



INTERCHANGE

President's Corner Momentum!



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Were you at SOCCA's 30th annual meeting held last month past May in Washington, DC? If you were, you (hopefully) came away with a strong sense of excitement and enthusiasm for the future of SOCCA. Despite clearly cramped facilities, the excellent presentations, number of interested intensivists, bustling poster sessions, and sense of possibility were sustained and full of promise. I should note that the IARS contract in DC was finalized before their merger with the AUA and us, so we should have more meeting space next year in Chicago.

Meeting statistics suggest that the 2017 meeting was one of the most successful in recent history. Final attendance was 265, the highest number in the IARS era. Fifteen were from foreign countries, with 3 from as far away as Australia. I'd also like to note that 15 were non-member anesthesiologists and 46 were non-member residents or fellows, suggesting that our appeal outside our core audience may be growing.

And why not? This year's meeting contained excellent and novel presentations on topics ranging from coming plagues to the long-term sequelae of ARDS to teaching compassion to mass casualty. Our Lifetime Achievement award winner Dr. Dorman reminded us of how much we still don't know about critical care and our Young Investigator Award winner Dr. Rasheed suggested that

outcomes after carotid endarterectomy may surpass those obtained with carotid stenting. I'd like to take a moment to congratulate Drs. Dorman and Rasheed, and thank our excellent Annual Meeting Committee, Drs. Andrew Steel, Adam Evans, and Sheela Pai, for conceiving and executing such an outstanding demonstration of the energy, achievements, and potential of SOCCA members.

Other metrics of SOCCA's health are, as our residents like to say on ICU rounds, "uptrending." Active membership has increased by >10% this past year, and our financial condition has improved sufficiently that we are setting aside a reserve and hoping someday to fund our own research awards. The number of programs participating in our fellowship match has increased from 47 to 54 in 3 short years, and this year's match will offer almost 50 more training slots than in 2014 for anesthesia residents interested in specialty training in critical care. All in all, it could be worse.

I would like to highlight one new initiative that has come out of the IARS meeting. Part of the A&A Editor's retreat on Sunday was focused on ways to increase the journal's online presence. One initiative the Journal is sponsoring is "Free Article Friday," where a recently published article is offered free for a (Fri)day. I am working with them to feature an article written by a SOCCA member, and to synergize that article three ways: with the release of this issue of the Interchange (in the "A Conversation With..." section), as a journal club on our Twitter page, and as a Free Article Friday. This issue's selection is titled "Relationship between a sepsis intervention bundle and in-hospital mortality among hospitalized patients: a retrospective analysis of real-world data" by SOCCA member Dr. David Shimabukuro, who also spoke on the same topic at our Meeting. Check out our interview with Dr. Shimabukuro in this issue of the *Interchange*, look for it on Free Article

Friday (08/25) and on our Twitter page that week at @SOCCA_CritCare!

And, if you are interested in contributing to or becoming more involved with A&A please do let me know (atung@dacc.uchicago.edu)! I am always on the lookout for interested reviewers. If (even better) you are interested in writing something, and want to bounce an idea off somebody, I am happy to offer suggestions! In addition to the traditional research article, A&A offers review article, open mind, brief report, and special report formats. In fact, a 2016 review article on methylene blue (PMID 26678471) first authored by SOCCA member, Dr. Leila Hosseini, is one of the top 20 most viewed articles on the A&A website! Getting SOCCA members published is a goal of our society.

As always, SOCCA is interested in new ways to leverage the boundless energy of our members. If you are interested in contributing to the above initiative, my President's Column in the previous Interchange contains the relevant contact information. If you have an idea about how to promote SOCCA's goals (see our webpage if you want to know what those are), the Board is all ears!

Contents	
President's Column	1
PEEP Strategies in the Morbidly Obese	2
A Brief Conversation with ... David Shimabukuro.	5
PRO/CON: Suddenly Sugammadex: Should Sugammadex Become the New ICU Standard for Reversal?	6
SOCCA 2017 Board of Director Election Results	8
SOCCA 30th Annual Meeting in Pictures	9
Call for Articles, Fall Issue of Interchange	10
SOCCA Board of Directors	12

PEEP Strategies in the Morbidly Obese



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The care of morbidly obese patients presents many challenges to the intensivist. Notable among them is the optimization of mechanical ventilation. Obesity is associated with prolonged mechanical ventilation and increased ICU length of stay.¹ The optimal strategy for mechanical ventilation of obese patients is still a matter of debate.² Decreased compliance of the chest and abdominal walls lead to atelectasis, low end-expiratory lung volumes, and hypoxemia.³⁻⁶ Despite this knowledge, we continue to provide inadequate PEEP to morbidly obese patients.⁷ Recent literature describing the use of esophageal manometry and decremental PEEP trials in obese patients provides a potential solution.

Obesity significantly decreases FRC and ERV in both awake¹ and sedated^{4,8,9} patients. If the FRC falls below closing capacity, small airway closure and atelectasis will result. This leads to the potential for a negative transpulmonary pressure ($P_{TP} = P_{airway\ opening} (AO) - P_{pleura(pl)}$) at end expiration, despite the absence of flow. Behazin *et al.* recorded esophageal pressure (P_{ES}) and airway pressure at which lung inflation begins (threshold pressure, PAO_{-thr}) in 50 sedated and paralyzed morbidly obese patients at FRC.¹⁰ They found marked elevations in both values compared to lean controls, suggesting elevated pleural pressures and small airway collapse at end-expiration. Notably, neither P_{ES} nor PAO_{-thr} correlated with BMI, suggesting that obesity per se does not predict elevated pleural pressures and a mechanism for

customized PEEP determination may be needed to mitigate end-expiratory chest wall force. The measurement of intra-esophageal pressure as a proxy for pleural pressure allows one to set PEEP to maintain a positive transpulmonary pressure at end-expiration.

In their 2016 article, Pirrone and colleagues demonstrated that 1) we are setting PEEP too low for our obese patients and 2) PEEP guided by P_{ES} and decremental PEEP trials can remedy that.⁷ The study examined 14 mechanically ventilated obese patients without ARDS. Their end-expiratory lung volumes, airway pressures, and esophageal pressures were measured at baseline PEEP, zero PEEP, PEEP set to maintain positive end-expiratory transpulmonary pressure ($PTPe$) without a recruitment maneuver (RM), PEEP set to maintain a positive $PTPe$ after a RM, best decremental PEEP with a RM,¹¹ and best decremental PEEP with the head of the bed at 30 degrees. They found that the PEEP set by the ICU team (11.6 ± 2.9 cmH₂O) was on average 9.1 cmH₂O less than the PEEP required to keep a positive $PTPe$. End-expiratory lung volumes, lung elastance, and oxygenation improved markedly and similarly in the RM+ $PTPe$ and RM+best decremental PEEP groups. Similar to prior publications,⁶ they showed that recruitment maneuvers were necessary to see the benefits of increased PEEP levels. They also found that higher PEEP levels did not lead to changes in hemodynamics, vasopressor usage, or fluid administration.

That higher PEEP levels improved oxygenation is not surprising; the more notable conclusions are the improvement in lung compliance and lack of hemodynamic effects with higher PEEP. This parallels the findings of Talmor *et al.* in ARDS patients, who also found better compliance and unchanged V_d/V_t in a positive PTP strategy.¹² Together they suggest that higher PEEP in

P_{ES} -guided ventilation strategy is not merely over-distending normal lung.

While a measurement of the chest wall's effect on respiratory mechanics is very appealing, questions remain about the utility of esophageal manometry. Patient position, compression from mediastinal contents, consolidated lung, pleural fluid, gravitational gradients in pleural pressure, and esophageal wall tension have the potential to introduce error into P_{ES} as a surrogate of pleural pressure (P_{pl}).^{13,14} Potential errors like these are arguably the largest barrier to widespread adoption of this technique. As opposed to using absolute value of P_{ES} , one calculation technique uses the change in P_{ES} to estimate end-inspiratory PTP , but this method assumes that end-expiratory PTP is zero and provides no information about the lung at end-expiration.^{15,16} Unfortunately, concerns about the ability of the absolute value of P_{ES} to reflect the pleural pressure are unlikely to be completely resolved because esophageal manometry remains the only method currently suitable for estimating pleural pressure in humans.¹⁷ A study in a dog model of ARDS, however, showed excellent correlation in absolute P_{ES} and P_{pl} in the middle lung field across a wide range of pleural and esophageal pressures.¹⁸ The degree to which measurement error is small compared to the wide range of P_{ES} in ARDS patients (0-34 cmH₂O)¹⁹ and obese patients without ARDS (3-26 cmH₂O)¹⁰ allows the esophageal pressure to provide useful information about the contribution of the chest wall to pulmonary mechanics.^{20,21}

It may be possible to set optimal PEEP without placing the esophageal balloon. However, the Pirrone study started their decremental PEEP trial 4 cmH₂O above the $PTPe$, which was determined by esophageal manometry. Finding the best PEEP may be

(continued on Page 3)

PEEP Strategies in the Morbidly Obese

Continued from Page 2

more difficult without the pleural pressure estimate because pleural pressures in obese patients vary widely and do not correlate with BMI.^{10,19} Placement of an esophageal balloon also allows monitoring of respiratory muscle and ventilator synchrony, calculation of work of breathing, and quantification of intrinsic PEEP in spontaneously breathing patients.^{13,22} The marginal utility of this additional information is hard to assess because most physicians' daily practice does not currently include esophageal manometry.

Although sometimes leading to alarmingly high PEEP levels, combining esophageal manometry and decremental PEEP trials has shown great promise in ventilating challenging patients.²³ There is compelling physiologic data to show that obesity causes an increase in expiratory pleural pressures, the effects of which can be offset by first recruiting atelectatic lung units and then setting a PEEP level specifically to counteract the increased mass of the chest wall. Esophageal pressure monitoring may prove to be a valuable tool in this regard.

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SOCCA Has Created A New Jobs Bank!

We recognize that one of our members' concerns is identifying job opportunities for critical care anesthesiologists.

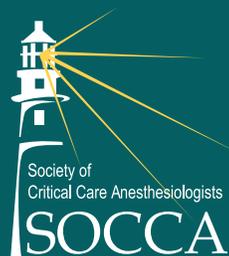
You can visit our new site here: <https://goo.gl/1kS9mV>. If you would like to post a job on this site, please email a description and /or flyer to SOCCA President Avery Tung at atung@dacc.uchicago.edu.

SAVE
the DATE

SOCCA 31st Annual Meeting
and Critical Care Update
Friday, April 27, 2018
Hyatt Regency Chicago
Chicago, Illinois



Explore current practices and discuss cutting-edge topics in research and education with the leading educators and researchers in critical care anesthesia. Plus, stay an extra day for the IARS Aligned Meeting and SOCCA Focus on Critical Care Day on Saturday, April 28.



For more information,
visit www.socca.org.

A Brief Conversation with ... David Shimabukuro



Dr. David Shimabukuro, MD, is a Clinical Professor of Anesthesia and Perioperative Care at the University of California San Francisco (UCSF). In addition, he is an Associate Medical

Director for several of the intensive care units at the UCSF Moffitt-Long Medical Center. His research interests and clinical expertise center around sepsis detection and treatment and the development of healthcare system measures to improve organ system dysfunction in critical illness.

1. *Can you briefly describe your recent research article for our readers?*

In this article, we describe the results from our retrospective cohort study of approximately 1000 patients admitted to the UCSF Moffitt-Long Medical Center with severe sepsis or septic shock over a three-year period (January 2012 – December 2014). During this period, we implemented a sepsis intervention bundle, based on work funded through the California Delivery System Reform Incentive Program, throughout our hospital that consisted of five main components:

- Measurement of blood lactate
- Blood cultures before antibiotics
- Early initiation of broad-spectrum antibiotics
- Fluid bolus if the patient was hypotensive or had an elevated lactate level
- Vasopressor therapy for patients who remained hypotensive despite the fluid bolus

In addition to the development of the sepsis bundle, we developed a process to leverage our EMR, in real-time, to

monitor patients for the development of sepsis and created a hospital-wide education program, that included attendings, fellows, residents and many other healthcare workers to identify sepsis and to implement the sepsis bundle whenever the possibility of sepsis existed. We measured our internal compliance with the defined sepsis bundle and provided targeted education to clinicians or clinical areas that needed additional help with bundle compliance.

2. *Very cool...so what were your article's most important conclusions?*

Overall, we had very good sepsis bundle compliance over the 3-year study period (just over 72%). This was a very good sign that our education plan about sepsis and the sepsis bundle were effective. More importantly, though, we found that the use of the sepsis bundle was associated with a 31% lower risk of in-hospital mortality, when adjusting for important contributors to mortality in our patient cohort. From this data, we calculated that the number needed to treat (NNT) to prevent death with this sepsis bundle alone was 15.

3. *Wow! Those results are fantastic ... what drove you to look at this topic?*

I've been interested in sepsis and sepsis care for a number of years. Earlier in my career, a close friend and colleague developed severe septic shock. We had not worked together in a few years, but still, I flew across the country to see her and be with her while she was in the Intensive Care Unit. And even though she was receiving the very best care based on the most current evidence and guidelines, she still had a very

complicated course. Fortunately, she recovered and is back to her surgical practice—but, even now, the events had a real and profound effect on my view of sepsis and how we can improve the care we provide to our patients.

4. *A personal connection to a disease or its treatment can be a strong motivator to improve our clinical practice or research. What do you plan to do next with this work?*

From our data, we noticed that patients who developed “nosocomial sepsis” had a much worse outcome than those who developed “community-acquired sepsis.” This is an interesting finding because I had assumed that patients that arrived from the community have probably been septic for a longer period of time and have a longer delay in first-dose of antibiotics and fluid resuscitation than those patients who are in the hospital. Yet, somehow these patients, despite the likely delays in care, seemed to have a better survival than those patients who should not have had significant delays in care delivery. I really want to investigate the underlying reasons for the differences in outcomes among these patient groups to see if there are actions that should be taken for one group or the other to further improve mortality in our patients.

5. *That's a great way to further evaluate an unexpected result from your study. What advice do you have for junior faculty or fellows that want to improve the care in their own hospitals?*

Be patient. In the beginning, you may feel that new or important things are not happening in your hospital or in your career...especially not at the pace

(continued on Page 6)

A Brief Conversation with...David Shimabukuro

Continued from Page 5

that you want. Creating new protocols, adopting newly published findings, developing research programs, getting published...these all take time. But just be patient. Focus on your current

responsibilities and learn and do everything you can. One day, you will get your chance to make a big difference and when you do...you should be ready to take it, run with it, and make the absolute most of your opportunity.

This interview
was conducted by:
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PRO: Suddenly Sugammadex: Should Sugammadex Become the New ICU Standard for Reversal?



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Sugammadex, which was approved by the FDA recently, is being integrated into anesthetic practices throughout the United States. Sugammadex is a superior reversal agent for intraoperative muscle relaxation compared to the standard regimen of glycopyrrolate and neostigmine (glyco/neo). It has a faster onset, reliably reverses deep blockade, can be redosed rapidly, and causes fewer side effects than alternative medications.^{1,2} Despite multiple recommendations favoring sugammadex reversal in the OR, there has been little discussion as to the role of sugammadex in the ICU. However, the same factors that make sugammadex superior in the OR apply to the ICU as well.

There are two general reasons to favor Sugammadex in the ICU- efficacy and safety. The greater efficacy of sugammadex would pay dividends in the most critically

ill patients. Broadly speaking, intubated ICU patients have less functional reserve than patients intubated solely for a surgical procedure. Extubation may require several days and significant effort to optimize the patient. With less effective reversal (such as with neostigmine and glycopyrrolate), such extubations may fail where a sugammadex reversal would have succeeded. Sugammadex abolishes residual neuromuscular blockade, whereas glyco/neo reversal may leave residual blockade in up to a third of patients, which can lead to atelectasis and hypoxemia.³ Sugammadex reversal gives critically ill patients their best chance to be extubated and remain extubated.

In addition to greater efficacy, sugammadex is the safer option for reversal of muscle relaxation. Adverse effects are rare in literature and clinical experience, and the initial concerns about frequent hypersensitivity reactions seem unrealized.⁴ Although glyco/neo is relatively safe when administered by knowledgeable providers, the potential deleterious effects of this combination should not be disregarded. After all, glycopyrrolate frequently causes tachycardia, and it must be given along with the neostigmine to prevent the latter's

muscarinic side effects, as unpleasant as diarrhea and as dangerous as asystole! These adverse effects are even less desirable in critically ill patients in the ICU.

The benefits of sugammadex will become evident to ICU providers rapidly once they try this drug. It provides foolproof reversal of muscle relaxation and lesser risk of adverse effects. Studies directly comparing sugammadex and glyco/neo have yet to appear in critical care literature. Nonetheless, once mindful of the other robust data in favor of sugammadex, ICUs should adopt this drug as their reversal agent of choice.

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CON: Suddenly Sugammadex: Should Sugammadex Become the New ICU Standard for Reversal?



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Sugammadex, a new steroidal muscle relaxant encapsulator, is now officially in the US and Canadian market and is quickly gaining popularity as the best reversal agent for any depth of neuromuscular blockade (NMB) that is provided by rocuronium, vecuronium or pancuronium (with efficacy for rocuronium > vecuronium >> pancuronium). Although sugammadex seems like the ideal selective chelating agent for rapid reversal of NMB by the aforementioned agents, I would like to caution critical care anesthesiologists who might care for these patients either in the ICU or OR.

Unplanned reintubations, following general anesthesia administration, are serious adverse events that trigger emergency response systems. Not surprisingly, utilization of intraoperative neuromuscular blockade, despite reversal agents' administration, is a significant contributor to the reintubation rate.¹⁻³ Depending on the timing of postoperative respiratory failure, reintubations can either take place in the post anesthesia care unit (PACU) or at various discharge locations, including the ICU. Following sugammadex administration, there is a recommended 24 hour waiting period in order to reparelyze patients with steroidal NMB drugs (rocuronium

or vecuronium).⁴ This effect may be overcome by higher doses of steroidal NMB drugs but regardless it creates an additional consideration in the midst of an urgent situation. Ignoring the presence of sugammadex in a patient's system could potentially diminish the success rate of reintubation. This possibility will be higher, especially if reintubation is taking place away from the operating room or PACU, since rapid response team members will not be considering the presence of sugammadex and therefore inadequate paralysis could jeopardize reintubation attempts.

Drug interactions are another area of concern when it comes to sugammadex. Drugs that can potentiate neuromuscular blockade such as magnesium and aminoglycosides can counteract the effect of sugammadex and therefore a larger dose may be required. Considering this new era of surgical home initiatives and utilization of different multimodal approaches to improve recovery, including intraoperative magnesium infusions, this issue needs to be considered more carefully. Underdosing of sugammadex may lead to increased risk of recurrence of NMB in the postoperative period.

One problem of particular concern in critically ill patients concerns the elimination of sugammadex, which relies on renal excretion. In patients with substantial renal impairment, the elimination half-life of sugammadex and rocuronium are increased by factors of 15 and 2.5, respectively.⁵ Likewise, clearance of sugammadex and rocuronium by dialysis is unpredictable. As a result, recommendations state that sugammadex should not be used in patients with creatinine clearance less than 30 mL/min. This makes it problematic in critically

ill patients with renal dysfunction, especially those requiring renal-replacement therapy.

Although sugammadex is known to be well-tolerated, practitioners should be aware of a rare but serious side effect. Upper airway obstruction with complete adduction of vocal cords upon administering sugammadex was observed in a group of 9 patients, in 2016.⁶ Repetitive upper airway obstruction on each of these patients was short-lived and was recorded via fiberoptic exam. Similar findings were observed in an earlier case report by Curtis et al. in 2012, when sugammadex was used in a "can't intubate can't ventilate" situation in which neuromuscular junction recovery was observed but ventilation was still, briefly, not observed.⁷ In all these instances, laryngospasm was considered to be a side effect of sugammadex. Bradycardia and severe bradycardia with cardiac arrest have been reported in post market experience with sugammadex, usually observed within minutes of administration.

Anaphylaxis is another side effect worth mentioning, with several case reports to date.⁸⁻¹¹ The Japanese Society of Anesthesiologists recently issued a warning about sugammadex-induced anaphylactic shock, due to five episodes observed since March 2010. This might also be attributed to the fact that Japan has the largest number of sugammadex utilizations, followed by Spain.⁸⁻¹⁰ Sugammadex-induced anaphylaxis typically presents when the patient is already extubated and is being transferred to their hospital bed, the PACU, ICU, etc.^{11,12} In these cases emergency re-intubation outside the operating room may be required, which brings me back to my aforementioned comment on repetitive rocuronium administration after sugammadex. Overall, while this novel medication may have several

(continued on Page 9)

Suddenly Sugammadex: CON

Continued from Page 8

potential benefits, its use in critically ill patients should be approached with caution.

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SOCCA 2017 Board of Directors Election Results

It is with pleasure that I announce the results of the recent election for the two open SOCCA Board positions for 2017-2018. Our new Board members are **James Blum, MD, FCCM** and **Benjamin Kohl, MD, FCCM**. They will join the SOCCA board beginning immediately.

Congratulations to Drs. Blum and Kohl! And, thank you as always for participating in SOCCA activities.

– Avery Tung, MD, FCCM
President, Society of Critical Care Anesthesiologists (SOCCA)

James Blum, MD, FCCM

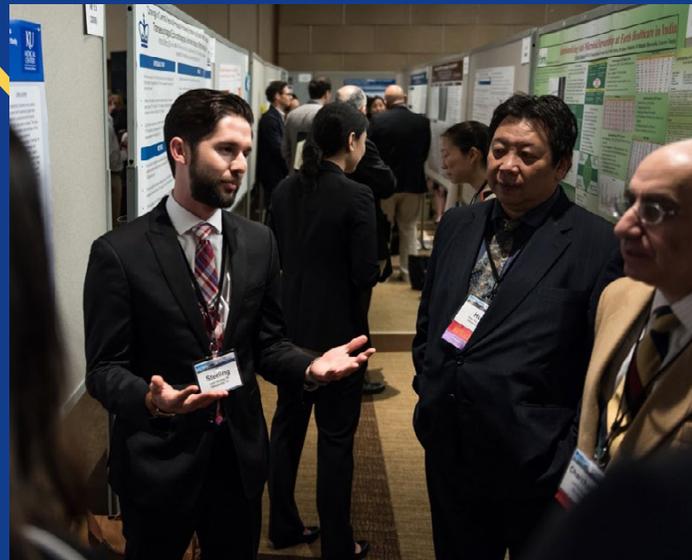
As a member of the SOCCA board, I would like to encourage the organization to further establish its research mission and expand its presence in the critical care community. I would seek to engage SOCCA with other clinical trial organizations like the Canadian Critical Care Trials Group and SCCM Discovery and then investigate the establishment of a research group within SOCCA that would focus on the care of the perioperatively critically ill patient.

To expand SOCCA in the critical care community, I would like to engage newly graduated fellows from our programs, regardless of their base training, and bring our distinct knowledge to both non-anesthesiologist critical care providers and anesthesiologists that do not practice critical care. I would facilitate this by welcoming these providers to our annual meeting and leverage our relationship with the IARS to develop workshops and/or select non-anesthesiologist speaker engagements under the SOCCA name.

Benjamin Kohl, MD, FCCM

Since joining SOCCA in 2004, my involvement in the society has become a natural extension of the work I do each day. I directed our Annual Fellowship Directors Breakfast symposium (held each year at the Annual Meeting) for many years and have been devoted to bringing the practice of critical care ultrasound to the forefront of our specialty. As a Program Director, I developed a tremendous appreciation and respect for those committed to educating our future intensivists and devoted much of my time towards centralizing and unifying our national group of ACCM program directors. I was our Society's first Chairman of the newly created SOCCA Program Director's group and created a formal group and a new Committee within SOCCA to represent all program directors. Prior to completing my role as Chairman, I led our specialty into the match which has been very successful.

SOCCA 30th Annual Meeting



See more photos from the SOCCA 30th Annual Meeting [here](#).

Call for Articles for the Fall Issue of *Interchange!*

If you have an interesting case report, an idea for a pro-con discussion, a review idea, or an opinion on a recently published article, please submit your proposal/article to Vivian Abalama, CAE, vabalama@iars.org on or before Monday, September 18, 2017. If your article is chosen for the Fall Issue of *Interchange* 2017, we will contact you then for editing and formatting!

SOCCA Information

Email

Meetings: SOCCAm Meetings@iars.org
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 Visit the SOCCA website at: www.SOCCA.org

Membership

Membership in SOCCA is open to all anesthesiologists who have an interest in critical care medicine; non-anesthesiologist-physicians and scientists who are active in teaching or research relating to critical care medicine; residents and fellows in approved anesthesiology programs; and full-time medical students in an accredited school of medicine.

Membership Benefits

Discounted pricing for the SOCCA Annual Meeting, a forum for the specialist with broad-based interests, including respiratory therapy, postoperative cardiac surgical, neurological and transplant management, and trauma care

Discounted membership in the IARS, which includes access to two peer-reviewed journals – *Anesthesia & Analgesia* and *A&A Case Reports*, free journal CME, and eligibility to apply for IARS research grants

Free ICU Residents' Guide

Free quarterly newsletter *Interchange*, which covers ethically controversial issues, survey of practice patterns, and historical aspects of anesthesiology

Renew or join today at www.SOCCA.org/membership.php

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Fellowship Program Reviews

If you would like to contribute a review for a Fellowship Program at your institution in a future issue of the *SOCCA Interchange*, please contact: jbrandmd@gmail.com.

Editorial Policy

The opinions presented are those of the authors only, not of SOCCA. Drug dosages, accuracy and completeness of content are not guaranteed by SOCCA.

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