STA Interface
NEWSLETTER

SOCIETY FOR TECHNOLOGY IN ANESTHESIA • NOVEMBER 2021

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President's Message

MAXIME CANNESSON, MD, PHD
University of California, Los Angeles

"As I am writing these lines, the number of patients impacted by Covid-19 is finally starting to go down. We hope we are getting close to the end of the most acute phase of an outbreak that has tested the resilience of our healthcare systems to its extreme limits. It also tested our resilience as a scientific society and our resilience as individuals. Many of us have lost loved ones to this disease. The least affluent parts of our own community have been disproportionately harmed. Many unknowns remain: The impact of new variants and the vaccination roll-up are just a few of them. But we start seeing the light at the end of the tunnel."

I wrote the message to members above as the incoming President of the Society for Technology in Anesthesia (STA) in March 2021. We know what happened next. Ironically, I could just have started this message today with almost the same exact introduction I wrote nine months ago.

This year has been challenging, but our community has remained strong and engaged. The STA stands on strong foundations. These foundations rely on those who have been the founders of our Society and on their constant guidance and stewardship, as well as on the energy and enthusiasm that new members and leaders are bringing to our organization.

Over the past two years, we have made significant contributions to the development of technologies in the perioperative setting that have helped our profession navigate the COVID-19 crisis. Since the outbreak, our members have demonstrated their leadership to both patients and healthcare professionals' safety through their expertise in technology and engineering. Beside the extraordinary clinical care our members have provided during the past 18 months, many of them have also brought their expertise in technologies and engineering to improve processes of care locally and nationally.

Our members have been involved in countless initiatives focusing on perioperative technologies and COVID-19 such as the safe use of HEPA filters, the purposing of anesthesia machines as ICU ventilators,

President's Message *continues on page 3*

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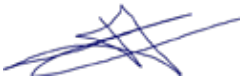
President's Message *continues from page 1*

the development of safe intubation devices, the management of PPE, the implementation of COVID-19 testing in the perioperative period, the rise of tele-medicine, and many others. Our industry partners have also played a critical role and have helped us tremendously. The partnership between engineers, physicians, and industry, is one of the cornerstones of the STA identity. This partnership has never been as meaningful as it has been since the management of this pandemic.

The year to come will hopefully bring what we are all missing: the social connection. The social distance necessitated by the pandemic made us crave celebrations and camaraderie that were routine before. We were hoping to return to an in-person Annual Meeting in January 2022, but the uncertainty that remains forced us to postpone for another year. We will hopefully have the chance to reconnect during the International Anesthesia Research Society (IARS) in Hawaii in April 2022, and then at the STA 2023 Annual Meeting in Las Vegas, NV, from January 11-14, 2023.

I look forward to passing the baton to Dr. Lara Brewer. I know that the STA will keep on thriving under her leadership and I look forward to seeing you all virtually at the STA 2022 Virtual Annual Meeting, held January 13-15, 2022. Registration is now open on the STA website: www.stahq.org/events/annual-meeting.



Maxime Cannesson, MD, PhD
STA President

Message from the Editor

JONATHAN M. TAN, MD, MPH, MBI, FASA
STA Communications Committee Chair
Children's Hospital of Los Angeles

The past 18 months have been and continues to be a challenging time for all of us. Reflecting on this time, so much has changed in our professional and personal lives as a result of COVID-19. Brought to the forefront of this worldwide healthcare crisis was the resolve of health care professionals and the health care scientific industry to meet the needs of individual patients and entire nations. The role of engineering, basic science, clinical informatics, and tried and true public health measures have been and continue to be essential to working our world back to a sense of normal.

We have decided in this issue of the STA *Interface* to uniquely combine the issues from 2021. In this issue, we have a fantastic recap of the 2021 Annual Meeting from Co-Chair Matthias Gorges, PhD and Ira Hofer, MD. The recap is accompanied by several screen shots of the virtual meeting with many notable long standing STA members and new members alike. Important STA abstract award winners from the meeting are also highlighted in this issue. Lastly, the ever-important 2022 Board of Directors Election candidate statements are included in this issue. Please look at the wonderful candidates who will help direct the future of the STA in the years ahead and cast your vote!

By the time this is in print, the STA Board has made the decision to have the 2022 STA Annual Meeting be virtual due to the uncertainty of COVID-19. They were hard at work these past few months speaking with STA members about the uncertainty of travel and safety. It is amazing to see the effort and thoughtfulness that the Board has had to consider the needs and comfort of the membership. With such a successful first virtual STA Annual Meeting, I have no doubt that the 2022 STA Annual Meeting will continue to be a success. The STA is more important than ever before, and we hope to continue to communicate that here in the STA *Interface*.

Jonathan M. Tan, MD MPH MBI FASA
STA Communications Chair

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Perspectives from our Membership: *The Society for Technology in Anesthesia: Then and Now*

DAVID STERN, MD
University of Rochester

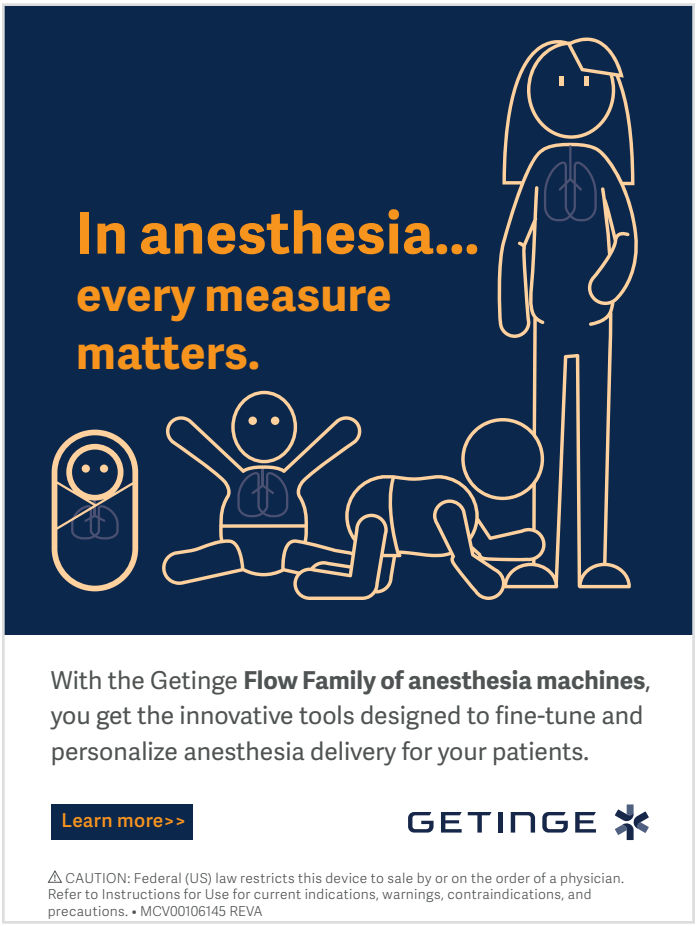
My background is in physics and engineering, as well as medicine, so I was naturally drawn to the technical side of the specialty, which led me to become involved with the Society for Technology in Anesthesia (STA).

In 1998, I ran a workshop on troubleshooting Simulator Equipment, and I moderated other simulator workshops the following day. The University of Rochester was one of the early adopters of Medical Simulation in the clinical training of residents and medical students, and we planned and ran the first three national simulation conferences. The first two meetings were in Rochester, and we then co-hosted with STA in 1998. The workshops were intended to help others who were just purchasing simulation equipment and starting their own simulation programs so they could benefit from our experiences. Back then, simulators were very much in beta development, and it was up to the users to do most of the troubleshooting. The meetings involved a great deal of one-on-one discussion and had a very personal feel.

Over the years, the STA membership has grown in size and scope, becoming more international and multicultural. Decades ago, meetings tended to attract small groups of technically minded anesthesiologists from University backgrounds. They met to share new ideas, equipment, and techniques, as well as home-brew solutions to problems. There was a lot of small-scale innovation in solving day-to-day clinical problems with anesthesia machines and monitors. Today, much of that happens at the equipment manufacturer's level, paralleling the evolution of electronic devices and automobiles that can no longer be easily developed or repaired without the benefit of advanced and expensive diagnostic equipment, and teams of highly trained individuals. Yet, there is still a role for the lone clinician in bringing problems and potential solutions to the attention of others.

From my experience with the 2021 Virtual Annual Meeting, I see that there continues to be a friendly atmosphere within STA, where ideas can be shared and discussed, and that members continue to deliver high quality presentations.

**Dr. David Stern was also the winner of the STA 2021 Virtual Annual Meeting Asynchronous Content Scavenger Hunt! Congratulations!*



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STA 2021 Annual Meeting Recap

MATTHIAS GÖRGES, PHD
2021 Annual Meeting Program Co-Chair
British Columbia Children's Hospital

IRA HOFER, MD
2021 Annual Meeting Program Co-Chair
Ronald Reagan UCLA Medical Center

This year's STA annual meeting certainly was different. When the two of us signed up to be co-chairs of the 2021 Annual Meeting we never could have imagined this would be the first time in the STA's 31-year history that we would not be able to meet in person. While it would have been fantastic to see everyone in Naples, we feel that our first-ever virtual annual meeting was a success and brought some innovations that will probably shape part of our future in-person meetings.

This year's meeting featured five panels on timely topics by a diverse group of expert presenters from medicine, engineering, data science, and industry covering topics like rapid innovation, virtual care/telemedicine, staff wellness, retrospective data analytics, and pediatrics. In addition to the panels, there were two half-hour breakout sessions for our 30 posters-in-minute, several presentations from our industry partners, and a surprise last minute discussion with a representative from the FDA - all in a single day on Zoom.

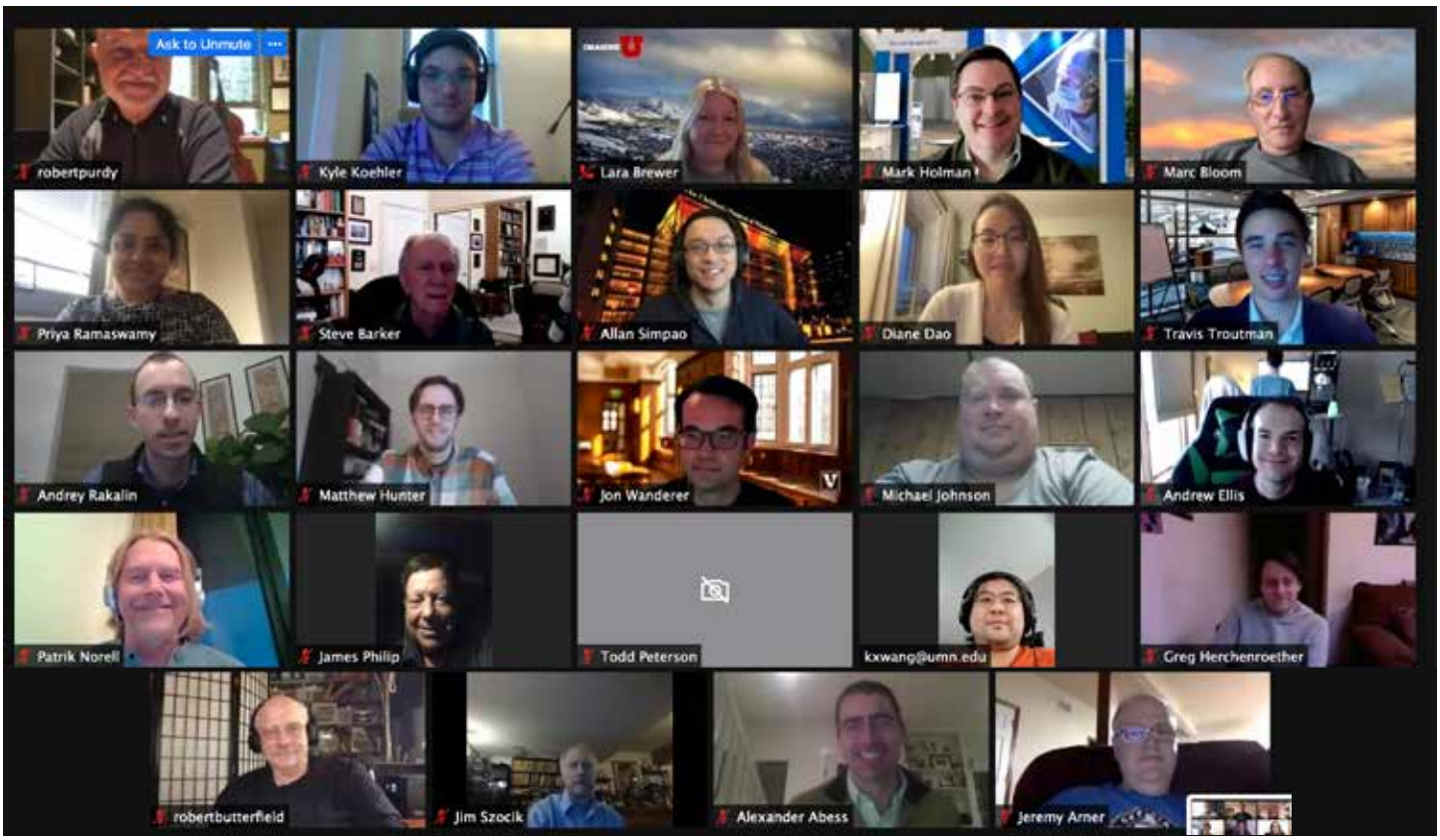
To accommodate the logistics of squeezing the meeting into a single day and keeping the content as interactive as possible, we had some asynchronous content available on the web including our 30 posters-in-a-minute, a wonderful Gravenstein lecture from Dr. Feldman, and extended presentations by our abstract award winners. Attendees were able to watch this content in their own time and we even had a scavenger hunt based on their content, which was won by Dr. David Stern with a runner-up prize to Dr. Patrick McCormick – congratulations!

The virtual format provided many challenges, but it also created some opportunities. We peaked at over 130 simultaneous attendees on Zoom, joining us from five continents! That is something that certainly would have been harder in person. We also discovered a very popular and active chat with over 300 public messages being exchanged and shared – and who knows how many private ones. Most attendees said they hoped we could have this kind of chat even when we return in person. For those of you that weren't able to join us or missed part of the meeting, all of our sessions have been available online and members can claim CME credit for the rest of the year.

We would be remiss if we didn't thank our amazing professional staff, Marie Odden, our abstract co-chairs, Drs. John Pearson and Jack Wasey, our fantastic moderators and speakers, our industry partners for their support, as well as all of our attendees for making the 2021 STA Virtual Annual Meeting a memorable one, even if it was only for Zoom group pictures. While many of us have been forced to focus on other healthcare issues throughout 2020 and 2021, it is wonderful to know that the light of anesthesia technology innovation is undimmed.

Annual Meeting Recap *continues on next page*

Annual Meeting Recap *continued from previous page*



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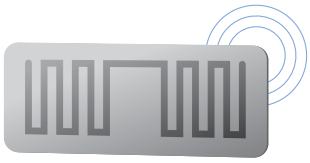

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STA 2021 Annual Meeting Abstract Winners

Abstracts Listed on pages 12-17

Best in Show

Reduction of Preoperative Anxiety Using Virtual Reality vs Midazolam: A Randomized Controlled Trial

Presenting Author: Anthony Koo, MD, Phoenix Children's Hospital

Best Clinical Application

Analgesic Monitoring Indices in Response to Noxious Stimuli of Laparoscopic Cystectomy Surgery and Their Time Optimization

Presenting Author: Shen-Chih Wang, MD, Taipei Veteran General Hospital

Excellence in Technology

Measuring the Performance of Multi-Pump Infusion Systems with Spectrophotometry

Presenting Author: David Arney, PhD

2021 STA Annual Meeting Abstract Winners

Best in Show

Reduction of Preoperative Anxiety Using Virtual Reality vs Midazolam: A Randomized Controlled Trial

Presenting Author: Anthony Koo, MD, Phoenix Children's Hospital

Co-Authors: Sanjana Khanna, BS, Sarah Okot, BS, CCLS, Matthew Pankratz, PhD, Vanessa Pohl, BS, Neil Singhal, MD, Phoenix Children's Hospital

Background/Introduction: More than 50% of pediatric patients experience significant stress and anxiety prior to surgery[1]. High anxiety can result in increased postoperative pain, increased analgesic consumption and delayed recovery[2]. In order to reduce this preoperative anxiety, multiple therapeutic modalities have been developed, including the use of distraction, such as playing video games, watching movies, and listening to music. In severe cases of anxiety, anxiolytic and sedative medications like midazolam are used. However, given the acknowledged drawbacks of medications, including the risk of paradoxical reactions to the drug, alternatives to medication for reducing preoperative anxiety in patients may be useful. Our study compares the use of Virtual Reality (VR) to midazolam in reducing preoperative anxiety in surgical patients, and assesses differences in induction compliance, emergence delirium, pain scores, and opioid use in VR vs midazolam-treated patients.

Methods: 27 first-time surgical patients between the ages of 5-11 undergoing tonsillectomy or tonsillectomy and adenoidectomy procedures were randomly assigned to either receive midazolam (0.5mg/kg up to 25mg) or play an interactive underwater-themed immersion game using VR. The Modified Yale Preoperative Anxiety Scale (mYPAS) was administered by a single child life specialist preoperatively, and only patients who reached a threshold of >40 on mYPAS scoring were enrolled (scale range: 23-100). Additional anxiety measurement was tested using the adult and child State-Trait Anxiety Inventory (STAI). Midazolam or VR was administered prior to transport to the OR, and mYPAS was scored again at the time of separation from family. The Induction Compliance Checklist (ICC) was utilized for further data collection and assessment of patients at the time of anesthesia induction. VR-treated patients continued use of the VR headset up to and through mask induction. A standardized anesthesia induction protocol was used for all patients. The Pediatric Anesthesia Emergence Delirium scale (PAED) was administered at emergence, post-operatively. Postoperative nurses scored pain and administered IV pain medication as needed. Group means and standard deviations were reported and compared with 2-sided *t* tests.

Results: Interim results showed that 57% of first time surgery patients scored with mYPAS had scores >40, indicating anxiety. The mYPAS anxiety scores dropped 21.67 ±12.5 points following midazolam treatment ($p<0.001$) and dropped 28.3 ±9.2 points following VR treatment ($p<0.001$). There was no significant difference in mYPAS scores between groups following treatment (midazolam= 32.0±5.2; VR= 25.6±5.1; $p= 0.11$). There were no significant differences between midazolam and VR-treated groups in the Induction Compliance Checklist (ICC), emergence delirium (PAED), peak postoperative pain scores, and medication use for pain control, post-operatively. This study is currently ongoing.

Conclusion: Based on these results, VR appears to provide an equivalent alternative to midazolam in reducing preoperative anxiety. Distraction and immersion with VR can help minimize preoperative anxiety during peak stress events, including separation from parents, arrival in the OR, and anesthetic induction. VR was equivalent to midazolam in preoperative induction compliance, and, postoperatively, patients in both groups had similar emergence

2021 STA Annual Meeting Abstract Winners

Best in Show

delirium, pain scoring, and pain medication use. The patient population for this study was limited and additional studies will be necessary to confirm if the conclusions formed are generalizable to the entire pediatric population, including patients with developmental delays and previous surgical experience undergoing a variety of procedures.

References:

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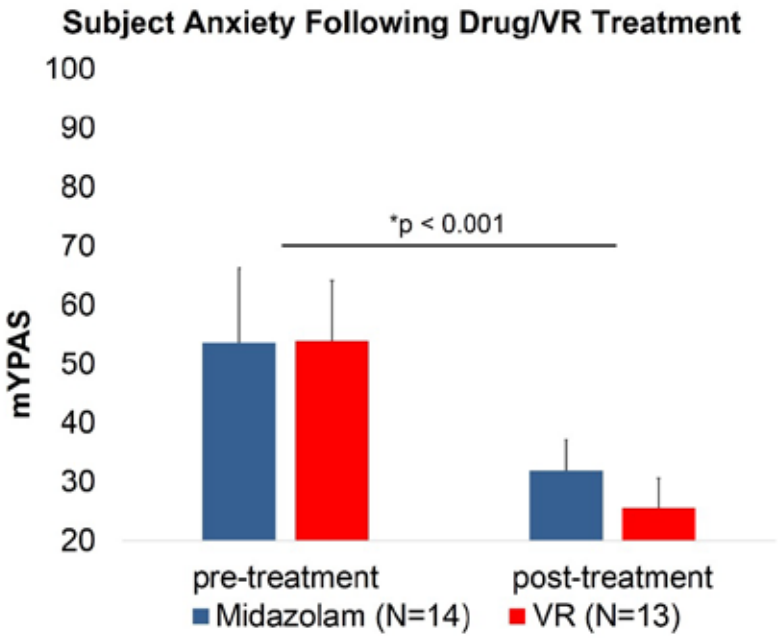
2. Kain ZN, Mayes LC, Caldwell-Andrews AA, Karas DE, McClain BC. Preoperative anxiety, postoperative pain, and behavioral recovery in young children undergoing surgery. Pediatrics. 2006; 118(2):651-8.



2021 STA Annual Meeting Abstract Winners

Best in Clinical Application

Analgesic Monitoring Indices in Response to Noxious Stimuli of Laparoscopic Cystectomy Surgery and Their Time Optimization

Presenting Author: Shen-Chih Wang, MD, Taipei Veteran General Hospital

Co-Author: Yu-Ting Lin MD, Shen-Chih Wang, MD, Chien-Kun Ting, MD, Shin-E Wang, MD, Yi-Ming Shyr, MD, Taipei Veteran General Hospital

Introduction: Adequate pain relief is a sophisticated work for perioperative patient management. Parameters, based on different physiological data, including heart rate, autonomic nervous system and electroencephalographic (EEG) activity are developed to reflect dynamic changes of noxious stimuli in surgery. However, the duration from the painful stimulus to the peak index of these parameters are not elucidated. Several factors are involved, such as the physiologic response time and the time window of data processing in the instrument. The knowledge of such time profiles of parameters for pain may help the anesthesiologist to assess the analgesia-nociception balance more accurately.
In this study, we investigate the time profile of indices from several analgesic monitoring instruments in response to uniform noxious stimuli. The precise time points facilitate the subsequent probing of the best time duration of index responses in terms of the group receiver operating characteristic (ROC) area.

Methods: After obtaining institutional ethic committee approval, we conducted the prospective observation study to collect intraoperative data from the monitoring instrument from patient undergoing laparoscopic cholecystectomy surgery with each informed consent. EEG monitoring instruments including Bispectral Index (BIS), Entropy module (Spectral Entropy and Response Entropy), Analgesia Nociception Index (ANI), and Surgical Pleth Index (SPI) as well as the standard patient monitor (GE CARESCAPE B850, GE Healthcare, Chicago, IL) were attached with corresponding sensors per clinical standard and manufacturers' instructions. The data were recording for offline analysis. We recorded the exact time stamps of sequential noxious stimuli, including endotracheal intubation, skin incision, peritoneal penetration via Kelly hemostatic forceps, laparoscopic trocar tube insertion, ballbladder pinch, cystic duct clamping, cystic duct cutting, cystic vessel clamping, cystic vessel cutting.

The data analysis is performed with respect to the stimulus time to find the "best" time interval after. With respect to each stimulus, we use the one minute before as the "pre-stimulus" period and the subsequent two minutes as the interval to search for the "optimal" post-stimulus period. After normalizing data of "potential" post-stimulus period by the mean value of pre-stimulus period with respect to each case and index, we use the group area under the ROC curve (AUC) as the fitness function to obtain the optimal post-stimulus period. Data between 10% and 90% percentile were considered for calculation. The analysis was performed by R language (ver. 4.0.3) and the R package *pROC* (ver. 1.16.2).

Results: SPI and ANI are the best two noxious indices across all noxious stimuli except the endotracheal intubation. The time optimization shows stronger responses in somatic area than visceral area, while the pinch of gallbladder and the cystic duct clipping are the most two visceral stimuli according to SPI and ANI index. The maximum response time of SPI (73.5s) is earlier than that of ANI (100.0s). EEG derived indices are relatively obtuse.

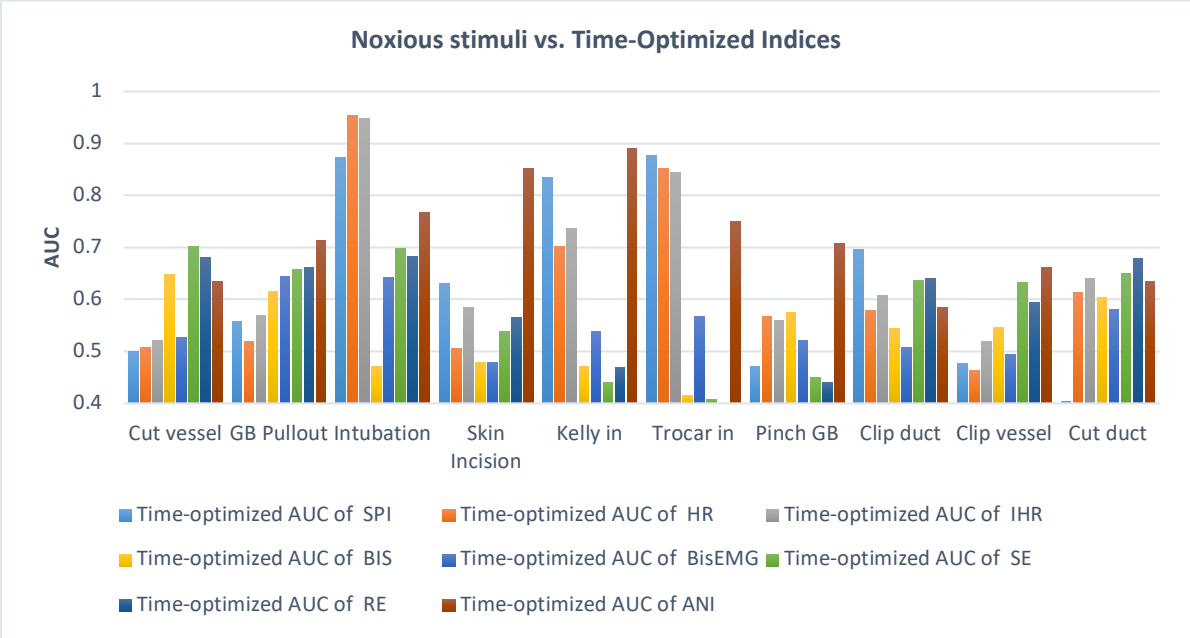
Conclusions: The strengths and time profiles of indices are distinct and probably valuable for Intraoperative analgesics administration.

2021 STA Annual Meeting Abstract Winners

Best in Clinical Application

page 2

Figure:



2021 STA Annual Meeting Abstract Winners

Excellence in Technology

Measuring the Performance of Multi-Pump Infusion Systems with Spectrophotometry

Presenting Author: David Arney, PhD
Co-Authors: Nathaniel M. Sims, MD; Lauren E. Gibson, MD; Anders S. Knudsen; Robert A. Peterfreund, MD, PhD

Background: Infused drugs are often delivered to a patient via an infusion system consisting of a pump, tubing, and the intravascular catheter. For some patients receiving multiple infusions, the output of 2 or more pumps merge at a junction point or manifold, often with a carrier, then flow together through one catheter lumen. The rate at which a pump delivers fluid, even at a static setting, changes over time with cycles ranging in length from seconds to minutes because of the way the pumps are designed and manufactured. The composition of the combined pump output at the point where it meets the patient's bloodstream is affected by the changing rates of the multiple pumps and by fluid dynamics, particularly mixing that occurs in the infusion system dead volume. For many drugs, the rate variations are small enough to not be clinically relevant. However, short term variations in drug concentration may be clinically relevant when fast-acting drugs with a short half-life are given at high concentrations and low flow rates. These conditions are encountered when treating patients limited in the total amount of fluids they can receive, such as in pediatric populations. To understand the performance of multi-drug infusion systems, we need to determine the overall system flow rate and the composition of the combined infusion.

Methods: We have developed a technique to continuously measure the composition of a fluid containing multiple drugs flowing together. We combine this composition measurement with gravimetric measurement of total fluid flow to determine the overall rate of delivery. This is an improvement over previous methods which used a mechanical fraction collector to integrate the delivered fluid over one-minute intervals and required manual processing before measurement. This approach is similar to (Snijder et al, 2016) which used continuous spectrophotometry to measure the composition of fluid flowing through a flow cell. Flow cells add considerable dead volume, increasing mixing of the fluids being measured. Our approach is to use a multi-lumen catheter inserted into a piece of clear tubing. The tubing is inserted into a carrier plate which holds it in the light path immediately distal to the end of the catheter. This allows measuring the fluid composition precisely where it would reach a patient's bloodstream. In previous work, we use dyes such as methylene blue and tartrazine yellow as model drugs (Tsao 2013, Parker 2017). We use a narrow band light sources selected to be at the spectral absorbance peaks of the model drugs (e.g., ThorLabs M660L4 for methylene blue) and measure the amount of transmitted light at each band simultaneously using a spectrophotometer (Ocean Optic USB2000). We calibrate the system using known concentrations of the model drug across the concentration range of interest, producing a series of light measurements at various concentrations, and build a linear regression model to interpolate measurements between these points. By using narrow band light sources that are chosen to match non-overlapping absorbance peaks of the model drugs, we can independently measure the concentration of several model drugs without interaction.

Results: We have collected preliminary data comparing the new measurement system to the previous techniques. We are finding that we get data more often (10 to 300 measurements/second vs 1 measurement/minute), with minimal manual intervention, and with comparable spectral and amplitude resolution.

2021 STA Annual Meeting Abstract Winners

Excellence in Technology

page 2

Conclusion: Precise measurement of the performance of multi-drug infusion systems is necessary to better understand the limitations of these systems, particularly when high concentration, fast-acting drugs with short half-lives are given at low flow rates. Understanding the system's current performance is essential for devising improvements, both to individual infusion pumps and to the whole multi-pump system.

Snijder RA, Egberts TC, Lucas P, Lemmers PM, van Bel F, Timmerman AM. Dosing errors in preterm neonates due to flow rate variability in multi-infusion syringe pump setups: An in vitro spectrophotometry study. Eur J Pharm Sci. 2016 Oct 10;93:56-63. doi: 10.1016/j.ejps.2016.07.019. Epub 2016 Aug 4. PMID: 27497614.

Tsao AC, Lovich MA, Parker MJ, Zheng H, Peterfreund RA. Delivery interaction between co-infused medications: an in vitro modeling study of microinfusion. Paediatr Anaesth 2013;23:33–9.

Parker MJ, Lovich MA, Tsao AC, Deng H, Houle T, Peterfreund RA. Novel Pump Control Technology Accelerates Drug Delivery Onset in a Model of Pediatric Drug Infusion. Anesth Analg 2017;124:1129–34.

2022 BOARD OF DIRECTORS ELECTION

Deadline to Cast Your Vote: December 1, 2021

2022 Board of Directors Voting Information

The 2022 candidate statements for the STA Board of Directors are provided to assist you with voting. Voting is conducted online, please **CLICK HERE** to visit the STA website to proceed to the voting website.". *Note: You **MUST** hold a STA membership for 2022 for your vote to be valid. Log on to the STA website to renew your membership today!*

President-Elect *(Vote to Approve)*

Jonathan Wanderer, MD, MPhil, FASA

Dr. Jonathan Wanderer is a Professor for Biomedical Informatics and Anesthesiology at Vanderbilt University, and has been an active and engaged STA supporter since 2012. He currently serves on the Board as a Director At-Large and was Meeting Chair for the 2016 Annual STA Meeting. In addition, he has been an enthusiastic participant in presenting research results at STA, previously winning the Top 5 Abstract award as an anesthesia resident. He has contributed to multiple STA meetings in the past, having given 4 panel presentations and hosting 1 workshop.

Dr. Wanderer's research interests largely revolve around clinical informatics and improving the usage of technology as applied to anesthesia and more broadly in the perioperative space. In addition to service at STA, he has served on the Anesthesia Quality Institute's Data Definitions, Data Use and Registry Operations Committees. He is a member on Epic's Anesthesiology Specialty Steering Board and leads adult representation of the mobile application group. At Vanderbilt, he is the Medical Director for Perioperative Informatics, Associate Fellowship Director for the Clinical Informatics Fellowship Program, and co-course director for the Foundations of Clinical Informatics in the Masters of Applied Clinical Informatics Program.

Dr. Wanderer will help foster STA's mission in promoting technology through education, research and continuing STA's collaboration with industry. He looks forward to continuing to serve his favorite anesthesia society.

At Large International Director *(Vote to Approve)*

Clyde Matava, MD

Dr. Clyde Matava is a Staff Anesthesiologist at SickKids and Associate Professor at the University of Toronto. He is the Associate Chief of Perioperative Services for Bioinformatics and the Director of Anesthesia Informatics, Innovation and Technology in the Department of Anesthesia at SickKids.

Dr. Matava has created and designed several apps, won several teaching and innovation awards. His current work focuses on the use of 3D printing, Virtual Reality, and machine learning to improve outcomes in medical education and patient care. He is also co-director of the SickKids' and University of Toronto's VR lab - CHISIL that is researching the use of virtual, augmented, and mixed reality in medicine. His clinical interests include airway management and regional anesthesia. He is currently the Past President of the Canadian Pediatric Anesthesia Society and has served on the STA Board. He looks forward to continued contributions to the STA in the post-COVID era.

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At Large Industry Director *(Vote to Approve)*

Justin Adams, BSEE, MBA

Justin Adams is the Chief Executive Officer of AlertWatch, Inc. He has overseen all facets of the firm, including the commercialization of its FDA 510(k)-cleared AlertWatch:OR, AlertWatch:OB and AlertWatch:AC monitoring solutions. Justin co-authored two design patents involving the innovative AlertWatch display, and he continues to code in Objective-C and Swift for fun.

Prior to joining AlertWatch, Justin worked in the automotive industry, investment banking, venture capital, and ran several firms as interim CEO, helping oversee R&D efforts and operational turnarounds. He holds a Bachelor of Science in Electrical Engineering from the University of Michigan, and an MBA from the Ross School of Business.

Justin has enjoyed collaborating on the STA Board over the last year, and he looks forward to helping STA carry out a second successful Virtual Annual Meeting in early 2022. He will focus on strengthening STA's role as the premiere organization supporting anesthesia's critical role in healthcare innovation.

At Large Director *(Vote for One of Six)*

Christopher Connor, MD, PhD

Dr. Christopher Connor is Assistant Professor of anesthesiology at Brigham and Women's Hospital, Harvard Medical School and also Associate Professor of Biomedical Engineering at Boston University. He completed his PhD in Medical Engineering at MIT and his MD at Harvard Medical School. This year, he will be appointed to two national ASA Committees: the Committee on Informatics and Information Technologies, and the Committee on Equipment and Facilities. His professional interests are strongly aligned with the mission of the STA.

Chris is particularly known for his work on machine learning and its application to patient monitoring. He wrote the chapters on anesthesia monitoring equipment for the 7th and 8th editions of Barash's Clinical Anesthesia, and the chapters on electrical safety for the 1st and 2nd editions of Clinical Anesthesia Fundamentals. In 2019, he published the Anesthesiology review article "Artificial Intelligence and Machine Learning in Anesthesiology." In this last year, he published the A&A article "A Forensic Disassembly of the BIS Monitor": a detailed examination of the design of the device, including the extraction and examination of its internal software. A follow-up article "Emulation of the BIS Engine" in JCMC demonstrates the execution of the BIS software on any modern computer, allowing the algorithm to be applied to any EEG signal.

He is seeking appointment to the Board of Directors of STA because we are entering an era in which attaining professional mastery and control of machine learning and artificial intelligence will become increasingly central to the development of our specialty. Chris is directly involved with this change, and is capable of helping STA benefit from it.

Talmage Egan, MD

Dr. Talmage Egan completed his undergraduate education at Brigham Young University, graduating Magna Cum Laude in the humanities. He attended medical school at the University of Utah School of Medicine where he was inducted into the *Alpha Omega Alpha* academic honor society. After completing a preliminary general surgery residency at the University of Utah, Dr. Egan sought postgraduate training in anesthesiology which he began at the University of Utah and completed at Stanford University. Following residency he pursued fellowship training in clinical pharmacology also at Stanford. More recently, he also completed intensive physician executive training at the Harvard School of Public Health and a sabbatical as a visiting scientist at the Imperial College in London.

Dr. Egan is currently staff physician and chair at the Department of Anesthesiology at the University of Utah Health Sciences Center. His clinical practice focuses on neurosurgery and obstetric patients. He is Past President of the Medical Staff and Chairman of the Medical Board, and served for over a decade as the Chief of Neuroanesthesia.

Dr. Egan's research interests include the clinical pharmacology of sedatives and analgesics, the development of novel intravenous anesthetics and alternative propofol formulations, the development of optimal drug administration regimens based on pharmacokinetic- pharmacodynamic concepts, the identification of factors (i.e., gender, body weight, shock, SNPs, etc.) that influence drug behavior, and computer controlled drug delivery technology. These interests have resulted in successful entrepreneurial ventures, patents and trademarks. Dr. Egan is internationally regarded as a pioneer in the development of total intravenous anesthesia techniques, particularly

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the clinical application of the short acting opioid remifentanil, and the characterization of the interaction between propofol and opioids. His publications have been accompanied by numerous editorials and have been featured as cover stories in leading, peer-reviewed anesthesiology journals. Dr. Egan has mentored over 20 junior faculty and graduate students, many of whom have emerged as independent investigators.

Dr. Egan served for many years as a Board Member, Treasurer, and President of the International Society for Anaesthetic Pharmacology (ISAP). Currently an Associate Editor for the *British Journal of Anaesthesia*, he has also served as Associate Editor for *Anesthesiology* and guest reviewer for numerous other pharmacology, anesthesia and bioengineering journals. For many years Dr. Egan was a member and Chair of the American Society of Anesthesiology Subcommittee on Drug Disposition. He has published a well-received anesthesia pharmacology and physiology textbook (now in its 2nd edition) with Elsevier (*Pharmacology and Physiology for Anesthesia: Foundations and Clinical Application*) as co-editor.

Dr. Egan was the inaugural recipient of the International Anesthesia Research Society's (IARS) Teaching Recognition Award. He is holder of the K.C. Wong Presidential Endowed Chair in Anesthesiology at the University of Utah. Dr. Egan has lectured extensively in the United States and internationally, including numerous honorary and keynote lectures at major universities and international anesthesiology societies. In 2016, he received the Lifetime Achievement Award from ISAP.

His personal life is devoted to his wife of 36 years and their five children. He is fond of saying that his family is the most important element of his CV! Dr. Egan enjoys coaching basketball (two time Utah State AAU Boys Champions!), karaoke, snow skiing, bass guitar, English literature and Japanese conversation.

Ori Gottlieb, MD

Dr. Ori Gottlieb is a lifetime member of STA and appreciates its mission to bring technology, in all of its forms, together with medicine to further patient care. Beyond that, he values the relationships he has developed with others in STA as he seems to gel on similar frequencies. He is board certified in Anesthesiology as well as Biomedical Informatics at the University of Chicago and has thrived in the learning and teaching environments that STA has afforded its members. Nothing would please him more than to serve on the Board and further its mission. He says, "let's advance technology through education and innovation together."

Vitaly Herasevich, MD, PhD

Dr. Vitaly Herasevich is a Professor of Anesthesiology and Medicine in the Department of Anesthesiology and Perioperative Medicine, Division of Critical Care, Mayo Clinic, Rochester, Minnesota. He has been involved in medical informatics for over 20 years, with a specific concentration on applied clinical informatics in critical care and perioperative environment.

Dr. Herasevich codirects the Clinical Informatics in Intensive Care laboratory that works to decrease complications and improve outcomes for critically ill patients through applied clinical informatics and quality improvement. He is interested in studying and developing clinical syndromic surveillance alerting systems ("sniffers"), clinical data visualization (novel patient-centered EMR), and health care predictive and prescriptive ambient intelligence. He is co-inventor of a number of technologies including the AWARE platform. Dr. Herasevich has coauthored over 100 articles and the book, Health Information Evaluation Handbook. He is Fellow of Society of Critical Care Medicine and American Medical Informatics Association active within professional societies and served SCCM Tele-ICU committee as chair. Dr. Herasevich is also part-time CMIO of Ambient Clinical Analytics (ambientclinical.com). More information can be found at his Mayo Clinic profile web page.

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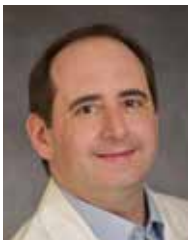

Ira Hofer, MD

Dr. Ira Hofer is an Associate Professor at the David Geffen School of Medicine at UCLA. Dr. Hofer did his medical school and residency at the Ichan School of Medicine at Mount Sinai where he was introduced to the STA by his mentor, Dr. David Reich. In 2013, he joined the faculty at UCLA and was the founder and first director of the Division of Bioinformatics and Analytics in the Anesthesia Department. Over the course of 8 years, he grew the group to take on responsibility for all OR and ED reporting throughout the hospital. Along the way, he developed a software platform that facilitates extracting data from EPIC which he subsequently spun out into a successful startup.

Dr. Hofer's research interests include clinical decision support, big data analytics and machine learning, and perioperative risk stratification. He currently serves as an Associate Editor of A&A's section on Technology, Computing and Simulation and has a K01 award from the NIH on using machine learning to predict perioperative cardiorespiratory instability.

Ira has been a member of the STA since 2008 and served as the Abstract Co-Chair for the 2020 Annual Meeting and Meeting Co-Chair for the last year's Annual Meeting. He has always found the STA a wonderful and friendly place for mentorship and learning. He is particularly passionate about the STA's mission of promoting academic and industry collaborations as he believes they are crucial to successfully changing healthcare for the better. As a member of the Board of Directors he plans to focus on increasing engagement with new (especially younger) members by promoting avenues for networking and mentorship, as well as fostering opportunities for industry and academic collaborations.

Matthew Levin, MD

Dr. Levin is a cardiac anesthesiologist and the Director of Research Informatics in the Department of Anesthesiology at the Icahn School of Medicine at Mount Sinai in New York City. He earned an electrical engineering and computer science degree from the Massachusetts Institute of Technology and worked in the software industry before pursuing a medical career. Dr. Levin is board certified in both Anesthesiology and Clinical Informatics. He is also an Associate Professor of Anesthesiology and Genetics and Genomic Sciences. Dr. Levin's research includes the generation of machine learning patient prediction models using input from the perioperative and genetic areas of the medical record, perioperative physiology and outcomes, and using open-source design and technologies to improve clinical interfaces and patient care. Nationally, Dr. Levin is a member of the ASA Committee on Informatics and Information Technologies, and has presented multiple times throughout the years at the ASA, SCA and other large meetings.

Dr. Levin has been an active member of STA for over ten years. He fondly remembers the last Las Vegas meeting in 2010 - his first STA meeting – not only for the lifelong colleagues he met, but for his visit to the Pinball Hall of Fame as well. Dr. Levin is very excited about the future of STA and would be honored to serve as Director At-Large.

Society for Technology in Anesthesia Virtual Annual Meeting

Dear Colleagues,

The Society for Technology in Anesthesia (STA) Board and 2022 Annual Meeting Co-Chairs have been meeting to assess the current state of the COVID pandemic, specifically the Delta variant and its effect on our planned in-person Annual Meeting in January at the Four Seasons Hotel in Las Vegas, NV.

While the decision for the meeting format falls to the elected Board of Directors, STA has always encouraged participation of the membership in Board decisions. In that spirit, we sent a survey to the membership in July to gauge the level of comfort our members had traveling, whether they could travel given their geographical location and border closures, and finally, if their institution or employer would allow them to travel. Unfortunately, the answers (can or would attend vs. cannot attend) were split nearly 50/50 among respondents.

Thus, STA has made the difficult decision to cancel the in-person 2022 Annual Meeting. Rest assured that the Board of Directors and the meeting chairs are working to develop an abbreviated virtual meeting for 2022. We intend to implement many of the great suggestions from the membership survey to increase networking opportunities and overall user experience for our attendees. Please save the dates of Thursday, January 13 to Saturday, January 15, 2022, for the STA 2022 Virtual Annual Meeting.

This is not a decision STA took lightly. While we would truly love to get together with all of you in Vegas, STA members' and their families' safety and well-being are of the utmost importance. In making this decision, we worked with the Board of Directors, the membership, and our Corporate Members to understand the financial implications of an in-person, hybrid, or virtual meeting. The Board concluded that the pandemic will likely be insufficiently under control to permit us to gather safely in January 2022.

STA has successfully reserved space for an in-person 2023 Annual Meeting at the Four Seasons Hotel in Las Vegas during January 11-14, 2023.

In the interim, stay safe and healthy. If you have any questions, feel free to reach out to us.

Sincerely,

Maxime Cannesson, MD, PhD
STA President

John Pearson, MD
STA Annual Meeting Co-Chair

Olivia Nelson, MD
STA Annual Meeting Co-Chair