

EDUCATION - CLINICAL -
OUR FUTURE



SRNA Sedation Sequels



SUMMER 2017,
Issue 6

WELCOME FERNANDO ALFONSO!

Fernando Alfonso's experience as an ICU nurse was at Jackson Memorial Hospital at Holt's Children's Hospital Pediatric Intensive Care Unit. This was his first and only position as an RN. He describes it as being "an incredible learning environment," and that he couldn't think of a nursing unit that suited him better.

In 2013, he graduated from the FIU's CRNA program and had Mt. Sinai as his clinical base. After graduation, he worked at South Miami Hospital, West Kendal Baptist, and several outpatient surgery centers with the Anesthesia Associates of Greater Miami.

When asked about what made him want to become a CRNA, he said he always wanted to be in healthcare but had no real desire to be a physician. In 11th grade while speaking with a senior classmate, he heard about the nurse



anesthetist profession and made his decision then and there. From that point on, he wasted no time progressing towards his goal.

Talking about anesthesia, Fernando says his favorite cases are C-sections. He says: "I truly enjoy the obstetric department and seeing the joy as a baby is brought into the world. It is rare in anesthesia for us to be able to socialize with our patients for any considerable length of time, or for the surgery to be a happy event."

His long-term goals include becoming a Clinical Assistant Professor at FIU, he is currently working on his DNP. He

adds, "in 5 years, my boys will be 7 and 5, so I expect I'll be spending a lot of quality time with them, and hopefully just enjoying life."

According to Fernando, the main necessity to be successful in anesthesia school is a never-ending work ethic. "Anyone can make through the program if they work hard and long enough. When one expects to do what is minimally necessary or doesn't put the time in for studying, that is where the troubles begin. Be a proactive student. Go and search for every possible learning opportunity. Don't be obsessed over getting released from clinicals at a certain time."

His words of encouragement for those in the program include: "Just keep swimming." Jokes apart he says, "we've all been there, me more recently than others, and we all made it through. Everyone at some point questions if it is worth the headache; it is not only worth it, it's far from impossible. Just keep moving forward and you'll make it to the finish line."

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Larisse Greenwell, SRNA C/O 2018

Student Spotlight – Anthony Catron



Anthony Catron, soon to graduate with a competitive MSN and DNP Dual Degree from Florida International University (FIU) will come to be known as Dr. Antony Catron DNP CRNA. Following graduation, his dreams of becoming an elite member in the field of nurse-anesthesia practice will be actualized.

Anthony was born and raised in New Castle, Indiana. At the age of 18 he courageously joined the Army to pursue, what turned out to be, a lifelong professional journey within the healthcare field. Upon enlisting in the military, Anthony became a medic, and then in 1991 served as a nurse for the Army. Increasing his clinical autonomy and obtaining a graduate level education are very important to him, but his real dream is to be able to someday use his skills and deeply rooted compassion to give back to the small community that he calls home.

Prior to starting his journey as a student registered nurse anesthetist at FIU, Anthony worked at a local county hospital in Indiana, in the capacity of an ICU, PACU and ER registered nurse.

Anthony considers his greatest achievement to have successfully navigated the challenges of being a

parent. He is the proud father to a 26-year-old daughter and a 24-year-old son. Raised within a household rooted in stern direction and optimism, he believes with certainty that it was his encouragement, moral direction, discipline, advice, and love during the critical times in their upbringing that helped them become successful adults today.

For Anthony, moving away for school has had its fair share of positive and negative stressors. The obvious ones include: being away from family, moving into an unknown area, increased expenses, and the loss of a familial support system. Anthony finds solace in knowing that “he gained 40+ new friends the day school started.” He has found within them a new support system that has helped him make it through this very rigorous and competitive school experience.

I have had the pleasure of knowing Anthony for 2+ years and have witnessed his success up close. Anthony is an exemplary example of drive and determination. Seeing him progress in both his career and schooling has been admirable, but what I have appreciated most is how humble he has remained.

A message from Anthony to the Graduating Class of 2017:

“I would like to thank my entire class for being such loving, caring, and giving people. You are the best example of what society can and should be. A group of people from all different backgrounds and beliefs working together, helping each other, lifting each other up, and thriving together.”

Emilio Acosta, SRNA C/O 2017

Future CRNA Employment in the State of Florida

As the number of Certified Registered Nurse Anesthetists (CRNAs) continues to grow, it has become imperative to study the current predictors of CRNA employment in the state of Florida. A convenience sample of 87 hospitals and ambulatory surgery centers throughout Florida was examined.¹ CRNA programs in Florida were assessed for the amount of predicted graduates between 2014 and 2018.¹ Data projected 633 new full time jobs for CRNAs with an estimated 747 graduate nurse anesthetists in the state of Florida.¹ This was an 18% growth rate of full time openings for nurse anesthetists, while a 22% growth rate would be required to accommodate all graduating nurse anesthetists with full time jobs in the Florida workforce.¹

Results also showed a faster expected growth (31%) in the Tampa-St Petersburg area compared to other regions (16%) and accelerated growth of ambulatory surgery centers compared to other facilities.¹ There are several factors that will continue to impact the CRNA workforce such as doctoral mandated CRNA programs and healthcare reform. It will remain important to continue examining the supply and demand of anesthesia providers in the state of Florida to understand future workforce estimates.

Reference:

1. Wunder, L., Glymph, D., Schirle, L., Valdes, J. Workforce Initiative for Current Predictors of CRNA Employment in the State of Florida. American Association of Nurse Anesthetists. 2017;85(3), 217-221. <http://www.aana.com/newsandjournal/20102019/workplace-initiative-0617-pp217-221.pdf>

Frida Iturriaga, SRNA C/O 2017

Clinical Spotlight

Memorial Regional Hospital



Caitlin Scott graduated from Barry University in 2013 as a CRNA. Since graduation, she has worked at Memorial Regional Hospital during day and night shift. She enjoys working night shift because it gives her the opportunity to fulfill a more well-rounded experience as a CRNA. During night shift, she gets exposure to OB, trauma, and a plethora of emergency cases due to Memorial's complex patient population. Caitlin's favorite cases are trauma. She welcomes the challenge using all of her knowledge and skills to facilitate a successful trauma resuscitation. Caitlin also enjoys being a part of the team environment. Her trauma mentors have been Dr. Berlin, Dr. Goldar, and Dr. Carmel. Caitlin's future goals are to eventually go back to school for her DNP and be the best preceptor possible in and out of the trauma room.

From a student's perspective, Caitlin is calm, patient, knowledgeable, and poised in the OR. She is definitely a CRNA that enjoys teaching students and takes the time to hone their skills into safe and effective SRNAs. Caitlin gives feedback where needed and is not afraid to push her/your expectations.

Her advice to students is to keep working hard, push yourself to new goals, and graduate the best provider you can be.

Clifford Burdick, SRNA C/O 2017

Substance Use Among Nurses and Nursing Students

Substance abuse among healthcare providers is a growing epidemic in the healthcare field. Over the past decade, the issue of substance abuse has gained significant interest in a variety of professions, including nursing and anesthesia. This topic poses a serious issue that can have a lasting effect on the healthcare industry and more importantly, on patient care. The potential impact that substance abuse can have on a practitioner is immense: it can affect their families, their job, and could even place their patients at risk.

The article titled "*Substance Use Among Nurses and Nursing Students*" by Stephen Strobbe and Melanie Crowley clearly depicts the growing issue that clinicians and students face with substance abuse.¹ The evidence presented in the article suggest that the prevalence of substance abuse among nurses is similar to that of the general public. Many of the related factors include family history, job-related stress, depression, and accessibility to highly addictive medication.¹

Although the article explains the issues plaguing today's clinician with substance abuse, this focus of the study is on two primary approaches to addressing nurses with impaired practice or drug diversion. The two approaches depicted in the article consist of discipline and alternative-to-discipline (ATD). Discipline entails due process and involves the suspension or revocation of a practitioner's license and no state board recovery program. Alternative-

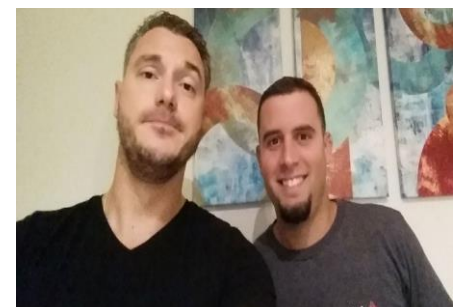
to-discipline programs, which are generally administered by a third party consist of the nurse being refrained from practice while they undergo treatment in a recovery program with the possibility of a return to work in the future.¹

In the past, substance abuse among healthcare providers has been viewed in a negative light and with indisputable punishment as the final decision. In this article, Strobbe and Crowley attempt to change the discussion from punishment to rehabilitation. They provide a different alternative that potentially provides a greater impact on protecting the public than disciplinary programs.¹

Reference:

1. Strobbe S, Crowley M. Substance Use Among Nurses and Nursing Students: A Joint Position Statement of the Emergency Nurse Association and the International Nurse Society on Addictions. *Journal of Addictions Nursing*. 2017;00(0):1-3. Doi:10.1097/JAN.0000000000000150

Ullyses Rodriguez, SRNA C/O 2019
Oscar Ruque, SRNA C/O 2019



Clinical Spotlight

Memorial Hospital Pembroke



Zulkiif "Zul" Darajat is a FIU Alumni and Clinical Coordinator at Memorial Hospital Pembroke. Zul graduated from FIU in 2011 and has been a CRNA for 6 years at Pembroke. Prior to becoming a CRNA, Zul gained his ICU nursing experience from Jackson Memorial Hospital's surgical ICU. From very early on, Zul knew he wanted to continue to grow within nursing. He was initially intrigued by the Acute Care Nurse Practitioners on his unit but after doing some research and speaking to colleagues, becoming a CRNA fell in line with his love for autonomy, independence and critical thinking. Most importantly, it would allow him to care for one patient at a time.

Zul has precepted many FIU SRNAs throughout his career and he is most passionate about teaching and paying it forward to his profession. He uses many clinical situations as learning opportunities and continuously pushes SRNAs to their fullest potential. To unwind from a long day, Zul loves spending time with his family and playing with his one-year-old daughter. He also loves traveling, reading and listening to audio books.

The advice Zul extends to SRNAs is to minimize your risk with everything, and do not forget about retirement and financial planning. Finances for many of us in school is a major stressor which can continue post-CRNA school if proper steps are not taken. "It is important to think about retirement early to get on the right track, this is something I wished someone talked to me about in school." Zul wishes all SRNAs well and looks forward teaching more FIU SRNAs.

Jodi-Ann Elliston, SRNA C/O 2018

Nitroglycerin Use in Obstetrics

Nitroglycerin has been used in anesthetic practice to induced hypotension and manage perioperative hypertension and myocardial ischemia. Contrary to the continuous low dose infusions (5-20 mcg/min) used for the same, intravenous bolus dosages are sometimes administered at the behest of obstetricians for removal of retained placenta. Use of nitroglycerine in managing retained placenta is undertaken as a last resort when other measures fail to relax the uterine smooth muscles. Intravenous nitroglycerine relaxes smooth muscle cells by releasing nitric oxide thus causing prompt cervico-uterine relaxation. It relaxes smooth muscle via dose dependent dilatation of arterial and venous beds to reduce both preload, afterload, and myocardial oxygen demand. Apart from the prompt uterine relaxation, this drug has an advantage of rapid onset of action (75-95 seconds) which is faster than the available tocolytics. Administration of small boluses is not associated with significant blood loss and has the advantage of rapid termination of action.

Therapeutic indications for IV nitroglycerin (NTG) range from facilitating external cephalic version, difficult vaginal or cesarean section delivery, and manual exploration of the uterus, to its use as a tocolytic. The intravenous regimen of NTG required to obtain the desired degree of uterine relaxation is extremely variable; intravenous bolus doses of 50 mcg to 500 mcg, with up to three repeated injections of 50 mcg to 250 mcg have been reported. Other

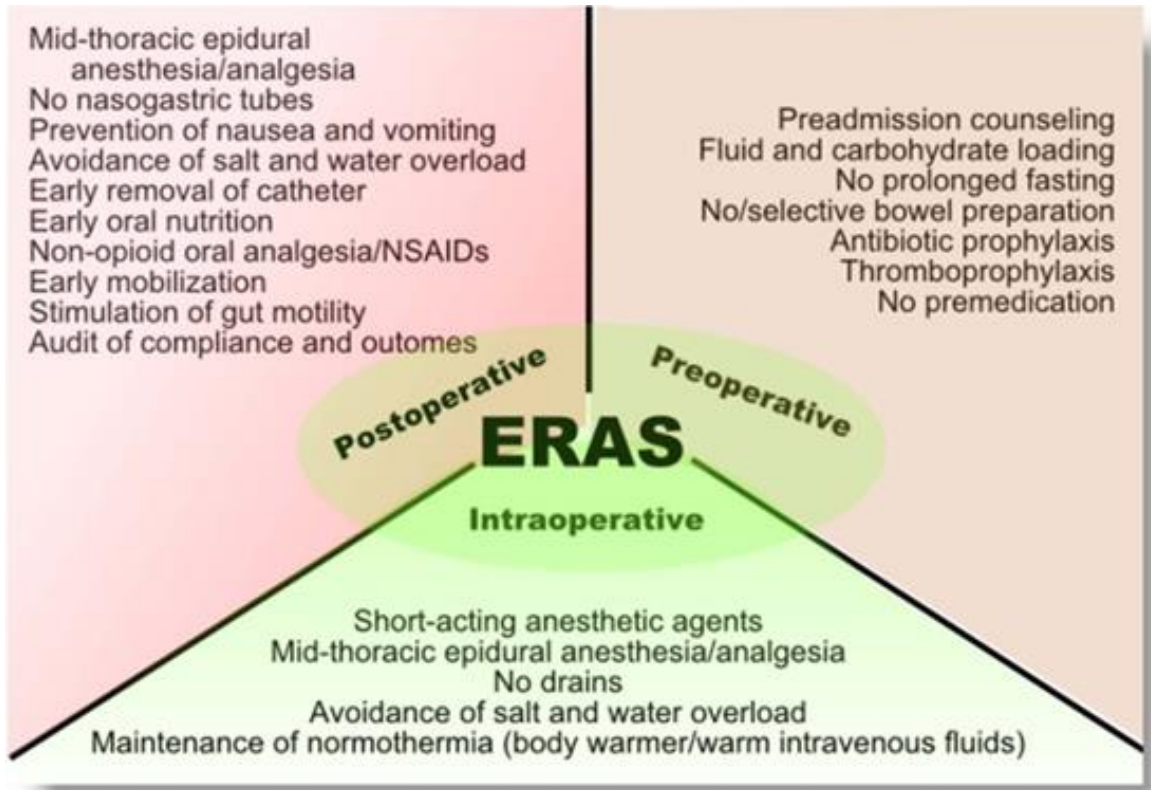
methods of NTG administration include transdermal patches and sublingual spray. When used in low doses, may provide safe and effective uterine relaxation with no clinically apparent fetal or maternal adverse effects. However, clinical trials with use of objective methods of evaluating uterine tone and comparing NTG to other tocolytic agents are required before widespread use in advocated.

References:

1. JF S. Use of nitroglycerin for uterine relaxation. - PubMed - NCBI. Ncbinlmnihgov. 2017. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/9751938>. Accessed June 26, 2017.
2. Stoelting RK, Hillier SC, Shafer S, Flood P, Rathmell JP. *Stoelting's pharmacology and physiology in anesthetic practice*. 4th ed. Philadelphia, PA: Lippincott Williams and Wilkins; January 1, 2015.
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Izaskun Green, SRNA C/O 2018





ERAS: What's the Big Deal?

Enhanced Recovery After Surgery (ERAS) was developed as a fast track surgery and anesthesia method to improve patient outcomes in the post-operative period. Enhanced recovery refers to multimodal care pathway designed to accelerate recovery by reducing the surgical stress response and supporting physiologic function.^{1,2} Although the protocol can be applied to most surgeries, the most common application is in major abdominal surgery including bowel resections and colorectal surgery. When asked about ERAS and patient outcomes, colorectal surgeon Dr. Henry Wodnicki replied: "It is outstanding. The protocol has decreased hospitalization by two and a half days. Wound healing is excellent and post-operative complications are minimal. Patients love it, they can go back to work in two weeks or less."

With the implementation of ERAS protocol, modifications in patient care and management are made during the pre, intra, and post-operative periods. These

modifications vary according to each institution's protocol. The anesthetist plays a critical role in this sequence. It is the anesthetist's responsibility to limit fluids, maintain normothermia, administer the correct medications, and perform a regional block, all while maintaining the patient in a comfortable and pain-free state.

The ERAS protocol has significantly impacted post-operative patient outcomes. "Upon transferring patients to PACU on drips, pain management is better controlled. Narcotic use is reduced, relieving side effects of constipation. In addition, TAP blocks have been beneficial in the post-op phase," states Elizabeth Martinez, CRNA. ERAS protocols generate marked improvements in patient care such as reduced length of stay without readmission, lower pain scores, faster return to bowel function, and earlier mobilization.^{1,3}

References:

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3. Enhanced recovery care pathway. A better journey for patients seven days a week and better deal for the NHS. National Health Service 2012-2013. <http://www.nhs.uk/resource-search/publications/enhanced-recovery-care-pathway-review.aspx>.

Elise Fajardo, SRNA C/O 2018
Nathalie Felipe, SRNA C/O 2018

House Bill 543

The Florida House Bill 543 became effective June 23, 2017. This bill focuses on two specific aspects related to nursing. The first concerns nursing schools and their curriculums. The Board of Nursing (BON) can now endorse rules regarding curriculums that can even extend to the use of simulation laboratories such as the STAR lab. Another change is the process for evaluating the passing rate for licensure examination. In addition, nursing programs who are on probation due to failure to meet graduate passing rates can be given a one-year extension that is sanctioned by the BON. The House Bill has removed the requirement for a nursing student who takes the examination six months after graduation to take a course prior to the examination. The second aspect of the Bill focuses on the practice of the advanced registered nurse practitioner (ARNP).

Four significant changes have been made. The first is the removal of an obsolete pathway for certification. The bill also removed the joint committee as the body that determines ARNP protocols' minimum standards. In addition, the protocols should be listed where the ARNP practices instead of filing it with the BON. Lastly and most importantly, Bill 543 removed the need for an ARNP to have a supervisory protocol with at least one physician when practicing within a physician group practice.

Reference:

The Florida Senate. (n.d.). Retrieved July 29, 2017, from <https://www.flsenate.gov/Committees/BillSummaries/2017/html/1528>

Benjamin Tabaria, SRNA C/O 2019



Federal Advocacy: AANA Files Suit over CRNA Reimbursement for Chronic Pain Management

In Fall 2016, Novitas Solution, Inc., a Medicare Administrative Contractor (MAC) through the Centers for Medicare & Medicaid Services (CMS), issued a local coverage determination (LCD) that would limit payment to CRNAs for epidural injections for chronic pain management. Novitas, which covers patients in more than 12 states across the United States, including the District of Columbia, states that although CRNAs have been performing epidural injections safely, they would be ineligible for reimbursement due to the arbitrary and unsupported claim that CRNAs are not qualified providers. According to the lawsuit, the LCD requires CRNAs to get specific training in order to be reimbursed for procedures. However, Novitas acknowledges that there are no available training/certification programs for non-physician practitioners that would enable CRNAs to meet the stated requirements.

As part of their federal advocacy effort, the AANA filed a lawsuit and a temporary restraining order on April 11th, 2017 against Novitas and the CMS. In response, Novitas agreed to voluntarily suspend implementation of the LCD from

May 4th to June 5th. Despite the LCD going into effect, the AANA continues to pursue its open case and dialogue with federal authorities. Not only does this LCD affect CRNA reimbursement for services, but it will affect vulnerable populations, such as rural communities, military veterans, troops in combat, and those suffering from chronic pain will be deprived of access to care. In addition, patients could no longer have access to interventional pain management services. These patients will then be forced to travel long distances to obtain care, or turn to a greater reliance on opioids.

Reference:

Nimmo C. AANA continues challenge to LCD, pursues dialogue with CMS. American Association of Nurse Anesthetist. <http://www.aana.com/myaana/Publications/membernews/Pages/061317-Novitas-Update-AANA-Continues-Challenge-to-LCD-Pursues-Dialogue-with-CMS.aspx>. Published June 13, 2017.

David Hernandez, SRNA C/O 2017

Student Spotlight - Adam Shindle



Many students will attest to nurse anesthesia school being the hardest academic endeavor they have ever undertaken. Long clinical hours, countless hours of studying, sleep deprivation, and high stress levels become the norm during anesthesia school. It is easy to see how many students can easily become overwhelmed. However, one student in particular, Adam Shindle, is known for always keeping his composure under the most stressful of situations. A professor once stated, “a bomb could be going off in the background, and Adam would continue to do his job as if it were no big deal.”

Adam states that, “anesthesia school is the hardest thing I have ever done, but I cope by creating margin in my life for the things that make me happy.” When Adam is not saving lives in the GI suite at Mt. Sinai or studying for an exam, you can often find him playing sports such as basketball, baseball, or fishing. One of his favorite leisure campus activities is feeding the turtles or ducks on campus. Adam states, “spending some time outside really helps to recollect my thoughts when I am stressed or overwhelmed

and allows me to clear my mind.”

Adam draws much of his inspiration and passion for nurse anesthesia from his late stepfather. “He was the one of the greatest and most passionate nurse anesthetist I have ever met and I try to make him proud every day. He loved life and loved what he did. I try to do the same and embrace the struggle rather than fight it.” As students, we can all take note and learn from Adam, remembering to enjoy life and allow time for the little things that make you happy. Embrace the struggle.



Michael Barrios, SRNA C/O 2018

Enhanced Nurse Licensure Compact Implementation

The original Nurse Licensure Compact (NLC) allows nurses practice in their home state and other NLC states with a multistate license. The NLC allows nurses to cross state borders in a quick manner and provide nursing services in the event of a disaster. This cost effective compact permits access to care while sustaining public protection at a state level.

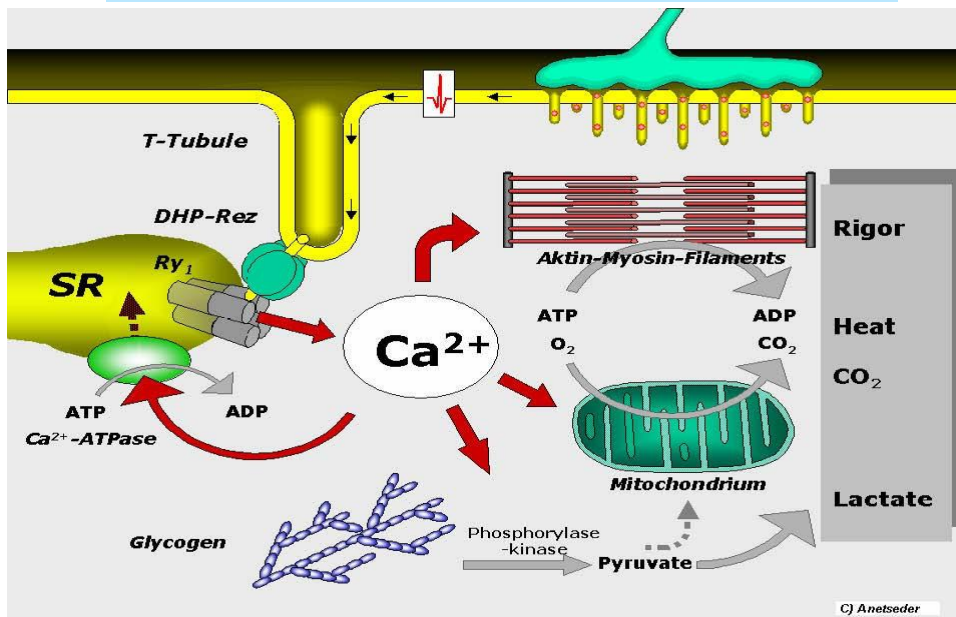
The new Enhanced Nurse Licensure Compact (eNLC) allows nurses to provide care to patients in other eNLC states without having to acquire additional licensures. Original NLC multistate license holders will be grandfathered into the new eNLC. There are 11 licensure requirements that new applicants residing in the compact states will have to meet. If these 11 licensure requirements are not met, applicants may still apply for a single state license. The eNLC includes 26 states that make up this compact. The eNLC states include: Arizona, Arkansas, Delaware, Florida, Georgia, Idaho, Iowa, Kentucky, Maine, Maryland, Mississippi, Missouri, Montana, Nebraska, New Hampshire, North Carolina, North Dakota, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, West Virginia and Wyoming.

Reference:

ENLC Implementation. (n.d.). Retrieved July 30, 2017, from <https://www.ncsbn.org/enhanced-nlc-implementation.htm>

Carmen Chan, SRNA C/O 2018

Malignant Hyperthermia



I recently treated a patient that had a documented history of malignant hyperthermia (MH). She was 22 years old from Europe and stated that after her mother had a documented MH reaction, she was diagnosed with the MH gene after a blood test was performed. Of primary concern was that a couple of years prior, she experienced an MH reaction in the recovery room after a surgery of which the anesthetics consisted only of propofol, fentanyl and versed. Of secondary concern was that the patient had baseline tachycardia and hypertension, which are usually the first signs of MH. After speaking with the patient, it became a large team effort to create the utmost of safe conditions. The patient was assigned to an OR room that was out of the way from other ongoing cases. Vaporizers were removed from the room and a new soda lime canister installed. The anesthesia machine was flushed with 15 L of 100% oxygen (O₂) for over an hour (current recommendations require only 20 minutes). We also coordinated with the recovery room staff to have the patient recovered in

a preoperative isolation room as we did not want to expose her to any of the gases that other patients were exhaling in the recovery room. With everybody working as a team, the patient experienced no complications and was discharged a few hours after surgery.

Malignant Hyperthermia is a rare, potentially fatal, autosomal dominant disorder characterized by hyperthermia (that may exceed 43°) initiated by a hypermetabolic state. This hypermetabolic state of skeletal muscle is triggered by exposure to inhalational anesthetics (most notably halothane) or succinylcholine, a depolarizing neuromuscular blocker. MH was formally described in 1960 in Australia, however, the first suspected cases date back to 1915 – 1925 where five members of the same family died in surgery after experiencing muscle rigidity and hyperthermia post anesthetic induction.¹ Early symptoms of MH include tachycardia, tachypnea, hypertension, increasing end tidal carbon dioxide (ETCO₂), and Masseter muscle spasm. Late symptoms include myoglobinuria and myoglobinemia, rhabdomyolysis, hyperkalemia, renal failure, and respiratory and metabolic acidosis.²

According to John J Nagelhout, the rate of incidence is estimated between 1: 5,000 to 1: 50,000 of general anesthetics.³ The Malignant Hyperthermia Association of the United States (MHAUS) states that a high incidence of MH occurs in Wisconsin, Nebraska, West Virginia and Michigan. Males are more than twice as likely than females to experience MH (2013). Additionally, the highest incidence is in young people with a mean age of 18.3 years. Although still unclear, studies have shown that a small percent of patients who develop muscle breakdown post exercise or after heat stroke, experience the genetic changes associated with MH. Further, MH like incidents have occurred in patients with muscle diseases that manifest as muscle weakness such as muscular dystrophy and myotonia.² Additionally, in a 2017 study out of Pittsburgh, it was noted that muscular individuals have been shown to have a 13.6-fold increased risk of death during MH.⁴

The basic pathophysiology of MH is abnormally increased levels of cell calcium in the skeletal muscle. The increased levels of calcium are the result of the ryanodine receptor calcium channel stuck in an open position which leads to elevation of intracytoplasmic calcium. As a result, continuous muscle activation and ATP breakdown occur leading to both increased heat production and oxygen consumption which results in increased CO₂ levels.²

Prevention of malignant hyperthermia includes a thorough preoperative evaluation and avoiding any MH triggers such as volatile anesthetics or succinylcholine. Intraoperatively, temperature and ETCO₂ should be monitored closely. Recognition of masseter muscle spasm as well as vigilance regarding unexplained

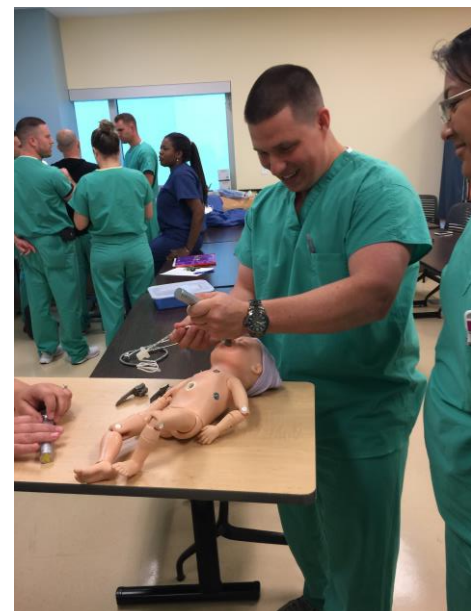
tachycardia, hypercarbia or hyperthermia is imperative. The treatment for MH is 2.5 mg/kg Dantrolene, a ryanodine receptor antagonist and a post synaptic muscle relaxant. Dantrolene is administered IV continuously and rapidly until symptoms subside. Dantrolene is available in two formulations: DANTRIUM®/REVONTO® and RYANODEX®. DANTRIUM®/REVONTO® an older formulation, necessitates the availability of 36 vials, with each vial to be diluted with 60 ml sterile water. RYANODEX®, a newer formulation, necessitates the availability of 3 vials, with each to be diluted with 5 ml of sterile water for injection. There should be there drugs and interventions for the treatment of MH related symptoms include sodium bicarbonate, insulin, calcium chloride, refrigerated cold saline solution, and a cooling blanket. It should be noted that cooling should be stopped when the patient's temperature falls below 38°.²

Patients that have been identified as having the MH autosomal dominant gene as well as their family members should register their MH susceptibility with the North American Registry of MHAUS. These patients can have surgery without the use of MH triggering anesthetics. These patients must be continuously monitored intraoperatively as well as post operatively, as MH cases have occurred to patients in the recovery room. Any facility with malignant hyperthermia triggering agents should have both an MH cart with Dantrolene as well as a MH crisis plan. It is imperative as healthcare providers to be vigilant regarding the safety of all our patients.

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Orphee Cameron, SRNA C/O 2018



MORE SUGA PLEASE!

There is a “new” reversal taking the clinical setting by storm. In a world where instant gratification is much desired, sugammadex is winning the hearts of anesthesia providers. Sugammadex (Bridion) is indicated for the reversal of neuromuscular blockade (NMB) induced by amino-steroidal agents rocuronium and vecuronium. It rapidly and completely reverses the effect of rocuronium and vecuronium. However, the high cost of sugammadex has prevented its widespread use as a standard reversal, a statement which is of great debate.

In a systemic review, which included trials on the efficacy and safety of sugammadex, was inclusive of 1321 patients. Sugammadex was shown to be more effective than placebo (no medication) or neostigmine in reversing muscle relaxation and is relatively safe.¹ In another study, after abdominal surgery, sugammadex reversal eliminated residual neuromuscular blockade in the PACU, and shortened the time from start of study medication administration to the time the patient was ready for discharge from the operating room.²

How do we give Sugammadex?

Sugammadex comes in the concentration 100 mg/ml in a 2-ml and 5-ml single-dose vial. The vials include a peel-off label that can be placed on the syringe.³ Sugammadex dosing is based on actual body weight and includes dosages of 2 mg/kg, 4 mg/kg, and 16 mg/kg. The dosing selection is guided by train of four (TOF)³.

- Use the 2 mg/kg dosing if spontaneous recovery has reached the reappearance of the second twitch (T_2) in response to TOF stimulation.³ Reversal time is 1.5 minutes.

- Use the 4mg/kg for deep NMB, if spontaneous recovery of the twitch response has reached 1-2 post-tetanic counts, with no twitch response to TOF.³ Reversal time is 3 minutes.
- 16 mg/kg is recommended if there is a clinical need to reverse ROCURONIUM quickly, approximately 3 minutes after the intubation dose of 1.2 mg/kg. The efficacy of the this has not been tested in vecuronium.³

What's not to love about Sugammadex?

Sugammadex is contraindicated in patients with hypersensitivity.³ Not recommended for use in patients with severe renal impairment, including those requiring dialysis. Sugammadex causes hormonal contraceptives to be less effective related to its lowering of plasma concentration, therefore it is important to inform female patients of childbearing age to use a non-hormonal contraceptive method or back-up method of contraception for the next 7 days.³ Sugammadex is physically incompatible with verapamil, ondansetron, and ranitidine³.



What if you have to return to surgery?

There is a minimum waiting time before re-administration of a steroidal neuromuscular blocking agents. This table below highlights the recommended waiting period.³

The recommended wait time for the 16 mg/kg is 24 hours. If NMB is required before waiting period ends, use a non-steroidal NMB agent, such a cisatracurium (nimbox).

How does it work?

Sugammadex exerts its effect by forming very tight water-soluble complexes at a 1:1 ratio with steroidal neuromuscular blocking drugs (rocuronium > vecuronium >> pancuronium).⁴ During rocuronium-induced neuromuscular blockade, the IV administration of sugammadex creates a concentration gradient favoring the movement of rocuronium molecules from the neuromuscular junction back into the plasma, which results in a fast recovery of neuromuscular function.⁴

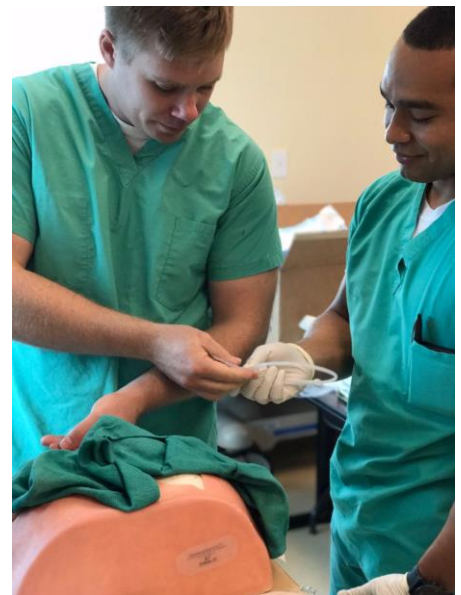
In a nutshell, sugammadex is well tolerated and is relatively free of adverse effects. There are many advantages to its use. It will decrease the incidence of residual muscle paralysis and hence, improve patient safety.⁵ Anesthesia providers can now give incremental doses of muscle relaxant if required towards the end of the surgery without hesitation.⁵ The RSI dose for rocuronium can be safely used in cases of short duration.⁴ Unwanted cardiovascular and other adverse effects of anticholinesterases or anticholinergics can now be avoided. Finally, in emergency situations, the need to rapidly reverse NMB in cannot intubate, cannot ventilate scenario rocuronium-sugammadex may be preferred to the use of succinylcholine.⁵

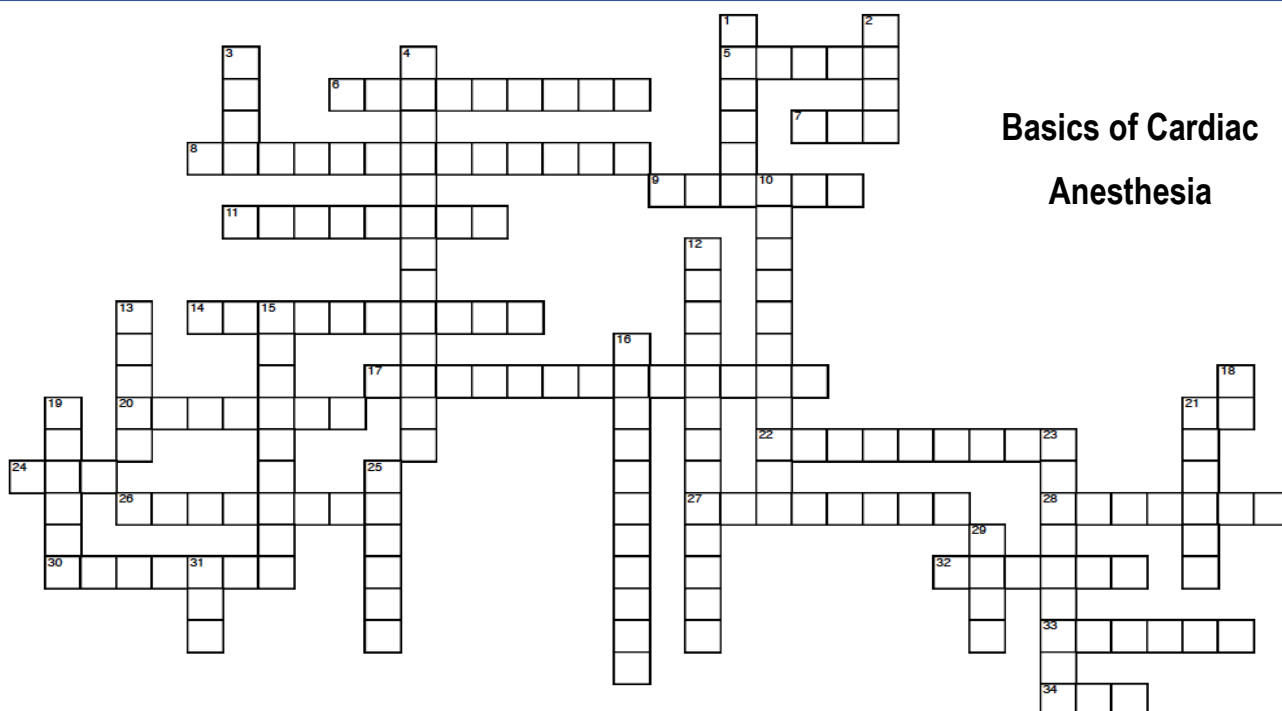
Re-administration of Rocuronium or Vecuronium after Reversal (up to 4mg/kg BRIDION)

Minimum Waiting Time	NMBA and Dose to be Administered
5 minutes	1.2 mg/kg rocuronium
4 hours	0.6 mg/kg rocuronium or 0.1 mg/kg vecuronium

References:

1. Abrishami A, Ho J, Wong J, Yin L, Chung F. Sugammadex, a selective reversal medication for preventing postoperative residual neuromuscular blockade. *The Cochrane database of systematic reviews*. 2009(4):CD007362. <http://www.ncbi.nlm.nih.gov/pubmed/19821409>.
2. Brueckmann B, Sasaki N, Grobara P, et al. Effects of sugammadex on incidence of postoperative residual neuromuscular blockade: A randomized, controlled study. *Br J Anaesth*. 2015;115(5):743-751. Accessed Jul 30, 2017. doi: 10.1093/bja/aev104.
3. TAILORED DOSING BASED ON DEPTH OF BLOCK FOR BRIDION (sugammadex). Dosing & Administration | BRIDION® (sugammadex). <https://www.merckconnect.com/bridion/dosing.html>. Accessed July 31, 2017.
4. Naguib M. Sugammadex: Another milestone in clinical neuromuscular pharmacology. *Anesth Analg*. 2007;104(3):575-581. Accessed Jul 31, 2017. doi: 10.1213/01.ane.0000244594.63318.fc.
5. Nag K, Singh DR, Shetti AN, Kumar H, Sivashanmugam T, Parthasarathy S. Sugammadex: A revolutionary drug in neuromuscular pharmacology. *Anesth Essays Res*. 2013;7(3):302-306. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4173552/>. Accessed Jul 31, 2017. doi: 10.4103/0259-1162.123211.





Basics of Cardiac Anesthesia

ACROSS

- 5 Bezold-Jarisch Reflex results in severe _____ cardia
 6 Hypercalcemia will cause a _____ QT segment
 7 What phase of the cardiac action potential do calcium channel blockers work on? (spell out the number)
 8 When preload increases, stroke volume increases. This describes which law of the heart? (no space b/t words)
 9 In the Pressure-Volume Loop, left ventricle diastole ends when the _____ valve closes
 11 When managing a patient w/ aortic regurgitation, should the SRNA/CRNA increase or decrease their afterload?
 14 The Oculocardiac Reflex is due to the afferent response is via the _____ nerve
 17 _____ is considered a direct-acting venodilator
 20 _____ wall MI will show changes in leads I, aVL, and V4-V6
 21 PR interval is related to _____ nodal delay
 22 When _____ increases, stroke volume decreases
 24 Nitric oxide (NO) triggers the production of which second messenger?
 26 Concentric hypertrophy develops in response to a _____ overload
 27 The left anterior descending (LAD) supplies which cardiac wall?
 28 The cardiac nodal cell's Phase 0 involves which electrolyte?
 30 Nitric oxide (NO) vaso _____ our blood vessels
 32 The resting membrane potential of the cardiac myocyte cell is - ____ mV (spell out the number)
 33 The cardiac myocyte's Phase 0 involves which electrolyte?
 34 Two key determinants of mean arterial blood pressure are CO and _____

DOWN

- 1 In the nodal action potential, phase 1 and 2 are _____
 2 Bezold-Jarisch Reflex is stimulated by severe _____ volemia
 3 What phase of the nodal action potential do calcium channel blockers work on? (spell out the number)
 4 Stroke volume is determined by 3 factors: preload, afterload, and _____
 10 If the Pressure-Volume Loop changes after a valve Closes, then the valve is _____
 12 The gold standard for diagnosing cardiac pathology?
 13 In acute aortic regurgitation, the Pressure-Volume Loop is small or large?
 15 In the Pressure-Volume Loop, when preload increases, end-diastolic volume _____
 16 _____ is considered a direct-acting arterial dilator that has a reflex tachycardia side effect
 18 Cardiac output is determined by HR and _____
 19 Contractility is considered a myocardial oxygen demand or supply?
 21 The P wave is related to the _____ depolarization
 23 What happens to the diastolic blood pressure as the arterial pressure waveform travels peripherally?
 25 Hyperkalemia causes a _____ T wave
 29 Best overall lead to detect an MI is V _____ (spell out the number)
 31 Mitral stenosis symptoms occur when the mitral valve orifice is less than how many cm²?

Pork Corn Vegetable Soup

Ingredients:

1. Short pork ribs
2. Chunks of corn
3. Mushroom
4. Carrots
5. Tofu (optional)
6. Green scallion
7. Cooking wine
8. Salt
9. Vinegar



Cooking:

1. Put short pork into boiling pot for 10 mins.
2. Pour out the water and rinse out the rib
3. Boil another pot of water, put rinsed short rib in it
4. Pour 60-100mL of cooking wine
5. Put some cutter ginger into the boiling water
6. Boil for 25 mins. and put stove heat to medium
7. Put rest of vegetables into the pot
8. Use spoon to scoop out foam on pot surface.
9. Boil for another 20 mins and turn off the heat.
10. Pour some salt and four teaspoons of vinegar to taste
11. Enjoy!

Vivien Li, SRNA C/O 2018



Upcoming Events:

Welcome Party for C/O 2019!

Post-orientation on Aug. 19, 2017, hosted by C/O 2018 at Carolina Ale House. Details in class email

School Schedule

Start of Fall 2017 semester – Aug. 21

Conferences:

AANA

Annual Congress. Seattle, WA
Sept.8-12, 2017

FANA

Annual Meeting. Tampa, FL
Oct. 9-12, 2017

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Answers for the Previous Edition

Regional Anesthesia

