

PENNSYLVANIA society of ANESTHESIOLOGISTS

WINTER 2020 NEWSLETTER

SENTINEL

Richard Month, MD, FASA
PSA PRESIDENT

President's Message

Happy new year to all! As the Pennsylvania Society of Anesthesiologists moves into 2020, I wanted to share with you my New Year's Resolution for PSA. Far from our standard "new year, new me" resolutions, my goal for PSA has been half the decade in the making. We've undertaken many changes to our internal structures – from our bylaws, to our committee structure, to our entire leadership scheme – in order to bring this resolution to you.

This year, I resolve to continue improving PSA's member engagement using the tools we've developed over the past five years.

For 2020, we plan to do this primarily by activating our new committee structure and enhancing member involvement throughout PSA committees. In our overhaul of the Bylaws, we streamlined our committee structure. Each committee is assigned to a Section of the Society and is led by a named Vice President. PSA's standing committees are:

Section on Administrative Affairs:

Vice President for Administrative Affairs: Andrew Boryan, MD, FASA

- Committee on Bylaws
- Committee on Membership
- Committee on Nominations
- Judicial Committee

Section on Professional Affairs:

Vice President for Professional Affairs: Gordon Morewood, MD, FASA

- Committee on Governmental Affairs
- Committee on Anesthesia Practice

Section on Scientific and Educational Affairs:

Vice President for Scientific and Educational Affairs: Joe Answine, MD, FASA

- Committee on Communications
- Committee on Professional Education
- Committee on Residents and Medical Students

continued on page 3

...my goal for PSA has been half the decade in the making.

Table of Contents | WINTER 2020

2019-2020 Officers

PENNSYLVANIA *society of* ANESTHESIOLOGISTS

SENTINEL *NEWSLETTER*

Editor
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President's Message

continued from page 1

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Assistant Secretary-Treasurer: Bhaskar Deb, MD

- Committee on Financial Review

This year, for the first time since I began working with this organization, there are rank-and-file PSA members on every PSA committee for which the Bylaws permit it. Going forward, we intend this to be the rule, not the exception. In addition, we intend the committees to become fertile ground to grow new PSA initiatives, ensure member engagement, and maximize our value to you. Toward this goal, each committee was assigned goals for 2020 to direct them as a starting point.

The Committees on Membership and Communications will be working primarily on member engagement. They'll work on answering the questions: 1. What do our members want, 2. How can we deliver value to our members, 3. How can we convince non-members to become members, and 4. How do we most efficiently deliver our message to members and non-members alike. Both committees will also work together to investigate expansion of electronic and social media and how best to use these tools to engage our members.

The Committee on Anesthesia Practice will continue its work on the Corporate Practice of Medicine. In addition, the Committee will develop tools to assist members with issues we see routinely come across our inboxes.

The Committee on Governmental Affairs will continue to be one of the most active committees, as they continue to advocate on behalf of our members and our profession to policymakers and elected officials. Issues before the Committee will continue to be scope of practice, CRNA titling, the Pennsylvania Hospital Regulations and how they pertain to the delivery of anesthesia services, balance billing, and the inevitable "topic not yet known."

The Committee on Residents and Medical Students will work on engaging our trainees and finding out how PSA can help them. We hope to begin developing a career and leadership mentorship program for Pennsylvania trainees, so that medical students and residents with specific interests in anesthesiology or anesthesia leadership can be paired with PSA leaders to foster that interest.

Finally, the Committee on Professional Education will continue their outstanding work on developing and presenting our First Annual Scientific Meeting – June 6 and 7, 2020, Hershey Lodge, don't miss it – and beginning their planning for the 2021 meeting.

As you can see, your PSA committees will be hard at work throughout 2020 and beyond to ensure that you, as members, get the most value out of your membership in PSA; to that end, we'll be reaching out to you for your feedback as the year progresses to see what is working, what isn't, and where you'd like us to go. As always, we're here for you.

So once more, Happy New Year, and thank you for your continued support!

NEW PSA MEMBERS!

Rammurti McKenzie, MD
Justin Roh, MD
Frank Domeracki, MD
Scott Barndt, DO
Jake Duggan, MD
Helen Grichkevitch, MD
Rachna Hotchandani, DO
Andrea Liu Gerytch, DO
Max Masgudov, MD
Anne Paige Pribonic, MD
Taylor Ralston, DO
Heather Acuff
Abbey Halula
Carlos Hernandez
Nicole Kus
Timothy Leiter
Jillian Printz
Avisha Shah
Jordan Weber

EDITORIAL

Richard O'Flynn, MD, FASA
EDITOR

Where Have All Our Members Gone?

A recent email action alert was sent to 2,300 PSA members. The initial open rate of the email was 28%. A follow-up email blast was sent to members who did not open the initial email. This email was opened by an additional 8% of recipients, bringing the final email open rate to 36%.

I could understand the low open rate if PSA overwhelmed our members with frequent emails. However, the Society has made a concerted effort to limit email communication to a small number of important messages. For this reason, the response is disappointing and concerning.

Why do almost two-thirds of our members feel that the communications from the Society are not important enough to even open and at least glance?

Has the PSA become irrelevant to the majority of our members so much so that even the limited number of direct emails are routinely ignored? If so, how does this portend for the future of our Society? Is Society membership simply something that is provided by group employers or are members simply content to keep the status quo and hope that the engaged members and Board of Directors keep the Society on the correct path?

The PSA has two main functions: protect patient safety during anesthesia and provide education to its members. The Society's role in patient safety is more important than ever given the statewide and nationwide push for independent practice of advanced practice nurses. While this in and of itself may not necessarily be a bad thing, physicians cannot be entirely removed from the provision of medical care. The necessary guidance as to when and where care may be appropriately relinquished needs to be discussed and decided upon with physician input and not left entirely to legislators' discretion. The PSA is your voice in that process.

The disappointing results that were observed on this single email blast are not isolated to the PSA; it is unfortunately repeated across all aspects of organized medicine. Our own Political Action Committee, Z-PAC, has only a 13% participation rate and has been dropping yearly from a high of 23% in 2013. Is this related to the loss of private practices and the employment of anesthesiologists by large corporations?

Is this simply an outcome of the corporatization of medicine? While apathy is a symptom, it can be cured by realizing that you can make a difference. Become involved. Offer suggestions and insights if you feel that the Society isn't representing you. Don't simply walk away. The PSA is your Society – make it a value to you. It can be contagious.

In this issue of The Sentinel are two important and related articles. PSA Attorney, Charles Artz, reviews in depth the new Pennsylvania law regarding mandatory opioid treatment agreements (page 15). While this is most relevant for our chronic pain management colleagues, all anesthesiologists should familiarize themselves with this new law. This is one of the many ways that our legislators are attempting to address the opioid epidemic in PA.

The second article, by Neal Shah, MD, Chinyere Archie, MD, and Paige Pribonic, MD, details the role of the anesthesiologist in addressing the opioid epidemic (page 20). Special attention should be directed to the charity event sponsored by UPMC Department of Anesthesiology. They raised more than $11,000 last year and are hoping for another successful event. The recipient of their efforts is the Light of Life Rescue Mission, which provides long-term residential recovery programs for those affected by opioid addiction.

PSA is *Unwrapping* its First Scientific Meeting This June!

PSA's First Annual Scientific Meeting | June 6 - 7, 2020 | Hershey Lodge, Hershey, PA

Registration Opening February 2020!

Early Bird Rates *(Register by May 1)*
Members - $175
Non-members - $225
Resident - $50

Ultrasound Fees
If attending Saturday meeting - $150
Ultrasound Only - $200

Featuring:

- Opioid Education
- Patient Safety
- Hands-on Ultrasound Guided Regional Anesthesia Workshop
- What's New in Anesthesiology
- Networking
- Industry Exhibitors
- CME, MOCA Credits & more!

Education sessions, meeting schedule and hotel information will be posted on www.psanes.org/meetings.

@PSAnesth
#PSA2020

Questions?
Contact us at 717-558-7750 ext 1596 or info@psanes.org.

BUSINESS & MEDICINE

Two Heads Aren't Better Than One When It Comes To Medical Group Leadership

Mark F. Weiss, JD
The Mark F. Weiss Law Firm, a Professional Corporation

Decisive leadership is what's needed, so, of course, many healthcare entities seemingly go out of their way to self-sabotage their future.

Harken back to a childhood party: the three-legged race. Contestants are paired up, standing side by side, with the left leg of one runner tied to the right leg of his or her partner.

Ready! Set! Try to run! Fall.

The same sort of stupid, don't want to hurt anyone's feelings, two heads must be better than one sort of thinking hampers medical groups, hospital systems, and other healthcare businesses.

Take, for example, the recent story of the collapse of the co-CEO structure adopted by Advocate Aurora Health. The organization was the merger of two Midwestern health systems, Aurora Health Care and Advocate Health Care. At its inception, Advocate Aurora Health appointed the CEOs of both constituent entities as co-CEOs of the combined healthcare system.

For 18 months, leadership flailed like two preteens in a three-legged race.

"Let's go right!" "Let's go left!"

"Enough about 'going left,' we're letting you go!" That is, one of the co-CEOs has now, ahem, "left" to pursue other interests. (Like, perhaps, unemployment.)

Small medical groups often go for some of this silliness because the group's so small, everyone "must" be involved. Must, is of course, just an opinion. The fact, however, is that if everyone's a leader, no one's a leader.

You magnify the inability to make decisive decisions for your medical group's future when your (or your group's leaders) legs are tied to someone else.

Not only is it impossible to make fast and decisive decisions, the co-CEO model comes preloaded with the excuse that the other guy made the stupid decision, or refused to sign on to any decision.

And, on top of that, it's a set-up for a tragedy of the commons-like situation: Each "leader" thinks that he or she doesn't have to act because the other will take care of it, or not.

No matter what you call them, "co-CEOs," "two-in-a-box," "diptychs," they are all three-legged race teams that tie your future up in knots.

BUSINESS & MEDICINE

All Things Personal

Standing ahead of me in line at the small town BBQ joint were a couple from even farther out of town than I was, maybe from Minnesota (don't you know).

"How's the barbecue chicken?" Ms. Midwesterner queried.

"The best in town!" exclaimed the woman behind the counter.

"How's your coleslaw?"

Once again, the woman behind the counter exclaimed with even more gusto, "The best in town!"

Maybe they were, but there's a much better question, "What else is in town?"

My guess is nothing, and certainly no place that sells either barbecue chicken or coleslaw.

Comparing ourselves to the local competition works only so long as there's only local competition.

But when competition comes in from out of town, it's likely that sooner or later there will be better coleslaw or, at least, an understanding of what better coleslaw is.

Of course, coleslaw outside of the actual BBQ joint is just a placeholder for what you do. In today's healthcare world, you can be certain that the competition will never simply be local.

The "best in town" isn't saying much.

LEGISLATIVE UPDATE

Milliron and Goodman

In a new year, many people begin to think about their New Year's Resolutions. Most will commit themselves to lose a few pounds, eat healthier, or maybe read more. PSA has a different kind of resolution for its members. We want your New Year's Resolution to be that you commit yourself to be an advocate for our patients and profession by joining the PSA Champions Network.

This past July, the PSA worked to reinvigorate its Legislative Champions Network. The idea behind our solicitation and actions are to get more of our members engaged with State Representatives and Senators. We sent thousands of solicitation letters to Pennsylvania anesthesiologists. From that solicitation, we captured only 61 individuals willing to be an advocate for the Society. This means that our Champions do not even account for 1% of our total membership. We know you are busy; everyone is. However, there are significant threats to our patients and the profession on the horizon in Pennsylvania. The General Assembly has many new faces that have little or no exposure to a local anesthesiologist or her/his expertise in medicine. We need you to step up and act.

The specific concerns the PSA is facing and is engaged with are numerous. They include Department of Health hospital regulation changes, mid-level provider legislation and legislation concerning "balance billing". These legislations would dramatically change the way anesthesia is managed in Pennsylvania hospitals. The PSA continues to advocate for patients and makes sure Anesthesia's voice is heard at the table. We are working closely with Senator Killion and Representative Steve Mentzer; both have introduced legislation that would put physician supervision of anesthesia into statute.

With all of these issues facing the PSA, it is vital for you to become involved in advocacy. The Legislative Champions Network was created as a way to keep members who are committed to being Champions of our profession in the know on these important issues. If we do not have an effective base of advocates, we will be unable to stop harmful legislation – just as we were unable to get a single negative vote on Senate Bill 325. Your support is vital in the protection of our patients and profession.

Make it your New Year's Resolution to be a PSA Champion and advocate for your patients. What does an advocate or PSA Champion do? They educate themselves and others on the issues that are facing their patients and profession. A PSA Champion will also go and meet with their legislators to help them understand the issues that are facing anesthesiologists and our patients. They will create and maintain a relationship with their legislators so that they can always educate those legislators on issues that affect our patients and profession. It is only through education and advocacy that we can truly protect our patients and profession. Challenge yourself this year to be the best PSA Champion that you can be and help keep our patients and profession safe.

We need you to be a champion for your patients and profession.

If you are interested in joining the fight for our patients and profession, please join the PSA Legislative Champions Network. To join all you have to do is fill out the form that can be found online at https://www.psanes.org/ or simply email tyler@millirongoodman.com.

Innovation is the Future of Anesthesia

Krzysztof Laudanski, MD, PhD, MA, FCCM, MHCI (2020)

Department of Anesthesia and Critical Care/Leonard Davis Institute for Healthcare Economics

Gabriela Sabate

Health Semantics, CEO
University of Pennsylvania
MHCI

E. Blair Clark-Schoeb

Principal at
BiotechComm

Anesthesiology: A history rich with disruptive innovation

Through disruptive innovation, the field of anesthesiology revolutionized medicine. The first successful case of ether anesthesia performed by Dr. Morton at Massachusetts General Hospital in 1946 is an excellent example of a disruptive innovation that transformed and enabled the rapid development of many fields of medicine, drastically improving patient safety. The term disruptive innovation was first introduced by Clayton Christensen in 1997. He referred to it as a process "by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors."[1] Currently, over 40 million individuals in the United States benefit from some form of anesthesia that enables medical procedures which were not considered possible before the introduction of ether. While disruptive innovation has been at the origin of anesthesiology, the future of our specialty depends upon incremental innovation to reduce costs and improve patient outcomes, quality of care, and access. The adoption of transformative innovation in anesthesiology through incremental innovation, as well as integrated, data-enabled and machine-learning infused perioperative patient care models, may be the answer we need for a successful anesthesiology future.[2]

Variations of innovation

The concept of innovation has risen to a level of prominence across all fields, including anesthesiology, and it comes in many forms. Innovation can exist in a continuum, ranging from incremental innovation, when markets and technologies exist and are improved by an innovation; to disruptive innovation, when we apply new technology to existing markets to create an innovation; to radical innovation, when we create entirely new markets using new technologies. Transforming products and processes tend to be incremental innovation. Business model innovation is generally disruptive, radical and transformative in nature. We will explore the significance and impact of innovation for anesthesiologists in the context of accelerated developments in technology and the future of our specialty.

How innovations arise can vary. Often, the components of innovation in a product, process or business model already exist, but the combination

continued on page 10

[1]Bowler, J.L., Christensen C.M., *Disruptive Technologies: Catching the Wave. Harvard Business Review (1995).*

[2]Kain, Z., Hwang, J. and Warner, M. *Disruptive Innovation and the Specialty of Anesthesiology: The Case for the Perioperative Surgical Home. Anesthesia & Analgesia. (2015)*;120:5, p 1155-1157.

Innovation is the Future of Anesthesia

continued from page 9

can result in a distinct new value that defines the innovation. Innovation starts with the identification of a problem, followed by the creation of a solution. In the case of an incremental innovation in a product, it could respond to more efficient features desired by customers; or in the case of a process, it could result in a leaner and more productive operation. A new product tends to be customer-facing and in a more direct way, drive up revenues more than a process innovation, which tends to drive down cost. A business model innovation can create new market disruptions in existing markets (e.g., Airbnb or Uber) or create new market categories (e.g., social media). All these types of innovations have been deployed in the field of anesthesiology, and more are needed in the future.

Anesthesiologists are well-positioned to identify areas of innovation

Anesthesia is a high-stakes and decision-intensive process-oriented discipline with continuous changes. New problems need to be quickly identified in the perioperative environment. Creative solutions within established best practices need to be thought of within very tight timing and resource constraints. These variable features make the field of anesthesiology ripe for innovation. The ubiquitous presence of technology, combined with a central position in hospital workflows, naturally exposes anesthesiologists to the cutting edge of medicine, engineering and process management. A fluency in innovation is an increasingly valued skill in anesthesia. The role of the anesthesiologist in medicine uniquely positions the physician to observe, engineer and influence processes in all aspects of healthcare delivery.

Innovation from within: Leadership and culture

For innovation to succeed, there needs to be the right culture and leadership support. To innovate, one must be comfortable with failure. Innovation is a fast-paced and iterative process. The goal is to try something new and make decisions quickly on whether it works or not. The culture must embrace this concept. To innovate, there needs to be an ongoing culture of testing and learning. Sometimes individuals or groups will need to use external resources to scale up initial ideas, whether it's in securing access to developers or operations professionals or tapping into the external venture capital community for funding.[3] Leadership is essential in the creation of an organizational culture that supports and embraces innovation. Many attempts to innovate are not successful. Therefore the leaders must embrace the rocky road to find the innovations that will improve patient care. Having staff focused on support is critical to fostering innovation. Successful adoption of a culture of innovation takes time in any organization, and it may be the case that not all organizations have the resources, will, resilience and leadership to achieve it. Innovation needs to be taught and nurtured. Innovation can start as a grassroots movement. It's vital that we educate and nurture individuals to support innovators. There are several innovation hubs present in Pennsylvania. The Penn Center for Innovation (http://pci.upenn.edu/about), or PCI, helps to translate the University of Pennsylvania discoveries and ideas into new products and businesses for the benefit of society. The Penn Medicine Center for Health Care Innovation (https://healthcareinnovation.upenn.edu) created a formal training program with the explicit goal of supporting innovation among faculty and accelerating ideas to transform health care. Thomas Jefferson University offers the Health Hack Program. Dream It Ventures is a private entity aimed at funding and accelerating innovation. The City of Pittsburgh has had great success with the University of Pittsburgh Innovation Institute (https://www.innovation.pitt.edu) and the Integrated Innovation Institute at Carnegie Mellon University (https://www.cmu.edu/iii). These are just examples of the innovation ecosystem in Pennsylvania.

The innovator's toolbox: How to acquire innovation skills

How can an anesthesiologist become an innovator? There are many ways to further develop your innovation skills. To begin your journey, you need to expose yourself to the right environments. Events at accelerators, innovation fairs, hackathons, and angel or venture capital investing events are an excellent

continued on page 11

[3]Gaskell, A. (2016, Nov. 8). *Building a Culture of Innovation in Healthcare. Forbes*. https://www.forbes.com/sites/adigaskell/2016/11/08/building-a-culture-of-innovation-in-healthcare/#29bc1eea44a7

Innovation is the Future of Anesthesia

continued from page 10

place to start. Innovators tend to be together and connecting with the entrepreneurial ecosystem may prove very helpful during the initial steps of your innovation journey. Eventbrite and MeetUps may be other ways to meet like-minded people in the ecosystem. Also, you can identify thought leaders and journalists via social media that you can connect with to accelerate your journey. Acquiring innovation skills may be self-driven and organic or done in a more formal way. The latter option is currently possible by earning the Master of Health Care Innovation degree, or MHCI, at the University of Pennsylvania, Perelman School of Medicine (https://improvinghealthcare.mehp.upenn.edu/master-of-health-care-innovation). The MHCI program allows for systematic knowledge acquisition while interacting with world leaders in each academic field and collaborating with cross-disciplinary peer teams.

Innovation opportunities in anesthesiology: From devices to artificial intelligence

There are numerous areas of innovation in anesthesia, including workflow improvements, development of new devices and adoption of data science. The innovation of workflows utilizing novel techniques is perhaps a most underappreciated area for anesthesia. Phone applications and telemedicine allow for effective supervision of patients in the operating room or intensive care unit. Several novel workflows have been identified in pain management as well. We have seen innovation in device and process automation that allows closing the loop on parameter feedback, through continuous monitoring, adjustment of anesthesia levels and personalization of responses to surgical stimulus. This additional intelligence infused into the workflow can help improve safety and outcomes. The development of new devices is the most common and distinct innovation pathway for an anesthesiologist. We see opportunities for technology to improve lives every day in our practice. The introduction of new devices is one of the least challenging pathways in innovation. Though the FDA approval process for a device is not simple, it is easier than drug development.

The widespread adoption of data science, continuous sensors, genomics, and cloud computing will allow for ubiquitous machine learning and artificial intelligence use cases in anesthesia. This area of innovation offers the most transformative opportunities to impact the perioperative environment and the overall health care experience for both specialists and patients. New scenarios enabled by these technologies will emerge, where anesthesia can expand its current perioperative role and be involved earlier in the patient journey—covering the intraoperative experience, the ICU and the home-based discharge process. The anesthesiologist's leadership and participation in this expanded continuum of care can allow for a change in paradigm toward a personalized and continuous multi-factorial optimization of a surgical patient, improving surgical outcomes, survival and safety.

Going to your leadership and suggesting novel solutions for specific problems you would like to address may be a good first step to lead innovation in your organization. Through innovation, anesthesiologists can assume expanded leadership roles in developing novel and broader clinical pathways, while enabling personalized and real-time decision making to transform perioperative care into an integrated experience.

With an innovation focus, we can work to optimize multiple variables before, during and after the intraoperative phase for the patient. This personalized and integrated approach to anesthesia through innovation has the potential of improving care, outcomes and cost-effectiveness, while eliminating or reducing single points of failure, disconnected care events, process errors and medical complications. The field of anesthesia has never had a brighter opportunity to embrace innovation and improve medicine.

Joint Commission Releases Guidance on Surgical Attire and USP <797>

Erin A. Sullivan, MD, FASA

ASA District IX Director

In recent weeks, the Joint Commission (TJC) released guidance on two issues that may have an impact on local policies for physician anesthesiologists and their groups. In November, TJC posted several Frequently Asked Questions (FAQs) on their website describing elements of surgical attire that local facilities should include in their policies. TJC separately issued a statement on how hospitals can use either the old or the revised USP <797> chapter when updating policies on compounding.

The Standards FAQ from TJC entitled "Attire-Determining Requirements for Operating Room/Surgical Attire" (https://www.jointcommission.org/standards/standard-faqs/) notes that while TJC does not prescribe operating room dress or surgical attire, there are certain elements that hospitals must include in their policies. Policy must reflect state rules and regulations as well as Centers for Medicare and Medicaid Services (CMS) infection control requirements. Manufacturer instructions should also be consulted. The TJC FAQ further states, "Organizations can choose which guidelines or consensus statements they will follow based on their own evaluation process" and that "Surveyors will survey to facility policy." Physician anesthesiologists may wish to consider to use the ASA Statement on Developing Policy for Infection Prevention Related to Surgical Attire (https://www.asahq.org/standards-and-guidelines/statement-on-developing-policy-for-infection-prevention-related-to-surgical-attire) and the ASA Guidelines for Surgical Attire (https://www.asahq.org/standards-and-guidelines/guidelines-for-surgical-attire) when discussing surgical attire policies with their colleagues. Earlier this year, ASA was successful in working with the Association of Perioperative Registered Nurses (AORN) to revise their surgical attire guidelines to better reflect available evidence.

The ASA Committee on Occupational Health and the Advisory Group on Infection Control are charged with periodically reviewing scientific evidence and expert opinion on matters related to infection control and prevention in the operating room. Based upon evidence available as of April 2019, the Committee and the Advisory Group put forth the following ASA Guidelines for Surgical Attire.

Process Recommendations

1. The facility's surgical attire policy should be based upon scientific evidence and expert opinion. Evidence should be relevant, free from bias, and drawn from all available information.

2. Local infection control policy should be set by the health care professionals who provide patient care within the setting to which the policies apply (e.g., for policies affecting practices within the operating room, nurses, surgical technicians, surgeons, and anesthesiologists should share representation in the group setting the policy). Outside professional consultation should be sought as necessary (e.g., infectious disease professionals).

Clinical Guidelines

1. In restricted or semi-restricted procedural areas, wear clean scrub attire that fits well.

2. When choosing scrub material, consider both containment of shed skin particles and comfort.

3. Establish and implement a process for laundering scrubs regularly and whenever they become visibly soiled. Change out of visibly soiled scrub attire as soon as possible without delaying exigent patient care.

4. When in a restricted or semi-restricted procedural area, cover the hair and scalp with head gear made of a disposable or launderable re-useable material.

continued on page 13

Joint Commission Releases Guidance on Surgical Attire and USP<797>

continued from page 12

5. When choosing head gear material, consider containment of shed particles, comfort and fit.

6. Establish and implement a process for laundering reusable head coverings regularly and whenever they become visibly soiled.

7. During a procedure in which normally sterile surfaces or mucous membranes are exposed or entered through a needle or cannula, wear a surgical mask that fully covers the mouth and nose. Wear the mask when sterile instruments intended for the procedure are exposed. This does not apply to the insertion of cannulas into superficial peripheral veins for short-term (less than 3 days) intravenous access.

8. When in a restricted or semi-restricted procedural area, cover facial hair not contained within a mask, especially when working over or near the surgical field.

9. When choosing a facial hair covering material, consider containment of shed particles, comfort and fit.

TJC also recently released a Statement on USP <797> (https://www.jointcommission.org/resources/news-and-multimedia/newsletters/newsletters/joint-commission-online/dec-11-2019/statement-to-be-released-regarding-usp-797-revision/) - the US Pharmacopeia Chapter detailing compounding standards that is currently under review. With regard to this USP review period, TJC states, "during on-site surveys, compliance [with USP <797>] will be determined based on the organization's selection of one of the two available versions of the USP 797 chapter — either the 2008 version of the chapter or the 2019 revised chapter." Hospitals may not "independently choose specific discrete components from both versions but should adopt in full the version selected."

ASA Resident Scholar

The American Society of Anesthesiologists® (ASA) is pleased to announce the opening of the application for the 2020-2021 cycle of the Anesthesiology Policy Research Rotation in Political Affairs, also known as the "Resident Scholar Program." The rotation is a paid, four-week, ABA-approved rotation, located in ASA's Washington, D.C., office. The Rotation allows resident physician anesthesiologists to experience the political, legislative, and regulatory factors that affect the delivery of patient care.

The application is open until February 14, 2020.

During the rotation, residents will gain a comprehensive understanding of health care politics and policy by experiencing the political environment first-hand, assisting in day-to-day activities in ASA's Advocacy Office, attending lobby events sponsored by ASA, creating research projects, and reporting on policy changes affecting the profession of anesthesiology.

The Rotation has been approved by the American Board of Anesthesiology to count toward residency credit. A stipend of $5,500 is provided to offset living expenses in the nation's capital. Residents will be supervised by ASA's Congressional and Political Affairs Department during the rotation, which takes place during one of five months based on availability.

The application is easily filled out online here: asahq.org/ResidentScholar.

Residents who will be in their PGY-4/CA-3 year and fellows during the 2020-2021 academic year are eligible to apply for the rotation. Please note: applicants who wish to serve during the last three months of their PGY-4/CA-3 year will require additional approval from the ABA to participate.

Not a resident? Tell a resident! More information can be found online at: asahq.org/ResidentScholar.

LEGAL UPDATE

Mandatory Opioid Treatment Agreements

Charles I. Artz, Esq.
PSA General Counsel

A new Pennsylvania law mandates physicians who prescribe opioids to patients to enter into an Opioid Treatment Agreement with each patient. The law, known as the Opioid Treatment Agreement Act or Act 112 of 2019, was introduced as Senate Bill 572, Printer's Number 1400, and was effective immediately upon the Governor's approval on November 27, 2019. The important elements of Act 112 – 2019 are summarized below.

PRESCRIBER REQUIREMENTS

Before issuing an individual the **first prescription** in a single course of treatment for chronic pain with a controlled substance containing an opioid, regardless of whether the dosage is modified during that course of treatment, the prescriber must conduct an assessment, discussion, review and sign a Treatment Agreement, obtain consent, record the consent, and conduct urine drug testing.

A "**prescriber**" is a physician, physician assistant or nurse practitioner who is registered with the DEA and lawfully authorized to distribute, dispense or administer a controlled substance during the course of professional practice.

ASSESSMENT

The prescriber must assess whether the individual has taken or is currently taking a prescription drug for treatment of a substance use disorder before issuing the first opioid prescription.

The term "**opioid**" includes any of the following:

- A preparation or derivative of opium;
- A synthetic narcotic that has opiate-like effects but is not derived from opium; or
- A group of naturally occurring peptides that bind at or otherwise influence opiate receptors, including an opioid agonist.

The term "**chronic pain**" is defined as "pain that persists or progresses over a period of time that may be related to another medical condition and is resistant to medical treatment." It does not include "acute pain."

The term "**acute pain**" is defined as "pain that comes on quickly, may be severe, but lasts a relatively short time and is provoked by a specific condition or injury."

DISCUSSION

The prescriber must have a discussion with the patient before issuing the first opioid prescription for chronic pain that includes all of the following:

- The risks of **addiction and overdose** associated with the controlled substance containing an opioid;
- The **increased risk of addiction** to a controlled substance if the individual suffers from a mental disorder or substance abuse disorder;
- The **dangers** of taking a controlled substance containing an opioid with benzodiazepines, alcohol or other central nervous system depressants;
- Any information the physician deems relevant from the **product label**; and
- The **non-opioid treatment options** available for treating chronic non-cancer pain if applicable, that are **consistent with the best practices pursuant to the Pennsylvania Opioid Prescribing Guidelines.**

OPIOID TREATMENT AGREEMENT REQUIREMENTS

Before issuing the first opioid prescription for chronic pain, the prescriber must **review and sign a Treatment Agreement** that includes all of the following:

1. The **goals** of the treatment.

continued on page 16

Mandatory Opioid Treatment Agreements

continued from page 15

2. The **consent** of the individual to a **targeted test** in a circumstance where the physician determines that a targeted test is medically necessary.

3. The treatment of **chronic pain shall be consistent with the Pennsylvania Opioid Prescribing Guidelines.**

4. The prescriber's policies which include:

    - A requirement that the individual **take the medication as prescribed**; and
    - A **prohibition on sharing** the prescribed medication with other individuals.

5. A requirement that the patient **inform the physician about any other controlled substances prescribed or taken by the patient.**

6. Any reason why the opioid therapy may be **changed or discontinued** by the prescriber.

7. Appropriate **disposal methods** for opioids that are no longer being used by the patient as specified in consultation with the prescriber.

8. Obtain **written consent** for the prescription from the patient, which may be accomplished utilizing electronic methods. The consent must be recorded in the agreement itself.

9. The brand **name or generic name, quantity and initial dose of the controlled substance** containing an opioid being prescribed.

10. A statement indicating that a controlled substance is a drug or other substance that the United States Drug Enforcement Administration has identified as having a **potential for abuse**.

11. A statement certifying that the prescriber engaged in the discussion summarized above.

12. The signature of the patient and the date of signing.

13. The signature of the prescriber.

The stated goal of the Treatment Agreement is to make sure the patient understands:

1. Treatment responsibilities.

2. The conditions of medication use.

3. The conditions under which the treatment of the individual may be terminated.

4. The responsibilities of the prescriber.

URINE DRUG TESTING

Physicians and extenders who prescribe opioids for chronic non-cancer pain are now statutorily required to conduct urine drug testing on patients. The following rules apply:

1. A **baseline test** is required prior to the issuance of the initial prescription for chronic pain.

2. A **baseline test**, **periodic test** or **targeted test** must be used to establish a **general assessment** for an individual **new to treatment for chronic pain** and a **monitoring adherence** to an existing individual treatment plan, as well as to **detect the use of a non-prescribed drug**.

3. An individual who is treated for **addiction** or an individual who is considered moderate or high risk by the prescriber **must be tested at least once annually or as frequently as necessary to ensure therapeutic adherence.**

The term "**baseline test**" is defined as the initial assessment through a urine drug test to:

- Identify the presence of an illegal substance prior to prescribing a controlled substance; or
- Assess the presence or absence of a prescribed drug or drug class.

The term "**periodic test**" is defined as a "urine drug test that screens for a selection of drugs."

The term "**targeted test**" is defined as "a urine drug test ordered at the discretion of the prescriber, based on the observation of the prescriber and related circumstances that enhanced clinical decision making."

The term "**presumptive positive drug test**" is defined as follows:

A urine drug test that is used to identify suspected possible use or non-use of drugs or a drug class that may be followed by a definitive test to specifically identify drugs or metabolites.

The term "**definitive drug test**" is defined as follows:

continued on page 17

Mandatory Opioid Treatment Agreements

continued from page 16

A qualitative or a quantitative urine drug test used to identify specific drugs, specific drug concentrations and associated metabolites.

STATUTORY ADOPTION OF PENNSYLVANIA OPIOID PRESCRIBING GUIDELINES

As noted above, Act 112 refers to the Pennsylvania Opioid Prescribing Guidelines twice. The Guidelines are not specifically defined; however, it is reasonable to conclude that the Opioid Prescribing Guidelines refer to the eight guidelines currently published and posted on the Pennsylvania State Board of Medicine's website.[1]

We have previously recommended compliance with each of these Guidelines because expert testimony could establish those guidelines as the applicable standard of care. The provision stating that "the treatment of chronic pain shall be consistent with the Pennsylvania Opioid Prescribing Guidelines" and the requirement that physicians must discuss non-opioid treatment options available for treating chronic non-cancer pain consistent with the guidelines demonstrate that the Medical Board's Opioid Prescribing Guidelines are now the law of the Commonwealth of Pennsylvania. Whether those guidelines can be modified without following regulatory review statutory procedures remains an open question. For now, it is legally prudent to adhere to every element of every Guideline that is applicable to any treatment circumstance.

EXCEPTIONS

The Urine Drug Testing Requirements do not apply if the treatment of an individual with a controlled substance containing an opioid is associated with or incident to:

1. A **medical emergency** documented in the medical record of the patient.

2. The management of pain associated with **cancer**.

3. The use of controlled substances in **palliative or hospice care**.

4. The **professional judgment** of the prescriber with respect to assessments and discussions summarized above.

The prescriber is required to document in the patient's medical record which of the four factors summarized above the prescriber believes applies to the individual in order to justify an exception.

SANCTIONS AND PENALTIES

A physician or extender who violates Act 112 is automatically subject to sanctions under the prescriber's Professional Practice Act and by the appropriate licensing board. In other words, any violation of Act 112 constitutes an automatic violation of the Medical Practice Act or the Osteopathic Medical Practice Act, subjecting the physician to sanctions against the physician's license.

OPEN LEGAL QUESTIONS

Careful analysis of Act 112 raises questions that have not been answered.

First, the Opioid Treatment Agreement is referred to as a "form" several times. Act 112 does not include a specific form (as some other statutes have done). Although the Department of Health is required to publish temporary regulations before the end of February 2020, Act 112 does not require DOH to prepare the form. Even if it did, the Act is already in effect.

Second, the Opioid Treatment Agreement Act imposes the Prescriber Requirements "before issuing an individual the first prescription in a single course of treatment for chronic pain with a controlled substance containing an opioid." What about existing patients "being treated with opioids for chronic pain?" Act 112 is completely silent as to whether existing patients receiving opioid prescriptions for chronic pain are subject to the extensive requirements of Act 112. Act 112 does not contain any "grandfather clause" or any other specific exception for existing patients.

Third, physicians and extenders must think critically about the reasons why opioid therapy may be changed or discontinued, which must be included in the prescribing policies contained in the Opioid Treatment Agreement. That suggests the physician has a fair amount of discretion to change or discontinue opioid therapy, but there are no specific parameters contained in Act 112.

continued on page 18

[1]These include the Safe Prescribing of Opioids in Orthopedics and Sports Medicine; Emergency Department Pain Treatment Guidelines; Opioids to Treat Non-Cancer Pain Guidelines; Geriatric Pain Treatment Guidelines; Obstetrics & Gynecology Pain Treatment Guidelines; Use of Addiction Treatment Medications in the Treatment of Pregnant Patients with Opioid Use Disorder Guidelines; Safe Prescribing for Workers' Compensation Guidelines; and Pediatric and Adolescent Populations Guidelines.

Mandatory Opioid TreatmentAgreements

continued from page 17

Fourth, the urine drug testing requirements apply to individuals new to treatment for chronic pain and monitoring adherence to an existing individual treatment plan. With respect to existing patients, the Medical Board's Opioid Guidelines give physicians some discretion about how to advise patients on the necessity of periodic compliance checks that include urine or saliva drug testing as well as pill counts. Because the Guidelines are now the law, does that mean existing patients receiving opioid prescriptions are subject to mandatory urine drug testing? Do saliva drug testing and pill counts remain optional?

Perhaps the Department of Health's temporary regulations will address these and other issues that arise; however, those regulations are not required to be published until the end of February 2020.

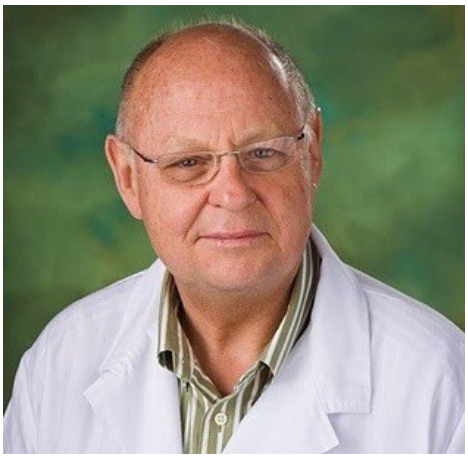
In the meantime, PSA members who prescribe opioids to patients with chronic pain as defined in Act 112 must move quickly to develop and implement Opioid Treatment Agreements and procedures consistent with Act 112.

To read the entire Act 112, go to:

https://www.legis.state.pa.us/cfdocs/billInfo/billInfo.

Z-PAC Update

Extinction Event

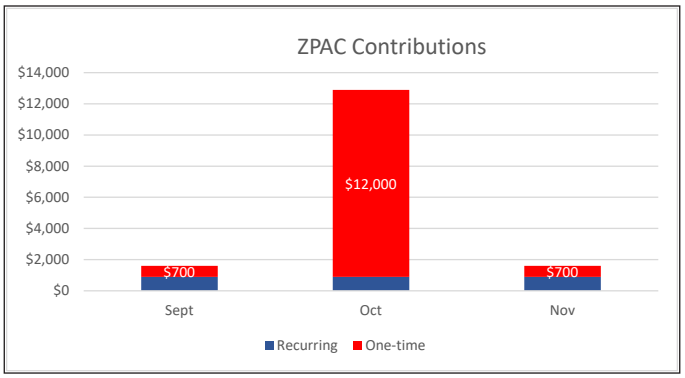


Craig Muetterties, MD

An interesting thing happened to me the other day when I stopped at the Z-PAC post office box. There were two envelopes addressed to the PAC. I recognized the name on one of the envelopes but was unsure who had sent the other. When I sat down to record the contributions, I discovered that both letters were sent by family members of deceased physicians. This was particularly interesting since these two items were sent at the end of the month when a flurry of contributions had been sent to the PAC in response to a mailing.

I am always delighted to see that there are members of our society who are retired who still contribute to the PAC. I plan on being one of them when I finally retire myself. I hope there will be continued interest in supporting the cause when older physicians "die off". I am concerned that there is a lack of interest in supporting this type of function by younger physicians. Physicians starting in practice today have many of the day to day issues of the business of anesthesia performed by large groups or businesses. Although the responsibility of caring for these things may have changed hands, the issues remain the same. People feel removed from that responsibility.

I believe these factors contribute to the small number of ongoing contributors to the PAC. I recently looked at the graph of contributions made through credit card donations the month preceding and following the October surge in contributions. I include a snapshot of the three-month period that caught my attention.



The months before and after the October mailing characterize the typical engagement of society members providing ongoing PAC support. The response to the mailing was extremely encouraging but it reminded me of the Holocene extinction that is getting a lot of recent press. It seems we are in the midst of the sixth mass extinction. This is an ongoing event that has been attributed to human activity. No one can deny that we are witnessing the extinction of numerous animal species. When people realize that a single publicized species is endangered, there is a flurry of activity to try to stop the process – much like the activity we saw in October. The problem is that the process continues and it requires ongoing activity. Likewise, the issues we face as a society are ongoing issues that affect our profession. The society needs your continued participation to help protect our patients and our livelihood.

I have some advice that I believe in my heart is essential:

Don't keep trying to put out brushfires with sporadic contributions Become a participant in averting the extinction.

Contributions can be made by check or credit card.

Recurring ACH drafts can be made from your bank account using any online banking application. They can be sent to:

Z-PAC
PO Box 325
Media, PA 19063

Credit card contributions can be made by accessing the Society website at:
https://www.psanes.org/donate-to-zpac.html

Please remember to indicate your employer on the form and make it a "recurring" contribution.

Resident's Column

PA's Opioid Epidemic: What is our role as anesthesiologists?

(left to right) PSA Resident Component President-Elect: Chinyere Archie, MD, PGY3 at Temple University Hospital; PSA Resident Component President: Neal Shah, MD, PGY3 at the University of Pittsburgh Medical Center; PSA Resident Component Secretary: Anne P. Pribonic, MD, PGY1 at the University of Pittsburgh Medical Center

The opioid epidemic is certainly the most prevalent public health crisis of the decade. At the peak of the epidemic, in 2012, Pennsylvania physicians wrote 83.3 opioid prescriptions per 100 people. By 2017, the rate had decreased to 58.7 per 100 people[1]. While great strides have been made in combating this problem, the most recent data shows over 17,845 emergency department visits due to opioid overdose since January 2018 in Pennsylvania alone[2]. Though rates of individuals with a drug use disorder have only decreased marginally, deaths from drug overdose decreased by 18%[2]. At least some of this decrease can be attributed to the PA Secretary of Health's standing order for naloxone prescriptions, which can be used by any individual without a visit to a healthcare provider. Pennsylvania Medicaid also provides coverage for the prescription with no copay or restrictions.

Various proposals have been made in the state legislature to combat the opioid crisis. Recently, Rep. Jim Struzzi-R, proposed legislation that would legalize fentanyl test strips, which evaluate for the presence of fentanyl in various street drugs. Drugs laced with fentanyl have been implicated in increasing overdose deaths. Proponents of this legislation also cite a presumed economic benefit from reduced deaths and hospitalizations from opioid abuse. Currently, fentanyl test strips are considered drug paraphernalia and are not legal in the state of Pennsylvania.

There are countless ways in which you can help make an impact to combat the opioid epidemic. All anesthesiologists with opioid prescribing privileges should register and use our state's drug monitoring services. Through the Pennsylvania Prescription Drug Monitoring Program (PDMP), providers may access online records of all filled prescriptions for controlled substances. This resource is easy to use and helps to facilitate safe prescribing practices.

As anesthesiologists, we may be called to assist with the emergent care of patients who have overdosed on opioids. Naloxone is a life-saving medication that is easily accessible in our operating rooms and 'emergency boxes'. Dr. Jerome Adams, U.S. Surgeon General and anesthesiologist, is a fierce advocate of co-prescribing naloxone with outpatient opioid regimens. He has helped make the way for distribution of free doses of naloxone to physicians, medical technicians, law-enforcement officers and patients in many states. We can further this cause in Pennsylvania. As physicians we have a role to play in educating our colleagues, patients and the public about recognizing signs of opioid overdose and appropriate medical interventions.

Obtaining a focused mental health history from our patients should not be overlooked when planning the delivery of anesthetic care. This helps to identify those patients who are at highest risk for, or who are already struggling with, opioid misuse. A hospital admission for a seemingly unrelated complaint may be the only opportunity for physicians to help patients seek treatment and gain access for resources to combat opioid addiction.

To help decrease the reliance on opioids for postoperative pain, anesthesiologists have a unique opportunity to offer alternative forms of analgesia such

continued on page 21

Resident's Column

continued from page 20

as neuraxial and regional anesthetic techniques. When consulted, we may suggest alternate medications and non-pharmacological approaches, where appropriate, for pain management. We must continue to encourage a multimodal approach to the treatment of pain and opioid use disorders. Engaging primary care providers, nurses, patients and family members will improve the effectiveness of our efforts.

One way to engage healthcare providers from all specialties and the general community is through advocacy. Anesthesiologists are uniquely positioned to know how opioid abuse can impact one's life. For the last two years, the University of Pittsburgh Medical Center (UPMC) Department of Anesthesiology and Perioperative Medicine has led an initiative to improve access to opioid addiction treatment for the homeless population in Pittsburgh and the surrounding areas. Residents have done this by partnering with the Light of Life Rescue Mission organization to fund their community outreach programs. Light of Life Rescue Mission was founded in 1952 in Pittsburgh. The organization provides long term residential recovery programs and is developing new ways to serve the community. Last year the organization provided more than 250,000 meals and 10,000+ shelter stays.

This year, led by Neal Shah, MD (PSA Resident Component President), UPMC Anesthesiology is once again hosting the Opioid Epidemic Awareness Fundraiser on Saturday, January 25, 2020 from 7pm to 11pm. This charity event is co-sponsored by major organizations, including UPMC Health Plan, Pennsylvania Society of Anesthesiologists (PSA) and the University of Pittsburgh Graduate Nursing Student Organization. Last year the group raised $11,500 for the charity and the team looks to donate more this year.

The goal of the event is to bring the community together to support a great organization and raise awareness for a major public health concern. Individuals can support the event by attending the event, donating a gift or donating via GoFundMe, and sharing the event on social media.

1. Tickets ($40) include appetizers, soft drinks, cash bar and live auction and can be bought at: https://opioidepidemicawarenessfundraiser.eventbrite.com/.

2. Donate via GoFundMe at: https://www.gofundme.com/opioid-epidemic-awareness-fundraiser.

3. Share event on Twitter and learn more about the event via the Facebook page at https://www.facebook.com/events/454077542130134/

This event is multidisciplinary and goes beyond just healthcare professionals. All are welcome. While there is still significant room in our daily practice to limit the risk of opioid abuse, it is our responsibility as active members of the community to provide additional forms of assistance.

We want to encourage all readers to commit to active participation in our unified front. Together, we can significantly reduce opioid abuse. No venture is too small and no change is insignificant. In your daily practice, reiterate the importance of these ventures when interacting with colleagues of all disciplines. Lead educational initiatives at your local hospital or practice group. Think of new ideas for how to help save Pennsylvania and please reach out to the Pennsylvania Society of Anesthesiologists for support as we continue to partner with and represent you.

We hope to see you on January 25th 2020!

[1]https://www.health.pa.gov/topics/disease/Opioids/Pages/Opioids.aspx

[2]https://data.pa.gov/stories/s/9q45-nckt/

Neal Shah, MD
PSA Resident Component President

Chinyere Archie, MD
PSA Resident Component President-Elect

Paige Pribonic, MD
PSA Resident Component Secretary

Purchase tickets

Contribute to the cause

The Evolution of the Preoperative Evaluation

Joseph F. Answine, MD, FASA

Thirty-five years ago, I had the displeasure of stopping a charging running back with my face. Due to my obvious lack of tackling skills, I suffered a busted nose with a deviated septum. I was scheduled for a septoplasty, and as part of the preoperative evaluation, an electrocardiogram, chest x-ray, extensive blood work and a urinalysis were performed. All studies were considered normal. I was without any known health problems and was obviously physically active. The procedure was done with deep sedation, approximately 30 minutes in duration, and with about five milliliters of blood loss.

The preoperative work-up was standard regardless of health or the procedure being performed. The question arises as to whether the work up would have changed the preoperative risk or the decision to proceed. In a healthy asymptomatic individual, the answer is more than likely, no. Today, it can be argued that no work-up other than a focused history and physical examination is indicated based on the individual and the planned procedure.

CLEARANCE

When we consult medicine or a medicine subspecialty, such as cardiology, the question commonly asked (or assumed) is "preoperative clearance". The consultant may be concerned because a clearance may infer that the surgeon may proceed; that the patient is fit for surgery; that there is no medical risk to the patient to undergo the procedure (regardless of what you say after "cleared for surgery"); and that the consultant accepts responsibility for the eventual outcome of the patient after the procedure. However, none of these are possibly the intention of the consultant. A preoperative consult should provide a risk assessment to the patient and family to allow for a truly informed consent; a description of the co-morbidities and the extent of the disability; a determination if the patient is optimized prior to procedure and if not, develop a plan to intervene; a plan for chronic medications; a post-operative care plan; and a guided pre-operative testing/laboratory studies.

An example of a common consult request is **"85-year-old white female s/p hip fracture, please provide clearance for surgery"**. This request should be more appropriately stated as **"The patient is an 85-year-old white female s/p hip fracture after fall with no other injuries. There is a history of CAD s/p CABG and stable symptoms but new abnormalities on ECG (? Ischemia), a history of mild aortic stenosis by ECHO 18 months ago, and diabetes with the last A1c of 7.2. The expected blood loss is 300 ml and the expected hospital stay is 4 days. Studies show that surgery within 24 hours leads to reduced morbidity. Please evaluate, optimize and make recommendations for perioperative care."**

PERIOPERATIVE RISK

Decades ago, the go-to preoperative criteria for risk of a postoperative cardiac event after noncardiac surgery were those outlined by Goldman et. al. from 1977. The criteria included: advanced age, recent MI, CHF, arrhythmias, emergency and/or thoraco-abdominal surgery, and poor general health.[1] Many have modified the criteria to include abnormalities such as lung disease and cardiac valve disease; but the consensus is that age, recent cardiac events, high risk and/or emergent surgery and poor physical conditioning lead to an increased risk of postoperative morbidity.[2, 3, 4]

As suggested previously, perioperative risk is also stratified based on the procedure being performed. Low risk procedures such as cataract removal, dental surgery, knee arthroscopy, or a cystoscopy need not have the same work up as an intermediate risk procedure such as cholecystectomy, splenectomy or head-and neck surgery; or a high risk procedure such as a thoracotomy, extensive bowel resection or major vascular surgery. Imagine taking on the risk of an exercise stress test or coronary angiography as a preoperative assessment in an older individual prior to cataract surgery?

continued on page 23

The Evolution of the Preoperative Evaluation

continued from page 22

COMMON PREOPERATIVE PATHOLOGY

What about common potentially significant pathology such as aortic valve stenosis and new onset atrial fibrillation? With the more frequent use of echocardiography and the advancing age of our population, more and more patients are coming to the operating room with the diagnosis of severe aortic stenosis with a valve area less than or equal to 1 cm^2. We deem these individuals at high risk and usually postpone the surgery for interventions, such as valvuloplasty, TAVR or surgical valve replacement. However, if a patient is asymptomatic and their mean gradient is less than 45-50 mmHg, recent studies show that they can tolerate most operations with appropriate management, including a higher level of perioperative monitoring, IV fluid volume support, and alpha agonists (phenylephrine/norepinephrine). A valve corrective procedure likely runs a much higher risk than the originally planned procedure.[5]

With atrial fibrillation, if the surgery is elective, a workup is indicated since common triggers, such as MI, CHF, acute pulmonary disease, thyroid disease, liver disease and kidney disease, would likely alter perioperative care. Performing the appropriate perioperative workup allows time for cardioversion and rate control. However, if the surgery is emergent, acute rate control with beta blockers, calcium channel blockers and/or amiodarone can be initiated, and, as with aortic stenosis, a higher level of perioperative care should be used.

Diabetes, whether type 1 or 2, has become of increasing concern due to how prevalent the disease is in the United States. Poor glycemic control, indicated by A1c and fasting serum glucose, can place patients at high perioperative risk. Pre-operative assessment and management prior to emergent/urgent surgery will aid with hemodynamic, volume and electrolyte control during the perioperative period. The level of control indicated by A1c and serum glucose will aid in risk stratification, insulin management and/or oral medication management, and post-operative plan of care.

SPECIFIC PREOPERATIVE TESTS

It is now known that unnecessary preoperative testing carries potential risk. And, no, it is not the radiation from an otherwise unnecessary chest x-ray. We can probably tolerate over 1000 chest x-rays throughout our life without significant risk. It's the risk of a false positive result which will lead to more studies and potentially an invasive procedure which may carry more risk than the originally planned surgery.

Let's start with the chest x-ray. In a meta-analysis by Archer et. al. (1993): 10% of 14,390 subjects had abnormalities. Only 1.3% of those screened had an unsuspected abnormality. Only 0.1% (0 to 0.6%) of those screened had chest x-rays that changed management. Furthermore, there is substantial risk of the occurrence of a false positive result such as a "pulmonary nodule" which leads to a CT scan and possibly an invasive procedure, even though it has ZERO impact on the risk of the procedure. There is also a risk to the healthcare system due to the cost of unneeded preoperative chest x-rays and subsequent work.[6] So, the take home message is - if the patient has no history of lung disease, the lung exam is normal, and the intended surgery does not involve the thoraco-abdominal region, a chest x-ray provides little benefit.

An electrocardiogram also does not have to be an automatic preoperative study. Patients with known coronary disease, a significant arrhythmia, peripheral arterial disease, cerebrovascular disease, or other significant structural heart disease, would benefit from a pre-operative electrocardiogram. The exception is patients undergoing low-risk surgeries. It can be considered for asymptomatic patients without known CAD, having a moderate to high risk procedure. Most authorities recommend an ECG for those with risk factors of CAD, and some use an age cut-off. Most of the value is likely as a baseline to measure against any post-op changes. The time interval for an ECG is commonly 1-3 months preoperatively. A helpful finding for the anesthesiologist is a prolonged QT interval since many agents used may affect the QT interval.

A cardiology consult for anticoagulation management can be considered for high risk patients based on risk assessment criteria and the presence of unstable angina, known significant valvular disease, and/or coronary stents (bare metal or drug eluting).

A hemoglobin and/or hematocrit are the most commonly obtained studies due to the low risk to perform and bleeding as a common surgical risk; however, it should not be automatically obtained. Clinical characteristics to consider as indications for hemoglobin and/or hematocrit include type and invasiveness of the procedure, patients with liver disease, extremes of age, and history of anemia, bleeding, and other hematologic disorders.

Clinical characteristics to consider for ordering selected coagulation studies include bleeding disorders, renal dysfunction, liver dysfunction, and type and invasiveness of procedure. Anticoagulant medications

continued on page 24

The Evolution of the Preoperative Evaluation

continued from page 23

and alternative therapies may present an additional perioperative risk therefore coagulation studies may be warranted. Coagulation tests before regional anesthesia are only indicated if there is a known risk for abnormalities.

Clinical characteristics to consider before ordering pre-anesthesia serum chemistries include likely perioperative electrolyte abnormalities; hepatic or renal toxic therapies; endocrine disorders; risk of renal and liver dysfunction; and use of certain medications (e.g. diuretics) or alternative therapies. Serum chemistries may be considered at extremes of age.

A urinalysis is rarely indicated. Urinalysis is not indicated except for specific procedures (e.g. prosthesis implantation, urologic procedures) or when urinary tract symptoms are present.

A CONSULTANTS RECOMMENDATION OF A SPECIFIC ANESTHETIC

Occasionally, a consultant will recommend one anesthetic over another (e.g. recommend spinal over GA, or recommend conscious sedation only). Obviously, this should be discouraged. A large meta-analysis in 2015 found no difference in 30-day mortality when comparing general versus regional anesthesia for hip surgery.[7] Also, in 2015, an article in Anesthesia & Analgesia found that in patients with COPD, regional anesthesia was associated with lower incidences of morbidity, pneumonia, prolonged ventilator dependence, and unplanned postoperative intubation.[8] A statement from a 2011 article in the British Journal of Anaesthesia read: **"Whether regional anesthesia influences outcome after surgery is a controversial topic. Several meta-analyses have investigated this important topic with controversial results."**[9] The bottom line is that with variability in the abilities of the individual anesthesiologist in performing different anesthetics, as well as a lack of consensus on the superiority of anesthetic choice on outcome, it is difficult to make a recommendation on anesthesia technique from afar.

THE OPTIMIZATION CLINIC

I am a big fan of the optimization clinic. However, there is a common misconception: The clinic will replace the primary care physician. Actually, a well-designed optimization clinic will increase the utilization of the primary care physician with early consultation and intervention in order to optimize the patient's physical status. Unless the patient is free of chronic disease, primary care notification and a request for evaluation is common. The optimization clinic is the "great equalizer". It will gather the data from the primary care physician and surgeon, and determine if further studies, sometimes based on consultation with the anesthesiologist, are warranted. They will either refer to the primary care physician for testing or obtain the studies themselves. Studies show that the use of an optimization clinic improves patient readiness for surgery, reduces day of surgery cancellations, and improves patient outcomes (reduced LOS, less complications, improved patient satisfaction and reduced readmissions).

The preoperative evaluation has appropriately evolved. It is now a patient and procedure specific evaluation in order to avoid a full body work up for a 30-minute septoplasty because someone decided to tackle with his face.

[1]Goldman L, Caldera DL, Nussbaum SR, et. al. Multifactorial index of cardiac risk in noncardiac surgical procedures. N. Engl J Med. 297:845, 1977.

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[3]Fleisher LA, Beckman JA. ACC/AHA 2007 guidelines on peri-operative cardiovascular evaluation and care for non cardiac surgery: a report of American College of Cardiology/American Heart Association Task force on practice guidelines (Writing committee to revise 2002 guidelines on peri-operative cardiovascular evaluation for non cardiac surgery) Circulation. 2007;116:e418–e500.

[4]Karnath BM. Preoperative Cardiac Risk Assessment. Am Fam Physician 2002;66:1889-96.

[5]Samarendra P, Mangione MP. Aortic Stenosis and Perioperative Risk With Noncardiac Surgery. Journal of the American College of Cardiology, Volume 65, Issue 3, January 2015.

[6]Archer C, Levy AR, McGregor M. Value of routine preoperative chest x-rays: a meta-analysis. Can J Anaesth. 1993;40(11):1022-7.

[7]Di Zuo, Chunyu Jin, Minhong Shan, Lijuan Zhou, Yanshuang Li. A comparison of general versus regional anesthesia for hip fracture surgery: a meta-analysis. Int J Clin Exp Med. 2015; 8(11): 20295–20301.

[8]Hausman MS, Jewell ES, Engoren M. Anesthesia & Analgesia: June 2015 - Volume 120 - Issue 6 - p 1405–1412.

[9]Kettner SC, Willschke H, Marhofer P. Does regional anaesthesia really improve outcome? British Journal of Anaesthesia, Volume 107, Issue suppl 1, December 2011, Pages i90–i95.

Know Your Equipment: Monitoring Neuromuscular Blocade

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Introduction

In 1942, Harold Randall Griffith was the first to use curare, a neuromuscular blocking drug (NMBD) in a young man undergoing appendectomy. Neuromuscular blockade (NMB) has revolutionized the practice of clinical anesthesia but it has brought its own share of problems such as residual NMB and its associated morbidities. Therefore, monitoring the NMB when such drugs are used is strongly recommended.

How can neuro-muscular blockade be monitored?

The essential technique to monitor the NMB is to stimulate the motor nerve and evoke a muscular contraction. A battery-operated nerve stimulator is used to generate a constant electrical current, up to a maximum of 80 mA. The pulse stimulus lasts 0.3 milli-second (ms) and is of a monophasic, square wave type. The stimulating cables are connected to surface electrodes placed on the skin along the path of the nerve with the negative electrode placed distally.

The different patterns of nerve stimulation and the interpretation of the evoked responses are explained below.

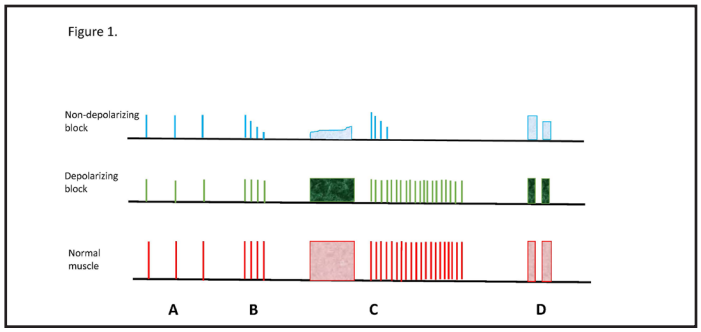

Figure 1. *The twitch responses of a muscle paralyzed by depolarizing and non-depolarizing muscle relaxants compared to those of a normal muscle. (A – Single twitch; B – Train of four; C – Tetanic and Post-tetanic count; D – Double burst stimulation)*

1. **Single Twitch:** A single supramaximal stimulus at a frequency of 1 every 10 seconds (0.1 Hz). The twitch height is reduced for depolarizing as well as non-depolarizing NMB. However, to estimate the degree of blockade it needs to be compared to the twitch response prior to the administration of the NMBD.

2. **Train-of Four (TOF)**: The TOF pattern is made up of 4 supramaximal stimuli at 2 per second (2 Hz). When a non-depolarizing NMBD is administered, the height of the twitch starts decreasing in a graded manner from the 1st to the 4th twitch. This is referred to as 'fade'. Fade is thought to be an effect of a non-depolarizing NMB agent on the presynaptic nerve membrane. The TOF ratio (TOFR) is calculated by dividing the amplitude of the 4th twitch to the first (T4/T1). This would require a quantitative monitoring device. As the intensity of the NMB increases, the number of twitches start disappearing from the 4th to the 1st. At this stage the TOF count (TOFC) correlates to degree of NMB (1 - >95%, 2 – 85-90%, 3 – 80-85%, 4 – 70-75%). However, when a depolarizing NMBD is used, the height of all the four twitches decreases equally and there is no fade.

3. **Tetanic stimulation and Post-tetanic Count (PTC)**: In a clinical situation when there is no response to TOF (TOFC=0), a tetanic stimulus at 50 Hz for 5 seconds followed by a series of up to 20 stimulations at 1 Hz can provide further information about the intensity of the NMB. A tetanic stimulus causes a sustained muscle contraction. It transiently mobilizes presynaptic acetylcholine (Ach) to be released into the neuromuscular junction. This causes a subsequent stimulus to be potentiated (post-tetanic

continued on page 26

Know Your Equipment: Monitoring Neuromuscular Blocade

continued from page 25

facilitation). The number of post-tetanic responses (PTC) is inversely proportional to the depth of the NMB. As an example, a PTC of 6-8 suggests that the TOFC of 1 is imminent from an intermediate-duration NMBD, while a PTC of 1 suggests that it may take up to 30 minutes. The post tetanic responses show fade. The frequency of tetanic stimulus used should be 50 Hz, as higher frequency can cause 'fade' even without NMB.

4. **Double Burst stimulation (DBS):** The double burst consists of two, 50 Hz tetanic stimulus, each for 60ms duration delivered 750ms apart. Similar to the TOF, the ratio of the second to the first response or DBS ratio gives an estimate of non-depolarizing NMB. This was developed on the assumption that a subjective assessment of fade would more accurate when two twitch responses are compared instead of four.

Although, visual and tactile evaluation of the twitches are commonly employed, it is less accurate than the quantitative techniques that measures the mechanical and electrical response of the muscle to the stimulation.

Mechano-myography: This technique measures the isometric force generated by the stimulated muscle. It is regarded as the gold standard for quantification of twitch monitoring, but is mainly used in laboratories and not available for clinical use.

Accelero-myography: When the ulnar nerve is stimulated it contracts the adductor pollicis and the force of contraction can be interpreted by the acceleration of the movement of the thumb (Force = mass x acceleration; Newton's 2nd law of motion). An accelerometer is mounted on the palmer surface of an unrestricted thumb. Therefore, it cannot be used when the arm is tucked by the side of the patient and under the surgical drapes. The monitor displays the TOFC and the TOFR, when there are four twitches. This is the most used technique in clinical practice.

Electro-myography (EMG): Electrodes placed over the thenar eminence or needle electrodes inserted into the adductor pollicis muscle can detect the evoked electrical response. Although, EMG is routinely used for intraoperative neuro-monitoring, the use of this technique for a dedicated neuromuscular monitor is recent. This technique can be used even if the arm of the patient is tucked under the drapes and the movement of the thumb is restricted.

Box 1: Level of Neuro-Muscular Block. (PTC – Post-tetanic count; TOFC – Train of four count; TOFR – Train of four ratio)

Level of block	Quantitative measure of Adductor pollicis	Comments
5 – Intense or Complete	PTC - 0	Do not attempt reversal of NMB
4 – Deep	PTC ≥ 1, TOFC = 0	Sugammadex – 4mg/kg
3 - Moderate	TOFC 1-3	Administer reversal agent
2b - Shallow	TOFR < 0.4	TOFR - 0.4 – vital capacity is reduced by 26%
2a - Minimal	TOFR = 0.4-0.9	TOFR- 0.6–0.8 – significant impairment of swallowing and potential for aspiration
1 – Acceptable recovery	TOFR ≥ 0.9	Recovery sufficient for tracheal extubation

Which is the preferred site to monitor NMB?

NMBD affect different muscle groups differently. The NMB occurs faster in the central muscles (larynx, diaphragm) compared to the peripheral muscles (adductor pollicis, flexor hallucis). However, the diaphragm recovers faster because of a higher number of nicotinic acetylcholine receptors. The sequence of fastest to slowest recovery after a non-depolarizing NMB is diaphragm, laryngeal muscles, corrugator supercilii, abdominal muscles, orbicularis oculi, geniohyoid (upper airway), and adductor pollicis. The recovery of the corrugator supercilii muscle (eyebrow) correlates closely to that of the diaphragm and larynx, while that of the orbicularis oculi correlates with the adductor pollicis muscle. However, it is clinically difficult to differentiate between the two orbital muscles and therefore facial nerve stimulation may overestimate recovery from NMB.

The stimulating electrodes are placed along the course of the nerve and should be remote from the muscle being monitored so as to avoid direct stimulation of the muscle. The ulnar (adductor pollicis) and the facial (corrugator supercilii and orbicularis oculi) nerves

continued on page 27

Know Your Equipment: Monitoring Neuromuscular Blocade

continued from page 26

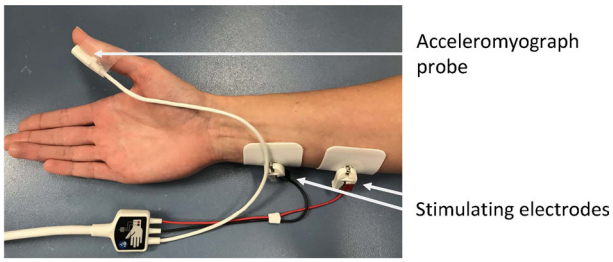

Figure 2. *Ulnar nerve - Adductor pollicis monitoring using the acceleromyograph. The stimulating electrodes are placed along the course of the ulnar nerve.*

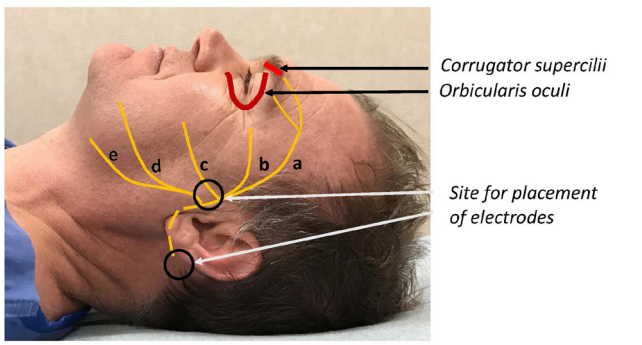

Figure 3. *Facial nerve – Orbicularis oculi / Corrugator supercilii monitoring. The stimulating electrodes are placed at the mastoid process and in front of the tragus to stimulate the facial nerve. The contraction of the orbicularis oculi causes concentric twitching around the orbit, while that of the corrugator supercilii causes the medial part of the eyebrow to contract, like a 'frown'.*

are the commonly used sites for monitoring. While the twitch response of the adductor pollicis can be monitored using the acceleromyograph technique, that of the orbital muscles are accessed visually. The acceleromyograph can also be used to monitor the response of the flexor hallucis by placing the probe on the palmer surface of the great toe, while stimulating the posterior tibial nerve posterior to the medial malleolus.

Why should NMB be monitored?

NMB should be monitored in all patients who receive a neuromuscular blocking drug (NMBD) during the perioperative care. It helps to guide the dosing of these drugs, to assess the degree of recovery from NMB and the dosing and timing of administration of NMB reversing agents.

Complete resolution of NMB cannot be guaranteed by the presence of spontaneous breathing, and the clinical tests such as sustained handgrip or a 5-second head-lift. An absence of 'fade' on visual assessment also does not guarantee muscle recovery as it may still be associated with a TOFR of 0.4-0.6.

Volunteer studies have demonstrated that TOFR of 0.7-0.9 may be associated with impaired pharyngeal function and increased risk of aspiration, weakness of upper airway muscles and airway obstruction, and unpleasant symptoms of muscle weakness.

Reversing NMB

Non-depolarizing NMBD competes with Ach molecules for the nicotinic-Ach receptors within the neuromuscular junction. To reverse the NMB, the concentration of Ach within the synaptic junction is increased by an acetylcholine esterase inhibitor (ACEI) which prevents the breakdown of Ach. The commonly used ACEI is neostigmine (0.03-0.07 mg/kg) which is administered along with a muscarinic-Ach receptor blocker such as glycopyrrolate or atropine to prevent the unwanted cholinergic effects such as bradycardia and salivation.

It is important to remember that although the amount of Ach that can be generated is limited by the ceiling effect of ACE inhibition, there is no such limit to the concentration of NMBD, especially if a large dose is administered by the clinician.

Sugammadex is a modified gamma cyclodextrin which forms a complex with rocuronium or vecuronium, reducing the amount of these NMBD in the plasma.

Box 2: Dose of Sugammadex depends on the recovery of neuromuscular blockade. (TOFC – Train of four count; PTC – Post-tetanic count)

NMB monitoring	Dose of Sugammadex
TOFC of 2 or more	2mg/kg
TOFC = 0; PTC more than 1	4 mg/kg
Immediate reversal of an intubating dose of rocuronium	16 mg/kg

continued on back page

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Know Your Equipment: Monitoring Neuromuscular Blocade

continued from page 27

Clinical Points

- The TOFR and TOFC provides the best assessment of NMB in clinical practice.
- PTC is used when a deep NMB is required as during an open-globe ophthalmic or certain intracranial surgery.
- The recovery of the diaphragm as indicated by breathing does not ensure recovery of the airway muscles.
- The electrodes to stimulate the facial nerve are to be placed on the mastoid process and just anterior to the tragus, to avoid direct muscle stimulation.
- Tetanic stimulation accelerates the twitch recovery of the stimulated muscles which may prompt administration of additional doses of NMBD or at end or surgery, a false sense of adequate recovery of neuromuscular function. Therefore, it is suggested to wait for at least 6 minutes after a tetanic stimulation before repeating it or doing a TOF at the same site. The TOF stimulation does not cause such a potentiation and can be repeated at intervals more than 12 seconds.
- When deep NMB of the laryngeal and upper airway muscles is needed as during intubation, monitoring the adductor pollicis is appropriate. Similarly, during recovery from the NMB, a TOF >0.9 at the adductor pollicis ensures recovery of the diaphragm and the airway muscles. However, during surgery, absence of response from adductor pollicis does not guarantee that the diaphragm is paralyzed, which explains the embarrassing situation of a patient 'bucking' while the TOFC is 0.
- It is inadvisable to attempt reversing an NMB when the TOFC is 0 and the PTC is 0 or 1.

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