

The University of North Carolina at Chapel Hill  
Department of Anesthesiology  
Annual Research Report  
2020-2021



SCHOOL OF MEDICINE  
Anesthesiology

Dear Reader:

Welcome to our 2020-2021 UNC Department of Anesthesiology Annual Research Report. I hope that this summary gives you a better understanding of the exciting research work being done in the department. Our goal is to serve our patients through discovery, and we have had a very productive year.

The research success summarized in this report is achieved by three main factors. First, we are fortunate to have gathered together an incredible group of faculty and staff in the department. Second, these individuals excel at working together in collaborative, multidisciplinary teams. Research is truly a team sport. The effective collaboration of individuals in each of the projects described in this report accounts for our success, and we are fortunate that our numbers continue to grow. Finally, we have a Chair who fully embraces the mission of the university to reduce suffering and improve outcomes through advances, which lead to improved patient health. Dr. Zvara has provided the infrastructure and leadership necessary for transformative research, even during very challenging economic times.

I encourage you to check back often and keep up with our department research activities via <http://www.med.unc.edu/anesthesiology/research>. Also, if you have any questions regarding our research or work, don't hesitate to email me any time at [Samuel\\_McLean@med.unc.edu](mailto:Samuel_McLean@med.unc.edu).

Sincerely,

A handwritten signature in black ink, appearing to read 'Samuel McLean', written in a cursive style.

Samuel McLean, MD, MPH  
Vice Chair, Research, Department of Anesthesiology  
The University of North Carolina at Chapel Hill  
Chapel Hill, NC

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# Areas of Departmental Research Focus

## 1. Institute for Trauma Recovery

On behalf of the Anesthesiology Department, welcome to our Research Division. Our research portfolio in the department includes a thematic, NIH-funded research program focused on improving pain outcomes and recovery after stress and trauma (UNC Institute for Trauma Recovery). The goal of the UNC Institute for Trauma Recovery is to advance understanding of the processes mediating recovery

after trauma, and to develop interventions that promote rapid recovery and prevent chronic symptom development. Our primary strategy for the research program is to develop and recruit outstanding faculty, and outstanding research team members who are passionate about improving the care of individuals who have experienced trauma. Our success is entirely due to the efforts of our phenomenal alumni, and current team. We continuously work to create a scientific community where research scientists have the intellectual space to develop and actualize their individual leadership potential within areas of interest, while also enriching the quality of their science by collaborating with a phenomenal team of faculty and staff. Our scholarly culture is driven by our devotion to the recovery of individuals experiencing trauma.



**A. AURORA: Longitudinal Assessment of Post-traumatic Syndromes (U01MH110925, PI McLean)**

The AURORA Study represents a major national initiative to improve the understanding, prevention, and recovery of individuals who have experienced a traumatic event. This is the largest-ever study of trauma recovery involving 30+ emergency departments nation-wide, utilizing more than 30 million dollars in federal and private funding, and involving partnerships with leading tech companies such as Google. Nearly four thousand participants who presented to the emergency department for evaluation after trauma exposure, met screening and eligibility criteria, and consented to the study underwent a brief

emergency department assessment of trauma-related, psychosocial, neurocognitive, and biological factors. Participants were discharged with ecological monitoring, and completed physiologic, biologic, neurocognitive, symptom, and health outcome assessments during one-year follow-up. Subsamples of study participants in Boston, Detroit, and Philadelphia completed in-person deep phenotyping at 2 weeks and 6 months, consisting of biologic collection, functional magnetic resonance imaging (fMRI), and psychophysical evaluation. This past year was spent overcoming challenges associated with the COVID-19 pandemic, concluding AURORA data collection in June 2021, and ramping up analyses on the massive, first-in-kind AURORA dataset to prepare a blizzard of groundbreaking manuscripts. You can learn more about the AURORA study at <https://www.med.unc.edu/itr/aurora-study>.

**The Crisis**

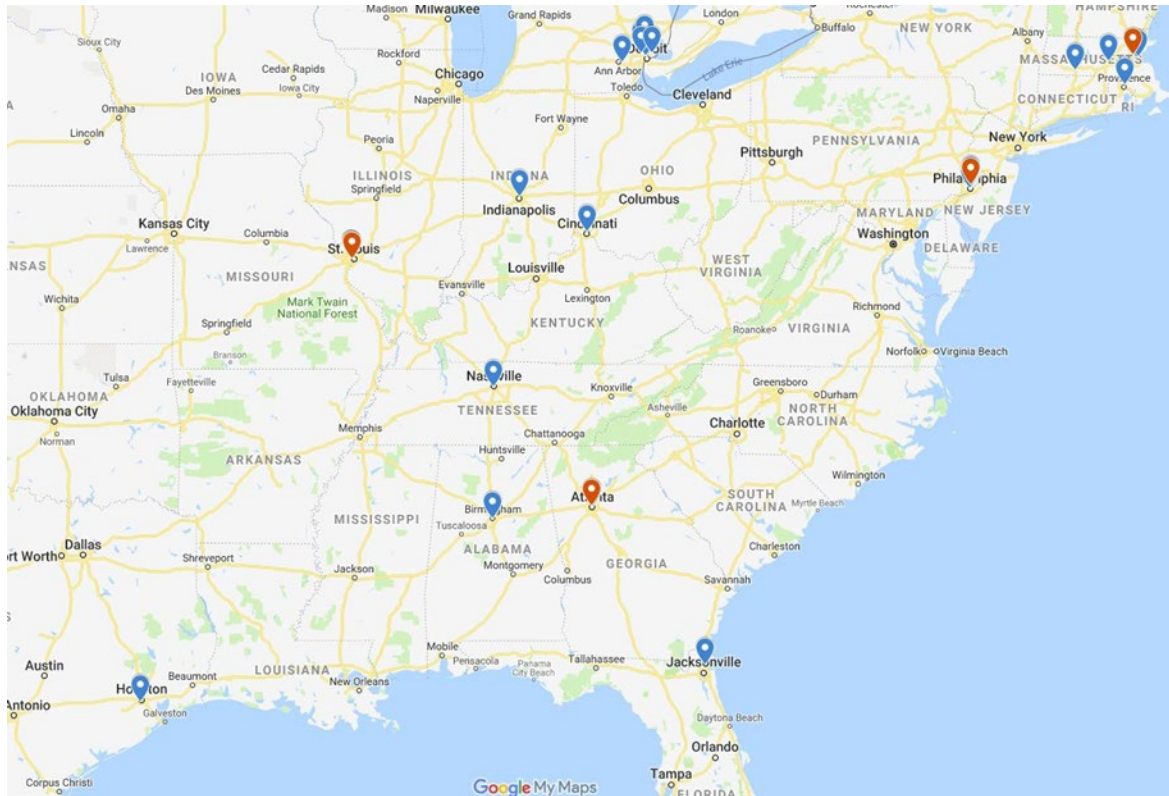
More than 2.5 million servicemen and women have been deployed to Afghanistan or Iraq, since September 11, 2001. Post-traumatic stress, depression, pain, and/or symptoms of traumatic brain injury are epidemic among these veterans. The disorders are also common in the millions of Americans who experience traumatic events, such as motor vehicle collision, sexual assault, and the unexpected death of a loved one.

**The Response**

In September 2016, the National Institutes of Health launched the AURORA Study—a 30 million dollar initiative to achieve critical discoveries for new treatments. The AURORA study has been the most comprehensive trauma study ever performed, and involved the efforts of 28 institutions and more than 50 leading scientists. Led by scientists from the University of North Carolina and Harvard, this moonshot study has applied the latest tools in physiology, genomics,



and neuroimaging to achieve the quantum leap in knowledge that military veterans and civilian trauma survivors so desperately need.



### *AURORA Sites*

*ED Sites: Blue, DP sites:*

*Red*

AURORA utilized 28 enrolling ED sites across the country, with a high concentration of those sites being within Massachusetts, Michigan and Pennsylvania. The study utilized an additional 5 DP sites located throughout the country.

### **Impact of COVID-19 on the AURORA Study**

COVID-19 has presented unprecedented challenges to research operations, including a halt in recruitment and in-person data collection and ultimately the untimely conclusion of AURORA enrollment and data collection. However, the pandemic presented an opportunity for unique data collection; the AURORA Team was able to leverage the existing Discovery by Mindstrong App to collect COVID-19 related data about how the pandemic has affected our study

participants. Such data will help us investigate the how the additional stress of the pandemic can influence recovery after trauma.

AURORA recruitment ultimately concluded in December 2020 as a result of challenges related to COVID-19, and data collection concluded in June 2021. Efforts have transitioned to cleaning, preparation, and analysis of the AURORA dataset.

### **The AURORA Dataset**

With the completion of about 200 weeks of AURORA data collection in June 2021, we have transitioned to cleaning, preparation, and analyses of the data collected from nearly 4000 trauma survivors. This data includes over 15,000 full-length surveys, over 90,000 neurocognitive assessments, and over 150,000 flash surveys. We collected over 537,000,000 minutes of watch wear data from the Verily Study Watch, or about 100 terabytes worth. The Discovery by Mindstrong app helped us collect 1.375 million days of continuous digital phenotyping data (keystroke, GPS, word cloud, communication, and accelerometry data), and over 16,000 audio recordings for paralinguistic analyses. Our deep phenotyping and blood draw sessions resulted in 670 MRIs, 705 startle sessions, 698 psychophysical sessions, and over 76,000 biological samples.

In total, the hard work of hundreds of AURORA personnel and thousands of trauma survivors has resulted in over 120 terabytes of first-in-kind data that is now in the hands of some of the world's most talented investigators. AURORA investigators are hard at work using this data to help future trauma survivors

### **2020-2021 AURORA Related Abstracts**

Hinrichs R et al. Skin Conductance in the Emergency Department Immediately Following a Trauma can Predict Post-Traumatic Symptom Trajectories. International Society for Traumatic Stress Studies: ISTSS 36th Virtual Annual Meeting November 4–14, 2020.

Pierce J et al. Association Between Peritraumatic Psychological Factors and Experimental Pain Sensitivity in the AURORA Study. International Society for Traumatic Stress Studies: ISTSS 36th Virtual Annual Meeting November 4–14, 2020.

Harnett N et al. Resting state connectivity assessed in the acute aftermath of trauma predicts future posttraumatic and depressive symptoms. International Society for Traumatic Stress Studies: ISTSS 36th Virtual Annual Meeting November 4–14, 2020.

Stevens J et al. Functional MRI Predictors of Posttrauma Psychiatric Symptom Trajectories. International Society for Traumatic Stress Studies: ISTSS 36th Virtual Annual Meeting November 4–14, 2020.

Fani N et al. The Role of PTSD and Depressive Symptoms in Changing Patterns of Substance Use Post-trauma. International Society for Traumatic Stress Studies: ISTSS 36th Virtual Annual Meeting November 4–14, 2020.

Basu A et al. Associations Between Latent Classes of Lifetime Trauma with Traditional Diagnoses and Multidimensional Psychiatric Outcomes in a Multisite US Emergency Department Cohort. International Society for Traumatic Stress Studies: ISTSS 36th Virtual Annual Meeting November 4–14, 2020.

Beaudoin FL et al. Associations between alcohol use and adverse posttraumatic neuropsychiatric sequelae in the early aftermath of trauma. Abstract no. 891. American College of Emergency Physicians Research Forum. Oral Presentation. Boston, MA. October 2021.

Jones CW et al. Characteristics and Three-Month Outcomes of Individuals Presenting to the Emergency Department after Physical Assault. Abstract no. 884. American College of Emergency Physicians Research Forum. Oral Presentation. Boston, MA. October 2021.

McLean SA et al. Development and validation of a simple clinical prediction tool to identify individuals in the emergency department at high risk of posttraumatic stress disorder after motor vehicle collision. Abstract no. 625. American College of Emergency Physicians Research Forum. Oral Presentation. Boston, MA. October 2021.



Tishad A et al. Association between RDoC Construct Negative Valence Domain Trajectories and Posttraumatic Stress Symptom Cluster Domain Trajectories in the Aftermath of Trauma. Annual Meeting of the Society of Biological Psychiatry. Poster Presentation. Online. April 30, 2021.

Macchio LD et al. Impact of the COVID-19 Pandemic on Adverse Neuropsychiatric Outcomes After Trauma Exposure. Poster Presentation. Annual Meeting of the Society of Biological Psychiatry. Online. April 30, 2021.

### **Impact of COVID-19 on the AURORA Study**

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**B. The Women's Health Study: Influence of PTSD Symptoms on Chronic Pain Development after Sexual Assault (1R01AR064700-01A1, PI McLean)**



## Better Tomorrow Network

The mission of the Better Tomorrow Network is to conduct high-quality research studies that yield continuously improved understanding, treatments, and services for sexual assault survivors. We conduct this work to achieve a world in which effective treatments exist so that no sexual assault survivor will experience chronic reductions in physical health, mental health, or quality of life due to sexual assault.

### Women's Health Study: Disseminating the Results of a First-in-Kind Study



Since completing data collection in April 2020, the Better Tomorrow Network team has been hard at work analyzing and publishing results from the 706 women who participated in this observational study on the impact of sexual assault on survivors' physical and emotional wellness.

Findings from the Women's Health Study will shape emergency care providers' ability to screen for likely post-traumatic stress risk and deliver preventive interventions in the immediate aftermath of sexual assault. We continue to feel deep gratitude for the contributions of the Women's Health Study's participants, who have made this progress possible.

## Short Trauma and Anxiety Research (STAR) Lab



Dr. Nicole Short, an Assistant Professor in the Department of Anesthesiology, leads the STAR Lab, where she broadly studies the etiology, prevention, and treatment of trauma- and anxiety-related disorders via a translational approach. Specifically, Dr. Short is interested in identifying and characterizing cognitive-affective and other risk factors (e.g., anxiety sensitivity, sleep disturbance) for the development of posttraumatic stress and related symptoms (e.g., anxiety, depression, substance use disorder); better understanding how these risk factors relate to underlying biological processes; and utilizing this knowledge to develop novel preventions and treatments for these disorders, particularly by leveraging technology-based interventions. She employs a variety of methods to study these areas, such as ecological momentary assessment (EMA), elicitation and assessment of the human stress response, and advanced quantitative methods.



Currently, under the mentorship of Dr. Samuel McLean, Dr. Short is testing RISE Guide, a novel cognitive-behavioral preventative intervention to reduce risk for posttraumatic stress after sexual assault.

The STAR Lab proudly hosts five graduate and eight undergraduate students, whose contributions include data analysis, study coordination, manuscript preparation, participant communications, and more!



## RISE Pilot and Randomized Control Trial (RCT) Studies: Putting Data into Action



When presenting for emergency care in the immediate aftermath of sexual assault, survivors are typically offered prophylaxes for pregnancy and sexually transmitted infections, but not for the more common outcome of posttraumatic stress disorder. To address this, the UNC Department of Anesthesiology's Dr. Nicole Short began designing RISE Guide, a smartphone-based intervention designed to prevent the development of anxiety sensitivity (AS) and posttraumatic stress symptoms (PTSS) following sexual assault, in 2018. The digital intervention is based on cognitive-behavioral techniques for preventing and treating AS and PTSS. Smartphone-based delivery allows this intervention to be disseminated at the time of emergency care and does not require additional visits, aiding uptake and ease of use.

To assess the safety and usability of RISE Guide, the Better Tomorrow Network launched the RISE Pilot in Spring 2020 and is actively recruiting at UNC Medical Center in Chapel Hill, NC and UC Health Memorial Hospital in Colorado Springs, CO. The Pilot has enrolled 11 participants as of August 5, 2021.

A randomized control trial (RCT) assessing the efficacy of RISE Guide in mitigating post-sexual assault AS and PTSS is on track to launch in Fall 2021.

### Athena Pilot Study



Athena  
Study

The Athena Study builds upon the Women's Health Study by adapting to and learning from adolescent survivors of sexual assault (ages 13 to 17). In collaboration with Brown University's Dr. Nicole Nugent, this study aims to not only gain insight into the recovery process of adolescents, but it will uniquely examine how digital interactions, such as Facebook and texting, play a role in recovery. Survivors' parents will also enroll, giving a more complete picture of the social context in which these survivors heal.

To prioritize the safety of young survivors of sexual assault, the Athena Pilot Study was placed on hold during the height of the COVID-19 pandemic. We are eager to resume progress on this impactful study in the near future.

### Grants awarded since August 2020

2020, Mechanisms underlying sleep and substance use risk among women trauma survivors: A multimodal intensive longitudinal pilot study | UNC Sleep Innovation Grant (\$10,000)

### Presentations since August 2020

Burud GB, Short NA, Thomas R, Lechner M, Bell K, Black J, Buchanan J, Reese R, Ho J, Reed G, Platt M, Riviello R, Rossi C, Nouhan P, Phillips C, Martin SL, Liberzon I, Rauch SM, Bollen K, Kessler RC,

McLean SA. Research among women sexual assault survivors presenting for emergency care is justified: Results from a multi-site, prospective observational cohort study. Poster presentation at Society of Biological Psychiatry's 2021 Annual Meeting. Virtual, May, 2021.

McLean BM, McLean SA, et al. "They helped me the best they could": Experiences of women sexual assault survivors with police in the early aftermath of assault and associations with past trauma history and acute psychological responses. Poster presentation at Society of Biological Psychiatry's 2021 Annual Meeting. Virtual, May, 2021.

Rodriguez S, McLean SA, et al. Latinas have worse mental and physical health outcomes following sexual assault, but are less likely to receive health care. Poster presentation at Society of Biological Psychiatry's 2021 Annual Meeting. Virtual, May, 2021.

Short NA, An X, Ji Y, D'Anza T, Lechner M, Greene S, Bell K, Black J, Buchanan J, Reese R, Ho J, Reed, Tungate A, Bollen K, Martin SL, Liberzon I, Rauch SAM, Sullivan M, McLean SA. Patient-Centered Classifications of Mental and Physical Health Symptoms after Sexual Assault: Results from a Large Prospective Study. In A. Basu & S. A. McLean (chairs), Understanding Lifetime Trauma Profiles, Multidimensional Posttraumatic Sequelae, and Treatment Implications from Large Cohort US Emergency Departments. Symposium presented at the annual meeting of the International Society for Traumatic Stress Studies: November, 2020, Atlanta, GA.

Short NA, Tungate AS, Bollen KA, Witkemper KD, Lechner M, Bell K, Black J, Buchanan J, Reese R, Reed GD, Liberzon I, Rauch SAM, Kessler RC, McLean SA. Acute stress symptoms mediate the transition from acute to persistent pain after sexual assault. In A. Rogers & N. A. Short (chairs), Improving treatment outcomes for comorbid chronic pain and posttraumatic stress: Recent translational findings. Symposium presented at the annual meeting of the Association for Behavioral and Cognitive Therapies: November, 2020, Philadelphia, PA.

### Publications since August 2020

Short NA, Tungate AT, Bollen K, Sullivan J, D'Anza T, Lechner M, Bell K, Black J, Buchanan J, Reese R, Ho J, Reed G, Platt M, Riviello R, Rossi C, Martin SL, Liberzon I, Rauch SAM, Kessler RC, Nugent N, McLean SA. Pain is common after sexual assault and posttraumatic arousal/reactivity symptoms mediate the development of new or worsening persistent pain. *PAIN*. In press.

Short NA, Zvolensky MJ, Schmidt NB. A pilot randomized clinical trial of Brief Behavioral Treatment for Insomnia to reduce problematic cannabis use among trauma-exposed young adults. *J Subst Abuse Treat*. In press.

Lechner M, Bell K, Short NA, Martin SL, Black J, Buchanan JA, Reese R, Ho JD, Reed GD, Platt M, Riviello R, Rossi C, Nouhan P, Phillips C, Bollen KA, McLean SA. Perceived Care Quality Among Women Receiving Sexual Assault Nurse Examiner Care: Results from a 1-Week Postexamination Survey in a Large Multisite Prospective Study. *J Emerg Nurs*. 2021;47(3):449-458. doi:10.1016/j.jen.2020.11.011



- Short NA, Uhde TW, Paquet C, Milanak M, Rheingold AA, Wilkerson A. An investigation of the rate and predictors of initiating and attending group cognitive behavioral therapy for insomnia after referral. *Cogn Behav Pract*. In press.
- Buchbinder M, Brassfield ER, Tungate AT, Witkemper KD, D'Anza T, Lechner M, Bell K, Black J, Buchanan J, Reese R, Ho J, Reed G, Platt M, Riviello R, Rossi C, Nouhan P, Phillips CA, Martin SL, Liberzon I, Rauch SAM, Bollen K, McLean SA. "I Still Feel So Lost": Experiences of Women Receiving SANE Care during the Year after Sexual Assault. *JACEP Open*. 2021;2(4):e12464. doi.org/10.1002/emp2.12464
- Austin AE, Naumann RB, Short NA. Associations of Medicaid expansion with suicide deaths among nonelderly adults. *Am J Epidemiol*. 2021 May 4; kwab130.
- Christensen KA, Short NA. The case for investigating a bidirectional association between insomnia and eating pathology. *Int J Eat Disord*. 2021; 54(5):701-707.
- Gilmore AK, McKee G, Flanagan J, Leone R, Oesterle D, Kirby C, Short NA, Gill-Hopple K. Medications at the emergency department after recent rape. *J Interpers Violence*. 2021 Mar 18.
- Margolies SO, Patidar SM, Chidgey BA, Goetzinger A, Sanford JB, Short NA. Growth in crisis: A mixed methods study of lessons from our patients with chronic pain during the COVID-19 pandemic. *Journal of Contextual and Behavioral Science*. 2021 Jan; 19: 12-16.
- Short NA, Lechner M, McLean BS, Tungate A, Black J, Buchanan J, Reese R, Ho J, Reed G, Platt M, Riviello R, Rossi C, Nouhan P, Phillips C, Martin SL, Liberzon I, Rauch SAM, Bollen K, Kessler RC, McLean SA. Health care utilization by women sexual assault survivors after emergency care: results of a multisite prospective study. *Depress Anxiety*. 2021; 38(1): 67-78.
- Short NA, Allan NP, Saulnier K, Preston TJ, Joiner TE, Schmidt NB. Factor mixture modeling of the Insomnia Severity Index in psychiatric outpatients. *J Psychopathol Behav Assess*. 2021; 43: 227-239.
- Short NA, Lechner M, Bell K, Black J, Buchanan J, Ho J, Reed G, Corzine A, Riviello R, Martin SL, Liberzon I, Rauch SAM, McLean SA. Anxiety sensitivity prospectively predicts increased acute posttraumatic stress and related symptoms after sexual assault. *J Trauma Stress*. 2020 Nov 11; 33(6): 1111-1120.
- Austin AE, Short NA. Sexual violence, mental health, and prescription opioid use and misuse. *Am J Prev Med*. 2020; 59(6):818-827.

### C. Linnstaedt Lab



#### Summary:

The main goals of the Linnstaedt Lab are to a) identify risk factors of chronic pain development following trauma exposure and b) discover potential therapeutic targets for the prevention of chronic pain following trauma. Over the past year we



have made significant progress towards these goals by progressing three key lines of research.

The first line of research has been focused on the role that stress system pathways play in chronic pain development following trauma exposure. We have recently shown that inhibition of a key regulator of the glucocorticoid stress system, FKBP51, reduces the onset and duration of chronic pain behavior following traumatic stress exposure. Additionally, we have shown that the timing of inhibition of FKBP51 following traumatic stress influences the effectiveness of pain prevention. In a second line of research related to this topic, we have shown, using data from the large UK Biobank dataset, that individuals with risk alleles in *FKBP5*, a smaller hippocampus, and a history of childhood trauma are most likely to have chronic pain as an adult. Finally, in a third line of research related to this topic, we have examined methylation levels in trauma survivors and showed that differences in the methylation of stress system genes predicts pain recovery following trauma exposure. For this line of research, we were fortunate to successfully compete for two grants that were awarded in the past year, a Rita Allen in Pain grant and an R01 through NINDS.

The second line of research has been focused on understanding why women are more vulnerable to chronic pain following trauma exposure versus men. We published a body of work showing that a woman's circulating level of 17 $\beta$ -estradiol at the time of trauma exposure predicts their pain recovery over the subsequent year. This relationship between 17 $\beta$ -estradiol and chronic pain replicated across three trauma cohorts, and more recently we showed the same results in a fourth cohort of women. Further, we have now shown that administration of 17 $\beta$ -estradiol following traumatic stress exposure in animals prevents the onset of enduring hyperalgesia. We are currently working to understand the mechanism through which 17 $\beta$ -estradiol protects against chronic pain development. This work is funded by a K01 grant through NIAMS.

The third line of research has been focused on identifying clinical, demographic, and molecular predictors of chronic pain development following trauma exposure. We recently submitted a manuscript describing these efforts and showing that a distinct set of questions asked of trauma survivors in the emergency department show good accuracy in predicting chronic pain outcomes

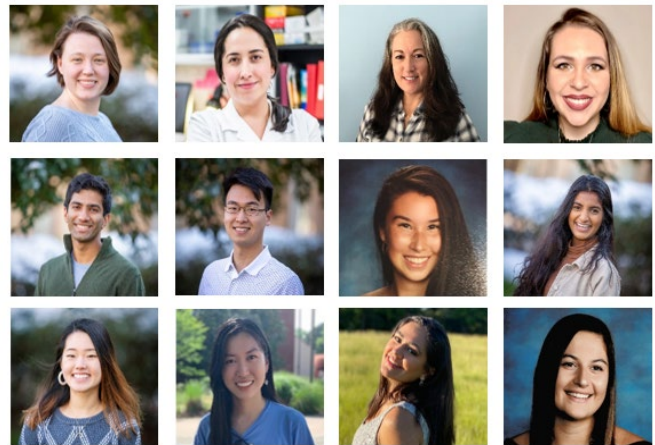
following motor vehicle collision trauma. In this work we used machine learning methods and validated our findings on an external dataset. Future efforts related to this work will focus on determining whether we can improve accuracy of prediction by incorporating additional factor (e.g. molecular and genetic factors). This work is funded by Departmental support and through a collaborative U01 through NIMH.

Overall, we feel very fortunate to have been able to collaborate with amazing scientists and clinicians and to have received the necessary funding to be able to perform research centered around our goals of helping improve pain outcomes for trauma survivors.

*Personnel:*

We are excited to welcome four new full time lab members to our group: Dr. Lauren A. McKibben, Ms. Liz Albertorio, Ms. Jacqueline Mickelson, and Ms. Erica Branham.

Dr. McKibben joined our group as a postdoctoral scholar after completing her PhD thesis work at the University of Alabama. Her research with our group will extend the reach of our FKBP51/stress system focused studies by assessing morphological and functional brain changes mediated by FKBP51 following early life adversity. She will also assess how these changes increase vulnerability to chronic pain following trauma exposure as an adult.



Ms Albertorio joined our AURORA study biomarker team in Fall 2020 and has been working meticulously towards collecting high quality blood-based biomarker data using samples collected from hundreds of participants who were enrolled in the AURORA study following trauma exposure. She will soon also be analyzing the cytokine data that she measured to assess for significant relationships between cytokine levels in the peritraumatic period and pain recovery trajectories following trauma.

*Linnstaedt Lab, 2020-2021*

Our Covid-19-approved socially distanced lab photo! From top to bottom, left to right: Britannia Wanstrath, Liz Albertorio, Jacqueline Mickelson, Lauren McKibben, Jarred Lobo, Aaron Lee, Kaila Hamm, Ishani Deliwala, Esther Son, Tina Lin, Rhea Arora, and Sophia Kuhl-Chimera. Not pictured: Raphael Kim, Leo Pang, and Connie Chen.

Ms Mickelson is our new behavioral scientist, and she will be performing the majority of the lab's animal experiments. These experiments will be focused on understanding the role that FKBP51 plays in the development of chronic pain, by using a small molecule inhibitor of FKBP51 and cutting-edge behavioral assays to measure pain behavior. Ms Mickelson also leads a team of undergraduate research assistants who are helping to perform these studies.

Ms Branham joined our team after completing her first year of graduate school in BBSP at UNC. We were very excited that she selected our lab for her thesis work after rotating with us in Winter 2021. Ms Branham will focus her thesis research on understanding how DNA methylation of key stress system genes influences vulnerability of chronic pain after trauma exposure. She is interested in how life's stressors and socio-demographic factors influence methylation in these genes and in turn how the differences in methylation affects pain levels.

In addition to our full-time lab members, we have collaborated with a number of medical, graduate, and undergraduate students over the past year including Jarred Lobo (First year medical student, UNC-CH), Raphael Kim (First year graduate student, Harvard University), Connie Chen (Second year masters student, Boston University), Esther Son (Senior undergraduate student, UNC-CH), Leo Pang (Senior undergraduate student, UNC-CH), Aaron Lee (Senior undergraduate student, UNC-CH), Kaila Hamm (Senior undergraduate student, UNC-CH), Ishani Deliwala (Junior undergraduate student, UNC-CH), Tina Lin (Junior undergraduate student, UNC-CH), Rhea Arora (Sophomore undergraduate student, UNC-CH), Sophia Kuhl-Chimera (Sophomore undergraduate student, UNC-CH) .

#### *2020-2021 Grants/funding*

Rita Allen 2020 Scholar in Pain awarded to Dr. Linnstaedt to support high risk research projects in the lab. \$150,000 over three years

R01 via NINDS and the HEAL initiative for the lab's work on FKBP51. Grant title: FKBP51 antagonism to prevent chronic pain: optimizing efficacy & evaluating safety and mechanisms.

K01 via NIAMS for our group's sex-differences in pain research. Grant title: Key molecular mechanisms of chronic pain vulnerability in women experiencing MVC.

U01 via NIMH (in collaboration with Dr. Sam McLean and others) for our group's predictive biomarker research. Grant title: Longitudinal Assessment of Post-traumatic Syndromes

#### *2020-2021 Related Abstracts*

Hernandez H, Rawls A, Wang Y, Zhang X, Chen J, **Pan Y**, Dang H, Slade G, **Linnstaedt SD**, Parisien M, Diatchenko L, Nackley A. Tissue-specific regulation of miR-374a-5p and its mRNA targets

associated with pain in humans and mice. Submitted for presentation at Society for Neuroscience, Chicago, IL October 2021.

Ayoub LJ, **Lobo JJ**, **Linnstaedt SD**, Moayed M. Hippocampal volume, FKBP5 genetic vulnerability, and childhood trauma compound risk for chronic multisite pain in the UK Biobank cohort. Submitted for presentation at Society for Neuroscience, Chicago, IL October 2021.

#### *2020-2021 Related talks*

**Linnstaedt SD**. FKBP51 antagonism to prevent chronic pain. Translational Pain Research Consortium of the Gulf Coast Consortia and the Texas Pain Research consortium. This is a virtual symposium attended by 200-250 scientists each month. March 19, 2021

**Linnstaedt SD**. Molecular risk predictors of chronic pain following traumatic stress: path to preventative interventions. Invited research presentation at the Pain Society of the Carolinas 2020 Annual Meeting and Scientific Sessions, Asheville North Carolina, September 18, 2020 \*Due to COVID-19, this conference was conducted virtually and my talk was live recorded and uploaded to the meeting website.

#### *2020-2021 Related Publications*

Steuber ER, Seligowski AV, Roeckner AR, Red M, Lebois LAM, van Rooij SJH, Murty VP, Ely TD, ... **Linnstaedt SD**, ... Koenen KC, Mclean SA, Ressler KJ, Jovanovic T, Harnett NG, Stevens JS. Thalamic volume and fear extinction interact to predict acute posttraumatic stress severity. Journal of Psychiatric Research. In press, July 14, 2021.

Ziobrowski HN, Kennedy CJ, Ustun B, House SL, Beaudoin FL, An X, Stevens JS, Zeng D, Neylan TC, Clifford GD, Jovanovic T, **Linnstaedt SD**,... Kessler RC. Predicting posttraumatic stress disorder and major depression three months after a motor vehicle collision: results from the AURORA study. JAMA Psychiatry. In press, July 2, 2021.

**Lobo JJ**, Tungate AS, Peak DA, Swor RA, Rathlev NK, Hendry PL, McLean SA, **Linnstaedt SD**. Polygenic risk scoring of a longitudinal trauma cohort to assess genetic overlap and protective factors influencing vulnerability to posttraumatic stress, chronic pain, and depression. Translational Psychiatry. 2021 Jun 29; 11(1):359. PMID: 34226500

**Linnstaedt SD**, Mauck MC, **Son EY**, Tungate AS, **Pan Y**, **Rueckeis C**, **Yu S**, Lechner M, Datner E, Cairns BA, D'Anza T, Velilla MA, Pearson C, Shupp JW, Smith DJ, McLean SA. 17 $\beta$ -estradiol levels circulating in the early aftermath of trauma exposure influences chronic posttraumatic pain



outcomes: results from women and men enrolled in three longitudinal trauma cohorts. PAIN. 2021 Mar 26. PMID: 34028234

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Harnett NG, van Rooij SJH, Ely TD, ... **Linnstaedt SD**, ... Koenen KC, Mclean SA, Ressler KJ, Stevens JS. Prognostic neuroimaging biomarkers of trauma-related psychopathology: resting-state fMRI shortly after trauma predicts future PTSD and depression symptoms in the AURORA study. Neuropsychopharmacology 2021 Jun;46(7). PMID: 33479509

Khoury S, Wang QP, Parisien M, Gris P, Bortsov A, **Linnstaedt SD**, McLean SA, Tungate A, Sofer T, Lee J, Louie T, Redline S, Kaunisto M, Kalso E, Munter HM, Nackley A, Slade G, Smith S, Zaykin D, Fillingim R, Ohrbach R, Greenspan J, Maixner W, Neely G, Diatchenko L. Multi-ethnic GWAS and meta-analysis of sleep quality identify MPP6 as a novel gene that functions in sleep center neurons. Sleep. 2021 Mar 12;44(3). PMID: 33034629

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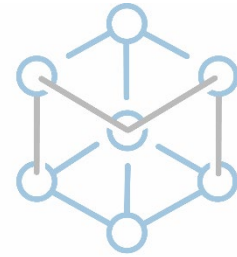
Joorman J, McLean SA, Beaudoin FL, An X, Stevens JS, Zeng D, Neylan TC, Clifford GD, **Linnstaedt SD**, Germine LT, ... Ressler K, Kessler R. Socio-demographic and trauma-related predictors of threshold depression within eight weeks of motor vehicle collision in the AURORA study. Psychological Medicine. 2020 Oct 29:1-14. PMID: 33118917

Kessler RC, Ressler KJ, House SL, Beaudoin FL, An X, Stevens JS, Zeng D, Neylan TC, **Linnstaedt SD**, Germine LT, ..., McLean SA. Socio-demographic and trauma-related predictors of PTSD within

eight weeks of a motor vehicle collision in the AURORA study. *Molecular Psychiatry*. 2020 Oct 19:10.1038/s41380-020-00911-3. PMID: 33077855

#### **D. Mauck Lab**

The Institute for Trauma Recovery is working to better understand the mechanisms of underlying chronic pain development in the aftermath of major thermal burn injury. Nearly 500,000 individuals seek care after burn injury each year in the US, and approximately 40,000 sustain major thermal injuries requiring hospitalization. A significant number of these individuals go on to experience life-altering chronic pain and itch. The Institute has teamed up with surgeons in the Jaycee Burn Center at UNC, as well as with leading burn centers from around the United States, to improve our understanding of the mechanisms responsible for chronic pain and suffering experienced by survivors of major burn injuries. Results from an observational study conducted by the research group have indicated that deficiency in Vitamin D around the time of burn injury has been shown to contribute to chronic pain and racial disparities in chronic pain outcomes following burn injury.



MAUCK LAB

The Mauck Lab has also shown through the Burn Recovery Trail, a pilot, randomized controlled trial to assess the efficacy of Vitamin D and Fish Oil in the prevention of chronic pain development following burn injury (NCT03313076) that administration of Vitamin D for 6 weeks following burn injury reduced chronic pain and narrowed racial disparity. This result has been used to adequately power a planned larger-scale clinical trial.



**Matthew Mauck, MD, PhD**

Given these exciting results, the Mauck Lab has an exciting new pilot, multicenter randomized controlled trial to prevent chronic pain and reduce racial disparity in pain outcomes following motor vehicle collision that has been recently funded by the National Institute on Minority Health

and Health Disparities via an R21 funding mechanism. The laboratory is excited to get this trial underway.

#### *2020-2021 Related Abstracts*

**Barton, C., Mauck, MC, Linnstaedt, S,** Kurz, M, Hendry, P, Pearson, C, Velilla, MA, Lewandowski, C, Datner, E, Domeier, R, Liberzon, I, **McLean, S.** Immune profile in the immediate aftermath of MVC and its prediction of APNS. Society of Biological Psychiatry Annual Meeting, New York, NY, April, 2020.

Akbar, TA, Stookey, S, **Barton, C, Tungate, A,** McGrath, K, **Mauck, MC.** Preventative Analgesia Influences Acute Pain and Opioid-use. Pain Society of the Carolinas. Charleston, SC. December, 2020.

#### *2020-2021 Related Publications*

**Mauck MC, Linnstaedt, SD,** Bortsov, A, Kurz, M, Hendry, PL, Lewandowski, CL, Velilla, MA, Datner, E, Pearson, C, Domeier, R, Fillingim, RB, Beaudoin, FL, Ting, JP, **McLean SA.** Vitamin D Insufficiency Increases Risk of Chronic Pain Among African Americans Experiencing Motor Vehicle Collision . Pain. 2020; 161(2): 274-280.

**Mauck MC, Barton CE, Tungate A,** Shupp JW, Karlnoski R, Smith DJ, Williams FN, Jones SW, **McGrath KV,** Cairns BA, **McLean SA.** Peritraumatic Vitamin D levels predict chronic pain severity and contribute to racial differences in pain outcomes following Major Thermal Burn Injury. J Burn Care Res. 2021. Epub ahead of print. PMID: 33564878.

**Mauck MC, Barton CE, Tungate AS,** Shupp JW, Karlnoski R, Smith DJ, Williams FN, Jones SW, **Sefton C,** McGrath K, Cairns BA, **McLean SA.** Peritraumatic plasma Omega-3 fatty acid concentration predicts chronic pain severity following thermal burn injury. J Burn Care Res. 2021 Epub ahead of print. PMID: 33895836.

**Linnstaedt SD, Mauck MC,** Son EY, Tungate AS, Pan Y, Rueckeis C, Yu S, Lechner M, Datner E, Cairns BA, Danza T, Velilla MA, Pearson C, Shupp JW, Smith DJ, McLean. Peritraumatic 17 $\beta$ -estradiol levels influence chronic posttraumatic pain outcomes. Pain. 2021. Epub ahead of print. PMID: 34028234



# Heroes Health Initiative

You are doing so much for *others*. Heroes Health is to support *you*.

## E. Heroes Health

### Need and Vision

While COVID-19 brought illness and death to growing numbers of the global population in early 2020, healthcare facilities and healthcare workers in most affected areas became overwhelmed by the logistic, professional and personal demands associated with providing quality care in the context of a worldwide pandemic. Dr. Sam McLean saw and experienced first-hand the ways that working in a healthcare facility threatened the holistic wellbeing of all employees. The stresses of the possibility of infection, passing the virus to family and friends at home, the increased patient isolation from visitors and the limited supply of PPE all weighed heavily on hospital employees, so Dr. McLean decided to work toward a solution to help healthcare workers monitor their own mental health and to deploy resources to those individuals conveniently and without cost.

### Solution

The Heroes Health Initiative was birthed out of this commitment to help. In short order, a consortium of medical and research professionals under the leadership of Dr. McLean, in collaboration with Google X and supported by funding from Bank of America, the Rockefeller Foundation, OneMind and other private donations, the Heroes Health App and an institutional partnership model launched on July 14th, 2020.

The Heroes Health App, freely available on Apple and Google app stores, enables healthcare workers to monitor their mental health by investing just five minutes each week. Participants complete six short mental health self-assessment surveys (PHQ9, GAD7, PTSS, Sleep, WSAS and PPE), and the app generates a snapshot “report card” indicating levels of symptom severity as it relates to depression, anxiety, sleep health, and life impact of stress. App users can also see a trend report which reflects how each symptom severity has changed over the course of time. Most importantly, the Heroes Health app contains resources ranging from crisis hotline numbers to access to mental health self-care tools which can be incorporated into a participant’s well-being routines.

The Heroes Health app most positively benefits healthcare workers when used in the context of an institutional partnership. The Heroes Health Initiative offers a free partnership with healthcare institutions. When institutions partner with Heroes Health, the individual user and the institution enjoy added benefits. The individual now has in-app access to customized resources offered by the institution. Institutional leadership receives de-identified aggregate reports indicating group-level mental health symptom markers and is empowered to deploy local support appropriate to the needs of their workforce. Additionally, a designated mental health outreach team has access to daily identified reports which include a list of those suffering from high symptom burden in critical mental health areas or indicate a significant level of suicidal ideation. The mental health team confidentially contacts those individuals with encouragement and offers supportive resources.

### Research Value

While the Heroes Health study is primarily a quality improvement initiative focused on the current COVID-19 pandemic, there is significant research value for future efforts. The following are questions that data from the study may inform. To what extent did Heroes Health partnerships deliver successful support to those suffering from mental health crises? What resources were most accessed by participants? How can an app like this be most beneficial in future crises that put healthcare workers under additional stress? How can Heroes Health be most beneficial to healthcare workers during typical (non-pandemic) conditions? What other populations can be served through a similar initiative?

### Progress

Since launching in July 2020, the Heroes Health team remains committed to helping as many healthcare workers and institutions as possible. As of this report, there are over 1,500 users, spread nationwide across all 50 states. In addition to individual users of the app, we have partnered with over a dozen institutions who provide individual outreach to users at their organization who flag for high symptom burden. Organizational mental health workers at partnering institutions are successfully aiding healthcare workers suffering from anxiety, depression, and suicidal thoughts. Healthcare workers with high symptom burdens who received personalized outreach through Heroes Health reported a high degree of satisfaction with the program.

In the spring of 2021, we partnered with a start-up company, Marvin. Marvin partners with hospital systems and healthcare employers to provide comprehensive mental health care for clinicians. Marvin saw the value in the service that Heroes Health was providing, and decided to take over the app and continue to run it. The app will continue to be offered free of charge to our partnering organizations and individual users. Additionally, Marvin will offer mental health outreach to employees at partnering organizations should this be a resource that is of interest to the institution. As of this report, the app is



undergoing testing by Marvin and our app technical support team at Boston Technology Corporation in preparation of the relaunch. The app has remained fully functioning for users, and will remain so until all partnering organizations and users are transferred to the new instance of the app. It is anticipated that the transfer to Marvin will be complete by December 2021.

## 2. Anesthesiology Clinical Trials Research Unit

The UNC Anesthesiology Clinical Trials Research Unit specializes in pain management studies involving medications or devices. Their facilities at the hospital of UNC Health Care and the Pain Management Center at Southern Village allow them to attract a diverse patient population. They work with Department of Anesthesiology faculty to manage and conduct both industry-sponsored clinical trials and investigator-initiated studies. Their team of professionals includes a full-time research coordinator and nurse, as well as regulatory and other support staff. Individual faculty studies performed in collaboration with the clinical trials team are described below.



### *Clinical Research Team*

Left to Right: Drs. Harendra Arora, Fei Chen, Kathleen Smith, Brian Specht & Priya Kumar; Vicki Sandlin, Drs. Meena Bhatia & Concetta Lupa; Lindsey Boerger

**A. PeriOperative Ischemic Evaluation-3 (POISE-3) Trial (PI: Kumar)**



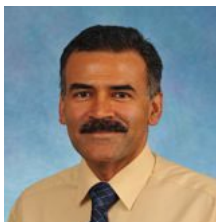
The primary objective of this study is to determine if TXA is superior to placebo for the occurrence of life-threatening, major, and critical organ bleeding, and non-inferior to placebo for the occurrence of major arterial and venous thrombotic events; and to determine the impact of a hypotension-avoidance strategy versus a hypertension-avoidance strategy on the risk of vascular death and major vascular events in patients who are followed for 30 days after noncardiac surgery. This study began in September 2018 and is currently enrolling.

**B. Treatment of Post-Operative Pain Following Orthopedic Surgery With SPRINT® Peripheral Nerve Stimulation (PNS) System (PI: Grant)**



This is a multicenter, randomized, double-blinded, placebo-controlled trial conducted by SPR Therapeutics investigating the utility of peripheral nerve stimulation in transitional surgical pain. Participants will be followed for 12 months post start of treatment. UNC began enrolling participants in June 2021.

**C. Efficacy and Safety of HSK3486 Compared to Propofol for Induction of General Anesthesia in Adults Undergoing Elective Surgery (PI: Arora)**



This is a multicenter, randomized, double-blinded, propofol-controlled, Phase 3 clinical study to evaluate the efficacy and safety of HSK3486 for induction of general anesthesia in adults undergoing elective surgery. UNC was selected as a site and will begin enrolling patients in fall of 2021.

**D. SOAP Registry for COVID-19 in Pregnancy (PI:Smith)**



This is a multicenter registry supported by the Society for Obstetric Anesthesiology and Perinatology (SOAP) of pregnant patients diagnosed with COVID-19. The study will evaluate treatment strategies and outcomes of pregnant women with COVID-19 and a group of control patients.

**E. VRAS- Virtual Reality After Surgery (PI: Specht)**



Virtual Reality After Surgery. Exploring the impact virtual reality headset use has on pain scores, opioid use and overall satisfaction among post-operative pediatric patients. VR headsets will be compared to the standard of care - iPad use.

**F. Does In Shock Improve Clinicians' Empathy and Professionalism? (PI: Martinelli)**



Clinicians (residents, CRNAs, faculty) in the Anesthesiology department were invited to take a short empathy survey. They were then invited to read the book In Shock. We hosted 4 book club facilitated discussions, each consisting of 8-10 clinicians at varying levels of role and experience. This study is employing a thematic qualitative approach to analyze the focus group discussion data.

**G. Family Anesthesia Experience: Educating Residents and their Support Persons to Improve Relationships and Increase Wellness (PI: Martinelli)**

This study aims to assess the effect of the CA-1 Family Anesthesia Day on residents' wellbeing using a mixed method approach.

#### **H. Erector Spinae Plane Blocks (ESP) for Cardiac Surgery: Retrospective Review of Outcomes (PI: Kolarcyk)**



Retrospective study comparing outcomes in cardiac surgical patients who had bilateral single level T3-T4 ESP blocks as compared to historical matched controls. ESP blocks are a form of multimodal analgesia, and the aim of the project is to compare time to extubation and opioid consumption.

#### **I. Remifentanyl versus propofol-based sedation for patients undergoing transcatheter aortic valve replacement (PI: Kolarcyk)**

This is a retrospective cohort study that compares outcomes in patients who undergo remifentanyl-based sedation to patients who undergo propofol-based sedation, as it is unknown which of these is associated with fewer anesthesia-related complications in these high-risk surgical patients undergoing TAVRs

#### **J. Incentive Spirometry as a pain measure (PI: Lobonc)**



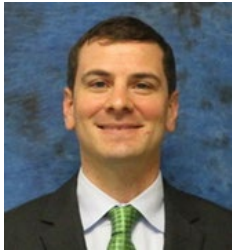
We followed 100 post-operative patients with epidurals for pain control and tested incentive spirometry before and after surgery to determine if it correlated with the level of pain control. Patients were asked for their VAS “pain score”, a subjective measure of pain control (not controlled, somewhat controlled, well controlled) and were asked to use their incentive spirometer. They were followed until discharge or 6 days postoperatively. Hypothesis: that incentive spirometry values will correlate with level of pain control so that they can be used as an objective marker for postoperative pain control.

**K. Evaluating pain, function and satisfaction after implementation of precision prescribing recommendations for postoperative opioids. (PI:Chidgey)**



We have implemented opioid prescribing recommendations for over 80 surgical populations and conducted surveys using PROMIS measures to evaluate function etc.

**L. Case Series for Pediatric Hyperthermic Intraperitoneal Chemotherapy, HIPEC (PI: Suchar)**



pediatric patients.

Does a novel anesthesia protocol that includes a tunneled thoracic epidural catheter provide adequate analgesia and an uneventful post operative course? NC is now the center for the most pediatric HIPEC cases and we have 30 cases to date. We plan on reporting our results of a standardized anesthesia protocol that involves a tunneled thoracic epidural with extubation at the end of the surgical case for our first 25

**M. Interscalene Catheter vs. Interscalene Liposomal Bupivacaine for Arthroscopic Rotator Cuff Repair (PI: Schoenherr)**



This is a prospective comparison of patients undergoing rotator cuff repair that receive one of two types of interscalene nerve block, both of which are currently being used at UNC. Group 1 will be comprised of patients with a preoperative interscalene nerve catheter placed with 20mL 0.25% bupivacaine and a 0.2% ropivacaine infusion by an OnQ pain pump. Group 2 will be comprised of patients with a preoperative interscalene nerve block



placed with 10mL 0.5% bupivacaine and 10mL 1.3% Liposomal Bupivacaine

(Exparel). All patients in both groups will have a similar intraoperative general anesthetic with multimodal analgesic pre-op oral medications. Outcomes measured by PACU assessment and telephone follow up.

**N. Do Preoperative Gabapentinoids Prolong PACU Stay in Select Patient Populations Undergoing Laparoscopic Hysterectomy? (PI: Schoenherr)**

We plan to retrospectively analyze pre-existing data sets to determine if there is any significant prolongation of PACU time in lap hysterectomy patients that received preoperative gabapentinoids (pregabalin or gabapentin). Are patient weight or age correlated with increased sedation in PACU after receiving preoperative gabapentinoids in this cohort?

**O. Self-reported Adverse Reactions to COVID-19 Vaccination and the Effect on Work Related Absences (PI: Levi)**



The aim of this study is to ascertain through a retrospective survey the side effects experienced by individuals vaccinated for COVID-19 and the impact on work related absences.

### 3. Resident Conference Presentations

Presenter	Title	Conference/Date	Place
<b>PGY-1 Residents</b>			
Blake, Lauren	Subdural Hematoma after Unintentional Dural Puncture Headache	SOAP, May 13-16, 2021	Virtual
<b>CA-1 Residents</b>			
Dengler, Erin	Music as Medicine: Decreasing Maternal Anxiety Around Cesarean Sections	ASA, October 2-5, 2020	Virtual
Ghanavatian, Shirin	Risk Factors Associated with the Development of Postherpetic Neuralgia in Renal Transplant Recipients and Efficacy of the Current Pain Management	PSOC, September 2020	Virtual
Ghanavatian, Shirin	1. Improving pts comprehension of the pre-procedure instructions at UNC Hospitals Imaging and Spine Center 2. A Multimodal Approach to Acute Pain Management in an Opioid Dependent Burn Victim,	ASA, October 2-5, 2020	Virtual
Ghanavatian, Shirin	"1. Epidural injection of autologous platelet-poor plasma for radicular pain 2. Diagnostic Radiologic Alternatives in Evaluation of Spinal Epidural Hematomas in Patients Unable to Undergo MRI"	ASRA, November 2020	Virtual
Ghanavatian, Shirin	Vitamin B12 Deficiency Neuropathy Unmasked by Spinal Cord Stimulator Percutaneous Trial Lead Placement, A Case Report	AAMP, April 2021	Virtual
Grosshuesch, Craig	Cardiac Chamber Measurements Using Transesophageal Echocardiography: More Than Meets The Eye.	ASA, October 2-5, 2020	Virtual
Grosshuesch, Craig	1. Complete Heart Block after Incidental Placement of an AngioVac Suction Device Against the AV Node: A Case Report 2. Dollars for Diagnosis: An Analysis of TEE Billing for the Cardiac Anesthesiologist	SCA, April 24-27, 2021	Virtual
<b>CA-2 Residents</b>			
Brown, Kenneth	Point of Care Ultrasound as an Aid in Diagnosing Eosinophilic Myocarditis	ASA, October 2-5, 2020	Virtual
Capshew, Bryna	Persistent Vegetative State and 24 weeks Pregnant: A clinical and ethical dilemma	SOAP, May 14-16, 2021	Virtual
Erney, Austin	1. Intraoperative Anesthetic Considerations for a 3 year old girl with large Nasal Mass. Lessons learned. 2. Massive PE Masquerading as Subamassive. Lessons Learned.	ASA, October 2-5, 2020	Virtual

Erney, Austin	1. Intraoperative Anesthetic Considerations for a 3 year old girl with large Nasal Mass. Lessons learned. 2. Massive PE Masquerading as Subamassive. Lessons Learned.	SCA, April 24-27, 2021	Virtual
Gonzalez, Michael	The Merits of General Versus Neuraxial Anesthesia for Infected Prosthetic Joint Removal	ASA, October 2-5, 2020	Virtual
Gray, Logan	Challenging Case: Office-based Anesthesia For A Patient With Hypoplastic Left Heart Syndrome	ASA, October 2-5, 2020	Virtual
Gray, Logan	1. Evaluation of Simpson's Method to Determine Left Ventricular Ejection Fraction Using the Transgastric Two-chamber View 2. Quantitative vs Qualitative EF in the Cardiac OR 3. Evaluation of the Effectiveness of a Transesophageal Review Course	SCA, April 24-27, 2021	Virtual
Goldberg, Michael	Guided At-Home Pediatric Regional Anesthesia Education Using a Portable Ultrasound: Adapting an In-Person Workshop for Distance Learning	SEA, April 17, 2021	Virtual
Hart, Alexandria	Management of Idiopathic Pulmonary Artery Aneurysm	SCA, April 24-27, 2021	Virtual
Hunter, Dylan	Intraoperative Radiation for squamous cell carcinoma involving the carotid artery	ASA, October 2-5, 2020	Virtual
Hunter, Dylan	Teaching an Old Drug New Tricks: Changing the approach to the difficult pediatric airway	SPA, February 25-28, 2021	Virtual
Hunter, Dylan	Old Meets New - Is it time to change the approach to the difficult pediatric airway?	IARS, May 2021	Virtual
Johnson, Eric	Stress-Induced Cardiomyopathy Diagnosed Using Transesophageal Echocardiography During Extensive Burn Surgery	ASA, October 2-5, 2020	Virtual
Johnson, Eric	Liposomal Bupivacaine Sciatic and Femoral Nerve Block for Axillo-Profunda Bypass and Above-Knee Amputation: A Challenging Case	ASRA, November 2020	Virtual
Leone, Nathan	Recurrent Massive Right Atrial Thrombus Requiring Two Open Embolectomies: A Coin Collectors Tale	SCA, April 24-27, 2021	Virtual
Levene, Jacob	The Effects of Achondroplastic Dwarfism on Combined Anterior-Posterior Spinal Fusion	ASA, October 2-5, 2020	Virtual
McNulty, Luke	THE REGIONAL TRIFECTA: COMBINING THREE UPPER EXTREMITY NERVE BLOCKS FOR THE PNEUMONECTOMY PATIENT UNDERGOING COMPLEX AVF CREATION"	ASRA, November 2020	Virtual
Mills, Kathryn	There's an APP for That: iPads Improve Patient Satisfaction During Pain Procedures	ASA, October 2-5, 2020	Virtual
Pham, Tiffany	Perianesthetic Implications of Pheochromocytoma after recent NSTEMI During Covid-19 Pandemic	ASA, October 2-5, 2020	Virtual

Swearingen, Jordan	Cancel or Proceed? Polysubstance Abuse History in the First-start Orthopedic Trauma Add-on	ASA, October 2-5, 2020	Virtual
Swearingen, Jordan	Medically Challenging Cases: Preoperative Single-Shot Nerve Blocks for Tibial Shaft Fracture Repair in a Patient with Autonomic Dysreflexia	ASRA, November 20, 2020	Virtual
<b>CA-3 Residents</b>			
Akbar, Adam	1. Cold Case: Determining the cause for intraoperative hypothermia 2. Controlling Pain in Spades:Reduction in Intraoperative Opioid Requirements with Pudendal Nerve Blocks in Hypospadias Repair	ASA, October 2-5, 2020	Virtual
Allred, Amber	Instituting A Team-Based Huddle Prior to an Unscheduled Cesarean Delivery: A Quality Improvement Project	ASA, October 2-5, 2020	Virtual
Doan, Vivian	Left Pneumonectomy Performed Three Weeks After Orthotopic Heart Transplantation	ASA, October 2-5, 2020	Virtual
Doan, Vivian	Large Left Ventricular Aneurysm Causing Mass Effect	SCA, April 24-27, 2021	Virtual
Hart, Michael	Newborn Cyanosis During Post-Cesarean Skin-to-Skin in the OR	ASA, October 2-5, 2020	Virtual
Khatri, Nasir	1. Improving Social Media/Virtual Footprint at a Large Academic Anesthesiology Department 2. Implementation of Perioperative COVID-19 Patient Protocol	ASA, October 2-5, 2020	Virtual
Khatri, Nasir	New Onset Severe Leg Pain Following Spinal Cord Stimulator Implant	ASRA, November 2020	Virtual
Whitehouse, Anne	Lost In Translation: A Case Of Delayed Recognition Of Postpartum Hemorrhage	ASA, October 2-5, 2020	Virtual
Yatsky, Yaro	Perioperative Pressure Injury Awareness Assessment Among Anesthesiology Providers	ASA, October 2-5, 2020	Virtual

## Departmental Research Products

### **1. Published Abstracts (in alphabetical order of first author)**

Chen, F., Lee, Y. Hubal, R. (June, 2020) Testing of a Virtual Patient: Linguistic and Display Engagement Findings, poster presentation. iLRN 2020 virtual conference online and in virtual reality.

D'Ercole F, Dhanda V, Rhodes H, Stander S, McMillan D, Flynn D, Lamm M, Levi M. The Utility of Radio Frequency Identification Technology for Pyxis Inventory Optimization in the Operating Room. Oct 2-5 Virtual ASA 2020 eAbstract and Video.

Erin Dengler, Marwa Sidani. ASA 2020: Music as medicine: Music's effect on maternal anxiety around cesarean section.

Macchio LD, An X, Agala CB, Ji Y, Dougherty R, Koenen KC, Ressler K, Kessler R, McLean SA for the AURORA study investigators. Impact of the COVID-19 Pandemic on Adverse Neuropsychiatric Outcomes After Trauma Exposure. Poster Presentation. Annual Meeting of the Society of Biological Psychiatry. Online. April 30, 2021.

Nanda, Monika: The Case against See One-Do One-Teach One in Regional Anesthesiology Education. ASRA 2021, May 12, Orlando FL.

Raudales AM, Weiss NH, Contractor AA, Greene T, Short NA. (2020, November). Extending our understanding of the association between posttraumatic stress disorder and positive emotion dysregulation: A network analysis approach. Symposium presented at the 36th Annual Meeting of the International Society for Traumatic Stress Studies, Atlanta, GA.

Short NA, An X, Ji Y, D'Anza T, Lechner M, Greene S, Bell K, Black J, Buchanan J, Reese R, Ho J, Reed, Tungate A, Bollen K, Martin SL, Liberzon I, Rauch SAM, Sullivan M, McLean SA. Patient-Centered Classifications of Mental and Physical Health Symptoms after Sexual Assault: Results from a Large Prospective Study. In A. Basu & S. A. McLean (chairs), Understanding Lifetime Trauma Profiles, Multidimensional Posttraumatic Sequelae, and Treatment Implications from Large Cohort US Emergency Departments. Symposium presented at the annual meeting of the International Society for Traumatic Stress Studies: November, 2020, Atlanta, GA.

Short NA, Tungate AS, Bollen KA, Witkemper KD, Lechner M, Bell K, Black J, Buchanan J, Reese R, Reed GD, Liberzon I, Rauch SAM, Kessler RC, McLean SA. Acute stress symptoms mediate the transition from acute to persistent pain after sexual assault. In A. Rogers & N. A. Short (chairs), Improving treatment outcomes for comorbid chronic pain and posttraumatic stress: Recent translational findings. Symposium presented at the annual meeting of the Association for Behavioral and Cognitive Therapies: November, 2020, Philadelphia, PA.

Sidani M Mechanical Valve Thrombosis, Acute Myocardial Infarction, and Acute Heart Failure in Late Pregnancy: Pearls and Pitfalls, Session: Fellow Case Reports, Friday May 14, 2021, 3:00 PM – 4:20 PM

Smeltz AM, Kumar PA. An unusual LVOT obstruction, or just another artifact? Journal of Cardiothoracic and Vascular Anesthesia, accepted October 9, 2020

Tishad A, An X, Ji Y, Zend D, Jovanovic T, Stevens J, Ressler K, Kessler R, McLean SA for the AURORA study investigators. Association between RDoC Construct Negative Valence Domain Trajectories and Posttraumatic Stress Symptom Cluster Domain Trajectories in the Aftermath of Trauma. Poster Presentation. Annual Meeting of the Society of Biological Psychiatry. Online. April 29, 2021.

## **2. Journal Articles (in alphabetical order of first author)**

Analgesia. J Midwifery Womens Health. 2020 May;65(3):335-341. doi: 10.1111/jmwh.13124. Epub 2020 May 26. PMID: 32452155.

Arora H, Kumar PA Ruptured Sinus of Valsalva Aneurysm: Does TEE have a Role in the Era of Sophisticated Cardiac Imaging? JCVA 2020 Dec;34(12)3382-84

Arora H, Kumar PA Case Series of Vacuum-Assisted Thrombectomy: An Acceptable Trade-off in Evidence Based Methodology? JCVA 2020 Nov4:S1053-0770(20)31167-8

Austin AE, Naumann RB, Short NA. Associations of Medicaid expansion with suicide deaths among nonelderly adults. Am J Epidemiol.



Austin AE, Short NA. Sexual violence, mental health, and prescription opioid use and misuse. *Am J Prev Med*, in press.

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### **3. Books**

Evoked Potentials: Don't Approach the Surgeon or Neurophysiologist Until You Know These Principles- Anthony N. Passannante and Laurel E. Moore, Chapter 222 in Avoiding Common Anesthesia Errors, 2nd ed. , Marcuccu C, Gierl BT and Kirsch JR, Wolters Kluwer, Submitted Fall 2019, Published May 2020

#### 4. Grants Funding

TITLE: FKBP51 inhibition to prevent chronic pain following traumatic stress  
Grant Type (or Number): Rita Allen Award in Pain  
Grant Amount: \$150,000  
Funding Agency: Rita Allen Foundation  
Grant Period: 2020-2023  
Grant Status: AWARDED

Principal Investigator: Sarah Linnstaedt (0% effort)  
Industry sponsor: Global Blood Therapeutics  
Amount: \$94,233  
Project: Examination of the Impact of COVID-19 Pandemic on Management and Care of Sickle Cell Patients  
Submitted: June 23, 2020  
Martha Kenney

Nanda, Monika and Katie Davenport: UNC IHQI Improvement Scholar Project Support Grant for year 2021-22  
"Improving care of geriatric patients with hip fracture".

TITLE: FKBP51 antagonism to prevent chronic pain: optimizing efficacy & evaluating safety and mechanisms  
Grant Type (or Number): R01NS118563  
Grant Amount: \$3,317,472  
Funding Agency: NIH/NINDS  
Grant Period: 2020-2025  
Grant Status: AWARDED  
Principal Investigator: Sarah Linnstaedt and Sam McLean

TITLE: Development of a digital therapeutic targeting anxiety sensitivity to reduce PTSD-SUD in women presenting for emergency care after sexual assault  
Grant Number: K23DA054299  
Total Grant Amount: \$795,945.00  
Principal Investigator: Nicole A. Short (75% effort)  
Submitted: October, 2020

Dr. Nicole Short has received a \$165K grant from the Mayday Foundation to fund her pilot intervention to prevent chronic pain and posttraumatic stress in sexual assault survivors.

TITLE: Predicting PTSD using multi-omic epigenomic profiling via single cell sequencing analysis of human peripheral blood mononuclear cells  
Grant Type (or Number): R01XXX (not yet assigned)