimated blood volume (EBV) than dose per unit BMI (Rho=0.54 vs Rho=0.33).
Conclusion: Target range anti-Xa levels were achieved in 85% of patients using BMI-based enoxaparin dosing. Patients with above target anti-Xa levels were significantly shorter by nearly 3 inches, suggesting an increased risk of overdosing enoxaparin in shorter, obese patients. An EBV-based dosing regimen may better account for patient height and is supported by a greater correlation with anti-Xa levels with dosing based on EBV than BMI.

Chou, Samantha — Molecular & Cellular Research

Investigation SRCP1's therapeutic potential in Spinocerebellar Ataxia 3

Authors: Chou S, Santarriaga S, Scaglione KM.
Project Mentor and Department: K. Matthew Scaglione, PhD; Biochemistry

Protein aggregation is thought to be the underlying pathogenesis behind most neurodegenerative diseases. One class of neurodegenerative diseases, the polyglutamine (polyQ) diseases, or CAG trinucleotide repeat disorders, result from polyQ expansion within specific proteins, leading to protein aggregation and neurodegeneration. Current research into treatments for the polyQ diseases aims to decrease protein aggregation, anticipating this will halt disease progression. Previous research in our lab identified Dictyostelium discoideum as an organism that is naturally resistant to protein aggregation. Further work identified Serine Rich Chaperone Protein 1 (SRCP1) as one protein that suppresses aggregation of polyQ-expanded mutant huntingtin (mHtt), the mutated protein in Huntington's disease (HD). We also found SRCP1 was sufficient to suppress mHtt aggregation in other organisms, including human cells, zebrafish, and iPSCs. The goal of this project was to determine if SRCP1's effects could be expanded to other polyQ proteins, including Ataxin3 (ATXN3), the mutated protein in Spinocerebellar Ataxia 3 (SCA3). SCA3 is the second-most common polyQ disease, following HD. PolyQ expansion within the C-terminal tail of ATXN3 results in ATXN3 aggregation, and degeneration of cerebellar and motor neurons. Our findings demonstrate that SRCP1 decreases both normal length and aggregated ATXN3. In addition, SRCP1 utilizes a combination of ubiquitin proteosome pathway (UPS) and autophagy to decrease ATXN3 proteins within cells. Inhibition of either the UPS or autophagy is sufficient to prevent SRCP1-mediated decreases in normal, wild-type ATXN3, while inhibition of both pathways is necessary to prevent SRCP1-mediated decreases in polyQ-expanded ATXN3. These results not only expand SRCP1's versatility as a potential treatment for polyQ diseases outside of HD, but also shed light onto potential mechanisms through which SRCP1 works in the human cells.

Coleman, Madelyn — Clinical & Translational Research

Risk Factors Associated with Pelvic Osteomyelitis After Penetrating Trauma

Authors: Madelyn Coleman, Carisa Bergner, Thomas Carver
Project Mentor and Department: Thomas Carver, MD; Surgery – Trauma and Critical Care

Objective: This project was designed to determine the incidence and risk factors associated with pelvic osteomyelitis following gunshot wounds (GSWs) to the pelvis given the paucity of evidence regarding this complication.
Methods: Using the trauma registry, 12 years of patients (3/2010–11/2022) were screened for GSW to the pelvis. Patients meeting inclusion criteria underwent chart review for the development of pelvic osteomyelitis and the following data elements were extracted: demographics, characteristics of the pelvis injury, presence of bowel injury, type of bowel injured, operations performed, complications including osteomyelitis, use of antibiotics (≤24 hours vs >24 hours post-op), whether surgical debridement was performed, if retained bullet fragments were present, and bullet trajectory. Discrete variables were analyzed using Wilcoxon rank-sum test, chi-square, and Fischer's exact test.
Results: 242 patients were identified from the registry. Males were 86% of the entire cohort and the average age was 27. Concomitant bowel injury was present in 108 patients (45%). 11 patients (4.5%) developed osteomyelitis, all of whom had a concomitant bowel injury ($p<0.001$). Age, gender, race, BMI, tobacco use, prolonged antibiotics, surgical debridement, retained bullet fragments, and bullet trajectory were not significantly associated with osteomyelitis development.
Conclusion: Development of osteomyelitis after GSW to the pelvis was significantly associated with concomitant bowel injury, specifically to the colon. Prolonged antibiotics and bony debridement do not seem to be protective, and may even be harmful. Retained bullet fragments, even after traversing bowel, do not seem to increase risk of osteomyelitis. These findings are limited because of their retrospective nature but can be used to design a multi-center trial to further explore the gaps around the role of prophylactic antibiotics or other strategies to prevent this complication.

Conroy, Meghan

Clinical & Translational Research

Pancreatic Cancer Patient Experiences with Social Determinants of Health

Authors: Meghan Conroy, Sam Thalji, Susan Tsai, David Nelson
Project Mentor and Department: David Nelson, PhD, MS; Family and Community Medicine

Purpose: Pancreatic cancer is a highly burdensome disease that has detrimental effects on patients and their caretakers. It is known that social determinants of health play a role in pancreatic cancer incidence and outcomes, however, there has been little research into how social determinants impact patients' personal experiences of illness. The purpose of this study is to gain insight into how patients with pancreatic cancer experience social determinants in the context of their disease.
Methods: Participants were recruited from Froedtert Hospital (Milwaukee, WI) after seeing a surgical oncologist for their pancreatic cancer. In-depth interviews were conducted around perceptions of social determinants. Survey on social determinants and in-depth interview methods were used. Coding was carried out through inductive analysis based on grounded theory.
Results: Coding of six (6) interviews resulted in three primary themes: specific social determinants, psychosocial impact, and physicians and the healthcare system. Of the many social determinants discussed, a strong social support system significantly contributed to the cancer care process in all cases. These results indicate the importance of a social support system, among other social determinants, in giving patients with pancreatic cancer the ability to feel stable in their lives.
Conclusions: The presence and recognition of social determinants is an important consideration for the health of patients and positive outcomes. There is a need to build an intentional system that connects resources around social determinants to patients with medical issues like pancreatic cancer. This research study will inform future interventions to maximize resources to improve outcomes and quality of life.

Conway, Brian

Clinical & Translational Research

Quantitative Assessments of Finger Individuation with an Instrumented Data Glove

Authors: Brian Conway, Léon Taquet, Timothy Boerger, Sarah Young, Kate Krucoff, Brian Schmit, Max Krucoff
Project Mentor and Department: Max O. Krucoff, MD; Neurosurgery

Background: In clinical and research settings, hand dexterity is often assessed as finger individuation, or the ability to move one finger at a time. Despite its clinical importance, there is currently no standardized, sufficiently sensitive, or fully objective platform for these evaluations.
Methods: Here we developed two novel individuation scores and tested them against a previously developed score using a commercially available instrumented glove and data collected from 20 healthy adults. Participants performed individuation for each finger of each hand as well as whole hand open-close at two study visits separated by several weeks. Using the three individuation scores, intra-class correlation coefficients (ICC) and minimal detectable changes (MDC) were calculated. Individuation scores were further correlated with subjective assessments to assess validity.
Results: We found that each score emphasized different aspects of individuation performance while generating scores on the same scale (0 [poor] to 1 [ideal]). These scores were repeatable, but the quality of the metrics varied by both equation and finger of interest. For example, index finger intra-class correlation coefficients (ICC's) were 0.90 (< 0.0001), 0.77 (< 0.001), and 0.83 ($p < 0.0001$), while pinky finger ICC's were 0.96 ($p < 0.0001$), 0.88 ($p < 0.0001$), and 0.81 ($p < 0.001$) for each score. Similarly, MDCs also varied by both finger and equation. In particular, thumb MDCs were 0.068, 0.14, and 0.045, while index MDCs were 0.041, 0.066, and 0.078. Furthermore, objective measurements correlated with subjective assessments of finger individuation quality for all three equations ($\rho = - 0.45$, $p < 0.0001$; $\rho = - 0.53$, $p < 0.0001$; $\rho = - 0.40$, $p < 0.0001$).
Conclusions: We provide a set of normative values for three finger individuation scores in healthy adults. Each score emphasizes a different aspect of finger individuation performance and may be more uniquely applicable to certain clinical scenarios

Cooper, Brennen — Clinical & Translational Research

Effects of CPG Implementation on Antibiotic Prescribing and Resource Utilization for Preseptal Cellulitis

Authors: Brennen Cooper, Michelle Mitchell, Svetlana Melamed, Melodee Leigl, Amy Pan, Alina Burek
Project Mentor and Department: Alina Burek, MD; Pediatrics - Hospitalist

Objectives: The purpose of this study was to evaluate impacts of a new clinical practice guideline (CPG) on antibiotic use and resource utilization for pediatric preseptal cellulitis.
Methods: This retrospective quasi-experimental study included patients between the age of 2 months and 17 years admitted for preseptal cellulitis at a children's hospital between January 2013 and January 2023. Patients were excluded if they had post-septal extension including orbital involvement or abscess, nasolacrimal pathologies, animal bites, viral infections (e.g., HSV); were immunocompromised; had eye prosthetics, penetrating orbital trauma or eye surgery within 30 days of hospitalization.
Results: Of 404 patients, 210 met inclusion criteria with 175 and 35 patients comprising the pre- and post-CPG cohorts respectively. Median age was 4.6 years and 53% of the population were male. Significant empiric antibiotic changes post-CPG implementation included decreases in dual/triple therapy from 47% to 14% ($p<0.001$), broad spectrum use from 100% to 63% ($p<0.001$), and MRSA active use from 86% to 29% ($p<0.001$). Significant definitive antibiotic changes included decreases in dual/triple therapy from 22% to 6% ($p=0.032$), broad spectrum use from 97% to 66% ($p<0.001$), and MRSA active use from 76% to 26% ($p<0.001$). There was a decrease in CBC orders from 75% to 54% ($p=0.023$). There was not a significant difference in use of CT scans post-CPG. There was not a significant difference in the length of stay or treatment failure rate between patients treated with narrow versus broad spectrum antibiotics within the skin-penetration etiology subgroup.
Conclusion: In conclusion, the CPG successfully improved antibiotic prescribing for pediatric preseptal cellulitis without worsening patient outcomes.

Dang-Saberwal, Lorraine — Molecular & Cellular Research

Role of the IL-27 Signaling Pathway in the Regulation of Regulatory T cell Survival and Metabolism

Authors: Lorraine Dang-Saberwal, Wenwen Xu, Alison Moe, William Drobyski
Project Mentor and Department: William Drobyski, MD; Medicine – Hematology and Oncology

Graft versus host disease (GVHD) is characterized by the increased production of inflammatory cytokines and activated alloreactive donor T-cells, and the failure of existing regulatory mechanisms to suppress this inflammatory process [1, 2]. Our lab previously demonstrated that blockade of IL-27 signaling, a member of the IL-6 cytokine family, will reduce GVHD severity by increasing the reconstitution of regulatory T cells [3]. The data additionally suggested that inhibition of IL-27 signaling prolonged the survival of regulatory T cells by modulating cell death pathways. We therefore hypothesized that IL-27 plays an important role in regulating the metabolic and anti-apoptotic pathways that promote the survival of CD4+ regulatory T cells. To investigate this mechanism, regulatory T cells from wild-type and IL27R-/- mice spleens were analyzed by Western Blots, extracellular acidification rate (ECAR) and oxygen consumption rate (OCR) to examine the impact of IL27 on the survival of regulatory T cells and cell metabolism. Our results did not show any statistical difference in the absolute expression levels of pro-apoptotic (Bim, Bak, and Bax) and anti-apoptotic (Bcl-2 and MCL-1) proteins. However, the absence of IL27R appears to alter metabolic function of cells under stress with increased mitochondrial respiration and glycolytic rate to maintain the metabolic fitness of the cells. Together, these findings suggest IL27 plays a critical role in promoting the survival of CD4+ regulatory T cells, but not via apoptotic pathways. In addition to apoptosis, autophagy is another regulated cell death pathway that might influence metabolic stress and will be further examined.

de Guzman, Timothy — Urban & Community Health

Neurobiological Effects of Stress on Nicotine Addiction in Menthol Cigarette Smoking African Americans

Authors: de Guzman T, Engelmann JM

Project Mentor and Department: Jeffrey Engelmann, PhD; Psychiatry and Behavioral Medicine

Introduction: The smoking rate among African Americans in certain Milwaukee neighborhoods is as high as 36%. African Americans also have lower smoking cessation rates and a higher use of mentholated tobacco products compared to non-Hispanic whites. This study aims to explore brain response in African American smokers who primarily use menthols and investigate the relationship between perceived stress and addiction biomarkers.
Methods: We recorded fMRI from 17 smokers during the presentation of neutral, pleasant, unpleasant, and cigarette-related pictures. BOLD responses were analyzed in relation to these picture categories. Participant appraisal of stress was obtained using the PSS and correlated against BOLD scores in specific areas of the brain implicated in addiction.
Results: Main effects of picture category on BOLD response were significant in 5 regions of interest identified. Simple effects of PSS within each picture category showed significant relationships in 8 regions of interest identified.
Conclusion: This study found high neural biomarker activity in addiction-related brain regions. This study also investigated the influence of stress on addiction to mentholated tobacco and found unexpected findings, indicating the need for further research. However, the lack of a non-mentholated tobacco control group was a major limitation, and future research should include such a comparison to inform regulatory decisions on menthol bans in cigarettes.

de Sibour, Trevor — Clinician Educator

Behavioral Intervention Compliance in a Randomized Control Trial for the Treatment of Delayed Sleep-Wake

Authors: Trevor de Sibour, Helen Burgess, Kelley DuBuc, Leslie Swanson

Project Mentor and Department: Renee Foutz, MD; Medicine – Geriatric and Palliative Medicine

External Partner: Michigan Medicine, Department of Psychiatry, Sleep and Circadian Research Laboratory

Objectives: 1) To examine behavioral intervention compliance in a treatment regimen for Delayed Sleep Wake Phase Disorder (DSWPD). 2) To examine sleep variables one-month post-study.
Methods: In a double-blind, randomized, controlled trial, 44 participants were recruited to assess the impact of measuring dim light melatonin (DLMO) onset in the treatment of DSWPD. Participants took 0.5 mg of exogenous melatonin nightly for 4 weeks and were randomly assigned to take their melatonin dose either 3 hours before their measured DLMO or 5 hours before average sleep onset per actigraphy. Additionally, participants were given specific bed and rise times and instructed to dim all lights (£ 50 lux) one hour before their instructed bedtimes, verified with wrist actigraphy. Compliance with melatonin administration time was tracked via MEMSCap. One month post-treatment, a subset of participants completed a questionnaire regarding their current time in bed schedule.
Results: Per wrist actigraphy, participants were compliant with bed times 81.76 (± 16.43)% of all nights, compliant with rise times 84.75 (± 15.53)% of all mornings, compliant with melatonin administration time 81.08 (± 14.87)% of all treatment days and melatonin was taken on 96.91 (± 3.78)% of all treatment days. One month post-treatment, on average, participants were going to bed on work/school nights 49.11 (± 88.53) minutes after their desired bedtime, with 50% going to bed at their desired bed time. On average, they were going to bed on free nights 49.4 (± 74.16) minutes after their desired bedtime; 55% were maintaining their desired bed time on free nights. On work/school mornings, participants reported that they were waking up an average of 47.44 (± minutes 93.33) later than their desired time, with 61.11% waking at their desired wake time. On free mornings, they were waking up an average of 71.20 (±131.76) minutes later than their desired rise time, with 55% waking at their desired time.

DeGroot, Andrew

Clinical & Translational Research

Investigation of Exercise Intolerance in Civilians with Mild Traumatic Brain Injury (mTBI)

Authors: Andrew DeGroot, Daniel Huber, John Leddy, Hershel Raff, Michael A. McCrea, Blair D. Johnson, Lindsay D. Nelson

Project Mentor and Department: Lindsay Nelson, PhD; Neurosurgery

The Buffalo Concussion Treadmill Test (BCTT) is a validated test of exercise tolerance frequently used to differentiate mTBI phenotypes (e.g., autonomic/physiological mTBI) and tailor exercise recommendations in youth athletes with mTBI. We examined the degree to which adult civilians with and without mTBI tolerate the BCTT (i.e., complete the 15-minute test without meeting discontinue criteria). We also explored the relationship between baseline factors, mTBI-related symptoms, and BCTT duration. N = 37 level 1 trauma center patients with mTBI and 24 healthy controls (HC) were assessed at 1-week and 1-month post-injury with an interview, questionnaires (Rivermead Post-Concussion Symptoms questionnaire [RPQ]; International Physical Activity Questionnaire), and the BCTT. Pre-injury baseline variables considered were age, gender, body mass index [BMI], height, and activity level. mTBI participants completed the BCTT (i.e., made it to the 15-minute limit) 14% and 16% of the time at 1 week and 1 month, respectively. Thirty percent of HCs completed the BCTT at both times. Greater BMI, shorter height, and female gender predicted shorter BCTT duration at one or more time points (1-week/1-month). Age and pre-injury activity did not predict BCTT duration. Greater mTBI-related symptom burden (higher RPQ score) was associated with shorter BCTT duration. Exercise intolerance was prevalent in civilians with and without mTBI through 1-month post-injury. That pre-injury factors influenced tolerance to the BCTT indicates a need to further tailor the BCTT protocol to individual baseline characteristics (e.g., using lower starting speeds) to better discern individual exercise tolerance levels and determine the physiological effects of mTBI.

Denton, Stephen

Clinical & Translational Research

Early outcomes in targeted muscle reinnervation for traumatic amputations

Authors: Denton SR, McBride C, Hammond AP, LoGiudice AJ

Project Mentor and Department: Anthony J. LoGiudice, MD; Orthopaedic Surgery

Introduction: Traumatic amputees commonly experience residual limb pain (RLP) and phantom limb pain (PLP) which present major barriers to rehabilitation. Targeted muscle reinnervation (TMR) is an evolving treatment which shows promise in reducing these symptoms. While initial data is encouraging, existing studies are low power, and more research is needed to assess the long-term outcomes of TMR. We present the results of selfreported outcome surveys distributed to amputees >1yr post-TMR which are compared to data from a landmark randomized control trial (RCT). Methods: Data was obtained from 17 adult traumatic amputees who were >1yr post-TMR using numerical rating scale (NRS) and PROMIS surveys. Data was compared to results published in a 2019 RCT which assessed TMR versus standard care (without TMR) after major limb amputation and demonstrated substantial improvement in pain scores 1-year post-TMR. Results: There was a statistically significant reduction in this cohort of TMR amputees' RLP worst-pain scores relative to amputees who received standard care in the comparison study. Mean RLP NRS worst pain scores were 3.1±4.2 for treatment TMR amputees and 6.0±2.8 for comparison standard care amputees with a mean difference of -2.9 (-5.4-0.3) and p-value of 0.028. In general, there were no other significant differences between this study's TMR outcomes relative to the comparison study. However, worst pain NRS for phantom limb pain was significantly higher in this cohort relative to the comparison study's TMR group. Discussion: These findings support the use of TMR for reducing RLP in traumatic amputees. Relative to a similar group treated without TMR in the comparison study, this cohort's residual limb pain was significantly improved. However, phantom limb pain may show variable results in the long-term due to its complex nature. Future studies should aim to recruit more amputees and include analysis of functional outcomes, especially in upper limb amputees.

Dominguez, Elizabeth — Clinician Educator

Critical reflection to investigate medical student attitudes toward skin tone in their pre-clinical year

Authors: Elizabeth Dominguez, Molly Thapar, Katarina Stark, Johnathon Neist, Kerrie Quirk, Malika Siker, Jeff Fritz, Gretchen Roth, Teresa Patitucci

Project Mentor and Department: Teresa Patitucci, PhD; Cell Biology, Neurobiology and Anatomy

Purpose:
Implicit racial bias is a persistent barrier to quality medical care for people of color in the United States. Early, learner-driven intervention within health professional training programs is crucial to establish cultural competence.
Materials and Methods:
Over three academic years, pre-clinical, second-year medical students were asked to submit an anonymous critical reflection regarding skin tone in medicine (n=794). Course credit was given based on the honor system. Reflection submission content and student feedback were analyzed quantitatively and qualitatively.
Results:
Most students completed the assignment and reported feeling comfortable expressing themselves honestly in the anonymous format. Student comfort with honesty declined if they had to identify themselves. Student comments indicated relief to have a place to process experiences and emphasized importance of anonymity for value of this assignment. Thematic analysis identified two themes and 13 subthemes among student submissions. Submissions varied in format and typically contained multiple codes, indicating students participated meaningfully in the assignment.
Conclusions:
Although some educators may hesitate to address these topics, students at our institution appreciated having a space to process their thoughts. This assignment structure is an effective way for educators to address a difficult, sensitive, and important topic in a meaningful way with students.

Dong, Athena — Global Health

Targeting H. pylori , obesity, and Alzheimer's disease using bioactive natural compounds in humans

Authors: Athena Dong, Li-Shu Wang

Project Mentor and Department: Li-Shu Wang, PhD, Medicine

Alzheimer's disease (AD) is a neurodegenerative condition that is currently the leading type of dementia. While extensive research has been performed regarding the mechanism of AD development and potential cures for the disease, definitive conclusions have yet to emerge. One of the major hypotheses regarding development of AD is that of the microbiota-gut-brain axis, which posits that processes such as inflammation and alteration of bacterial profiles in the gastrointestinal tract lead to neuronal damage and central nervous system deterioration. Infection with Helicobacter pylori and obesity are two gastrointestinal conditions associated with these systemic processes, and thereby have been considered as risk factors for AD. While there are a number of standard clinical practices regarding management of these conditions, the utilization of bioactive natural compounds as adjunct therapies has become a recent focus of research in the field. In addition, ethnopharmacology, which refers to the study of natural products used in cultural traditions for medicinal purposes, has become a topic of greater concern as clinicians encounter patients from diverse cultures in their practice. This review evaluates the methodology and results of recent evidence-based, clinical trials in assessing the ability of various natural products to treat of H. pylori infection, obesity, and AD. Overall, the amount of clinical data for these treatments is variable, and while many studies are promising, further high-quality research will be needed before establishing whether the natural products studied are viable supplements to standard clinical management.

Dornon, Mary Kate

Clinical & Translational Research

Assessment of prenatal care on maternal and neonatal outcomes in bariatric patients

Authors: Dornon, M.K., de La Pena, R., Pan, A., Liegl, M., Cruz, M.
Project Mentor and Department: Meredith Cruz, MD, MPH, MBA; Obstetrics and Gynecology

The obesity epidemic is one of the most significant problems facing the United States healthcare system today. Bariatric surgery for the management of obesity is becoming increasingly popular and has been shown to help with long-term weight loss and decreased mortality. This is especially important in women who may desire pregnancy, as studies suggest that obese women who become pregnant after bariatric surgery have decreased rates of gestational diabetes and maternal hypertensive disorders. However, previous studies report conflicting results whether there is an increased risk for maternal and neonatal outcomes after such surgery. The objective of this study is to investigate the relationship between number of prenatal visits and pregnancy outcomes in patients who have previously undergone bariatric surgery using the Adequacy of Prenatal Care Utilization (APNCU) Index. Results from our study confirm that prenatal care is an important indicator in adverse maternal and neonatal outcomes. Our findings also suggest that the APNCU index is a more important indicator of adverse neonatal outcomes than adverse maternal outcome across both bariatric and non-bariatric pregnancies. Continued work should elucidate ways to quantify quality of prenatal care in addition to number of visits to assess adequacy of prenatal care.

Duarte, Jessie

Urban & Community Health

Social Factors Associated with Utilization of COVID-19 Relief Funding at an Urban Health Center

Authors: Duarte J, Bauer L
Project Mentor and Department: Lauren Bauer, MD MPH; Family and Community Medicine
Community Partner: Sixteenth Street Community Health Centers (SSCHC)

BACKGROUND: The COVID-19 pandemic disproportionately affected communities of color in Wisconsin and nationwide. The Sixteenth Street Community Health Centers (SSCHC) serves a predominantly Hispanic/Latino patient population. SSCHC established a Patient Relief Fund to provide emergency financial support for basic needs to patients who did not qualify for stimulus funds or other public assistance. SSCHC also distributed Ryan White HIV/AIDS Program (RWHAP) COVID-19 CARES Act funds and Milwaukee Rent Assistance Program (MRAP). Economic stability, and in this case poverty, food security, and housing stability, are social determinants of health.
OBJECTIVES: The primary objective of this study is to describe the demographic, family, and social factors associated with fund-utilizing individuals. The second objective is to perform subgroup analysis of patients who utilized funds more than once, looking for any trends in these factors. The third objective is to perform a subgroup analysis for those who had multiple types of need.
METHODS: A retrospective data fund and Electronic Health Record chart review was performed to explore factors associated with individuals who were given relief funds at some point from April 2020 to April 2021 (n=381).
RESULTS: The majority of those who received aid were Spanish-speaking, Hispanic, and uninsured. Most of the aid relief went towards rent assistance. Patients who utilized funds more than once were older than those who received aid once ($p=0.01367$).
CONCLUSION: These descriptive statistics and results will help SSCHC, stakeholders, and community partners better understand the demographics and social determinants of patients who had to rely on these funds. As a result, improved resource allocation, skill-building workshops, additional community resource collaboration, and improved internal screening and patient protocols can be implemented.

Elftmann, Ashlyn

Quality Improvement and Patient Safety

Using Design Thinking to Improve the Assessment of Pediatric Patients with Potential Head Injury

Authors: Ashlyn Elftmann, Sam Halama, Maria Brix, Mark Nimmer, Catherine Ferguson, Danny Thomas
Project Mentor and Department: Catherine Ferguson, MD; Pediatrics - Emergency Medicine

BACKGROUND In 2015, the CDC published best practices for concussion care and management to address the lack of standardization in concussion diagnosis. Yet, many Emergency Department (ED) providers do not consistently apply these guidelines when caring for pediatric patients who present for evaluation of head injury. The reason why ED providers do not implement these best practices is unknown.
METHODS To address this problem, we employ Human-Centered Design and Design Thinking (DT) methodology to better understand the provider's perspective. DT is a non-linear, iterative process that cycles between five stages (Empathize, Define, Ideate, Prototype, and Test) to create interventions tailored to the user. We incorporate user feedback with interviews and survey collection. We monitor provider response (whether they use concussion assessment tools) with SPC charts.
RESULTS From our ideation sessions, we collected provider input to create a Driver Diagram. From this Driver Diagram, we selected Provider Education to prototype and test. After testing our first intervention, "Concussion University," we incorporated provider feedback to create our second intervention, "Concussion CliffsNotes."
DISCUSSION Previous research using DT focuses on improving medical education, developing products, and increasing patient satisfaction. Our results show that DT offers an opportunity to improve direct patient care by addressing clinical problems from the provider's perspective. Unlike other studies in concussion improvement, we employ DT to re-design the diagnostic process of patient care. Moving forward, we will modify our interventions, so that we can continue to improve the care for pediatric patients with concussion.

Elmir, Ezzeddine

Clinical & Translational Research

Skin Dosimetric Constraints that Predict Wound Complications in Extremity STS Patients Receiving Preop RT

Authors: Ezzeddine Elmir, Lucas Gilbride, Douglas Prah, Candice Johnstone, Adam Wooldridge, Ciani Ellison, John Charlson, Meena Bedi
Project Mentor and Department: Meena Bedi, MD, MS; Radiation Oncology

Purpose: Preoperative radiation therapy (RT) is accepted as a treatment modality for patients receiving limb-sparing surgery for soft-tissue sarcoma (STS) of the extremity. One disadvantage of preoperative RT is the increased risk of post-operative wound complications (WC). This study aimed to determine skin dosimetry parameters that predicted for acute WC in patients undergoing preoperative RT for STS of the extremity.
Materials/Methods: A retrospective review was performed on 56 patients undergoing preoperative RT prior to limb-sparing surgery for STS of the extremity. Contours were created at varying depths (1, 3, 5 and 10 mm) by using a Boolean function and CT scans previously utilized to plan patients' RT treatment. Logistic regression was used to determine association between WC and dosimetric data at V10, V20, V50 and Dmax at each of the contours. Receiver-operating curves (ROC) determined the best cut-off value that predicted for WC in variables significant on logistic regression. Fisher's exact test was used to determine significance of the variation in WC above and below the cut-off.
Results: All 56 patients had limb-sparing surgery. 66% had lower extremity tumors. 50 patients received 3D CRT and 6 received IMRT. 41% received neoadjuvant chemotherapy. Dosimetric parameters ST3mmV10 (p=0.018), ST3mmV20 (p=0.033) and ST5mmDmax (p=0.029) had a statistically significant association with WC. ROC revealed an increase in WC when ST3mmV10 ≥85.6% (p=0.002), ST3mmV20 ≥65.3% (p=0.014) and ST5mmDmax ≥5329 cGy (p=0.004). When ST3mmV10 ≥85.6%, 38.2% of patients had WC versus 4.5% when ST3mmV10 <85.6% (p=0.0045). When ST3mmV20 ≥ 65.3%, 44.4% had WC versus 15.8% when ST3mmV20 <65.3% (p=0.044). When ST5mmDmax ≥5329 cGy, 33.3% had WC versus 17% when ST5mmDmax <5329 cGy (p=0.0049).
Conclusion: In patients receiving preoperative RT for STS of the extremity, ST3mmV10, ST3mmV20 and ST5mmDmax were associated with WC. Future prospective studies will help validate these results.

Fisher, Max — Clinical & Translational Research

Using Preoperative Planning Software to Predict Range of Motion in Reverse Total Shoulder Arthroplasty

Authors: Max Fisher, Maxwell Hershey, Matthew Van Boxtel, Logan Andryk, Dustin Richter, Steven Grindel
Project Mentor and Department: Steven Grindel, MD; Orthopaedic Surgery

Introduction:
Reverse total shoulder arthroplasties (RTSA) can improve symptoms of pain, function, and quality of life in patients with osteoarthritis (OA) of the shoulder. The condition causes degeneration of the glenohumeral joint, resulting in pain, loss of function, and restricted range of motion (ROM). Previous studies have investigated factors that affect postoperative ROM. However, more investigation into the role of preoperative planning software in predicting postoperative ROM is needed.
Materials & Methods:
A retrospective chart review identified patients who received an RTSA. Our subjects included individuals diagnosed with primary shoulder OA. Demographic information, the reported ROMs (FF, ER at side, ER at 90 º, IR, adduction, and abduction), and the planning software's predicted ROMs (FF, ER at side, and abduction) were recorded from the charts. The ROMs were recorded preoperatively and at the most recent clinic follow-up date.
Results:
Actual postoperative ROM and computer-predicted postoperative ROM were compared. Positive predictive values for three ROM values (FF, ER at side, and abduction) were calculated. We found FF and abduction to have significant negative correlations, with p-values of 0.013 and 0.007, respectively. Additionally, when analyzing the effect of comorbid medical conditions on the predictive value of the software, we found that several conditions significantly decreased the predictive value of the software for FF, ER at side, and abduction.
Discussion:
While the data contradicted our hypothesis, the negative correlation indicates that patients' postoperative ROM will be greater than the software predicts. The knowledge that comorbidities can affect the predictive value of the software can help manage patients' expectations. This study demonstrates the importance of using planning software to guide surgical decisions. This process can allow surgeons to provide personalized care for each candidate, ensuring the best outcomes.

Flanagan, Leah — Global Health

A translational study of epigenetic and neural mechanisms of risk phenotypes for PTSD

Authors: Terri deRoon-Cassini, Dr. Gwen Lomberk, Kelley Jazinski-Chambers, Carissa Tomas, Isela Piña, Leah Flanagan
Project Mentor and Department: Terri deRoon-Cassini, PhD, and Kelley Jazinski-Chambers; Surgery

Posttraumatic stress disorder (PTSD) is a widely burdensome mental health disorder, having negative impacts on mental and physical health, financial and social wellbeing, and overall quality of life. The aims of this study are to determine epigenetic patterns associated with/predictive of risk for PTSD, evaluate how socioenvironmental stress impacts epigenetic variation, and analyze epigenetic patterns as they relate to neural circuitry activity during emotion regulation/dysregulation and PTSD symptom severity. We hypothesize that epigenetic patterns are formed by socio-environmental and economic stress factors and/or influenced by genetic factors and are associated with the development of PTSD status post injury. Data collected in the form of questionnaires & interviews (to assess risk for & severity of PTSD as well as characterize socioenvironmental stressors), biospecimen (for genetic evaluation), and neuroimaging (to map neural function phenotypes) are utilized to identify patterns as they relate to PTSD status. Data analysis is ongoing. The findings of which have the propensity to offer novel PTSD assessment/prognostic tools and insight into early intervention/prevention strategies to ultimately improve quality of life outcomes for traumatic injury survivors.

Fletcher, Jesse — Clinical & Translational Research

Analysis of Adolescent Idiopathic Scoliosis Population for Surgical Site Infection Risk Factors

Authors: Fletcher JA, Thometz JG, Liu X

Project Mentor and Department: John G. Thometz, MD and Xue-Cheng Liu, MD, PhD; Orthopaedic Surgery

Background: The incidence of surgical site infection (SSI) in Adolescent Idiopathic Scoliosis (AIS) patients undergoing corrective fusion varies but is commonly reported between 0.5-6.7%. Current literature suggests several potential risk factors for SSI as well as SSI prevention techniques, but evidence in support of these varies. The development of SSI is a cause of significant morbidity and cost to patients and their families. Further exploration into risk factors for SSI in AIS patients and how to mitigate them is warranted. We hypothesized that multiple key factors are associated with an increased risk of SSI in the surgical correction of AIS. We aimed to determine the incidence of SSI in patients with AIS undergoing primary fusion at our hospital, explore demographic and clinical variables in the development of SSI in AIS patients, and compare SSI prevention techniques noted in the literature and used at our hospital.

Methods: Patients aged 10-19 that underwent posterior spinal fusion for initial correction of AIS at our hospital between the years 2012-2020 were included. Patients with any previous spine surgery or spine fracture were excluded. In total, 818 patient charts were reviewed and 333 met inclusion criteria with data collected on multiple variables. A descriptive analysis was performed on the data.

Results: One SSI was identified resulting in an incidence of infection of 0.3%. Antimicrobial preparation was used in 196 cases and Betadine solution was used in 320. Antibiotic-loaded allograft or antibiotic powder was used in 224 cases and intraoperative antibiotics were used in 325.

Conclusion: Due to identifying only a single SSI, we were unable to draw statistically significant conclusions on which factors represent true risk for infection. The low incidence of infection provides additional evidence for the benefit of infection prevention techniques previously suggested in the literature.

Forest, Gabriel — Global Health

Greenhouse Gas Emissions from Milwaukee County, WI Emergency Medical Services Transport in 2019

Authors: Gabriel Forest, Caitlin Rublee, Joanne Bernstein, Ben Weston, Alexis Puyleart

Project Mentor and Department: Joanne Bernstein, MD; Medicine – General Internal Medicine

The United States transportation sector emits the most greenhouse gas emissions of any economic sector. While understudied, emergency care ground transport via non-electric ambulances causes pollution from the combustion of fossil fuels. The purpose of this project was to quantify carbon emissions of ambulance transports in Milwaukee County, Wisconsin. Milwaukee County Emergency Medical Services system is a countywide system with 14 municipal fire departments serving 945,726 people and covering 241 square miles. Annual transport volume and distance traveled per ambulance response call from scene to facility were retrospectively collected from the Milwaukee County Office of Emergency Management during 2019. One-way individual transport distances via odometer readings were summated and compared with call volumes to obtain an estimate for the distance travelled per patient encounter. Monthly and annual emissions in carbon dioxide equivalents were then quantified using the Environmental Protection Agency equivalency calculator.

From January 1 - December 31, 2019, there were 92,850 calls and 37,908 transports with an average distance per patient transport of 5.24 miles. The total transport miles from scene to facility was 198,637 miles. Estimated annual emissions equate to 170,888 kilograms (kg) of carbon dioxide equivalents. With a total 37,908 transports in 2019, this exceeds 4.2 kg of carbon dioxide equivalents per patient transport. The highest monthly emissions were July with 14,690 kg and August with 14,210 kg (Min 13,233 kg in February). Results identify key mitigation opportunities for Emergency Medical Services to reduce transportation impact and incentivize policies that incorporate environmental footprint, adopt best use practices, and commit to electrifying ambulance fleets for the health of patients and first responders.

Franklin, Rivka — Clinical & Translational Research

A 67-Year-Old Woman with CLL and Acute Liver Failure

Authors: Rivka Franklin, Pinky Jha, James Miller, Maxwell Hershey
Project Mentor and Department: Pinky Jha, MD, MPH; Medicine – General Internal Medicine

Background: Chronic lymphocytic leukemia (CLL) is the most common form of leukemia in adults in the Western world. However, hepatic liver failure, not due to a Richter's transformation, is an uncommon presentation in CLL.
Clinical Case: A 67-year-old African American female with a past medical history of indolent CLL, presented with acute hepatic failure. Initial tests were consistent with hepatic liver failure, with elevated ALP 773 U/L, AST 196 U/L, ALT 276 U/L, Albumin 4.3 g/dL, Bilirubin 3.2 mg/dL, PTT 10.8 seconds, and INR 1.0. The white cell count was 8.3 k/uL. The hemoglobin was 12.6 g/dL. The platelet count was 318 k/uL. The differential revealed 57% neutrophils, 2% eosinophils, 1% basophils, 31% lymphocytes, and 8% monocytes. RUQ ultrasound showed enlarged periportal lymph nodes up to 3.9 cm. She underwent an acute hepatitis panel for further evaluation of her transaminitis, which was negative for viral hepatitis. In addition, the patient was negative in a screen for urine drugs of abuse and acetaminophen. US-guided liver core biopsy revealed hepatic involvement of CLL/SLL, seen as dense monotonous lymphocytic infiltrates in the portal tracts. Immunohistological studies showed that these lymphocytes were negative for CD10, BCL-6, and BCL-1, indicating no evidence of progression to a large B-cell lymphoma and thus ruling out a Richter transformation. The patient is currently undergoing inductive chemotherapy while her laboratory results are being closely followed.
Conclusion: This is one of the few cases demonstrating hepatic involvement of CLL/SLL without evidence of progression to a large B-cell lymphoma, thus ruling out a Richter transformation.

Gallagher, Meghan — Urban & Community Health

Inpatient vs outpatient management of gestational hypertension or preeclampsia without severe features

Authors: Meghan Gallagher, Blake Neuburg, Melodee Liegel, Amy Phan, Anna Palatnik
Project Mentor and Department: Anna Palatnik, MD; Obstetrics and Gynecology

Objective:
To compare maternal and neonatal outcomes and gestational latency in patients diagnosed with gestational hypertension or preeclampsia without severe features who were managed inpatient versus outpatient.
Study Design:
A retrospective, cohort study of patients with HDP without severe features before 37 weeks 2014-2021. Patients were managed either inpatient or outpatient at the discretion of their obstetric provider. Patients with initial presentation with severe features were excluded. The primary outcome was severe maternal morbidity (SMM) as defined by one or more of the 21 CDC maternal morbidity identifiers. Secondary outcomes included maternal ICU admission, development of severe features, placental abruption, time from diagnosis to delivery, preterm birth< 37 weeks, low birthweight (< 2500g), 5-minute Apgar score < 7, and stillbirth.
Results:
A total of 279 patients met the inclusion criteria with 236 (84.6%) being managed outpatient and 43 (15.4%) being managed inpatient. In univariate analysis, SMM rates were higher in inpatient compared to outpatient group (14.0% vs. 2.3%, p=0.001). Maternal ICU admission was higher in the inpatient management group (7.0% vs. 0.4%, p< 0.001). Frequencies of placental abruption and development of severe features did not differ between the groups. Time from diagnosis to delivery was longer in the outpatient compared to inpatient group (13d vs. 3d, p< 0.001). Low birth weight and preterm birth were more frequent in the inpatient group. In multivariate analyses, controlling for gestational age at HDP diagnosis, HDP type, twin gestation, maternal diabetes, BMI, and residential distance from hospital, SMM did not differ between the groups (aOR 0.17, 95% CI 0.02-1.78) All secondary outcomes did not differ between outpatient and inpatient management groups.
Conclusion:
Outpatient management of gestational hypertension or preeclampsia without severe features was not associated with adverse maternal or neonatal outcomes.

Garren, Anna — Quality Improvement and Patient Safety

What is a paraesophageal hernia? The case for a more precise definition

Authors: Garren A, Gould J
Project Mentor and Department: Jon Gould, MD, MBA; Surgery

Introduction: In patients with hiatal hernias complicated by refractory GERD, dysphagia, or post-prandial chest/epigastric pain, laparoscopic repair is considered the standard of care. Type I hiatal hernias occur when the gastroesophageal junction (GEJ) migrates above the diaphragm. With type III hiatal hernias, both the GEJ and the fundus of the stomach migrate above the hiatus. When a large type I transitions to a small type III is unclear but has important implications when examining outcomes.
Methods: A retrospective review of prospectively maintained data was performed for patients who underwent repair of hiatal hernias between January 2019 and April 2021. Perioperative outcomes were assessed with the Gastroesophageal Reflux Disease Health Related Quality of Life (GERD-HRQL) instrument.
Results: 82 patients were included, 29% (n=24) of which had a type I hiatal hernia (2-5 cm), while 71% (n=58) had a larger type II-IV hiatal hernia (all >5-cm axial). Mean interval between surgery and follow-up assessment was 16 months for smaller hernias and 15 months for larger hiatal hernias (p=0.83). There was a statistically significant difference in postoperative composite GERD-HLRQ scores (p=0.02), dysphagia (p=0.02), and use of acid reduction medications (p=0.02), with type I hiatal hernias scoring worse in all measures. Patients undergoing repair of type II-IV hernias had an increased length of stay following surgery ($p<0.05$) and more often required mesh (13% smaller vs 48% larger, $p<0.01$).
Conclusion: Patients who undergo surgical repair of smaller hiatal hernias tend to be have an impaired disease-specific quality of life long-term compared to patients with larger hiatal hernias. The literature as it relates to hiatal hernia repair outcomes is confounded by the fact that many investigators include smaller hernias in their paraesophageal hernia cohort. A more precise classification system for hiatal hernias is necessary given the clear differences in patient outcomes.

Gerdes, Austin — Clinician Educator

Use of core medication teaching elements at ED discharge differs by staff role

Authors: Austin Gerdes, Cori Gibson, Jaclyn Moeller, Chris Spahr, Andrea Morrison
Project Mentor and Department: Andrea Morrison MD, MS; Pediatrics – Emergency Medicine

Objective To improve the percentage of pediatric emergency department discharges with core medication teaching elements covered during discharge teaching.
Methods An improvement team determined key drivers of patients receiving quality discharge medication teaching. Interventions included workflow improvement, staff training on best practices, improvements in the EHR discharge tools, and boost trainings at staff meetings.
A discharge observation checklist, including discharging staff role and core medication teaching elements, was completed by a trained observer. Analysis included the percentage of each element as well as all elements as an overall percentage of the checklist completed. The percent of discharges with the element completed were followed on statistical process control charts (p-charts).
Results A total of 267 discharges were observed using the developed core medication teaching elements checklist. During the implementation period, a "Helping Hands" program, consisting of mainly NPs, began to aid with discharges in high turnover areas of the ED during times of staff attrition and high ED volumes. A total of 204 discharges by RNs and 63 by NPs were observed. Overall, the core medication teaching elements were completed on average 57.2% of the time. There was no special cause noted during the study period.
When comparing RNs vs the NPs in the discharge specific role, NPs were found to teach the overall medication regimen (35% vs 20%), medication dose (85% vs 73%) and frequency (94% vs 85%), significantly more than staff nurses ($p<0.05$ for all).
Conclusions There was no significant increase in the core medication teaching elements over time. There were differences by staff teaching role (RN vs NP) with each demonstrating different strengths in medication teaching. This not only serves as evidence for interdisciplinary teaching, but also demonstrates the need for role clarity and ensuring staff have the time and tools needed for safe ED discharge.

Gerlach, Leah — Urban & Community Health

The Use of an Atrophy Index to distinguish Cognitive Decline: An automated volumetric MRI Study

Authors: Leah R Gerlach, Vivek Prabhakaran, Piero G Antuono, Elias Granadillo
Project Mentor and Department: Elias Granadillo, MD; Neurology

Intro: Determining etiologies of dementia can be difficult, yet specific diagnosis is necessary to manage cognitive decline. Alzheimer Disease (AD) and Frontotemporal disorders (FTD) present similarly, and magnetic resonance imaging (MRI) can be used to identify patterns of brain atrophy and aid in diagnosis. Automated software tools like Neuroreader (NR) have been developed to report volumetric data for segments of the brain and have been shown useful in distinguishing types of dementia in research cohorts. The use of an anterior vs. posterior index (API) could aid in distinguishing AD from FTD, but evidence surrounding accuracy in clinical cohorts is limited. We hypothesize that an API from NR data can accurately predict AD vs FTD diagnosis in a clinical cohort.
Methods: Patients with AD or FTD and NR were included. A retrospective chart review was completed. We derived a simplified API to reflect NR data: API=((logV_A/V_P) -μ)/σ where V_A is weighted volume of frontal and temporal lobes and V_P of parietal and occipital lobes derived from NR data. μ and σ are the mean and standard deviation of logV_A/V_P computed for AD patients only. Receiver operating curves and regression analyses assessed the efficacy of the API vs. single brain areas in predicting the diagnosis of AD vs FTD as it was determined clinically.
Results: 39 patients with FTD and 78 patients with AD were included. The samples are similar in terms of demographics, mini-mental state exam score, and MRI type. The API had an excellent performance with an AUC of 0.816 in addition to a positive association with diagnostic classification on logistic regression analysis (B=1.491, $p<0.001$). Most brain areas in isolation performed poorly, except for the parietal lobe which had an AUC of 0.701, showing an acceptable performance.
Conclusion: The API can successfully distinguish AD and FTD in a clinical setting with an excellent level of performance, performing better than any studied brain area alone.

Goodman, Max — Clinical & Translational Research

Diffusion Tensor Imaging: A Step-by-Step Guide for Radiology and Neurology Clerkship Students

Authors: Max J. Goodman, Wesley T. Richerson, Dawn F. Wolfgram
Project Mentor and Department: Dawn Wolfgram, MD, MS; Medicine - Nephrology

Diffusion-tensor imaging has become common practice in radiology and imaging research due to its many applications in brain connectivity and neurodevelopment as well as for pathologies including tumors, ischemia, trauma, and neurodegeneration. However, its novelty compared to other neuroimaging techniques has meant that graduate programs, particularly medical schools, have not included opportunities to learn how diffusion tensor imaging can visualize the brain and interpretation of the data clinically and in research. Diffusion tensor imaging can be a challenging utility to understand for newcomers and is subject to wide interpretation. We offer for medical and graduate students as well as residents a step-by-step guide in interpreting diffusion tensor imaging results for clinical analysis using simple explanations of physics and neuroscience and its application in clinical and translational research.

Gorman, Allyson — Quality Improvement and Patient Safety

Adaptive Sports for All: Investigating the Socioeconomic Challenges to Participation

Authors: Allyson Gorman, Ryan Stefanczyk, Beth Weinman
Project Mentor and Department: Beth Weinman, DO; Orthopaedic Surgery

Introduction: Adaptive sports are a source of physical activity for the disabled population and the benefits are well-documented. There are barriers to participation, but no studies investigate how barriers differ among socioeconomic groups. We hypothesize that barriers to adaptive sports participation disproportionally affect participants of low socioeconomic status (SES).
Methods: A survey was emailed to adaptive sports organizations for distribution to participants. Wilcoxon rank-sum test was performed to compare the number of barriers reported between groups of low and non-low SES. Low SES indicators were female sex, low-income, public insurance, and non-white race. A simple logistic regression was fitted to compare indicators of low SES and each barrier to adaptive sports participation.
Results: Of 122 total respondents, there were no statistically significant relationships between low SES and number of barriers reported. However, analysis of secondary outcomes showed female participants were more likely to report difficulty with transportation and discriminatory attitudes; participants of non-white race were more likely to report lack of knowledge of adaptive sports opportunities and inaccessible fitness facilities; participants in the low-income group were more likely to report problems with personal cost and lack of caregiver support; and participants with public insurance were more likely to report difficulty with transportation.
Conclusion: This study identified seven barriers to adaptive sports participation among four demographic groups. While further research is warranted with a larger sample size, low-income participants seem to face more barriers to adaptive sports participation, and thus would be a good primary target for outreach programs to increase involvement.

Greenberg, Rachel — Urban & Community Health

Survey of Discrimination in Pregnant Persons and Correlation with Unplanned Healthcare Utilization

Authors: Greenberg R, Anguzu R, Jaeke E, Palatnik A
Project Mentor and Department: Anna Palatnik, MD; Obstetrics and Gynecology

OBJECTIVE: To determine the association between lifetime exposure to discrimination and unplanned healthcare utilization in pregnant persons.
STUDY DESIGN: This was a prospective cohort study of pregnant persons receiving care at a single Midwestern academic institution from 2021 to 2022. Primary data was collected from participants on sociodemographic factors and on Perceived Ethnic and Discrimination Questionnaire (PED-Q), a validated 17-item scale measuring perceived lifetime interpersonal racial and ethnic discrimination in four domains: work/school, social exclusion, stigmatization, and threat. The primary outcome was unplanned healthcare utilization, defined as unplanned labor and delivery admissions, triage, Emergency Department, or urgent care visits. Bivariate and multivariate analyses were done to examine the association between lifetime exposure to discrimination and unplanned healthcare utilization.
RESULTS: A total of 289 completed the PED-Q and were included in the analysis. Of these, 123 (42.6%) had unplanned healthcare utilization. Median [interquartile range] of lifetime discrimination was higher in the unplanned healthcare utilization group (1.6 [1.2, 1.9] vs. 1.4 [1.1-1.8], p=0.017). Univariate analysis showed that lifetime discrimination was significantly associated with unplanned healthcare utilization (OR 1.96, 95% CI 0.23-3.11). Significant associations were found between unplanned healthcare utilization and maternal age (p=0.04), insurance type (p=0.01), married status (p< 0.001), education (p=0.013), household income (p=0.001), and chronic hypertension (p=0.004). After controlling for potential confounding factors, perceived lifetime discrimination remained significantly associated with higher odds of unplanned healthcare utilization (aOR 1.78, CI 95% 1.01-3.11).
CONCLUSION: We found that a higher level of perceived lifetime discrimination was associated with increased unplanned healthcare utilization during pregnancy.

Grissim, Garrett — Bioethics & Medical Humanities

Longitudinal Assessment of Cone Structure in Congenital Achromatopsia

Authors: Grissim, Garrett, Carroll, Joseph
Project Mentor and Department: Joseph Carroll, PhD; Ophthalmology and Visual Sciences

Purpose: Achromatopsia (ACHM) is an autosomal recessive disease that results in reduced or absent cone function. There is controversy regarding the extent to which cone structure shows progressive degeneration in ACHM. Here we performed a retrospective review of optical coherence tomography (OCT) images to evaluate cone structure over time in patients with genetically confirmed ACHM.
Methods: Sixty-three patients with ACHM (due to CNGA3, CNGB3, or ATF6 mutations) with Bioptigen or Cirrus OCT images from multiple time points stored in the Advanced Ocular Imaging Program Bank were included. Integrity of the ellipsoid zone (EZ) was assessed twice by a single grader (GG) in a masked fashion using the grading scale from Sundaram et al (2014). Images with disparate grades between the two assessments were finalized by a second grader (JC).
Results: A total of 465 OCT images were processed and graded, 243 OD and 222 OS. The baseline distribution of EZ grades was highly symmetrical between eyes (OD: I=8, II=33, III=2, IV=17, V=3; OS: I=8, II=32, III=2, IV=17, V=2). The average patient age was 23.01 years at the first visit and 26.03 at the last visit, with an average time between visits of 2.92 years for OD images and 2.59 years for OS images (range from 5 months to 10 years). A total of five eyes showed change in EZ grade (OD: n=3, OS: n=2) across follow-up from a grade II (EZ disruption) to grade IV (hyporeflective zone). These eyes belonged to three individuals (aged 24, 29, & 35 years), representing 4.76% of the total study group. The remaining 60 subjects, 95.24% of the total study group, retained the same EZ grade throughout the follow-up period.
Conclusions: ACHM appears to be a generally stable condition, at least over the follow-up period assessed here. Even with stable EZ appearance there may be other factors that impact the therapeutic potential of a given ACHM retina, which may change/progress over time.

Grogan, Laura — Quality Improvement and Patient Safety

Impact of patient safety bundle and team-based training on obstetric hypertensive emergencies

Authors: Laura Grogan, Erika Peterson, Megan Flatley, Amy Domeyer-Klenske MD
Project Mentor and Department: Amy Domeyer-Klenske, MD; Obstetrics and Gynecology

Background Hypertensive disorders of pregnancy, chronic (<20 weeks) or gestational (>20 weeks), are a leading cause of pregnancy related mortality in the United States1. Hypertensive disorders of pregnancy had increased prevalence from 13.3% to 15.9% among delivery hospitalizations between 2017 and 20191. The objective of this project was to increase the percentage of obstetric patients with hypertensive emergency who received evidence-based treatment within 60 minutes.
Methods Data was collected before and after the implementation of a hypertension patient safety bundle. Each occurrence of hypertensive emergency was assessed to determine if evidence-based intervention occurred within 60 minutes, and if the intervention steps were successfully followed.
Implementation included creation of an order set and interdisciplinary team-based simulations. Baseline data compared 250 pre- to 250 post-implementation interventions. The quality improvement interdisciplinary team reevaluated data monthly and incorporated process improvements through Plan Do Study Act (PDSA) cycles.
Results A total of 1025 hypertensive emergencies were identified in 543 patients. Prior to the protocol on average 64% of patients received evidence-based, timely treatment. After implementation of this bundle and several PDSA cycles, we sustained >80% of patients receiving target treatment for the final six months of data collection. The leading deviations were “no medication given” and “incorrect medication” (PO labetalol instead of IV). Order set accessibility and repeated team-based trainings led to improvement in protocol deviations for incorrect medication and no medication given.
Conclusion Implementation of a patient safety bundle led to sustained improvement in treatment of obstetric hypertensive emergency within 60 minutes. Processes that helped achieve this outcome included standardized order sets, team awareness of institutional data and team-based simulations.

Gross, Kendall — Clinical & Translational Research

Utilization and Adequacy of Telemedicine for Outpatient Pediatric Surgical Care

Authors: Kendall Gross, Christina Georgeades, Manzur Farazi, Lynn Calaway, David Gourlay, Kyle J Van Arendonk

Project Mentor and Department: Kyle Van Arendonk, MD, PhD; Surgery – Pediatric Surgery

Introduction. Telemedicine (TM) use accelerated out of necessity during the COVID-19 pandemic, but the utility of TM within the pediatric surgery population is unclear. This study measured utilization, adequacy, and disparities in uptake of TM in pediatric surgery during the COVID-19 pandemic.

Material and Methods. Scheduled outpatient pediatric surgery clinic encounters at a large academic children's hospital from 1/2020 through 3/2021 were reviewed. Subgroup analysis examined post-operative (PO) visits after appendectomy and umbilical, epigastric, and inguinal hernia repairs.

Results. Of 9,149 scheduled visits, 87.9% were in-person and 12.1% were TM. TM visits were scheduled for PO care (76.9%), new consultations (7.1%), and established patients (16.0%). Although TM visits were more frequently canceled or no-shows ($p<0.001$), most canceled TM visits were PO visits, of which 41.7% were cancelled via electronic communication reporting the absence of any PO concerns. TM visits were adequate for accomplishing visit goals in 98.2%, 95.5%, and 96.2% of PO, new, and established patient visits, respectively. Patients utilizing TM visits were more frequently of white race, privately insured, from less disadvantaged neighborhoods, and living a greater distance from clinic ($p<0.001$ for all comparisons).

Conclusions. TM was adequate for the majority of visits in which it was utilized, including the basic PO visits that occurred via TM. TM was used more by patients with greater travel and less by those of minority race, with public insurance, and from more disadvantaged neighborhoods. Future work is necessary to ensure broad access to this useful tool for all children requiring surgical care.

Gutkin, Paulina — Clinical & Translational Research

Local control outcomes using stereotactic body radiotherapy or surgical resection for metastatic sarcoma

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Project Mentor and Department: Beth Erickson, MD; Radiation Oncology

Introduction Traditional management of metastatic sarcoma primarily relies on systemic therapy, with surgery often used for tumor control. We analyzed the rates of recurrence, overall survival, and treatment complications in patients undergoing either surgical resection or stereotactic body radiotherapy (SBRT) for metastatic sarcoma of the bone and/or soft tissue.

Methods The records of patients with metastatic sarcoma between 2009-2020 were reviewed. Local recurrence (LR) was defined as tumor growth at the tumor site. Cumulative LR incidence was analyzed, and groups were compared using the Gray-test. Overall survival (OS) was assessed using the Kaplan Meier method and log-rank test. Hazard ratios were determined using Cox proportional test.

Results A total of 525 metastatic lesions in 217 patients were analyzed. Two-year cumulative incidences of LR for surgery and SBRT were 14.8% and 1.7%, respectively ($p=0.003$). LR occurred in 72/437 (16.5%) tumors treated with surgery and 2/88 (2.3%) tumors treated with SBRT. Adjusted hazard ratio for LR of lesions treated surgically was 11.5 ($p=0.03$) when controlled for tumor size and site. Median OS was 29.6 months. Of 275 procedures, there were 47 surgical complications. Of 58 radiation treatment courses, radiation-related toxicity was reported during the treatment of 7 lesions (12%), and none were higher than grade 2.

Conclusion We observed excellent local control among patients selected for treatment with SBRT for metastatic sarcoma, with no evidence of increase in LR following SBRT when compared to surgical management. Further investigation is necessary to better define the most appropriate local control strategies for metastatic sarcoma.

Hamad, Bushra — Global Health

Factors associated with delayed identification and amplification of congenital sensorineural hearing loss

Authors: Marc Drake, Bushra Hamad, Gifty Marfowaa, David R. Friedland, Jazzmyne A Adams, Valerie Flanary,
Project Mentor and Department: Valerie Flanary, MD and Marc Drake, MD; Otolaryngology

Introduction: Universal newborn hearing screening (NBHS) programs have resulted in early identification of patients with hearing loss. However, clinical and social factors may lead to a delay in amplification or progression to cochlear implantation.
Objectives: To identify the impact of social determinants of health and clinical status on referral and intervention for congenital sensorineural hearing loss.
Methods: Retrospective observational cohort study of all children with congenital sensorineural or mixed hearing loss identified after newborn hearing screen between 2013 and 2021 in an academic children's health system.
Results:
Non-white race, prematurity, and public insurance were associated with delay in hearing aid referral and fitting ($p<0.05$). Public insurance was associated with prolonged interval between referral and hearing aid fitting ($p<0.01$).
Privately insured patients and patients with a positive CMV test were more likely to: be referred for cochlear implant ($p<0.01$), seen in cochlear implant clinic for evaluation ($p<0.05$), and to undergo implantation ($p<0.01$).
Conclusions: Sociodemographic factors were significantly associated with rates of referral for auditory rehabilitation for children with identified congenital sensorineural hearing loss.

Hammond, Alexander — Clinical & Translational Research

Differences in Tenon's Capsule Fascia with Aging and Previous Ocular Surgery

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Project Mentor and Department: Smith Ann M Chisholm, MD and Iris Kassem, MD, PhD; Ophthalmology and Visual Sciences

Tenon's capsule fascia is encountered during strabismus surgery, but its composition and function remain poorly understood. As a result, there is no consensus whether Tenon's fascia in the surgical field should be minimally disrupted or excised widely. This study tested the hypothesis that there are differences in the composition and abundance of Tenon's capsule proteins with aging and after strabismus surgery. Tenon's capsule samples were collected from 40 subjects who were undergoing strabismus surgery. Samples were collected from subjects in 3 age groups:
a) children (<18 years old)
b) adults (18 to <55 years old)
c) older adults (55 years and older)
Each group had 2 subgroups: surgically naïve (SN) subjects and subjects who had prior strabismus surgery (PSS). Samples were collected from 6 subjects in each of the 6 subgroups. Data from 30 randomized subject samples were analyzed by liquid chromatography with tandem mass spectrometry.
Type I and type III collagen were found to decrease with age in SN subjects. SN children had 3-fold more abundant type I collagen compared to SN adults and 12-fold compared to SN older adults. Type III collagen was 24-fold more abundant in SN children than SN older adults.
Type I and type III collagen were found to be less abundant in PSS children and PSS adults compared to the SN children and SN adults, respectively, but were more abundant in PSS older adults compared to SN older adults.
Our results confirm our hypothesis that the protein composition of Tenon's fascia changes with age and prior strabismus surgery. The decrease in collagen with age was consistent with the authors' observation that Tenon's fascia is thick in children and thin in older adults. The decrease in collagen in PSS children and adults compared to SN subjects was unexpected as scar tissue is comprised of these proteins and was expected to increase following surgical intervention.

Hargreaves, Mathew — Quality Improvement and Patient Safety

Sensitivity of PD-L1 immunohistochemistry to storage time of histological sections

Authors: Mathew Hargreaves, Rehaan Macchi, Yunguang Sun, John F. Langenheim, Linna Ge, Julie M. Jorns, Hallgeir Rui

Project Mentor and Department: Hallgeir Rui, MD, PhD; Pathology

Immunohistochemical detection of PD-L1 in formalin-fixed, paraffin-embedded (FFPE) tumor samples is important for guiding patient cancer treatment and for research. Multiple antibodies have been approved for clinical use. However, loss of PD-L1 antigenicity has been reported in histological sections that are stored before immunohistochemistry is performed. We examined the robustness of commercially available PD-L1 antibodies against epitope degradation in sections during storage.

Methods Sections of FFPE placenta tissue cut freshly or stored for 1-3 months or for 1-5 years underwent DAB chromogen immunohistochemistry with seven different PD-L1 antibodies and PD-L1 staining intensity was quantified using QuPath image analysis software.

Results Over 3 months of slide storage, PD-L1 antibody 22c3 displayed the least signal intensity loss while SP142 showed the greatest signal reduction. When comparing 22c3, 28-8, SP263, SP142, CAL10 and 73-10 signal intensity at 1 year, 22c3 retained the highest signal intensity at 45.5%. After 5 years, all of the antibodies had >80% reduction in signal intensity.

Discussion Our study indicates that 22c3 outperforms other PD-L1 IHC assays in aging tumor samples. The antibodies used to detect PD-L1 bind to different epitopes which may play a role in the loss of detection of PD-L1 over time. The work underscores the importance of using fresh cut sections for optimal PD-L1 immunohistochemistry, and that interpretational caution should be taken if researchers or pathologists interpret PD-L1 staining of sections stored for prolonged or for different lengths of time.

Harter, Joseph — Health Systems Management & Policy

Enhancing informed consent for newborn circumcision: A call for education and strategies for improvement

Authors: Joseph A. Harter, Steven R. Leuthner, Alicia Sprecher

Project Mentor and Department: Alicia Sprecher, MD; Pediatrics - Neonatology

Purpose: Consent for newborn circumcision (NC) is often based on cultural influences and familiarity with a circumcised or intact (uncircumcised) penis, rather than an understanding of the practical risks and benefits of the surgery. We aimed to strengthen parental informed consent for newborn circumcision by improving the educational resources available to parents and promoting open discussions with providers.

Methods: Interventions included the creation of two new teaching sheets that provided information on NC and intact penis care. The teaching sheets were distributed in prenatal classes, the newborn nursery, and used to update web-based resources. The primary outcome measure was the incidence of NC. Parents of male infants were surveyed on their understanding of NC and the consent process before and after the interventions. P-charts were used to analyze trends and determine if a sustained shift occurred.

Results: The incidence of NC remained at 84.3% during the study period. A total of 112 parent surveys were submitted. 47.1% of parents reported that a conversation with a provider aided their decision about NC. Despite this, only 44.9% of parents reported discussing NC with a provider before admission for delivery. 51.9% of parents who elected for NC were explained both the risks and benefits of the surgery. Parents' leading reasons for NC were hygiene (76.6%), to look like family members (40.4%), and to reduce the risk of UTIs (37.2%). There were no sustained shifts or trends in these values during the study period.

Conclusion: This study demonstrates that families value input from providers when deciding about NC. However, these discussions frequently do not occur until after delivery, and the risk-benefit conversation is often incomplete. There was no detected change in the timing or nature of NC education. Future interventions will focus on incorporating the teaching sheets into OB prenatal clinics to facilitate conversations remote from delivery.

Helding, George — Clinical & Translational Research

Hormone Therapy for Transgender Individuals and Risk of Suicidal Ideation

Authors: George Helding, Kevin Robertson MD
Project Mentor and Department: Kevin Robertson; Family and Community Medicine

Hypothesis: This study aims to prove that transgender individuals who have a shorter period between recognizing their gender identity and accessing gender-affirming hormone therapy have a decreased risk of suicidal ideation as adults.
Specific Aims: This study uses multivariable logistic regression to examine any associations between the period before accessing GAHT and risk of suicidal ideation within the past 12 months among respondents to the 2015 US Transgender Survey.
Study Methods: We identified 12,943 individuals who reported ever receiving hormone therapy and also provided answers to all relevant demographic questions. Using respondents' answers to questions, "At what age did you begin taking hormone therapy?" and "At what age did you start to think you were transgender?", a new variable was calculated to represent the period between when a patient recognized their gender identity and when they accessed hormone therapy.This new independent variable was then used in a multivariable logistic regression modelling an individual's suicidal ideation over the past 12 months. The model was adjusted for demographic variables independently associated with suicidal ideation including age, age of gender awareness, gender identity, sex at birth, sexual orientation, race, education level, income level, and family support.
Results: After controlling for all demographic variables, a longer period between realizing their gender identity and accessing hormone therapy was associated with increased odds of suicidal ideation over the past 12 months (aOR=1.032, p<0.0001). With each additional year in the period between realizing their gender identity and accessing hormone therapy, there is 3.2% increase in the odds of suicidal ideation in the past 12 months.
Conclusion: Not only does GAHT help resolve many of the immediate issues associated with gender dysphoria, but it also has positive effects in regard to the long term mental health outcomes of transgender individuals.

Henry, Katie — Global Health

Comparative efficacy randomized controlled trials in rheumatology guidelines

Authors: Katie Henry, Desh Nepal, Erin Valley, Connor Pedersen, Alí Duarte-García, Michael Putman
Project Mentor and Department: Michael Putman, MD, MS; Medicine - Rheumatology

Background
Comparative efficacy randomized controlled trials (RCTs) compare two active interventions in a head-to-head design. They are useful for informing clinical practice guidelines, but the degree to which such trials inform clinical practice guidelines in rheumatology is unknown.
Methods: The American College of Rheumatology (ACR) and European Alliance of Associations for Rheumatology (EULAR) websites were searched from 1/1/2017-6/12/2021 for clinical practice guidelines. RCTs referenced by each guideline were identified, and information regarding design and outcomes were extracted. Clinical practice recommendations from each guideline were also analyzed.
Results: Fifteen ACR and 9 EULAR endorsed guidelines were included, which cited 609 RCTs and provided 481 recommendations. Referenced RCTs enrolled an average of 418 patients (SD 985), most commonly evaluated biologic/targeted synthetic disease-modifying antirheumatic drugs (b/tsDMARDs) (70.1%), and infrequently utilized a head-to-head design (28%). A minority of recommendations received a high level of evidence (LOE) by the Grades of Recommendation, Assessment, Development, and Evaluation (GRADE) methodology (2.9%) or an "A" grade by the Oxford Centre for Evidence based Medicine Standards (OCEBM) methodology (28.9%). LOE was higher for recommendations informed by RCTs ($p < 0.001$) or head-to-head RCTs ($p = 0.008$). Many recommendations received a strong recommendation despite low (8, 2.6%) or very low (25, 8.3%) LOE.
Conclusion: Less than 1 in 6 rheumatology guideline recommendations are informed by head-to-head RCTs. Recommendations that were informed by head-to-head RCTs were more likely to have a high LOE by both GRADE and OCEBM. Efforts to introduce more comparative efficacy RCTs should be undertaken.

Herold, Kaila — Global Health

Breast sensation is important to patients: Which factors matter and how do we quantify them?

Authors: Kaila M. Herold, David D. Rivedal, Karri A. Adamson, John A. LoGiudice, Erin L. Doren
Project Mentor and Department: Erin Doren, MD, MPH; Plastic Surgery

Background: Loss of breast sensation following mastectomy decreases patient satisfaction, quality of life (QOL) and sexual function. Advances in breast reconstruction include techniques for restoring sensation of the breast. Despite this, breast sensation and quantification are poorly understood. This study attempts to define baseline breast sensation.
Methods: A single center prospective study was conducted on women 18 years or older with no prior history of breast surgery. The patients underwent Semmes-Weinstein monofilament (SWM) sensory testing over nine areas of the breast bilaterally. Patients completed a survey involving objective and subjective inquiries related to breast sensation. Linear mixed model and Pearson's correlation were used for statistical analysis.
Results: 53 women participated. The upper breast skin quadrants were the most sensitive part of the breast compared to the nipple (2.54 vs. 2.88, $p<0.001$). The nipple was found to be more sensitive than the areola (2.88 vs. 3.35, $p<0.001$)). Survey responses demonstrated that 56.6% and 67.9% of participants considered breast sensitivity moderately to highly important to their quality of life and sexuality, respectively. 55% of participants expressed moderate to high concern about an overall loss of breast sensitivity post-operatively, with 60.4% of participants expressing moderate to high concern about loss of erogenous sensation.
Conclusion: Patients report that breast sensitivity impacts their QOL and are concerned about losing sensation with breast surgery. Breast sensation quantification is an important aspect of complete breast care for the reconstructive surgeon, especially when evaluating outcomes of sensory restoration procedures. Quantification tools beyond SW monofilament should be considered.

Hershey, Maxwell — Clinical & Translational Research

Revision reverse shoulder arthroplasty has similar outcomes to primary reverse at 5 year follow-up

Authors: Hershey ML, Trenga AP, Roge SA, Fisher MR, Grindel SI
Project Mentor and Department: Steven I. Grindel, MD; Orthopaedic Surgery

Introduction: Total shoulder arthroplasty (TSA) is a successful procedure that not only provides pain relief, but also improves range of motion. In this study, we look at the outcome of revision reverse total shoulder arthroplasty and compare it to the outcomes of primary reverse and anatomic total shoulder arthroplasty. We hypothesize that those with revision reverse TSA will have worse long-term outcomes both in range of motion and ability to perform activities of daily living (ADLs) than after primary reverse or anatomic TSA.
Methods: We identified patients undergoing total shoulder arthroplasty at Froedtert between 2010 and 2020. Data was prospectively collected and retrospectively reviewed for post-operative range of motion (ROM), strength, and ADLs in patients with revision surgery and compared to controls. We also collected patient reported outcome measures (PROMs) to identify subjective outcomes of TSA.
Results: Our total patient sample was split between three groups: those with primary anatomic TSA (PA), those who underwent primary reverse TSA (PR), and those who were revised to a reverse shoulder arthroplasty (RR). All three groups had improvements in abduction and forward elevation ($p<0.01$ for all) from their pre-operative baseline to two years follow-up. Of the ROMs, PR had a significantly better improvement than RR in abduction at one year follow-up, but not two years ($18.53 ^\circ \pm 7.05 ^\circ$, ANCOVA $p<0.01$). For PROMs, the ASES and SST score had a significant increase from pre-op to most recent follow-up in all three groups, whereas pain scores only decreased in the PA and PR groups ($p<0.01$ for all). SST scores for RR were worse than PR at most recent follow-up of 5.27 years ($p=0.01$).
Conclusion: Our data suggest there is an improvement in ROMs and PROMs with both the primary and revision surgeries, and that results after revision reverse total shoulder arthroplasty are similar to primary reverse total shoulder arthroplasty.

Heschke, Rachel — Global Health

Climate change vulnerability and opportunities for adaptive capacity in patients with heart failure

Authors: Rachel Heschke, Joanne Bernstein
Project Mentor and Department: Joanne Bernstein, MD, MSE; Medicine – General Internal Medicine

BACKGROUND: Climate Change, a global crisis, affects health through changes such as more intense and longer lasting heatwaves. Some populations are more vulnerable to such events, including those with certain medical conditions, like heart failure. This study aimed to improve understanding of heat-related vulnerabilities and opportunities to enhance adaptive capacity of patients within an ambulatory heart failure clinic.
METHODS: Zablocki VA Heart Failure Clinic patients voluntarily completed a 25-question multiple-choice survey. We present descriptive statistics of the survey responses with count and percentage for categorical responses.
RESULTS: We found 46.55% of patients surveyed strongly agreed or agreed they would benefit from discussing heat-illness related risks with their physician (n=60). 31.58% were not aware their heat-illness risk is higher on days >90 degrees. Several vulnerability factors were common: 70.69% follow a prescribed fluid restriction, 33.33% live alone, 20.34% lack a car with air conditioning, and 20.00% worried about ability to pay electric bills. Notable knowledge gaps included 65% do not check forecasted temperatures, 60% do not plan activities for the coolest times of day, 43.10% lacked awareness of cooling centers, 27.12% lacked awareness of Wisconsin's Focus on Energy program, and 20% were unsure of heat-illness symptoms.
CONCLUSIONS: A sizable portion of patients felt they would benefit from discussing heat-illness risk with their physicians, and many underestimated their personal risk. Additionally, multiple vulnerability factors were highly prevalent and knowledge gaps were demonstrated. Our findings support adaptive capacity opportunities through heat-illness education and anticipatory guidance for patients with heart failure in ambulatory settings.

Ishueva, Camila — Clinical & Translational Research

Pathophysiology, Phenomenology, Disability, and Surgical Treatment of Tremor in Multiple Sclerosis

Authors: Camila Ishueva, Scott Beardsley, Aristide Merola, Ahmed Z. Obeidat
Project Mentor and Department: Ahmed Z. Obeidat, MD, PhD; Neurology

Tremor is a common complication of multiple sclerosis (MS). Nearly half of MS patients report disabling postural or intention tremor. However, little is known about its pathophysiology, phenomenology, associated disability and possible surgical treatments. We aim to review the pathophysiology, phenomenology, disability, and possible surgical treatments of MS tremor through a systematized review of current literature. In sequential order of prevalence, nine studies discussed tremor phenomenology, five studies were classified as pathophysiology, and two studies focused on disability. No studies addressed pediatric MS tremor. Majority of studies focused on deep brain stimulation (DBS) and there is no consensus on their effectiveness or long-term safety. Few surgical research discussed ultrasound and gamma knife thalamotomy as a treatment for MS tremor. Phenomenology studies discussed use of scale metrics such as the Expanded Disability Status Scale (EDSS) or the Fahn-Tolosa-Marin tremor rating scale (FTM), and characterizing MS tremor via accelerometry. Other studies used physical exam maneuvers like goal-directed tasks or the finger-to-nose test to describe MS tremor phenomenology. Several pathophysiology studies reported that MS tremor may be related to cerebellar and thalamic dysfunction. Possible structures associated with MS tremor pathogenesis included the cerebellum, thalamus, areas within the brainstem and cortex. Studies on disability focused on personalized accessibility tools such as custom wheelchairs. We identified several gaps in MS tremor research. Further, MS measures of disability does not effectively incorporate tremor impact and an MS-specific PRO tool for tremor does not exist. Several opportunities for future studies are discussed.

Jain, Sparsh — Clinical & Translational Research

High Rates of Chronic Constipation in Inflammatory Bowel Disease Patients

Authors: Sparsh Jain, Andres Yarur ,Sneha Nagavally, Daniel J. Stein
Project Mentor and Department: Daniel Stein, MD; Medicine - Gastroenterology

Introduction Even though patients with inflammatory bowel diseases (IBD) typically present with diarrhea, some may develop constipation. The prevalence and clinical scenarios in which constipation is seen in IBD patients has not been well described. We aim to evaluate the prevalence of constipation and assess the phenotypic characteristics of those IBD patients that develop it.
Methods Using a retrospective case-control study, we enrolled 500 patients with a confirmed diagnosis of IBD seen in an outpatient tertiary referral clinic. IBD outpatients seen at least once in 12 months were included. We excluded patients with a known bowel obstruction, short gut, colectomies, and an ostomy. Data collected included disease phenotype, clinical and endoscopic disease activity, medication, and previous surgeries. The primary outcome was constipation, defined subjectively as less than three bowel movements per week and the secondary outcome per the more stringent Rome IV criteria.
Results Out of 500 patients included, 50.1% met the subjective criteria for constipation and 27.4% met Rome IV criteria. Female patients were found to significantly ($p< 0.001$) have at least 2 Rome IV constipation modalities compared to men. Constipated patients significantly ($p< 0.001$) used more laxatives and fiber. There was a significant ($p< 0.001$) increase in constipation among patients who were using opioids. No significant association was seen with active IBD activity, disease characteristics, prior surgeries, or medication use.
Discussion We found a large proportion of IBD patients deal with constipation regardless of disease activity, prior surgery, or medication use. Rates of IBD patient constipation is tied to female sex and opioid use which is also seen in the general population. The prevalence does not seem driven by inflammation or post-surgical anatomy, so other etiologies identifying other underlying etiologies of constipation is important as they can guide appropriate therapy.

Janardan, Abhishek — Health Systems Management & Policy

Title Human Efficiency of a Post Discharge Digital Engagement Program

Authors: Abhishek Janardan, Alexandra Polovneff, Neemit Shah, Maie Zagloul, Bradley Crotty
Project Mentor and Department: Bradley Crotty, MD, MPH; Medicine – General Internal Medicine

Patient check-ins following hospital discharge offer tremendous opportunities for health outcome improvement. Digital applications for remote patient monitoring are gaining popularity and offer patients increased autonomy in out-of-hospital symptom management and communication with the care teams. We implemented a post-discharge digital engagement (PDDE) platform alongside traditional telephonic-based outreach for discharged patients to increase accessibility and scale care efforts. All inpatient hospital discharges between March 2020 - November 2020 were stratified by readmission risk. Inclusionary criteria required a patient to be admitted to an inpatient unit, have a primary care provider within the Froedtert Health System, and have an insurance payor that is a part of the risk-based payment program within the Froedtert system A pragmatic, stepped-wedge cluster randomization trial with five implementation waves based on primary care clinic region was performed. 5,490 patient discharges (2,735 control; 2,755 intervention) were evaluated. 1949 patients were classified as high-risk, 2,032 as medium-risk, and 1,509 as low-risk. A statistically significant increase in POE counts was seen in the PDDE-eligible cohort and medium-risk patient populations that were eligible for PDDE. ($p < 0.001$, $p < 0.001$). Further, sub-analysis via activation of the PDDE displayed statistically significant increases in POE counts for medium and high-risk patients who activated the PDDE app vs. those that did not ($p < 0.001$, $p = 0.023$). Our findings indicate that utilization of a post-discharge digital engagement application in concert with standard telephonic care outreach can increase patient contact with the medical system.

Janquart, Amanda — Global Health

Inclusion of mental health impacts from climate change on global professional psychiatry websites

Authors: Amanda R. Janquart, Caitlin Rublee

Project Mentor and Department: Caitlin Rublee, MD, MPH; Emergency Medicine

Global climate change is increasingly harming the health of individuals around the world, including mental health. The incidence of depression, anxiety, and post-traumatic stress disorder is increasing with increasing climate change-related disasters. This study aims to assess the content available on professional psychiatry websites of selected countries as a tool to increase access to knowledge on the mental health impacts of climate change among professionals and the public globally. Countries were chosen according to a high or low degree of commitment to climate change mitigation strategies as determined by Nationally Determined Contributions (NDCs) and the existence of a professional psychiatry organization website. Analysis of search words identified on each website revealed increased inclusion of disaster among all websites searched as compared to climate change, suggesting adequate messaging on the mental health impacts resulting from natural disasters, but minimally highlighting the connection of these increasing catastrophic events and effects on mental health to climate change. While natural disasters are one of the primary ways climate change is impacting mental health, these websites offer limited discussion of the other mechanisms contributing to changing patterns in mental health disorders. Given the serious health consequences and evolving climate crisis, it is essential to have concise and reputable information available for a wide audience. Further investigations should be done to evaluate the utilization of these websites as a resource and encourage integrating more information on climate change into discussions of mental health.

Johnson, Morgan — Urban & Community Health

National Trends in "Going Flat" after Mastectomy

Authors: Morgan K. Johnson; Chandler S. Cortina; Tzu-Lun Hsu; Chiang-Ching Huang; Shane Huang; Julia Frebault; Amanda L. Kong

Project Mentor and Department: Amanda Kong, MD, MS; Surgery – Surgical Oncology

Introduction: The "Going Flat" movement became widely publicized in 2016 and provides information and support to women who choose to forego post-mastectomy breast reconstruction (PMBR). The objectives of this study were to evaluate temporal trends in PMBR to ascertain the potential impact of this movement and assess which factors are associated with going flat.

Methods: A retrospective cohort analysis was performed using the NCDB which included women with non-metastatic breast cancer who underwent mastectomy between 2004–2019. Trends in going flat after mastectomy were examined and stratified by age (<50, 50-69, ≥70). A multivariate logistic regression model was used to identify factors associated with going flat.

Results: 650,983 patients met inclusion criteria: 244,201 (37.5%) underwent PMBR and 406,782 (62.5%) went flat. Among women <70, rates of going flat steadily decreased from 2004–2015 and then stabilized after 2015, coinciding with the rise of the "Going Flat" movement. In multivariate analysis, non-white race, older age, increasing comorbidities, government provided insurance, treatment at a community program, radiotherapy, and adjuvant chemotherapy were associated with a higher likelihood of going flat ($p<0.001$).

Conclusion: In the first two years after the "Going Flat" movement, the number of women going flat after mastectomy has stabilized in women <70 for the first time in over a decade. These trends suggest that the social and cultural impact of this movement may have contributed to the stabilization of PMBR rates.

Kerschner, Anna — Clinical & Translational Research

Evaluating risk factors of lower extremity stress injuries in adolescent female distance runners

Authors: Kerschner Anna E., Fehr Shayne, Cross Janelle, Fritz Jessica
Project Mentor and Department: Shayne Fehr, MD; Orthopaedic Surgery

Introduction: Among high school runners, bony stress injuries commonly result from overuse. Previous studies report physical and biomechanical variables that correlate with such injuries. Determining the presence of such variables prior to the competitive season and tracking injury development will give insight into which variables are associated with injury among this population.
Methods: High school female distance runners from a Milwaukee-area school district were recruited before the competitive season. At the time of enrollment, questionnaires were used to collect clinical and running histories, physical assessments were done to test flexibility, range of motion, and functional strength, and motion analysis was done to assess gait. Over a year, athletes completed monthly surveys to provide health data, while fitness trackers were worn to collect mileage and workout data. Statistical analysis was done to determine correlation between preseason variables and injury development to identify risk factors for injury.
Results: Initial clinical data collected from one injured and one uninjured participant showed greater leg strength in the uninjured participant. The uninjured participant showed a lower percent difference in Q-angle (16.7%) compared to the injured participant (-33.3%). A review of the biomechanical data showed that the injured subject had significant differences in peak pressure, force, and tibial acceleration between the left and right limbs, while the uninjured subject had significant differences in peak pressure and tibial acceleration and no significant difference in peak force.
Conclusions: The injured participant possessed some variables that have been historically associated with injury development, including decreased strength, elevated Q-angle, and asymmetrical differences in peak pressure, force, and tibial acceleration. More investigation into physical and biomechanical factors is necessary to identify potential risks for injury development

Khoja, Komal — Quality Improvement and Patient Safety

Racial disparities in referral and surveillance patterns of incidental pancreatic cysts

Authors: Khoja, Komal; Strohbeen, Stephanie; Xu, Yilin; O'Connor, Stacy; Tsai, Susan; Smith, Zachary
Project Mentor and Department: Zachary Smith, DO; Medicine - Gastroenterology

Introduction: Pancreatic cystic lesions (PCLs) are commonly discovered incidentally on imaging, and should undergo appropriate guideline-based surveillance and management. Data from the Surveillance, Epidemiology, and End Results (SEER) Program demonstrates that pancreatic cancer disproportionately affects African Americans. This study aimed to evaluate racial disparities in rates of expert consultation and appropriate surveillance for patients found to have incidental PCLs.
Methods: All cross-sectional imaging radiology reports obtained from 2015-2020 in a large academic health system were queried for variations of "pancreas" and "cyst". Each chart was manually reviewed, and patients were included if this was the first-ever identification of a PCL. Radiology reports were reviewed for language pertaining to follow-up imaging or referral recommendations and whether a differential diagnosis was rendered. Univariate analyses were performed on all covariates, and a logistic regression model was fashioned retaining covariates with $p<0.2$. The primary outcome was “appropriate cyst follow-up,” defined as referral to a pancreas specialist or undergoing surveillance cross- sectional imaging within 12 months.
Results: 413 patients were identified. Black patients were significantly less likely to be appropriately referred or undergo surveillance for incidental PCLs (OR 0.49, 95% CI 0.28-0.88), a finding which remained significant when adjusting for insurance, life-limiting comorbidities, imaging setting (eg emergency department), and the presence of radiologist recommendations on follow-up within the report (OR 0.48, 95% CI 0.25-0.94). Patients with private insurance were significantly more likely to undergo appropriate follow-up of PCLs (OR 1.77, 95% 1.06 – 3.06); however, this relationship was explained when controlling for race.

Klinewski, Victoria — Quality Improvement and Patient Safety

Changes in Post-Surgical Opioid Prescribing & Persistence for US Veterans at a Single VA Medical Center

Authors: Victoria Klinewski, Julia A Vogt, Cyrus Kiamanesh, Shannon Dugan, Katherine Sherman, Craig Cummings, Emily Nordin, Thomas J. Ebert

Project Mentor and Department: Thomas J. Ebert, MD, PhD; Anesthesiology

Opioids are a controversial mainstay analgesic strategy after surgical procedures, in part due to an association of postoperative opioid prescribing to formerly opioid naïve patients who remain on opioids more than 3 months after the surgical intervention, called opioid persistence. This project seeks to understand recent downward changes in post-surgery discharge opioid prescribing and opioid persistence at the CJ. Zablocki Veterans Affairs Medical Center (VAMC). Patient inclusion criteria were opioid naïve 30 days prior to elective surgery, elective surgery between 1/ 2017 and 5/2018 and 8/2020 and 2/2021 at the VAMC, and prescribed opioids on discharge. Type of surgical procedure, pre-existing health conditions and opioid needs were recorded.

Opioid prescription sizes after surgery, reported in morphine milligram equivalents (MME), decreased significantly between 2017/2018 and 2020/2021. The average decrease in size of an opioid prescription was 99 MMEs or 49.7% ($p < .0001$). The percentage of patients with persistent opioid use was statistically higher in the 2020/2021 data set (OR = 3.51, 95% CI [2.20, 5.58]) with patient with malignancy (OR= 2.42, 95% CI [1.48,3.94]) or a mental health condition (OR =2.510, 95% CI [1.547, 4.071]) at increased risk.

The decrease in prescription size can be attributed to increased opioid education in residency curriculum, increased patient awareness, and the implementation of the PDMP. With the rise of non-opioid pain management options, many patients are refusing opioid prescriptions in the post-operative period. The subset receiving opioids maybe more at risk of persistent opioid use, especially those with a malignancy or mental health condition.

Koller, Steven — Clinical & Translational Research

Impact of Histology and Immunohistochemical Findings on Sebaceous Carcinoma Patient Outcomes

Authors: Steven Koller, Karolyn Wanat, Zoe Brown-Joel

Project Mentor and Department: Karolyn Wanat MD; Dermatology

Sebaceous carcinoma (SC) is a rare, but potentially deadly form of skin cancer. Due to its similarity in clinical appearance to benign entities, diagnosis of SC can be challenging, leading to missed or delayed diagnosis. Clinical behavior is also highly variable, ranging from relatively indolent to aggressive, metastatic disease. Given the ambiguity of clinical features and variable disease course, histological examination of possible SC is crucial. In this study, we aimed to elucidate the relationship between the histopathological features and immunohistochemical markers of SC with the clinical outcomes of cancer recurrence and metastasis.

A single-center, retrospective chart review of 27 SC cases was performed. Clinical characteristics such as patient demographics, tumor location, treatment modality, and outcome were assessed. Histopathological features, including the degree of differentiation, growth pattern, presence of perineural or lymphovascular invasion, and presence of pagetoid spread or comedonecrosis were evaluated. Immunohistochemical profile including adipophilin, androgen receptor, and MSH2/MSH6 was reviewed. Cases with a 'good outcome' were defined as having a full remission after treatment. 'Poor outcome' cases were defined as those with recurrence or metastasis following initial treatment.

Over 60% of tumors analyzed were well-differentiated with a lobular growth pattern. A cystic appearance and comedonecrosis were found at higher rates in those who had local recurrence. There were no significant differences in degree of differentiation, pagetoid spread,

growth pattern, or mitotic activity between good and poor outcome groups. Additionally, poorer outcomes were associated with loss of MSH2 and MSH6 mismatch repair genes, as these markers often correlate with underlying genetic conditions that increase risk of SC. However, this study is limited by a small sample size, and additional analysis with expanded patient population is recommended.

Korom, Bethany — Urban & Community Health

"It's about being healthy"; a novel approach to the socio-ecological model using family perspectives

Authors: Bethany Korom, Meghan Malloy, Caroline Remmers, Mari Cevilla, Kelly Dione, Paula Papanek, Jeff Condit, David Nelson

Project Mentor and Department: David Nelson, PhD; Family and Community Medicine

Community Partner: United Community Center

Background: The Latinx community is at risk for obesity, type 2 diabetes, and other chronic illnesses. Culturally appropriate, community facing physical activity (P.A.) and nutrition programs may provide the basis for families to improve their health status. Our objectives are as follows: 1. To investigate synergistic factors within this type of program that play a role in creating an environment for participants to learn and practice healthy behaviors. 2. To apply factors into a novel model of components that support health and wellness. 3. To design an intervention for future implementation and evaluation.

Methods: A two-year P.A. and nutrition program, Families Inspired Together 4 Youth Empowered to Succeed (FIT 4 YES), took place in Milwaukee, WI. with Hispanic families from 2018 to 2020 through a community-academic partnership. A pair of interviewers spoke with families who provided insight into the impact of the program. A grounded theory qualitative approach to code the transcripts guided the team to identify overarching themes.

Results: Twenty-four interviews were conducted. Common themes indicated that children had a stronger belief in their abilities and confidence in peer support. Parents noticed their children increasing self-directed healthy behaviors. All families grew in their implementation of health and wellness.

Conclusions: Three main components of FIT 4 YES contributed to its success: opportunities for engagement, supportive relationships, and the interplay of components that emerged from the interviews. Effective programs could include these components to make their outcomes more cohesive within the family. A novel model emerged that builds on the social-ecological model that emphasizes the dynamic interactions between these main components. Additional research is needed to evaluate the long-term effects and response by the community.

Krantz, Julia — Bioethics & Medical Humanities

From reactive to proactive: Evaluation of utilization of ethics consults at a pediatric hospital

Authors: Julia Krantz, Melissa Atwood, Annie Friedrich

Project Mentor and Department: Melissa Atwood, DO, MA; Pediatrics – Critical Care

Objective: Ethics consults are an important avenue for discussion of disagreement in the clinical setting. Few studies have looked at barriers to ethics consults in the pediatric setting. This study aimed to learn about how ethics consultations at Children's Wisconsin (CW) are currently utilized and how the views of stakeholders (physicians, nurses, other providers) inform their decision of whether or not to initiate an ethics consultation.

Methods: We surveyed a selection of 413 CW healthcare providers. We asked providers about their previous experiences with the ethics consult service, potential barriers to obtaining consults, and factors that would make them more likely to obtain a consult if needed in the future. The survey was administered electronically via email.

Results: Of the 413 total providers, 85 completed the survey (20.6% response rate). Respondents were mostly physicians and nurse practitioners (NPs) from critical care (pediatric and neonatal) or hematology/oncology. Sixty-one percent of respondents had cared for a patient whose case involved an ethics consult and just over half of those participants found the consult to be helpful. Identified barriers to consults included: not wanting to upset the patient/family, not wanting to upset colleagues, not knowing if they were dealing with an ethical issue, and general logistics.

Conclusions: Providers identified several barriers to ethics consults. Those barriers may differ according to the type of provider. Consideration should be given to ensuring that hospital employees are aware of the general logistics of an ethics consult, including how to initiate and what to expect, and clear final recommendations should be provided.

Kubiak, Grace — Urban & Community Health

Evaluating Barriers to Opioid Use Disorder Treatment: From the Patients' Perspectives

Authors: Cecilia Nguyen, Grace Kubiak, Neil Dixit, Staci A. Young, John R. Hayes
Project Mentor and Department: John, Hayes, DO; Family and Community Medicine

Introduction: Medically Assisted Treatment (MAT) provides an effective treatment for opioid use disorder (OUD); however, it remains underutilized. Stigma surrounding substance use disorders, insufficient provider knowledge about substance use disorders and MAT, and lack of physicians with X-waivers to prescribe buprenorphine contribute to this underutilization. Our study aims to elucidate barriers to accessing MAT in Milwaukee, Wisconsin. We hypothesize that stigma negatively impacts patient motivation to seek treatment.
Methods: We conducted semi-structured interviews with patients receiving MAT at a family residency program in Milwaukee, Wisconsin. Interviews were audio-recorded, transcribed, and analyzed using rapid qualitative analysis. Participants completed a Likert scale survey to evaluate for self- and treatment-related stigma. The stigma scales were developed and evaluated for internal consistency and validation in prior studies.
Results: Interviews with 30 participants showed that motivations to seek treatment appeared self-driven and/or for loved ones. Most participants had no concerns with treatment, though some had fears of treatment denial and many noted experiences with incarceration. Housing instability, insurance, and transportation were common structural barriers to treatment. Results of the stigma scales suggest lower self and treatment-related stigma than hypothesized.
Conclusions: Offering MAT at more family medicine clinics and connecting patients with socioeconomical support early in care would help alleviate the issue of insufficient MAT clinics. Family physicians can build on patient motivation through motivational interviewing and patient-centered care. Future studies may further explore effects of structural inadequacies and biases on MAT access and quality.

Kumar, Devesh — Clinical & Translational Research

Phenotypes of velopharyngeal tube law in obstructive sleep apnea

Authors: Devesh Kumar, B. Tucker Woodson, Guilherme J.M. Garcia
Project Mentor and Department: Guilherme J.M. Garcia, PhD; Biomedical Engineering, Marquette University & The Medical College of Wisconsin

Introduction: Different modes of upper airway (UA) collapse are routinely observed in patients with obstructive sleep apnea (OSA) during drug induced sedated endoscopy (DISE). These different modes of collapse may reflect differences in UA biomechanical properties with potential implications for therapy selection.
Methods: The area-pressure relationship (tube law) of the velopharynx was quantified during DISE in 17 OSA patients via step reductions in nasal mask pressure. The minimal area of the velopharyngeal airspace was estimated from video endoscopy, while the intraluminal pressure was recorded with a catheter. The tube law was quantified for nasal mask pressures from 0 to 16 cmH2O at mid-inspiration (tube law A) and mid-expiration (tube law B) in all patients. The tube law was also quantified during multiple points of the breathing cycle at a constant nasal mask pressure of 0 or 4 cmH2O (tube law C) in three patients representing different phenotypes.
Results: Tube laws A and B revealed three phenotypes, namely collapse during inspiration (phenotype 1, 4 patients), collapse during expiration (phenotype 2, 2 patients), and collapse during both inspiration and expiration (phenotype 3, 11 patients). Tube law C revealed that phenotype 3 displays a nearly constant airway size (i.e., low pharyngeal compliance) during the breathing cycle, while phenotypes 1 and 2 display sizeable changes in airway size (i.e., high pharyngeal compliance) during the breathing cycle.
Conclusion: Three phenotypes of velopharyngeal collapse were observed, namely collapse driven by a negative lumen pressure with high intra-breath pharyngeal compliance (phenotype 1) or low intra-breath pharyngeal compliance (phenotype 3), or expiratory collapse (phenotype 2). Future studies should investigate how these phenotypes of UA collapse affect therapeutic outcomes.

Kumar, Shivani — Health Systems Management & Policy

Effect Modification of Early and Late Life Social Support on the Risk of Diabetes among Adults with ACEs

Authors: Shivani Kumar; Jennifer Campbell; Leonard Egede
Project Mentor and Department: Jennifer Campbell, PhD, MPH; Medicine – General Internal Medicine

Introduction: Adverse childhood experiences (ACEs), characterized by exposures in childhood to neglect, household dysfunction, and abuse, are of growing public health concern. Social support in early life and adulthood may be an important potential protective factor to decrease the impact of ACEs, however this has not been examined in diabetes. The objective of this study is to evaluate whether timing and type of social support mediates the risk of diabetes in those with ACEs.
Methods: This analysis used data on 6,323 adults from the national survey of Midlife development in the United States (MIDUS). Logistic regression models were used to estimate effect modification of social support on the relationship between ACEs and diabetes. ACEs were categorized for three types (abuse, household dysfunction, and financial strain in childhood). Separate models were run for each category of ACE and diabetes to investigate whether early life social support (maternal and paternal affection) and/or late life social support (family, friendship, spouse/partner solidarity) mediated the relationship between ACE and risk of diabetes.
Results: 55.9% of the population reported at least 1 ACE. ACEs were significantly associated with less early life social support (2.81 compared to 3.12, p<.0001) and less late life social support (3.17 compared to 3.25, p<.0001). In the unadjusted model, ACEs were also associated with a 34% increased odds of diabetes. Those who reported a history of ACEs and early life social support had significantly increased odds of diabetes (OR=1.25, CI=1.00-1.56) compared to those with ACEs and no early life social support. Individuals who reported a history of abuse and later life social support were more likely to have diabetes (OR=1.33, CI=1.01-1.75).
Conclusion: While this study confirmed prior findings that ACEs are associated with risk of diabetes, early and late life social support may not decrease the impact of ACEs on risk of diabetes in adulthood.

Kurylo, Chris — Clinical & Translational Research

Correlation of Esophageal Mean Nocturnal Baseline Impedance with Markers of Laryngopharyngeal Reflux

Authors: Christopher M. Kurylo, Daniel Eastwood, Joel H. Blumin, Nikki Johnston, Jonathan M. Bock
Project Mentor and Department: Jonathan Bock, MD; Otolaryngology

Objectives: Mean nocturnal baseline impedance (MNBI) is a measure of the esophageal epithelial barrier function calculated via high-resolution impedance manometry and can be used as a diagnostic tool and treatment response predictor for gastroesophageal reflux disease (GERD). However, its utility for laryngopharyngeal reflux (LPR) has been minimally studied. We aimed to investigate the relationship of MNBI between patients with suspected LPR, healthy controls, and their 24-hour multichannel intraluminal impedance-pH (MII-pH) study results.
Methods: Retrospective patient series analysis was performed of patients with suspected LPR and healthy controls who underwent 24-hour MII-pH monitoring. MNBI values were calculated from impedance channels at the level of the hypopharynx, proximal esophagus, and distal esophagus. We compared these MNBI values between the subject groups with secondary analysis on MII-pH results, reflux symptom index, reflux findings score, DeMeester score, and salivary pepsin levels.
Results: Twenty-three patients with suspected LPR and fourteen healthy controls were enrolled. Decreased distal esophageal MNBI was found to be significantly decreased in patients with suspected LPR compared to healthy controls ($P < 0.01$) and in subjects with positive MII-pH studies compared to negative MII-pH studies ($P < 0.01$). There were no significant correlations of MNBI at the hypopharynx or proximal esophagus.
Conclusion: Distal esophageal MNBI has significant correlations with many phenotypic and biological markers of LPR. These findings indicate that MNBI has the potential to be applied to LPR, similar to its emerging use as a diagnostic tool and treatment response predictor for GERD.

Kuster, Kymarie — Urban & Community Health

Qualitative Analysis of Family Caregiver and Patient Support During the Inpatient Discharge Process

Authors: Kuster K, Kavanaugh M, Gale K, Wenzlaff M, Ruffalo L
Project Mentor and Department: Lesli Ruffalo, PhD; Family & Community Medicine
Community Partner: Eras Senior Network

Background: Elderly patients have complex health problems making in-hospital stays strenuous, so the conventional discharge process does not encompass a social determinants of health lens or help family caregivers care for their recently discharged older patients.
Method: We recruited and conducted one-time interviews with the following groups: 1) inpatients age 60+, 2) family caregivers of patients, 3) professionals engaged in the discharge process. We analyzed interview transcripts using coding strategies and principles of thematic analysis techniques.
Results: Fifty patients, twenty family caregivers, and twelve hospital professionals were interviewed by the study team. Patient and caregiver highlighted themes that sometimes involves a "chaotic" discharge process with varying and post-discharge information. Hospital professionals often work in "siloed" roles that focus on a timely discharge which can lead to a transactional discharge process and where caregivers only identified when there is need which can contribute to miscommunications.
Conclusion: Between patients, family caregivers and hospital professionals, improved communication in quantity and quality was a similar theme identified in efforts to reduce hospital re-admissions and improve a "chaotic" discharge process. This includes increased identification and interaction with the family caregiver and all health care professionals and empathetic rapport to reduce communication breakdowns for an optimized patient and family-centered care throughout the entire discharge process.

LaBorde, Taylor — Clinician Educator

A comparison of faculty and student perception of curriculum and external e-learning resources.

Authors: Taylor LaBorde, Amy Prunuske
Project Mentor and Department: Amy Prunuske, PhD; Medical College of Wisconsin - Central Wisconsin

Researchers have shown that students report increased comprehension and enjoyment when they are provided with options in how they engage with material. One way to provide students with this freedom is through the utilization of e-learning. E-learning allows for asynchronous, quick, and standardized delivery of material to students. We aim to assess faculty knowledge, opinion, and utilization of external resources in their courses and compare this with the desires of students. To do this we utilized a faculty and student collaborative process to develop two surveys designed to gauge attitudes about, familiarity with, and current utilization of various teaching modalities and outside resources. Surveys were disseminated to all medical students enrolled at any of the 3 MCW campuses and all faculty who teach in the basic science years. Responses were recorded anonymously through Qualtrics. We received 118 student and 23 faculty responses. Student and faculty values were compared across several fields including curriculum content, learning modalities, and e-learning resource utilization. The majority of faculty and students agreed that both clinical correlates and USMLE preparation should be prioritized in the curriculum. Both acknowledged the importance of practice questions in this process. Students valued the familiarity and efficiency provided to them through interactive didactics, emphasizing the importance of asynchronous options. While the majority of faculty felt students were only utilizing e-learning resources for USMLE preparation, nearly all student respondents reported using these resources to further clarify lecture content. Key takeaways include the importance of not de-valuing USMLE preparation, the importance of supplying asynchronous learning opportunities, and the utility of incorporating e-learning resources for content clarity and practice questions. It is our hope that these data be used to further inform future curriculum development.

Lee, Joyce — Bioethics & Medical Humanities

An Ethical Exploration of Mental Health Care Across Racial and Ethnic Groups in the United States

Authors: Joyce H. Lee, Fabrice Jotterand

Project Mentor and Department: Fabrice Jotterand, PhD, MA; Institute for Health and Equity - Bioethics

Racial and ethnic minorities in the United States have reported using mental health services less often than whites, and they are often more severely ill and receive poorer quality mental health care when they do seek out help. The reasons for these statistics are attributed to obstacles such as mental health stigma, different presentation of psychiatric symptoms, complementary therapies specific to individual cultures, lack of ethnic-specific services, and finally socioeconomic and physical barriers to access. Mental health ethics, which includes the perspectives of bioethics, neuroethics, and psychiatric ethics, is a field uniquely positioned to overcome these obstacles and improve minority mental health as they employ the gold standard principles of medical ethics:autonomy, beneficence, non-maleficence, and justice. In order to better understand the mental health nuances specific to individual groups of racial and ethnic minorities, a literature review was conducted on 237 citations that met our inclusion and exclusion criteria of the 4,466 total citations gathered from the MEDLINE ®/PubMed ® Health Disparities and Minority Health Search Strategy with specific mental health search terms used in the MEDLINE ® database. This literature review aims to synthesize current research on the state of minority mental health care and offer ethically-guided solutions for current and future health care providers to improve the mental health care of minority groups in the United States, including Black/African American, Non-White Hispanic/Latinx, Asian American, Native Hawaiian/Pacific Islander, and American Indian/Alaskan Native populations.

Lee, Amy Yoonjin — Urban & Community Health

Attribution of symptoms and adherence to adjuvant endocrine therapy among older women with breast cancer

Authors: Amy Lee*, Anna Lyons*, Joan Neuner, Vaia Makris, Melinda Stolley, Sailaja Kamaraju, Kathryn E. Flynn; **Anna Lyons & Amy Lee contributed equally to this work*

Project Mentor and Department: Kathryn Flynn PhD; Medicine – Hematology and Oncology

Oral adjuvant endocrine therapy (AET) is an effective treatment for hormone receptor positive breast cancer shown to decrease recurrence and mortality. However adherence is poor, with 1/3 of patients not completing treatment. While previous studies suggest symptom onset post-AET initiation to be associated with early discontinuation, preliminary evidence suggests that pre-AET symptoms may be also be a predictor. Qualitative interviews were utilized to explore AET experience and attribution of symptoms to AET amongst adherent and discontinued patients to better understand attitudes regarding AET.

Participants recruited from the Froedtert/MCW Cancer Center registry were stratified by AET adherence. Semi-structured interviews were conducted based on constructs identified in literature as having strong associations with AET adherence. A multidisciplinary team developed a codebook based on themes that emerged from the data.

33 participants were interviewed ranging from 57-86 years, including 10 discontinued and 23 adherent patients. Major themes amongst discontinued included: worries, precedence of quality of life over treatment, and inadequate support. Major themes amongst adherent patients included: trust, adequate support, and necessity of AET. While both adherent and discontinued patients reported symptoms throughout treatment course, adherent patients were more likely to attribute symptoms to external factors including older age, comorbidities, other cancer treatments, while discontinued patients were more likely to attribute symptoms to AET and frequently cited AET symptoms as primary reason for early discontinuation.

The experience of symptoms during AET may influence a patient's attitudes and actions regarding therapy completion. Symptom attribution may be a key factor leading to discontinuation of AET, and a better understanding of this observation may assist in the identification of patients who are at higher risk of discontinuation.

Leissring, Morgan — Global Health

Comparison of person-administered vs automated screening tool for PTSD in a traumatically injured patient

Authors: Morgan Leissring, Elise A Biesboer, Amber Brandolino, Rachel Weber, Terri deRoon-Cassini, Mary E Schroeder

Project Mentor and Department: Mary "Libby" Schroeder, MD; Surgery – Trauma and Critical Care

Background: The development of post-traumatic stress disorder (PTSD) is a prevalent problem for patients suffering from injuries and has major implications for post-injury quality of life. Early identification of high-risk patients to prevent adverse mental health consequences can contribute to improved outcomes. As of January 2023, the American College of Surgeons Committee on Trauma (ACS CoT) has mandated that trauma centers have mental health screening and referral protocols in place for traumatically injured patients. Various screening tools are available to assess for PTSD. Two of these include the Injured Trauma Survivor Screen (ITSS) and an electronic medical record-based automated screener (AS). This study aims to prove the ITSS as a better predictor for PTSD against the AS. The goal of this study is to inform trauma centers creating screening protocols regarding the performance of these two tools in the same population.
Methods: A cohort of traumatically injured patients (n=207) at a Midwest Level 1 trauma center who had ITSS and clinician-administered PTSD Scale for DSM-5 (CAPS-5) results available were retrospectively reviewed via the EMR for the AS tool variables. A receiver operating characteristic (ROC) curve analysis was then conducted to compare. PTSD diagnosis was determined using the CAPS-5, which was administered 6-months post-injury.
Results: The area under the curve (AUC) for the ITSS was not statistically different from the AUC of the AS.
Conclusion: The ITSS and AS performed similarly in predicting PTSD risk at 6-months post-injury in the same population. Trauma centers should focus on the impact their screener choice will have on resource allocation. Their differential resource considerations are that the ITSS simultaneously screens for depression risk, while the AS does not require person administration. These differential impacts on resource allocation may instead guide the process for trauma centers as they determine a screening tool.

Li, Angel — Quality Improvement and Patient Safety

Optimizing Patient Interactions to Improve Behavioral Health Outcomes

Authors: Angel Li, Ryan Hanson, April Dawson, Sneha Nagavally, Bradley Crotty, Lawrence Miller, Mary Beth Alvarez

Project Mentor and Department: Mary Beth Alvarez, MD, MPH; Medicine

Maintaining programs is resource-intensive, particularly for multi-disciplinary programs like the Integrated Behavioral Health (IBH) program where patients see a care manager, psychiatrist, and psychotherapist for depression management within their PCP's office. We must allocate resources wisely by focusing on the most efficacious treatments, so we performed a retrospective analysis to determine which provider types had the greatest impact by reducing patients' PHQ-9 scores.
We did not find a statistically significant correlation between percent change in PHQ-9 and which provider types patients engaged with. However, we did find a statistically significant difference in patients' initial PHQ-9 scores. Patients who saw both a psychotherapist and psychiatrist with the care manager had the highest initial PHQ-9 while patients who saw a psychotherapist with the care manager had the lowest initial PHQ-9. Patients who saw all three providers were more complex on average. They were prescribed more psychotropic medications and had more behavioral comorbidities. On the other hand, patients who only saw a care manager were prescribed the least psychotropic medications with the least behavioral comorbidities.
IBH clinics follow a patient-centered model where patients are allocated resources based on their willingness to participate. This does not guarantee equitable care. Our data shows patients who had the lowest initial PHQ-9 scores saw both a care manager and psychotherapist with the same if not lower improvement in their PHQ-9 scores compared to if they saw the care manager alone. Instead of allocating resources based on patients' interest, we should be allocating them based on clinical need.

Lin, Ming — Urban & Community Health

Prevalence of Race/Ethnicity Reporting in Light Chain (AL) Amyloidosis Clinical Research in the U.S.

Authors: Mingqian Lin, Liliana E. Pezzin, Ali Mohamedi, Ankit Kansagra, Anita D'Souza
Project Mentor and Department: Anita D'Souza, MD; Medicine – Hematology and Oncology

Little is known about racial differences in the incidence of light chain (AL) amyloidosis despite the well-documented racial disparities in the epidemiology of other plasma cell disorders. The goal of this study was to examine the extent to which published clinical research in AL amyloidosis report information on patients' race. Clinical research publications in AL amyloidosis between 1/1/2010 and 12/31/2020 from the U.S. were identified. In addition to reporting of race, study design, funding, cohort size, year of publication, impact factor of publication journal, and first author degree were abstracted. Among papers reporting race, we also assessed whether ethnicity was reported separately. A PubMed search yielded 2,770 papers of which 220 met the pre-specified criteria for analysis. Of those, 37 (16.5%) reported race. Single institution publications, those with physicians as first authors, and those published in journals with impact factor 6 or higher were less likely to report race. On multivariate analysis, only single institution studies were negatively associated with race reporting. Of the 37 papers reporting race, none defined it in methods, 16% stated how race was identified, and 19% discussed its significance. Ethnicity was reported in 6 studies. Our results indicate that race/ethnicity are underreported in U.S. AL amyloidosis clinical literature leading to a challenge for identifying potential racial/ethnic disparities. Standards for collecting and reporting racial/ethnic demographics are needed. Clear and consistent reporting of race and ethnicity of clinical populations is a necessary first step in identifying disparities and promoting equitable care.

Lindemann, Jacob — Clinical & Translational Research

Robotic-assisted left atrial appendage exclusion in patients with prior cardiac surgery

Authors: Lindemann J, Seadler B, Syed A, Almassi H, Joyce D, Schena S, Gasparri M
Project Mentor and Department: Mario Gasparri, MD; Surgery - Cardiothoracic

Objectives: In patients with atrial fibrillation (AF), oral anticoagulation (OAC) remains the gold standard to reduce risk of thromboembolism. Alternatives include left atrial appendage (LAA) exclusion percutaneously or via transthoracic surgery. If patients have contraindications to OAC use and percutaneous LAA management, surgery must be pursued. However, in patients with prior cardiac surgery, additional cardiac procedures are relatively contraindicated. We hypothesized using a robotic platform could overcome surgical contraindications and provide safe and effective thromboembolism prevention in a cohort with few therapeutic options.

Methods: Adult patients with AF and history of prior cardiac surgery were included. Robotic-assisted approach was utilized for LAA clip application ± concomitant procedures. LAA exclusion was confirmed by intra-operative transesophageal echocardiography (TEE, <1cm residual stump) and TEE or cardiac CT scan at 3 months.
Results: Eight patients (7 males, 1 female; mean age 71.0 ± 6.4 years) with mean CHA2DS2-VASc=4.0±1.2 and HAS-BLED=3.1±1.5 met criteria. Reasons necessitating robotic surgery included prohibitive anatomy (2), anticoagulation intolerance (4), and/or the need for concomitant cardiac procedures (5). All 8 patients underwent successful LAA exclusion. There were no intraoperative complications or conversions to thoracotomy following clip placement. Five patients completed follow-up, confirming exclusion in 4 (80%).
Conclusions: Robotic-assisted LAA exclusion can be safely performed in patients with AF and prior cardiac surgery. This approach is safe and effective, mitigating increased risks associated with this cohort. Concomitant procedures may be performed as well. High success rates and low morbidity make this an alternative for patients with contraindications to OAC, percutaneous LAA management, or non-robotic cardiac surgery.

Lira, Gabriel — Clinical & Translational Research

Opioid Addiction and PTSD in the Milwaukee PROMPT Veteran Community Program

Authors: Lira G, Franco Z, Ahmed S, O'Connor S, Pazdera M, Winstead O
Project Mentor and Department: Zeno Franco, PhD; Family Medicine
Community Partner: Milwaukee PROMPT Veteran Community Program

Introduction: Opioid addiction has become an increasing public health dilemma in the United States since the late 1990's. A subset of the population that has been particularly affected by opioid addiction has been military veterans. The rate at which military veterans misuse prescription opioids is much higher compared to the general U.S. population. In addition to this, it has been noted that high dosage prescription opioids have been associated with increased risk of heroin use amongst veterans. Through this project we sought to better understand the relationship between drug use amongst Veterans and other mental health conditions.
Methods: 30 participants in the intervention were U.S. military veterans from the Dryhootch Milwaukee program who were above the age of 18 and had struggled or misused opioids. The intervention was a 12 week opioid use disorder prevention program with surveys conducted via RedCap. Results from the psychometric instruments PCL-5 (Posttraumatic Stress Disorder Checklist), ACE (Adverse Childhood Experiences), and DUDIT (Drug Use Disorders Identification Test) at baseline were used for linear and multiple linear regression to understand the correlation.
Results: A significant relationship was found between PCL-5 scores and DUDIT scores (p-value of 0.02391 and r2 0.175). There was also a significant relationship between both PCL-5 and ACE in regards to DUDIT scores (p-value of 0.0065 and an r2 of 0.3209)
Conclusion: Veterans who score high on PCL-5 and ACE are more likely to score higher on DUDIT. This correlation may allow for identification of veterans who would be at higher risk to develop drug abuse disorders.

Liu, Jeffrey — Clinical & Translational Research

Incidence and Natural History of Cystoid Macular Edema in the Presence of Intraocular Silicone Oil

Authors: Jeffrey Liu, Baseer Ahmad
Project Mentor and Department: Baseer Ahmad, MD; Ophthalmology and Visual Sciences

The recovery phase after surgical treatment of retinal detachments often requires the implementation of a tamponade that provides support for retinal attachment after initial surgical repair. Intraocular silicone oil (SO) and long-acting gas are the primary tamponade agents for the postsurgical treatment of complicated retinal detachments. SO is unique because it stays in the eye permanently, unlike gas tamponades, allowing physicians to choose when to surgically remove the tamponade. While SO use has ultimately provided patients with better outcomes after surgery, it has also been shown to have potential complications. Our study seeks to understand how SO implantation could be associated with cystoid macular edema (CME). Damage to the macula caused by CME can lead to permanent blurred vision, reduced color sensitivity, and vision loss. To that end, understanding the potential relation, incidence, and resolution between CME and SO implantation and its subsequent removal is important for treatment plans and clinical decision-making. In this study, we quantify cystoid macular edema development or exacerbation in patients with implanted silicone oil tamponade after vitrectomy surgery by assessing their optical coherence tomography measurements of retinal thickness and other related features. In total, we are assessing the outcomes of 534 patients who have received silicone oil tamponade after pars plana vitrectomy in regard to cystoid macular edema and its progression or resolution.

Livschitz, Jennifer — Clinical & Translational Research

Long Term Quality of Life Following Parathyroidectomy for Primary Hyperparathyroidism: A Systematic Review

Authors: Jennifer Livschitz, Tina WF Yen, Douglas B Evans, Tracy S Wang, Sophie Dream
Project Mentor and Department: Sophie Dream, MD; Surgery – Surgical Oncology

Background: Definitive treatment of primary hyperparathyroidism (pHPT) with curative parathyroidectomy has been shown to improve nonspecific neurocognitive symptoms and may improve long term quality of life. However, quality of life is not currently routinely assessed preoperatively and as a result, diminished quality of life may be overlooked as an indication for surgery. We aim to perform a systematic review to examine long term quality of life after parathyroidectomy in patients with pHPT.
Methods: A systematic, English-language literature review was performed to assess the long-term effect of parathyroidectomy on quality of life in patients with pHPT. We conducted a search of PubMed and Scopus using Medical Subject Heading (MeSH) terms for "hyperparathyroidism," "parathyroid hormone," "parathyroidectomy," "hypercalcemia," and "quality of life." All relevant literature published between June 1998 and February 15, 2021, was included.
Findings: 31 studies conducted in 14 countries were included. To assess quality of life, 21 (68%) studies utilized a general tool, Medical Outcomes Study 36-Item Short Form Survey (SF36), and 8 (26%) utilized the disease-specific tool, Parathyroidectomy Assessment of Symptoms (PAS). The remaining studies utilized a combination of 10 additional quality of life tools. The median follow-up period was 1 year (1-10 years). Of the 31 studies, 27 (87%) demonstrated significant score improvement in long-term quality of life after parathyroidectomy. The remaining 4 (13%) studies reported mixed results.
Conclusions: This systematic review demonstrates that parathyroidectomy provides improved and sustained quality of life in patients with pHPT. Patients with pHPT should be screened with a validated quality of life tool at the time of diagnosis to guide discussion regarding these symptoms in the preoperative setting and the potential for long-term improvement after curative parathyroidectomy.

Luebke, Marie — Clinical & Translational Research

Developing a Urinary Incontinence Care Pathway: Environmental Scan of Primary Care Clinics

Authors: Marie C Luebke, Joan M Neuner, Joanna Balza, Sarah Marowski, Emily RW Davidson, Emily Schmitt, R Corey O'Connor, Kathryn E Flynn
Project Mentor and Department: Kathryn Flynn, PhD; Medicine – Hematology and Oncology

INTRODUCTION AND OBJECTIVE: While over 50% of adult women report at least one episode of urinary incontinence (UI), most never receive treatment. No guidelines exist within primary care professional societies for its diagnosis and management. Recommendations from urology and urogynecology professional societies for UI include urinalysis and post-void residual tests for the initial diagnostic workup and behavioral modifications and pelvic floor physical therapy for first-line treatment. We are designing a guideline-based UI care pathway that integrates primary and specialty care. To understand the context for this intervention, we conducted an environmental scan with key informant interviews to assess the availability of key pathway resources in the primary care setting.
METHODS: Clinic managers from all primary care centers within the Medical College of Wisconsin network were invited to participate. Environmental scan interviews were conducted in 2021 by two trained medical students using a checklist developed by the multidisciplinary team. The checklist covered clinic structure, availability of diagnostic tools, and clinic resources.
RESULTS: Of 24 total primary care clinics, interviews were completed with 21 managers - 13 in-person and eight virtual. The sites included three internal medicine, five family medicine, and 11 combined clinics. UI screening intake forms were utilized by 14/21 (67%) clinics – 12 via paper and two electronic. While many clinics had point-of-care urinalysis capabilities (17/21, 81%), most did not have a working bladder ultrasound (14/21, 67%) or on-site pelvic floor physical therapy (18/21, 86%).
CONCLUSIONS: Streamlining our incontinence care pathway resources may better assist primary care providers in the diagnosis and treatment of UI and, ultimately, improve the integration of primary and specialty care.

Luna, Lila — Clinical & Translational Research

The role of genitourinary erythema in the clinical assessment of pediatric patients with suspected UTI

Authors: Lila Luna, Sadia Ansari, Danny Thomas

Project Mentor and Department: Danny Thomas, MD, MPH and Sadia Ansari, MD; Pediatrics - Emergency Medicine

Pediatric urinary tract infections (UTIs) are incredibly common, accounting for approximately 1.4 million outpatient visits and 13,000 hospitalizations annually. Definitive testing for diagnosis includes urinalysis with pyuria and urine culture with either ≥ 50,000 or ≥100,000 colony forming units of a uropathogenic bacteria depending on patient age. In 2011, the Academy of Pediatrics (AAP) published clinical practice guidelines for the diagnosis and management of UTI in febrile infants. However, many pediatric patients present with suspected UTI are ≥2 years of age and afebrile, leaving hospitals to develop internal practice guidelines for patients over 2 years old. This leads to significant interhospital variability in the assessment of patients with suspected UTI. Thus, there is a need for reliable clinical markers of UTI so that clinicians can more accurately prescribe empiric antibiotics and reduce long-term negative consequences of undertreated UTIs. In this retrospective chart review, the association of erythema on genitourinary (GU) exam and subsequent positive UTI in female patients aged 2-12 was investigated. A total of 749 charts were extracted from electronic medical records of Children's Wisconsin Urgent Care centers from January - December 2020. Erythema on GU exam was noted in 259 (58%) patients, 33 (12.7%) of which were UTI positive. No significant difference was found in the percentage of erythema noted at GU exam between patients with and without UTI (52% vs. 59%, p = 0.33). Our findings suggest that erythema on GU exam alone cannot be used to diagnose or exclude UTI in female pediatric patients presenting with suspected UTI.

Luzum, Nathan — Clinical & Translational Research

Identification Accuracy of Safety-Relevant Environmental Sounds in Adult Cochlear Implant Users

Authors: Nathan R. Luzum, Benjamin L. Hamel, Valeriy Shafiro, Michael S. Harris

Project Mentor and Department: Michael Harris, MD; Otolaryngology

Introduction: Assessment of cochlear implant (CI) outcomes has traditionally focused on speech perception. Perception of non-linguistic meaningful sounds, i.e. environmental sounds, in CI listeners has received considerably less attention, despite its contributions to quality of life, independence, and safety. The limited body of current research suggests that general improvements in environmental sound identification (ESI) following implantation are modest and individually variable. This is especially concerning when considering that many environmental sounds serve as safety cues in daily life, which CI users may not be able to properly recognize and respond to.

Objective: Examine cochlear implant (CI) users' ability to identify safety-relevant environmental sounds, imperative for safety, independence, and personal well-being.

Methods: Twenty-one experienced adult CI users completed an Environmental Sound Identification (ESI) test consisting of 42 common environmental sounds, 28 of which were relevant to personal safety, along with 14 control sounds. Prior to sound identification, participants were shown sound names and asked to rate the familiarity and, separately, relevance to safety of each corresponding sound on a 1-5 scale.

Results: Overall ESI accuracy was 57% correct for the safety-relevant sounds and 55% correct for control sounds. Participants rated safety-relevant sounds as more important to safety and more familiar than the non-safety sounds. ESI accuracy significantly correlated with familiarity ratings.

Conclusion: The present findings suggest mediocre ESI accuracy in postlingual adult CI users for safety-relevant and other environmental sounds. Deficits in identification of these sounds may put CI listeners at increased risk of accidents or injuries and may require a specific rehabilitation program to improve CI outcomes.

Lyons, Anna — Quality Improvement and Patient Safety

Attribution of symptoms and adherence to adjuvant endocrine therapy among older women with breast cancer

Authors: Anna Lyons*, Amy Lee*, Joan Neuner, Vaia Makris, Melinda Stolley, Sailaja Kamaraju, Kathryn E. Flynn **Anna Lyons & Amy Lee contributed equally to this work*

Project Mentor and Department: Joan Neuner, MD, MPH; Medicine – General Internal Medicine

Oral adjuvant endocrine therapy (AET) is an effective treatment for hormone receptor positive breast cancer shown to decrease recurrence and mortality. However adherence is poor, with 1/3 of patients not completing treatment. While previous studies suggest symptom onset post-AET initiation to be associated with early discontinuation, preliminary evidence suggests that pre-AET symptoms may be also be a predictor. Qualitative interviews were utilized to explore AET experience and attribution of symptoms to AET amongst adherent and discontinued patients to better understand attitudes regarding AET.

Participants recruited from the Froedtert/MCW Cancer Center registry were stratified by AET adherence. Semi-structured interviews were conducted based on constructs identified in literature as having strong associations with AET adherence. A multidisciplinary team developed a codebook based on themes that emerged from the data.

33 participants were interviewed ranging from 57-86 years, including 10 discontinued and 23 adherent patients. Major themes amongst discontinued included: worries, precedence of quality of life over treatment, and inadequate support. Major themes amongst adherent patients included: trust, adequate support, and necessity of AET. While both adherent and discontinued patients reported symptoms throughout treatment course, adherent patients were more likely to attribute symptoms to external factors including older age, comorbidities, other cancer treatments, while discontinued patients were more likely to attribute symptoms to AET and frequently cited AET symptoms as primary reason for early discontinuation.

The experience of symptoms during AET may influence a patient's attitudes and actions regarding therapy completion. Symptom attribution may be a key factor leading to discontinuation of AET, and a better understanding of this observation may assist in the identification of patients who are at higher risk of discontinuation.

MacLeod, James MacLeod — Clinical & Translational Research

Anatomy of the Lateral Antebrachial Cutaneous Nerve: Landmarks for Distal Biceps Repair

Authors: James MacLeod, Feras Qawasmi, Shahram Yari, Steven Grindel

Project Mentor and Department: Steven Grindel, MD; Orthopaedic Surgery

Introduction Lateral antebrachial cutaneous nerve (LABCN) injury is the most common complication of distal biceps tendon repair (DBTR) surgery. The LABCN is the terminal branch of the musculocutaneous nerve that runs along the radial aspect of the forearm and provides sensation to the lateral volar aspect. This study aims to describe anatomical landmarks to aid surgeons in localizing the LABCN to reduce nerve injury during DBTR.

Methods Fourteen fresh cadaveric upper extremities (UEs) from nine cadavers (7F, 2M) were dissected. The course of the LABCN was followed from the emerging point at the biceps brachii tendon (BBT) to the distal branching point. Several anatomical landmarks were measured by two shoulder and elbow fellows.

Results The LABCN emerged lateral to the BBT in all specimens and crossed medially in eight cadavers. It was profound to the superficial fascia in all donors. The LABCN was also medial to brachioradialis from the lateral epicondyle (LE) level to 7cm distal in all specimens. The mean distance from the LE at the interepicondyclar line was 28.9 ± 8.0mm (14-45). The mean distance from brachioradialis at the LE level was 6.3 ± 3.1mm (1-12). In all specimens, the LABCN was in the same fascia and, on average, 47.6 ± 5.1mm (37-55) deep to the antebrachial vein. All male specimens had two branches (n=3), while 73% of female UEs did (n=11). There were two situations where there was a single branch on the right and two contralaterally.

Discussion and Conclusion This study provides novel quantitative measurements to assist surgeons in localizing the LABCN and contributes to preexisting anatomical relationships described in the literature. Findings that differed from the limited existing literature included 79% of UEs having two branches of the LABCN and a shorter average distance to the LE at the IEL of 28.9 ±8.0mm (14-45mm). We found the nerve was 6.3 ± 3.1mm (1-12mm) from BR at the LE level on average and 47.6mm ±5.1 (37--55mm) deep to the AV.

Maddula, Snehith — Health Systems Management & Policy

Connected Health Innovation Research Program: A Bridge for Digital Health & Wellness in Cardiology & Oncology

Authors: Ragasnehith Maddula, James MacLeod, Sabrina Painter, Tyson McLeish, Austin Steward, Andrea Rossman, Abdulaziz Hamid, Mahi Ashwath, Hugo R. Martinez, Avirup Guha, Brijesh Patel, Daniel Addison, Anne Blaes, Indrajit Choudhuri, Sherry-Ann Brown

Project Mentor and Department: Sherry-Ann Brown, MD, PhD; Medicine

Study Objective: Cancer and heart disease are leading causes of mortality and cardio-oncology is emerging as a new field addressing the cardiovascular toxicities related to cancer and cancer therapy. Interdisciplinary research platforms that incorporate digital health to optimize cardiovascular health and wellness in cancer survivors are therefore needed as we advance in the digital era. Our goal was to develop the Connected Health Innovation Research Program (C.H.I.R.P.) to serve as a foundation for future integration and assessment of adoption and clinical efficacy of digital health tools for cardiovascular health and wellness in the general population and in oncology patients.

Design/Setting/Participants: Partner companies were identified through the American Medical Association innovation platform, as well as LinkedIn and direct contact by our team. Company leaders met with our team to discuss features of their technology or software. Non-disclosure agreements were signed and data were discussed and obtained for descriptive or statistical analysis.

Results: A suite of companies with technologies focused on wellness, biometrics tracking, audio companions, oxygen saturation, weight trends, sleep patterns, heart rate variability, electrocardiogram patterns, blood pressure patterns, real-time metabolism tracking, instructional modules, or integrating technologies into electronic health records was collated. We formed an interdisciplinary research team and established an academia-industry collaborative foundation for connecting patients with digital health technologies.

Conclusions: A suite of software and device technologies accessible to the cardiology and oncology population has been established and will facilitate retrospective, prospective, and case research studies assessing adoption and clinical efficacy of digital health tools in cardiology/oncology.

Malloy, Meghan — Urban & Community Health

Identifying risk factors for appointment no-shows in a pediatric orthopaedic surgery clinic

Authors: Meghan Malloy, Sergey Tarima, Bethany Canales, David Nelson, Jessica Hanley

Project Mentor and Department: Jessica Hanley, MD; Orthopaedic Surgery

Background: Appointment non-adherence in pediatric orthopaedic clinics negatively affects patient outcomes. While previous studies examined risk factors for missed appointments, there is a lack of such research in pediatric orthopaedics. This study hypothesizes that pediatric orthopaedic patients with greater socioeconomic risk are more likely to miss appointments. Our objective €¯is to identify risk factors contributing to no-show patterns to create accessible patient care plans to increase clinic visit adherence in vulnerable populations.

Methods: A retrospective chart review was conducted of all visits in an outpatient pediatric orthopaedic clinic and affiliated level 1 academic hospital in 2019. Possible covariates with appointment attendance collected include sociodemographic information (age, gender, race/ethnicity) and insurance status. The main study outcome was appointment status, defined as either “No-Show” or “Attended”. Using census data, the Area Deprivation Index (ADI) was determined for a matched case control sample to quantify socioeconomic risk. Factors associated with appointment no-show were analyzed with a logistic regression model.

Results: Among 10,078 total encounters included in the study, there was a no-show rate of 6.61%. Significant predictors of “No-Show” ($p<0.001$) included race, insurance type, and lag days between appointment scheduling and completion. In a matched case-control sub-study, ADI appeared to be positively associated with increased odds of “No-Show”, making this model unique from other studies.

Conclusions: This data will inform pediatric orthopaedic providers of risk factors for appointment non-adherence to individualize care plans based on specific socioeconomic needs. Efforts to improve appointment adherence will help reduce the rate of poor health outcomes in underserved areas. Next steps include determining no-show patterns among orthopaedic subspecialties and quantitative analysis to determine reason for no-show.

Marowski, Sarah — Urban & Community Health

Improving Urinary Incontinence Diagnosis and Treatment in Post Menopausal Breast Cancer Survivors

Authors: Sarah Marowski, Nicole Fergestrom, Aaron Winn, Joan Neuner

Project Mentor and Department: Joan Neuner, MD, MPH; Medicine – General Internal Medicine

Endocrine are a common and effective breast cancer treatment, however, at least 12% of post menopausal women receiving endocrine therapy for breast cancer report urinary symptoms including urinary incontinence. The Medicare Annual Wellness Visit (AWV) was created to address preventative care needs that may be over looked for patients over 65. It has shown to increase rates of cancer screenings and vaccinations, however, there are no guidelines for incontinence screening. We hypothesized that patients who receive an AWV will have high rates of incontinence diagnosis. Medicare claims data from women age 66 and older with a diagnosis of stage 0-3 breast cancer between 2011-2014 and were enrolled in Medicare was obtained from the Surveillance, Epidemiology, and End Results Medicare database. Logistic regression was performed to determine odds ratios between AWV utilization and number of physician visits and diagnosis of urinary incontinence. There was no difference in the likelihood of UI diagnosis in the AWV group compared to the non-AWV group (AOR 1.2 95% CI=0.9-1.2). Prior diagnosis of urinary incontinence was the highest predictor of current urinary incontinence diagnosis (AOR 17.3 95% CI= 15.0-20.0. Despite its goal of improving screening for common health conditions, the Medicare Annual Wellness Visit does not appear to improve urinary incontinence diagnosis or treatment in breast cancer patients. There may be some bias in who receives an AWV. Patients who underwent an AWV were more likely to be married, white, healthier, and had a higher income.

Maruska, Ben — Clinical & Translational Research

Prevalence of ICU delirium and it's impact on outcomes in critically ill patients with COVID-19.

Authors: Maruska BD, Nanchal RS

Project Mentor and Department: Rahul Nanchal, MD; Medicine - Pulmonary

Background: The development of acute brain dysfunction or delirium as characterized by disturbances in cognition and consciousness is associated with increased in-hospital mortality, ventilator days, as well as ICU and hospital lengths of stay (LOS). The frequent presence of neurological symptoms in patients with COVID-19 as well as the evidence of central nervous system involvement among patients infected with COVID-19 provides impetus to investigate the prevalence of delirium and its impact on outcomes in critically ill patients with COVID-19.

Methods: Retrospective review and cross-sectional analysis was performed on 214 consecutive patients admitted to the Froedtert Hospital (FH) Medical Intensive Care Unit (MICU) between 3/14/2020 and 6/8/2020. All patients were 18 years of age or greater and had positive COVID-19 PCR testing.

Results: Preliminary statistical analysis shows that 54% of critically ill patients admitted to the MICU developed delirium at some point during their admission. Among critically ill patients with COVID-19 admitted to the FH MICU those with delirium had significantly increased mortality, hospital LOS, and ICU LOS (all $p<.05$) relative to those without delirium. Further regression analyses will identify risk factors for the development of delirium and compare rates of delirium development between illness matched critically ill patients with and without COVID-19.

Conclusions: Among critically ill patients with COVID-19 the development of delirium is associated with significantly increased mortality and LOS. In critically ill patients, especially those at high risk of developing delirium, preventative measures such as reorientation, proper sleep hygiene, and proper pharmacological therapy choices should be carried out to decrease the risk of delirium development and avoid its deleterious effects on patient outcomes.

Mathson, Lucas

Quality Improvement and Patient Safety

The Effect of Preoperative Food Insecurity on Early Post-Operative Outcomes After Bariatric Surgery

Authors: Lucas R. Mathson; Kathleen L. Lak; Jon C. Gould; Rana M. Higgins; Tammy L. Kindel
Project Mentor and Department: Tammy Kindel, MD, PhD; Surgery

Setting: University Hospital
Objectives: To assess the rate of food insecurity in patients undergoing bariatric surgery. To compare the rates of 30-day post-operative complications based on food security status.
Methods: Patients undergoing primary Roux-en-Y gastric bypass or sleeve gastrectomy between 7/2020-3/2022 were screened for food insecurity via telephone using questions from the Accountable Health Communities Health-Related Social Needs Screening Tool. Screens were matched to patient data and 30-day outcomes from the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database.
Results: In total, 213 (59%) of the 359 bariatric surgery patients were screened with 81 (38%) screening positive for food insecurity. Evaluation of pre-operative variables based on food security status showed comparable age, BMI, and comorbidity status. Food insecure patients were found to have an increased length of stay following surgery compared to food secure patients ($p = 0.001$). Food insecurity was not associated with higher rates of MBSAQIP reported 30-day post-operative complications including emergency department/urgent care visits ($p = 0.45$) and hospital readmissions ($p = 0.86$).
Conclusions: Food insecurity was prevalent at 38% of the bariatric surgical population. Food insecure patients had a statistically longer length of stay after primary bariatric surgery but were not at increased risk of 30-day complications. Future studies are needed to determine the mid- and long-term effects of food insecurity status on bariatric surgical outcomes and the potential impact of food insecurity on length of stay.

Matoska, Thomas

Clinical & Translational Research

Definitive chemoradiation in patients with synchronous oligometastatic esophageal cancer

Authors: Thomas Matoska, Anjishnu Banerjee, Aditya Shreenivas, Lauren Jurkowski, Monica Shukla, Elizabeth Gore, Paul Linsky, Mario Gasparri, Sakti Chakrabarti, Ben George, Candice Johnstone, David Johnstone, Lindsay Puckett
Project Mentor and Department: Lindsay Puckett, MD; Radiation Oncology

Background: The study of oligometastatic esophageal cancer (EC) is relatively new. Preliminary data suggests that more aggressive treatment regimens in select patients may improve survival in oligometastatic EC. However, consensus recommendations are for palliative treatment. We hypothesized that oligometastatic esophageal cancer patients treated with a definitive approach (chemoradiotherapy [CRT]) would have improved overall survival (OS) compared to those treated with a purely palliative intent and historical controls.
Methods: Patients diagnosed with synchronous oligometastatic (any histology, ≤5 metastatic foci) esophageal cancer treated in a single academic hospital were retrospectively analyzed and divided into definitive and palliative treatment groups. Definitive CRT was defined as radiation therapy to the primary site with >40 Gy and >2 cycles of chemotherapy.
Results: Of 78 Stage IVB (AJCC 8th ed.) patients, 36 met the pre-specified oligometastatic definition. Of these, 19 received definitive CRT, and 17 palliative treatment. With a median follow-up of 16.5 months (Range: 2.3-95.0 months), median OS for definitive CRT and palliative groups were 90.2 and 8.1 months, ($p<0.01$), translating into 5-year OS of 50.5% (95% CI: 32.0-79.8%) vs 7.5% (95% CI: 1.7-48.9%), respectively.
Conclusions: Oligometastatic EC patients treated with definitive CRT benefited from that approach with survival (50.5%) that vastly exceeded historical standards of 5% at 5 years for metastatic EC. Oligometastatic EC patients treated with definitive CRT had significantly improved OS as compared to those treated with palliative only intent within our cohort. Notably, definitively treated patients were generally younger and with better performance status versus those palliatively treated. Further prospective evaluation of definitive CRT for oligometastatic EC is warranted.

McKinnon, Quinn

Bioethics & Medical Humanities

Beware the siren's song: questioning the wisdom of using artificial intelligence (AI) in medicine

Authors: McKinnon Q, Jotterand F.

Project Mentor and Department: Fabrice Jotterand, PhD, MA; Institute for Health and Equity - Bioethics

The aim of this research is to provide a taxonomy of the therapeutic relationship as it relates to the ultimate ends, or telos, of medicine. We then raise core concerns with respect to AI's relationship to technology and ultimately to the phenomenology of the patient-physician relationship using the taxonomic framework we provide. While a compressive analysis of these topics is beyond the scope of this paper, we survey each in turn. Based on our research, we surmise that an over-zealous preoccupation with objectifying and ordering interpreted data is detrimental, and dehumanizing, to the therapeutic relationship. This, we suggest, threatens to lower patient satisfaction and increase rates of both moral injury and burnout among physicians. We discuss the phenomenology of the illness experience, which is mediated through the patient-physician relationship, as it relates to the ontological realities of health and disease. In doing so, we propose the following four core elements of the patient-physician relationship: Respect, Trust, Care (compassion), and Empathy (understanding). These elements serve to mitigate uncertainty and alleviate suffering, and thus they are critical to the ends of medicine

McLeish, Tyson

Clinical & Translational Research

Analysis of cell-free DNA (cfDNA) in pediatric patients undergoing cardiac surgery

Authors: Michael E Mitchell, Tyson McLeish

Project Mentor and Department: Michael E Mitchell MD; Surgery - Pediatric Cardiothoracic Surgery

Background: Cardiopulmonary bypass has been associated with post-operative systemic inflammatory response and organ dysfunction. Therefore, endeavors have been made to discover biological predictive tools to forecast these outcomes postoperatively. A promising biomarker is circulating nuclear or mitochondrial cell-free DNA that is released from cells signaling inflammation and tissue injury.

Hypothesis: Cell free DNA is a predictive diagnostic tool and can be used to establish the relationship between cell-free DNA, the length of cardiopulmonary bypass, patient mortality and the physiological processes that occur after cardiac surgery.

Methods: Prospective cohort observational study of 117 neonatal and pediatric patients that underwent cardiac surgery using cardiopulmonary bypass. The Children's Wisconsin Institutional Review Board approved the protocol. Blood samples were drawn prior to skin incision, immediately after the completion of CPB, 12 after the initiation of CPB and subsequently at 24, 48, 72, 120 and 168 hours following the conclusion of CPB.

Results: Pre -operative and post-operative ncfDNA correlated with surgical STAT scoring with median pre-operative ncfDNA of 6.12 (ng/ml) for STAT-1, 6.12 for STAT-2, 8.82 for STAT-3, 12.20 for STAT-4, and 16.19 for STAT-5 ($z=3.15$, $p < 0.0016$). Median ncfDNA level of patients who experienced CAED (Cardiac arrest, ECMO or death) was higher pre-operatively (25 ng/ml) vs. those who did not, 6.4 ng/ml ($p < 0.01$). Mitochondrial and nuclear cfDNA peaked immediately post-operatively but differed in their return to baseline levels, at 12 hours vs. 24 hours. Short fragment cfDNA peaked 12 hours postoperatively, which may signal inflammation and positively correlates with the length of total bypass time. Long fragment DNA peaked 72 hours postoperatively, which may indicate wound healing at this time and is correlated with increased ischemic time ($p < 0.000315$).

Conclusions: Cell free DNA can be used as a diagnostic tool

Miller, Blake — Quality Improvement and Patient Safety

Effect of COVID-19 on Adverse Events in Health Care: A Retrospective Study in Ground and Helicopter EMS

Authors: Blake R. Miller, Timothy J. Lenz,
Project Mentor and Department: Timothy Lenz, MD, MPH, EMT-P; Emergency Medicine

Background: The COVID-19 pandemic has proven to be a significant hardship for the entire world. Healthcare systems, and its workers, have been stretched to their limits. Research regarding whether this increased strain has affected patient safety has not been sufficient, especially in emergency medical services.
Study Objective: Determine if there has been an increased rate of adverse events in ground and helicopter emergency medical services since the onset of the COVID-19 pandemic.
Study Design: A two-year retrospective review was done at a Midwest regional critical care transport service. The rate of adverse events from March 13th, 2019 to March 12th, 2020, and from March 13th, 2020 to March 12, 2021, was the primary outcome. All adverse events that generated a quality improvement incident report form (QIRF) were included, except those generated for non-clinical related incidents. Secondary outcomes included number of days between adverse events, number of calls the crew had prior, and number of hours the crew worked prior.
Results: Adverse event rates were 0.41% (13 of 3166 calls) and 0.88% (28 of 3188 calls) for pre and post COVID, respectively. Fisher's exact test showed a statistically significant difference ($p = 0.027$). The average number of days between adverse events was 52.3 days for pre-COVID and 17.5 days for post-COVID. A Mann-Whitney test did not find this difference to be statistically significant ($p = 0.079$). Furthermore, no statistically significant difference existed between the two time periods for the mean number of hours worked or number of calls the crews had before an adverse event ($p = 0.376$ and $p = 0.853$, respectively).
Conclusion: A higher rate of adverse events for the year following the onset of COVID-19 existed. Additional studies looking at the causes of adverse events and patient outcomes should be undertaken to further understand this increase.

Miller, Jessica — Global Health

Rethinking Data During a Pandemic: Open Data Initiative on COVID-19 in the Middle East and North Africa

Authors: Jessica Miller, K. Ben Alaya, Z. Mhirsi, N. Ben Messaud, Melek Somai
Project Mentor and Department: Melek Somai, MD, MPH; Medicine – General Internal Medicine
Community Partner: Tunisian Center for Public Health

Background As COVID-19 challenged healthcare capacities globally, a need for more extensive data emerged. Massive data sets were published by institutions like Johns Hopkins's CSSE and Oxford's Our World in Data; however, within the Middle East and North Africa (MENA) region, no centralized or open-source datasets existed. This research team created a GitHub repository and platform characterizing regional COVID-19 spread, vaccination, media reports, and COVAX deliveries. The repository's open-source dataset could be leveraged and enriched by regional stakeholders to deliver transparent, data-driven approaches in the fight against COVID-19.
Methods The open source repository aggregated data using automated bots and manual collection. A visualization platform was built to leverage highly interactive Carto (carto.io) geomapping technology. The open-source nature of the projects allowed contributors to suggest alternative sources and feedback within the repository. Anonymous user analytics were monitored using Google Analytics.
Findings The data repository was built on GitHub in February 2021 and gathered eight contributors. The visualization platform was launched in August 2021, and according to anonymous user analytics, by November 27th 2021 the visualization platform received 3,900 views and had 441 users. Of these users, 29% originated from the US, 17% from Tunisia, and 6% from China.
Interpretation The two date ranges with the largest increases in users were August 4th-7th 2021 (77 new users) and October 5th-7th 2021 (50 new users). The initial August spike correlated with an August 4th stakeholder meeting. At this meeting, attendees were provided information regarding the initiative's utility and how to access the data repository and platform. Similarly, the October spike in usage correlated with this project's presentation at a conference. Such trends indicated that community empowerment and engagement is paramount to the success of open-source initiatives.

Miller, Tessa — Urban & Community Health

Lead poisoning in Milwaukee: A medical and public health update

Authors: Tessa Miller, Joanna Balza, Julia Kellis, Heather Paradis, John Meurer, David Nelson
Project Mentor and Department: David Nelson, PhD, MS; Family and Community Medicine

Introduction: Every year, children are poisoned with lead with irreversible effects. This exposure most often occurs in older housing built before 1978 with chipping paint from windowsills where children play and ingest the lead particulates. Exposure to lead can cause neurological and psychological dysfunction, among other health issues.
Objective: This quality improvement study aims to evaluate our knowledge of at-risk children through a public health approach by analyzing the current public health data and barriers to lead testing, follow-up, and identifying at-risk children.
Methods: We received data on lead-poisoned children from the City of Milwaukee Health Department. We analyzed each child's demographics, average blood lead level, average blood lead difference, follow-up rates, ZIP code of residence, and family renter vs. home ownership.
Results: Affected children were disproportionately Black or African American and had an average age of 3.5 years. The average initial blood lead level for 207 children receiving public health nurse case management and monitoring was 25µg/dL, with an average 12.3µg/dL decrease in lead level with follow-up. About 9% of children were lost to clinical and public health follow-up. Most affected children were from economically disadvantaged ZIP codes (532-06, 08, and 10), and 94% lived in rented properties.
Conclusion: More work is needed to reduce lead in the environment and improve follow-up in affected children. ZIP code and rental data may indicate at-risk children. Although follow-up rates are high, the study determined variability in decreasing lead levels with follow-up. Identifying at-risk children and reducing lead levels in children is vital to support health equity.

Miltchev, Vladimir — Molecular & Cellular Research

Maternal thrombophilia and susceptibility to obstetric lung injury in mice

Authors: Castillo M, Miltchev V, Gunjan S, Sood R
Project Mentor and Department: Rashmi Sood, PhD; Pathology

Placental abruption is a pregnancy complication in which the placenta prematurely separates from the uterine wall. It complicates ~1% of all pregnancies. Severe abruption can rapidly evolve into Disseminated Intravascular Coagulation (DIC) associated with multiple organ failure. Etiology and pathogenesis of placental abruption and DIC involves complex and poorly understood interactions between coagulation, fibrinolysis and inflammation. Thrombophilia is a risk factor for placental abruption. We have previously shown that mice with thrombophilia, due to a deficiency of the anticoagulant protein Endothelial Protein C Receptor (EPCR), exhibit clinical and histological evidence of placental abruption. Here, we evaluated EPCR-deficient maternal organs for signs of pathology. Two major pathologies were observed: (1) EPCR-deficient mice showed clustering of CD45+ immune cells in the alveolar parenchyma that resembled bronchus-associated lymphoid tissue (BALT), an inflammation-inducible tertiary lymphoid tissue. Genes upregulated in lungs of EPCR-deficient pregnant mice included a variety of transcripts that are essential for BALT induction, organization, and maintenance. Immunohistochemical analysis of BALT structures demonstrated B- and T-cell recruitment and organization. (2) EPCR-deficient mice showed decreased alveolar parenchymal complexity that worsened with pregnancy. The lung pathology could be partially ameliorated with concomitant deficiency of clotting factor VIII or thrombin receptor Protease activated receptor 4 (PAR4), suggesting suppression of thrombin generation or activity as a potentially effective mechanism in preventing deleterious lung changes. Our study implicates maternal lungs as a prominent organ affected by inflammatory pathology born of a hypercoagulable state during pregnancy. These data uncover a novel phenomenon where maternal thrombophilia leads to lung lymphocyte accumulation and injury that is exacerbated during pregnancy.

Min, Heun — Clinical & Translational Research

Improving Quality of Life with Outpatient High-Dose Methotrexate in Intracranial Metastases Patients

Authors: H Min, E Weil, M Nelson, J Charlson, M Conroy, M Powell, Y C Cheng, L Chaudhary, J Burfeind, J Retseck, D Sriram, S Kamaraju

Project Mentor and Department: Sailaja Kamaraju, MD; Medicine – Hematology and Oncology

Introduction: Breast cancer patients with intracranial (IC) metastases including leptomeningeal metastasis (LM) confer poor prognosis. Upon disease progression with standard lines of therapy, high-dose intravenous methotrexate (HD IV MTX) is offered to patients given its effective CNS penetrance. HD IV MTX is commonly administered inpatient, requiring extended hospitalization, rigorous leucovorin rescue, IV hydration, and urine alkalinization. Currently, quality of life (QoL) aspects of inpatient v. outpatient regimens remain unknown.

Methods: An outpatient MTX protocol with daily visits to outpatient infusion centers was institutionally developed. Study eligibility criteria included solid tumor diagnoses with IC±LM metastasis, disease progression on standard of care treatment, and transition from inpatient to outpatient regimen within the past 12 months. For eligible patients upon consent, qualitative semi-structured phone interviews were conducted with focus on physical functioning and symptom burden. Thematic analysis was utilized.

Results: Of the 10 patients who were screened, three (breast=2, sarcoma=1) were eligible. Patient demographics included 2 Caucasians, 1 African American, mean age of 52 years, and s/p prior whole brain radiation.

Among QoL measures, no differences in functional status were reported between the two regimens. Single sarcoma patient reported less nausea and emesis with the outpatient regimen. All patients agreed on convenience, autonomy, greater personal and family time, and stronger emotional support while undergoing the outpatient protocol. Despite honorable mentions of inpatient onsite staff and services, all patients reported higher QoL experienced with outpatient MTX protocol vs. inpatient.

Conclusions: Interview analysis determined that patient autonomy and nonobligatory hospitalization are key outpatient MTX treatment hallmarks that greatly enhanced patient QoL. Cost-effect analysis of both regimens will be explored next.

Mitra, Tarini — Global Health

Impacts of Nature in Proactive and Responsive Behavioral Health Treatment of Urban Latinx Youth

Authors: T Mitra, C Remmers, C Jankowski, E DeLeon, J Ferschinger, W Reyes, K Malecki, B Canales, M Agnew, K Beyer

Project Mentor and Department: Kirsten Beyer, PhD, MPH, MS, Institute for Health and Equity - Epidemiology

Community Partner: Sixteenth Street Community Health Centers

Background: Studies have shown that weather impacts mood, and individual and community mental health. This program provides nature-based therapeutic interventions to youth regardless of language, income, or insurance. The population was primarily economically disadvantaged Latinx youth seeking behavioral health care at Sixteenth Street Community Health Centers (SSCHC). We hypothesized that enrolled participants who receive programming with higher doses and higher attendance will demonstrate the highest improvements in mental health outcomes such as anxiety, depression, and stress.

Methods: The nature-based curriculum was implemented into three cohorts with sixty participants in total. The Children and Adolescent Day Treatment Program, After School program, and Summer Camp programs were completed at different times throughout the year with each program having a different amount and length of sessions per week. The program was analyzed using a Pre vs. Post survey study design and regression analysis. Assessments include the Revised Child Anxiety and Depression Scale Strengths and Difficulties Questionnaire, Strength, and Difficulties Questionnaire, and the Perceived Stress Scale.

Results: Results of the three cohorts combined demonstrated that there is significance decrease ($p<0.05$) in anxiety and depression with the implementation of nature programming. In addition, there was significant findings ($p<0.05$) showing that increased attendance improved mental health outcomes in anxiety, depression, emotion, conduct, hyperactivity, peer relationships, prosocial behavior, and total stress.

Conclusion: This study further proves that exposure to nature improves mental health outcomes, and in relation with higher dosage and attendance. These findings will be implemented into a toolkit with activities, assessment, planning, training, and policy. Mental health in the Latinx community is of particular concern and further research should continue to be done to improve outcomes.

Moroz, Stacy — Clinician Educator

Early Prediction of Remediation Interventions in the First Months of Residency Training

Authors: Stacy J Moroz, Chris A Fox, Thomas J Ebert
Project Mentor and Department: Thomas J Ebert, MD PhD; Anesthesiology

Background: Early identification of residents struggling to meet training milestones can enable early remediation efforts to improve clinical competence. In this report, we evaluate the utility of faculty 'gut instinct' in predicting need for intervention of Clinical Anesthesia (CA)-1 residents during the second month of training.
Methods: 30-40 faculty physicians were asked to evaluate three CA-1 resident classes with a competency-based assessment tool termed the "Gestalt Survey" consisting of three questions regarding each resident's clinical performance, medical knowledge, and overall potential to excel in training. The survey was administered to faculty on a single occasion six weeks into the first year of residency training. Results of the Gestalt survey and other pre-residency match variables were related to the independent assessments of resident performance in the core competencies by the Clinical Competency Committee (CCC)'s standard review process. Resident performance was independently evaluated four, six, and twelve months into training by the CCC.
Results: The Gestalt score and resident candidate pre-match interview score were significant predictors of the need for a remediation action in the first year of clinical training as determined by the CCC, in multivariate modeling. The survey score had a strong predictive association with the remediation status variable ($p < 0.001$) in all regressions in which it was included, irrespective of other variables in the regression. Average pre-match interview scores were inversely related to need for remediation.
Conclusions: The Gestalt Survey had a significant association with the need for a remediation of residents in their CA-1 year of training in anesthesiology and provided a sufficiently strong predictive value to consider early intervention. Regressing the combined Gestalt and the pre-match interview-scores against need for remediation further reinforced the predictive strength of the model.

Morra, Cecelia — Urban & Community Health

Trauma-Informed Care Training in Trauma and Emergency Medicine: A Scoping Review of Existing Trainings

Authors: Nguyen K*, Morra CC*, Sieracki R, Pavlic A, Barry C. **Co-contributing authors*
Project Mentor and Department: Courtney Barry, PsyD; Family and Community Medicine

BACKGROUND AND OBJECTIVES: Greater lifetime exposure to psychological trauma correlates with a higher number of health comorbidities and negative health outcomes. However, providers are inadequately trained in how to care for patients with trauma, especially in acute care settings. Our objective was to identify implemented trauma-informed care (TIC) training for emergency and/or trauma department providers and review the strengths and gaps in instruction.
METHODS: We conducted a comprehensive literature search in MEDLINE (Ovid), Scopus, PsycInfo, Web of Science, Cochrane Library, Ebsco's Academic Search Premier, and MedEdPORTAL. Inclusion criteria were emergency and trauma department providers (medical doctors, advanced practice providers, residents), adult and/or pediatric patients, and training evaluation. Evaluation was based on the Kirkpatrick Model.
RESULTS: Researchers screened 2280 unique articles and identified 2 different training protocols. Results demonstrated the training included patient-centered communication and interprofessional collaboration.
CONCLUSIONS: Study findings from our review show a gap in the literature, highlighting a need for TIC training for ED and trauma providers. Current training protocols demonstrated an increasing comfort level with the TIC approach, integration into current practices, and referrals to trauma intervention specialists.

Nakamura, Keith — Clinician Educator

Comics in medical education: a scoping review

Authors: Keith Nakamura, Branden Vugrnick, Aditya Jadcherla, Theresa Maatman
Project Mentor and Department: Theresa Maatman, MD; Medicine – General Internal Medicine

Background: The field of Graphic Medicine is broadly defined as any use of comics as a medium to portray information related to medicine. Recently, there has been increased utilization of comics specifically for the education of medical trainees.
Objectives: Review and analyze all published literature on Graphic Medicine in medical training and assess the field of Graphic Medicine through the framework for understanding the evolution of an academic field put forth by Alexander Shneider.
Methods: An exhaustive literature search was conducted for published studies about the use of comics in medical education. To be included, studies must be peer-reviewed and utilize comics in the education of medical students and/or residents. These publications were then analyzed for the levels of trainees involved in the study, the type of data that was reported, the specific way that comics were used to educate learners, the replicability of the study, and the quality of the data analysis performed in the study.
Results: Our literature search returned 1375 publications. After duplicates were removed, 848 publications had their title and abstract screened leading to the assessment of 108 full-text articles. After a review of the entire manuscript, 29 publications were evaluated in our study.
Conclusions: In the context of Shneider's four stages of evolution of a scientific discipline, Graphic Medicine in medical education is at the end of the first stage. The field is currently made up of a small number of authors who do not always use consistent language to describe their work. These authors also employ a variety of techniques to gather similar data, leading to difficulties comparing results between studies or replication of results by a different research team. Despite its existence in an early stage, there have been clear signs of progress as evidenced by a recent increase in the use of quantitative-objective data including the first randomized control trial in the field.

Nascimento, Kristin — Bioethics & Medical Humanities

Get Out of My Ethics Room: Teaching Bioethics Through Games

Authors: Nascimento K, Lee J, Helms A
Project Mentor and Department: Ann Helms, MD, MS; Neurology

While medical students and residents lament the lack of exposure to common clinical ethics dilemmas and the methods of addressing them, few medical schools have a curriculum expectation that students understand ethical care. Similarly, few medical schools in the United States have dedicated courses addressing medical ethics and/or the law. The most commonly proposed explanations for insufficient ethics education are competing priorities for curriculum time and time constraints in faculty schedules. As physicians will inevitably be faced with ethical dilemmas, especially given the diversity of patient backgrounds, the absence of dedicated ethics training is of serious concern. Due to this lack of ethics education, the aim of this project was to develop a game that exposes medical students and residents to challenging ethical scenarios and fosters their abilities to navigate them by both citing key values in medical ethics (e.g. informed consent, confidentiality) and applying the four major principles: beneficence, non-maleficence, autonomy, justice. Get Out of My Ethics Room, the resultant game, focuses on the most commonly experienced medical dilemmas identified from previous surveys of attending physicians and residents. In consideration of limited time in medical school curriculums, the game was designed such that it could be played in a short period of time without faculty supervision. The viability of the game and its ability to teach medical ethics was evaluated through a survey of students who played the game.

Nguyen, Kevin — Urban & Community Health

Trauma-Informed Care Training in Trauma and Emergency Medicine: A Scoping Review of Existing Trainings

Authors: Nguyen K*, Morra CC*, Sieracki R, Pavlic A, Barry C. **Co-contributing authors*

Project Mentor and Department: Courtney Barry, PsyD; Family and Community Medicine

BACKGROUND AND OBJECTIVES: Greater lifetime exposure to psychological trauma correlates with a higher number of health comorbidities and negative health outcomes. However, providers are inadequately trained in how to care for patients with trauma, especially in acute care settings. Our objective was to identify implemented trauma-informed care (TIC) training for emergency and/or trauma department providers and review the strengths and gaps in instruction.
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CONCLUSIONS: Study findings from our review show a gap in the literature, highlighting a need for TIC training for ED and trauma providers. Current training protocols demonstrated an increasing comfort level with the TIC approach, integration into current practices, and referrals to trauma intervention specialists.

Noel, Jacob — Clinical & Translational Research

Perioperative Utilization and Outcomes in Pediatric Otolaryngology Surgery

Authors: Jacob Noel, Cecille Sulman

Project Mentor and Department: Cecille Sulman, MD; Otolaryngology - Pediatric Otolaryngology

Background: Prior institutional analysis of readmission rates and visits to the emergency department after tonsillectomy revealed two populations at higher risk: African Americans (7%) and Spanish-speaking populations (9%). A systematic literature review performed by Jabbour et al. 2017 found widespread disparities in pediatric otolaryngology. Low socioeconomic status, lack of insurance, nonwhite race, and "barriers to accessing care" were most commonly identified. Our aim is to understand risk factors in our perioperative population that may place patients at risk for postoperative complications.
Methods: Families were called after surgery to assess whether they had the necessary resources to support patients postoperatively. These questions were modeled after the CDC's Data Set Directory of Social Determinants of Health at the Local Level. Survey data was analyzed for social determinants that may predispose patients to readmission. Secondarily, the population that could not be reached was examined for risk factors.
Results: 232 families were called, and 160 surveys were completed. 10/160 families reported difficulties obtaining medications, 1/160 families reported not having enough help at home and none reported financial barriers. Families that did not use our text reminder service returned to the ED at a higher rate. Of the seven families that reported not getting enough information before surgery, four reported not using our reminder service.
Conclusions: In this pilot, we have found areas for improvement in preparing families for surgery. We have also uncovered a misunderstanding related to postoperative pain control. Beyond our data, we have tested the feasibility of conducting a social determinant screening postoperatively by phone. Future directions include adapting SDOH screening into existing peri-operative workflows, testing proposed interventions, and developing a risk-assessment tool.

Nowak, Madeleine — Quality Improvement and Patient Safety

Mind the Gap: Understanding the Timeline of Medical Readiness and Discharge

Authors: Madeleine Nowak, Amanda Rogers
Project Mentor and Department: Amanda Rogers, MD; Pediatrics - Hospitalist

An efficient discharge requires timely recognition of patients' medical readiness for discharge (MRD) and effective preparation of logistical discharge needs. Our objective was to better understand Pediatric Hospital Medicine (PHM) discharges to inform targeted discharge improvement work by 1. analyzing time of MRD throughout the day, 2. assessing time from MRD to discharge, and 3. categorizing common discharge delays.
We completed a retrospective chart review of PHM patients hospitalized with status asthmaticus, brief resolved unexplained event, hyperbilirubinemia, and rule out sepsis. The time of MRD was determined by reviewing the electronic health record (EHR) for completion of diagnosis specific criteria. The time of MRD was compared to the time of the discharge order and the time of discharge. If the time from MRD to discharge exceeded 2 hours, the discharge was considered delayed and further chart review was completed to identify potential reasons for the delay.
MRD occurred throughout the day with a median hour of 11 am. The median time from MRD to discharge was 1.7 hours (0.5 hours from MRD to discharge order and 0.9 hours from order to discharge) with the longest duration from MRD to discharge occurring in patients with status asthmaticus. 40% of patients had a delayed discharge, with status asthmaticus having the most discharge delays. Identified reasons for delays were coordination of discharge medications, family education, vaccinations, social barriers, and transportation.
MRD occurred throughout the day suggesting that time from MRD to discharge may be a more informative metric of discharge efficiency than discharges by a set time of day. While most patients were discharged within 2 hours of MRD, themes of common discharge delays were identified. Next steps include the development of forward facing EHR timestamps noting MRD for improved tracking and real-time communication, and targeted interventions to address identified reasons for delays.

Nwosu, Chiamaka — Urban & Community Health

Long-Term Opioid Use and Opioid Use Disorder in Women of Reproductive Age and During Pregnancy

Authors: Chiamaka Nwosu, Brooke Passolt
Project Mentor and Department: Brooke Passolt, MD; Family Medicine

Abstract:
This literary review and analysis project aims to explore the complexities of opioid use disorder (OUD) in women of reproductive age, focusing on identifying risk factors, understanding associated complications during pregnancy, researching multidisciplinary interventions, and providing recommendations for clinicians and patients. A comprehensive literature review was conducted using the databases PubMed, UpToDate, and Google Scholar, utilizing search terms related to the non-pharmacological treatment of OUD, medication-assisted treatment, pregnancy, chronic pain, overdose prevention, and prenatal substance use. The review revealed significant risk factors contributing to the development of OUD in women of reproductive age, with particular emphasis on the elevated risks associated with prior or current incarceration and lower socioeconomic status in vulnerable populations. Furthermore, pregnant women with OUD face heightened complications, including neonatal abstinence syndrome and neural tube defects, necessitating specialized care, and support. The findings highlight the need for comprehensive approaches to address OUD in this population, emphasizing patient education, screening, and counseling as integral components of interventions. We touch on the significance of medication-assisted treatment in facilitating full recovery and recommend that women receive appropriate support services to enhance outcomes. We highlight the importance of healthcare providers prioritizing the development and implementation of strategies that consider the social and socioeconomic factors influencing OUD in women of reproductive age. The findings underscore the significance of comprehensive interventions and support services in improving outcomes for both women and their children affected by OUD. Ultimately, we sought to aid healthcare providers with the necessary tools to effectively address OUD in women of reproductive age.

O'Donnell, Carly

Clinical & Translational Research

Responsive Neurostimulation of the Anterior Thalamic Nuclei in Refractory Genetic Generalized Epilepsy

Authors: Carly M. O'Donnell, Sara J. Swanson, Chad E. Carlson, Manoj Raghavan, Peter A. Pahapill, and Christopher Todd Anderson

Project Mentor and Department: Christopher Todd Anderson, MD; Neurology

Genetic generalized epilepsies (GGEs) are thought to represent disorders of thalamocortical networks. There are currently no well-established non-pharmacologic treatment options for patients with drug-resistant GGE. NeuroPace's Responsive Neurostimulation (RNS) System was approved by the United States Food and Drug Administration to treat focal seizures with up to two ictal foci. We report on three adults with drug-resistant GGE who were treated with thalamic RNS. Given the severity of their epilepsies and the potential ictogenic role of the thalamus in the pathophysiology of GGE, the RNS System was palliatively implanted with leads in the bilateral anterior thalamic nuclei (ANT) of these patients. The ANT was selected because it was demonstrated to be a safe target. We retrospectively evaluated metrics including seizure frequency over 18–32 months. One patient required explantation due to infection. The other two patients were clinical responders. By the end of the observation period reported here, one patient was seizure-free for over 9 months. All three self-reported an improved quality of life. The clinical response observed in these patients provides 'proof-of-principle' that GGE may be treatable with responsive thalamic stimulation. Our results support proceeding to a larger study investigating the efficacy and safety of thalamic RNS in drug-resistant GGE.

Ortmann, Stephen

Bioethics & Medical Humanities

Exploring Medical Students' Perception of Artificial Intelligence: A Cross-Sectional Survey

Authors: Stephen Ortmann, Fabrice Jotterand

Project Mentor and Department: Fabrice Jotterand, PhD, MA; Institute for Health and Equity - Bioethics

Introduction: As Artificial Intelligence (AI) and Machine Learning (ML) continue to evolve and improve at an unprecedented pace, their influence on the healthcare landscape is becoming progressively significant. Consequently, it is vital that future physicians possess a comprehensive understanding of these rapidly advancing technologies, their potential biases, applications, and implications. This study delves into medical students' perceptions, understanding, and the perceived necessity of AI and ML within the context of their formal medical education.
Methods: We conducted a comprehensive, literature-based survey, distributed to medical students at the Medical College of Wisconsin. The survey encompassed a range of questions on students' familiarity with AI and ML, perceptions and concerns about the technologies, and their perceived importance of training in these disciplines.
Results: From 47 responses, a significant comfort gap was identified regarding AI and ML, despite an awareness of their escalating importance in medicine. Although many respondents anticipated that certain specialties will heavily incorporate AI and ML tools, this did not appear to influence their future specialty choice. A large majority expressed a need for formal education on these technologies, particularly concerning their risks, biases, and policy implications.
Conclusion: This preliminary study advocates for the integration AI and ML into the medical curriculum. As these technologies continue to reshape healthcare, it's crucial that future physicians acquire the competencies to leverage them, understand their potential risks and pitfalls, and are empowered to influence policy-making regarding the use of these tools in healthcare. Despite being a pilot study, this research underscores the need for curriculum adaptations to address students' concerns and position them as significant contributors to the evolving narrative of AI in healthcare.

Osafo, Neil — Urban & Community Health

Standardization of Outcome Measures for IT Steroid for Idiopathic Sudden Sensorineural Hearing Loss

Authors: Neil K. Osafo, David R. Friedland, Michael S. Harris, Jazzmyne Adams, Chasity Davis, Ling Tong, Jake Luo

Project Mentor and Department: Dr. David Friedland; Otolaryngology

Objective: To compare patient response to intratympanic steroid (IT) treatment using the American Academy of Otolaryngology Head and Neck Surgery (AAO-HNSF) guideline vs other reported criteria.
Study Design: Retrospective chart review
Setting: Academic otology practice
Patients: 74 patients with a diagnosis of idiopathic sudden sensorineural hearing loss (ISSNHL) between April 2003 and December 2020 were included. All patients had at least 1 treatment with IT steroids and both pretreatment and follow-up audiograms.
Interventions: IT steroid injection
Main Outcome Measures: 1) Determination of the efficacy of IT steroids for ISSNHL using the AAO-HNSF guideline vs other reported criteria; 2) Correlation of clinical and treatment variables with response to IT steroid
Results: PTA-4 using AAO-HNSF reporting criteria demonstrated full recovery in 24.32% of patients. Applying the 8 other reported outcomes criteria to our patients showed full recovery ranging from 14.87% to 40.54% of patients. Similarly, AAO-HNSF criteria showed no recovery in 51.35% of patients, while applying the other reported criteria showed no recovery in 51.45% to 82.43% of patients. Low frequencies exhibited full recovery in 33.78% of patients while high frequencies recovered in 27.03%. Younger age ($p=0.003$, effect size 0.924) and IT injection within a week of onset ($p<0.001$, effect size 1.099) positively correlated with full recovery. There was no impact of prior or concurrent oral steroids nor number of steroid injections on outcome.
Conclusions: Great variability exists in the literature for assessment of IT steroid outcomes in ISSNHL. AAO-HNSF standardization of outcome measures is necessary to accurately characterize IT steroid efficacy.

Pain, Celeste — Global Health

Help! How Do I Say This? Fostering Character with SDH Communication Sessions in Preclinical Students

Authors: Celeste Pain, Sara Tesfatsion, Ashley Pavlic

Project Mentor and Department: Ashely Pavlic, MD, MA; Emergency Medicine

Patients' healthcare outcomes are closely tied to their social circumstances therefore, it's integral that medical students can identify non-biomedical factors contributing to their patient's health. Although there are fully integrated social determinants of health (SDH) courses in existence, there is variability in how this content is taught. Considering clinical simulation improves student learning, combining a skills practice session with real-time feedback could be crucial to developing well-rounded students.
We demonstrate how we created a skills practice session that utilizes real time feedback from peers and faculty and focuses on specific themes of SDH. Our goal is to contribute to the existing literature on SDH education to provide other undergraduate medical educators with an outline of how SDH can be integrated into preclinical skills courses.
A facilitator guide was created for sessions to be run by non-experts. Four pilot sessions were held with preclinical students. Every student was assigned a case that they acted out with a standardized patient. The students received in-person feedback after their case. In addition to real-time feedback after each session, we sent out pre- and post-surveys, and a delayed survey 1 month after the session.
Our pilot sessions revealed strongly positive experiences among students. The data collected from surveys showed that after the sessions, they felt more prepared to have these conversations with patients. Additionally, in the post-surveys, students highlighted these character strengths in their experiences and how they promoted deeper professional development. Overall, our study shows that these practice sessions are an effective way of enhancing medical students' communication skills and character strengths which are crucial for providing well-rounded medical care. It also provides a framework for incorporating SDH education into pre-clinical coursework that can be adapted by other institutions and educators.

Palathinkara, Murali — Health Systems Management & Policy

Differences between Early Onset, Late Onset and Very Late Onset Adult Multiple Sclerosis

Authors: Murali Palathinkara, Abrahim N. Razzak, Delaney Cairns, Ahmed Z. Obeidat
Project Mentor and Department: Ahmed Z. Obeidat, MD, PhD; Neurology

Background: There may be a difference in clinical and radiologic characteristics between very late onset MS (VLOMS) and adult onset MS.
Methods: We performed a retrospective review of medical records of FH patients diagnosed with MS between 8/1/2017 and 3/1/2022. We included patients with MS diagnosis, were 60 years or older - Very Late Onset (VLOMS), 50-59 years old at diagnosis – Late Onset (LOMS), or were 18-30 years old at diagnosis – Early Onset (EOMS) and had complete imaging and clinical records. The frequency of clinical symptoms and location of demyelinating lesions were extracted from medical records and compared using the chi square test, $p<0.05$.
Results: A total of 246 newly diagnosed patients were identified. 53 were EOMS, 28 were LOMS and 34 were VLOMS. Sex ratio was not different between groups. EOMS had a higher percentage of patients who self-identify as black while LOMS had higher percentage of patients who self-identify as white.
LOMS and VLOMS showed significant differences in tremors, and lesion distribution. LOMS was more likely to present with motor symptoms, sphincter dysfunction, fatigue, and tremors. EOMS was more likely to have lesions in the cerebellum and occipital lobe and lesions were more likely to show contrast enhancement at the time of diagnosis.
Conclusion: Our findings revealed novel differences in clinical and imaging characteristics between VLOMS and LOMS. The current classification of LOMS may benefit from revision to better align with chronological age classification for old age >60 instead of the current standard in the literature of >50 years.

Palladino, Carmine — Health Systems Management & Policy

The effect of primary spoken language and race in overall HbA1C reduction

Authors: Carmine N. Palladino, Mark Lodes, Yilu Dong
Project Mentor and Department: Mark Lodes, MD; Director of Population Health

As a health system with a clinically integrated network with approximately 950,000 outpatient visits a year, Froedtert & the Medical College of Wisconsin (F&MCW) understands the importance of implementing programs aimed at improving preventive health maintenance while optimizing quality outcomes and efficient care delivery. Studies have shown that only 23.7% of patients reach their clinically desired HbA1c goals. F&MCW utilized the Ambulatory Diabetes Outreach Program (ADOP) to significantly decrease overall participant % HbA1c by 1.60. The effect of race and primary spoken language were analyzed, with all spare the Non-English Black patients seeing a statistically significant decrease in % HbA1c. However, the decrease in HbA1c was significantly lower for our BIPOC population, but it appears that language is not a modifier for this discrepancy.
Overall, ADOP is generally effective across race, with an overall %HbA1c reduction of 1.60; however, there were relatively better results in White (-1.72), Hispanic (-1.68), followed by Black (-1.37) minorities, with covariates adjusted. When looking at primary spoken language (English vs. Non-English) for each race group, all measured groups, spare Non-English Black, saw a statistically significant decrease in % A1C reduction as compared to their respective controls ($p<0.05$). This shows that overall, primary spoken language did not appear to the be modifying factor to describe the lower %HbA1c seen in our BIPOC patient population as compared to our white patient population. By understanding the factors that impact the overall %HbA1c reduction, we hope to determine the best interventions and resource allocations that would close the gap between white and BIPOC patient populations. Overall, programs such as ADOP prove to be beneficial to patients of all backgrounds; however, work must be done to address the relatively poorer response that we saw among our BIPOC patient population.

Partovi, Omeed — Clinician Educator

Using a peer-led roleplay model to help pre-clinical medical students improve interpersonal skills

Authors: Molly Thapar*, Omeed Partovi*, Madeline McGauley, Christopher Gitter, Jose Lucas Zepeda, Robert Treat, Himanshu Agrawal, April Zehm, Andrew Petroll. **these authors contributed equally to this work*
Project Mentor and Department: Andrew Petroll MD; Medicine – Infectious Disease

Problem Training in communication skills in pre-clinical medical training impacts future clinical competence, yet is often underutilized or absent. We describe the structure, and content of our novel extracurricular program, "Operation Conversation," and describe its feasibility, acceptability, and preliminary efficacy.
Approach In the 2021-2022 academic year, two cohorts of pre-clinical medical students at MCW participated in a semester-long program of three bimonthly virtual workshops. Each group had two student participants and one faculty facilitator. Each student role-played as a physician and a patient in separate scenarios during each workshop. Facilitators observed role-plays and provided immediate feedback. After each role-play, students and facilitators completed an assessment tool to rate student performance. After each workshop, students completed a self-evaluative survey. At the final workshop, students and facilitators completed a program evaluation survey.
Outcomes Over 90 students have participated in Operation Conversation; attendance at workshops neared 100%. Data from the first 64 participants demonstrated increases in performance scores from the initial to the final workshop on all three perspectives (self, peer, facilitator). Student reflections supported the use of peers as group partners, identified newfound appreciation of the dynamic relationship between patient and provider, and noted the importance of seeing a difficult situation through a patient's eyes.
Next steps We demonstrated that a student-run role-play program to enhance communication skills is feasible, well-regarded, and has preliminary efficacy among pre-clinical medical students. Addressing the lack of interpersonal skills training through an extracurricular program positively supplements traditional curricular content. Moreover, the use of active role-play, spaced repetition, and self-reflection is innovative and has potential to augment the curriculum at MCW and elsewhere.

Patel, Mira — Quality Improvement and Patient Safety

Contouring: How Do We Manage This Pivotal but Time-Consuming Workload?

Authors: Mira Patel, Anjishnu Banerjee, Beth A. Erickson, Joseph A. Bovi
Project Mentor and Department: Joseph Bovi, MD; Radiation Oncology

Purpose/Objectives: Radiotherapy continues to be an important and curative treatment modality for many malignancies. Image-guided, intensity-modulated radiation is important in delivering curative radiation doses while decreasing morbidity. The first step in creating these complex plans is contouring radiation targets and organs at risk. This process takes substantial time which is unaccounted for in the physician's daily schedule. The goal of this study was to distribute a survey to explore how contouring and treatment planning is managed and its impact on quality of life (QOL) amongst radiation oncologists, physicists, and dosimetrists.
Materials/Methods: A 19-question survey was created using Qualtrics. The survey was distributed through Twitter, AAMD, a Medical Physics Journal, as well as directly to radiation oncology practices. Survey responses were summarized as proportions and associations tested using Fisher's exact test.
Results: Physicians spent more time completing job responsibilities after work than dosimetrists and physicists, with an average of 6.22 hours (range 0-20) in comparison to 4.16 (range 0-30) for dosimetrists and 1.55 (range 0-12) for physicists (p-value 0.001). Physicians on average spent more time contouring on weekends with 1.81 hours (range 0-10) in comparison to 0.54 (range 0-10+) for dosimetrists and 0.31 (range 0-10) for physicists (p-value <0.001). When considering QOL and time spent after work, more respondents agreed there was a negative impact on QOL with increased responsibilities outside work hours (p-value <0.001). Of interest, contouring time spent after work hour was similar for both academic and private centers.
Conclusion: We present significant insight in the unaccounted-for workload contouring creates and the impact this has on QOL for radiation oncologists. Allotment of scheduled clinic time for treatment planning and contouring may be a solution to improve QOL.

Patel, Kahaan — Clinical & Translational Research

Assessing the role of Benevolent Childhood Experiences in preventing physician burnout

Authors: Agrawal H, Thordsen S, Patel K, Le J

Project Mentor and Department: Himanshu Agrawal, MD; Psychiatry and Behavioral Medicine

Physician burnout negatively impacts both physicians and patients. Benevolent Childhood Experiences (BCEs) have been suggested as one factor that may protect against burnout. This study sought to better understand the relationship between BCEs and physician burnout. We hypothesized that more BCEs would reduce physician burnout. Our cohort was comprised of 44 physicians at the Medical College of Wisconsin who completed electronic surveys consisting of demographic variables, the Benevolent Childhood Experiences (BCE) questionnaire and the Maslach Burnout Inventory (MBI) survey. The MBI scored based on standardized scoring instructions including domain sub-scores: exhaustion, personal accomplishment, and depersonalization. BCE was scored based on a numerical score. BCE scores were analyzed against MBI scores using simple linear regression. Our cohort had a mean age of 45.5 years (range 35-70 years) and had been in practice for an average of 12.62 years (range 1-40 years). 20 (52.6 %) reported their current rank as Assistant Professor, 13 (34.2%) reported being Associate Professor, and 6 (13.2%) reported being a full Professor. Overall, the mean BCE score was 9.16 (SD 1.18, maximum score 10). 42.9% of the respondents in the emotional exhaustion domain, 35% in the personal accomplishment domain, and 64.3% in the depersonalization domain were (moderately or highly) burned out. Even though there was not a statistically significant correlation between BCE and MBI scores, (in part due to small sample size), this study found high rates of burnout (depersonalization) in spite of high BCE.

Patel, Nisha — Global Health

A qualitative study to improve pandemic preparedness in Milwaukee County

Authors: Nisha Patel, Kia Lechleitner, Natalie Anumolu, Hamsi Karra, Courtney Jankowski, S.T. Lara, Darren Rausch, Rachel Weber, Kirsten Beyer

Project Mentor and Department: Kirsten, Beyer, PhD; Institute for Health and Equity - Epidemiology

Lack of communication, inconsistent messaging, and misinformation adversely affected the COVID-19 response. Politicization of the pandemic response nationwide added another layer of complication to responding to the unprecedented nature of the COVID-19 pandemic. The objective of this study was to characterize the process of pandemic response in the Milwaukee County via qualitative interviews with responders who worked across multiple sectors including disruption to organizational functions, processes of decision and policy making, and recommendations for system change. 30 open-ended qualitative interviews were conducted and coded using the MAXQDA software. Two overarching themes emerged that offered targets for improved pandemic preparedness in the region: lack of policy constraints and personal challenges faced by staff. Interviewees expressed that lack of authority and trust from citizens and government officials, lack of timely decisions and flexibility. This was further complicated by exhaustion, lack of cooperation, and external stressors related to the pandemic. Measures should be taken to increase the workforce and allow mental health services to be more accessible. Additionally, a standardized and unified approach should be taken across all branches of government in the Milwaukee to gain public support for future public health crisis.

Pedersen, Connor

Bioethics & Medical Humanities

Unpublished Clinical Trials of Common Rheumatic Diseases

Authors: Pedersen C, Tai S, Valley E, Henry K, Duarte-GarcÃ-a A, Singla S, Putman M.
Project Mentor and Department: Michael Putman, MD, MSCI; Medicine - Rheumatology

Background: Randomized controlled trials (RCTs) provide high-quality evidence for treatment efficacy, but many RCTs remain unpublished. The objective of this study was to describe the proportion of unpublished RCTs in 5 rheumatic diseases and to identify factors associated with publication.
Methods: Registered RCTs for 5 rheumatic diseases (systemic lupus erythematosus, vasculitis, spondyloarthritis, SjÃ¶gren's syndrome, and psoriatic arthritis) with over 30 months since study completion were identified using ClinicalTrials.gov. Index publications were identified by NCT ID numbers and structured text searches of publication databases. The results of unpublished studies were identified in abstracts and press releases; reasons for non-publication were assessed by surveying corresponding authors.
Results: Out of 203 studies that met eligibility criteria, 17.2% remained unpublished, representing data from 4,281 trial participants. Higher proportions of published trials were phase 3 RCTs (57.1% vs 28.6% unpublished, $p < 0.05$) or had a positive primary outcome measure (64.9% vs 25.7% unpublished, $p < 0.001$). In a multivariable cox proportional hazards model, a positive outcome was independently associated with publication (HR 1.55, CI 1.09-2.22). Corresponding authors of 10 unpublished trials cited ongoing preparation of the manuscript (50.0%), sponsor/funder issues (40.0%), and unimportant/negative result (20.0%) as reasons for lack of publication.
Conclusions: Nearly one in five RCTs in rheumatology remain unpublished two years after trial completion, and publication is associated with positive primary outcome measures. Efforts to encourage universal publication of rheumatology RCTs and reanalysis of previously unpublished trials should be undertaken.

Pennington, Nicholas

Health Systems Management & Policy

Case Report: Numbness in Feet Only Clinical Sign Leading to MS Diagnosis

Authors: Nicholas Pennington, Matthew Andreoli
Project Mentor and Department: Matthew Andreoli, MD; Family Medicine

Multiple sclerosis (MS) is a chronic immune-mediated, demyelinating disorder of the central nervous system affecting the brain, spinal cord, and optic nerves. It can present with changes in sensation, mobility, balance, sphincter function, vision, and cognition, and many of those affected develop irreversible disability (Brownlee et al., 2016). Diagnosis is made through relating clinical symptoms with evidence of CNS lesions on MRI, but the course can be highly variable, making it challenging to diagnose early in its progression, especially differentiating between MS and other diseases that can mimic its clinical picture (e.g., neuromyelitis optica) that may require distinct treatments for positive effects. Early treatment of MS, however, has been shown to slow disease conversion (Comi et al., 2001), and is thus important in preventing irreversible destruction of brain tissue by inflammatory processes (Berger et al., 2017), making accurate early identification and diagnosis of MS paramount to improving long term patient outcomes.
The following case details a 28 year-old male with past medical history of glaucoma in his left eye, cataracts, and tobacco use disorder presenting to an outpatient primary care clinic with a chief complaint of 2 weeks of bilateral numbness and tingling in his feet with no immediately clear etiology from his past medical history or physical exam. He was subsequently referred for EMG and nerve conduction studies and later MRI, which revealed severe onset demyelination with lesions in the spinal cord, and intracranially in the juxtacortical, periventricular, and infratentorial regions. It was recommended that he receive aggressive early treatment given the degree of contrast-enhancement noted in multiple lesions.

Pittman, Ashley — Urban & Community Health

Use of Low Dose Computed Tomography in Children with Nephrolithiasis: A Multi-Institutional Analysis

Authors: Pittman A., Paloian N., Pan A., Zhang L., Moyer A., Medairos R., Thakrar P., Ellison J.
Project Mentor and Department: Jonathan Ellison, MD; Urologic Surgery

Introduction: Although ultrasound (US) is the preferred first-line imaging for pediatric nephrolithiasis, computed tomography (CT) may be necessary in cases of a non-diagnostic US or when US in not available. Utilization of dose reduction strategies in children undergoing CT for nephrolithiasis is not well described. We compared use of low dose computed tomography (LDCT) in children presenting to two pediatric centers.
Methods: We performed a retrospective chart review of children ≤ 17 years of age presenting with suspected nephrolithiasis to two tertiary children's hospitals between 2013- 2019. Children were included with an index CT scan from either the pediatric or referring center while those who had prior documented CT for nephrolithiasis within the study period or missing radiation dose assessment were excluded. The primary outcome was LDCT as defined as radiation dose <3 mGy. The primary comparator was pediatric versus outside referral center. Exploratory analysis evaluated other factors associated with LDCT, including radiation dosage as a continuous variable.
Results: A total of 155 individuals met inclusion criteria, with 126 (81.3%) receiving standard dose and 29 (18.7%) receiving LDCT. Pediatric facilities were more likely to utilize LDCT as compared to referral centers ($p < 0.05$). Older age and higher BMI were also found to be associated with increased radiation dose exposure.
Conclusion: Pediatric facilities utilized LDCT more frequently, although age and BMI may also influence imaging choices. An understanding of the factors associated with dose reduction in CT will impact future efforts to explore optimum imaging stewardship in pediatric nephrolithiasis.

Polovneff, Alexandra — Quality Improvement and Patient Safety

Scaling care coordination through digital engagement: stepped-wedge trial assessing readmissions

Authors: Alexandra Polovneff, Neemit Shah, Abhishek Janardan, Erika Smith, Ivan Pasillas, Natalie Mortensen Jeana M. Holt, Melek Somai, Rodney Sparapani, Bradley Crotty
Project Mentor and Department: Bradley Crotty, MD, MPH; Medicine – General Internal Medicine

Objectives: Transitions of care are pivotal, vulnerable times for patient. Telephonic care coordination is standard care, but labor intensive. We implemented a patient post-discharge digital engagement (PDDE) program to scale coordination. We hypothesized PDDE could reduce low risk readmission and supplement care coordination for medium and high-risk patients.
Design: Pragmatic, stepped-wedge cluster randomization trial with five implementation waves based upon primary care clinic region.
Methods: All inpatient hospital discharges between March 2020 - November 2020 were stratified by readmission risk. Low risk patients were offered access to PDDE, while moderate-risk and high-risk patients were offered access to PDDE and care coordination.
Readmission was defined as an unplanned-inpatient admission, 30 days from discharge. An 'intention to treat' primary analysis was conducted using mixed-effects logistic regression clustering for wave; a treatment-on-the-treated analysis was also conducted to assess the impact among program users.
Results: A total of 5,490 patient discharges were examined (2,735 control; 2,755 intervention). 1,949 patients were high-risk, 2,032 medium-risk, and 1,949 low-risk. PDDE intervention did not significantly impact readmission among low (95% CI -0.23-0.90, p=0.23), medium (95% CI -0.14-0.60, p=0.21), and high-risk groups (95% CI -0.32-0.64, p=0.48), after adjustment for time and patient factors. In a treatment-on-the-treated analysis, patients who activated PDDE, readmission was also similar amongst the low, medium, and high-risk cohorts.
Conclusions: Our study expanded resource-limited care coordination by offering low risk patients a service they were unable to receive previously, while having no impact on readmission. PDDE provided additional touch points between patients and providers, efficiently.

Popp, Nick — Health Systems Management & Policy

Scalp incisions with stairstep pericranial edges: a technical note with early results

Authors: Nicholas Popp, Ishan Singhal, Brandon Laing, Kate Krucoff, Max Krucoff
Project Mentor and Department: Max O. Krucoff, MD; Neurosurgery

Background: Wound healing problems are especially prevalent in craniotomies for intra-axial brain tumors as patients often require radiation, chemotherapy, and chronic steroids. While newer techniques like minimally invasive approaches and routine vancomycin powder use have helped overall complication rates, poor skin healing remains a frustratingly persistent cause of morbidity.
Objective: To describe the novel technique of elevating and closing a stairstep pericranial edge as an offset, vascularized layer to protect hardware and support wound healing from beneath the incision, and to report early outcomes.
Methods: Ninety-one consecutive patients underwent supratentorial, intra-axial brain tumor surgery with a single surgeon at a single institution using this technique. Patient demographics, pathology, adjuvant interventions, and other independent risk factors were analyzed.
Results: No wound-related complications requiring readmission, intravenous antibiotics, or reoperation were encountered at a median 3-month follow up. There were also no surgical site infections, dehiscences, or CSF leaks. Six patients (6.5%) were placed on a short course of oral antibiotics perioperatively due to concerns with initial scalp healing (i.e., excessive scabbing at follow up), none of whom progressed to infection or required further intervention.
Conclusion: Here we outline in detail the principles, design, and execution of incisions with stairstep pericranial edges in supratentorial brain surgery. This technique was designed with plastic surgeons to provide an intact, vascularized layer of pericranium beneath the healing incision and over the bone graft/hardware to optimize wound healing conditions and prevent morbid sequelae in inevitable cases of poor initial skin healing. Early results are promising.

Potter, Mary Claire — Clinician Educator

How do classroom-based IPE interactions influence medical students' clerkship experiences?

Authors: Mary Claire Potter, Kelly Horton, Erica Chou
Project Mentor and Department: Erica Chou, MD; Pediatrics - Hospitalist

Background: Classroom-based interprofessional education (IPE) has been shown to improve medical students' understanding of IPE competencies, but less is known about how those skills apply in clinical environments. This study assesses an IPE session's influence on medical students' interactions with cross-disciplinary colleagues during their pediatrics clerkship.
Methods: Medical, nursing, and pharmacy students in pediatrics clinical rotations participated in an hour-long, virtual classroom-based small-group IPE activity in which they answered questions about a hypothetical case of a febrile neonate's course of hospitalization. Each student received answers to these questions given to students from other professions, such that answering the questions from the perspective of their own profession required the students to share and gather information from other students in their group. After the session, students completed retrospective pre- and postsession self-assessments of their achievement of IPE session objectives, which were analyzed using the Wilcoxon signed-rank test. They also participated in focused interviews that were analyzed qualitatively to explore the session's influence on their clinical experiences.
Results: Medical students' retrospective pre- and postsession self-assessment ratings differed significantly, indicating improvement in students' IPE competencies. However, interviews revealed that less than one-third of medical students applied IPE skills during their clerkship due to lack of autonomy and confidence.
Conclusions: The IPE session's influence on medical students' interprofessional collaboration was minimal and suggests that classroom-based IPE has limited impact on students' interprofessional collaboration in the clinical learning environment. This finding suggests the need for intentional, clinically integrated IPE activities.

Prokhoda, Polina — Urban & Community Health

Access to resources, genetic testing, and vision care in individuals with albinism

Authors: Polina Prokhoda, Joseph Carroll, PhD
Project Mentor and Department: Joseph Carroll, PhD; Ophthalmology and Visual Sciences

Introduction: The purpose of this study is to understand gaps in access that individuals with albinism may face in relation to genetic testing, their visual health, and community resources.
Methods: A survey was distributed on the NOAH website, during in-person research sessions at MCW and emailed to previous research participants. The data was de-identified and analyzed.
Results: Of 47 responses, 62% were based on self and 38% based on child. 66% of participants were women, 32% men, and 2% transgender. There was a wide distribution of ages, location, household income and degree of education. 85% of participants had medical insurance, including 15% Medicare/Medicaid. 64% had genetic testing done, of those 40% had to travel an average of 459 miles to access it. 34% felt their questions were not fully answered. 83% Felt they had good understanding of their visual health. 60% were aware of community resources related to improving quality of life related to visual health, but only 45% utilized the resources.
Discussion: This population has access to eye doctors. However, access to genetic testing could be improved with lack of opportunity and high cost being major obstacles. 40% of participants were unaware of community resources aimed at quality-of-life improvement related to visual health, but over 90% said they wanted to learn more, showing need for more advertisement of local low-vision health organizations. This could be facilitated by optometrists, ophthalmologists, and primary care doctors.
Conclusion: Future efforts should be aimed at expanding genetic testing opportunities and outreach of community resources.

Punyamurthy, Nina — Global Health

Review of cutaneous blastomycosis seen in Wisconsin

Authors: Nina T Punyamurthy, Kimberly Katz, Alan Vu, Nathan Duncan, Karolyn A Wanat
Project Mentor and Department: Karolyn Wanat, MD; Dermatology

Introduction: Blastomycosis is a fungal infection caused by Blastomyces dermatitidis. This dimorphic fungus is hyperendemic in several areas in northern Wisconsin. It most commonly presents as a pulmonary infection caused by the inhalation of spores found in soil and frequently disseminates to the skin. Studies evaluating the presentation and diagnosis of blastomycosis with skin as a presenting sign have not been thoroughly evaluated, and understanding the most accurate way to diagnose this infection is important for earlier therapeutic intervention.
Methods: This is a retrospective chart review study of a single institution. Subjects were identified through a search of ICD-9 and ICD-10 codes for blastomycosis in the clinical record and pathology database. Patients were included if diagnosed with cutaneous blastomycosis infection or involvement of the skin from systemic infection between January 1, 2009 and June 1, 2021.
Results: Twenty patients with a diagnosis of cutaneous involvement of blastomycosis were identified. 65% (n=13) of patients were male. Mean age of diagnosis was 55.5 years. 55% of patients were white, 35% were black or African American, and 10% were not reported. In addition to residence in an endemic area, 50% (n=10) had exposure risk factors. 50% of patients (n=10) initially presented with a skin concern. 65% (n=13) of patients had extracutaneous involvement. Diagnosis was made by histopathology alone in 55% (n=11), culture plus histopathology in 35% (n=7), and culture alone in 5% (n=1) of cases.
Conclusions: Our study highlighted similarities to those previously performed. Our patients had similar lung and cutaneous involvements, and half of the patients (n=5) who had cutaneous involvement of blastomycosis did not demonstrate clinically significant pulmonary involvement. Histopathology and culture remain critical in diagnosing cutaneous blastomycosis.

Puyleart, Alexis — Global Health

Assessing the environmental impact of security vehicles at an academic hospital in Southeastern WI, USA

Authors: Puyleart A, Forest G, Bernstein J, Zaharias J, Mian I, Moyle J, Mauro N, Beyer K, Rublee C
Project Mentor and Department: Joanne Bernstein, MD, MS; Medicine – General Internal Medicine

In 2019, the transportation sector generated the most greenhouse gas emissions in theUnited States, driving anthropogenic climate change and health harms. Security vehicles forhealth systems provide surveillance for protection of patients and staff. The aim of this project was to assess the carbon footprint of security patrol vehicles.
The emissions from fleet security vehicles for a 689-bed academic hospital in Milwaukee,Wisconsin were quantified. Three data sources were used to estimate kilograms of carbondioxide equivalents. Data sources included 24 hours of real-time ride along calculations, 30days of gas receipts, and 2020 service records. Environmental Protection Agency emissions factors were used to calculate emissions.
Ten vehicles are utilized by security. According to ride along data, gas receipts, andservice records, extrapolated annual emissions for all vehicles were 196,971 kg, 152,577.69kg, and 125,033.90 kg, respectively. This is equivalent to burning 48,500 to 76,400 kg ofCoal annually. Four observations from patrols were elicited: 1) occupational exposure to tailpipe emissions from open windows; 2) proximity of patients to emissions; 3) low speeds and frequent braking straining vehicles; 4) long idle times.
The amount of carbon emissions generated from security vehicles at a single academic facility were substantial. With patient and staff safety as a priority, results inform evidence-based protocols that balance safety with pollution for vulnerable groups exposed to tailpipe emissions in covered spaces. There are personnel, procedure, and vehicle emission reduction solutions that align with Practice Greenhealth guidance. Key recommendationsinclude maintaining mileage logs, electric vehicles, alternative patrol methods, and involvingdrivers as stakeholders in climate action. Surveillance should be included in climate-smart transportation plans that incentivize active transport and commit to climate justice across health systems.

Rayes, Ramsey — Clinical & Translational Research

Utility and usability of two forms of vibrotactile kinesthetic feedback for enhancing reach accuracy.

Authors: Ramsey K Rayes, Rachel N Mazorow, Leigh A Mrotek, Robert A Scheidt
Project Mentor and Department: Robert Scheidt, PhD; Biomedical Engineering, Marquette University & The Medical College of Wisconsin

Advances in wearable sensors and computing have led to sensory augmentation technologies that can enhance human motor performance and quality of life in various applications. We compared the objective utility and subjective user experience for two biologically inspired ways to encode movement-related information into supplemental feedback for the real-time control of goal-directed reaching in healthy adults. One encoding scheme mimicked visual feedback by converting real-time hand position in a Cartesian frame of reference into supplemental kinesthetic feedback provided by a vibrotactile display attached to the non-moving arm. The other approach mimicked proprioceptive encoding by providing real-time arm joint angle information via the vibrotactile display. After brief training, both encoding schemes of supplemental feedback promoted improved reach accuracy without concurrent visual feedback over levels achieved using proprioception alone. Cartesian encoding promoted greater reductions in target capture errors without visual feedback. Accuracy gains in both encoding schemes came at a cost of temporal efficiency; target capture times were longer with supplemental kinesthetic feedback than without. Furthermore, neither encoding scheme yielded movements that were particularly smooth, although movements with joint angle encoding were smoother than Cartesian encoding. Participant responses on user experience surveys indicate that both encoding schemes were motivating and yielded passable user satisfaction scores. However, only Cartesian endpoint encoding was found to have passable usability; participants felt more competent using Cartesian encoding than joint angle encoding. These results are expected to inform future development of wearable technology to enhance the accuracy and efficiency of goal-directed actions using continuous supplemental kinesthetic feedback.

Rehfeldt, Elisabeth — Quality Improvement and Patient Safety

Emergency Department Discharge TO CARE (Telephone Outreach: Connect to Aftercare and Risk Evaluation)

Authors: Elisabeth Rehfeldt, Zoey Schmidt, Julie Owen
Project Mentor and Department: Julie Owen, MD, MBA; Psychiatry and Behavioral Medicine

Emergency department (ED) utilization is rapidly growing, with psychiatric concerns constituting 4.45% of annual visits (Hooker, 2019). When compared to patients receiving referrals for medical reasons, patients receiving referrals for psychiatric care are more likely to reach an answering machine, obtain an appointment >2 weeks away, or be referred elsewhere due to insurance (Knesper, 2010). Providing follow-up contact to patients discharged to home after presenting to the ED for psychiatric concerns is a feasible intervention that can detect safety concerns in a high-risk period, improve patient adherence to aftercare, and enhance connection to outpatient resources.
Patients seen by the embedded ED Psychiatry service agree to post-discharge follow-up contact during ED visit. A dedicated ED psychiatric social worker calls the patient 48-72 hours post-discharge, for a total of 3 attempts. SW asks protocolized questions regarding outpatient follow-up, medication status/adherence, and suicidal ideation (PHQ-9 Question 9).
Of 1,396 patients evaluated by the ED Psychiatry team during the study period (2/1/21-8/31/22), 845 patients were eligible for follow-up contact. Telephone contact was successfully made with 457 patients (54%); 280 patients (61%) were reached on the first attempt. 64% of patients reached had initiated contact or scheduled with an outpatient clinic. 75% of patients had picked up their prescribed medications.
As ED resources are progressively strained, focus needs to be placed on the impact of population health factors. A multidisciplinary approach to providing timely post-discharge follow-up for ED patients with psychiatric concerns positively impacts patient care and systems-based processes by monitoring patient safety post-discharge, aiding patients in the navigation of outpatient resources, and encouraging treatment adherence. Further investigation is warranted into the potential impact on ED utilization in an already strained acute care system.

Remmers, Caroline — Urban & Community Health

Impacts of Nature Programming on Attitudes Towards Outdoor Play and Skills Self-Efficacy among Youth

Authors: Caroline Remmers, Bethany Canales, Tarini Mitra, Courtney Jankowski, Jamie Ferschinger, Elizabeth DeLeon, Kirsten Beyer
Project Mentor and Department: Kirsten Beyer, PhD, MPH, MS; Institute for Health and Equity - Epidemiology
Community Partner: Sixteenth Street Community Health Centers

Background: Youth mental health is of concern as youth suicide rates and mental health hospitalizations show increases each year. Alternative treatment options (namely outdoor therapies) are critical to impact increasing rates of mental illness, yet are limited, especially for urban, minority youth, despite the proven mental health benefits of nature exposure. The aim of this study is to evaluate how enhancing community programs and outpatient treatment with nature-based, behavioral health treatment techniques improves participants' perceptions of nature and skills self-efficacy.
Methods: Behavioral Health leaders of a Milwaukee-based community organization developed a nature-based curriculum emphasizing behavioral regulation, social skills building, conflict resolution, and positive coping skills. Implementation of the curriculum occurred among three cohorts, Summer Camp (SC), After-School (AS) and Child and Adolescent Day Treatment Program (CADT). Surveys include Attitudes Toward Outdoor Play scales and a Skills Self-Efficacy survey.
Results: A total of 54 youths participated. Most students were female and identified as Hispanic. The average age was 9.64 years. Paired t-tests for all cohorts collectively revealed statistically significant increases in the overall self-efficacy score and in taking pictures using a camera and hiking in nature. In individual cohorts, various skills showed significant increases post-intervention: ice-skating (AS, CADT), taking pictures using a camera (CADT, SC), write or draw about my feelings (CADT), doing mindfulness activities (SC). Regression analysis revealed that increased attendance led to significant increases in the adjusted self-efficacy score following the program.
Conclusion: The findings of our study highlight the efficacy of nature-based interventions in increasing outdoor skills efficacy, providing support for the use of funds in various settings to carry out similar programs.

Rotherham, Brianna — Urban & Community Health

Yield of Follow-Up Skeletal Surveys in Children Evaluated for Physical Abuse

Authors: Brianna Rotherham, Ashley Stahnke, Hillary W. Petska

Project Mentor and Department: Hillary Petska, MD, MPH; Pediatrics – Child Advocacy and Protection

Background: AAP recommends children <2 years with suspected physical abuse undergo initial skeletal surveys (SS). Follow-up SS (f/u SS) are recommended 2-3 weeks later to provide additional information about fractures/subtle injuries. Although f/u SS are known to provide new information, the true yield is unknown as the rate of adherence to recommendations varies. Since 2012, the Children's Wisconsin (CW) child protection team has tracked initial/follow-up SS with an adherence rate near 100%, allowing a more accurate determination of the clinical yield of f/u SS.
Hypothesis: If children with an initial SS performed due to concern for abuse undergo repeat SS, a significant percentage of children will have additional findings. If interventions such as implementation of hospital protocols, research participation, and legislative policy changes are implemented, adherence to f/u SS and abuse detection will improve.
Methods: Children evaluated at CW for concern of physical abuse who had a SS from 2004-2019 were included. The CW EMR was abstracted to include initial and follow-up SS results, level of abuse suspicion, and more. Positive SS were those that identified a previously unsuspected fracture/finding.
Results: From 2012-2019, 965 cases met inclusion criteria and f/u SS were performed in 94% of cases. 8% of patients who underwent a f/u SS had additional findings which resulted in increased LOC for abuse in 3% and decreased LOC in 1% of cases. Thus, when children undergo f/u SS, a significant percentage will have additional findings, which may change the level of concern for abuse. From 2004-2014, events affecting adherence were identified: egregious patient outcomes, hiring additional staff, national guidelines, participation in a multi-site study, implementation of a managed care program, and naming of a value champion. The latter two events significantly improved adherence. While abuse detection did not significantly increase, f/u SS did impact final diagnosis.

Rubin, Micah — Clinical & Translational Research

Examining Sex Bias in Vascular Surgery Research

Authors: Micah Rubin, Nalani Wakinekona, Margaret Reilly, Bethany Canales, Rodney Sparapani, Mitchell Dyer, Neel Mansukhani

Project Mentor and Department: Neel Mansukhani, MD; Vascular Surgery

Introduction: Despite known anatomic and physiologic differences between men and women, women have historically been excluded from clinical trials. We sought to characterize the frequency that women are included in current vascular surgery research studies and the extent to which sex is analyzed as a variable.
Study Methods: In this retrospective bibliographic review, all original manuscripts published in the European Journal of Vascular and Endovascular Surgery, Journal of Vascular Surgery, JVS: Venous and Lymphatic Disorders, Journal of Endovascular Therapy, Annals of Vascular Surgery from January 1, 2018 to December 31, 2020 were reviewed. The evaluated outcomes included the frequency of sex-related discussions, the examination of sex in any capacity, the utilization of sex in multivariable and independent analysis, and the extent of sex matching.
Results: Of the 2,558 articles included, 22.6% of articles included a discussion of sex, 38.4% analyzed sex, 22.2% included sex in multivariable analysis, and 4.1% included sex as an independent variable. When analyzing these four variables, there were no differences over time. Multicenter studies had significantly higher rates of independent analysis of sex over single center studies (6.3% vs 2.9%, P<.001). Only 30 articles (1.2%) had equal inclusion of men and women in their study. Notably, 877 articles (34.3%) had 30% or less matching in their studies. In addition, 2098 (82%) articles had more men than women.
Conclusion: Discussion and analyses of sex within current vascular surgery clinical research is low despite known differences between men and women's clinical presentations and responses to treatment.

Saltzman, Claire — Health Systems Management & Policy

Comparison of TMR and RPNI in a Rodent Neuropathic Pain Model

Authors: Saltzman CS, Roth E, Hoben GM

Project Mentor and Department: Gwendolyn Hoben, MD, PhD; Plastic Surgery

Introduction Targeted muscle reinnervation (TMR) and regenerative peripheral nerve interfaces (RPNI) are surgical procedures that re-route nerves during or following limb amputation to provide motor input for bioprostheses. An unforeseen benefit to these procedures is prevention and relief of neuropathic pain in amputees. This study will compare pain outcomes of TMR and RPNI following spared nerve injury (SNI) in a rodent model.
Methods Rats were divided into 3 cohorts: SNI, SNI + TMR, and SNI + RPNI. Interventions were performed on the left hind legs of all animals under anesthesia using proper aseptic technique. Pain was measured using spinal reflex testing, spontaneous pain behavior was measured with the guarding scale, and depressive behavior was measured via the sucrose preference test.
Results SNI successfully produced a pain state in all 3 cohorts. Immediately following SNI intervention, all cohorts experienced a significant decline in withdrawal threshold and a significant increase in responses to noxious stimuli ($p<0.05$). However, the TMR and RPNI cohorts did not have significant changes in pain measurements as compared to SNI; all cohorts remained in pain. TMR and RPNI had slight decreases in some pain measures as compared to SNI, but this was not statistically significant.
Discussion These results reinforce the efficacy of the rodent neuropathic pain model. However, no significant changes were observed between SNI and the intervention groups regarding reduction in pain behaviors. Further studies should explore more objective measures of pain behavior and timing of interventions (immediate versus delayed TMR and RPNI).

Schilthuis, Meghan — Clinical & Translational Research

Incongruent VWF Levels, Genetics, and Bleeding Symptoms in Families with Type 1 von Willebrand Disease

Authors: Meghan A. Schilthuis, Pamela A. Christopherson, Sandra L. Haberichter, Andrew D. Paterson, Robert R. Montgomery, Veronica H. Flood and the Zimmerman Program Investigators

Project Mentor and Department: Veronica Flood, MD; Pediatrics – Hematology and Oncology

Background: Type 1 von Willebrand Disease (VWD) is a common bleeding disorder defined by partial quantitative deficiency of von Willebrand factor (VWF). Inheritance is reported as autosomal dominant with variable penetrance.
Aims: To determine the percentage of families who show congruence of type 1 VWD diagnosis, VWF genotype, and bleeding phenotype.
Methods: Index cases (IC) and their relatives were enrolled at 35 centers across the United States (310 families, 1402 individuals). Diagnosis of type 1 VWD was defined as VWF:Ag <50 IU/dL or VWF:RCo <54 IU/dL. Sanger sequencing of the VWF coding region was performed for ICs with assessment of variant pathogenicity by ACMG criteria. Bleeding scores were calculated using the ISTH bleeding assessment tool.
Results: Familial congruence was determined across three categories: presence of VWF genetic variant, low VWF levels, and abnormal bleeding score. Only 24% of families showed complete congruence. Furthermore, the proportion of congruent and incongruent families with a VWF variant did not differ ($p=0.24$). The mean VWF:Ag was similar between those with and without a genetic variant ($p=0.15$). The mean IC bleeding score was significantly higher in families with congruency of genetic variants, bleeding score, and VWF levels ($p<0.001$).
Conclusions: Most families affected by type 1 VWD do not show complete congruence of VWF levels, genotype, and bleeding phenotype. Congruence was associated with higher bleeding scores in the IC affirming importance of symptoms in VWD diagnosis. Genetic changes outside the VWF coding region or locus or other explanations for bleeding phenotypes may be important in this population. Our study demonstrates the complicated nature of VWD inheritance.

Schleusner, Taylor — Quality Improvement and Patient Safety

Risk factors and health care utilization in pediatric motor vehicle and firearm traumatic injuries

Authors: Taylor Schleusner, Christina Georgeades, Carisa Bergner, Samantha Leonard, Patricia K. Marik, Matthew D. Jandrisevits, David Gourlay, Katherine T. Flynn-O'Brien

Project Mentor and Department: Katherine Flynn-O'Brien, MD, MPH; Surgery – Pediatric Surgery

Introduction This study compared psychologic and socioeconomic risk factors and health care utilization (HCU) in children injured by firearm vs motor vehicle collision (MVC). Researchers hypothesized the firearm cohort would have a higher burden of mental health (MHD) diagnoses, Area Deprivation Index (ADI), Adverse Childhood Experiences (ACEs), and HCU.

Methods This study compared retrospective cohorts of 5-17 year olds injured by firearm and MVC from January 2016 to March 2021 at a Level 1 Trauma center in Milwaukee. The cohorts were matched 1:1 for age, sex, season of injury, and Injury Severity Score (ISS). Extensive chart review was performed to assess the temporal relationship between MHD and moderating variables including race, ADI, and ACEs. HCU was also compared. Chi-squared analysis compared categorical variables, and Wilcoxon tests compared continuous variables. Statistical significance was $p<0.05$.

Results There were no differences in MHD at any timepoint. Overall, MHD during injury admission were made in 0.0-3.1% and 0.0-2.0% in post-injury children. ADHD was the most common. Firearm patients were only more likely to experience neglect ($p=0.01$), financial problems within their family ($p=0.04$), family conflict ($p=0.007$), and separation from their family ($p=0.006$). Firearm patients had a higher median ADI (9.0 vs 8.0), but MVC patients maintained a median ADI in the top 2 deciles of deprivation with a wide IQR overlapping the firearm cohort (8.00 – 10.0). Firearm patients more frequently utilized Pain Services, Security, and Social Work (all $p<0.001$). There were no significant differences in Child Advocacy, Pediatrics, Psychiatry, and Psychology.

Conclusion In Milwaukee, there are few differences between firearm and MVC patients with low socioeconomic status predisposing to both. The extremely low prevalence of MHD demonstrates many traumatically injured children experience a hidden burden of MHD persisting beyond index admission for firearm or MVC.

Schroeder, Tamara — Clinician Educator

The Relationship between Unmet Social Needs and Access to Care in Adults with Cardiovascular Disease

Authors: Tamara Schroeder, Mukoso N. Ozieh, Abigail Thorgerson, Joni S. Williams, Sanjay Bandari, Leonard E. Egede

Project Mentor and Department: Mukoso Ozieh, MD; Medicine - Nephrology

OBJECTIVE Growing evidence supports the influence of unmet social needs on health outcomes and lack of access to care is associated with poor cardiovascular outcomes. This study aimed to understand the relationship between unmet social needs and access to care in adults with cardiovascular disease (CVD).

METHODS Study included 2,790 participants, representing 7,428,965 adults aged over 18 with self-reported CVD in Health Center Patient Survey. Unmet social need was defined as those receiving food stamps; WIC program; Section 8 Housing; or other government assistance in the past year. The four dependent variables to investigate access to care: inability to access medical care, delay in medical care, inability to access prescription care and delay in prescription care. Multiple logistic regression was used with unmet social need as the main independent variable, adjusting for covariates.

RESULTS Approximately 13%, 15%, 19%, and 24% of adults reported inability to access medical care, delay in medical care, inability to access prescription care, and delay in prescription care respectively. Following adjustments for relevant covariates, unmet social need was significantly associated with delay in prescription care. A significant interaction was found between unmet needs and race. Unmet social need was associated with delay in prescription care (OR 2.32 (95% CI 1.28-4.20) in non-Hispanic Whites (NHW) but not in adults not identifying as not NHW (OR 0.82 (95% CI 0.44-1.52).

CONCLUSIONS Unmet social need is associated with delays in prescription care particularly in NHW adults with CVD. Further research studies should investigate the underlying mechanism for this association.

Seifert, Elena — Global Health

Perspectives of African health care workers on pediatric emergency care training

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Project Mentor and Department: Megan Schultz, MD, MA; Pediatrics - Emergency Medicine

While there has been improvement in global child survival in recent decades, the burden of pediatric disease and death still varies greatly geographically. Globally, the leading causes of child mortality include communicable diseases such as pneumonia, diarrhea, and malaria, as well as neonatal complications. Sub-Saharan Africa has the highest under-five mortality rate in the world at 73 per 1,000 children. In order to reduce the rates of child death in sub-Saharan Africa, it is crucial that pediatric emergency care is available, and that local health care workers (HCW) are equipped to diagnose and treat conditions before they progress to be life-threatening. In areas with the highest rates of child mortality, there are relatively fewer HCWs available and less access to emergency care. In addition, many of the HCWs in African settings are not receiving emergency training specific to the needs of pediatric patients. In recognizing this dichotomy, work has been done to increase HCW education in these resource-limited settings. There are many examples of short courses implemented in Africa covering a wide range of topics, from neonatal resuscitation to emergency care and triage. However, relatively few studies exist that describe the format of these courses or their content. There is a knowledge gap surrounding the ideal training format, the most effective way to implement these curricula, and any potential negative consequences from these courses. We aim to address this gap with a mixed methods study to gather information from African HCWs regarding their preferences for pediatric emergency care training.

Shah, Neemit — Health Systems Management & Policy

Remote patient monitoring: Factors of engagement with a mobile application

Authors: Shah N, Polovneff A, Janardan A, Ark T, Smith E, Pasillas I, Crotty B
Project Mentor and Department: Bradley Crotty, MD, MPH; Medicine - General Internal Medicine

Remote patient monitoring (RPM) allows healthcare providers to track and follow a patient's health status without a patient's physical presence in a healthcare setting. The purpose of this investigation is to assess factors that affect user engagement with the implementation of an innovative RPM program.
GetWell Loop (GWL) is a mobile health application serving as an RPM program within the Froedtert Health system where post-discharge hospitalized patients had the option of being enrolled in the GWL service. Through this mobile app, patients were able to update their providers regarding their day-to-day health status through virtual questionnaires, submit questions, and receive feedback in real-time. All inpatient hospital discharges within the Froedtert Health system between March 2020 - November 2020 were stratified on readmission risk (low, medium, high). Low-risk patients were offered access to GWL, while moderate-risk and high-risk patients were offered access to GWL and conventional care coordination. Various demographic variables were analyzed such as patient age, patient sex, marital status, and risk level for hospital readmission. Engagement was defined as an engagement score of greater than 50%. Univariate and chi-squared analysis was used to examine demographic and user differences between users who engaged in the application and those who did not. Multivariate analysis was then run to control for all factors to determine true significance. Preliminary data suggest that patients with a low-risk level for readmission are approximately two times more likely to be engaged with GWL than high-risk level patients. Information from this study can help inform health systems on how to better implement such technologies more appropriately and efficiently. Maximizing the understanding of when and where RPM programs are the most useful can help towards improving patient satisfaction and outcomes.

Shah, Harini — Quality Improvement and Patient Safety

Character strengths in medical student action statements: a qualitative study

Authors: Harini Shah, Nalani Wakinekona, Christopher Stawski PhD, Jessica Miller, Nawara Abufares, Imeh Ndiokho, Tracy Bui, Marisa Tobes, Elizabeth Dominguez, Aliyah Keval, Kathlyn Fletcher MD MA
Project Mentor and Department: Kathlyn Fletcher, MD, MA; Medicine – General Internal Medicine

Introduction There is a need for institution-wide initiatives that encourage members of the medical community to commit to a culture of inclusion. Character Strengths, as defined by the VIA Institute on Character, are 24 attributes in positive psychology that may promote well-being and life satisfaction in medicine. Using VIA character strengths as a deductive framework, we performed a qualitative analysis of health equity-focused action statements written by first-year medical students.
Methods Following new student orientation, first-year U.S. allopathic medical students were asked to write an action statement to show up for Milwaukee, accomplishable within the year. Statements were collected via anonymous Qualtrics survey. Responses were randomized and each statement was coded by two investigators independently. Interrater agreement (Kohen's kappa) was calculated from the initial coding sets, and agreement was defined as having identical codes for the same statement. Investigators then arrived at consensus codes for each action statement through discussion.
Results Among 221 student recipients, 192 (86.9%) submitted action statements. Overall, 16 of 24 character strengths were represented in the responses. Interrater agreement (Kohen's Îº) was 0.54. Most frequently represented character strengths were kindness (58.3%), fairness (39.6%), and love of learning (31.8%). Statements were assigned a median of 2 codes each (average 2.3, standard deviation 0.9986).
Conclusion Medical students displayed kindness, fairness, and love of learning when asked to show up for Milwaukee. Early-career trainees may benefit from writing action statements for health equity. Next steps would evaluate the impact of action statements on long-term medical student well-being.

Shamsa, Ali — Bioethics & Medical Humanities

Bias or biology? Importance of model interpretation in machine learning studies from elec. health records

Authors: Amanda Momenzadeh, Ali Shamsa, and Jesse G. Meyer
Project Mentor and Department: Jesse Meyer; Biochemistry

Objective: The rate of diabetic complication progression varies across individuals and understanding factors that alter the rate of complication progression may uncover new clinical interventions for personalized diabetes management.
Materials and Methods: We explore how various machine learning (ML) models and types of electronic health records (EHRs) can predict fast versus slow onset of neuropathy, nephropathy, ocular disease, or cardiovascular disease using only patient data collected prior to diabetes diagnosis.
Results: We find that optimized random forest models performed best to accurately predict the diagnosis of a diabetic complication, with the most effective model distinguishing between fast versus slow nephropathy (AUROC ¼ 0.75). Using all data sets combined allowed for the highest model predictive performance, and social history or laboratory alone were most predictive. SHapley Additive exPlanations (SHAP) model interpretation allowed for exploration of predictors of fast and slow complication diagnosis, including underlying biases present in the EHR. Patients in the fast group had more medical visits, incurring a potential informed decision bias.
Discussion: Our study is unique in the realm of ML studies as it leverages SHAP as a starting point to explore patient markers not routinely used in diabetes monitoring. A mix of both bias and biological processes is likely present in influencing a model's ability to distinguish between groups.
Conclusion: Overall, model interpretation is a critical step in evaluating validity of a user-intended endpoint for a model when using EHR data, and predictors affected by bias and those driven by biologic processes should be equally recognized.

Sheikali, Adam — Clinical & Translational Research

Management of Pediatric Renal Trauma

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Project Mentor and Department: David M Gourlay, MD; Surgery – Pediatric Surgery

Background Pediatric renal trauma is rare and lacking population-specific data to generate evidence-based management guidelines. A nonoperative approach is preferred and shown to be successful. However, little is known about the bleeding risk assessment and role of collecting system management. We introduce the multi-institutional pediatric acute renal trauma study (Mi-PARTS), to describe the demographics and contemporary management of pediatric renal trauma at Level I trauma centers in the United States.

Methods Retrospective data was collected at 13 participating Level I trauma centers on pediatric patients presenting with renal trauma between 2010 through 2019. Data were gathered on demographics, injury characteristics, management, and short-term outcomes. Descriptive statistics were used to report management.

Results A total of 1216 cases were collected. 67.2% were male and 93.8% had a blunt injury mechanism. 29.3% were isolated renal injuries. 65.6% were high grade (AAST Grade III-V) injuries. Open surgical intervention was performed in 2.9%, with a nephrectomy rate of 2.7%. Angioembolization was performed in 0.9%. Collecting system intervention was performed in 7.9%. The rate of avoidable transfer (children being discharged within 2 days without intervention nor advanced imaging) was 28.2%. The percentages of transfer from another facility, involvement of urologist, and the length of hospitalization do not differ in the period, with stable rates or means during the decade.

Conclusion: Conservative management of bleeding following renal injury is a well-established practice. The rate of intervention for either bleeding or collecting system injury are low the pediatric patients with renal trauma. The nephrectomy rate remains low. With data made available through Mi-PARTS we aim to answer pediatric specific questions that include establishing a bleeding risk nomogram and better understanding indications for interventions for collecting system injuries.

Slaughter, Danielle — Molecular & Cellular Research

Placental hypoxia and mitochondrial damage in preeclampsia

Authors: Slaughter D, Kozak K, McIntosh J

Project Mentor and Department: Jennifer McIntosh, DO, MS; Obstetrics and Gynecology

Background: Preeclampsia (PreE) is a complication that affects 5-8% of pregnancies world-wide and is a leading cause of maternal death and serious maternal/fetal complications We explored a novel mechanism whereby hypoxia leads to increased reactive oxygen species in the placental mitochondria (mROS) which ultimately damages and releases the mitochondrial DNA systemically, and through vascular receptor signaling, contributes to the development of PreE. The goal of this project was to evaluate whether hypoxia invokes an increased production of mROS in the placenta.

Methods: Human microvascular endothelial cells (HMEC-1) were first cultured and then incubated under placental hypoxic (1% O2) and normoxic (10% O2) conditions for 24 hours. After 24 hours, mROS were detected using MitoSOX Red Mitochondrial Superoxide Indicator. Hoechst stain was applied as a nuclear control. Representative cells from each dish were imaged using confocal microscopy. For each cell imaged, the amount of MitoSOX fluorescence was quantified in ImageJ as a MitoSOX/Hoechst ratio. Population means were compared using non-parametric t-test.

Results: In total, n=5 unique dishes of HMEC-1 cells were incubated under hypoxic conditions and n=6 under normoxic conditions. The MitoSOX/Hoechst ratio was calculated for n=1,531 individual hypoxic cells and n=1,890 normoxic cells. Overall, there was a trend towards greater MitoSOX signaling in the hypoxic vs normoxic groups. Mean MitoSOX/ Hoechst ratio in the hypoxic group 0.38, SEM 0.01 vs normoxic group 0.30, SEM 0.004, $p<0.0001$.

Conclusion: mROS in hypoxic vs. normoxic environments was significantly increased, suggesting a possible novel mechanism of PreE development. Future work will include the effect of hypoxia in placental trophoblast cell lines and human placental explants.

Stahnke, Ashley — Urban & Community Health

Yield of follow-up skeletal surveys in children evaluated for physical abuse when adherence is high

Authors: Stahnke A, Petska H

Project Mentor and Department: Hillary Petska, MD, MPH; Pediatrics – Child Advocacy and Protection

Background: Although previous studies have revealed that follow-up skeletal surveys can reveal new information in up to 61% of cases, these studies have had highly variable rates of compliance with follow-up. CHW has a nearly 100% compliance rate with follow-up skeletal surveys.
Objective: To assess the utility of consistent follow-up skeletal surveys in young children with suspected physical abuse.
Participants/setting: Children younger than five years old who were hospitalized with suspected physical abuse and seen by the child protection team between January 1, 2013 and December 31, 2019.
Methods: Retrospective chart review study of 1,396 young children who underwent initial and follow-up skeletal surveys and were evaluated by the hospital-based child protection team at Children's Hospital of Wisconsin between 2013 and 2019. The impact on the level of concern for abuse was evaluated based on the findings on follow-up skeletal survey.
Results: Of the 965 cases that met inclusion criteria, follow-up skeletal surveys were performed in 94% of cases. 8% of patients who underwent a follow-up skeletal survey had additional findings, which increased the level of concern for abuse in 3% of cases and decreased the level of concern for abuse in 1% of cases.
Conclusions: While follow-up skeletal surveys did provide additional information in a significant number of cases, the yield of follow-up skeletal surveys when consistently performed was lower than previously reported. This may suggest that follow-up skeletal survey completion in other studies was prioritized in children at highest risk.

Statz, Brianna — Clinical & Translational Research

Cadaveric Evaluation of Threaded Carpal Tunnel Release

Authors: Brianna Statz, Anthony Trenga, Jessica Hanley, Anthony LoGiudice

Project Mentor and Department: Anthony LoGiudice, MD; Orthopedic Surgery

INTRODUCTION
Carpal Tunnel Syndrome is the most common peripheral entrapment neuropathy. Open carpal tunnel release (OCTR) remains the most common and preferred surgical method, however other methods do exist, including endoscopic and ultrasound-guided releases. The threaded carpal tunnel release (TCTR) is a recently developed minimally invasive technique involving the percutaneous looping of a cutting suture around the trans carpal ligament (TCL) to aid in transection. This technique has been found to be potentially safe and effective in both cadaveric and live patient settings, however this approach has not yet been validated by a US fellowship-trained hand surgeon. While the approach itself may be safe, we hypothesize that this method may result in an incomplete release of the TCL.
METHODS
This procedure was performed sequentially on 25 fresh frozen cadaver hands; we performed the technique as originally described. Fifteen specimen were performed by a senior Orthopedic surgery resident and the remaining 10 were performed by a fellowship-trained hand surgeon.
RESULTS
Results showed a surgical success rate of 48%, markedly lower than the 81-98% typically observed in OCTR. Of the 25 procedures performed, 15 (60%) captured other surrounding structures. Data from this study clearly exhibits that TCTR has a high risk of an incomplete release of the TCL as well as an unacceptable rate of injury to surrounding structures.
DISCUSSION
TCTR may be a novel approach to optimize outcomes over OCTR, but the technical learning curve associated with ultrasound and increased potential for unidentified injury to surrounding structures remains a concern for those who do not routinely use ultrasound in practice. Future directions of this research should include more specimens and increased training diversity of participants.

Stromswold, Jett — Clinical & Translational Research

Evaluating the impact of comorbidities on outcomes for adults with acute lymphoblastic leukemia

Authors: Stromswold J, Guru Murthy G, Rein L

Project Mentor and Department: Guru Subramanian Guru Murthy, MD, MS; Medicine – Hematology and Oncology

Acute lymphoblastic leukemia (ALL) is malignancy associated with the pediatric population, but in adults has a comparatively higher degree of mortality. The understanding of why adult vs pediatric outcomes in ALL are worse is unclear but may be related to higher comorbidity burdens in adults. We conducted a retrospective single center analysis of adult patients (age ≥18) with ALL to assess the impact of baseline comorbidities using four accepted indices, with the goal of determining their association with outcomes. Comorbidities were assessed using four scales: Hematopoietic Cell Transplantation – Comorbidity Index (HCT-CI), Charlson Comorbidity Index (CCI), Cumulative Illness Rating Scale – Geriatric (CIRS-G), and Adult Comorbidity Evaluation – 27 (ACE-27). Overall survival for each comorbidity index was determined using Kaplan-Meyer curves, with statistical significance determined via log-rank test. Multivariable analysis using Cox Proportional Hazards regression and logistic regression were used to determine the association of comorbidities with patient outcomes after adjusting for baseline characteristics. Kaplan-Meyer plot p-values for HCT-CI, CCI, CIRS-G, and ACE-27 were 0.016, 0.010, <0.001, and 0.008 respectively. C-statistics of overall survival for the base model, HCT-CI, CCI, CIRS-G, and ACE-27 were 0.635, 0.653, 0.644, 0.684, and 0.645 respectively, with pairwise comparison of the base model and CIRS-G having a p-value of 0.04. For all comorbidity indices, higher scores were associated with significantly reduced overall survival. Based on C-statistic values, CIRS-G scores were significantly better at predicting overall survival in comparison to the base model. Incorporation of formal methods of comorbidity assessment in clinical practice is needed to assess ALL patients at baseline and potentially utilize it for tailoring therapy. Prospective studies to validate and identify the optimal comorbidity determination scale in ALL is needed.

Sutherland, Bryn — Clinician Educator

Is a female always a woman? Sex and gender terminology in the M1 and M2 courses at MCW

Authors: Bryn Sutherland, Madeline Zamzow, Kendall Trieglaff, Sandra Pfister

Project Mentor and Department: Sandra Pfister, PhD; Pharmacology & Toxicology

Background: Sex and gender-based medicine (SGBM) is a burgeoning field of study in the biomedical sciences and is increasingly recognized as a priority in health professions curricula. Sex and gender terms (SGTs) are central to SGBM but are often used incorrectly in the literature. Using correct language is crucial for equity in healthcare, especially in working with a growing number of people who identify as LGBTQ+. Our team sought to document and characterize SGT use in a premedical medical school curriculum.

Methods: 3 M1s and 4 M2s at our institution audited each lecture during the 2020-2021 school year. Auditors recorded: 1) whether SGBM content was included, 2) whether appropriate SGT was used, and 3) specific examples. The final audit dataset contained one entry per session that merged all the auditors' observations and comments.

Results:, SGT and SGBM were represented topics in all preclinical courses at MCW. 54.6% of lectures included SGBM topics. Half the time SGBM was discussed, lecturers did not use correct language. Two main themes emerged. First was inconsistent or interchangeable use of sex and gender terms. For example, a lecturer verbally using females and women interchangeably. The second theme was use of gender terms to discuss a sex-based topic, such as saying that X-linked diseases primarily affect "boys."

Conclusions/Impact: Incorrect use of SGTs was a common occurrence in the premedical curriculum. Our team concluded that both educators and students would gain value from a deeper understanding of SGT and SGBM topics.

Swenson, Matt — Quality Improvement and Patient Safety

Pulmonary embolism diagnosed in the emergency department: documentation and outcomes

Authors: Matt Swenson, Igor Shusterman

Project Mentor and Department: Igor Shusterman, MD; Emergency Medicine

Pulmonary embolism (PE) is a potentially lethal diagnosis with few well-validated clinical guidelines regarding submassive PE, massive PE, and final disposition following a diagnosis of PE. For these reasons, large institutions have incorporated pulmonary embolism response teams (PERT) into their treatment algorithms. To assess current management of patients presenting to the emergency department (ED) with a diagnosis of PE, we examined patients diagnosed with PE in the ED in 2020 at five Froedtert hospitals. This represents a population of 231 patients, of which 141 were analyzed. Of these 141 patients diagnosed with PE, nine (6.4%) had massive PE, 58 (41.1%) had submassive PE, and 74 (52.5%) had low-risk PE. 15 (10.6%) patients had all-cause 30-day mortality, nine (60%) of which were attributed to PE. Of these nine PE-caused mortalities, one (11.1%) was a low-risk PE, two (22.2%) were submassive PE, and six (66.7%) were massive PE. There were 67 (47.5%) cases where the PE met the ED criteria for PERT activation (submassive or massive PE), however PERT was only activated in 21 of these 67 cases (31.3%). Of these 21 activations of PERT, the team recommended thrombolytics and/or embolectomy in seven (33.3%) cases and routine care (anticoagulation and admission for observation) in 14 (66.7%) cases. Six (28.6%) patients with PE resulting in PERT activation had 30-day mortality. Based on this data, we believe there is room for growth in documentation and communication of uniform recommendations for PE management to improve patient outcomes.

Tendick, Shane — Clinician Educator

The Role of Plastination in Medical Education

Authors: Shane Tendick, Ryan Hillmer

Project Mentor and Department: Ryan Hillmer, PhD; Cell Biology, Neurobiology, and Anatomy

Objective: With the recent advent of plastination processes, medical education has begun using this to further educate its students. The purpose of this study was to explore students' opinions on the use of plastinates as an adjunct in the medical school classroom setting.

Methods: Two brain specimens were dissected, and plastinated in the anatomy lab at the Medical College of Wisconsin. These structures included the amygdala, hippocampus, fornix, and mamillary bodies. A PowerPoint presentation was created and viewed by 43 2022 M1 students at the Medical College of Wisconsin in the Medical Neuroscience class. This PowerPoint presentation included pictures of the plastinated specimens and a brief explanation of the anatomic location and function of each. After viewing the PowerPoint, students completed a post-class survey of five statements using a five-point Likert scale of evaluation.

Results: 43 responses were completed. 72.1% of students surveyed strongly or somewhat agreed that viewing of the plastinated brain was helpful to their learning as compared to an anatomical model or two-dimensional drawing. 9.3% of participants somewhat disagreed that the plastinated brain helped their learning, and 0% strongly disagreed. Questions 2-5 focused on specific brain structures. Viewed as a total of questions 2-5, 61.05% of students strongly agree or somewhat agree that they were confident in identifying the four brain structures indicated on coronal or axial CT imaging after viewing of the plastinated brain. 8.7% of students strongly or somewhat disagreed that they were confident in identifying the four brain structures indicated in coronal or axial CT imaging after viewing of the plastinated brain.

Conclusions: Based upon the results of the study, there is a positive indication towards the usefulness and beneficence of using plastinated specimens as an adjunct to cadaver dissection, and anatomical models in medical student education.

Thapar, Molly — Clinician Educator

Using a peer-led roleplay model to help pre-clinical medical students improve interpersonal skills

Authors: Molly Thapar*, Omeed Partovi*, Madeline McGauley, Christopher Gitter, Jose Lucas Zepeda, Robert Treat, Himanshu Agrawal, April Zehm, Andrew Petroll

Project Mentor and Department: Andrew Petroll MS MD; Medicine – Infectious Disease

Problem Training in communication skills in pre-clinical medical training impacts future clinical competence, yet is often underutilized or absent. We describe the structure, and content of our novel extracurricular program, "Operation Conversation," and describe its feasibility, acceptability, and preliminary efficacy.

Approach In the 2021-2022 academic year, two cohorts of pre-clinical medical students at MCW participated in a semester-long program of three bimonthly virtual workshops. Each group had two student participants and one faculty facilitator. Each student role-played as a physician and a patient in separate scenarios during each workshop. Facilitators observed role-plays and provided immediate feedback. After each role-play, students and facilitators completed an assessment tool to rate student performance. After each workshop, students completed a self-evaluative survey. At the final workshop, students and facilitators completed a program evaluation survey.

Outcomes Over 90 students have participated in Operation Conversation; attendance at workshops neared 100%. Data from the first 64 participants demonstrated increases in performance scores from the initial to the final workshop on all three perspectives (self, peer, facilitator). Student reflections supported the use of peers as group partners, identified newfound appreciation of the dynamic relationship between patient and provider, and noted the importance of seeing a difficult situation through a patient's eyes.

Next steps We demonstrated that a student-run role-play program to enhance communication skills is feasible, well-regarded, and has preliminary efficacy among pre-clinical medical students. Addressing the lack of interpersonal skills training through an extracurricular program positively supplements traditional curricular content. Moreover, the use of active role-play, spaced repetition, and self-reflection is innovative and has potential to augment the curriculum.

Titi, Mohammad — Health Systems Management & Policy

Fight COVID Milwaukee: Protective Behaviors and Risk Communications Associated with the COVID-19 Pandemic

Authors: Mohammad Titi, Aliyah Keval, Emma Martinez, Julia Dickson-Gomez, Staci Young, John Meurer

Project Mentor and Department: John Meurer, MD, MBA; Institute for Health and Equity

The COVID-19 pandemic has had a major impact on society, causing significant disruptions to everyday life. Risk communication strategies can play an important role in risk management as they allow individuals to prepare for and respond to public health emergencies appropriately. The aim of this study is to investigate public risk behaviors and experiences with COVID-19 to better inform public health decisions about communicating and reducing personal risk. Nine virtual focus groups were conducted with 79 residents of Milwaukee County. Audio transcripts of focus group recordings were qualitatively analyzed using MAXQDA. Predominant themes identified include public risk protective behaviors, the emotional toll associated with lockdown measures, and risk communication. Our findings provide a better understanding of how adults, African American and Hispanic groups in particular, view risk associated with COVID-19, and how to effectively communicate public information about personal risk. These findings can help guide risk communication efforts and public health policy interventions for potential infection outbreaks in the future.

Tobes, Marisa — Quality Improvement and Patient Safety

Relationship Between Clinical Handoffs and Hospital Length of Stay in Patients with Gastroschisis

Authors: Tobes MK, Berlin K, Zhang J, Yan K, Yale S, Cohen S
Project Mentor and Department: Susan Cohen, MD; Pediatrics - Neonatology

INTRODUCTION: Diagnostic error (DE) can contribute to lengthened hospitalizations and complications. The NICU is an environment where providers may be more likely to rely on heuristic thinking rather than data to aid in decision-making. Outcomes depend heavily on timely identification and management of post-surgical complications. We sought to evaluate how frequency of clinical handoffs relates to complications leading to delay in enteral autonomy and prolonged length of hospital stay (LOS) in patients with gastroschisis. We hypothesized that higher numbers of handoffs (NOH) would correlate with increased LOS and/or increased time to enteral autonomy (TEA) in NICU patients with gastroschisis.
METHODS: Retrospective chart-review cohort study of infants born between 01/01/12–12/31/20 diagnosed with gastroschisis who received their care within the CW NICU. Focus variables included primary vs secondary closure, LOS (days), NOH between attendings (both neonatology and surgery), and TEA (days).
RESULTS: No significant correlations identified between NOH and TEA in the cohort in addition to both primary and secondary closure groups. A negative correlation was found between NOH per day and LOS (R=-0.29; p=0.0047). A negative correlation was also found between NOH per day and LOS among both primary (R=-0.28; p=0.04) and secondary (R=-0.37; p=0.029) closure groups individually.
CONCLUSIONS: Higher NOH was correlated with decreased LOS; this relationship remained significant whether primary or secondary closure was utilized in gastroschisis repair. No relationship was found between NOH and TEA, regardless of closure type. Findings suggest that higher NOH are at least not harmful to LOS or TEA in this cohort. Physician handoffs should be utilized as opportunities to demonstrate critical, intentional thinking to reduce DE. Future research may focus on developing tools that can assist in handoffs between attending physicians to close a gap where heuristic thinking might dominate.

Tran, Jacqueline — Clinical & Translational Research

Vaccines and Use of Immunosuppressive Therapy in a Pediatric Dermatology Clinic

Authors: Jacqueline Tran, Dylan L Trinh, Amy Pan, Stephen R Humphrey
Project Mentor and Department: Stephen R. Humphrey, MD; Dermatology

Introduction: Administration of live vaccines in immunosuppressed patients may lead to greater risk of disease such as systemic infections. Our primary aim was to investigate the prevalence of vaccine counseling documentation before immunosuppressant prescriptions for inflammatory dermatologic diagnoses.
Methods: We retrospectively chart reviewed patients seen at Children's Wisconsin Pediatric Dermatology Clinic on immunosuppressive therapy between 11/1/2012-6/1/2020. Immunosuppressants prescribed and vaccination status at the time of prescription were collected. Patients <18-years-old, with an inflammatory dermatologic diagnosis, and Wisconsin Immunization Registry (WIR) available were included. Mixed-effects logistic regression was performed to examine the relationship between immunization status, current age, gender, immunosuppressant medications, and vaccine counseling documentation.
Results: After initial screening, 235 patients were included, totaling 337 visits. At the time of immunosuppressant initiation, only 136 (40%) encounters were up to date (UTD) with vaccinations. Flu (49%) and HPV (16%) are the most common missing vaccines across all encounters. Live vaccines MMR and Varicella have 4% and 5% missing, respectively. Approximately 76% of patient encounters do not have documented vaccine counseling in the medical chart, prior to initiation of immunosuppressive medications. Overall, 154 (46%) encounters included patients who were not UTD and subsequently did not have vaccine counseling documented. As age increases, vaccine counseling was less likely to be documented (OR 0.89; 95% CI 0.84-0.95, P=0.001).
Conclusion: Approximately 60% of patient encounters are not fully up to date with their vaccines at the time of initiation. Out of those encounters that were not UTD, 77% lacked vaccine counseling documentation. Specific concerns lie in the lack of documented counseling for patients who are not UTD with vaccinations prior to prescription.

Trieglaff, Kendall — Clinician Educator

Audit of Sex and Gender Medicine Topics in Pre-Clinical School of Medicine Curriculum

Authors: Kendall Trieglaff, Madeline J. Zamzow, Bryn Sutherland, Amy Farkas, Sandra Pfister
Project Mentor and Department: Sandra L. Pfister, PhD; Pharmacology & Toxicology

Introduction: The importance of the inclusion of sex and gender medicine (SGM) in medical education has been formally recognized by both the American Association of Medical Colleges (AAMC) and the Department of Health and Human Services since 1995. Yet, few medical schools including the Medical College of Wisconsin (MCW) have a standard SGM curriculum. This work mapped SGM health topics taught in the MCW pre-clinical curriculum. Methods: Seven medical students audited 16 basic science pre-clinical courses in 2020-2021. SGM characterizations including epidemiology, diagnosis, presentation, treatment, prognosis, pharmacology, and disparity were captured by a survey tool. Comparisons were made to 38 high-yield topics presented in the text "How Sex and Gender Impact Clinical Practice: An evidence-based guide to patient care". Results: Of the 604 pre-clinical sessions audited, 54% contained some SGM content. Epidemiology was the most common SGM characterization (23% of total). 34 of the 38 high-yield clinical SGM topics received some mention in the basic science sessions. Frequently covered SGM-based topics included breast cancer, stroke, and systemic lupus erythematosus with representation in 4 of the 16 pre-clinical courses. Conclusion: Utilizing a medical student cohort to thoroughly audit courses was an effective way to document that MCW pre-clinical curriculum introduces many clinically relevant SGM topics. However, the audit also discovered varying levels of detail among the high yield topics with concern that students may not be adequately prepared to treat all patients. These results establish the groundwork for a more formalized and integrated approach to include SGM in pre-clinical curriculum.

Turbati, Mia — Clinical & Translational Research

Robotic simulation: validation and qualitative assessment of a general surgery residency curriculum

Authors: Mia Turbati BS, Matthew I Goldblatt MD, Jon C Gould MD and Rana M Higgins MD
Project Mentor and Department: Rana Higgins, MD; Surgery

Background: The daVinci skills simulation curriculum has been validated in the literature. The updated simulator, SimNow, features restructured exercises that have not been formally validated. The purpose of this study is to validate the SimNow resident robotic basic simulation curriculum. This study also consists of a qualitative assessment that gives greater insight into the learner's experience completing the robotic curriculum.
Methods: There were 18 participants in this study: 6 novices, 6 competent surgeons, and 6 expert surgeons. The curriculum comprised 5 exercises; participants completed three consecutive scored trials. Computer-derived performance metrics were recorded. The NASA Task Load Index survey was used to assess subjective mental workload. Subjects were asked a series of open-ended questions regarding their experience that were recorded and transcribed. Codes were identified using an inductive method, and themes were generated.
Results: Performance metrics were significantly different between novice versus competent and expert surgeons. There was no significant difference in any score metric between competent and expert surgeons. On average, overall score percentages for competent and expert surgeons were between 90.4% and 92.8% versus 70.5% for novices ($p=0.02$ and $p=0.01$). Expert surgeons perceived a higher level of performance completing the exercises than novice surgeons (15.8 vs 45.8, $p=0.02$). Participants noted a similar robotic experience, utilizing efficiency of motion and visual field skills. Participants agreed on exercise strengths, exercise weaknesses, and software limitations. Competent and expert surgeons were better able to assess the exercises' clinical application.
Conclusions: The SimNow curriculum is a valid simulation training as part of a general surgery resident robotic curriculum. The curriculum distinguishes between novices compared to competent and expert surgeons, but not between competent and expert surgeons.

Tyson, Katherine — Quality Improvement and Patient Safety

Optimizing Discharge Opioid Prescribing in Trauma Patients: A Quasi-Experimental Study

Authors: Katherine Tyson, Basil S. Karam, William J. Peppard, Rachel Morris, Patrick Murphy, Anuoluwapo Elegbede, Mary Schroeder, Lewis Somberg, Colleen Trevino, PhD

Project Mentor and Department: Colleen Trevino, PhD, Surgery – Trauma and Critical Care

Background: Patients prescribed higher opioid dosages are at increased risk of overdose and death without added pain reduction. Increases in opioid prescribing continue to fuel the epidemic. We hypothesized a comprehensive guideline to standardize opioid prescribing would decrease post-discharge dosages for trauma patients without requiring additional refills.

Methods: This quasi-experimental study compared opioid prescribing by trauma providers before and after the implementation of a departmental guideline on April 1, 2019, aimed at aligning opioid prescription patterns with CDC recommendations. Patients prescribed opioids before implementation were the control group, whereas those prescribed opioids after were the intervention group. The primary outcome was the proportion of patients receiving ≥50 morphine milligram equivalents (MME) per day.

Results: We identified 293 and 280 trauma patients in the control and intervention groups, respectively. There were no differences between the groups' ISS ($p=0.69$) or the frequency of having a procedure performed ($p=0.80$). Total MME and maximum MME per day were 16% and 25% lower, respectively, in the intervention group compared to the control group ($p<0.001$). The proportion of trauma patients prescribed ≥50 MMEs per day at discharge decreased from 57% to 18% after implementation ($p<0.001$). The proportion of trauma patients prescribed ≥90 MMEs per day also decreased, from 37% to 14% ($p<0.001$). There was no significant increase in the frequency of refill requests ($p=0.105$) or refill prescriptions ($p=0.099$) after discharge.

Conclusion: A departmental guideline aimed at optimizing opioid prescription patterns successfully lowers the amount of MMEs prescribed to trauma patients and improves compliance with CDC recommendations.

Untaroiu, Ana — Quality Improvement and Patient Safety

Development of a Clinical Report for Adaptive Optics Scanning Light Ophthalmoscopy Imaging

Authors: Ana Untaroiu, Jenna Grieshop, Brea Brennan, Robert Cooper, Joseph Carroll

Project Mentor and Department: Joseph Carroll, PhD; Ophthalmology and Visual Sciences

The non-invasive and high-resolution nature of adaptive optics scanning light ophthalmoscopy (AOSLO) offer enormous potential for clinical applications. However, there is a lack of standardized reporting of imaging outcomes to physicians. Here we sought to develop a clinical style report for communicating AOSLO outcomes. We designed a pipeline for report creation by writing a MATLAB script for adding AOSLO imaging data into a standardized outline. With this, we constructed example reports as proof-of-concept from previously acquired data. The report begins with demographic and background information, preparing the reader to interpret imaging outcomes. These outcomes are presented with qualitative and quantitative measures of the retinal area imaged, along with example retinal images. The next section gives a higher-level synopsis of the imaging session. Image quality is presented with qualitative labels ranging from high to low, along with signal-to-noise ratios. The last section provides information regarding subject follow-up and the footer includes the report creator name with a time-stamp for version control. Across four imaging sessions, the average time for creating a report was six minutes and thirteen seconds. Feedback from physicians endorsed current gaps in communication and validated the report as a valuable step towards closing those gaps. The method presented here serves as a starting point for incorporating clinical reporting to AOSLO imaging. As inconsistent feedback had been cited as a lack of physician engagement in recruiting for AOSLO studies, this pipeline has the potential to improve enrollment in imaging trials and supports efforts to expand clinical utilization of AOSLO imaging.

Valdes, Raquel — Urban & Community Health

Eyes on the Future: Inspiring Latino Middle School Youth to Pursue a Career in STEM

Authors: Raquel Valdes, Laura Carrillo, Velinka Medic, Eric Desjarlais, Judy E. Kim
Project Mentor and Department: Judy E. Kim, MD; Ophthalmology and Visual Sciences
Community Partner: Bruce Guadalupe Middle School

Background Given the ever-increasing ethnic and racial make-up of the U.S., the need for a diverse healthcare workforce is imperative. Physicians from groups underrepresented in medicine (URiM) play an important role in addressing health disparities. As such, efforts must be made to support underrepresented minorities (URM) in medicine and the STEM fields early in their education.
Methods The Eyes on the Future (EOTF) program consisted of five educational sessions provided by medical and graduate students from MCW over five weeks. Twenty-five students from a Milwaukee middle school were selected to participate by their science teacher. To evaluate the impact of the program, a survey was designed to assess the student's attitudes about the sciences and career goals using a 5-point scale. Students were administered the voluntary, anonymous survey prior to and after completion of the program.
Results From the participating students, 24 and 22 responded to pre- and post-program surveys, respectively. Both the pre- and post-program survey responses to questions in the science interest and STEM career domains were high scoring for both boys and girls. The majority of the question score comparisons were not statistically significant for any combination of gender and question domain.
Discussion Students showed strong interest in science concepts and STEM careers, with high and positively correlated similar pre- and post-program survey responses. Feedback provided mentioned the positive reception by students and enhanced exposure to academic institutions. Future directions include increasing the number of students participating in the program and randomizing student selection.

Vallee, Emma — Quality Improvement and Patient Safety

Development of hybrid leadership training at a student-run free clinic

Authors: Emma Vallee, Morgan Leissring, Jennifer Livschitz, Rebecca Lundh
Project Mentor and Department: Rebecca Lundh, MD; Family Medicine
Community Partner: Saturday Clinic for the Uninsured

Over the past few years, medical education has needed to adapt to changes brought forward by the global pandemic. The Saturday Clinic for the Uninsured, a student-run free clinic supported by the Medical College of Wisconsin, similarly needed to adapt its training for leadership to a primarily virtual format. However, as students took on the hands-on roles required for clinic administration and to provide quality patient care, they felt largely unprepared as they had only been exposed to training in a virtual format. Clinic leadership sought to create a hybrid training format that would not only allow for COVID-19 precautions to be met, but also provide a meaningful learning experience for students.
All policy and protocol-based sessions were presented virtually over two weeks. Additionally, a two-day, in-person training was developed. The purpose of this two-day intensive was to provide an opportunity for students to practice the skills they had seen in their virtual sessions with past student clinic leaders present to guide them.
Confidence was assessed with pre- and post- surveys using a Likert scale rating system. Skills taught and assessed that did not have an associated virtual didactic component expectedly had the largest increase in confidence (165%). All other tasks that did have associated didactic sessions also showed increased confidence (range: 40%-93%). Based on these data and feedback, future training will continue to incorporate hands-on sessions to compliment virtual didactic sessions, potentially further decreasing the amount of time spent with didactic learning and increasing that spent with active learning sessions.
As medical education continues to evolve and adopt an increasingly virtual format, it is still crucial to incorporate effective, hands-on learning experiences. These sessions should be focused on activity-based learning that compliments self-paced didactic material.

Vang, Iaong

Global Health

Refugee health curriculum improves healthcare students' confidence in providing cross-cultural care

Authors: Iaong Vang, Athena Dong, Danica Vendiola, Jessica Zhou, Tianzeng Chen, Sarah Dittmer, Melissa Chiu, Caitlin Kaeppler

Project Mentor and Department: Melissa Chiu, MD, and Caitlin Kaeppler, MD; Pediatrics - Hospitalist

Community Partner: International Institute of Wisconsin (IIW), Catholic Charities Refugee and Immigration Services

Introduction (75): Despite growing numbers of resettled refugees, many medical trainees lack formal education and feel underprepared to provide care. A former study at the Medical College of Wisconsin (MCW) created a refugee health curriculum and assessed its efficacy in improving participants' knowledge, awareness, and confidence in providing cross-cultural care. The curriculum improved knowledge and awareness, but had no significant improvement in confidence. This study sought to revise and further develop the curriculum to increase participant confidence.

Methods (31): A 5-module curriculum was developed and presented to medical trainees at MCW. Participants completed pre- and post-surveys adapted from "The Cross-Cultural Competency Survey". Survey results were evaluated using non-parametric statistical analyses.

Results (63): Out of 41 participants, 17 completed pre-surveys (41.5%) and 10 completed post-surveys (24.4%). Evaluation of the curriculum's impact showed statistically significant improvements in knowledge and awareness, confidence in providing cross-cultural care, and comfort when working with interpreters and taking histories ($p<0.05$). However, the curriculum had no statistically significant improvements in comfort when interacting with non-English speaking individuals and individuals with different cultural backgrounds.

Conclusions (53): This study continues to demonstrate a need for education on refugee health. The revised curriculum was effective in improving participants' confidence in providing cross-cultural care; however, trainees may benefit from additional sessions working with interpreters and interacting with individuals with different cultural backgrounds. Future directions include expanding the curriculum to provide hands-on experience.

Vendiola, Danica

Quality Improvement and Patient Safety

Improved caloric goal documentation in the PICU through modification of electronic health records

Authors: Danica F. Vendiola, Amy Y. Pan, Jennifer Andres, Nicole Fabus, Melissa M. Froh, Rebecca Heisler, Miranda R. Privatt, Mary R C Seidl, Martin K. Wakeham, Theresa Mikhailov

Project Mentor and Department: Theresa Mikhailov, MD, PhD, Pediatrics - Critical Care

Nutrition is an important aspect of care when treating critically ill children, with studies showing worsened clinical outcomes for patients who suffer from malnutrition. Additionally, research shows that an early estimation and documentation of caloric goals in the electronic health record (EHR) is associated with higher daily energy intake. One approach to increase caloric goal documentation is to standardize the EHR with system prompts. The Plan-Do-Study-Act (PDSA) quality improvement method was used, and a smart link prompt was developed and incorporated into the EHR progress notes templates in May 2021. We monitored the monthly rate of documentation of caloric goals within 48 hours of admission by critical care providers up to April 2022. Utilizing automated systems-based prompting in EHRs resulted in an increased frequency of caloric goal documentation exceeding 90% monthly. Establishing a standardized prompting system within the EHR directly led to an overall increased frequency of caloric goal documentation.

Wakinekona, Nalani

Quality Improvement and Patient Safety

Reporting and Analysis of Race in Vascular Surgery Research

Authors: Nalani A. Wakinekona, Micah J. Rubin, Mitchell R. Dyer, Neel A. Mansukhani,
Project Mentor and Department: Neel A. Mansukhani, MD, MS, Surgery (Northwestern)

Introduction: Non-White patients experience higher morbidity and mortality associated with common vascular pathologies. To our knowledge, race-based reporting and analysis is not well characterized in vascular surgery research. We aim to characterize race-based inclusion, reporting, and analysis in vascular surgery original research.
Methods: Bibliographic review of all original manuscripts published in five high-ranking medical journals relevant to the field of vascular surgery from January 1, 2018 to December 21, 2020 was conducted. Data abstracted consisted of race-reporting and inclusion of race-based analyses.
Results: 2,717 articles were included for review, and 622 (22.8%) articles reported the race of participants. Of the 622 articles that reported race, 298 (48%) included race in any statistical analysis, 212 (34%) included race in a multivariable analysis, 34 (6%) reported results separately by race and 150 (24%) discussed racial differences in the discussion section. US-based articles were more likely to include race in any statistical analysis compared to non-US-based articles (51% vs 18%, P <0.001). Multi-center studies were more likely to include race in any statistical analysis compared to single-center studies (62% vs 26%, P<0.001). There was wide variation in race-based analysis among disease process and anatomic location. Analysis of disease process showed that articles investigating arterial occlusive and stroke/TIA pathologies had the highest and lowest percentages, respectively, of including race in any analysis (54% and 20%, respectively), including race in a multivariate analysis (41% and 20%, respectively), reporting data separately by race (5% and 0%, respectively), and discussing racial differences (26% and 0, respectively).
Conclusions: Our results highlight the need to improve and standardize race-based reporting and analysis within vascular surgery research.

Wamuo, Obinnaya

Health Systems Management & Policy

Patient and Provider Factors Associated With Successfully Addressing Medical Needs Using Telehealth

Authors: Wamuo O, Hyun N, Holt JH, Somai MM, Crotty BH.
Project Mentor and Department: Bradley Crotty, MD, MPH; Medicine – General Internal Medicine

Few data exist that highlight areas where telemedicine shines or struggles from the patient perspective. We conducted a retrospective analysis of patient experience data from 19,465 visits using a logistic regression to model the odds a virtual visit addressed a patient's medical needs. Patient age (80 years: OR 0.58; 95% CI, 0.50-0.67 vs 40-64 years), race (Black: 0.68; 95% CI, 0.60-0.76 vs White), and connection (telephone conversion: OR 0.59; 95% CI, 0.53-0.66 vs video success) were associated with a lower likelihood of addressing medical need with results varying modestly across specialties. These data suggest that while telehealth is generally well accepted by patients, differences are seen amongst patient factors and specialty.

Wannow, Abigail — Urban & Community Health

Improving blood pressure control by providing ambulatory blood pressure cuffs to patients

Authors: Abby Wannow, Brooke Passolt, Rebecca Lundh, Ellen Wegner, Ellen Hallberg, Chiamaka Nwosu
Project Mentor and Department: Brooke Passolt, MD; Family Medicine

INTRODUCTION: 2017 AHA guidelines state ambulatory blood pressure monitoring is recommended in conjunction with clinical intervention to titrate antihypertensives and manage patients with hypertension. Ambulatory blood pressure monitoring may play a larger role in allowing clinicians to manage patients' hypertension.
OBJECTIVE: In patients with uncontrolled hypertension, does receipt of a blood pressure cuff lead to a higher percentage of patients with blood pressures <140/90 after 3 months when compared to the general clinic population?
METHODS: 103 adults without ESRD or pregnancy with uncontrolled hypertension (>/=140/90) were enrolled. Patients received an automatic home blood pressure monitor and logged blood pressures daily. After 3 months, patients were contacted for a survey. We compared blood pressure values before and after intervention, adherence to antihypertensive medications and satisfaction with home blood pressure monitoring. Titration of antihypertensives by provider were not tracked.
RESULTS: Thirty eight percent (21/54) of patients who received a blood pressure cuff and knew their home readings achieved blood pressures <140/90. For patients unable to be reached via phone for the survey, or those who did not know their blood pressure measurement, their most recent office blood pressure post intervention was used. One-third of these patients (7/21) achieved control.
CONCLUSION: Our data suggests providing home blood pressure monitors can help improve blood pressure control. Our next step will be comparing our group's blood pressure control to that of the general clinic population. Next, we hope to have patients submit blood pressures more frequently to encourage medication adjustments and faster blood pressure control.

White, Michael — Quality Improvement and Patient Safety

Collaborative care in acute settings: An integrated approach to psychiatric care within an academic emerg

Authors: Michael White, Matthew Fiorillo, Julie Ruth Owen
Project Mentor and Department: Julie Ruth Owen, MD, MBA; Psychiatry and Behavioral Medicine

Background: The number of patients presenting to Emergency Departments (EDs) in the US with primarily psychiatric complaints has been steadily rising in the last 2 decades. These patients are more likely to experience increased ED length of stay (ED LOS), increased use of restraints, and financial difficulties.
Aim: This project intends to improve the experience of patients presenting to the ED at Froedtert Hospital with primary psychiatric concerns. Specific goals of the service include decreased ED LOS, improve decision-making around final dispositions, and improved connection to post-discharge psychiatric care.
Methodology: An embedded ED Psychiatry Service (EPS) was implemented at Froedtert Hospital in 2019. Between 2019 and 2021, charts from all patients who received a consult from EPS (n=1140) were reviewed for ED LOS, discharge diagnosis, treatment, and final disposition. These data were compared with randomly selected charts (n=1140) of patients presenting to the ED with primary psychiatric concerns from the two years prior to implementation (2017-2019).
Results: The difference in ED LOS was not statistically significant between the pre- and post-implementation groups (p = 0.68). However, patients were more likely to receive outpatient prescriptions for stabilizing psychotropic medications after seeing the EPS team.
Conclusion: Although there was no significant difference in ED LOS among study groups, there was a difference in the provision of outpatient psychiatric prescriptions, which suggests improved carecoordination/access to psychiatric treatmentfor patients seen by the Emergency Psychiatry Service.

Willow, Edward

Health Systems Management & Policy

Associations between socioeconomic status and bispecific LV20.19 CAR T cell therapy outcomes.

Authors: Edward Hackett, Jennifer M. Knight, Aniko Szabo, Ruizhe Wu, Garrett Sauber, Bryon Johnson, Rachel N. Cusatis, Elizabeth Aughey, Steve W. Cole, Cecilia J. Hillard, Nirav N. Shah
Project Mentor and Department: Jennifer M. Knight, MD, MS; Psychiatry

As utilization of novel chimeric antigen receptor (CAR) T-cell treatment continues to rise, it is increasingly important to identify populations vulnerable to the unique adverse effect profile of CAR T-cell therapy. Socioeconomic status (SES) is a major contributor to health disparities, with several overlapping neuroinflammatory markers seen in CAR T-cell therapy. In this phase I clinical study (NCT03019055), we hypothesized that novel anti-CD20 and anti-CD19 (LV20.19) CAR T-cell treatment outcomes were worse in patient of lower SES. Our second goal was to explore possible candidate biological mechanisms relating the effects of SES on CAR T-cell therapy outcomes, including cytokines and kynurenine metabolites. Fifteen patients provided blood samples and patient reported outcome (PRO) data 15 days before therapy (baseline), Day 14 post therapy (D14), D28, and D90. SES was categorized by household annual income based on a median split. Proinflammatory cytokines, kynurenine neurotoxic metabolites, clinical observations, and patient reported outcomes across timepoints were compared between SES groups. Baseline LDH was 3.4-fold higher in low compared to high SES patients ($p=0.04$). Low SES patients had elevated G-CSF, I-309, IL-8, IP-10, MCP-2, and TNFÎ± ($p<0.05$) cytokines and elevated kynurenine metabolites 3-hydroxyanthranilate (3-HAA; $p<0.05$) and quinolinic acid (QA; $p<0.01$). Cytokine Release Syndrome onset was earlier ($p=0.009$) in low SES patients. Patients with low SES indicated more pain intensity (BPII; $p=0.021$) and worse sleep quality averages below the PSQI threshold for good sleep ($p<0.05$). Our data provide preliminary evidence that SES is associated with biological and clinical outcomes among patients receiving CAR T-cell therapy.

Wong, Jonathan

Global Health

Assessing the Impact of Housing Insecurity and Threat of Eviction on Health

Authors: Wong J, Goss A, Gray C, Mazzone M, Labott A, Nelson D
Project Mentor and Department: David Nelson, PhD; Family and Community Medicine
Community Partner: Waukesha Family Medicine Residency at ProHealth Care Barstow Clinic

Background: Living under the threat of homelessness produces significant health challenges. We investigated how the threat of eviction affects a person's life and health and what role physicians play in securing safe, stable, and affordable housing.
Purpose: To ascertain what the perceived impact housing security has on health and how primary care physicians can help those at risk for eviction.
Methods: This study used interviews with patients selected from multiple primary-care clinics in Wisconsin. Patients were selected based on a 5-question screening protocol developed by the researchers based on the literature. Patients were interviewed using a semi-structured qualitative interview format. Responses were recorded, transcribed verbatim, and analyzed for theme emergence.
Results: We interviewed 6 total participants thus far with more planned for the future. Major themes that emerged were 1) suboptimal living conditions contributing to poorer physical health, 2) issues with landlords causing increased psychological stress, 3) putting up with suboptimal housing to be closer to resources, 4) unstable relationships with the surrounding environment increasing psychological stress and physical safety, 5) psychological stress of living with risk of eviction and unstable housing, 6) importance of housing as a "home," 7) importance of social support, and 8) uncertainty regarding physicians/healthcare's role in securing housing stability.
Conclusions: Safe, stable, and affordable housing profoundly impacts peoples' lives and health. There is a clear positive impact on psychological and physical health. More interviews are required to determine this benefit further. Identifying participants' beliefs regarding how unstable housing affects their health and how they feel physicians could support them will allow us to develop strategies for healthcare facilities to implement to secure these resources for patients.

Woolfolk, Monet

Bioethics & Medical Humanities

The Importance of an Antiracist Medical School Curriculum

Authors: Monet Woolfolk, Sandra Pfister, Bryn Sutherland
Project Mentor and Department: Sandra Pfister, PhD; Pharmacology & Toxicology

Equity in medicine has been a frequently discussed topic in the last 5 years. Multiple studies have shown that medical students and trainees in the United States are ill-equipped to treat diverse patient populations. A 2016 study showed that half of a sample of white medical students and residents believed that black Americans had biological differences that decreased the amount of pain they feel. This shows there are major gaps in the knowledge of these learners about race and its implications in medicine. This study was conducted to determine the perspective of faculty, residents, and students on the current MCW curriculum in terms of antiracism. Both a design sprint and a survey were conducted involving 133 members of the MCW community. This involved qualitative data describing what people believe is missing from the current curriculum, and people's past experiences with learning about race in medicine. The second portion was a quantitative survey which involved ranking different topics on how often they have been discussed in this curriculum. Finally, all participants were asked about what format they would prefer to have antiracism incorporated into the curriculum. The results showed that both faculty and students felt as if there is not enough anti-racism incorporated into the curriculum right now and that a longitudinal antiracism curriculum would be the most effective way to teach medical students about it.

Xiong, Na

Clinician Educator

4-years of Face2Gene in a General Genetics Clinic: Insights from Retrospective Analysis of Diagnosed Case

Authors: Na Xiong, Donald Basel, Michael Muriello
Project Mentor and Department: Donald Basel, MD; Pediatrics - Genetics

Diagnosing patients with non-specific dysmorphic features is a challenge faced by medical geneticists. Machine learning ("artificial intelligence") technologies in medicine have the potential to improve the diagnostic yield and shorten the diagnostic odyssey. Face2Gene (F2G) is a facial image analysis software developed using deep-learning algorithms to detect features from thousands of patient images1.

Deficiencies in healthcare is a cause for diagnostic errors and mistakes in treatment and diagnosis 6, 7 . Highlighting the importance of minimizing errors via diagnostic tools, up to 20% of NICU deaths have been identified as a major diagnostic error 1. Genetic testing can only pick up about 15% of neonates with anomalies with an identifiable cause, with rare heritable disorders being more challenging to diagnose 1. Datasets recommending treatment options and dosage for select treatments by AI clinicians was on average more reliable and effective than those chosen by human clinicians 3 .

AI tools have been proven to outperform clinicians in experiments in identifying correct syndrome within 502 images, with a top 10 accuracy rate of 91% 2. Tools like face2gene is a useful tool used by healthcare teams with little to no experience with computers or clinical genetics 5. Researchers found that by increasing training images of specific syndromes, it helps improve the machine learning ability of Face2Gene to discriminate syndromes 4. These tools can in theory allow for the fast tracking of patient care and diagnosis. This project will inform and increase clinical confidence in utilizing AI tools to correctly diagnose patients with dysmorphia.

Yass, Natalie — Bioethics & Medical Humanities

Faculty Physician and Trainee Experiences with Micro- and Macroaggressions: a Qualitative Study

Authors: Cynthia Kay, Joanne Bernstein, Natalie Yass, Jennifer Woodard, Sara Tesfatsion, Cecelia Scholcoff
Project Mentor and Department: Cynthia Kay, MD, MS; Medicine – General Internal Medicine

Background: Micro- and macroaggressions are often stereotype threats that can have detrimental effects on the recipients. Survey data shows that these aggressions are happening. However, there are few qualitative studies on trainees and faculty physicians' experiences with such aggressions and their impact.
Objective: Explore how micro- and macroaggressions impact physician trainees and faculty.
Design, setting, participants: Virtual, one-on-one, semi-structured interviews were conducted between February and September 2021, among 14 physicians and trainees (medical students, residents, fellows, and faculty) at a tertiary, urban, US academic medical center and its associated hospitals. Participants shared their experiences with micro- and macroaggressions in training and the workplace, as well as their thoughts on intervention and education.
Approach: Qualitative interviews; grounded theory approach KEY RESULTS: A total of 14 physicians and trainees (5 faculty, 2 fellows, 5 residents, 2 students; 11 [79%] women) participated. Four themes with multiple subthemes surfaced: definition, the moment an aggression is experienced, aftereffect of an aggression, and education and training. While general definitions of micro- and macroaggressions were similar among participants, some may have overlooked the inclusion of a marginalized group as central to each term. Both types of aggressions had a range of effects on participants, with faculty noting a cumulative effect. Institutional diversity was identified as a key source of support. Ideas on how to combat such acts included mandatory educational programs and policies, with the acknowledgment that much effort and time are necessary to change mindset and culture.
Conclusions: Faculty physicians and medical trainees shared their personal experiences with micro- and macroaggressions during work and training. Participants described various emotions in the moment but also noted that these aggressions often had lasting impacts.

Zamzow, Madeline — Urban & Community Health

Audit of Sex and Gender Medicine Topics in Pre-Clinical School of Medicine Curriculum

Authors: Madeline J. Zamzow, Kendall Trieglaff, Bryn Sutherland, Amy Farkas, Sandra Pfister
Project Mentor and Department: Sandra Pfister, PhD; Pharmacology and Toxicology

Introduction: The importance of the inclusion of sex and gender medicine (SGM) in medical education has been formally recognized by both the American Association of Medical Colleges (AAMC) and the Department of Health and Human Services since 1995. Yet, few medical schools including the Medical College of Wisconsin (MCW) have a standard SGM curriculum. This work mapped the SGM health topics taught in the MCW pre-clinical curriculum. Methods: Seven medical students audited 16 basic science pre-clinical courses in 2020-2021. SGM characterizations including epidemiology, diagnosis, presentation, treatment, prognosis, pharmacology, and disparity were captured by an online survey tool. Comparisons were made to 38 high-yield topics presented in the text “How Sex and Gender Impact Clinical Practice: An evidence-based guide to patient care”. Results: Of the 604 pre-clinical sessions audited, 54% contained some SGM content. Epidemiology was the most common SGM characterization (23% of the total). 34 of the 38 high-yield clinical SGM topics received some mention in the basic science sessions. The most frequently covered SGM-based topics included breast cancer, stroke, and systemic lupus erythematosus with representation in at least 4 of the 16 pre-clinical courses. Conclusion: Utilizing a medical student cohort to thoroughly audit courses was an effective way to document that MCW pre-clinical curriculum introduces many clinically relevant SGM topics. However, the audit also discovered varying levels of detail among the high-yield topics with concern that students may not be adequately prepared to treat all patients. These results establish the groundwork for a more formalized and integrated approach to include SGM in the pre-clinical curriculum.

Zunker, John

Quality Improvement and Patient Safety

Enhancing Patient Safety by Standardizing Heparin Use in the Interventional Radiology Suite

Authors: John D. Zunker, Timothy E. Klatt, MD

Project Mentor and Department: Timothy E. Klatt, MD; Obstetrics and Gynecology

While undergoing Catheter Directed Thrombolysis (CDT) by Interventional Radiology (IR), a patient received a low-dose heparin infusion specific to the provider. This infusion was prepared by IR staff, hand labelled, and not accessible elsewhere in the hospital. When the next heparin infusion was hung in the ICU staff failed to recognize a change in concentration, resulting in a critical safety event. Several latent weaknesses in the baseline process were identified and rapid cycle improvement was used to create a new standardized workflow. Interventions included standardizing low-dose heparin infusions across IR providers and compounding the infusions in the central pharmacy to allow for bar coding and hospital wide access. The new workflow was then allowed to run for 20 months. This study assessed whether compliance with the new workflow endured and quantified how many infusions were dispensed. The electronic medical record was reviewed for every CDT procedure at Froedtert Hospital between August 21, 2019, and April 21, 2021. For each case the heparin infusions ordered in the IR suite and in the post-procedure ICU were examined. Additionally, the number of heparin infusions dispensed were compared with the total number compounded by central pharmacy. The audit identified 66 CDT cases that required low-dose heparin infusions. In all 66 cases the standard concentration of heparin was ordered. In 54 (82%) of cases, the pharmacy compounded infusion were used. In the remaining 12 cases the infusion concentration was ordered correctly, but done so without using the pharmacy compounded infusion. While the standardized concentration was used for every patient, latent risk remains for the orders that did not use the pre-compounded infusions. During the study period pharmacy stocked 610 bags of heparin in the IR suite, of which only 73 (12%) were administered. We intend to use this project to set a new national standard for best practices for catheter directed thrombolysis.