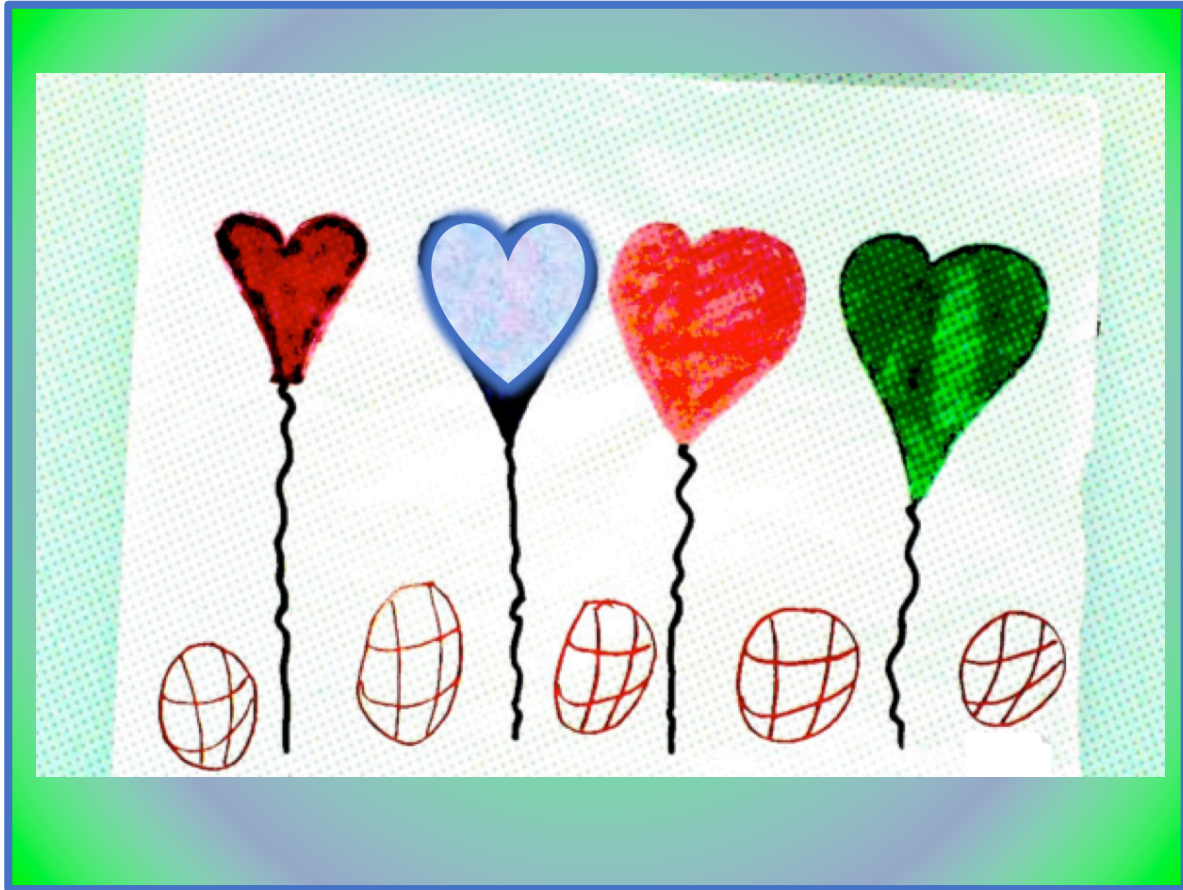


# The Art and Science of Pediatrics



**Volume 16, December 2018**  
**Pediatric Interest Group**



**Weill Cornell**  
**Medicine**



**NewYork-Presbyterian**  
Phyllis and David Komansky  
Children's Hospital



**Weill Cornell  
Medicine**



**New York-Presbyterian  
Phyllis and David Komansky  
Children's Hospital**

December 2018

Dear Weill Cornell Medicine Students and Faculty:

One measure of the quality and success of a special event lies in the support it generates in subsequent years. The reviews of previous Pediatric Medical Student Research Days have been overwhelmingly positive. All in attendance at these events agree they are a tradition worth continuing.

On behalf of the Department of Pediatrics and the Weill Cornell Medical Student Pediatric Interest Group, it is a pleasure for me to welcome you to the *Sixteenth Annual Pediatric Research Day*. In addition to medical student research and scholarly project abstracts, this year's Journal, "*The Art and Science of Pediatrics*," features interviews with faculty and community service opportunities. The work presented in this journal and displayed at Pediatric Research Day is the product of a wonderful collaboration between our medical students and faculty committed to developing the next generation of pediatric scientists. What makes this effort even more special is that our students accomplished this work in spite of the tremendous demands placed on their time by medical school. We believe this exposure to research early in one's medical career is an essential first step not only in launching a successful career in investigation but also in establishing a foundation for lifelong learning for those who choose to pursue clinical medicine.

As Chairman of the Department of Pediatrics, I congratulate and thank the students and their faculty mentors on the success of their research efforts, and acknowledge the strong leadership of the Pediatric Interest Group: Kimberly Bogardus, Brienne Lubor, Prithvi Mohan, and their advisors, Drs. Thanakorn Jirasevijinda and Susanna Cunningham-Rundles, on organizing and continuing this important pediatric program.

Sincerely,

A handwritten signature in black ink that reads 'Gerald M. Loughlin'.

Gerald M. Loughlin, M.D., M.S.  
Nancy C. Paduano Professor and Chairman  
Department of Pediatrics

Weill Cornell Medicine

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**STUDENT WRITING  
FACULTY INTERVIEWS AND ESSAY**

## **Interview with Dr. Christopher Cunniff**

*Meridith Pollie, MSI*

Dr. Christopher Cunniff is the Chief of the Division of Medical Genetics and a Professor of Pediatrics at Weill Cornell Medical College. In addition to being a researcher, an editorial board member for Molecular Syndromology, and a board certified clinically active pediatric geneticist, Dr. Cunniff is also one of the unit leaders of the genetics unit for first year medical students. Dr. Cunniff graciously took the time out of his busy schedule of medical practice, research, and teaching to speak with me about his path to medicine, his medical career, and his discoveries in pediatric genetics.

Dr. Cunniff grew up in a small town in Alabama, and shared that, growing up, he “didn’t really know what the world looked like.” In medical school, at the University of Alabama School of Medicine, Dr. Cunniff found that his pediatrics rotation stood out to him. In addition to enjoying being around children, Dr. Cunniff also found he liked both the pediatricians and the culture of pediatrics. Dr. Cunniff described his colleagues in pediatrics as being typically future-oriented, compassionate, and dedicated to advocating for a population that doesn’t typically have a voice.

The field of genetics appealed to Dr. Cunniff because it allowed him to quickly become one of the world’s experts in certain disorders. In addition, as a geneticist, Dr. Cunniff is involved in the most consequential moments in people’s lives, and he finds the experience of guiding people, both physically and emotionally, through their discoveries about their genetics, to be extraordinarily rewarding.

Dr. Cunniff shared that the best part of his job is the variety – both his variety of work responsibilities and the diversity of the patients he sees in clinic. On the one hand, Dr. Cunniff’s work day can involve working on a manuscript at the beginning of the day, teaching medical students, and then getting to see patients in the afternoon who have incredible stories to share. Dr. Cunniff also has opportunities to mentor trainees at all levels, whether they aim to climb the academic research ladder or become better clinicians. In clinic, Dr. Cunniff sees a diverse group of patients from many different age groups.

Before coming to Cornell, Dr. Cunniff did over twenty years of public health research on population-based surveillance for genetic disorders and developmental disabilities including Duchenne and Becker muscular dystrophy, Fetal Alcohol Syndrome, and Autism Spectrum Disorder. Since coming to New York, Dr. Cunniff’s research has focused more on pediatric cancer predisposition syndromes, particularly Bloom’s Syndrome. He currently serves as Registrar for the Bloom’s Syndrome Registry, and in this role, he works with patients and their families affected by this disorder on screening and health supervision. In addition to expanding and developing the registry, Dr. Cunniff has focused on more clinical and translational applications, using Bloom’s tumor sequencing to discover links between genotype and phenotype and to better understand cancer onset and development.

Dr. Cunniff expressed that one of the biggest challenges of being a pediatric geneticist is that pediatric geneticists still cannot diagnose everyone, and that even in those whom they can diagnose, there are fewer treatments than he’d like, especially for disorders that cause intellectual defects. Exome sequencing technology completely changed Dr. Cunniff’s method of diagnosis. In New York, it is far easier to test people than it was where Dr. Cunniff practiced before coming to Cornell; however, many patients remain undiagnosed, and this can create a frustrating barrier to care.

Dr. Cunniff’s advice for medical students choosing a specialty is threefold: 1) look at who your colleagues will be in the field, for those will be the people you spend your life with; 2) consider the types of patients you will care for every day, for patient populations vary widely with each specialty; and 3) be sure you are excited about the day-to-day activities of the specialty, for this will be how you are spending most of your time.

## **Interview with Dr. Ratna Behal**

*Justin Lee, MSI*

Dr. Ratna Behal is the director of Pediatric Palliative Care at the Phyllis and David Komansky Children's Hospital at New York-Presbyterian Hospital/Weill Cornell Medical Center. Over the past year, Dr. Behal has overseen the development of and currently leads the Pediatric Advanced Care Team (PACT). Through PACT, Dr. Behal has assembled a group of clinicians who provide critically ill pediatric patients with an additional layer of support, placing focus on holistically improving the patient's quality of life. Dr. Behal graciously took time out of her busy schedule to speak with me about her path to medicine, medical career, and passions.

Dr. Behal's interest in medicine started early in childhood and she had the opportunity to pursue her interest by attending Georgetown University for her undergraduate and medical studies. As someone who was always interested in pediatrics, Dr. Behal moved to New York City to complete a Pediatrics residency at New York-Presbyterian Hospital/Weill Cornell Medical Center. She went on to complete a Pediatric Hematology/Oncology fellowship at the combined program between New York-Presbyterian Hospital/Weill Cornell Medical Center and Memorial Sloan Kettering Cancer Center, but decided that she wanted to further specialize. This led Dr. Behal to complete another fellowship year in Hospice and Palliative Medicine at Memorial Sloan Kettering Cancer Center.

Since completing her training, Dr. Behal has championed the use of palliative care methods while treating patients of all ages and is glad to see Pediatric Palliative Care becoming the standard of care across the nation for seriously ill children and their families. Throughout our interview, Dr. Behal was passionate about breaking down the false equivalence between palliative care and hospice care. Instead, what palliative care means to Dr. Behal is providing pain and symptom management to children who have life-altering illnesses and improving communication with their caretakers. Dr. Behal also wants to clear the misconception that having a career in Pediatric Palliative Care is always sad – she mentioned that while some days were really sad, she found the joy of the breakthroughs and the chance to make a child smile even more rewarding.

In addition to palliative care, Dr. Behal takes a strong interest in promoting wellness among caregivers and healthcare providers. When she was a medical student at Georgetown, Dr. Behal participated in a program called "Mind-Body Medicine" where she learned important techniques to help increase self-awareness, reduce compassion fatigue, prevent burnout, and preserve her overall sense of well-being. Nowadays, Dr. Behal ensures that members of PACT don't suffer burnout by using pre-visit meetings and debriefs. This way, team members know what to expect going in to a case and have the space to talk about unexpected events afterwards. Furthermore, Dr. Behal wants to help not only current healthcare providers but also medical students, residents, and other trainees by utilizing debriefs and discussing ways to improve work-life balance before becoming attending physicians.

Dr. Behal's work encapsulates what modern medicine is all about. She collaborates with individuals ranging from fellow physicians to chaplains to give her patients the options to choose the best care possible for themselves. Her dedication to promoting wellness amongst her peers and for future healthcare providers is also incredibly reassuring. In our modern age where physicians and caregivers are suffering from higher rates of depression and suicide, Dr. Behal reminds us to stop and reflect whether we are doing alright. These principles help us perform better and also encourage us to pause when interacting with patients and determine if what we are doing will also make the patient feel better. Needless to say, after talking with Dr. Behal, I walked away inspired with the take-home message that each of us deserves the highest quality of life, whether we are in the hospital bed or taking care of the person in it.

## **A Summer Worlds Away** *Prithvi Mohan, MS2*

The main hospital of the Christian Medical College is 8 km away from the medical school campus, which entails a 25-minute ride in a crowded bus through the intense potholes of the streets of Vellore. Immediately, I was struck by the towering blue buildings of the hospital and clinical departments. However, the size of the building immediately paled in comparison to the sheer mass of people present in and around the hospital. It's not an exaggeration in the slightest to say every square inch of the hospital was occupied by patients, family, and employees.

I think it's important to clarify the admittedly stereotype picture I just painted, which seems to be a very common and easy pitfall in global health. CMC is one of the largest and most esteemed medical institutions in India, and as such it serves a diverse population of patients from all over the subcontinent and surrounding countries. Every doctor in the hospital speaks at least 3 languages, and switches seamlessly when communicating with the patients. Parents travel from every part of India and surrounding countries, bringing their sick children on crowded commercial trains for days to get treatment at CMC.

I rotated on the general pediatrics wards, and would best describe my presence as constantly in the way. During rounds, the team consisted of an average of 10 people at minimum. As a visiting medical student, I would engage with the group while being mindful not to be in the way. From a learning perspective, I saw pathologies that I will likely never see on the wards in the US – the first patient I saw was a 5 month old baby with severe malnutrition and keratomalacia.

A common theme is that as a medical student, you can feel pretty useless on the wards for any practical purpose. My job was to observe and learn, and my Tamil language fluency proved useful and helpful to stay clued in. It's easy to get frustrated, because didn't we cross that useless bridge already in undergrad? Why aren't we useful yet?

My downtime between rounds changed that feeling, because that's when the residents would shoo me away to go talk to patients while they charted. Almost none of the families spoke English, and a majority of them were illiterate. What I quickly realized is that they seldom had time to chat with their healthcare providers, who were managing dozens of children with bacterial sepsis and severe tuberculosis. A simple "eppadi irrukunga" (how are you doing?) gave the parents a moment of surprised pause, before the floodgates opened about everything from their financial struggles to lunch that day. This proved to be a symbiotic relationship – I loved talking to them and learning more about their child's condition, and in turn they had extra time to talk about all of their concerns, health and otherwise.

There was one patient in particular who I will not forget. Ms. A was a quiet, slight girl in her early teens. She had been struggling with multidrug resistant extrapulmonary tuberculosis, along with renal complications. She and her family had been travelling to CMC from Sikkim, which is up near Nepal, for the last two years for treatment. She had missed almost two entire years of school, and spent months at a time away from friends and family. The doctor had just informed her that she would need to stay for another couple weeks, and then left to round on other patients. Her parents had already left. She broke down, crying right there. We sat together for a bit, in the stifling heat of the pediatric unit lacking fans or air conditioning (or respirator masks, for that matter). There was nothing I could do in a medical capacity for Ms. A, but I could spend the next two hours sitting with her and playing cards until she was at least a little distracted. She is one of a multitude of patients that challenged me and forced my perspective this summer.

Shortly after I left CMC, I read Atul Gawande's book, *Being Mortal*. A quote that I kept coming back to was "If to be human is limited, then the role of caring professions and institution – from surgeons to nursing homes – ought to aid people in their struggle with those limits." I won't insult actual physicians by suggesting that I have the qualifications to act anywhere near their level at this point in my training. However, I would like to think that in a small way, I was able to help a few patients in that struggle with limitations, just by being there and listening.

I am writing all of this as I sit on my plane back to New York. I truly cannot express in words what this summer experience has done for me. I found myself wanting to read my textbooks and learn more about things I was seeing in the hospital, and every patient I saw motivated me a little bit more and forced my perspective constantly. I read a biography of Dr. Ida Scudder, the trailblazing founder of CMC. Dr. Ida was one of the first



women to graduate from Cornell Medicine, and she was a pioneer for women in medicine. The combination of her story and experiencing her legacy is going to be a driving force for me for a very long time, as cheesy as that may sound. My return to New York is bittersweet – I will miss CMC and my experiences endlessly, but I am more clearheaded and motivated than ever to continue my journey to become a physician.

## **NEW INITIATIVES**



**Weill Cornell  
Medicine**

**NewYork-Presbyterian Kids**

Komansky Children's Hospital

**Pediatrics Minority Visiting Scholars Program**



**The Departments of  
Pediatrics is pleased  
to announce the  
Pediatrics Minority  
Visiting Scholars  
Program for the  
2018-19 academic  
year**

**Weill Cornell  
Medicine takes pride  
in cultivating a  
diverse and inclusive  
environment for  
healthcare, research,  
education & the  
community.**

**Program Leadership Team:**

**Joy D. Howell, MD**

*Vice Chair, Diversity*

[jd2002@med.cornell.edu](mailto:jd2002@med.cornell.edu)

**Jennifer I. DiPace, MD**

*Director, Pediatric Graduate Medical  
Education*

[jed9008@med.cornell.edu](mailto:jed9008@med.cornell.edu)

**Thanakorn Jirasevijinda, MD**

*Director, Pediatric Undergraduate Medical  
Education*

[thj2002@med.cornell.edu](mailto:thj2002@med.cornell.edu)

**Imani Robinson**

*Coordinator, Pediatrics Minority Visiting  
Scholars Program*

[imr2003@med.cornell.edu](mailto:imr2003@med.cornell.edu)

<https://pediatrics.weill.cornell.edu/education/residency-program>



**Weill Cornell  
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**NewYork-Presbyterian Kids**  
Komansky Children's Hospital

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### **Pediatrics Minority Visiting Scholars Program**

The Departments of Pediatrics is pleased to announce the Pediatrics Minority Visiting Scholars Program for the 2018-19 academic year. The purpose of this program is to provide 4<sup>th</sup> year medical students from backgrounds underrepresented in medicine exposure to general and subspecialty pediatric care in a tertiary medical center. In addition, we seek to increase diversity and cultural competency in the health care workforce, and to promote interest in academic medicine. The scholars program is seeking applicants from underrepresented backgrounds (URiM) who have demonstrated vision and commitment to improving the health status of diverse patient populations. The Department of Pediatrics will select and award outstanding medical students who will have completed the core clinical clerkships at a LCME accredited institution. The award will include:

- Housing for the 4 week rotation
- A stipend of \$1,500 to cover other living expenses
- Opportunities to meet with selected faculty members
- Networking opportunities within the department and medical college at large

#### **Program Description**

Awardees will participate in the clinical activities within the Department of Pediatrics. The 4-week away elective will include clinical activities, educational and research conferences as well as mentoring opportunities.

#### **Eligibility**

- Enrollment as a 4<sup>th</sup> year student at a LCME accredited institution at the time of the elective
- Member of groups underrepresented in medicine
- Demonstrated commitment to improving the health status of diverse patient populations

#### **Application Process**

- Application for an away elective through VSAS
- A completed visiting scholars program application
- A letter of support from the clerkship director or academic affairs

Please submit VSAS and supplemental application materials to the program coordinator, Ms. Imani Robinson ([imr2003@med.cornell.edu](mailto:imr2003@med.cornell.edu)).

**Application Deadline is 4/15/18**

**Notification of award will be made by 5/15/18**

**RESEARCH ABSTRACTS**  
MEDICAL, GRADUATE, AND MD/ PHD STUDENTS

## Predictors of Emergency Room Visits in Pediatric Patients with a Primary Headache Disorder

Kimberly Bogardus<sup>1</sup> BA, Melanie Prior<sup>2</sup> MD, Mahmoud El Jalby<sup>1</sup> BS, MMSc, Xian Wu<sup>3</sup> MPH, Zachary Grinspan<sup>4</sup> MD, MS, Eric Mallack<sup>4</sup> MD, MBE

<sup>1</sup> Weill Cornell Medical College, <sup>2</sup> NY-Presbyterian Hospital/ Weill Cornell Medicine, Department of Pediatrics, <sup>3</sup> Division of Biostatistics and Epidemiology, Weill Cornell Medicine, <sup>4</sup> Weill Cornell Medicine, Department of Pediatrics, Division of Child Neurology

**Background:** Primary headache disorders are some of the most common chronic neurological disorders in children. They are accompanied by multiple emergency department (ED) visits and inpatient admissions for management, resulting in billions of dollars spent treating headache per year in the United States. The cost of one ED visit associated with headache is \$775, and a subsequent inpatient admission is \$7,317 per admission on average. However, headache disorders should be managed in the outpatient, not the inpatient, setting. The primary care system, which is underutilized, provides an opportunity to reduce these costs and identify patients at risk for, and prevention of, future ED use for acute headache management. However, little is known about what outpatient clinical factors predict ED visits for these patients.

**Objectives:** Identify clinically significant and modifiable variables, which predict ED visits for pediatric headaches, with the goal of preventing future ED visits. At the population level, reduce clinical and societal costs of acute headache care.

**Methods:** We performed a retrospective review of our institution's pediatric headache population. Patients who never used the ED within 1 year of their first pediatric neurology visit (Controls: Headache Positive/ED Negative) were compared to patients who required an ED visit within 1 year of their first visit (Cases: Headache Positive/ED Positive). We performed a bivariate analysis to identify differences between groups. We then fit a multivariable logistic regression model with three significant predictors of interest.

**Results:** On average, ED-users will use the ED for management of headache exacerbation 2 times per year. Patients in the ED-user group had more frequent clinic attendance within 1-year of the first visit (mean 1.90 vs 0.29,  $p < 0.001$ ), were more likely to be imaged with MRI (OR 7.13 (2.38, 22.2),  $p < 0.0001$ ), and the proportion of patients with Medicaid was higher (OR 6.91 (1.35, 69.26),  $p < 0.013$ ). Notable non-differences between groups include no difference in preventative medication use (non-vitamin,  $p = 0.903$ ), or difference in abortive medication use ( $p = 0.929$ ). Clinically, there is a non-significant trend towards a greater degree of photophobia and phonophobia in ED-users, as well as higher rates of obstructive sleep apnea (OSA), atopic conditions, and depression ( $p$ -values all  $\sim 0.2$ ).

**Conclusion:** Patients who require ED-level care for acute headache exacerbation use outpatient services more often than non-ED users, are more likely to be imaged, and are more likely to carry government-based insurance. Furthermore, our data show that preventative and abortive pharmacological interventions do not prevent patients from seeking emergency care.

## Comprehensive Assessment of Cognitive Function in Chronic Pediatric TBI

Eric Caliendo<sup>1</sup>, Sumit N. Niogi, MD, PhD<sup>1,2</sup>, Sophie Nowak<sup>3</sup>, Nicholas Schiff, MD<sup>4</sup>, Jeremy Hill, D.Phil<sup>3,5</sup>, and Sudhin Shah, PhD<sup>3,4</sup>

<sup>1</sup>Weill Cornell Medicine, <sup>2</sup>Department of Radiology, New-York Presbyterian Hospital, <sup>3</sup>Cognitive Recovery Research Program, Blythedale Children's Hospital, <sup>4</sup>Brain and Mind Research Institute, Weill Cornell Medicine, <sup>5</sup>Burke Neurological Institute

**Purpose:** This study evaluates the utility of individualized behavioral assessments and functional EEG measures in determining cognitive function in patients with a disorder of consciousness.

**Background:** Traumatic brain injury (TBI) is the leading cause of death and disability in the pediatric population. Following moderate or severe TBI, it is difficult to reliably assess neurological function objectively and quantitatively, making accurate prognosis impossible. Currently, children recovering from TBI are evaluated using qualitative behavioral assessments, which are often subjective and imprecise. They are insensitive to residual and emerging brain function when a disorder of consciousness is present since they depend on motor behavior which is often impaired. Several electroencephalography (EEG) measures enable direct and quantitative detection of cognitive function biomarkers not manifest in overt behavior elicited by standard qualitative clinical assessments. These include perception of novel stimuli, language comprehension, mental imagery, spontaneous activity and sleep dynamics which have been shown to inform diagnosis, track and predict recovery, and improve prognosis (Giacino, et al. 2014). We perform a case study in a pediatric patient to serve as proof of concept that the value of EEG is generalizable to pediatric patients suffering from TBI.

**Methods:** In a 15 year-old boy with severe motor impairment 5 years post severe TBI, we conducted a comprehensive assessment of cognitive function using 1) the Individualized Quantitative Behavioral Assessment (IQBA, Whyte, et al. 1999), and 2) resting and evoked functional EEG measures, supported by a 5-year longitudinal review of clinical neuroimaging.

**Results:** MRI showed chronic stable gliosis and ischemic injury present in the precentral motor gyrus extending into the corticospinal tracts through the centrum semiovale and internal capsule bilaterally that is suspected to be the etiology of the bilateral upper motor dysfunction. The IQBA revealed consistent evidence of command following in multiple modalities. Spectral analysis of EEG signals consistently differentiated between listening to meaningful speech recordings and listening to scrambled versions of the same recordings.

**Conclusions:** Whereas previous evidence of higher cognitive function had not been reliably confirmed by standard clinical qualitative assessments, IQBA and EEG provide significant objective evidence for this patient's occult cognitive abilities, which will positively guide management of interventions to help him gain greater function. In general, a comprehensive protocol that combines quantitative assessments of behavior, function and structure can assess and reveal covert cognitive function in pediatric chronic disorders of consciousness.

## Exercise Therapy as Treatment for mTBI: Establishing ECG Biomarkers

Catherine Callaway<sup>1</sup> and Barry Kosofsky, MD, PhD<sup>2</sup>

<sup>1</sup>Weill Cornell Medical College, <sup>2</sup>Division of Child Neurology, Weill Cornell Medical College

**Purpose:** This study aimed to establish defining properties of electrocardiograms (ECGs) during an autonomic challenge to identify those at risk of post-concussion syndrome (PCS), or ongoing concussion symptoms.

**Background:** Traumatic brain injury (TBI), or impaired brain function due to an insult to the head, accounts for 2.8 million emergency department visits, hospitalizations, and deaths in the United States annually. Children with sports injuries comprise more than 300,000 of these incidents. Mild TBI (mTBI), known colloquially as concussion, is the most common form of brain injury, yet it continues to prove a clinical challenge in both diagnosis and treatment. Currently, no gold standard diagnostic tool exists for mTBI. Historically, complete rest served as the standard of care for concussions; however, a growing body of evidence indicates that graded exercise results in quicker recovery in patients with PCS, likely due to brainstem involvement and autonomic nervous system (ANS) dysfunction in mTBI. Moderate exercise performed to a sub-symptomatic heart rate provides a challenge to the ANS. We aim to harness the power of exercise as therapy to identify ECG biomarkers reflective of recovery from mTBI.

**Methods:** We recruited healthy controls (n = 9), Muay Thai boxers without active concussions (n = 7), and concussed patients (n = 21) from ages of 14 to 45 to participate in data collection. Subjects completed a medical history, including a depression, anxiety, and concussion inventories, and clinical testing, including balance evaluations and eye tracking. They attempted a 15-minute graded exercise task on a stationary bike. At each minute interval, resistance increased on a scale determined by age and weight. Subjects rated their symptoms on a scale of 1 to 14 and their exhaustion on a scale of 1 to 10. While any subject could discontinue testing at any time, we stopped those whose heart rate exceeded 80% of their maximum to decrease risk of cardiovascular events. We collected electrocardiograms (ECGs) at 250 Hz during the exercise task for analysis. We applied high and low pass Butterworth filters to denoise signals and used an R peak detection algorithm to determine RR intervals. In addition to comparisons of baseline RR statistics, we performed spectral analysis using the smoothed pseudo-Wigner-Ville time-frequency distribution and integrated the spectral powers between 0.0 to .04 Hz, .04 to .15 Hz, and .15 to .4 Hz. These ranges correspond with sympathetic, mixed, and parasympathetic activity, respectively. We performed the Kruskal-Wallis test for significance followed by Dunn's test.

**Results:** We removed 7 subjects from analysis due to mechanical errors during collection, leaving healthy controls (n = 7), Muay Thai boxers (n = 5), and concussed patients (n = 18). Though our study group was small, we made several significant findings. RR variance and mean were significantly different between control and concussed patients. In keeping with the hypothesis that concussion causes impaired auto-regulation, the concussed individuals had much lower variance than that of control subjects. Notably, these significant differences maintained the addition of the Muay Thai boxers to the control group. Spectral analysis revealed an interesting relationship between sympathetic and parasympathetic control. At very low frequencies, which typically correspond with sympathetic input, the Muay Thai boxers and the control subjects differed significantly from the concussed patients. However, at low and high frequencies, which typically correspond with mixed and parasympathetic inputs, only the control subjects differed significantly from the concussed patients, and the Muay Thai boxers closely resembled the concussed patients.

**Conclusions:** Larger test groups are needed to establish the validity of these findings; however, early results suggest that concussion causes changes to sympathetic response to exercise. Our study also demonstrates similar changes to the parasympathetic nervous system in individuals with active concussion and those with repeated head injuries, relative to controls.



## Off-Label Drug Use in Critically Ill Children

Andzelika Dechnik, BA<sup>1</sup>, Allison Schacter<sup>1</sup>, Emily Stemp<sup>1</sup>, Elena Mendez Rico, MD<sup>2</sup>, Elizabeth Mauer<sup>3</sup>, Linda M. Gerber<sup>3</sup>, Chani Traube MD<sup>1</sup>

<sup>1</sup>*Department of Pediatrics, Weill Cornell Medicine, New York, NY*, <sup>2</sup>*Department of Pharmacology, Weill Cornell Medicine, New York, NY*, <sup>3</sup>*Department of Healthcare Policy and Research, Weill Cornell Medicine, New York, NY*

**Background:** Multi-institutional studies in critically ill adults report that 36%-43% of drugs prescribed were “off-label”, meaning that they were not approved by the Federal Drug Administration (FDA) for use in the population, or for the indication, administered. Off-label use of drugs in adults was associated with serious adverse events. There has been no large-scale study describing frequency or characteristics of off-label drug use in critically ill children. We hypothesized that more than 50% of drugs prescribed to critically ill children nationwide are administered off-label.

**Objective:** To describe the frequency of “off-label” drug use in the pediatric critical care unit, and determine subgroups with the highest exposure to off-label drugs. A secondary objective was to determine the association between off-label drug use and hospital mortality.

**Design/Methods:** Retrospective cohort study of children 0-18 years of age admitted to 25 pediatric intensive care units (PICU) in the United States between January and April 2017, utilizing the Pediatric Health Information Systems (PHIS) administrative database. Off-label drug use was defined as administration of a drug that lacked a labeled indication for the child’s age, as recorded in Micromedex Solutions.

**Results:** 15, 278 children and 94,212 PICU days were included in analyses. Of the 963,911 drugs prescribed, 29.7% were off-label. When assessed by drug class, 39% of off-label drugs were central nervous system agents, and 20% were gastrointestinal agents. 80% of children were exposed to at least one off-label drug, with a median exposure of 3 drugs per child. Children most likely to receive 3 or more off-label drugs were younger than age 13 years (OR 0.8, CI 0.7-0.9 for adolescents), children with highest severity of illness (OR 2.3, CI 2.0-2.7), and children with longer PICU lengths of stay (OR 4.7, CI 4.4-5.0 for every 1-log increase in PICU days). Multivariate regression analysis showed an independent association between off-label drug use and mortality (OR 3.0, CI 1.6-5.7 in those who received 3 or more off-label drugs), after controlling for risk of mortality score on admission, need for mechanical ventilation, and PICU length of stay.

**Conclusions:** The majority of critically ill children are prescribed off-label drugs during their PICU stay, with increased exposure in the sickest children. Prospective research is needed to assess the impact of off-label drug use on serious adverse events. It would be prudent for the FDA to create economic incentives for pharmaceutical companies to test drugs in critically ill children.

## **Pediatric Ambulatory CAUTIs: Investigation of Incidence of Infection and Patient Outcomes**

William J. H. Ford, Elizabeth Klein, Oghale Obaro-Best, David G. Bundy, MD, MPH, Suzette Oyeku, MD, MPH, Lisa Saiman, MD, MPH, Alexandre Peshansky, MS, Moonseong Heo, PhD, Rebecca Rosenberg, MD, MPH, Patricia DeLaMora, MD, Philip Zachariah, MD, Barbara Rabin Fastman, MHA, MT(ASCP)SC, BB, Vishwa Niranjana, Parsa Mirhaji, MD, PhD, Kelly Balem, RN, CPN, CCRC, and Michael L. Rinke, MD, PhD

**Objective:** To determine rates of infection, risk factors and outcomes of affected pediatric patients with ambulatory catheter-associated urinary tract infections (CAUTIs).

**Background:** CAUTIs occur in pediatric inpatients at rates between 2.1 to 5.4 infections per 1,000 catheter-days and are associated with substantial morbidity. There have been few studies of ambulatory CAUTIs in pediatric patients. A 2017 systematic review found no studies of CAUTI rates or risk factors in pediatric outpatient or home care settings. Research into ambulatory CAUTIs epidemiology is vital to the development of interventions to reduce these harmful infections and improve the care of these patients.

**Methods:** Pediatric patients (age <22) seen between October 2010 and September 2015 at 5 major academic medical centers were identified based on ICD-9 billing and diagnosis codes suggestive of 1) CAUTIs or urologic issues, 2) indicating positive urine cultures, or 3) the presence of a urinary catheter. Manual chart review was used to identify patients with an ambulatory indwelling or clean intermittent urinary catheterization (CIC) and then adjudicate if these patients had ambulatory CAUTIs. CAUTIs were identified using the 2015 National Healthcare Safety Network guidelines, which were adapted for the ambulatory context and the inclusion of infections associated with CIC.

**Results:** A total of 3503 patients were identified by the queries, of whom 374 experienced ambulatory catheterization and had 189,842 ambulatory catheter days (12,880 indwelling and 176,962 CIC). Of those patients, 62 individuals had a total of 94 ambulatory CAUTIs. The overall ambulatory CAUTI rate was 0.50 infections per 1,000 catheter-days (0.93 for indwelling catheters and 0.4 for CIC). First ambulatory CAUTI in the study window was significantly associated with presence of a complex chronic condition (OR 21.2, 95% CI:6.4–70.1). Of all ambulatory CAUTIs, 44.7% resulted in hospital admission, with a median duration of 3 days (IQR: 2, 4); 2.1% resulted in PICU admission; 25.5% resulted in an emergency department visit; and 12.8% of infections resulted in a clinic visit. Antibiotics were given in 86.2% of CAUTIs.

**Conclusions:** CAUTIs occurred at a lower rate in pediatric outpatients than inpatients but are nevertheless associated with significant morbidity, including hospitalization. CIC was more common and carried a lower CAUTI rate than indwelling catheters. Patients living with one or more complex chronic conditions were at significantly higher risk for experiencing a CAUTI, suggesting that these patients would benefit from future quality improvement research to reduce their risk exposure to these harmful infections.

# Perceptions of Therapeutic Intent Amongst Parents of Patients Enrolled in Pediatric Oncology Studies: A Cross-Sectional Study

Priyanka Mehrotra MD<sup>1</sup>, Rachel Friedlander<sup>2</sup>, Clara Oromendia<sup>3</sup>, Linda Gerber PhD<sup>3</sup>,  
Erika Abramson MD<sup>1</sup>, Jennifer M Levine MD<sup>1</sup>

<sup>1</sup>Weill Cornell Medicine, Department of Pediatrics, <sup>2</sup>Weill Cornell Medical College, <sup>3</sup>Weill Cornell Medicine, Department Biostatistics

**Purpose:** Examine how parents or guardians who gave informed consent for their children with cancer retrospectively think about the research study that provided treatment for their child. Furthermore, this study aims to determine the degree of therapeutic misconception (TM) in this population after informed consent has been obtained and treatment has initiated, is ongoing, or recently completed.

**Background:** Prior studies have demonstrated that patients who have consented to participate in an early-phase clinical research trial experience TM. TM is the misunderstanding of the degree of individualization of the intervention being provided, the likelihood of benefit from participation, and the purpose of research as intended to benefit future patients. Appelbaum and others in 2013 validated a 10-question survey tool to assess the degree of TM in an adult patient. In adults, older age, lower level of education, lower level of function and poorer health status, and a relatively more optimistic outlook about future health than the average patient have been established as risk factors for TM. No previous study has used the survey tool in the pediatric population, nor has TM been studied over time, once a family has either completed or is in the middle of treatment. Often, pediatric patients present in an acute state at time of cancer diagnosis, and parents/guardians may consent to participation in an oncology study when they are overwhelmed. We hypothesize that parents/guardians with children enrolled in or who have recently completed a therapeutic cancer trial will exhibit TM.

**Methods:** This is a pilot, observational, non-interventional, cross-sectional study. Questionnaires are completed by parents/guardians of children with cancer who are enrolled in a therapeutic cancer clinical trial to assess for degree of TM, measured as a score of at least 27. Three surveys are completed: 1) Ten-question, "TM" assessment tool adapted from Appelbaum et al (3 questions based on the TM dimension of individualization, 3 on purpose, and 4 on benefit), 2) Questionnaire regarding basic demographic and educational information about the study participant, 3) Open-ended section regarding perceptions and expectations of the parents/guardians after having enrolled their child into a research study for treatment of the cancer. Eligible participants are determined based on physician referral and chart review of patients from 04/2013 to 04/2018 in the Hematology - Oncology Department at Weill Cornell Medicine. Potential participants were excluded if the patient was not formally enrolled in a clinical trial, enrollment was less than 3 months or more than 5 years prior, or if parent/legal guardian was non-English speaking. By contacting all available parents of children in therapeutic cancer trials who are either undergoing treatment or have recently finished, we expect to accrue n=20 parents/guardians who will complete the surveys and n=20 pediatric oncology patients on whom we will retrospectively chart review and collect specific data at WCM. With this many participants, we will be able to estimate the proportion of parents/guardians with TM to within +/-23%, conservatively assuming a 50% true proportion.

**Results:** n=13 eligible subjects were identified and approached. n=10 completed surveys. While there were variances in individual domains, a single TM score can be summed since the domains are highly correlated. All 10 parents/guardians displayed TM. Of note, the questions reflecting the TM dimension of individualization revealed the greatest degree of TM.

**Conclusions:** Future research on a larger scale in these 3 dimensions of TM is needed to re-assess this finding, to shape physician conversations of informed consent and target this area of parent misperception.

## Predictive Value of Fetal Abdominal Circumference for Diagnosis of Small and Large for Gestational Age Infants

Rohini Kopparam<sup>1</sup>, Kathy Matthews, MD<sup>2</sup>, Tracy Grossman, MD, MSc<sup>2</sup>, Shari Gelber, MD, PhD<sup>2</sup>

<sup>1</sup>Weill Cornell Medical College, <sup>2</sup>Obstetrics and Gynecology, Division of Maternal Fetal Medicine, New-York Presbyterian Hospital

**Purpose:** We sought to determine whether sonographic fetal abdominal circumference (AC) measurement from 25-36 weeks' gestation can independently predict small for gestational age (SGA) and large for gestational age (LGA) infants at birth.

**Background:** Fetal growth restriction and macrosomia are dichotomous conditions that are both associated with adverse perinatal outcomes and have implications for long term health of the newborn. Identification of at risk fetuses would allow for interventions to decrease morbidity and mortality of this population. While clinical assessment and ultrasound imaging may suggest fetal growth restriction or macrosomia, the accuracy of ultrasound estimated fetal weight (EFW) is imperfect. We evaluated the predictive ability of sonographic fetal abdominal circumference (AC) measurement from 25-36 weeks' gestation for diagnosis of SGA and LGA infants.

**Methods:** We performed a retrospective database review of singleton pregnancies imaged by one Maternal Fetal Medicine ultrasound unit from 2006 to 2016. Inclusion criteria were singleton pregnancies with growth ultrasounds between 25-36 weeks' gestation for whom newborn gender, length, weight, and head circumference were available. To independently evaluate SGA infants, fetuses with an estimated fetal weight (EFW) <10<sup>th</sup> percentile at any point during pregnancy were excluded, and to evaluate LGA infants, fetuses with an estimated fetal weight (EFW) >90<sup>th</sup> percentile were excluded. SGA was defined as a birth weight <10<sup>th</sup> percentile on the Fenton growth curve, while LGA was defined as a birth weight >90<sup>th</sup> percentile. Z scores were calculated for AC at various gestational ages: 25-28, 29-32 and 33-36 weeks. We determined the sensitivity, specificity, PPV, NPV and AUROCC of AC Z score cut-offs from -3.00 to +3.00 in predicting SGA and LGA infants.

**Results:** Ultrasounds of 4801 women with 5799 pregnancies were reviewed. After excluding pregnancies with EFW<10<sup>th</sup> percentile for SGA and EFW>90<sup>th</sup> percentile for LGA, our study population had an SGA prevalence of 7.8% and LGA prevalence of 5.8%. In SGA infants at birth, an AC Z-score of -1.28, corresponding to the 10<sup>th</sup> percentile, had the highest sensitivity of 36.9% and specificity of 94.1% at 29-32 weeks' gestation. The AUROCC at this time point was 0.79. For LGA infants, an AC Z score of +1.88, corresponding to the 97<sup>th</sup> percentile, had a sensitivity of 34.3%, specificity of 98.2%, and NPV of 96.2% at 29-32 weeks' gestation. The AUROCC at this time point was 0.88.

**Conclusions:** In women with singleton pregnancies as early as 25-28 weeks' gestation, fetal AC <10<sup>th</sup> percentile may identify a cohort at higher risk for SGA who may have been overlooked when using EFW alone. These pregnancies may benefit from increased surveillance and additional counseling. Given that a relatively high portion of these patients delivered preterm, these findings can also aid in timing of antenatal corticosteroids and transfer to tertiary care centers when necessary. Furthermore, a fetal AC below the 97<sup>th</sup> percentile in the third trimester has a very high negative predictive value in ruling out LGA newborns. This may help identify pregnancies that are not at high risk for fetal macrosomia and therefore would not benefit from elective cesarean delivery. This study considers the value of additional fetal sonographic measurements in predicting SGA and LGA infants to influence clinical management of pregnancy. The high areas under receiver operating characteristic (ROC) curves supports the use of AC over more traditional measurements.

## **Rates of depression and anxiety in children with epilepsy and other chronic health conditions**

Brian LaGrant, BS<sup>1</sup>, Belinda Oyinkan Marquis, MD<sup>2</sup>, Anne T. Berg, PhD<sup>3,4</sup>,  
Zachary Grinspan, MD, MS<sup>2,5</sup>

<sup>1</sup>Weill Cornell Medical College, Weill Cornell Medicine, <sup>2</sup>Department of Pediatrics, Weill Cornell Medicine, <sup>3</sup>Epilepsy Center, Ann & Robert H. Lurie Children's Hospital of Chicago, <sup>4</sup>Department of Pediatrics, Northwestern-Feinberg School of Medicine, <sup>5</sup>Department of Healthcare Policy & Research, Weill Cornell Medicine

**Purpose:** This study compares the rates of depression and anxiety in children with epilepsy to those of children with other chronic health conditions.

**Background:** Six of every 1,000 children in the United States have epilepsy. These children are more likely than children without epilepsy to have depression or anxiety. It is unclear whether the high rates of comorbid psychopathology are due to the psychosocial effects of having a chronic disease or whether there is an underlying neural substrate among children with epilepsy that predisposes them to having depression or anxiety. Understanding how children with epilepsy compare to children with other chronic health conditions can shed light on the relative contributions of each factor in pediatric epilepsy.

**Methods:** We used the 2009-2010 National Survey of Children with Special Health Care Needs (NS-CSHCN) to identify children with epilepsy, asthma, allergies, and migraines. We then determined how many children in each group had depression, anxiety, or both. We used the sample weighting of the survey to calculate national estimates. Each condition was assessed by items in the survey that asked the parent/guardian if the child had ever been diagnosed with that condition and, if so, whether the child currently had the condition. Children under the age of five were excluded from analysis, as is typically done in studies of depression and anxiety. For our main analyses we compared the rates of depression and/or anxiety in children with epilepsy to those of children with asthma, allergies, and migraines while controlling for age, gender, race, ethnicity, region of United States, income, whether the child's needs for specialist care are met, type of health insurance, and parent education level. We also investigated whether having epilepsy increased the odds of depression and/or anxiety among all children with special health care needs.

**Results:** The final sample included 1,042 children over the age of five with epilepsy. After applying the sampling weights, we estimated that 283,000 children [ $\pm 33,732$ ] between 5 and 17 years of age have epilepsy in the United States. Among these children, 25 percent have depression and/or anxiety (i.e. 1.6% with depression alone, 11.8% with anxiety alone, and 11.5% with both). In our analyses of children with other chronic health conditions we estimated that there are 4,480,367 children with allergies but no epilepsy, 1,002,400 children with migraines but no epilepsy, and 3,195,954 children with asthma but no epilepsy ages 5-17 in the United States.

Relative to all children with epilepsy, estimated rates of depression and/or anxiety were not significantly different among children with asthma (16.5%,  $p = 0.36$ ) or allergies (21.6%,  $p = 0.31$ ) but were significantly higher among children with migraines (43.2%,  $p < 0.001$ ) while controlling for demographic variables. In a regression of all children with special health care needs, having epilepsy did not increase the odds (OR = 0.89 [0.68-1.15],  $p = 0.37$ ) of having depression and/or anxiety while controlling for demographic variables.

**Conclusions:** One in four U.S. children with epilepsy have depression and/or anxiety. This high rate of psychiatric comorbidity is similar to that of other chronic health conditions including allergies and asthma. Having epilepsy on top of another special health care need did not increase the risk for depression and/or anxiety. Our findings support the idea that the experience of having a chronic health condition is a major contributor to psychopathology among children with epilepsy.

## **Stop The Bleed: Life-Saving Skills All Incoming Medical Students Should Learn**

Brienne Lubor<sup>1</sup>, Adam Sholi<sup>1</sup>, Paolo de Angelis<sup>1</sup>, Lauren Tufts<sup>1</sup>, Cara Berkowitz<sup>1</sup>, Dana Zappetti, MD<sup>2</sup>,  
Mayur Narayan, MD, MPH, MBA, MHPE, FACS, FCCM<sup>1</sup>

*1: Division of Trauma, Burns, Acute, and Critical Care, New York Presbyterian Hospital/Weill Cornell Medicine*

*2: Division of Pulmonary and Critical Care Medicine, New York Presbyterian Hospital/Weill Cornell Medicine*

**Background:** Uncontrolled bleeding is one of the leading causes of preventable death for both pediatric and adult populations. There is an urgent need to educate bystanders in first aid and bleeding control techniques. Stop The Bleed (STB) is a basic bleeding control course to educate the public about the management of acute bleeding. We hypothesized that conducting a STB training session for our incoming first year medical student class would improve likelihood of student response in emergency situations.

**Methods:** The STB course entailed a 30-minute didactic session followed by a one-hour demonstration and student simulation session of appropriate bleeding control management, including wound compression, packing, and tourniquet application using medical models. Students completed a baseline pre-training and post-training survey after course completion. Survey questions were based on a 5-point Likert scale from zero (extremely unlikely/unconfident) to four (extremely likely/confident) and analyzed with Chi-square tests for categorical variables, and student t-test or ANOVA for continuous variables.

**Results:** 106 first year medical students participated in the STB training course and 102 participants (96%) completed pre and post-training surveys for the session. 93% of students reported having no bleeding control training prior to medical school. Pre- to post-training surveys demonstrated that after the STB training, participants felt more confident about responding to an emergency medical situation ( $p < 0.001$ ) and their ability to stop someone from bleeding ( $p < 0.001$ ), applying pressure to a wound ( $p < 0.001$ ), packing a bleeding wound ( $p < 0.001$ ), and using a tourniquet ( $p < 0.001$ ). Participants also reported they were more likely to help someone who had been hurt ( $p < 0.001$ ). Themes that emerged from interaction with trainees included enthusiasm about learning new skills and confidence building through hands-on training.

**Discussion:** Our study marked the first time an entire incoming medical school class was trained in basic bleeding control techniques. We observed that incoming students have little training and low confidence in their ability to manage acute bleeding. Our data suggest that STB training sessions significantly increase medical students' likelihood of responding to an emergency situation and confidence in appropriate emergency responses and bleeding control techniques. These life-saving skills should be taught to every student entering medical school.

## Assessment of Adolescent Inflammatory Bowel Disease Patient Education Activity Focused on Transition Care Issues that Arise During College

Lavina, Ilana Scandariato<sup>3</sup>; Grapstein, Arielle Nicole<sup>1</sup>; Wu, Yiyuan<sup>2</sup>; Gerber, Linda<sup>2</sup>; Sockolow, Robbyn<sup>1</sup>; Chien, Kimberley Ann<sup>1</sup>

<sup>1</sup>. *Pediatric Gastroenterology, Weill Cornell Medical College, New York, NY, United States.*

<sup>2</sup>. *Healthcare Policy and Research, Weill Cornell Medical College, New York, NY, United States.*

<sup>3</sup>. *Department of Pediatrics, Weill Cornell Medical College, New York, NY, United States.*

**Introduction:** Adolescents and young adults (AYA) with inflammatory bowel disease (IBD) are inadequately prepared for transfer of care from pediatric to adult GI care. The “Transition to College Night” education program at Weill Cornell Medicine was established in order to equip AYA with IBD with the necessary skills and knowledge to succeed in the context of living away from home. We performed this study to evaluate the effectiveness of this patient education intervention on the perceived knowledge of adolescents with IBD.

**Methods:** IBD patients 15-18 years of age and their parents were invited to participate in a ‘Transition to College Night’ event. Covered topics regarding self-care of IBD included health maintenance, nutrition, dorm life, health insurance, accommodations, substance use, sex, and stress management. Participants anonymously completed a 7-question pre- and post-survey, using a 5-point Likert scale to assess self-perceived knowledge on these subjects. Univariable analysis was conducted to investigate statistically significant associations with other independent variables. Since the counts observed were very low (<5) and even 0 in some cases, categorical variables were analyzed using Fisher’s exact test to compare proportions between pre-test and post-test groups. All p-values were two-sided with statistical significance evaluated at the 0.05 alpha level. All analyses were performed in SAS Version 9.4.

**Results:** 57 participants submitted the survey in 2016, 2017 and 2018, resulting in 28 pre-tests and 29 post-tests. There were 6 pre-tests from 2016, 10 pre-tests from 2017 and 12 pre-tests from 2018. There were 8 post-tests from 2016, 9 post-tests from 2017 and 12 post-tests from 2018. Item response was on a scale from 1 to 5 with 1 meaning strongly disagree and 5 meaning strongly agree. We collapsed levels into three categories: “AGREE”- corresponding to 4 and 5, agree and strongly agree, on the survey. “Disagree”- corresponds to 1 and 2, strongly disagree and disagree, on the survey. “Neutral” - corresponds to 3, neutral on the survey. There was a significant increase in positive response from pre- to post-test responses regarding the following questions: “I feel comfortable managing my IBD while at college”, “I know what to do if I have an emergency with regards to my IBD while at college”, “I know what accommodations are available to me while attending college.” 57% vs. 69% of participants felt they knew about dating and intimacy with regards to their IBD, 79% vs. 90% of participants felt they knew how drugs and alcohol could affect their IBD, and 64% vs. 72% of participants felt comfortable discussing their IBD with future college friends and roommates, pre- vs. post-test response, respectively. 89% and 97% of participants felt knowledgeable about the role of nutrition in IBD, pre-and post-test respectively. This difference did not reach statistical significance.

**Conclusion:** The Pediatric IBD Transition to College Night event is a novel patient education intervention that provides AYA with IBD with the opportunity to receive comprehensive education about managing their IBD while going to college. This event led participants to feel more prepared when dealing with an emergency and more knowledgeable about college accommodations provided to IBD patients. Although a larger number of participants agreed that they learned more about the impact of sex, drugs, and alcohol on IBD, and felt more confident about navigating friendships with potential college confidants after taking part in the event, the difference did not reach statistical significance. Overall, involvement in this educational event led to improvement in participants’ comfort level with having IBD while at college. We conclude that patient education events directed towards college preparation for AYA with IBD may provide them with tools so that they can navigate the psychosocial and medical challenges often encountered during college more effectively.

## **Impact of a Multi-Disciplinary Craniofacial Clinic on Patient Satisfaction and Outcome**

Melissa Yuan BA, Andre Boyke BS, Imali Perera MPH, Ashley O'Connor CPNP, MSN, RN, Mark Souweidane MD, Thomas Imahiyero MD, Caitlin Hoffman MD

**Objective:** Multi-disciplinary clinics are becoming widely utilized. Given the number of craniofacial patients evaluated at our institution, and the burden of assessment by multiple sub-specialists, we created the Weill Cornell Craniofacial Multidisciplinary Clinic (WCCMC) composed of a nurse practitioner, Neurosurgery, Plastic surgery, Otolaryngology, Oro-Maxillo-Facial surgery, Genetics, Pulmonology, Occupational therapy, Dentistry, and Child Life to improve patient experience, lessen the burden of assessment, decrease time to surgery, and improve patients' understanding of the diagnosis and treatment plan. We review the impact of this clinic after 1 year of implementation.

**Methods:** Retrospective review was performed to identify neurosurgical patients seen before and after implementation of WCCMC in February 2017. We assessed clinic experience and the quality of the clinical and surgical care at WCCMC.

**Results:** Thirty patients were identified. Our survey response rate was 67% (n=20/30). Before WCCMC, mean number of clinics visited per month was 1.8 (range:0-8) and mean number of visits was 2.6 (range: 0-16) with 19 visits annually (range: 0-192). Number of opinions sought prior to WCCMC was higher (mean=0.85, range:0-3) than after (n=0.16, range:0-1). Mean time to surgery before WCCMC was 25 months (range:1-127) compared to 4 months (range: 3-5) after implementation. Parents agreed that they felt well-informed (n=18/20, 90%) and had an improved understanding of the diagnosis after WCCMC (n=18/20, 90%). Respondents agreed the presence of a plastic surgeon (11/16, 68.8%) and nurse practitioner (17/19, 89.5%) were valuable in coordination of their care. Following surgery, 75% (n=12/16) were happy with the outcome, 76% (n=13/17) were happy with the appearance of the scar, and 95% (n=19/20) would recommend WCCMC to others.

**Conclusion:** Multidisciplinary evaluation of craniofacial conditions provides comprehensive, efficient, and effective care, as well as improved parent satisfaction and knowledge base.



# **SERVICE LEARNING ORGANIZATIONS**

## Camp Phoenix



Every year, almost one million American children are burned. Fortunately, advancements in trauma and resuscitative care have improved the treatment and survival of these young patients. Despite these medical and surgical advances, the psychosocial care of pediatric burn victims continues long after discharge. These children often return home with scars as permanent reminders of their trauma and the aftermath of surviving a serious burn usually includes considerable stress, diminished self-esteem, and difficulty creating positive social relationships. Camp Phoenix provides a safe environment for pediatric burn survivors and their siblings to interact with their peers, share their experiences and establish a system of support. Many of Camp Phoenix's campers come from low socioeconomic backgrounds, and this is their only means to obtain a summer camp experience.

Camp Phoenix, the first burn camp in the United States run by medical students, was founded in 2000 by Paul Mullan, a 2004 Graduate of Weill Cornell Medical College. Since then, Camp Phoenix has expanded and now sponsors three single day events and one overnight camping trip each year. Past events have been held at the Intrepid Museum, the Bronx Zoo, Lucky Strikes Bowling, Sony Wonder Technology Lab, Chelsea Piers, New York Knicks games, the Museum of Natural History and NYC Firehouses, amongst many others. We have worked with over 250 children at these events, with an average of 30 campers and 25 volunteer counselors at each event. Camp Phoenix activities are designed to build confidence, emphasize teamwork, initiate friendship, and maximize fun.

Last June, a group of campers and volunteer counselors spent an incredible three days at Camp Kinder Ring in Hopewell Junction, NY. The overnight camping trip is always especially memorable for both campers and counselors. Campers participate in activities such as swimming, tie-dye, sports, and field games. For many of our campers, this is their first time away from home and outside of an urban setting. Campers are divided into cabins, where they work together and quickly develop their sense of community and camaraderie. They create cabin names and cheers and group enthusiasm is rewarded as the cabins participate in one of Camp Phoenix's favorite traditions, the Messy Olympics. Campers compete for cabin pride in games such as the Human Ice Cream Sundae.

In addition to helping the campers and their families, Camp Phoenix offers a unique educational experience for the medical students involved. Our volunteers serve as mentors for children with a range of medical and psychosocial issues, allowing them to hone their skills as leaders, role models, and caretakers. Positive experiences at the day events and overnight camp weekend have inspired many volunteers to develop interest in Pediatrics, Burn Surgery and Psychiatry.

Camp Phoenix aims to give future physicians opportunities outside of the classroom to better appreciate the art of compassionate and empathetic care for complex patients. Our shadowing program allows medical students to spend time with the pediatric team in the burn unit. These experiences will help students learn about the inpatient and surgical experiences of our campers and relevant psychosocial issues. Camp Phoenix creates a platform to educate all interested students about what our campers went through during the rehabilitation phase of their burn care and to provide unique insight from experts.

### **Student Leadership:**

Tara Pilato [tcp2003@med.cornell.edu](mailto:tcp2003@med.cornell.edu)  
Ivan Guan [ivg2004@med.cornell.edu](mailto:ivg2004@med.cornell.edu)  
John Chae [jkc2005@med.cornell.edu](mailto:jkc2005@med.cornell.edu)  
Daniel Huang [hah2220@med.cornell.edu](mailto:hah2220@med.cornell.edu)

### **Faculty Advisor:**

T. Jirasevijinda, MD [thj2002@med.cornell.edu](mailto:thj2002@med.cornell.edu)

## **The Heads Up! Pediatric Literacy Program**

A Project of the Weill Cornell Medical College Department of Pediatrics

Economic disadvantage and limited parental education mean that children born into poverty are susceptible to delays in language development. These children routinely lag behind their peers before pre-school or kindergarten even begins. In most cases, this gap continues to widen in elementary and middle school as children with poorer educational foundations fall further below school standards. Weakness in language and reading skills can lead to poorer educational and health outcomes, such as school failure, low self-esteem, troubled behavior, and substance abuse. In contrast, recent studies have shown that reading aloud to children from early on in life has positive effects on children's language and pre-literacy skills.

In an effort to improve early literacy, the Heads Up! Pediatric Literacy program has initiated an intervention mediated by pediatric primary care physicians. Doctors are the professional constituents with the most access to children and parents before school begins. By having physicians alert parents to the need to read to their young children—and by giving an age-appropriate book as part of the physical exam—we make the promotion of early language and literacy development a standard part of primary pediatric care.

Beyond encouraging language development and school readiness, books can also be used for assessment in the exam room. Books can help physicians see whether a four-month-old reaches for objects or if a child who moves to accept a book has a normal gait. In addition, at WCMC, trained volunteers help children select more books and conduct parent outreach in the waiting room. Because we believe deeply in the mission of promoting child literacy, we are working hard to keep this program going as strong as ever through continued involvement with volunteers as well as book donations.

**Program Contact Information:** Hovig Shamamian [hos2005@med.cornell.edu](mailto:hos2005@med.cornell.edu)

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## **Health For Life**

Health for Life is a program run by the NYP Department of Pediatrics that works with overweight children. A team of pediatricians, fitness specialists, social workers, nutritionists, and medical student volunteers help children and teens ages 7-18 learn about how to lead a healthier life. The 8-week program has 2 major components: nutrition and exercise. The nutrition sessions focus on learning how to prepare healthy meals via cooking demonstrations and hands on activities. The exercise portion focuses on having fun while engaging in physical activity and teaching participants how to incorporate activity into their daily lives. Medical students have the opportunity to form relationships with children and their parents, while also serving as role models and having a great time!

### **Faculty Advisor:**

Maura Frank, MD [mdfrank@med.cornell.edu](mailto:mdfrank@med.cornell.edu)

### **Program Coordinator:**

Robyn Turetsky, MS, RDN, CDN [rkt9001@nyp.org](mailto:rkt9001@nyp.org)

### **Student Contact:**

Jason Silberman [jas2087@med.cornell.edu](mailto:jas2087@med.cornell.edu)

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## **Health Professions Recruitment & Exposure Program (HPREP)**

The Health Professions Recruitment & Exposure Program (HPREP) is part of the Pipeline Mentoring Institute of the Student National Medical Association (SNMA). HPREP aims to expose high school students from underrepresented minorities to science, medicine and the health professions. The overarching goal is to encourage minority students to pursue a career in medicine by giving them meaningful exposure to the health field. During the

three month after school program, the students attend a variety of lectures, participate in an anatomy lab dissection, receive assistance on their college application and essay, hear about the intersections of medicine and other disciplines, and build a lasting relationship with a medical student mentor. This year we anticipate around 96 high school students to engage roughly 45 medical students from across all classes to be mentors and role models for the high schoolers. HPREP has a rich history in the community, with alumni often coming back to speak on the program. This program began here at Cornell and has subsequently spread to many other medical colleges around the country.

**Student Leadership:**

Han Li hal2019@med.cornell.edu

Samir Touhamy II sat2032@med.cornell.edu

Aretina Leung akl2001@med.cornell.edu

Dianna Mejia dlm2005@med.cornell.edu

Anthony Mok jkm2004@med.cornell.edu

**Faculty Advisors:** Dr. Carol Capello (cfc2002@med.cornell.edu) Dr. Jane Chang (jac9009@med.cornell.edu)

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**The Komansky Children's Hospital Family Advisory Council**

The Komansky Children's Hospital Family Advisory Council (KCHFAC) is a group of 35 dedicated parents and family members of pediatric patients who are committed to working together as equal partners with hospital staff and administration to provide Patient and Family Centered Care to all patients since 2007. The work of the KCHFAC members is organized in the following three areas:

Quality and Patient Safety/Advisors: The KCHFAC members are active on numerous Departmental and Hospital Committees, including the Quality and Patient Safety Council. KCHFAC members have direct impact and influence on policies, programs, and practices which affect the care and services of children and their loved ones. The Komansky Children's Hospital joined the Solution for Patient Safety Learning Collaborative with over 97 hospitals working together to eliminate harm in pediatrics. We use the Patient and Family Centered approach to address current priorities in health care specifically in reducing readmission, decreasing infections and preventable medication errors, improving medication management, providing safe care transitions, and improving cost efficiency.

Medical Education/Family Faculty: Working in close collaboration with medical staff, we developed and host programs to educate medical students, residents and nurses on the principles of Family Centered Care. KCHFAC parents are afforded the opportunity to impart their experiences and opinions in order to contribute a family point of view based on "real life" situations. Family Faculty Groups work closely with Drs. Jennifer DiPace and Thanakorn Jirasevijinda, and Nursing Educator Nicole Farnsworth.

Patient Experience/Support Group: A child's stay in the hospital can often be a stressful and difficult time. Our members, through the sharing of their experiences, help guide other families and provide them with emotional support. From the parent lunches, teas and dinners to celebrating with patients and families at one of our many holiday events, we are committed to creating initiatives which supports families as well as systematically managing that support.

The Komansky Children's Hospital Family Advisory Council has partnered with Quality Improvement Research Team "Improving Pediatric Patient Centered Care Transitions (IMPACT)" to improve transitions care for patients with medical complexity who depend on technology for daily functioning. This technology includes tracheostomy. Feeding tubes, indwelling central venous lines, and ventriculoperitoneal shunt. We have developed the Simulation-based Discharge Program that has 2 parts: 1) Simulation-based education where caregivers can learn about tracheostomy care on mannequins 2) Parent to Parent Support provided by the Family Advisory Council Members in person and via telephone platform. Parent To Parent Network is a peer to peer program that provides the emotional support to families of children inpatient at The Komansky Children's Hospital. In addition to

participating in the Simulation Discharge Program as described above, this program provides support to families with children with Autism, Cancer, Cerebral Palsy, Down Syndrome, Diabetes, Leukemia, Neuroblastoma, Pancreatitis, Seizure Disorder, and Sepsis.

**Program Faculty Mentor:**

Mariella Guerra

Mag9152@nyp.org

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**MACHO – Motivating Action Through Community Health Outreach**

Motivating Action through Community Health Outreach (MACHO) is a Weill Cornell Medical College student led, community centered response to the alarmingly increasing rate of childhood obesity, particularly within minority and socioeconomically disadvantaged communities. The program partners with Public School 83 in East Harlem and aims to teach adolescents about nutrition and exercise through the lens of personal responsibility and practical tools for success in life. Although the immediate focus of our program is on healthy choices related to nutrition and exercise, MACHO's participants learn values and skills that can be applied to many other endeavors in life. By empowering our youth to lead healthy lives, we hope they can motivate and inspire others in their community to do the same.



**Program Faculty Mentors:**

MacKenzi N. Hillard, MD

mnh9003@med.cornell.edu

**Student Leadership:**

Prithvi Mohan pmm2001@med.cornell.edu

Dianna Mejia dlm2005@med.cornell.edu

Clare Burchenal cab2049@med.cornell.edu

Maya Feldman mbf2003@med.cornell.edu

Ashley Wu-Sung asw2011@med.cornell.edu

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**Weill Cornell Youth Scholars Program (WCYSP)**

The main purpose of the Weill Cornell Youth Scholars Program (WCYSP) is to expose students of underprivileged and underrepresented backgrounds, especially from inner city high schools, to the substantial educational resources and opportunities at Weill Cornell Medical College and NewYork-Presbyterian Hospital/Weill Cornell Medical Center. Many of these high schools have exceptionally high drop-out rates that coincide with low percentages of graduates going on to attend a four year university. By developing early experiences in medicine, students can develop appropriate attitudes towards their education, interpersonal skills, and, more importantly, confidence in themselves to succeed academically.

The WCYSP curriculum is designed to educate, inspire, and prepare participants for personal and professional success. We seek to address some of the weaknesses that prevent many inner city students from performing well at the college level through an innovative format that emphasizes critical reading and writing. Students attend lectures, given by WCMC students, in physiology, anatomy, and the basic medical sciences. Our daily Problem Based Learning (PBL) sessions provide a forum for youth scholars to interact with one another and learn the value of collaboration. All high school students that completed the program reported that it had a significant impact on their personal motivation to pursue a career in science or medicine and are more motivated to take more challenging courses in high school. Moreover, all of the students who graduated from the program went on to college, and most of those now in college major in science or other pre-medical tracks. Weill Cornell medical students, residents and attending physicians serve as mentors and teachers in the program. Volunteer teachers can

choose one or more topics and are given lecture notes and powerpoint slides that are prepared in advance to maintain consistent quality. Alternatively, volunteer teachers may use their own teaching materials for their particular topic with proper review in advance. The program runs for four weeks every July from Tuesday to Friday. Typically, each lecturer will give one or two one-hour lectures, but can choose to volunteer more of their time. We also recruit new leadership every year to plan the next summer's program under the guidance of leaders from the previous year.

**Student Leadership:**

Daniel Kramer dkramer@mail.rockefeller.edu

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## **Kids in Chronic Care Support (KICS)**

KICS is a student-run program with the New York Presbyterian Hospital that creates one-on-one matches between Weill Cornell medical students and children or adolescents currently receiving therapy. The focus of the program is to provide support for the children and their families; it gives the kids an opportunity to form a close, consistent relationship with someone outside of their treatment team. KICS currently works with departments of pediatric neurosurgery and hematology/oncology. KICS leadership personally matches students with patients interested in having a buddy. Once a match is made, the student makes the initial contact with the patient during a clinic visit. After this, buddies can spend time together whenever it is best for both; this can be during hospital visits or even outside of the hospital. For kids, the hospital can be an intimidating place associated with pain, discomfort, and, of course, the terrible effects of chemotherapy. Medical students can help make their treatment experience a little better. Especially in pediatrics, the diagnosis of cancer can have a major impact not only on the patient but also on the patient's family. For parents, KICS can take some pressure off of the situation and give them a needed break. KICS provides medical students with the opportunity to follow a patient case longitudinally and also to delve into the impact of chronic illness on patients and their families.

**Student Leadership:**

Hannah Krinsky hdk4001@med.cornell.edu

Sarah Hanif szh4001@med.cornell.edu

Anjana Rajan asr4002@med.cornell.edu

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## **MagicAid**

MagicAid is a club devoted to providing "magic therapy" to pediatric patients in the hospital. Medical students will visit patients in various pediatric wards, performing and teaching magic tricks to the patients and their families. This exciting service organization serves as a unique way for medical students to positively impact the patients' experiences and well-being. No magic experience is necessary—the effects are fun and easy to learn!



**Student Leadership:**

Brian LaGrant bsl2003@med.cornell.edu

Brienne Lubor bcl2003@med.cornell.edu

Kailyn Li krl2012@med.cornell.edu

Kimberly Bogardus kab2829@med.cornell.edu

Eliza Rose Gentzler erg2012@med.cornell.edu

Joshua Bliss jwb2006@med.cornell.edu

## Faculty Mentors and Advisors

**Erika Abramson, MD, MS**  
General Academic Pediatrics  
Weill Cornell Medicine  
err9009@med.cornell.edu

**Oleh Akchurin, MD**  
Pediatric Nephrology  
Weill Cornell Medicine  
oma9005@med.cornell.edu

**Alexander Aledo, MD**  
Pediatric Hematology/Oncology  
Weill Cornell Medicine  
aaledo@med.cornell.edu

**Michael J. Alfonzo MD, MS**  
Pediatric Emergency Medicine  
Weill Cornell Medicine  
mia2016@med.cornell.edu

**Zoltan Antal, MD**  
Pediatric Endocrinology  
Pediatric Diabetes Program  
Weill Cornell Medicine  
zoa9003@med.cornell.edu

**Ardavan Akhavan, M.D**  
Pediatric Urology  
Weill Cornell Medicine  
apa9010@med.cornell.edu

**Elaine Barfield, MD**  
Pediatric Gastroenterology and Nutrition  
Weill Cornell Medicine  
646-962-3869  
elb2020@med.cornell.edu

**Jennifer Bassetti, M.D.**  
Medical Genetics  
Department of Pediatrics  
Weill Cornell Medicine  
jab9161@med.cornell.edu

**Naomi Bishop, MD**  
Pediatric Critical Care Medicine  
Weill Cornell Medicine  
bishopn@med.cornell.edu

**Lauren Blatt, MD**  
Newborn Medicine  
Department of Pediatrics  
Weill Cornell Medicine  
apa9010@med.cornell.edu

**Susan Bostwick, MD**  
General Academic Pediatrics  
Department of Pediatrics  
Weill Cornell Medicine  
sbbostwi@med.cornell.edu

**Farid Boulad, MD**  
Department of Pediatrics  
Memorial Sloan-Kettering Cancer Center  
bouladf@mskcc.org

**Sheila Carroll, MD**  
Pediatric Cardiology  
Weill Cornell Medicine  
sjc7002@med.cornell.edu

**Marisa Censani, MD**  
Pediatric Endocrinology  
Weill Cornell Medicine  
mac9232@med.cornell.edu

**Catherine Chang, MD**  
Newborn Medicine  
Department of Pediatrics  
Weill Cornell Medicine  
cah9061@med.cornell.edu

**Jane Chang, MD**  
General Academic Pediatrics  
Weill Cornell Medicine  
jac9009@med.cornell.edu

**Kimberley Chien, MD**  
Pediatric Gastroenterology and Nutrition  
Weill Cornell Medicine  
kac9091@med.cornell.edu

**Thomas Ciecierrega, MD**  
Pediatric Gastroenterology  
Aerodigestive and Motility Centers  
Weill Cornell Medicine  
thc9032@med.cornell.edu

**Lilian Liou Cohen, MD**  
Medical Genetics  
Department of Pediatrics  
Weill Cornell Medicine  
apa9010@med.cornell.edu

**Jennifer Cross, MB, ChB.**  
Child Development  
Department of Pediatrics  
Weill Cornell Medicine  
jfc2001@med.cornell.edu

**Christopher Cunniff, MD**  
Medical Genetics  
Department of Pediatrics  
Weill Cornell Medicine  
cmc9039@med.cornell.edu

**Jeffrey Dayton, MD**  
Pediatric Cardiology  
Weill Cornell Medicine  
jed9031@med.cornell.edu

**Patricia DeLaMora, MD**  
Pediatric Infectious Disease  
Weill Cornell Medicine  
pad9003@med.cornell.edu

**Jennifer DiPace, MD**  
General Academic Pediatrics  
Weill Cornell Medicine  
jed9008@med.cornell.edu

**Elizabeth Poole-Di Salvo, MD**  
Child Development Program  
Department of Pediatrics  
Weill Cornell Medicine  
elp9066@med.cornell.edu

**Michael Espiritu, M.D**  
Newborn Medicine  
Department of Pediatrics  
Weill Cornell Medicine  
mie2005@med.cornell.edu

**Diane Felsen, PhD**  
Pediatric Urology  
Department of Pediatrics  
Weill Medical Medicine  
dfelsen@med.cornell.edu

**Alexis Jamie Feuer, MD, MS**  
Pediatric Endocrinology  
Pediatric Diabetes Program  
Weill Cornell Medicine  
646-962-3442  
alf9032@med.cornell.edu

**Robert Finkelstein, MD**  
Pediatric Critical Care Medicine  
Weill Cornell Medicine  
rof9025@med.cornell.edu

**Patrick Flynn, MD**  
Pediatric Cardiology  
Weill Cornell Medicine  
paflynn@med.cornell.edu

**Maura D. Frank, MD**  
General Academic Pediatrics  
Weill Cornell Medicine  
mdfrank@med.cornell.edu

**Katharina Graw-Panzer, MD**  
Pediatric Pulmonology  
Pediatric Aerodigestive Center  
Weill Cornell Medicine  
Kag9148@med.cornell.edu

**Cori Green, MD**  
General Academic Pediatrics  
Weill Cornell Medicine  
cmg9004@med.cornell.edu

**Daniel W. Green, MS, MD**  
Clinical Orthopaedic Surgery  
Weill Cornell Medicine  
Hospital for Special Surgery  
greendw@hss.edu

**Jeffrey P. Greenfield, MD, PhD.**  
Pediatric Neurologic Surgery  
Weill Cornell Medicine  
jpgreenf@med.cornell.edu

**Bruce Greenwald, MD**  
Pediatric Critical Care Medicine  
Weill Cornell Medicine  
bmgreen@med.cornell.edu

**Zachary Grinspan, MD MS**  
Pediatric Neurology  
Weill Cornell Medicine  
Zag9005@med.cornell.edu

**Michael B. Grody, MD**  
Child and Adolescent Psychiatry  
Weill Cornell Medicine  
mbg9005@med.cornell.edu

**Neera Gupta, MD**  
Pediatric Gastroenterology  
Weill Cornell Medicine  
neg9020@med.cornell.edu

**Katherine A. Hajjar, MD**  
Pediatric Hematology-Oncology  
Department of Pediatrics  
Department of Cell and Developmental Biology  
Weill Cornell Medicine  
khajjar@med.cornell.edu

**Elisa Hampton, MD**  
General Academic Pediatrics  
Weill Cornell Medicine  
elp9047@med.cornell.edu

**Jin-Young Han, MD, PhD**  
Pediatric Infectious Disease  
Weill Cornell Medicine  
jih9033@med.cornell.edu

**Duncan Hau, MD**  
General Academic Pediatrics  
Department of Pediatrics  
Weill Cornell Medicine  
dkh2001@med.cornell.edu

**Sherrie Hauft, M.D**  
Newborn Medicine  
Department of Pediatrics  
Weill Cornell Medicine  
jih9033@med.cornell.edu



**Caitlin Hoffman, MD**  
Pediatric Neurologic Surgery  
Weill Cornell Medicine  
ceh2003@med.cornell.edu

**Ralf Holzer, MD**  
Pediatric Cardiology  
Weill Cornell Medicine  
rjh3001@med.cornell.edu

**Joy D. Howell, MD**  
Pediatric Critical Care Medicine  
Weill Cornell Medicine  
jdh2002@med.cornell.edu

**Lisa Cooper Hudgins, MD**  
Pediatric Medicine  
Departments of Pediatrics, Medicine, Surgery  
The Rogosin Institute  
Comprehensive Lipid Control Center  
Weill Cornell Medicine  
lih2013@nyp.org

**Lisa Ipp, MD**  
General Academic Pediatrics  
Weill Cornell Medicine  
lsi9001@med.cornell.edu

**Thanakorn Jirasevijinda, MD**  
General Academic Pediatrics  
Weill Cornell Medicine  
thj2002@med.cornell.edu

**Christine Joyce, MD**  
Pediatric Critical Care Medicine  
Department of Pediatrics  
Weill Cornell Medicine  
clj9014@med.cornell.edu

**Shipra Kaicker, MD**  
Pediatric Hematology-Oncology  
Weill Cornell Medicine  
clj9014@med.cornell.edu

**Erica Lynn Kasdorf, M.D**  
Newborn Medicine  
Department of Pediatrics  
Weill Cornell Medicine  
erk9007@med.cornell.edu

**James Killinger, M.D**  
Pediatric Critical Care  
Department of Pediatrics  
Weill Cornell Medicine  
Memorial Sloan Kettering Cancer Center  
ak9023@med.cornell.edu

**Barry Kosofsky, MD**  
Pediatric Neurology  
Departments of Pediatrics and Neurology  
Brain and Mind Research Institute

Laboratory of Molecular & Developmental  
Neuroscience  
bar2009@med.cornell.edu

**Nicole Kucine, MD**  
Pediatric Hematology/Oncology  
Department of Pediatrics,  
Weill Cornell Medical College  
nik9015@med.cornell.edu

**Juhi Kumar, MD, MPS**  
Pediatric Nephrology  
Department of Pediatrics,  
Weill Cornell Medicine  
juk2013@med.cornell.edu

**Jennifer Levine, MD**  
Pediatric Hematology/Oncology  
Weill Cornell Medicine  
jel9022@med.cornell.edu

**Catherine Lord, PhD**  
Pediatric Psychology  
Center for the Developing Brain  
Weill Cornell Autism Research Program  
Weill Cornell Medicine  
cal2028@med.cornell.edu

**David C. Lyden, MD, PhD**  
Pediatric Hematology/Oncology  
Children's Cancer & Blood Foundation Labs  
Weill Cornell Medicine  
dcl2001@med.cornell.edu

**Catherine McGuinn, MD**  
Pediatric Hematology/Oncology  
Weill Cornell Medicine  
cam9061@med.cornell.edu

**Demetri Merianos**  
Pediatric Surgery and Trauma  
Weill Cornell Medicine  
dem9110@med.cornell.edu

**Jacob Messing, MD, FAPA**  
Child and Adolescent Psychiatry  
Weill Cornell Medical College  
jam9175@med.cornell.edu

**Jordan Metzl, MD**  
General Academic Pediatrics  
Department of Pediatrics  
Sports Medicine Institute for Young Athletes  
Hospital for Special Surgery  
metzlj@hss.edu

**Barbara Mildrod, MD**  
Pediatric Psychiatry  
Weill Cornell Medicine  
bmilrod@med.cornell.edu

**Marianne Nellis, MD, MS**  
Pediatric Critical Care Medicine  
Weill Cornell Medicine  
man9026@med.cornell.edu

**Stephen Oh, MD**  
Pediatric Surgery and Trauma  
Weill Cornell Medicine  
pio7001@med.cornell.edu

**Karen B. Onel, MD**  
Pediatric Rheumatology  
Hospital for Special Surgery  
onelk@hss.edu

**Jennie Ono, MD, MS**  
General Academic Pediatrics  
Weill Cornell Medicine  
jgo2002@med.cornell.edu

**Snezana Nena Osorio, MD**  
General Academic Pediatrics  
Weill Cornell Medical College  
snm2001@med.cornell.edu

**Virginia Pascual, MD**  
Gale and Ira Drukier Institute for Children's Health  
Department of Pediatrics  
Weill Cornell Medicine  
vip2021@med.cornell.edu

**Aimee Parow, M.D**  
Newborn Medicine  
Department of Pediatrics  
Weill Cornell Medicine  
aip9008@med.cornell.edu

**Eduardo Perelstein, MD, MPH**  
Pediatric Nephrology  
Weill Cornell Medicine  
emperels@med.cornell.edu

**Jeffrey Perlman, MD**  
Neonatology  
Department of Pediatrics  
Weill Cornell Medicine  
jmp2007@med.cornell.edu

**Shari Platt, MD**  
Pediatric Emergency Medicine  
Weill Cornell Medicine  
slp9001@med.cornell.edu

**Steven Pon, MD**  
Pediatric Critical Care Medicine  
Weill Cornell Medicine  
spon@med.cornell.edu

**Dix Poppas, MD**  
Pediatric Urology  
Weill Cornell Medicine  
dpoppas@med.cornell.edu

**Anjali M Rajadhyaksha, PhD**  
Pediatric Neurology  
Department of Pediatrics,  
Weill Cornell Medical College  
amr2011@med.cornell.edu

**Lisa G. Roth, MD**  
Pediatric Hematology/ Oncology  
Department of Pediatrics  
Weill Cornell Medicine  
lgr2002@med.cornell.edu

**Praveen Raju, MD, PhD**  
Pediatric Neurology  
Department of Pediatrics,  
Weill Cornell Medical College  
pr9001@med.cornell.edu

**Christine M. Salvatore, MD**  
Pediatric Infectious Disease  
Weill Cornell Medicine  
chs2032@med.cornell.edu

**Susan Samuels, MD**  
Pediatric Psychiatry  
Department of Psychiatry  
sus9079@med.cornell.edu

**Nicole Jean Sandover, MD**  
General Academic Pediatrics  
Weill Cornell Medicine  
Njg9002@med.cornell.edu

**Tiffany Schumaker, DO**  
Pediatric Endocrinology  
Weill Cornell Medicine  
sus9079@med.cornell.edu

**Anjali Rajadhyaksha, PhD**  
Pediatric Neurology  
Departments of Neurology and Pediatrics  
Brain and Mind Institute  
Weill Cornell Medicine  
amr2011@med.cornell.edu

**Devorah Segal, MD, PhD**  
Pediatric Neurology  
Department of Pediatrics,  
Weill Cornell Medicine  
des9146@med.cornell.edu

**Sujit Sheth, MD**  
Pediatric Hematology/Oncology  
Department of Pediatrics,  
Weill Cornell Medicine  
shethsu@med.cornell.edu

**Allison Gorman Steiner, MD**  
General Academic Pediatrics  
Department of Pediatrics  
Weill Cornell Medicine  
agg9003@med.cornell.edu

**Matthew Smith-Raska, MD**  
Newborn Medicine  
Department of Pediatrics  
Weill Cornell Medicine  
mrs7001@med.cornell.edu

**Brooke Ilana Spector, MD**  
General Academic Pediatrics  
Department of Pediatrics  
Weill Cornell Medicine  
bis9013@med.cornell.edu

**Robbyn E. Sockolow, MD**  
Pediatric Gastroenterology  
Weill Cornell Medicine  
ros2023@med.cornell.edu

**Aliza Solomon, DO**  
Pediatric Gastroenterology  
Weill Cornell Medicine  
als9047@med.cornell.edu

**Mark M. Souweidane, MD**  
Pediatric Neurologic Surgery  
Depts of Pediatrics and Neurologic Surgery  
Weill Cornell Medicine  
mrs7001@med.cornell.edu

**Nitsana A. Spigland, MD**  
Pediatric Surgery and Trauma  
Weill Cornell Medicine  
mrs7001@med.cornell.edu

**Shaun A. Steigman, MD**  
Pediatric Surgery and Trauma  
Weill Cornell Medicine  
shs9161@med.cornell.edu

**Leonard G. Steinberg, MD**  
Pediatric Cardiology  
Weill Cornell Medical College  
212-746-3561  
lgs9003@med.cornell.edu

**Arabela Stock, MD**  
Pediatric Cardiology  
Weill Cornell Medical College

**Heidi Stuhlmann, PhD**  
Department of Cell & Developmental Biology  
Department of Pediatrics  
Weill Cornell Medical College  
212-746-6156  
hes2011@med.cornell.edu

**Karen Su, MD**  
Pediatric Endocrinology  
Weill Cornell Medicine  
klin@med.cornell.edu

**Chani Traube, MD**  
Pediatric Critical Care Medicine  
Department of Pediatrics,  
Weill Cornell Medicine  
chr9008@med.cornell.edu

**Yaffa Vitberg, MD**  
Pediatric Emergency Medicine  
Weill Cornell Medicine  
ymv9001@med.cornell.edu

**Haviva Veler, MD**  
Pediatric Sleep & Breathing Disorder Center  
Weill Cornell Medicine  
klin@med.cornell.edu

**Mary Vernov, MD**  
Newborn Medicine  
Department of Pediatrics  
Weill Cornell Medicine  
mav2019@med.cornell.edu

**Mary Jo Ward, PhD**  
Child Development  
Department of Pediatrics,  
Weill Cornell Medicine  
mjward@med.cornell.edu

**Jeremy Wiygul, MD**  
Pediatric Urology  
Weill Cornell Medicine  
Jrw9011@med.cornell.edu

**Roger Widmann, MD**  
Pediatric Orthopedic Surgery  
Hospital for Special Surgery  
widmannr@hss.edu

**Stefan Worgall, MD, PhD**  
Pediatric Allergy, Immunology, Pulmonology  
Friedman Research Laboratories  
Weill Cornell Medicine  
stw2006@med.cornell.edu

**Vivien Yap, MD**  
Neonatal-Perinatal Medicine  
Department of Pediatrics  
Weill Cornell Medicine  
Vly9001@med.cornell.edu

# **MENTORING AND RESEARCH OPPORTUNITIES IN PEDIATRICS**

**Erika Abramson, MD, MS**

General Academic Pediatrics, Departments of Pediatrics and Healthcare Policy and Research  
Weill Cornell Medicine  
[err9009@med.cornell.edu](mailto:err9009@med.cornell.edu)

Field(s) and topics of interest: Educational research, pediatric hospitalist and outpatient medicine, health services research, healthcare safety and quality research

Research: Health services research, healthcare safety and quality research

Project Description: I mentor a host of residents and fellows on general pediatric, educational, and health services research projects. There is frequently a role for medical students in these projects, with varying responsibilities ranging from subject recruitment, retrospective chart review, data analysis, and abstract/manuscript writing. If any interest in these fields, please feel free to reach out to me.

Preferred Experience: None required

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**Oleh Akchurin, MD, PhD**

Pediatric Nephrology, Department of Pediatrics  
Weill Cornell Medicine  
[oma9005@med.cornell.edu](mailto:oma9005@med.cornell.edu)

Field(s) and topics of interest: Nephrology/Pediatric Nephrology. Iron metabolism, fibrosis, bone health, growth and development.

Research: Anemia, iron metabolism, renal fibrosis and bone health in chronic kidney disease

Project Description: In this project, we are targeting the novel mechanisms linking iron metabolism alterations in chronic kidney disease (chronic renal insufficiency) with renal fibrosis, and systemic complications of chronic kidney disease, including those affecting the skeletal system. The studies are conducted in both basic science (mouse models) and clinical / translational (the cohort of children with chronic kidney disease) settings.

Students' Role in the Project: Students interested in basic science will be able to participate in laboratory experiments. Students interested in clinical research will have the opportunity to work with our patient database.

Preferred Background/ Experience: Previous research experience would be helpful but not required.

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**Michael J. Alfonzo MD, MS**

Pediatric Emergency Medicine, Departments of Pediatrics and Emergency Medicine  
Weill Cornell Medicine  
[mia2016@med.cornell.edu](mailto:mia2016@med.cornell.edu)

Field(s) and topics of interest: Pediatric Emergency Medicine; Global Health; Sepsis; Electronic Health Records

Research: *Title:* Impact of Saving Children's Lives Program on Provider Knowledge, Resource Capacity and Patient Outcomes in Tanzania *Co-investigators:* Christine Joyce MD (Pediatric Critical Care Medicine, Weill Cornell), Adolphine Hokororo (Pediatrics, Weill Bugando)

Project Description: Saving Children's Lives (SCL), was created in 2013 to fill the gap in community healthcare providers' knowledge and skills to recognize and treat acute illness in children. A 2-day program adapted from the AHA program PEARS (Pediatric Advanced Emergency Assessment, Recognition, and Stabilization) is designed to reinforce the WHO's IMCI (Integrated Management of Childhood Illness) training and focus on the acutely ill child needing urgent hospital referral. Disorders include acute respiratory distress and hypovolemic shock from diarrhea. Implementation of a standardized mortality audit will be used for collection of outcome measures. Following provider training, data will be collected and analyzed to assess for a decrease in mortality.

Students' Role in the Project: Students will join a multidisciplinary team in several projects. Students can participate in research study design, data collection, and manuscript writing. Students will learn how to obtain informed consent, conduct chart reviews, and analyze data.

Preferred Background/ Experience: None required. Interested students should be creative, motivated, and interested in global health. Students planning to participate in a global health elective are strongly encouraged to collaborate.

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**Zoltan Antal, MD**

Pediatric Endocrinology

Weill Cornell Medicine

Email: zoa9003@med.cornell.edu

Field(s) and topics of interest: Endocrine late effects in survivors of childhood cancer, Mental health in children with type 1 diabetes, Growth in children with Fanconi Anemia

Research: Current projects:

- Growth chart assessment in children with Fanconi Anemia
- Evaluating gonadal function in male survivors of cancer post stem cell transplant

Project Description: Currently we are doing retrospective analyses in above listed study groups. Future plans include a proposal to do a prospective analysis of sexual function in males at risk for hypogonadism that will focus on correlation with serum testosterone levels.

Students' Role in the Project: This will vary with the project and may include such activities as data collection and analysis or formulation of a validated questionnaire to be used in the prospective study.

Preferred Experience: None required

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**Elaine Barfield, MD**

Pediatric Gastroenterology and Nutrition, Department of Pediatrics

Weill Cornell Medicine

elb2020@med.cornell.edu

Field(s) and topics of interest: Home Infusions of biologics in pediatric Inflammatory Bowel Disease (IBD), Fecal Microbiota Transplant for recurrent *Clostridium difficile* infection.

Research: Examination of a home infusion program in IBD; Safety of home infliximab infusions in IBD; Multicenter study of fecal microbial transplantation for *Clostridium difficile* infection in children; Cost of hospital infliximab and vedoluzimab infusions in pediatric IBD.

Students' Role in the Project: IRB proposal development, subject recruitment, data entry, abstract and manuscript preparation. The student will learn the basics of research project development, subject recruitment, and gain experience in writing abstracts/manuscripts

Preferred Background/ Experience: Must be enthusiastic, motivated and very organized. Knowledge of End Note and REDCap are helpful but not required.

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**Marisa Censani, MD**

Pediatric Endocrinology, Department of Pediatrics,

Weill Cornell Medicine

mac9232@med.cornell.edu

Field(s) and topics of interest: Obesity and insulin resistance, bone and mineral metabolism, growth, thyroid disorders, and diabetes.

Project Description: Patient recruitment, data acquisition, data analysis, and abstract formulation in patient-oriented research studies; please contact Dr. Censani for further details.

Preferred Background/ Experience: None

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**Kimberley Chien, MD**

Pediatric Gastroenterology and Nutrition, Department of Pediatrics

Weill Cornell Medicine

kac9091@med.cornell.edu

Field(s) and topics of interest: Transition care of pediatric patients with chronic gastrointestinal diseases, currently investigating the needs of adolescents with Inflammatory Bowel Disease (IBD) during transition to adulthood and

measuring effectiveness of interventions to improve patient outcomes and quality of life; Prevention of venous thromboembolism (VTE) in pediatric IBD

Research Project #1 (Principal Investigators (PI): Drs. Chien and Kucine): VTE burden in hospitalized IBD children. We are establishing the current risk/incidence of VTE in hospitalized pediatric IBD and studying the impact of VTE/ complications on the US healthcare system using national databases. Qualitative and quantitative research methods will be used.

Students' Role in the Project: Students will be involved in collection and analysis of data, and abstract writing.

Research Project #2 (PI: Dr. Kimberley Chien): Assessment of the WCM formal transition care program for pediatric IBD. We will investigate transition-care related issues and assess the impact of our established formal transition care program on the transition readiness of adolescent IBD patients using qualitative and quantitative research methods.

Students' Role in the Project: Students will be involved in patient recruitment, collection and analysis of data, national presentation submission, and abstract writing.

Preferred Experience for both: None required

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**Chris Cunniff, MD**

Medical Genetics, Department of Pediatrics  
Weill Cornell Medicine  
cmc9039@med.cornell.edu

Field(s) of Interest: Medical genetics, including genetic disorders associated with predisposition to cancer, multiple malformation syndromes and disorders of sexual development

Research: Bloom Syndrome Registry – a database of health information on persons with Bloom syndrome, a chromosome instability syndrome with predisposition to cancer

Project Description: The Bloom Syndrome (BS) Registry contains information on all aspects of health in this population and can be used to ask and answer questions about health and welfare in BS. We have ongoing projects examining feeding, growth, cancer development, intelligence, and academic accomplishment. Dr. Cunniff is also interested in development of guidelines for care of people with genetic disorders and their utility.

Students' Role in the Projects: Students may propose a question that can be examined with Registry data, or he/she may also join in one of our currently existing or planned projects. The student will work closely with Dr. Cunniff and the Bloom Syndrome Registry Research Assistant to extract and analyze data from the Registry; or he/she will use data being actively collected to describe characteristics of a subset of persons in the population.

Preferred Experience: None required

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**Diane Felsen, PhD and Dix P Poppas, MD**

Pediatric Urology, Department of Pediatrics  
Weill Medicine  
dfelsen@med.cornell.edu

Field(s) of and topics of interest: Congenital Adrenal Hyperplasia and Bladder dysfunction

Research Project #1: Modeling Congenital Adrenal Hyperplasia in zebrafish and in adrenocortical cells: Congenital Adrenal Hyperplasia [CAH] is an inherited deficiency of enzymes involved in steroid hormone production, mainly 21-hydroxylase [21-OHase]. Decreased cortisol and aldosterone production causes adrenocorticotrophic hormone stimulation of the adrenal cortex, leading to excess synthesis of male hormones. In severe CAH, children require life-long treatment to replace cortisol and aldosterone. Deficiency in females causes virilization, beginning in utero, causing virilized external genitalia that is often treated with feminizing genitoplasty.

There are 2 sub-projects. The first uses the zebrafish to model CAH and 21-OHase deficiency. Using CRISPR/CAS-9 to delete 21-OHase and study the effects in zebrafish, we will determine if replacement restores the phenotype. Studies examine the effects of 21-OHase and other steroid synthetic enzymes. Other studies will be

carried out using the H-295 human adrenocortical cell line. Overall the goal is to determine if/how 21-OHase enzyme activity can be restored in patients with CAH.

Research Project #2: Design of a Synthetic Bladder Augment Patch: Bladder dysfunction related to small, fibrotic bladders is a significant problem in children, due to high bladder storage pressures and low bladder volume. High pressures impact bladder function by inducing fibrosis and can lead to incontinence, renal failure and a lifetime of dialysis, and may require renal transplantation. The conventional surgical approach to increase bladder size is bladder augmentation [ileocystoplasty], but has significant morbidity. We are designing a synthetic bladder augmentation patch to increase the bladder storage capacity, which would reduce much of the current surgical morbidity, and also eliminate the metabolic complications of ileocystoplasty. We will be testing this bladder patch in a porcine animal model.

Students' Role in the Project: Students will learn basic laboratory techniques related to zebrafish/cell growth and maintenance, as well as cloning, PCR, western blots and CRISPR/CAS9 technology. In the bladder project, the student will assist in surgery and will then study the tissue in vitro using a variety of basic lab techniques.

Preferred Background/ Experience: Willingness to learn and work hard and committed interest are pre-requisites.

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**Maura D. Frank, MD**

General Academic Pediatrics, Department of Pediatrics  
Weill Cornell Medicine  
mdfrank@med.cornell.edu

Field(s) and topics of interest: Obesity, weight management

Research: Effect of weight management program on weight/BMI, eating and physical activity behaviors, and quality of life.

Project Description: Data entry and management, study recruitment, medical student mentoring program, IRB proposal development.

Students' Role in the Project: Student will learn the basics of research project development, recruitment for research projects, formulation of an abstract.

Preferred Background/ Experience: Some prior research experience is helpful but not necessary.

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**Cori Green, MD, MS**

General Academic Pediatrics, Department of Pediatrics  
Weill Cornell Medicine  
cmg9004@med.cornell.edu

Field(s) and topics of interest: Integration of pediatric mental health (MH) care into primary care, training practicing and future pediatricians in managing pediatric mental health problems, integrated models of mental health care

Research: Predictors for managing mental health problems in medical pediatric resident trainees: A needs assessment for improved education

Project Description: National assessment of pediatric training programs, their integrated models of mental health care, and trainee-perceived responsibility and practice behaviors.

Students' Role in the Projects: Students will be involved in recruitment of subjects, administrative tasks for the project, analysis of data, and abstract writing.

Preferred Experience: None required

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**Daniel W. Green, MS, MD**

Clinical Orthopaedic Surgery  
Hospital for Special Surgery  
greendw@hss.edu



Field(s) of Interest: Pediatric Orthopedic Surgery and Scoliosis

Research: Selected clinical projects in pediatric orthopedic surgery

Project Description (with Co-Investigators Drs. Emily Dodwell and Peter Fabricant) Previous projects have included: DDH, congenital muscular torticollis, discoid meniscus, scoliosis and kyphosis.

Students' Role in the Project: Literature review, radiograph review, data analysis

Preferred Background/ Experience: None requested

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**Katherine A. Hajjar, MD**

Pediatric Hematology-Oncology, Departments of Pediatrics and Cell and Developmental Biology  
Weill Cornell Medicine  
khajjar@med.cornell.edu

Field(s) and topics of interest: Hemostasis and thrombosis, angiogenesis, vascular leak and inflammatory syndromes, sepsis

Research: Regulation of membrane dynamics in vascular biology and inflammation

Project Description: The plasma membrane serves as a dynamic platform for assembly of molecules that regulate the clotting of blood and prevent fluid leak from blood vessels. At the same time, repair of intracellular organelle membranes is central to the control of inflammation. In humans, the annexins are a 12-member family of calcium-regulated, phospholipid-binding proteins that modulate a spectrum of dynamic membrane-related events. Our lab is defining these mechanisms in the context of vascular health and the inflammatory response. We use in-patient and out-patient clinical samples, genetically engineered mice, and cell culture techniques to determine how the annexins, especially annexin A2, impact health and disease. Our aim is to understand their specific roles in preventing thrombosis and vascular leak, regulating the innate immune system, and controlling the development new blood vessels. In particular, we wish to examine these processes in the pediatric population, where little is known about annexin expression and function. Ultimately, we hope that this research will lead to new treatment approaches for disorders involving thrombosis, excessive angiogenesis, and unregulated inflammation in children.

Students' Roles in the Projects: Depending on prior experience, students will learn basic laboratory techniques such as cell culture, basic molecular biology, western blotting, ELISA, mouse surgery, and blood and tissue processing. In addition, students may embark on analytical literature reviews relevant to ongoing projects.

Preferred Background/Experience: Strong interest in research, intellectual curiosity, and enthusiasm.

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**Barry Kosofsky, MD, PhD**

Pediatric Neurology, Departments of Pediatrics, Neurology  
Weill Cornell Medicine  
bar2009@med.cornell.edu

Research: Exercise therapy as treatment for mild Traumatic Brain Injury (mTBI)

Project Description: We are pursuing a clinical research program to establish the efficacy of a graded exercise program to accelerate the recovery of individuals who have persistent post-concussive symptoms following mTBI. We are using functional (autonomic, EEG, evoked responses, and eye tracking), and structural (DTI/MRI) assessments to identify changes in the brain following mTBI that will be predictive of, and correlate with the response to exercise therapy.

Students' role in the project: Subject enrollment and assessments during participation in a clinical research protocol.

Preferred Background/ Experience: Clinical research experience preferred (especially prior work in clinical trials).

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**Nicole Kucine, MD**

Pediatric Hematology/Oncology, Department of Pediatrics  
Weill Cornell Medicine  
nik9015@med.cornell.edu

Research: Assessment of VTE burden in hospitalized pediatric IBD patients

Principal Investigators: Dr. Kimberley Chien, Dr. Nicole Kucine

Project Description: We are establishing the current risk/incidence of VTE among hospitalized pediatric IBD patients. We are also investigating the impact of VTE and its complications on the US healthcare system. Using national databases, we will apply qualitative and quantitative research methods to assess patients during their hospitalizations.

Students' Role in the Projects:

Students will be involved in collection and analysis of data, and abstract writing.

Preferred Experience: None required

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**Juhi Kumar, MD, MPH**

Pediatric Nephrology, Department of Pediatrics

Weill Cornell Medicine

juk2013@med.cornell.edu

Field(s) and topics of interest:

- Non-invasive biomarkers of kidney injury in pediatric kidney allograft recipients using urine messenger RNA and urinary metabolites
- Early detection of kidney injury in neuroblastoma survivors
- Mineral metabolism in pediatric chronic kidney disease

Research: My NIH funded research focuses on identifying early biomarkers of kidney injury so that renoprotective measures can be instituted in a timely way and lessen further kidney damage. I am currently evaluating biomarkers of kidney injury in two specific pediatric populations, kidney transplant recipients and neuroblastoma survivors.

Project Descriptions:

1) VIRTUUS: Validating Injury in the Renal Transplant Using Urinary Signatures) in Children Study

(PI's: Juhi Kumar, Sandra Amaral, Brendan Keating)

This is a NIH/NICHD funded multi-center cohort study that aims to validate in pediatric kidney allograft recipients, urinary messenger RNA signatures and metabolite profiles associated with acute cellular rejection, antibody mediated rejection and BK virus nephropathy in adult kidney transplant recipients. By validating noninvasive diagnostic and prognostic biomarkers of early kidney allograft injury in pediatric recipients we hope to advance pediatric transplant clinical practice - by creating opportunities for non-invasive immune surveillance to inform preemptive treatment decisions before clinical signs arise, resulting in better long-term outcomes.

2) Identifying Biomarkers of Kidney Injury in Neuroblastoma Survivors Clinical and Translational Science Center (PI's: Juhi Kumar, Anuradha Gajjar, Danielle Novetsky Friedman). This study aims to assess traditional and novel markers of kidney injury in neuroblastoma survivors.

Students' Role in the Project: Students will assist in several aspects of the projects

Preferred Experience: Not required

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**David C. Lyden, MD, PhD**

Pediatric Hematology Oncology, Department of Pediatrics

Children's Cancer and Blood Foundation Labs

Weill Cornell Medicine

dcl2001@med.cornell.edu

Field(s) and topics of interest: Cancer Metastasis

Research Title: Tumor exosomes determine pre-metastatic niche formation and organotropism

Project Description: Tumor microparticles known as exosomes are released into the circulation and fuse with specific cells at distant sites establishing a pre-metastatic niche in cancer patients. Tumor exosomes transfer exosomal tumor contents (proteins, miRNA and DNA) into normal cells and "educate" these cells to a pro-

metastatic phenotype. Recently, our lab has discovered a new particle call exomere (amembranous particle smaller than an exosome), which packages proteins enriched in metabolic enzymes.

Students' Role in the Project: The student will be responsible for determining the key factors associated with exosomes that support their role in organotropism.

Preferred Background/ Experience: None requested

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**Marianne Nellis, MD, MS**

Division of Pediatric Critical Care  
Department of Pediatrics,  
Weill Cornell Medical College  
212-746-3056  
man9026@med.cornell.edu

Field(s) of Interest: Transfusion medicine research

Research Title: The Effects of Transfusion of Blood Products in Critically Ill Children

Project Description: I am working on several retrospective and prospective projects looking at the effects of red blood cell and platelet transfusions on critically ill children.

Students' Role in the Projects: Students can be involved in the projects on several levels including data acquisition, analysis and manuscript writing.

Preferred Experience: None required

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**Snezana Nena Osorio, MD**

General Academic Pediatrics, Department of Pediatrics  
Weill Cornell Medicine  
snm2001@med.cornell.edu

Field of Interest: Safety & quality in healthcare

Title of Project: Improving Pediatric Patient-Centered Care Transitions: A Multi-Center Research Quality Improvement Collaborative

Project Description: This study aims to promote partnership between patients/parents/caregivers and medical teams via shared ownership of care transitions at hospital discharge. The transition from the inpatient to outpatient setting presents a safety risk to pediatric patients. Errors in improper medication use, failure to recognize and activate contingency plans, and failure to adhere to follow-up appointments reflect poor patient hand-off prior to hospital discharge. We aim to improve parent/caregiver self-management.

Our intervention- Pediatric Discharge Bundle consists of 1) pre-discharge confirmation of patient/caregiver readiness for discharge, 2) caregiver's ability to teach-back essential components of a patient/caregiver-generated care plan, and 3) post-discharge phone follow-up to review essential information and clarify questions to "bridge the gap" prior to follow-up with the PCP. Our secondary objectives are to improve care coordination, provider handoff, and to decrease readmission rate.

Medical Student Research Opportunities IMPACT Study: #1. Teach Back Direct Observation: To evaluate the quality of the Teach Back technique used at hospital discharge by the nursing staff. After training, students will observe discharge instructions by nursing staff using a checklist-type instrument. Schedule is flexible and can be in the afternoon or evening. #2. Preventable Readmissions: To understand the epidemiology of preventable pediatric readmissions and to identify the risk factors contributing to preventable readmissions. After training, students will 1) review charts to determine the causes for readmission using an established tool; 2) interview caregiver in person or by phone about their hospital experience. #3. Provider Satisfaction Surveys and Qualitative Study: To better understand discharge communication needs to handoff patients from the hospitalist services to outpatient subspecialty providers.

Preferred Background/ Experience: None

**Jeffrey Perlman, MD**

New Born Medicine, Department of Pediatrics  
Weill Cornell Medicine  
jmp2007@med.cornell.edu

Field(s) and topics of interest: Neonatology, Brain development, Resuscitation, Global health

Research: Our current project goal is to determine biomarkers for identifying infants at high risk for neurodevelopmental deficits following perinatal hypoxia-ischemia treated with selective head cooling

Project Description: Evaluate the value of advanced MRI imaging and/or recovery of the EEG as early biomarkers of outcome in infants with HIE treated with selective head cooling

Students' Role in the Project: Assist in the review of the EEG after birth until the development of sleep awake cycling and delineate the pathways to recovery. Evaluate the potential role of MRI spectroscopy and or DTI in predicting recovery following HIE.

Preferred Background/ Experience: None

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**Matthew Smith-Raska, MD**

Division of Newborn Medicine, Department of Pediatrics  
Weill Cornell Medicine  
Email: mrs7001@med.cornell.edu

Field(s) and topics of interest: Genetics, Epigenetics, Genomic Imprinting

Research: I am interested in genomic imprinting, a model of epigenetic inheritance, in which traits/information are inherited independent of DNA sequence (by an unknown mechanism). In the case of imprinting, this is based on whether an allele/gene/chromosome is inherited from the mother or father. Specifically, I am studying how 2 genes (Nlrp7 and Khdc3l) influence initiation of imprinting in the oocyte. Women carrying these genetic mutations are unable to properly initiate imprinting in oocytes, and can develop hydatidiform moles if these oocytes are fertilized. By studying genes in a tissue culture model, I will explore their cellular function and regulation of imprinting.

Project Description: The project involves analyzing gene and protein expression changes upon knockout of a variety of genes important in genomic imprinting, in order to better understand their function. This involves tissue culture as well as a variety of cellular and molecular biology techniques. This may also lead to analysis of tissues from knockout mouse models.

Students' Role in the Project: Students will be expected to contribute to their portion of the project, including performing qPCR, Western Blots, bacterial cloning, and tissue culture. There is also the possibility of mouse breeding and dissection.

Preferred Experience: (if any or "None required"): None

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**Heidi Stuhlmann, PhD**

Departments of Cell & Developmental and Pediatrics  
Weill Cornell Medicine  
hes2011@med.cornell.edu

Research: Placental Development and Placentopathies

Project Description: The placenta serves as the site of contact for the maternal and embryonic circulatory systems to enable nutrient and gas exchange. It contains two primary functional cell types, trophoblast and endothelial cells. Proper placental development requires invasion and differentiation of trophoblast cells, as well as coordinated maternal vascular remodeling and fetal vasculogenesis. Any disruption in these processes can result in placental pathologies, including intrauterine growth restriction and preeclampsia (PE). Uteroplacental vascular insufficiency, a main cause of IUGR, results in chronic oxygen and nutrient deprivation. Fetal circulatory adaptations compensate for growth restriction, but also program the fetus for increased risk of hypertension, cardiovascular disease, and type 2 diabetes, later in life. PE is a leading cause of maternal and fetal morbidity and mortality worldwide, and the only resolving treatment is delivery of the baby and placenta. Although the pathophysiology of PE remains largely unknown, inadequate trophoblast cell invasion, endothelial cell dysfunction, dysregulated uteroplacental vascularization, and an imbalance of pro- and anti-angiogenic growth factors have been implicated in the disease.

We are using mouse models, trophoblast stem cells and human placental samples to investigate the role of EGFL7 and miR-126 during normal and pathological placental development. Expression of EGFL7, a secreted angiogenic factor, and miR-126 a non-coding microRNA within the Eglf7 gene were previously thought to be endothelial-restricted. We found that Eglf7 and miR-126 are expressed in the placenta in the maternal and fetal vasculature, as well as in trophoblast cells (Lacko et al., 2014. Mech. Dev. 133:163-176). Using loss-of-function mouse models, we uncovered specific and distinct roles for EGFL7 and miR-126 during placental development. Loss-of Eglf7 results in defects of placental vascularization, malperfusion, and fetal growth restriction. Our studies show that miR-126 regulates glycogen trophoblast proliferation and expression of imprinted genes specifically in the placenta. We also have a keen interest to understand their role in human placentas. In an ongoing collaboration with clinician-scientists in Maternal-Fetal Medicine at Weill Cornell, Columbia, and the University of Rom, we are investigating the role of EGFL7 protein in preeclampsia.

Student's Role in the Project: The student would get "hands-on" lab experience. Initially, the student would work together with a research scientist in the lab and later on work more independently. Potential projects include: Analysis of serum, placental explants cultures from PE patients for presence of EGFL7, and miR-126.

Preferred Background/ Experience: Basic lab skills, some knowledge in developmental biology, strong interest in research to understand disease mechanisms.

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**Mark Souweidane, MD**

Neurological Surgery  
Weill Cornell Medicine  
mmsouwei2med.cornell.edu

Field(s) and topics of interest: Pediatric brain tumors, Drug delivery to the brain, Translational research using preclinical models, early response monitoring for brain tumors

Research: Using preclinical research methods employing cell culture work and animal models derived from children with brain tumors, the Souweidane laboratory explores novel therapeutic agents, tumor response rates, and unconventional drug delivery methods with the hope of implementing early phase clinical trials in children.

Project Description: Incurable tumors in children warrant exploratory methods for treatment. Using a host of preclinical methods, drugs are tested to assess utility against some of these tumors. Therapeutic agents are also manipulated for in vivo tracking to assess important pharmacokinetic monitoring. Nontraditional delivery routes including convection-enhanced delivery, intra-arterial and intrathecal are tested for early phase translation.

Students' Role in the Project: Lab or bench side research (minimum commitment of 6 months, preferable one year)  
Retrospective data analysis related to neuro-imaging response data (minimum commitment of 6 months)

Preferred Experience: None required other than a professional and collegial demeanor

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**Chani Traube, MD**

Pediatric Critical Care Medicine  
Department of Pediatrics, Weill Cornell  
chr9008@med.cornell.edu

Field(s) of Interest: Pediatric Delirium, Pediatric Critical Care Medicine; Pediatric Neuro-Intensive Care

Research: Pediatric Delirium: Outcomes after Pediatric Critical Care  
Project Description: Nearly 200,000 children are admitted to the pediatric intensive care unit in the US each year, and nearly 97% survive their critical illness. However, there is considerable morbidity in survivors. Our research group seeks to define the long-term outcomes after pediatric critical illness, and investigate ways to change PICU care so as to improve the long-term health of survivors and their families.

Delirium affects 1 in 4 children admitted to the PICU, and is associated with poor outcome. At Cornell, we have implemented universal delirium screening in the PICU as standard of care. We are now investigating ways to prevent and treat delirium in at-risk children

Students' Role in the Project: Students will have the opportunity to join a multidisciplinary team engaged in several projects regarding pediatric critical illness and delirium. They will participate in research study design, data collection, and manuscript writing. Students will learn how to obtain informed consent, conduct chart reviews,

analyze data, and perform follow-up phone calls using surveys to detect whether a patient has experienced long-term effects from delirium or critical illness.

Preferred Background/ Experience: None required. Interested students should be friendly, comfortable interacting with children and their families, and demonstrate organizational skills and attention to detail. Research is ongoing, with active clinical trials in progress, others pending IRB approval, and others in planning stage.

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**Stefan Worgall, MD, PhD**

Pediatric Allergy, Immunology, Pulmonology  
Friedman Research Laboratories  
Weill Cornell Medicine  
stw2006@med.cornell.edu

Field(s) and topics of interest: Cystic fibrosis / host defense in lung / gene therapy

Research: Lung antigen presenting cells in cystic fibrosis and Respiratory Syncytial Virus (RSV) vaccine using capsid-modified adenovirus vectors

Project Descriptions:

1. Cystic fibrosis lung disease is characterized by exaggerated inflammation and increased susceptibility to infections. Although the CFTR protein is primarily thought to be expressed by epithelial cells we and others have studied the expression of CFTR in non-epithelial cells, in particular antigen presenting cells in the lung. This project studies the abnormalities of lung dendritic cells derived from CF knock-out mice. Our data so far indicates that abnormal CFTR expression lung macrophages and dendritic cells is related to abnormalities in innate immune responses. These findings are important in understanding lung disease in CF and also to identify new targets for therapy of this severe disease.

2. Infections with RSV are one of the major causes for viral lower respiratory tract illness, especially in young children. Our laboratory has been working on the development of genetic vaccines for pulmonary pathogens. This project aims to analyze the immunological properties of a novel anti-RSV vaccine using a capsid-modified adenovirus vector. Protection against RSV could be achieved with an efficient vaccination strategy inducing neutralizing humoral immunity as well as a Th1-dominant cellular response. Adenovirus gene transfer vectors can be used to evoke robust systemic and mucosal immunity against an immunogen expressed as a transgene and Ad functions as a potent adjuvants. The Ad modifications include the addition of a RGD motif to the fiber knob, a modification known to enhance infection of antigen presenting cells and to increase Th1-type immune response, as well as the addition of RSV epitopes into the Ad capsid. These modified vectors will be assessed to induce immunity and protection against RSV in adult and neonatal mouse models. The study will evaluate if a modified Ad vector expressing the RSV F protein engineered to increase activation and infectivity of antigen presenting cells could be useful as a RSV vaccine.

Students' Role in the Project: Design of new and continuation of the present experiments. Student will be involved in cell culture studies and flow cytometry analysis of lung dendritic cells (project 1) and adenovirus vector construction and immunological analyses (project 2).

**PEDIATRIC RESIDENCY MATCHES  
CLASS OF 2018 WEILL CORNELL MEDICINE**

<b>Specialty</b>	<b>Location</b>	<b>City, State</b>
General Pediatrics	NYP- Weill Cornell Medicine	New York, NY
General Pediatrics	Massachusetts General Hospital	Boston, MA
Child Neurology	NYP-Weill Cornell Medicine	New York, NY

**CLASS OF 2017 WEILL CORNELL MEDICINE**

<b>Specialty</b>	<b>Location</b>	<b>City, State</b>
General Pediatrics	SUNY Upstate Medical University	Syracuse, NY
General Pediatrics	Children's Hospital-Los Angeles	Los Angeles, CA
General Pediatrics	NYP- Weill Cornell Medicine	New York, NY
General Pediatrics	University of Washington Affiliated Hospitals	Seattle, WA
General Pediatrics	University of Southern California	Los Angeles, CA
Peds-Medical Genetics	Johns Hopkins Hospital, J H Medical Center	Baltimore, MD
Pediatrics-Preliminary	St Louis Children's Hospital	St Louis, MO
Medicine-Pediatrics	Icahn School of Medicine Beth Israel	New York, NY
Child Neurology	NYP-Columbia University Medical Center (2)	New York, NY

**CLASS OF 2016 WEILL CORNELL MEDICINE**

<b>Specialty</b>	<b>Location</b>	<b>City, State</b>
General Pediatrics	Baylor College of Medicine	Houston, TX
General Pediatrics	Hofstra Cohen Children's Medical Center	New Hyde Park, NY
General Pediatrics	Massachusetts General Hospital (2)	Boston, MA
General Pediatrics	Loma Linda University	Loma Linda, CA
General Pediatrics	NYP- Weill Cornell Medicine (2)	New York, NY
General Pediatrics	St Christopher's Hospital	Philadelphia, PA
General Pediatrics	Tufts Medical Center	Boston, MA
General Pediatrics	U North Carolina Hospitals	Chapel Hill, NC
General Pediatrics	UC San Diego Medical Center	San Diego, CA
General Pediatrics	UC San Francisco	San Francisco, CA
General Pediatrics	University of British Columbia	Vancouver, Canada
Pediatrics-Preliminary	Hofstra Cohen Children's Medical Center	New Hyde Park, NY
Peds/Childrens Hosp	Children's Hospital	Boston, MA
Medicine-Pediatrics	UPMC Medical Education	Pittsburg, PA
Child Neurology	Children's Hospital	Boston, MA
Child Neurology	St Christopher's Hospital	Philadelphia, PA
Child Neurology	UC San Francisco	San Francisco, CA

**NYP-WEILL CORNELL MEDICINE DEPARTMENT OF PEDIATRICS  
CLASS OF 2018 GRADUATE MEDICAL EDUCATION**

<b>Specialty</b>	<b>Location</b>	<b>City, State</b>
General Pediatrics	CAMcare Health	Camden, NJ
General Pediatrics	Hospital for Special Surgery	New York, NY
General Pediatrics	Connecticut Pediatric Partnerships	Bloomfield, CT
General Pediatrics	NYP- Weill Cornell Medicine	New York, NY
Critical Care	UT Southwestern	Dallas, TX
Critical Care	NYP- Weill Cornell Medicine	New York, NY
Critical Care	NYP-Columbia University Medical Center	New York, NY
Neonatology	NYP- Weill Cornell Medicine	New York, NY
Neonatology	University of Michigan	Ann Arbor, MI
Allergy/Immunology	LIJ Northwell Health	New York, NY
Sports Medicine	New York University	New York, NY
Hospitalist	NYP-Lower Manhattan (2)	New York, NY
Dermatology	UCSD, Research Fellowship	San Diego, CA
Emergency Medicine	Mount Sinai	New York, NY
Clinical Informatics	NYP-Columbia University Medical Center	New York, NY
Gastroenterology	Baylor College of Medicine	Houston, TX
Nephrology	Northwestern Medicine	Chicago, IL
Hematology/Oncology	MSK-NYP Weill Cornell Medicine	New York, NY



## **Acknowledgements**

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**AAP Student Representative:** Prithvi Mohan

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