

Anesthesia Research Collaborative Newsletter

Fall 2021 Newsletter

The Anesthesia Research Collaborative

Welcome to the inaugural **Anesthesia Research Collaborative Newsletter!**

Our newsletters present current or recently completed research projects led by anesthesiologists as well as ongoing studies led by investigators at the Division of Research that involve our clinicians.

In this issue, we will provide you with updates regarding research interests among TPMG physicians and DOR researchers, recent projects, and a list of recent publications which demonstrate the breadth of our collective expertise and interests.



A Deeper Look Inside This Update:

- Research highlight
- Anesthesiology research survey
- Upcoming events, funding & next steps
- Active and recent research projects
- Recent publications

Research Highlight: For our first research newsletter, we'd like to highlight Dr. Andrea Rubinstein, who currently serves as the Local Research Chair at Santa Rosa Kaiser Permanente.

Dr. Rubinstein is an anesthesiologist who specializes in chronic pain. Her research has focused on opiate related studies. She is one of the members of the Anesthesia Research Collaborative and serves as a mentor to other members.



Q: How did you get interested in research?

Dr. Rubinstein: I suppose I've been researcher all my life. I have always had a drive to figure out why things do or don't work and how to make them better. When I was five years old, I took all of the money out of my piggy bank and bought a microscope. I examined EVERYTHING under the lens of that microscope. I joined Kaiser Permanente in part because of the unique research opportunities available here. I knew I wouldn't thrive in a "publish or perish" academic environment but being able to supplement clinical work with research and keep it focused on the areas that were highly important to me, seemed like a perfect fit. KP has allowed me to ask the clinical questions that were plaguing my practice.

Q: How did you decide on what to research?

Dr. Rubinstein: The first research question came up within the first year of joining KP. As a pain physician I manage a lot of patients on opiates. One day a male patient of mine said to me "Hey doc, I think my testosterone is low." My initial response was to dismiss this thinking "how could you know what your hormone levels are?" But I took a big breath and I said to myself how many times have doctors dismissed patients, for saying something that they thought was silly only to discover that the patient was right. We all too often fall into the bias of "if this were true, I would know about it." So, I gave the patient the benefit of the doubt and I ordered a testosterone level.

The results? In this otherwise healthy 33-year-old man his testosterone was undetectable.

This led me to wonder if other men were also androgen-deficient related to their opiate use, so I started to check levels. It didn't take more than ten patients before I was pretty sure there was something going on: Seven of the first ten men had testosterone levels below normal levels. I looked in the medical literature and there was virtually nothing describing this relatively serious potential side effect of opiates. At that time, I shared an office with a neurologist, Alan Bernstein, who is also a researcher, and I said to him, "hey look at this. What do you think?". Without hesitation he said, "I think you have your first research project."

Dr. Bernstein connected me with a research mentor in the department of endocrinology, Dr. Jerry Minkoff, who at the time was the Local Research Chair at my facility who got excited by the question and gave me the information about how to apply for a community benefit grant. I was funded for that study and assigned a programmer and we showed that opioids, particularly long-acting opioids like MS-Contin and OxyContin, led to androgen deficiency in 70% of men. We

followed that first study of my own patient panel with a region-wide study that showed almost identical results.

That one patient who said, “Hey doc, I think my testosterone is low” led to a body of work that has pretty conclusively shown that opioids, particularly, long-acting opioids, suppress testosterone levels in men, and additionally, lead to osteoporosis, gynecomastia and a myriad of other secondary issues. These publications led to presentations at meetings, and ultimately our findings were cited by the CDC in their 2015 guidelines on opioid risk management.

It was one comment from one patient, that led to one question, that led to one grant (that led to subsequent grants), that led to two papers, that ultimately led to a change in practice that I believe has positively impacted the lives of many patients.

This is one of the accomplishments in my career of which I am most proud.

Q: What are other projects you are working on or have worked on?

Dr. Rubinstein: I have continued to work on other opiate related studies in which we’ve shown the relationship between the use of certain opioids and the development of hospital acquired pneumonia, opiate use and risk of developing sepsis, and opiate use as a risk factor for sleep apnea. I like to think that with each of these studies, our patients on opiates get a little bit safer as we understand the risks and how to mitigate them a little bit better.

At this point in my career, I enjoy helping others get excited about research.

Q: What wisdom would you like to share to those interested in research at KP?

Dr. Rubinstein: First, I think the most important bias we can fight against is the “if this were true, I would already know about it” bias. We tend to think anything we don’t know in our field must be false. This bias is a research killer. Instead, when you encounter something that seems off or weird or wrong, ask yourself, “could this be a research question?”

My second piece of advice is to get a research mentor. This may be someone in your specialty, such as the members of ARC, or they may be outside your specialty. It does not really matter, but I cannot overstate the value of having someone else, preferably someone with research experience, to bounce your ideas off of. Let them critique you, find the holes in your hypothesis and make your projects stronger. It isn’t always easy to hear criticism, but in the end your research will be stronger, and you are likely to be funded more often.

Talk to other researchers, call them up (their contact info is on every paper they publish). Research is lonely; they will want to talk. Ask them about methods, and interpretations and ideas for future studies.

Do not fall into the randomized control trial bias. There is so much great work that can be done that does not require a RCT. Leverage KPs amazing data, look for patterns, look for clues. If you find a “signal” maybe an RCT is in your future but don’t dismiss big data, a lot of clinical change comes without a single RCT.

KPNC Anesthesiologists are Interested in Research



43 Anesthesiologists responded to our recent survey expressing interest in research and provided recommendations about specific topic areas of interest.

37% of respondents indicated having previously participated in research by conducting patient chart reviews. 22% have participated in patient recruitment and 10% have led their own research studies.

37% conducted research during residency or as a fellow.

Respondents indicated high interest in learning more about community KPNC's Community Benefits, Delivery Science, clinical trials, and quality improvement funding mechanisms.

Survey Results

We asked you about high impact research questions related to anesthesiology that KP is uniquely positioned to answer. Research ideas identified included:

Regional anesthesia: Newer techniques and effectiveness; Exparel effectiveness compared to local anesthesia; utilization and diversity of block data among hospitals

Perioperative outcomes: ERAS outcomes; perioperative risk assessment in relation to postoperative care requirements and outcomes; PACU complications and LOS; PONV rates and mitigation strategies; Postoperative cognitive decline in elderly (comparing anesthetic techniques); outcomes in moribund patients; outcomes in joint surgery

Pain: Opioid use and cancer outcomes; Perioperative ketamine and mood change postoperatively; buprenorphine and outcomes; opioids and risk of infection

Obstetrics: Anesthesia techniques on OB quality indicators (i.e. rates of C/S, PDPH, pain scores, LOS); Spinal duramorph and post administration monitoring; autism in labor epidurals

Perioperative Medicine: POM model in prevention of complications, delays, cancellations; identification of sleep apnea and risk of complications

Medication related: Cost/benefit analysis of newer medications

Intraoperative care: Rocuronium/sugammadex outcomes in ESRD patients; short- and long-term effectiveness in non-opioid analgesics (i.e. ketamine, esmolol, magnesium, gabapentin); Opioid use in the OR; hypotension and postoperative stroke; NJ tube feeding and aspiration pneumonitis

Cardiac Surgery: Artificial intelligence for intraoperative/postoperative outcomes

Neuroanesthesia: Stroke care, epidural blood patches for cerebral hypotension

Hospital related: Variation in outcomes among different hospitals in acute and elective cases; hospital and systems operations data; PDPH dependent on service doing procedure

Pediatric: Perioperative outcomes, OSA utilization and organization in care

COVID-19: Perioperative outcomes in urgent/emergent surgery, elective surgery

Who's Interested in What?

Anesthesiologists interested in these research topics: an opportunity to collaborate

Perioperative Medicine

Amy Kim
Madeleine Bibat
Susan Guidici
Kevin Rhoden
Sipong Greg
Prakalapakorn
Jonathan Khersonsky
Karyn Daddio
Carly Dunlap
Norm Gunn
Michele Greenwood

Sameer Shah
Divakar Joshi
Arun Rama
Neeti Sajnani
William Chung
A. Kelly Gelenter
Michael Reinhard
Brandon Esenther
Stephen Sarafian
Farida Madraswala
Saba Dhiya

Howard Ching
Khodadad
Namiranian
J. Jerill Plunkett
Eric Huang
Serena Ng
Brad Cohn
Jasper Chen
Edward Yap
Chris Webb

Ambulatory Anesthesia

Amy Kim
Madeleine Bibat
Emily Ginsburg
Susan Guidici
Kevin Rhoden
Jonathan Khersonsky
Chris Webb

Carly Dunlap
Norm Gunn
Michele Greenwood
Sameer Shah
Michael Reinhard
Brandon Esenther

Saba Dhiya
Howard Ching
J. Jerill Plunkett
Jasper Chen
Edward Yap

Regional Anesthesia and Acute Pain

Amy Kim
Madeleine Bibat
Emily Ginsburg
Vu Duong
Susan Guidici
Kevin Rhoden
James Ko
Sipong Greg
Prakalapakorn
Jonathan Khersonsky

Karyn Daddio
Carly Dunlap
Norm Gunn
Sameer Shah
Divakar Joshi
William Chung
Jeremy Pearl
Toni Hall
A. Kelly Gelenter
Michael Reinhard

Darko Vodopich
Brandon Esenther
Howard Ching
J. Jerill Plunkett
Eric Huang
Serena Ng
Jasper Chen
Edward Yap
Chris Webb

Obstetric Anesthesia

Amy Kim
Eric Hunt
Kevin Rhoden

Sipong Greg
Prakalapakorn
Jonathan Khersonsky
Carly Dunlap

Michele Greenwood
William Chung
J. Jerill Plunkett
Serena Ng

Cardiac Anesthesia

Hanjo Ko
Judy Thai

J. Jerill Plunkett

Alex Edwards

Critical Care Medicine

Madeleine Bibat
Hanjo Ko
Jonathan Khersonsky
Neeti Sajnani

Toni Hall
Brandon Esenther
Khodadad
Namiranian

Brad Cohn
Alex Edwards
Chris Webb

Amy Kim
Susan Guidici
Karyn Daddio

Geriatric Anesthesia

Carly Dunlap
Sameer Shah
Neeti Sajjani

A. Kelly Gelenter
Farida Madraswala
Jasper Chen

Amy Kim
Jonathan Khersonsky
Sameer Shah

Neuro Anesthesia

Khodadad
Namiranian
J. Jerill Plunkett

Jasper Chen

Madeleine Bibat
Susan Guidici
James Ko

Pediatric Anesthesia

Carly Dunlap
Arun Rama
Toni Hall

Catherine Whang

Andrea Rubinstein

Pain

Upcoming Events

IARS AUA SOCCA 2022

Sponsor: International Anesthesia Research Society, Association of University Anesthesiologists, Society of Critical Care Anesthesiologists

Dates: March 17-21, 2022

Location: Hilton Hawaiian Village Waikiki Beach Resort, Honolulu, HI, USA

For more information: <https://meetings.iars.org/>

Anesthesiology 2021

Sponsor: American Society of Anesthesiologists

Dates: October 8-12, 2021

Location: San Diego, CA

For more information: <https://www.asahq.org/annualmeeting>

47th Annual Regional Anesthesia and Acute Pain Medicine Meeting

Sponsor: American Society of Regional Anesthesia and Pain medicine

Dates: March 31 - April 2, 2022

Location: Las Vegas, NV

For more information: <https://www.asra.com/events-education/event-item/2022/03/31/default-calendar/47th-annual-regional-anesthesiology-and-acute-pain-medicine-meeting>

20th Annual Pain Medicine Meeting

Sponsor: American Society of Regional Anesthesia and Pain medicine

Dates: November 18-20, 2021

Location: San Francisco, CA

For more information: <https://www.asra.com/events-education/pain-medicine-meeting>

SOAP 54th Annual Meeting

Sponsor: Society of Obstetric Anesthesia and Perinatology

Dates: May 11-15, 2022

Location: Chicago, IL

For more information: <https://www.soap.org/annual-meeting>

SPA 35th Annual Meeting

Sponsor: Society for Pediatric Anesthesia

Dates: October 8, 2021

Location: San Diego, CA

For more information: <https://pedsanesthesia.org/education-and-meetings/upcoming-meetings/>

SCA Annual Meeting

Sponsor: Society of Cardiovascular Anesthesiologists

Dates: May 14-17, 2022

Location: Palm Springs, CA

For more information: <https://scahq.org/education/meetings-and-events/annual-meetings-workshops/>

Internal Research Funding Opportunities

 **General Funding Opportunities**

 **Delivery Science and Applied Research**

 **Division of Research**

Next steps

The next Anesthesia Research Collaborative meeting planned is this coming **October 6th, 5 - 6pm**. Please email Edward.N.Yap@kp.org to be notified about the meeting. The goal of the meeting will be to go over current projects, discuss new projects and funding opportunities, and discuss any new research questions members are thinking about researching.

Active or Recently Completed Research Projects and Collaborations

Thank you to all who responded to our survey. The results were truly impressive! We identified current and recently completed research projects, as well as multiple scholarly work and activities led by our clinicians.

Community Benefit Grants

2020 - Yap, E. Evaluation of Anesthetic Techniques in Outpatient Total Joint Replacement Surgery

2019 - Rubinstein, A. Opioids and Sepsis.

Delivery Science Grants

2018 - Rubinstein, A. Opioid Tapering and the Effect of the Kaiser Permanente Opioid Safety Initiative

Rapid Analytics Unit

2021 - Yap, E. Cardiovascular risk management for noncardiac surgery: Association of preoperative care processes and outcomes.

2021 - Khersonsky, J. Evaluation of regional anesthesia and hospital resource utilization.

Collaborations

Recent Publications authored by Anesthesia Investigators (2018-present).

2021

Huysen MR, Tukey MH, Ely S, **Lo JC, Ray AL**, Ashiku SK. Transoral Minimally Invasive Tracheoplasty Technique for Cervical Tracheomalacia. *Ann Thorac Surg.* 2021;112(2):e101-e102. doi:10.1016/j.athoracsur.2020.11.047

Weyker PD, Webb CAJ, Flynn BC. Adverse Discharge Disposition (ADD): When Things Do Not ADD Up After Surgery. *J Cardiothorac Vasc Anesth.* 2021;35(2):490-491. doi:10.1053/j.jvca.2020.09.095

Harbell MW, Kolodzie K, Behrends M, Ma CB, Kinjo S, **Yap E**, Braehler MR, Aleshi P. Extraplexus versus intraplexus ultrasound-guided interscalene brachial plexus block for ambulatory arthroscopic shoulder surgery: A randomized controlled trial. *PLoS One.* 2021 Feb 18;16(2):e0246792. doi: 10.1371/journal.pone.0246792. PMID: 33600437; PMCID: PMC7891753.

Yap EN, Behrends M. Editorial Commentary: Neuraxial Anesthesia Improves Pain After Hip Arthroscopy but Risks Ambulatory Discharge Delay. *Arthroscopy.* 2021;37(1):147-148. doi:10.1016/j.arthro.2020.10.028

2020

Marquez JL, Wang E, Rodriguez ST, O'Connell C, Munshey F, **Darling C**, Tsui B, Caruso J, Caruso TJ. A retrospective cohort study of predictors and interventions that influence cooperation with mask induction in children. *Paediatr Anaesth.* 2020 Aug;30(8):867-873. doi: 10.1111/pan.13930. Epub 2020 Jun 25. PMID: 32452092.

Namiranian K, Siglin J, Sorkin JD. The incidence of persistent postoperative opioid use among U.S. veterans: A national study to identify risk factors. *J Clin Anesth.* 2021;68:110079. doi:10.1016/j.jclinane.2020.110079

Siglin J, Sorkin JD, **Namiranian K**. Incidence of Postoperative Opioid Overdose and New Diagnosis of Opioid Use Disorder Among US Veterans. *Am J Addict.* 2020;29(4):295-304. doi:10.1111/ajad.13022

Karmali RN, Ray GT, **Rubinstein AL**, Sterling SA, Weisner CM, Campbell CI. The role of substance use disorders in experiencing a repeat opioid overdose, and substance use treatment patterns among patients with a non-fatal opioid overdose. *Drug Alcohol Depend.* 2020;209:107923. doi:10.1016/j.drugalcdep.2020.107923

Weyker PD, Webb CA. Establishing a patient centered, outpatient total joint home recovery program within an integrated healthcare system. *Pain Manag.* 2020;10(1):23-41. doi:10.2217/pmt-2019-0040

Flynn B, Stiles K, Fritzel A, **Weyker P**, Ivascu N, Nazir N, Lozenski J. Survey of Workplace Perceptions of Female Anesthesiologists. *Anesth Essays Res.* 2020 Apr-Jun;14(2):177-182. doi: 10.4103/aer.AER_17_20. Epub 2020 Oct 12. PMID: 33487811; PMCID: PMC7819393.

Chadha R, Pai SL, Aniskevich S, McClain R, Egan B, **Webb C**, Sakai T. Nonopioid Modalities for Acute Postoperative Pain in Abdominal Transplant Recipients. *Transplantation.* 2020 Apr;104(4):694-699. doi: 10.1097/TP.0000000000003053. PMID: 31815897.

2019

Caruso TJ, Rama A, Knight LJ, Gonzales R, Munshey F, **Darling C**, Chen M, Sharek PJ. Operating Room Codes Redefined: A Highly Reliable Model Integrating the Core Hospital Code Team. *Pediatr Qual Saf.* 2019 Apr 12;4(3):e172. doi: 10.1097/pq9.0000000000000172. PMID: 31579871; PMCID: PMC6594783.

Lin C, **Darling C**, Tsui BCH. Practical Regional Anesthesia Guide for Elderly Patients. *Drugs Aging.* 2019;36(3):213-234. doi:10.1007/s40266-018-00631-y

Hedderson M, **Lee D, Hunt E**, et al. Enhanced Recovery After Surgery to Change Process Measures and Reduce Opioid Use After Cesarean Delivery: A Quality Improvement Initiative [published correction appears in *Obstet Gynecol.* 2019 Nov;134(5):1121]. *Obstet Gynecol.* 2019;134(3):511-519. doi:10.1097/AOG.0000000000003406

Namiranian K, Siglin J, Sorkin JD, Norris EJ, Aghevli M, Covington EC. Postoperative opioid misuse in patients with opioid use disorders maintained on opioid agonist treatment. *J Subst Abuse Treat.* 2020;109:8-13. doi:10.1016/j.jsat.2019.10.007

Damrose JF, Eropkin W, **Ng S**, Cale S, Banerjee S. The Critical Response Team in Airway Emergencies. *Perm J.* 2019;23:18-219. doi:10.7812/TPP/18-219

Hastie J, Panzer OPF, **Weyker P**, Flynn BC. Miniaturized Echocardiography in the Cardiac Intensive Care Unit. *J Cardiothorac Vasc Anesth.* 2019;33(6):1540-1547. doi:10.1053/j.jvca.2018.08.199

2018

Darling CE, Lin C, Caruso TJ, Tsui BCH. Lumbar erector spinae plane catheter via a thoracic approach for iliac crest autograft in a pediatric patient. *J Clin Anesth.* 2019;54:164-165. doi:10.1016/j.jclinane.2018.12.008

Darling CE, Hoffinger SA, Rodriguez S, Tsui BCH. Saphenous nerve block for medial foot surgery: Saphenous nerve beyond cutaneous sensory distribution. *J Clin Anesth.* 2019;54:160-161. doi:10.1016/j.jclinane.2018.12.012

Darling CE, Pun SY, Caruso TJ, Tsui BCH. Successful directional thoracic erector spinae plane block after failed lumbar plexus block in hip joint and proximal femur surgery. *J Clin Anesth.* 2018;49:1-2. doi:10.1016/j.jclinane.2018.05.002

Caruso TJ, Gupta A, Sidell DR, **Darling C**, Rodriguez S, Fonseca A, Tsui B. The successful application of high flow nasal oxygen during microdirect laryngoscopy and bronchoscopy in patients under 7 kg. *J Clin Anesth.* 2019 Feb;52:27-28. doi: 10.1016/j.jclinane.2018.08.027. Epub 2018 Aug 25. PMID: 30153541.

Darling C, Chao S, Ramamurthi R, Tsui B. Letter to the Editor: Early Consequences of Pectus Excavatum Surgery on Self-Esteem and General Quality of Life. *World J Surg.* 2019;43(3):963-964. doi:10.1007/s00268-018-4704-9

Namiranian K, Norris EJ, Jolissaint JG, Patel JB, Lombardi CM. Impact of Multidisciplinary Spine Conferences on Surgical Planning and Perioperative Care in Elective Lumbar Spine Surgeries. *Asian Spine J.* 2018;12(5):854-861. doi:10.31616/asj.2018.12.5.854

Campbell CI, Bahorik AL, VanVeldhuisen P, Weisner C, **Rubinstein AL**, Ray GT. Use of a prescription opioid registry to examine opioid misuse and overdose in an integrated health system. *Prev Med.* 2018 May;110:31-37. doi: 10.1016/j.ypmed.2018.01.019. Epub 2018 Feb 2. PMID: 29410132; PMCID: PMC6034705.

Webb CAJ, Madison S, Goodman SB, Mariano ER, Horn JL. Perioperative Pain Management for Total Knee Arthroplasty: Need More Focus on the Forest and Less on the Trees. *Anesthesiology.* 2018;128(2):420-421. doi:10.1097/ALN.0000000000001992

Webb CAJ, Kim TE. Establishing an Acute Pain Service in Private Practice and Updates on Regional Anesthesia Billing. *Anesthesiol Clin.* 2018;36(3):333-344. doi:10.1016/j.anclin.2018.04.005

Woodland DC, Randall Cooper C, Farzan Rashid M, Rosario VL, **Weyker PD**, Weintraub J, Bentley-Hibbert S, Kluger MD. Routine chest X-ray is unnecessary after ultrasound-guided central venous line placement in the operating room. *J Crit Care.* 2018 Aug;46:13-16. doi: 10.1016/j.jcrc.2018.03.027. Epub 2018 Mar 28. PMID: 29627658.

Behrends M, **Yap EN**, Zhang AL, et al. Preoperative Fascia Iliaca Block Does Not Improve Analgesia after Arthroscopic Hip Surgery, but Causes Quadriceps Muscles Weakness: A Randomized, Double-blind Trial. *Anesthesiology.* 2018;129(3):536-543. doi:10.1097/ALN.0000000000002321

Chiu C, Aleshi P, Esserman LJ, Inglis-Arkell C, **Yap E**, Whitlock EL, Harbell MW. Improved analgesia and reduced post-operative nausea and vomiting after implementation of an enhanced recovery after surgery (ERAS) pathway for total mastectomy. *BMC Anesthesiol.*

Recent Abstracts or Presentations authored by Anesthesia Investigators.

Yap E, Wei J, **Ng K**, **Webb C**, Behrends M. Comparative analysis between general and neuraxial anesthesia for outpatient total hip and knee arthroplasty: a cohort study. International Anesthesia Research Society Annual Meeting, 2021

Ng K, **Yap E**, Behrends M, **Webb C**. General versus neuraxial anesthesia for outpatient total knee arthroplasty: differences in patient demographics and outcomes. International Anesthesia Research Society Annual Meeting, 2021

Sharp A, Gray A, **Yap E**. The Role of Brachial Plexus Blockade in the Management of Vasospasm-Induced Critical Hand Ischemia. American Society of Regional Anesthesia and Pain Medicine Annual Meeting, 2021

Caruso, T., Menendez, M., Fonseca, A., Tsui, J., **Darling, C.**, O'Connell, C., Sidell, D. Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE) Use in Pediatric Populations for Microdirect Laryngoscopy and Bronchoscopy. American Society of Anesthesiology, San Francisco, CA. Oct 16, 2018. Poster Presentation.

Lin, C., **Darling C.**, Wang, E., Truong, M., Chang K., Tsui, B. Erector Spinae Plane Catheters for Pain Management of Rib Cartilage Harvesting for Stage 1 Microtia Reconstruction: A Retrospective Study. American Society of Anesthesiology, San Francisco, CA. Oct 15, 2018. Poster Presentation.

Bhargava, V., Aarstu, A., **Darling, C.**, Wang, E., Kache, S. Differential lung ventilation in a pediatric patient on ECMO using a bronchial blocker. A case report. World Federation of Pediatric Intensive & Critical Care Societies, Singapore June 9-13, 2018. Poster Presentation.

Darling, C., Pun, S., Caruso, T., Tsui, B. Successful Directional Thoracic Erector Spinae Plane Block after Failed Lumbar Plexus Block in Hip joint and Proximal Femur Surgery. Stanford Anesthesia Research Awards Dinner, Palo Alto, CA. June 11, 2018. Poster Presentation.

Lin, C. **Darling, C.**, Boltz, G., Navaratnam, M., Kamra, K., Maeda, K., Tsui, B. Erector Spinae Plane Catheter in the Regional Anesthesia Cardiothoracic Enhanced Recovery (RACER) Program: A Retrospective Study. Stanford Anesthesia Research Awards Dinner, Palo Alto, CA. June 11, 2018. Poster Presentation.

Lin, C., **Darling, C.**, Wang, E., Truong, M., Chang K., Tsui, B. Erector Spinae Plane Catheters for Pain Management of Rib Cartilage Harvesting for Stage 1 Microtia Reconstruction: A

Retrospective Study. Stanford Anesthesia Research Awards Dinner, Palo Alto, CA. June 11, 2018. Poster Presentation.

Darling, C., Tsui, B., Caruso, T. The incidence of desaturation during microlaryngoscopy and bronchoscopy: a quality control review in a single institution. International Anesthesia Research Society, Chicago, IL. April 28, 2018. Poster Presentation.

Caruso, T., O'Connell, C., Wang E., **Darling, C.**, et al. A retrospective cohort study of predictors and interventions that influence cooperation with pediatric anesthesia induction. International Anesthesia Research Society, Chicago, IL. April 28, 2018. Poster Presentation.

Darling, C., Ramamurthi, R., Chao, S., Tsui, B. Bilateral Automated Intermittent Bolus Erector Spinae Plane Blocks for Nuss Procedure. American Society of Regional Anesthesia, New York, NY. April 20, 2018. Poster Presentation.

Caruso, T., **Darling, C.**, Munshey, F., et al. Redesigning the Intraoperative Emergency Response. Society of Pediatric Anesthesia, Phoenix, AZ. March 24, 2018. Poster Presentation.

Caruso, T., Munshey, F., **Darling, C.**, et al. Utilizing Quality Improvement Methodology to Implement a Pediatric Universal Protocol. Society of Pediatric Anesthesia, Phoenix, AZ. March 24, 2018. Poster Presentation.

Recent Scholarly Work by Anesthesia Investigators.

Book Chapters and Reviews (2018 - Present)

Weyker P, Webb C. "Metabolic Acidosis". Cardiothoracic Critical Care edited by Drs. Flynn, Ivascu, Moitra, Gaffney", 1st Edition Oxford University Press. In press. 2019

Weyker P, Webb, C. Book Review: Comprehensive Pain Management in the Rehabilitation Patient. Anesthesia & Analgesia: July 2018 Volume 127 Issue 1 p 299.

Webb C, Weyker P. "Aortic Pathology". Consults in Obstetric Anesthesiology", 1st Edition Editor: Suzanne Mankowitz, MD. Springer International Publishing. 2018

Presentations (2018 - Present)

Hunt, E. Reducing Cesarean Section Surgical Site Infections: Multidisciplinary Implementation of a Novel Bundle within an Integrated Health Care System. Society of Obstetric Anesthesia and Perinatology Annual Meeting. Virtual; May 2021.

Rubinstein, A. The Case for Buprenorphine. California Society of Anesthesiologists. Virtual; April 2021.

Rubinstein, A. Long-Acting Opioids: Have we Been Duped? California Society of Addiction Medicine. Virtual; August 2020.

Rubinstein, A. Pain and Addiction, The Lines Begin to Blur. California Society of Addiction Medicine. Anaheim, Ca; August 2020.

Hunt, E. Setting up and Evaluation of a Successful ERAS Pathway for Cesarean Delivery, Society of Obstetric Anesthesia and Perinatology Sol Schnider Meeting. San Francisco, CA; March, 2019.

Darling, C. Overview of opiate-sparing analgesics in pediatric anesthesia, Faculty Lecture. Visiting Scholars in Pediatric Anesthesia Program. San Francisco, CA; June 2018

Darling, C. Perioperative Immersive Technologies. Workshop Session (Organized with international representation). Society for Pediatric Anesthesiology Annual Conference. Phoenix, AZ; March 2018.

Weyker, P. Surface Sonography Workshop - Ultrasound teaching, basic and advanced. NYSSA/PGA Annual Meeting, New York, NY, 2019.

Other Scholarly Work (2018 - Present)

Whang, C. Pediatric anesthesia lecturer for UC Davis pediatric conference.

Whang, C. CSA District 1 Delegate.

Weyker, P. American Board of Anesthesiology Board Question writer for Maintenance of Certification (MOCA minute) Exam in Anesthesiology.