December 2016

CURRENTS

Volume 11, No. 4

News Magazine of the Neurocritical Care Society

IN THIS ISSUE:

CURRENTS

Quarterly News Magazine of the Neurocritical Care Society

December, 2016
Volume 11 - Number 4

Note From the Editor

Greetings NCS Members,

I am honored to serve our Society as the new Editor-in-Chief of *Currents*, the official quarterly news magazine of the NCS! I want to welcome you to our final issue for 2016.

Currents' success was not built in a day. As such, I would like to express a sincere appreciation for our editorial board members and to everyone that gave the NCS international e-magazine its healthy start. Thank you for your work in sustaining the *Currents* spirit and advancing its mission. The longest-serving Editor-in-Chief in the newsletter's history, Matt Koenig, also merits a distinct acknowledgement. Matt has presided over *Currents* as it evolved into the robust and significant publication it is today. We owe him a deep debt of gratitude for his hard work and dedication. His infectious energy has always been a source of motivation to me and the rest of the editorial board.

Before my appointment as Currents Editor-in-Chief, I was an active NCS member since 2012. I sat on the NCS Communications Committee from 2014-2016 while serving as the Editor of *Currents'* Fellows Corner section. I finished my Neurocritical fellowship training at Massachusetts General Hospital/Brigham and Women's Hospital/Harvard Medical School in 2016 and have since joined the Neurocritical care faculty at Brigham and Women's Hospital. I look forward to my new role as Editor-in-Chief and would like to invite all NCS members and *Currents* readers to pass on their ideas, thoughts, and contributions to our editorial board.

My aim is to continue this international newsletter's pattern of success, keeping our content valuable, scientific, interesting, informative, relevant, and educational. I will also work to engage our NCS members, encouraging them to be part of the *Currents* network. It's all about teamwork, so please stay involved!

In addition to our regular newsletter columns, this issue of *Currents* features six exciting news articles that I highly recommend you peruse. The first article, written by David Hwang and Alejandro Rabinstein, discusses *Neurocritical Care Live*, a new online resource for up-to-date Neurocritical care knowledge.

I think it's about time to develop an alternative approach to self-directed learning. In this issue, James Siegler III and Joshua Levine tell us about the exciting new NCS Podcast initiative that will have us updating our podcast libraries in the very near future.

Don't miss the announcement of the 2017 Fund a Fellow campaign by our past NCS President, Claude Hemphill III, or the comparison between the old TBI guidelines and the updated 2016 guidelines by Christian Ricks and Lori Shutter.

The MOCHA study is heating up! In this article, David Greer tells us about this multi-center, international, observational study that aims to optimize post-cardiac arrest prognostication.

The NCS Annual Meeting in Baltimore was a success from both an educational and academic perspective. In addition to learning about the results of recent studies in our field, many of us had an excellent opportunity to exchange ideas, discuss new projects, have fun and foster new collaborations.

In this issue, we highlight the major studies that were discussed at the meeting as well as some of the events that took place. In addition, Pravin Gorge tells us more about how Captain Julian Bösel and the NCS-International team took on Captain Dave Seder and his U.S. team in a heated soccer rematch.

I hope you enjoy this issue. If you have ideas on improving *Currents* or wish to contribute, please email me at sizzy@bwh.harvard.edu. I'm also on the lookout for future *Currents* cover page artwork, so send me artwork that you would like to see proudly displayed on an upcoming issue.

On the cover: The cover art for this issue was snapped at the 2016 American Academy of Neurology meeting in the wonderful city of Vancouver, British Columbia, Canada and it shows the majestic Cauldron which was lit during the 2010 winter Olympics.

Saef Izzy

Saef Izzy, MD
Editor-in-Chief

The First 70 days!!

Since my hula dance demonstration at the business meeting in Washington DC, the executive committee, NCS staff, and I have been hitting the ground running. It is amazing to see how much the Society has grown over the years and how involved the members are in this growth.

It is important for us as a society to make sure we serve all our members, especially being the only multidisciplinary Neurocritical care society in the world. The Executive Committee recently approved a proposal to develop a committee for Advanced Practice Providers. This proposal provided recommendations on activities that would support this segment of our members. Jessica White and Sarah Livesay have agreed to serve as Co-Chairs with Susan Yeager serving as the BOD Liaison. Other members of the committee will be identified through a call for volunteers to the membership, so stay tuned and get involved!!

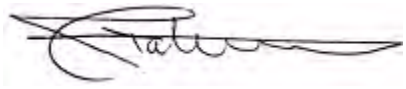
There has been a lot of discussions within the NCS community about how can the Society integrate quality metrics in the Neurocritical care unit. The Executive Committee recently approved two initiatives supporting this strategic goal. The first is regarding the development of a quality metrics white paper that outlines what constitutes a quality neuro-ICU. The Advocacy Committee will spearhead this initiative. The second initiative is for the Guidelines Committee to develop guidelines around quality measures which identify high level of practices based on proven criteria. The difference between the two quality-based initiatives is that the white paper would address the physical environment while the guidelines would identify core practices that are evidence-based. Both groups will collaborate to ensure their work compliments and supports the other. The goal is to have these developed by the 2017 meeting so that a joint program can be presented.

Last year, Dr. Edward Manno created several task forces. Membership on these task forces required special expertise in five key areas including branding, certification, global, ENLS and funding. The recommendations generated from the task forces were instrumental in guiding the Board in developing the NCS's strategic direction over the next three years. I am happy to announce that the work of the task forces is now complete and I'd like to thank the task force chairs and members for their involvement as we look forward to an active year implementing our strategic initiatives.

I would like to remind our junior members that applications for the 2017 NCS Research Fellowship are now being accepted. This program is aimed at promising applicants who are seeking a career in clinical or translational research in Neurocritical care and ultimately wish to become independent investigators. The program continues to receive high quality applications. Hopefully in the next year we will be able to increase the number of fellowships offered.

As we are approaching the Holidays Season, I would personally like to express my best wishes for each and every member of the Society. As a member, you are an integral part of NCS. Contributions have allowed NCS to expand its membership, increase its educational offerings, and contribute more than $25,000 to research this year alone, ultimately helping NCS members to better provide and advocate for the highest quality of care for patients with critical neurological illnesses throughout the world.

Hopefully more to come!!



Michel Torbey, MD, MPH, FCCM, FAHA
President, Neurocritical Care Society

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New Membership Videos

By Jose I Suarez, MD, FNCS

NCS has seen a record increase in new members in 2016. However, we are constantly trying to formulate various innovative ways to attract new members. One idea that we entertained was the creation of audiovisual aids containing information regarding the benefits of NCS membership. The Membership Committee has developed two videos to entice healthcare professionals to join our Society.

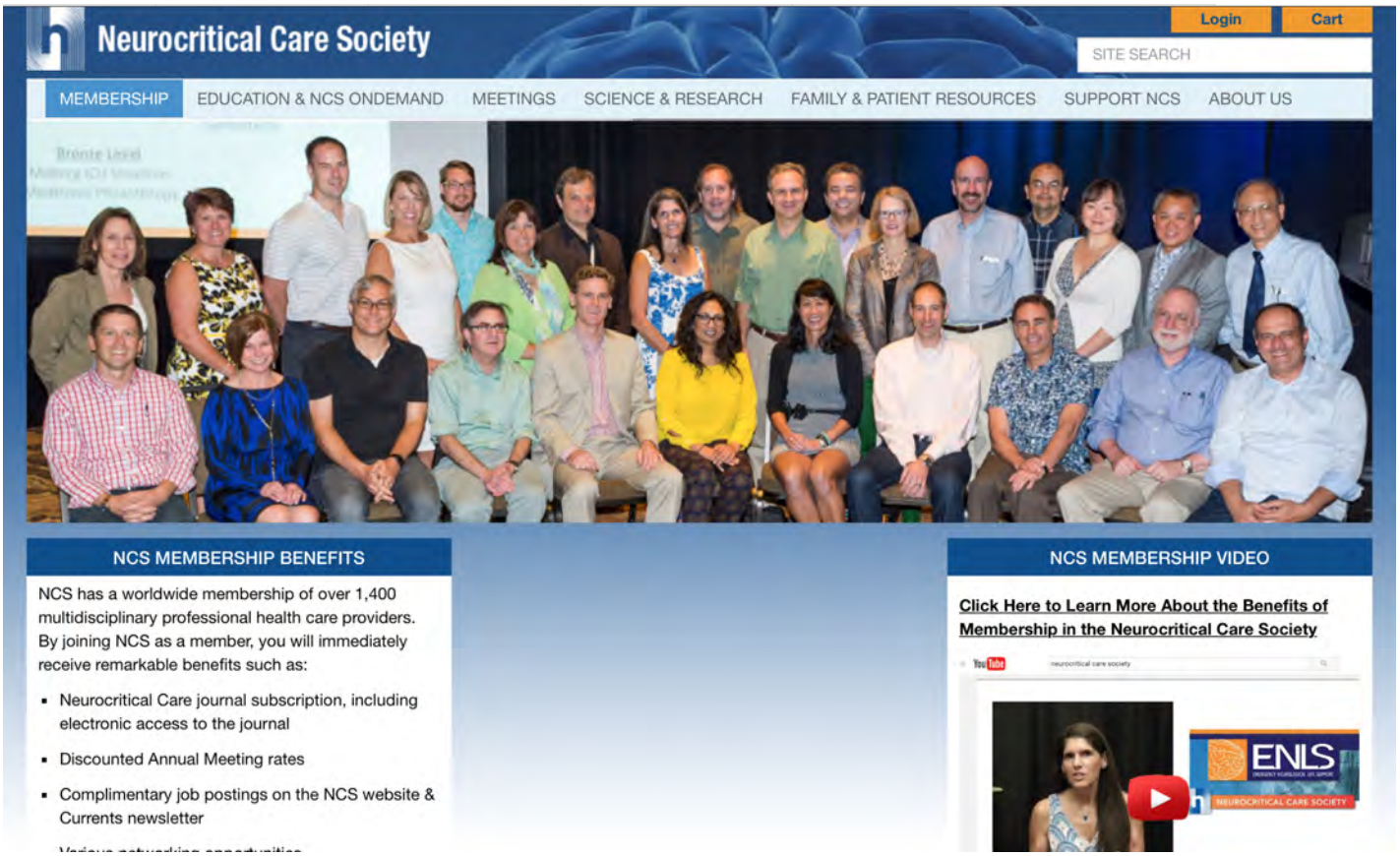
The overall goal of developing these videos was to convey a clear and engaging message to practitioners as to what it means to be an NCS member and what the advantages of membership are. We interviewed many NCS members during the past year and asked them a set of questions to address the overall goal proposed. Once the video clips were recorded, two members of the NCS Membership Committee independently reviewed them and chose what they determined offered a more compelling message. We also wanted the video clips to represent the diverse and multi-professional NCS constituency. The videos can be viewed by accessing the following web links:

https://www.youtube.com/watch?v=0hLWZSJTSS4&feature=youtu.be

http://www.neurocriticalcare.org/Membership/Membership-Benefits

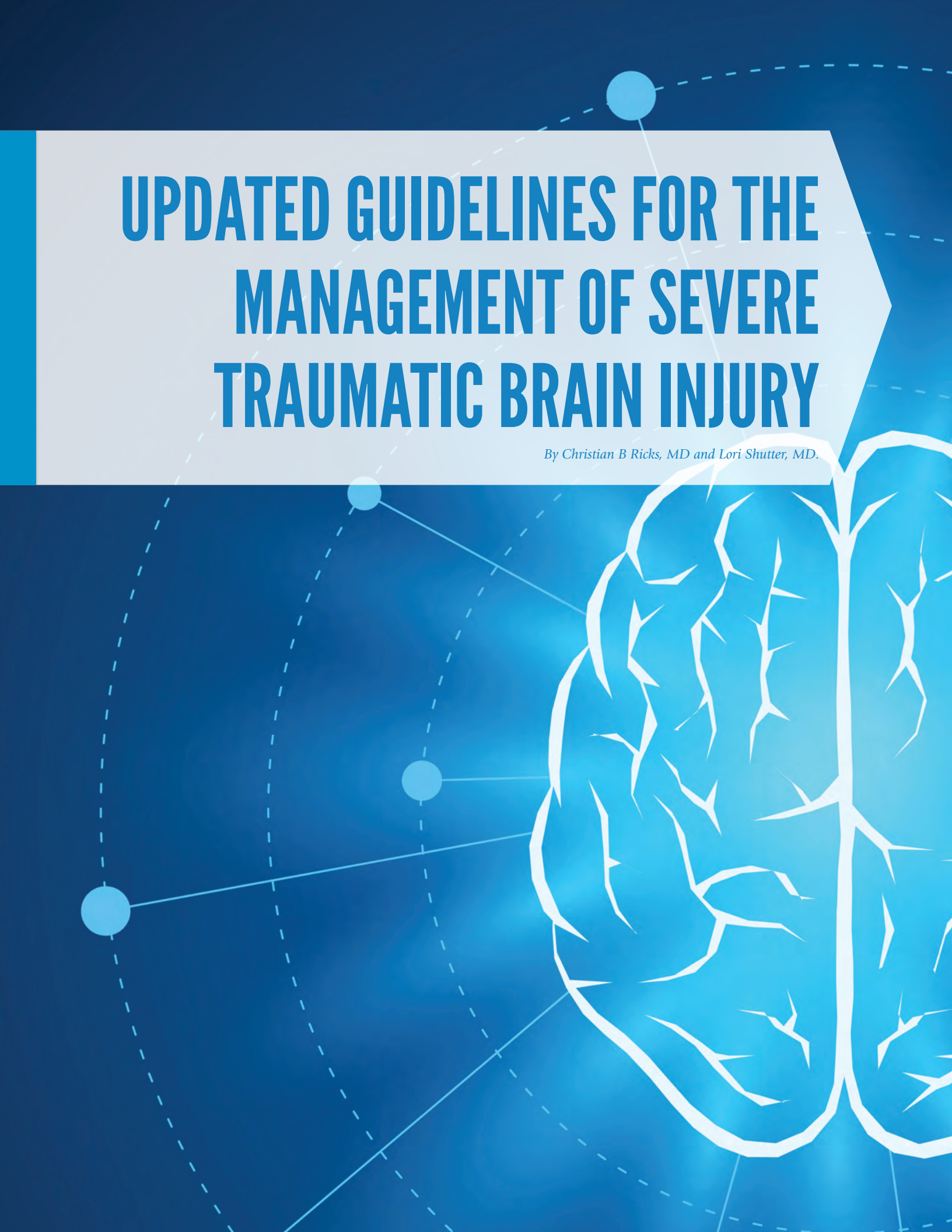
As our readers can attest after watching the videos, the message is that NCS membership offers the opportunity to network with likeminded professionals who interact in a supportive and collegial manner. In addition, they highlighted the many beneficial aspects of NCS membership which I reiterate here: Neurocritical Care journal subscription, including electronic access to the journal ; discounted Annual Meeting rates ; complimentary job postings on the NCS website & Currents newsletter; advancement and leadership opportunities from participation in various committees and activities to top governance positions; access to NCS member discussion forums on the NCS website; Global Partners/Dual Membership Discounts; and eligibility for various awards including Best Abstract, Young Investigator, Travel Grants, and Research Grants.

These membership videos were launched during the 2016 Annual NCS Meeting in National Harbor, MD. The feedback we have received has been overwhelmingly positive. Due to the acceptance of this initiative, we have decided to design membership videos in languages other than English, beginning with Spanish, Portuguese, German, Mandarin, and Japanese.



UPDATED GUIDELINES FOR THE MANAGEMENT OF SEVERE TRAUMATIC BRAIN INJURY

By Christian B Ricks, MD and Lori Shutter, MD.



Christian B Ricks, MD

Lori Shutter, MD

The fourth edition of the "Brain Trauma Foundation's Guidelines for the Management of Severe Traumatic Brain Injury" recently published in *Neurosurgery* (2016 Sep 20) represents several important updates over the 2007 edition and is an important reference tool for clinicians involved in the management of traumatic brain injury. It reviewed 189 publications to report on five Class 1, 46 Class 2, 136 Class 3 studies, and two meta-analyses. The complete Guideline document is available online at *https://braintrauma.org/coma/guidelines*. While several changes to recommendations represent updates in the literature since 2007, persistent gaps in evidence and methodologic errors have made these advances challenging.

The quality of evidence was assessed on four domains: aggregate quality of studies, consistency of results, whether evidence provided is direct or indirect, and precision of evidence. In addition, the number of studies and subjects were considered. Overall 28 evidence-based recommendations were issued, which included one level I, seven level IIA, ten level IIB, and ten level III recommendations. This article will focus on summarizing the 14 new or updated recommendations, and point out key differences compared to the 2007 guidelines.

It should be noted that the 4th Edition is transitional, as there will not be a 5th edition. Instead, the guidelines are moving to a model of continuous monitoring of literature, rapid updates to evidence review, and revisions to recommendations as evidence warrants. The concept of a "Living Guideline" reflects advances in technology, increasing volume of available information, and the change in expectations among clinicians and other stakeholders. A static document updated every few years no longer serves the demands of the community.

TREATMENTS

Decompressive Craniectomy: *Bifrontal DC is not recommended to improve outcomes as measured by the GOS-E score at 6 months post-injury in severe TBI patients with diffuse injury (without mass lesions), and with ICP elevation to values >20 mm Hg for more than 15 minutes within a 1-hour period that are refractory to first-tier therapies. However, this procedure has been demonstrated to reduce ICP and to minimize days in the intensive care unit (ICU) (Level II A). A large frontotemporoparietal DC (not less than 12 x 15 cm or 15 cm diameter) is recommended over a small frontotemporoparietal DC for reduced mortality and improved neurologic outcomes (Level II A).* This is a new topic. Of note, this recommendation may be modified soon based on the recent RESCUEicp trial that showed better ICP control and lower mortality in surgically decompressed patients, but with higher rates of vegetative states and severe disability.

Prophylactic Hypothermia: *Early (within 2.5 hours), short-term (48 hours post-injury) prophylactic hypothermia is not recommended to improve outcomes in patients with diffuse injury (Level II B).* Utility of hypothermia is still under investigation for refractory ICP control, and must be balanced with the risks of coagulopathy, immunosuppression, and cardiac dysrhythmias. This is a stronger recommendation than the prior edition that was based on subgroups from a meta-analysis, which no longer met current standards for inclusion.

Cerebrospinal Fluid Drainage: *An EVD system zeroed at the midbrain with continuous drainage of CSF may be considered to lower ICP burden more effectively than intermittent use (Level III). Use of CSF drainage to lower ICP in patients with an initial Glasgow Coma Scale (GCS) <6 during the first 12 hours after injury may be considered (Level III).* While these guidelines support the use of an EVD to lower ICP, the effect of this on mortality and morbidity remains unknown. This is a new topic.

Nutrition: *Feeding patients to attain basal caloric replacement at least by the 5th day and at most by the 7th day post-injury is recommended to decrease mortality (Level II A). Transgastric jejunal feeding is recommended to reduce the incidence of ventilator-associated pneumonia (Level II B).* Differences in intermittent vs continuous feedings, enteral vs parenteral routes, vitamins/supplements, and glycemic controls did not alter outcomes. These recommendations are based on additional evidence and introduce an earlier time point for attaining basal caloric replacement as well as a comment on the route of feeding.

Infection Prophylaxis: *The use of povidone-iodine (PI) oral care is not recommended to reduce ventilator-associated pneumonia (VAP) and may cause an increased risk of acute respiratory distress syndrome (Level II A). Antimicrobial-impregnated catheters may be considered to prevent catheter-related infections during external ventricular drainage (EVD) (Level III).* In the TBI population, VAP can be as high as 40% and EVD infections 27%, and are associated with worse neurological outcomes. These were independent of early vs late tracheostomy, prophylactic antibiotics, or PI oral care. Early tracheostomy is still given a Level II A recommendation. The revision adds a recommendation regarding VAP, modifies the prior recommendation regarding EVDs, and removes prior comments regarding periprocedural use of antibiotics.

Seizure Prophylaxis: *At the present time there is insufficient evidence to recommend LEV over PTN regarding efficacy in preventing early PTS and toxicity (No level).* Prior recommendations regarding prophylactic use of other anti-seizure medications remain in the new edition. The new statement was added based on variability in clinical practices and conflicting studies.

MONITORING

ICP Monitoring: *Management of severe TBI patients using information from ICP monitoring is recommended to reduce in-hospital and 2-week post-injury mortality (Level II B).* Level 1 evidence is lacking mainly because of routine use of ICP monitoring in developed nations and lack of equipoise, although basing treatment on radiographic and clinical data may be equally effective. This statement was felt to best represent current data. Some prior recommendations were restated in the current version with the acknowledgement that they are not supported by currents standards for evidence.

CPP Monitoring: *Management of severe TBI patients using guidelines-based recommendations for CPP monitoring is recommended to decrease 2-week mortality (Level II B).* Monitoring ICP and CPP does not change outcomes, only using these measurements in addition to clinical assessment for treatment decisions. CPP monitoring and threshold recommendations have been separated in this edition.

THRESHOLDS

Blood Pressure Thresholds: *Maintaining systolic blood pressure (SBP) at ≥100 mm Hg for patients 50 to 69 years old or at ≥110 mm Hg or above for patients 15 to 49 or over 70 years old may be considered to decrease mortality and improve outcomes (Level III).* This recommendation based on new literature is a change from the previous edition that recommended avoidance of a SBP of less than 90mm Hg (Level II).

ICP Thresholds: *Treating ICP above 22 mm Hg is recommended because values above this level are associated with increased mortality (Level II B).* Borderline ICP values should be interpreted in the context of CPP, PbtO2, and SjvO2 values. If these are normal a higher ICP may be acceptable. The prior recommendation to treat an ICP above 20 mm Hg was revised based on new literature and downward re-classification of older literature.

CPP Thresholds: *The recommended target cerebral perfusion pressure (CPP) value for survival and favorable outcomes is between 60 and 70 mm Hg. Whether 60 or 70 mm Hg is the minimum optimal CPP threshold is unclear and may depend upon the patient's autoregulatory status (Level II B).* CPP requires the monitoring of ICP, and levels greater than 70 mm Hg were associated with respiratory complications and worse outcomes. Increasingly the "ideal" CPP appears to be different for each patient, with those with intact pressure autoregulation tolerating higher CPP than those with dysfunctional pressure autoregulation. The previous recommendation to target CPP between 50 – 70 mm Hg was revised based on new literature and downward re-classification of prior evidence. The prior recommendation to avoid aggressive treatment to maintain CPP above 70 mm Hg has been retained as a Level III recommendation.

Advanced Cerebral Monitoring & Thresholds: This is now separated into two sections addressing monitoring modalities and treatment thresholds individually. No new recommendations have been added, but the previous Level III recommendation regarding brain tissue oxygen thresholds has been removed based on conflicting evidence.

As predicted, while some clarity has been shed on select areas of TBI management, the majority of decision making lacks high quality evidence-based recommendations. More disheartening is the continued utilization of study designs and protocols which will not produce strong evidence. It is our hope that these guidelines not only guide the decision making of clinicians, but also the topics and methods of future research.

International Expansion and Incorporation of Global Partners

As Immediate Past President I have assumed that position alleviating international relations and connectivity for the NCS. NCS continues to grow internationally as we spread on admission. Our international contingency and membership continues to expand on all continents. As our international membership has expanded, the Board of Directors set guidelines a few years ago for how specific regional chapters could hold Board of Directors seats within NCS. Several international regions have now started this process and we hope to be including them by our Annual Meeting in 2017. Each Global Partner region is in the process of developing their election/selection process. Regional Global Partners include South America, Asia, the Middle East, and European regions. I will keep you updated as we get more information from these leaders on the positions of their seats.

NCS continues to be involved with other critical care societies. We keep close ties with the European Society of Intensive Care Medicine which was well represented by NCS faculty at their last meeting. Next year's World Federation of Neurology will have a Neurocritical care section in Kyoto, Japan in September 2017. There are also burgeoning plans for another joint meeting with The German Neurocritical Care Society for 2018.

November 21-23rd, the third International NeuroCritical Care and Research Symposium was held in Quito, Ecuador. This featured over 40 speakers with 20 from the United States and 17 from South America. The symposium was co-sponsored by the Latin America Brain Injury Consortium (LABIC).

Neurocritical care is now reaching all areas of the world. The first Stroke and Neurocritical Care Symposium will be held in Almaty, Kazhakstan on March 28-30th 2017.

As always it continues to be an honor to serve NCS and its membership.

Respectfully submitted,
Edward M Manno MD FNCS

Apply for the NCS Research Fellowship. And Let's All Fund Our Next Fellow!

J. Claude Hemphill III, MD,MAS,FNCS

The Neurocritical Care Society is now accepting applications for the next NCS Research Training Fellowship Grant. A letter of intent is due by January 1, 2017 and approved applicants will be notified by February 1, 2017 regarding submission of a full application. Go to this link for more information and details http://www.neurocriticalcare.org/Science-Research/Grants-Funding/NCS-Research-Training-Grant.

What is the NCS Research Training Fellowship Grant? Well here is a little history about the program and how all of us can contribute to its success. One of the five pillars of the NCS Mission is **Research**. As NCS has grown and advanced its research mission through science at the Annual Meeting and development of the Neurocritical Care Research Network (NCRN), it became clear that investment in developing young investigators needed to be a major priority. For the last several Annual Meetings, NCS has sponsored a half-day Research Methods Workshop and this has been highly attended. Three years ago, as NCS President, I encouraged us as a Society to "put our money where our mouth is" and make a financial commitment to funding an NCS Research Fellowship that would provide a mentored research experience for an NCS member junior investigator. This was not a hard sell; the NCS Board of Directors funded the proposal and the first call for applications went out. This current call represents the 3rd NCS Research Training Fellowship Grant. Our first two awardees, David Hwang of Yale and Edilberto Amorim of Massachusetts General Hospital, represent the excellence possessed by many NCS junior investigators. Even as we look forward to awarding our next grant at the Hawaii Annual Meeting in 2017, I believe it is time for all of us to think bigger and make it happen. More about what you can do in a moment.

The NCS Research Training Fellowship Grant is a one-year award in the amount of $70,000 (up to $7,000 or 10% is also available for institutional indirect costs). Eligible candidates are NCS members within 5 years of completion of terminal degree or training. NCS is a multidisciplinary international society and physicians, nurses, pharmacists, and PhD researchers worldwide are eligible. Analogous to other research training fellowship grants from organizations such as NIH, AHA, and AAN, this award is intended to fund a specific research project and must involve a mentor who will aid the awardee regarding research methods and career development. At only one year, this is a short-term award that is intended to provide a stimulus for the awardee to gather experience and data to apply for future more substantial funding such as an NIH K08 or K23. We encourage all interested to apply.

NCS Honorary Member Werner Hacke tees off at University of Tennessee sponsored hole at 2015 NCS Annual Meeting Golf Tournament

You may be wondering, "I am more than 5 years out or am not applying for this Research Fellowship Grant, so what does this have to do with me?" That's where the ***Fund-A-Fellow Campaign*** comes in. Have you ever won a t-shirt from me at the NCS Annual Meeting Banquet Auction? Sponsored a hole at the 2015 NCS Golf Tournament in Scottsdale? What about the NCS Officer/BOD Dunk Tank at this year's meeting? Have you participated in the NCS Fun Run? Or donated to NCS when renewing your dues? If so, then you are already part of ***Fund-A-Fellow***. NCS is a participatory Society and the success of our mission depends on all of us, and you have delivered. I am proud to announce that as of the end of this year's Annual Meeting we have all raised **$84,717** from member donations to the research program. That means that we have funded our first fellow. Therefore, I am officially declaring the first ***Fund-A-Fellow*** campaign close! And I am announcing that the new ***Fund-A-Fellow*** campaign is officially open. We will seed this with the **$7717** remaining from the first fund, but the rest is now up to you and me. You don't have to wait for the Annual Meeting or until you renew your dues; you can go to the NCS website and donate now or anytime at http://www.neurocriticalcare.org/Support-NCS/Donate.

So what's next? Well, I consider this a great start to a program that now needs to expand. At the Board of Directors meeting during this year's Annual Meeting, I challenged the Board to leverage the commitment that our members have shown by expanding the NCS Research Training Fellowship program. I believe that we can expand the number and duration of the grants. However, there are many competing priorities for NCS funds. I am confident that if the membership demonstrates the same (or better) support of the next ***Fund-A-Fellow*** campaign, then we will realize this goal.

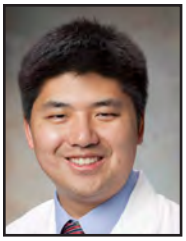
Here is my charge: participate in the NCS research program. Apply for the research grant, attend an NCRN meeting, and let's all ***Fund-A-Fellow***. Hopefully you aren't tired of me asking, because I don't plan to stop. Our junior investigators are counting on us.

J. Claude Hemphill III, MD,MAS,FNCS
Past- President, Neurocritical Care Society

T-shirt auction "winners" at NCS 2013 Annual Meeting Banquet

NCS Developing *Neurocritical Care Live*, a New Online Resource for Continually Updated Neurocritical Care Knowledge

By David Y. Hwang, MD, and Alejandro Rabinstein, MD, FNCS



David Y. Hwang, MD

Alejandro Rabinstein, MD, FNCS

The Educational Products Committee is excited to announce the ongoing development of *Neurocritical Care Live*, a subscription-based website with the objective of being the premier source for up-to-date Neurocritical care knowledge.

Approved in concept by the NCS Board of Directors and Executive Committee, *Neurocritical Care Live* will cover core topics in Neurocritical care in detail, with online chapters that are evidence-based and periodically edited to reflect the most current research and guidelines in our field.

Wade Smith, Immediate Past Co-Chair of the Educational Products Committee, said of the project, "The vision of *Neurocritical Care Live* is similar to *UpToDate*®, except for a key difference: we are specifically gearing the content to be useful to specialists. Our hope is that this NCS website will be indispensable for practicing neurointensivists at the point-of-care."

The plan for the first online version of *Neurocritical Care Live* will consist of 20 chapters, with the following selected topics:

- Acute ischemic stroke
- ICH
- Subarachnoid hemorrhage
- Seizures and epilepsy
- Acute neuromuscular disorders
- Neuroinfectious diseases
- Traumatic brain injury
- Traumatic spinal cord injury
- Multimodality neuromonitoring
- Perioperative neurosurgical critical care
- Toxic-metabolic encephalopathy
- Hypoxic-ischemic encephalopathy in adults
- Prognostic assessment in neurocritical care
- Clinical evaluation of coma and brain death
- Sedation and analgesia in neurocritical care
- Nutrition and metabolism
- Respiratory support of the neurocritically ill
- Cardiovascular monitoring and complications
- Endocrine disorders in neurocritical care
- Pediatric neurocritical care

The first versions of each chapter for the website are currently being developed by multidisciplinary expert writing teams; each consisting of two to three physicians, two pharmacists, and a nurse.

Dave Greer, Vice Chair of the Department of Neurology at Yale University School of Medicine, has been selected by the Educational Products Committee as the inaugural Editor-in-Chief of *Neurocritical Care Live*, after a call for a project leader went out to all NCS members with FNCS designation earlier this year. Dr. Greer, who will be serving an initial two-year term as Editor, will head a rotating multidisciplinary editorial board of 6-8 members who will be responsible for coordinating the website's content and working with chapter authors to keep their chapters frequently updated.

Per Dr. Greer, "We envision that each chapter on the *Neurocritical Care Live* website will be revised regularly—for some, perhaps as frequently as every 3 months—by chapter authors, to ensure incorporation of the most recent available data. Each chapter on the website will note the date of the last update for the convenience of our readers. Our Board will also work on defining a system to rotate new authors periodically onto the authorship team for each chapter, to ensure that the process of updating the website is sustainable."

Becca Stickney, NCS Director of Education, expressed excitement over the possibilities of utilizing the NCS website to host *Neurocritical Care Live*. "The sky is the limit with regard to what interactive content we will be able to embed into each chapter. Discussion forums, blogs, videos, NCS webinars, and future podcasts—all of these will be possible to link within the core text and figures on the website and will be maintained with guidance from our rotating authors."

Asma Moheet, Co-Chair of the Marketing and Outreach Subcommittee of the Educational Products Committee, and Theresa Human, Chair of the PONS Subcommittee for the Pharmacy Committee, led an effort this past summer to survey NCS membership regarding the eventual individual and institutional subscription pricing for the website, as well as the preferred format for viewing the product. Dr. Moheet reported, "We are happy to share that the NCS online platform will allow the product to be viewed conveniently on smartphones and will ensure that the resource will be easily searchable, two big items on the wish list from our focus group discussions. We are still working on the exact pricing structure, but making annual subscriptions to the website affordable will be the highest priority, with a discount for NCS members."

The Educational Products Committee is targeting a release of *Neurocritical Care Live* before next year's NCS Annual Meeting in October 2017. The website, which will support NCS's mission to develop and distribute multidisciplinary training and education to an international audience, will hopefully build on the popularity of foundational OnDemand products, such as *The Practice of Neurocritical Care* textbook, and become a key, "go-to" resource for critical care clinicians of all levels of training and experience.

Neurocritical Care Nurses: Building on Success!

Dea Mahanes, MSN, RN, CCRN, CNRN, CCNS

Neurocritical Care Society (NCS) provides nurses with many benefits and many opportunities to contribute to the society. In 2016, NCS nurses participated in or led committees, created educational products, coordinated and taught ENLS courses, represented NCS at national and international conferences, and presented at the annual meeting. At the beginning of the year, the Nursing Committee set three goals: 1) Complete a Needs Assessment of NCS nurses, 2) Develop two educational products for Neurocritical care nurses, and 3) Support an international presence for NCS nurses through participation in the World Federation of Critical Care Nurses (WFCCN). These goals were accomplished, and we hope to build on those successes in the coming year.

Led by members Mary Amatangelo, MS, RN, APRN-BC, CCRN, CNRN, SCRN, Mary Guanci, MSN, RN, CNRN, SCRN, and Karen March, MN, RN, CCRN, CNRN, a Needs Assessment was developed and distributed to the NCS nursing membership. In addition to demographic information, the Needs Assessment focused on perceived benefits of NCS membership for nurses, barriers to participation, and educational needs. Almost 60 NCS nurses completed the survey. Information from the Needs Assessment is already being used to guide nursing-focused NCS activities. Stay tuned for an overview of the results in an upcoming issue of Currents!

Cynthia Bautista PhD, APRN, FNCS is an active member of both the Nursing Committee and the Educational Products Committee, and leads efforts to develop educational products for nurses. Cindy worked with Debora Argetsinger, MS, AGACNP-BC, CCRN, Honey Beddingfield, BSN, RN, CCRN, CNRN, and Michelle VanDemark, MSN, CNP, CNRN, SCRN, FNCS to develop a web-based presentation on basic neurologic nursing assessment. This presentation is currently available through the "N-Case," a section of NCS OnDemand that serves as a central repository for educational products targeted to Neurocritical care nurses. In addition to the basic neurologic nursing assessment presentation, N-Case includes nursing sessions from previous NCS Annual Meetings and other resources. A presentation detailing advanced neurologic nursing assessment, developed in collaboration with JJ Baumann, MS, RN, CNS-BC, CNRN, SCRN and Fern Cudlip, MSN, CNRN, FNP, ANVP, will be completed by the end of 2016 and will also be available through N-Case. These products are a great resource for both new and experienced Neurocritical care nurses as well as advanced practice providers!

In support of NCS's vision "to provide and advocate for the highest quality of care for patients with critical neurological illness throughout the world," NCS nurses were active in the World Federation of Critical Care Nurses (WFCCN) in 2016. Susan Yeager, MS, RN, CCRN, ACNP-BC, FNCS, presented several sessions at the WFCCN Annual Meeting in Brisbane, Australia, including a plenary session on traumatic brain injury. Mary Kay Bader MSN, RN, CCNS, CCRN, CNRN, FAHA, FNCS, also attended the meeting in Brisbane, winning an award for her presentation on TBI and platelet dysfunction. NCS will continue to be active in the global nursing community, with Sarah Livesay, DNP, RN, ACNP-BC, ACNS-BC, FNCS assuming the role of NCS representative to the WFCCN.

ENLS was also an area of intense activity for NCS nurses in 2016. Led by Mary Kay Bader and Gretchen Brophy, PharmD, BCPS, FCCP, FCCM, FNCS, a team of NCS nursing members taught ENLS courses at the American Association of Neuroscience Nurses' (AANN) annual meeting and the American Association of Critical Care Nurses' (AACN) annual conference. Fifty-three nurses attended ENLS at AANN, and 78 attended the course at AACN. Feedback was very positive and both organizations will offer ENLS at their annual meetings in 2017 in collaboration with NCS. In addition, the first nurse-led international ENLS course was offered in 2016 in Manila, Philippines. Susan Yeager coordinated the course in collaboration with Isabelita Rogado, RN, MAN, DNSc (World Federation of Critical Care Nursing Society Secretary and founding member, and President of the Critical Care Nurses Association of the Philippines), and instructed the course with several physician colleagues. A total of 83 nurses and 4 physicians participated.

In 2017, the NCS Nursing Committee hopes to build on these successes. Guided by the 2016 Needs Assessment, we plan to develop additional educational resources to meet the needs of Neurocritical care nurses. We will continue and even expand our international presence through involvement in the WFCCN and other global initiatives. In addition, we hope to increase networking and communication opportunities for nurses through use of the NCS Nurse Forum.

All NCS nursing members have access to the Nurse Forum and can post items for discussion. In addition to clinical topics, Nursing Committee information is available on the Forum and includes meeting announcements and minutes. The NCS Nursing Committee welcomes participation from all members. If you have questions, ideas, or want to become more active with NCS nursing, please contact Dea Mahanes, MSN, RN, CCNS, Nursing Committee Chair via email (deamahanes@gmail.com).

NCS ON DEMAND

Neurocritical Care Society Pharmacy Section Year in Review

By Eljim Tesoro, PharmD, BCPS
Chair, Pharmacy Leadership Committee

This has been an incredible year for our team filled with many successes! Currently, we have over 120 pharmacists as members. The pharmacy section was well represented at the Annual Meeting in September with members presenting over fifteen research posters, speaking during the main sessions, and presenting at the Pharmacotherapy Workshop. I would like to acknowledge all the Pharmacy Committee members that have served this past year for your service and dedication. Special thanks to our past-Chair, Amber Castle, for all of her work building our section and promoting our members to the Society during the past year. I would like to welcome this year's Pharmacy Leadership Committee members: Jen Bushwitz, Amber Castle, Katleen Chester, Aaron Cook, Olabisi Falana, Salia Farrokh, Kristy Greene, Jimmi Hatton-Kolpek, Theresa Human, Kimberly Levasseur-Franklin, Chris Morrison, Jeffrey Mucksavage, Mehrnaz Pajoumand, Nicholas Panos, Andrea Tully (Passarelli). Jason Makii will be serving as Co-chair. John Lewin joins Theresa Human on the NCS Board of Directors and Gretchen Brophy is now our current NCS Vice-President.

Pharmacotherapy of Neurocritical Care Series (PONS)

One of our notable achievements this year is the accreditation of the Pharmacotherapy of Neurocritical Care Series (PONS) to provide continuing education credits for physicians, pharmacists, and nurses. This on-demand webinar series currently offers twelve core pharmacotherapy topics with six new releases scheduled in the coming year. The PONS series is an innovative tool to promote dissemination of updated information to clinicians as well as trainees and aligns nicely with the educational mission of the Neurocritical Care Society. It is currently the most visited site on the NCS webpage. Congratulations to Theresa Human, Jeffrey Mucksavage, Andrea Tully (Passarelli), Chris Morrison, and Gretchen Brophy for their efforts on this initiative this year!

NCS Annual Meeting

Over fifty pharmacy members attended the Annual Meeting in National Harbor, Maryland, this past September. Pharmacy members were very well represented in various venues throughout the meeting. Many thanks to Christopher Morrison and Gretchen Brophy who did an amazing job promoting pharmacist involvement on the Annual Meeting Planning Committee. John Lewin, Aaron Cook, and Eljim Tesoro were invited presenters in

the Practice Updates session. Christopher Morrison developed a session entitled *News in Neurocritical Care Drug Use* with Julian Bosen and Sherif Mahmoud also speaking (thanks to Theresa Human for stepping in as moderator!). Sarah Adriance gave a wonderful pharmacology review in the Advanced Practice Providers workshop. Jimmi Hatton Kolpek gave valuable presentations on clinical research careers as well as leadership and professionalism. Theresa Human was the authority on pharmacologic management of fever at the joint session with ESICM. Amber Castle highlighted the need of a pharmacist in *How to Build the Dream Team* session. Aaron Cook represented pharmacy well in a debate with Michael Diringer on guideline use in the ICU. The Pharmacotherapy Workshop was directed by Eljim Tesoro and showcased many great speakers including Jeffrey Mucksavage, Kent Owusu, Theresa Human, Jennifer Frontera, Paola Saccucci, Sherif Mahmoud, and Gretchen Brophy. Members also raised $800 for the Run for Research fundraising effort.

Publications

We had several pharmacy members as authors of significant guidelines published in *Neurocritical Care* this year. Shaun Rowe was one of the authors of the evidence-based consensus statement on EVD management (*Neurocrit Care*. 2016 Feb;24(1):61-81). John Lewin and Aaron Cook were authors on the reversal guidelines for antithrombotics in intracranial hemorrhage (*Neurocrit Care*. 2016 Feb;24(1):61-81).

Presidential Citations and Awards

The NCS Presidential Citation is an award that recognizes members who have shown exceptional support and dedication to NCS and have contributed to the Neurocritical care community. Pharmacy section recipients included Amber Castle, Aaron Cook, Theresa Human, Christopher Morrison, Denise Rhoney, and Eljim Tesoro. Shaun Rowe was inducted as a Fellow of the Neurocritical Care Society (FNCS) and was the only pharmacist recipient this year.

On behalf of the Pharmacy Leadership Committee of NCS, I would like to thank everyone for a great year!

Greetings NCS Members

I am honored to serve our Society as the Secretary! Part of my duties is to share our NCS member accomplishments, achievements and newsworthy items! We practice in locations around the world, so please let us know what is happening! I encourage you to send in your announcements to Mary Kay Bader, NCS Secretary, at Badermk@aol.com.

- Congratulations to Dr. Thomas P. Bleck who has been selected as the Society's eighteenth recipient of the ***Lifetime Achievement Award***. This award was created to honor an individual who has demonstrated meritorious contributions to the field of critical care through the advancement of medical science, medical education or medical care. Dr. Bleck has been instrumental in the formation and guidance of critical care, and has also been a staunch supporter and continue to provide wise counsel to members and leadership of this organization. This honor will be bestowed upon you during the Opening Session at SCCM's 47th Critical Care Congress in San Antonio, Texas.
- Jason M. Makii, PharmD, MBA, BCPS, BCCCP (Clinical Pharmacy Specialist, Neuroscience Critical Care at University Hospitals Cleveland Medical Center, Cleveland Ohio), received his MBA in May and passed the board of pharmacy specialties critical care exam offered in May of 2016.
- J. Javier Provencio MD FNCS (University of Virginia Medical Center) is the Director of the Nerancy Neuroscience Intensive Care Unit and the designated Louise Nerancy Associate Professor in Neurology at UVA. He received his award at a reception honoring Endowed Chairs in October.
- NCS member Hector Lopez MD organized the Mexican Critical Care Medicine meeting in the Neurocritical Care Course offered in October 2016. NCS members speaking at the conference included NCS Past Presidents Ed Manno MD and Romer Geocadin MD, Vice President Gretchen Brophy PharmD and Board member Fred Rincon MD.
- NCS member Daiwai Olson RN PhD recently travelled to Allentown Pennsylvania where he lectured on stroke at the LeHigh Valley medical center Neuroscience conference. Daiwai Olson also completed work as a tri-editor (Mary Kay Bader RN and Linda Littlejohns RN) for the upcoming publication AANN Core Curriculum of Neuroscience Nursing. The 800-page text is due out in print in the next week!
- Cynthia Bautista RN PhD co-authored the Prophylaxis of Venous Thrombosis in Neurocritical Care Patients: An Evidence-Based Guideline: A Statement for Healthcare Professionals from the Neurocritical Care Society which was published in January, 2016. She collaborated with fellow nursing colleagues to create Basic and Advanced Neurological Nursing Assessments for the NCS On-Demand website. Cynthia also represents AANN as a representative from the United States in the World Federation of Neuroscience Nurses. She recently co-authored in revising the Clinical Practice Guidelines for Movement Disorders.
- Congratulations to Dave Greer, Vice Chair of the Department of Neurology at Yale University School of Medicine, for being selected by the Educational Products Committee as the inaugural Editor-in-Chief of Neurocritical Care Live.

NCS current and former officers are representing NCS at international meetings. Past Presidents Romer Geocadin MD and Claude Hemphill MD, as well as current NCS Treasurer Jose Suarez MD, spoke at the European Society of Intensive Care Medicine (ESICM) conference in Milan, Italy in October 2016. NCS Vice President Gretchen Brophy PharmD, Past President Romer Geocadin MD, and NCS board member Fred Rincon MD spoke at the Mexican Critical Care Medicine meeting in the Neurocritical Care Course.

The Society of Critical Care Medicine (SCCM) will be hosting their annual meeting in Honolulu Hawaii in January 2017. NCS Past President Cherilee Chang MD is the Chair of the Planning Committee for the Hawaii meeting. Lori Shutter MD and Matt Koenig MD are session chairs for the Neurocritical Care course offered at the SCCM meeting.

ENLS courses are being organized across the country and in many international meetings. On December 2, 2016 in Greensborough NC, NCS members Mary Kay Bader RN, Gretchen Brophy Pharm D, Rhonda Cadena MD and Michael "Luke" James MD will be faculty at the course. Over 95 attendees have registered as of November 15! The course is being coordinated by local chapters of the American Association of Critical Care Nurse and the American Association of Neuroscience Nurses. Members Jean Pruitt and Missy Moreda are coordinating efforts with NCS. Are you hosting an ENLS course in your area? Send me an update on who was involved and the turnout!!

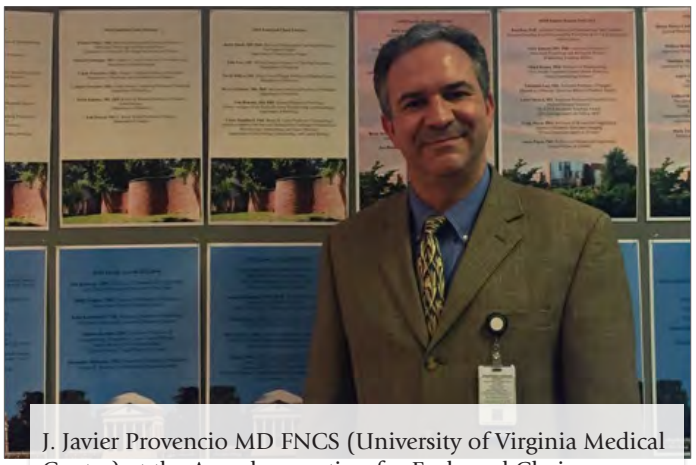
On a more adventurous front…NCS members Matt Koenig MD and Jennifer Moran ACNP of Queens Medical Center in Honolulu Hawaii competed in the "Ragnar 200-mile overnight relay race held in Hilo Hawaii on Oct 14-15, 2016. The grueling 200 miles was run with a team of six members…meaning they ran day and night until the 200 mile finish line was crossed. Their team, "Disco Nappers," finished in 34 hours and 27 minutes. Running up and down elevations reaching 3557 feet, Matt and Jennifer and teammates ran relay style with segments of 5-10 miles at a time. What an amazing feat for the team. Great job!!!

Remember if you have a news item, please forward it to me at Badermk@aol.com.

Team Disco Nappers at the 2016 Ragnar Race in Hilo Hawaii: Bob Hoesch, Jolene Vicario Hughes, Scott Marshall, Katie Misner and NCS members Jennifer Moran, and Matt Koenig

NCS Past President Cherilee Chang MD
2016 SCCM Meeting Chair

Cynthia Bautista RN PhD



J. Javier Provencio MD FNCS (University of Virginia Medical Center) at the Awards reception for Endowed Chairs

October 2016: Mexican Critical Care Medicine Meeting (CCOMEC 2016): Julio Mijangos MD, NCS Past Presidents Ed Manno MD and Romer Geocadin MD and Board member Fred Rincon MD

2016 Mexican Critical Care Congress Meeting (CCOMEC 2016)

2016 October: ESICM Meeting in Milan Italy. Group photo includes NCS members and Past President Claude Hemphill III MD and Romer Geocadin MD and NCS Treasurer Jose Saurez MD

Highlights
2016 NCS Ann

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"They Are Listening"

By Michael Rubin, MD, MA

A profession is partially defined by its culture and the esoteric language it may use. We see this even within medical specialties. OB/GYN uses their "G's" and "P's" and neurointensivist and neurosurgeons use their "PBD# POD# HH# MF#" phraseology to efficiently communicate elements of a subarachnoid hemorrhage patient. If we put the OB/GYN and neurosurgeon in the same room, they each will have to think back to med school to figure out what the other is trying to communicate.

While this nomenclature is done for efficiency, we ought to be careful for phrases that we use in front of patients and their families, especially with end-of-life disuccsions. We may say, "Withdrawal of care" or just "withdrawal" while what we truly mean is to withdraw life sustaining therapy, but still provide comfort measures. Even worse, physicians will use the crass term "pull the plug" as if people were machines similar to the technology that is supporting them.

While our intent may be to communicate efficiently and directly, we must consider how these phrases sound to patients and their families. The contrarian would retort, "Certainly we would never say these things around patients, we just use them with other physicians." However, next time you are in the ICU and someone else is speaking to other providers or speaking to a family, just watch. People are listening and people are watching our body language. They know when we are discussing a negative turn of events and they interpret our words through their own experience.

If we want to consistently communicate the message to families that we are withdrawing life sustaining measures or we are changing the goal to comfort care measures, we should use these phrases with other medical providers. We may think that we are alone, but we are not, they are listening.

Consider the term "futile." Every intensivist uses this term and might be familiar with the discourse on medical futility and inappropriate treatments. Now imagine how that word sounds to the family of a dying patient, even to the family who knows that any hope of recovery is lost. Please be careful, they are listening.

The MOCHA Study is Heating Up!

By David Matthew Greer, MD, MA, FNCS

The MOCHA (Multimodal Outcome CHAracterization in Cardiac Arrest) Study is a prospective, multi-center international study of prognostication after cardiac arrest using an innovative approach neurologic outcome assessment by reducing the impact of the self-fulfilling prophecy.

MOCHA has 3 main objectives: 1. To standardize the evaluation of post-cardiac arrest patients with validated tests (clinical, electrophysiologic, biochemical markers and imaging) at appropriate time points; 2. To encourage more time to allow for delayed recovery in patients with an uncertain prognosis; and 3. To establish a network for future prospective studies evaluating therapeutic interventions in defined subpopulations of cardiac arrest survivors.

It is important to note several important features of the study. First, centers are not expected to perform testing that is outside the scope of their standard care; however, guidance will be provided as to how to perform specific tests, as well as the appropriate timing of their performance. Second, centers will be encouraged to allow additional time for recovery, especially in cases in which the outcome is uncertain, or in patients in whom there are no overwhelming systemic comorbidities that might sway toward early WLST. Third, the study is international, and will include many centers in countries that traditionally have very little early WLST.

We are excited that the launch of MOCHA has begun, with over 30 sites in the US and internationally, including key locations such as Brazil and Korea, where different practice patterns may help to avoid the self-fulfilling prophesy bias. We are quite interested in recruiting more centers, especially those with high volumes of cardiac arrest as well as neurointensivists motivated to study this disease.

We are using a robust data collection tool using an online data entry system, as well as a centralized data warehouse for electrophysiological (EEG and SSEP) and neuroimaging (CT and MRI) data for central analysis. Sites will be credited with authorship based on their level of participation, and will be encouraged to take ownership of individual projects that are of interest to them, for which the database could be utilized.

Neuroprognostication is one of the core functions of neurointensivists, and prognostication after cardiac arrest is perhaps the most homogenous and best studied of all major cerebral injuries. However, based on limitations in the data thus far, prognostication of patients with hypoxic-ischemic encephalopathy is potentially inaccurate, biased and commonly premature. There is much to be gained by studying this disease well, as the tools utilized and lessons learned may translate into better methods of prognostication in many other disease states in Neurocritical care.

Navigating the Job Market: Exploring Academic vs Private Practice Models

Jennifer Ahjin Kim, MD, PhD

Becoming an attending neurointensivist is the ultimate goal for most trainees coming out of Neurocritical care fellowship. We work hard through medical school, residency and then fellowship, achieving all the academic benchmarks set out by the credentialing bodies. As we near the end of fellowship, many are suddenly faced with having to choose the type of work environment and division of time that were never previously under our control. The uncertainty of multiple options is compounded by the lack of exposure of most trainees to non-academic settings of practice. Even within academics the practice models of Neurocritical care vary immensely. While the AAN has highlighted some of the differences in practice environments for general neurology, specific information related to Neurocritical care practice tends to be primarily by word of mouth. As graduating trainees begin to envision their careers, being informed about the various options can be immensely helpful. To that end, we have interviewed six thriving neurointensivists, to demonstrate the diversity of options for practicing neurocritical care.

Marion Buckwalter: Associate professor at Stanford University Medical Center. She attends in the Neurocritical care unit (6 wks/yr) and runs a basic research lab working on how neurinflammation affects outcomes after stroke. She is also Director of admissions for Stanford's Neurosciences PhD program.

Jeffrey Fletcher: In private practice at Bronson Neuroscience Center. His clinical time is a 1 week on, 1 week off model. He also works on AAN guidelines and journal editorial boards.

David Greer: Vice chairman of the Dept of Neurology at Yale University. He attends in the Neurocritical care unit (8-10 wks/yr) and has research interests in stroke prevention and outcomes from coma and cardiac arrest.

Chad Miller: System medical chief and Medical director of Neurocritical care at OhioHealth. He is the co-chair of the ENLS committee and on the Board of Directors of NCS.

Max Mulder: In private practice at Abbott Northwestern Hospital. He is Medical director of the Neurocritical Care Unit and Chair of Allina Health Neurocritical Care Council.

Wendy Ziai: Associate professor at Johns Hopkins University and director of the neurovascular laboratory.

(Of note, most responses are paraphrased due to space limitations)

What do you consider advantages of working in academics or private practice Neurocritical care?

MB: I really enjoy being a mentor and a teacher. Being in academics allows me to train fellows, residents postdocs, graduate, and undergraduate students. I want to make discoveries that will help my patients and academics allows me to do so.

JF: In private practice, I enjoy interacting with other intensivists and stroke colleagues. There is more collaboration and cross-coverage across divisions than I experienced in academia. Salaries also tend to be higher in private practice than academics.

DG: Being in academics allows you to be a critical thinker and work on furthering the field. You have the flexibility and resources to be able to work on projects to investigate critical questions. It also provides educational opportunities to teach and guide future generations of the field.

CM: My health system does a tremendous job of short and long term strategic planning. Growth and development of the service line is very orchestrated. Physician input is highly valued.

MM: Private practice has less rigid departmental and structure allowing for more flexibility to work in different settings. Private practice emphasizes productivity. Schedules are generally more flexible, but you are often doing all the work on your own, which can be a pro or con.

WZ: In academics, there are prestige and challenges that come from so many opportunities. Collaborations across institutions allow us to be a part of changing how medicine is practiced. You are doing something different every day, which keeps things interesting.

What do you consider the biggest disadvantages of your practice environment?

MB: The biggest drawback of academia is when what one wants to do doesn't match well with what the institution wants you to do. For example, you want to do basic research and the academic center wants you to spend your time seeing patients and teaching housestaff, or the reverse.

JF: Depending on your career goals, private practice tends to require more clinical time, which leaves less time for research. Also, depending on private practice location, you may have limited exposure to other neurointensivists.

DG: Academics pays less than private practice, but you typically do much less clinical time. This gives you the freedom to pursue other career interests.

CM: In private practice, communicating change and implementing new processes can be challenging since many physicians are not bound in a departmental structure. Socializing the rationale and details of a plan require dedicated effort, and persistence and consistency.

MM: It can sometimes be a little lonely rounding or doing a 3am admit on your own in private practice, when you are used to rounding as a larger team.

WZ: There is perpetual competition for your time in academia. At some point you have to say "no" to some of the requests and there's always a struggle for the best work-life balance.

Were there either good or bad aspects of your work environment that you didn't expect?

MB: I think research grants are a little harder to get funded than I expected when I was in graduate school. However, I had ample warning that it would be a high bar to get NIH funding.

JF: Getting a new neuro ICU started was a lot of work and the change in culture from academics to private practice was initially difficult.

DG: My first faculty position environment was initially more competitive than I expected, and it was hard to navigate without clear mentorship. When looking into an institution, it is important to understand junior faculty support and identify good mentors.

CM: My work in a private practice position is very similar to my prior academic jobs. I conduct research, teach residents and trainees and give lectures. The clinical patient volume is equal or surpasses many academic centers.

MM: You could easily find yourself never looking back -or others desperately wanting to return to academics. I have been extremely fortunate in finding a great mixture of both: the complexity, acuity and quaternary care capabilities of a University hospital setting and the independence, flexibility and benefits/ compensation of private practice.

WZ: The best surprise was that good mentors were truly committed to the research work they were doing. Also, as long as you are willing to do the work, the grant writing will eventually become successful, and great students with great ideas will keep the process fun and challenging.

What advice would you give to trainees considering academic or private practice?

MB: I cannot stress enough that the decision should rest on your own desire to discover and to teach. If you want to be an academic, decide what you want to research and who you want to teach, and then find a job where there is the institutional will and resources to support you in your career. I not only mean financial, space and protected time, but also mentoring, collaboration availability, and facilities. Finding the academic environment that is perfect for you can take time. If you cannot start writing and getting grants when you start, it will be harder to succeed in the long run. On the other hand, if you take extra time as a postdoctoral fellow or as a clinical researcher, you may be more successful overall.

JF: At larger private centers, there is a blurry line between academics and private practice so many can still keep academic interests. It comes down to how much protected time you want.

DG: It is important think about whether pursuing research, education or being stimulated by asking hard questions excites you. Academics is not the right path if you are not excited by these things.

CM: Regardless of practice, I think it is crucial to understand the maturity of the critical care unit at which you are contemplating work and what struggles it may have had in the past. Does your position displace another intensivist, or does it add to the specialty capability of the hospital in a manner that will be supported by your colleagues? A young clinician can quickly find himself or herself in a leadership role, which while providing opportunity, need to be considered in light of personal pursuits, such as research, physician training, and work / life balance.

MM: Those of us who have spent so many years in the academic setting, often have some bias and hesitancy against leaving the academic setting. Trainees should look outside of academia, have an idea of your personal and professional goals and remember that private practice can mean a lot of different things.

WZ: Perseverance and choose the right mentor. Take advantage of outside collaborations early. Seek more than one mentor. The nature of funded research today is fully collaborative and working within networks is the new reality, but also a smart way to do research.

RESIDENT FELLOW COMMITTEE UPDATE

Anand Venkatraman, MD and Jennifer Kim, MD, PhD

Anand Venkatraman, MD

Jennifer Kim, MD, PhD

The Residents and Fellows Committee was involved in multiple events at the NCS 2016 Annual Meeting, in keeping with our aim of expanding our presence to maximize trainee exposure to all aspects of the NCS.

We had our second in-person meeting, where we introduced the new members, Ribal, Alexis, Kassi and Shola to the other members of the NCS. Anand Venkatraman was named as co-Chair, who will serve alongside current Chair, Jennifer Kim.

We hosted the resident/fellow breakfast corner the morning after the banquet. On one table, residents with an interest in Neurocritical care, met with fellows and attendings in Neurocritical care programs for advice regarding the fellowship application process and how to choose a program. At a second table, Neurocritical care fellows had the opportunity to ask questions of freshly-minted NICU attendings to get advice regarding the job search process. We also had an RFC happy hour where trainee members were invited to socialize with each other in a less formal setting.

For the first time at NCS, we co-hosted the Professionalism and Leadership workshop, created by Lori Shutter. During this session, expert NCS members discussed various leadership topics including: interviewing tips, contract negotiation, navigating difficult situations, successful promotion and work-life balance. We are excited to announce that this session will be conducted in conjunction with the Research Mentorship Program for the NCS 2017 meeting.

We have a number of very exciting projects on the horizon as well. We were very pleased to announce our new mentorship program. Residents and fellows can apply to work with some of NCS attendings across the country on a small project of interest while getting invaluable career advice. We will be collaborating with the Women in Neurocritical Care Committee to sponsor mentorship-oriented lunches at future NCS meetings as well.

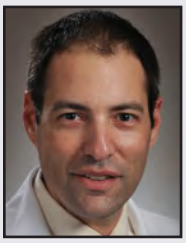
We are also creating a new Neurocritical care pocket guide! In conjunction with the Educational Products Committee, we will be creating a pocket guide for trainees, emergency medicine and general critical care practitioners covering the diagnosis and management of common Neurocritical care illnesses. Each chapter will be co-written by trainees with editorial guidance from senior NCS members. We expect the pocket guide to be released in Spring 2017!

In conclusion, NCS 2016 was an exciting time for the RFC. There were a lot of new trainee events, new faces, new projects on the horizon. We look forward to a terrific year ahead, and look forward to increasing trainee involvement in the Neurocritical Care Society.

INTRODUCING THE NCS PODCAST

James E. Siegler, MD and Joshua M. Levine, MD

James E. Siegler, MD



Joshua M. Levine, MD

As a healthcare provider, when I am not evaluating patients, I am either writing progress notes, putting time into my research, or trying to build a fund of knowledge required of my medical profession. To accomplish the latter, like many of my colleagues, I am constantly perusing UpToDate or the latest publication from high impact medical journals like *Neurology, Continuum, The Lancet Neurology,* and *Neurocritical Care*. It is nearly impossible for most medical professionals to keep up with the evolving and amassing entirety of medical literature, much less these 4 major journals. Even subscribing to a single journal can prove a cumbersome task. So we need to develop an alternative approach to self-directed learning—one perhaps not rooted in our office space, or limited by accessibility to printed manuscripts. We're all on the move, so we need a medium that moves with us.

Neurocritical Care, the official journal of the *Neurocritical Care Society,* has published over 1500 peer-reviewed manuscripts in nearly 90 issues since its inception in 2004. Like other related scientific periodicals, its content is available in print and online to subscribers, and each manuscript can be accessed on your mobile device. But that's not enough. In order to improve its accessibility to subscribers, the *Neurocritical Care Society* has officially planned the release of an audio podcast to be distributed along with its written content. The *NCS Podcast* will feature interviews and commentaries by the Editorial Board of *Neurocritical Care* along with investigators and other authors from around the globe. The abbreviated audio content will take the form of 15-20 minute episodes to be released on a monthly or bimonthly basis. The content will be freely available and accessible on all major podcast platforms (iTunes, TuneIn, Acast, and Stitcher).

Podcasting provides several obvious advantages to the written publications of the *Neurocritical Care Society,* and is ideally suited to supplement this content. The number of podcasts and online blogs which augment the scientific literature has exploded over the last decade, with many successful medical podcasts observing over 100,000 downloads annually. Audio podcasts can provide concise, high-yield clinical information in the form of open discussions with experts in the field, and it can be played at the leisure of the listener during periods where written content may not be as easily accessed. I, for one, am constantly tuned in to a personal collection of audio podcasts while commuting to work, at the gym, in the kitchen, and during periods of travel.

But it's not always easy to find the perfect podcast. In my preliminary search, I've found over 50 unique audio podcasts whose aim is to educate neurologists and trainees. Without a doubt, the most reputable podcasts are those affiliated with medical periodicals like *The Lancet Neurology* and *Neurology,* whose supplemental audio content has been around for several years now. Many of these journal-affiliated podcasts have the added benefit of providing Continuing Medical Education (CME) credit to faculty listeners, and this no doubt has made a strong impact on the volume of listeners. Other medical podcasts not affiliated with peer-reviewed publications, such as *Brain Matters* (a neuroscience podcast developed by the University of Texas at Austin) and *Brain Science* may also provide high-yield clinical content but they require a lot more digging for listeners to find. They also lack much of the peer-review and validation that goes into the production of podcasts affiliated with medical periodicals. For these reasons, the *NCS Podcast* has been designed around the interests of medical professionals committed to neurocritical care and its related disciplines. The *NCS Podcast* should gain immediate traction as a highly vetted, peer-reviewed audio program whose aim is to transmit the mission of the *Neurocritical Care Society* across the airwaves. So stay tuned!

DISCLOSURES

In addition to serving on the production staff for the NCS podcast, James E. Siegler also produces the BrainWaves *audio podcast which provides neurology education to medical trainees.*

"I love my PharmD."

Terrance Kummer, MD, PhD

If you, like me, spent years of training in the hospital before you met an in-the-flesh pharmacist, if the pharmacy to you became either a place to send your patients to have their prescriptions filled on the way out the door, or a basement stronghold from which disembodied medication dosing throw-downs were issued, if your pharmacist's pages (unfairly) felt like yet another threat to your survival when you were already gasping for air on call, then you were probably unprepared, as I was, to meet your critical care pharmacist.

If, when you did meet this person—let's call her Theresa, because I like that name and it happens to belong to my pharmacist—when you met Theresa, you thought "Thanks, but I got this," if you thought that your mastery of ACE inhibitor conversions on the floor had the slightest relevance to the hypertensive emergencies you were about to face in the ICU, if you wondered why Theresa was joining you on rounds, if you puzzled at the careful notes she was taking as you crafted your masterful plans for the day, then you were probably unprepared for the epic schooling that you were about to receive at the hands of your pharmacist.

If you came in the next day suddenly unsure of many things, if on rounds that morning you had a hard time looking Theresa in the eyes, if at every patient's bed you saw for yourself the beneficial effects of Theresa's pharmaceutical superintendence, if you were forced to accept that, were you left to your own devices, bed 8 would have been under-treated while bed 14 would have been over-treated while bed 18, well let's not talk about bed 18, if your fellows and residents never repeated your mistake because they (unlike you) learn quickly from an exceptional and nurturing educator like Theresa, then you were probably starting to come around to the importance of a critical care pharmacist in the Neuro ICU.

If 2 days later you found that your entire team had turned over and no one knew the patients—except Theresa, if your team failed to remember the ICU protocol for the treatment of shivering and Theresa politely reminded you that she wrote that protocol so maybe she could help, if some variant of "I was on the QI committee that studied that problem," or "I published 2 papers and an abstract on that last year," came up more times than you can remember in response to questions from the team, from nurses, and from patients, if later that night a patient crashed (bed 18; why didn't you listen?) and your fellow's text to Theresa about the appropriate dose of TPA was answered in under 30 seconds, then you were probably thinking that critical care pharmacists in the Neuro ICU are kind of…well critical.

If you went to your annual Society meeting prepared to dazzle your colleagues with your latest efforts to make mice find their way out of a wet pool a few seconds faster…only to find Theresa presenting 4 posters and a research seminar relevant to actually helping patients, if you wondered how you might serve your Society and started looking into joining a committee only to discover that Theresa is serving on 5 while chairing another (no joke!) and is on the Board of Directors and is leading courses, well then you might have had a few drinks alone in your hotel room that night and come to the belated conclusion that your field would have a hard time getting along without Theresa's contributions and that of others like her.

If, back on service, you burned yet another bridge with neurosurgery only to have Theresa help you repair it, if she humored you every time you suggested starting salt tabs, if her personality and charisma became a big part of why you looked forward to service time, even if she calls you "Dory" because people's names are hard to remember dammit, if you realized one day that you couldn't imagine taking care of patients without her, and that (though you thought yourself inscrutable) she knew and compensated for your thought patterns so well you'd have to pay her hush money if you ever ran for office, then maybe you finally learned your lesson: critical care pharmacists are an integral part of the Neuro ICU care team.

2nd Unofficial NCS Annual Meeting Soccer (Fútbol) Match Scores a Victory at National Harbor

By Pravin George, MD

This year's Annual Meeting of the Neurocritical Care Society in National Harbor was, as always, very successful and exciting. Not only did it again bring some of the latest results of important recent studies in the field, but it also allowed captain Julian Bösel and the NCS-International fútbol team to rematch captain Dave Seder and the NCS-USA soccer team in the biggest anticipated event in history since Ali v Frasier.

It was a bright and beautiful Thursday afternoon immediately preceding the NCS opening ceremonies; all competitors were transported to the soccer field just a few miles away from the Gaylord National Resort and Convention Center. This year's venue was an actual full soccer field and the turn out of both players and spectators was appreciably larger than the previous contest. Possibly in attendance were soccer champions Lionel Messi and Cristiano Ronaldo who along with Jose Suarez commented during the widely televised game. Returning from the US side were greats such as J Javier Provencio, Kevin Sheth, David Seder and in a surprise move, Susanne Muehlschlegel who last year played for the International Team. The International team, not to be outdone again this year, amassed a star-studded line up with Ivan Rocha Ferreira da Silva, Yasuhiro Kuroda, Han Jeong and Professor Hitoshi Kobata from Japan, who bought an NCS aloha shirt at the meeting just to have something in red. Professional referee Fernando Yuste took time from his multimodal neuro-monitoring to blow the first whistle and the battle started.

The US team, in similar form to last year, started off strong with some of the most experienced and seasoned individuals such as Rich Riker, moving the ball tactfully from the defensive-end, holding the international team to only one goal the entire first half. Surprising the International team offensively were the new additions to the US team, Andrea Blanchette and Paul Gomez from Portland, Maine. Playing both long and short passes, it did not take the US team long to score their first three unanswered goals. Professor Kobata put on an amazing fight for the International team, risking just about anything, with little regard for age or fitness and was simply samurai-like.

In the second half, similarly to last year, Pedro Kurtz from Brazil jump-started the International team offense, scoring a goal and starting the counterattack by combining Brazilian technique and keeping the team in order by being a true number 7. The International team dominated the second half offensively, taking several shots at the US goaltender, Pravin George who made several memorable saves, but allowed enough goals to tie. Then, with less than two minutes left, the International team scored a tie-breaking goal. Kevin Sheth, disheartened by this fought even more fiercely and sacrificed his body in a huge offensive move, which incidentally tore his leg and subsequently ended the game.

Despite the foot pain, muscular tears, head trauma and neurons lost, the pace remained fast and the players kept running with the ball. The referee blew the final triple whistle announcing the victory (and redemption) of the International-NCS team 4-3. Overall, the atmosphere of the day was again full of energy, fun, jokes and laughs. The International and US teams promise to battle it out again next year in Hawaii, possibly even on the beach. Join us next year to be part of this new tradition of the NCS meeting!

Currents Journal Watch

By: Aimee Aysenne, MD/MPH and Chitra Venkatasubramanian MBBS, MD, MSc.

Aimee Aysenne, MD/MPH

Chitra Venkatasubramanian MBBS, MD, MSc.

Welcome to Journal Watch! Recent publications advancing the practice of Neurocritical care include 2 international multicenter, randomized control trials: RESCUE ICP and MISTIE. We invite you to check out the NEWS on the NCS website for more information about these and other studies. As always, feel free to email us your comments and feedback!

Rescue decompressive craniectomy is lifesaving in severe TBI.

P.J. Hutchinson, et al., for the RESCUE-ICP Trial Collaborators* NEJM, 2016, 375, 1119-1130.

RESCUE-ICP is an international multicenter randomized trial comparing decompressive craniectomy (DC) versus medical management for refractory intracranial hypertension after traumatic brain injury (TBI). Patients were enrolled if they had ICP > 25 mm Hg for 1-12 hours despite a stepwise approach to medical management. The surgical arm underwent either a large unilateral frontotemporal DC or bifrontal craniectomy within 4-6 hours after randomization. The medical arm continued medical management with option to add barbiturates. Crossover was allowed at the discretion of the treating clinician if there was further deterioration. The primary outcome was extended Glasgow outcome scale (GOS-E) at 6 months. Poor outcome was defined as death, vegetative state or lower severe disability (i.e. dependent at home and outside). Secondary outcomes were GOS-E at 12 and 24 months, mortality and quality of life at 6, 12 and 24 months using the SF Health Survey, GCS at hospital discharge, assessment of ICP control, SAE's, time spent in ICU, time to hospital discharge and economic evaluation.

409 patients were recruited from 52 centers in 20 countries; 206 were assigned to surgical and 202 to medical arm. There was no significant difference in the medical management of ICP between groups. Crossover occurred in 37.2% of the medical arm whereas 9% in the surgical group received barbiturates. DC significantly reduced mortality (48.9% to 26.9%) but it resulted in higher rates of disability (30.3% versus 16.5%). There was no difference in good outcomes at 6 months, whereas at 12 months, the surgical group had higher rates of good outcomes (45.4% Vs. 32.4%, p=0.01). The surgical group also had better ICP control, shorter ICU stay, but had more adverse events. In a pre-specified subgroup analysis, benefit of DC for favorable outcome was better for patients < 40 years than for those > 40 years.

Commentary:

The RESCUE-ICP trial provides Class 1 evidence for using last tier decompressive craniectomy as a life saving intervention for refractory intracranial hypertension in severe TBI. Rescue decompressive craniectomy significantly reduced mortality (absolute reduction 22%) but left more patients dependent at 6 months. Interestingly, at 12 months, DC patients continued improving and 45% were independent at least at home versus 32.4% in the medical group. The 37% cross over rate from the medical arm underscores that maximal medical therapy is often not enough to control ICP, but may have also diluted the impact of DC. The inclusion of patients with refractory ICP, defined as > 25 mm Hg for > 1 hour after exhausting usual medical therapies increases the generalizability and applicability of the study results to real world scenarios unlike in the DECRA (Decompressive Craniectomy) trial where ICP had to be only > 20 mm Hg for 15 min before performing early DC. A life saving procedure is not always to be equated with a return to normal functioning. Quality of life is an individual determination and our discussions with families should take that into account while making life saving (but not always functionality improving) decisions.

Minimally invasive surgery + alteplase is safe in ICH and possibly improves 180 day functional outcome.

Daniel F Hanley, et al for the MISTIE Investigators. Lancet Neurol 2016; 15: 1228–37

MISTIE was an international, multicenter NIH funded open label phase 2 trial. The aim of the study was to test whether minimally invasive surgery (MIS) followed by alteplase was safe, and improved functional outcome. Patients who were 18-80 years of age with a spontaneous non traumatic supratentorial ICH of ≥ 20 ml that remained stable for ≥ 6 hours, with a GCS of ≤ 14 or NIHSS of ≥ 6 and a baseline mRS of 0 or 1 were included. Patients were allocated within 48 hours of onset to MIS + alteplase or standard medical care with AHA guidelines for ICH management. The first stage of MISTIE (i.e. dose finding stage), 0.3 mg and 1 mg doses of alteplase were tested. In the second stage, the 1 mg dose was used. Surgery involved aspiration of clot followed by placement of a soft catheter into the residual hematoma connected to a closed drainage system After ≥ 3 hours, intraclot alteplase was administered via the catheter every 8 hours for up to 9 doses. The system was closed for 1 hour to allow drug-clot interaction and then reopened. CT's were done every 24 hours until dosing was complete. Surgical endpoints were a) reduction of clot to 20% of stability CT volume b) 15 ml or less residual clot or c) occurrence of a clinically significant re-bleeding event. Primary outcomes were all safety outcomes: 30 day mortality, 7 day procedure related mortality, 30 day bacterial brain infection and symptomatic bleeding within 72 hours after the last dose. Pre-specified safety thresholds to ensure there was no difference between treatments were: 70% 30-day mortality, 35% symptomatic re-bleed and 15% infection rate. Secondary outcomes were clot size difference at end of treatment and its effect on functional outcome.

Fifty-four patients had MIS and 42 had medical management. Delayed open craniotomy occurred in 4 medical and 1 MIS patient. The MIS and medical groups were well balanced. 15% of MIS group had surgical endpoint without alteplase. Mean reduction in ICH size was 57% in MIS group vs. 5% in medical group for a mean difference of 21 ml. There were more patients with mRS score of ≤ 3 at 180 days in the MIS group than in the medical group (33% vs. 21%). No significant difference was seen at 365 days. Despite meeting all safety thresholds, the MIS group had a non-significant increase in symptomatic bleeds and a significant increase in asymptomatic bleeds (22% vs. 7%, p=0.05). There was no difference in survival or days spent in ICU but the MIS patients returned home faster (51 days vs. 89 days, p=0.03).

Commentary:

MISTIE is the first randomized trial showing the safety of a minimally invasive approach + alteplase for spontaneous ICH. There are certainly limitations from this small phase 2 clinical trials, and MISTIE-3, a 500 patient randomized trial testing the generalizability of the MIS procedure, stabilization protocol and its impact on functional outcome, is underway.

PRECISION NEUROCRITICAL CARE : THROMBOELASTOGRAPHY

By Fawaz Al-Mufti, MD & Christopher Zammit, MD

Fawaz Al-Mufti, MD

Christopher Zammit, MD

The authors have no actual or potential conflict of interest in relation to the topics discussed in this column. This article may discuss non-FDA approved devices and "off-label" uses. The NCS and Currents do not endorse any particular device.

Thromboelastography (TEG®) and rotational thromboelastogram (ROTEM®) are commercially available viscoelastic hemostatic assays (VHAs) that provides insight into the global visco-elastic properties of whole blood clot formation under low shear stress. Since VHAs are performed on whole blood samples, they measure many components of hemostasis (cellular, humoral, and fibrinolytic), thus identifying both hypocoagulable and hypercoagulable states and have been/ are being used to facilitate targeted transfusion strategies in trauma resuscitation, cardiothoracic surgery, and peri-liver transplant. As opposed to the traditional tests of coagulation, such as the prothrombin time (PT) and partial thromboplastin time (PTT) which are performed on platelet-poor serum, VHAs provide insight into the interaction of platelets with the coagulation cascade (aggregation, clot strengthening, fibrin cross linking and fibrinolysis) are numerous time points during clot formation and dissolution.

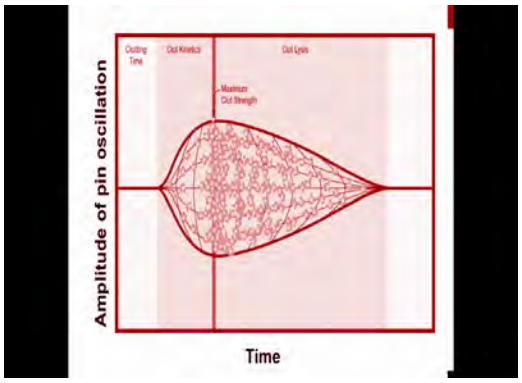
The VHA quantify and illustrate the mechanical resistance between whole blood clotting in a small cup and a pin that is suspended in the cup while either the cup (TEG®) or pin (ROTEM®) twists back and forth. The greater the torque or resistance on the pin, the greater the strength of the clot. As opposed to the PT and PTT, the test is not concluded when the clot has formed; the assay continues to run, demonstrating the inherent fibrinolytic characteristics of the sample.

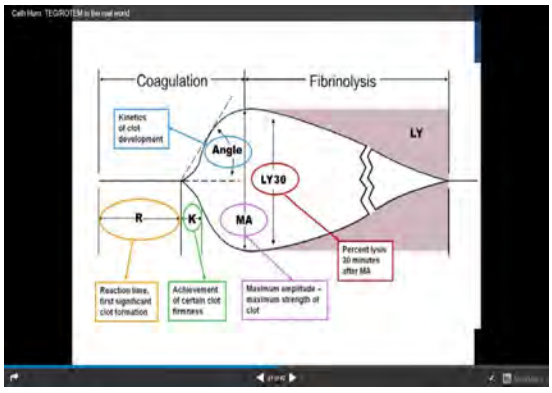
VHAs are largely point of care tests, and thus provide actionably information within 10 minutes of initiation. The entire assay takes 60-120 minutes to run. The tracing that is generated can be observed in real time remotely with the (TEG®) system. Drawbacks to the VHA include the need for calibration 2-3 times daily by trained personnel less making it susceptible to technical variations, the need for pipetting of reagents, and the sensitivity of the machines to motion and vibration. Newer generations of VHAs are in development that hope to overcome these limitations.

As a functional test of clot formation and lysis, it is conceptually well-suited to monitor the progress or resolution of coagulopathy after injury hence TEG has been used to predict the need for as well as guidance of transfusion strategies (see tables for examples).

Studies show cost-effectiveness and reduction in blood products in liver transplantation and cardiac surgery but it may also be useful in trauma (to reduce blood product use) and in the early detection of dilutional coagulopathy and injury induced hyperfibrinolysis. Results may be difficult to interpret in patients receiving LMWH, aspirin, anemia, following the use of fibrinolytics as well as those who are hypercoagulable or are post cardiac bypass.

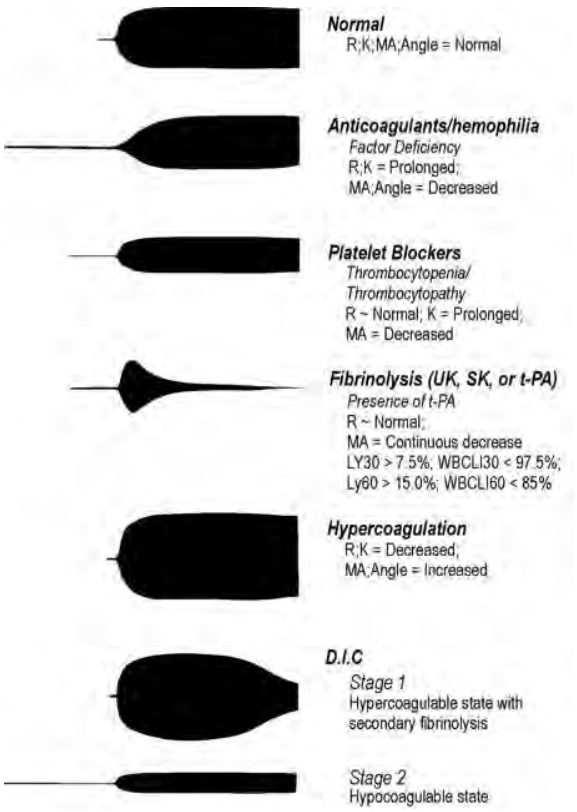
NORMAL TEG PHASE AND TERMINOLOGY





R value [Reaction time](s)	Time of latency from start of test to initial fibrin formation (amplitude of 2mm); i.e. initiation
K [Kinetics](s)	Time taken to achieve a certain level of clot strength (amplitude of 20mm); i.e. amplification
Alpha angle (Slope Between R and K)	Measures the speed at which fibrin build up and cross linking takes place, hence assesses the rate of clot formation; i.e. thrombin burst
TMA	Time to maximum amplitude(s)
MA [Maximum Amplitude](mm)	Represents the ultimate strength of the fibrin clot; i.e. overall stability of the clot
A30 or LY30	Amplitude at 30 minutes; percentage decrease in amplitude at 30 minutes post-MA and gives measure of degree of fibrinolysis
CLT	Clot lysis time (s)

TEG AS A GUIDE TO TREATMENT



THROMBOELASTOGRAPHY-GUIDED TRANSFUSION PARAMETERS

r-TEG parameter	Normal range	Transfusion trigger
TEG-ACT	78-110 seconds	>120 seconds (FFP)
Alpha angle	66°-82°	<66° (cryoprecipitate)
K value	30-120 seconds	>120 seconds (cryoprecipitate)
MA (maximum amplitude)	54-72 mm	<54 mm (platelets)
G value	5.3-12.4 dynes/second	<5.3 dynes/second*
LY-30 (lysis at 30 min)	0-8 percent	>8 percent¶

Stahel PF, Moore EE, Schreier SL, et al. Transfusion strategies in postinjury coagulopathy. Curr Opin Anaesthesiol 2009; 22:289

Despite the potential for expanded use, the use of TEG in the Neuro-ICU is limited and remains largely investigational.

TEG may provide valuable information in traumatic brain injury (TBI), subarachnoid hemorrhage (SAH), intracerebral hemorrhage (ICH), and acute ischemic stroke (AIS).

Trials examining the role of TEG in ICH, demonstrated a potential role in predicting hematoma expansion. With subarachnoid hemorrhage, TEG may help identify patients who are hypercoagulable (with significant increase in MA) or prone to aneurysm re-rupture. There maybe a role in prognostication following TBI or providing a therapeutic target in the mitigation of contusion expansion. In acute ischemic strokes, TEG may be useful in future studies to determine patients who will be aspirin non responders, orprone to thrombolytic resistance or complications.

Despite having been developed in 1948, data regarding its application in the Neuro-ICU remains preliminary. Ranges of normal values and therapeutic strategies have not yet been elucidated. TEG has the potential to revolutionize the management of thrombosis and hemostasis in Neurocritical care, however further information is necessary to determine the role that TEG will ultimately have in the clinical care of NCC patients.

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http://www.surgicalcriticalcare.net/Guidelines/TEG%202014.pdf

Neurocritical Care at Thomas Jefferson University Hospitals

By Fred Rincon, MD, MSc, FACP, FCCP, FCCM, FNCS

The Jefferson's Neuroscience Network leads the way in caring for the critically-ill neurological patients in Philadelphia and the Delaware Valley. A total of three Neuro-ICUs provide state of the art care of critically-ill neurological patients through multidisciplinary work. The Jefferson Hospital for Neuroscience (JHN) is the only dedicated hospital for neurological patients in the region. At JHN we treat the largest combined volume of patients with tumors, strokes, ICHs, aneurysms, and AVMs in the Philadelphia region. The JHN operates a combined 26-bed Neuro ICU, and a separate 20-bed Stroke Unit. Additionally, a 14-bed Neuro ICU operates in the main hospital or Gibbon Pavilion, where other critically-ill neurological patients are primarily managed.

The whole Neuro ICU program is led by two authorities in the fields of Neurocritical Care and Neurosurgical Critical Care: Rodney Bell, MD and Jack Jallo, MD, PhD. The clinical excellence, high volume, and quality of human resources have helped to attract more highly qualified professionals. Over the last 6 years, the program has grown to include a total of 9 neurointensivists that operate in a semi-closed model. Nine board-certified neurointensivists, two additional vascular neurologists, and two endovascular neurosurgeons support to the daily operation of the Neuro ICUs, providing a true multidisciplinary approach to the high complexity of neurological illness. Daily work rounds start at 6AM with house staff and fellows, and multidisciplinary rounds then take place between 9AM and 12PM. The Neuro ICU's daily operation is also supported by the work of several nurse practitioners and the excellent Neurocritical care nursing staff (see above).

Unique features to the practice of Neurocritical Care (NCC) at Thomas Jefferson University Hospitals (TJUH) are the use of modern technology applied to critical care such as: targeted temperature management, brain tissue oxygenation, point of care ultrasound, fiber optic bronchoscopy and laryngoscopy, and semi-invasive and non-invasive hemodynamic monitoring. Neuro ICUs at TJUH are backed-up by a 365, 24-hour, seven days a week, neurointensivist presence in all ICUs. Three neurointensivists provide 12-hour physical presence in all Neuro ICUs with a 12-hour tele-medicine robotic support during nights. The development of robotic tele-presence in the Neuro ICU allows the neurointensivists to provide a unique opportunity for identification of situations that require immediate attention. In addition, our NCC program extends the skills of general intensivists at our affiliates via our Tele-Neurocritical Care program. In addition to supporting the full NICU operation at TJUH and its affiliates, Jefferson neurointensivists also participate in the Jefferson Expert Teleconsulting (JET) program. JET is the first university-based mobile robotic tele-consulting system in the Delaware area, allowing Jefferson professionals evaluate time-sensitive Neurocritical diseases, like stroke, in real time, efficiently, and without delay.

Over the last 6 years, Thomas Jefferson University has offered and sponsored CME activities in the field of NCC. Over 5 iterations of a yearly NCC Symposium have demonstrated the ongoing need for physician and nursing education in the field. Recently, the faculty at Jefferson Neurocritical Care organized the successful 6th International Hypothermia Symposium where world experts in the field of temperature management from 16 different countries converged to discuss the current state of TTM in the field (see below).

A Neurocritical Care fellowship endorsed by the United Council of Neurological Subspecialties (UCNS) is currently available at TJUH. Every year, three positions are offered in combination with an ACGME accredited Vascular Neurology fellowship. Fellows are being trained in invasive procedures such as: central venous access, PAC insertion, airway and ventilator management; closed thoracostomies and thoracenthesis; management and interpretation of lumbar and ventricular drains, brain oxygen monitors; trans-cranial Doppler technology and Focused Cardiac Ultrasound (FOCUS®); fiber optic bronchoscopy and laryngoscopy; and non-invasive cardiac output monitoring; as well as interpretation of continuous EEG and conventional CT/MRI technologies. In addition to their expected time in the Neuro ICUs, fellows rotate in the CCU, MICU and SICU, and become experienced in the use of advanced sedation techniques. A fully functional simulation lab at TJU provides pre-clinical training in airway management, ACLS protocols, and bronchoscopy. Additional areas of training during the fellowship

are administration, research conduct, and Bioethics with emphasis on end-of-life issues. The current structure of the Jefferson Neurocritical Care fellowship will prepare individuals for a true career in Neurocritical Care (see right).

In summary, the practice of Neurocritical Care at Jefferson is solid. The presence of multiple schools of thought, excellent human assets, and the availability of modern technology, makes this Neuro ICU model a great environment to work at. A true multidisciplinary approach has facilitated the communication between specialists, reflecting better resource utilization, and patient satisfaction.

Job Opportunities

(as of September 29, 2016)

For full details on all available positions including position descriptions, applicant requirements and further contact information, visit our website at http://www.neurocriticalcare.org/Membership/Member-Resources/Career-Center/Career-Opportunities

Arizona

Neurocritical Care Physician – Honor Health
For more information or to apply, please contact: Joan Kilmartin Email: Joan.kilmartin@HonorHealth.com or call 602-882-4463

Arkansas

Neurointensivist, Vascular Neurologist - University Of Arkansas for Medical Sciences
Contact: Benedict Tan, MD, Director of Neurocritical Care at UAMS btan@uams.edu
or Lee Archer, MD, Interim Chairman, Department of Neurology at UAMS ArcherRobertL@uams.edu

California

Vascular Neurologist, Neurocritical Care Neurologist and Neurohospitalist – Mercy Medical Group
For more information, please contact providers@dignityhealth.org or see http://www.dignityhealth.org/physician-careers

Junior Faculty Neurocritical Care position - Cedars-Sinai Medical Center
If you are interested in this opportunity to join an expanding Neurocritical care team in a vibrant clinical and research environment, please send your CV, and statement of strategic vision to: NeuroICU Director, Dr. Axel Rosengart, c/o Academic.Recruiting@cshs.org

Neurointensivist – Loma Linda University
Please send your CV to: Mike Unterseher – Director of Physician Recruitment / 800-328-1163 recruitMD@llu.edu

Colorado

Neurocritical Care Neurologist - National Jewish Health
Interested candidates should send their CV to: Monica Kiger, Physician Recruiter kigerm@njhealth.org

Connecticut

BC/BE Neurologist - Hartford Healthcare
To apply, please contat patti.lowicki@hhchealth.org and visit www.joinhartfordhealthcare.com for even more information about Hartford HealthCare and living and working in our region.

Neurointensivist - Yale Medical School and Yale-New Haven Hospital
Interested candidates should send a CV and brief statement of interest to Kevin Sheth, MD, Chief, Neurocritical Care by email at kevin.sheth@yale.edu. Review of applications will begin immediately and continue until the position is filled.

Delaware

Neurointensivist - Christiana Care Health System
For additional details visit our website at www.christianacare.org. For consideration, send your CV and cover letter to Valerie Dechant, MD, Medical Director Neurocritical Care and Acute Neurology at vdechant@christianacare.org.

Florida

Neurointensivist - Baptist Hospital and South Florida Pulmonary and Critical Care
Applicants should submit curriculum vitae to: Karel Fuentes, M.D. karelf@baptisthealth.net

Neurointensivists - Memorial Healthcare System
Apply Here

Illinois

Neurointensivist - Southern Illinois University School of Medicine
For additional information, please contact, Sheila Bixler with Jordan Search Consultants at 636-294-6082 or Sbixler@jordansc.com.

Maryland

Neurocritical Care Nurse Practitioner/Physician Assistant - The University of Maryland Medical Center (UMMC) Neurocritical Care Unit (NCCU).
To learn more about this amazing opportunity please Rachel Hausladen at rhausladen@umm.edu.

Massachusetts

Advanced Practitioner NP - Lahey Health
Please forward resume to: Nathaly Insixiengmay / Nathaly.Insixiengmay@Lahey.org

Neurosciences Critical Care Advanced Practitioner - Baystate Health
For more information, please visit www.choosebaystatehealth.org/nccap/nccs or contact Kristin Richard, Sr. Recruiter Telephone: 413-794-7847 Email: Kristin.Richard@baystatehealth.org

Missouri

Neurocritical Care (1), Stroke (1) - Saint Louis Univ
Applicants should inquire with curriculum vitae to: Sean Goretzke, MD, Interim Chairman, Department of Neurology, Saint Louis University, c/o Stacie Thebeau, thebeasl@slu.edu

New York

Neurocritical care physician - Westchester Medical Center
Interested candidate should send curriculum vitae, along with a letter of interests by email to; physiciancareers@wmchealth.org or for more information, contact Allen Kram, Director of Physician Recruitment for WMCHealth at: (914) 909-6756

BC/BE Neurologists - Rochester Regional Health's Neuroscience Service Line
Apply Here: http://www.Click2apply.net/526mgdmbp3

Vascular Neurologist, Assist/Assoc Prof Level - Upstate University Hospital/Upstate Medical University
Contact Information: Julius Gene S Latorre, MD MPH / Clinical Office: 315-464-4243 / Administrative Office: 315-464-5014 email: latorrej@upstate.edu

North Carolina

Neurocritical Care Physician - Wake Forest Baptist Health Center
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Neurointensivist - Oregon Health & Science University OHSU
For additional information, please contact Dr. Koerner at **korneri@ohsu.edu**

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Neurointensivist - UTHSCSA
Contact Rachel Garvin, M.D., Division Chief of Neurocritical Care E-mail: garvinr@ut***hscsa.edu***

Registered Nurse (RN) – Intensive Care Unit (ICU) - HCA North Texas Division Mutiliple Locations
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Utah

Neuro-Critical Care Physician - Intermountain Medical Group Dixie Regional Medical Center
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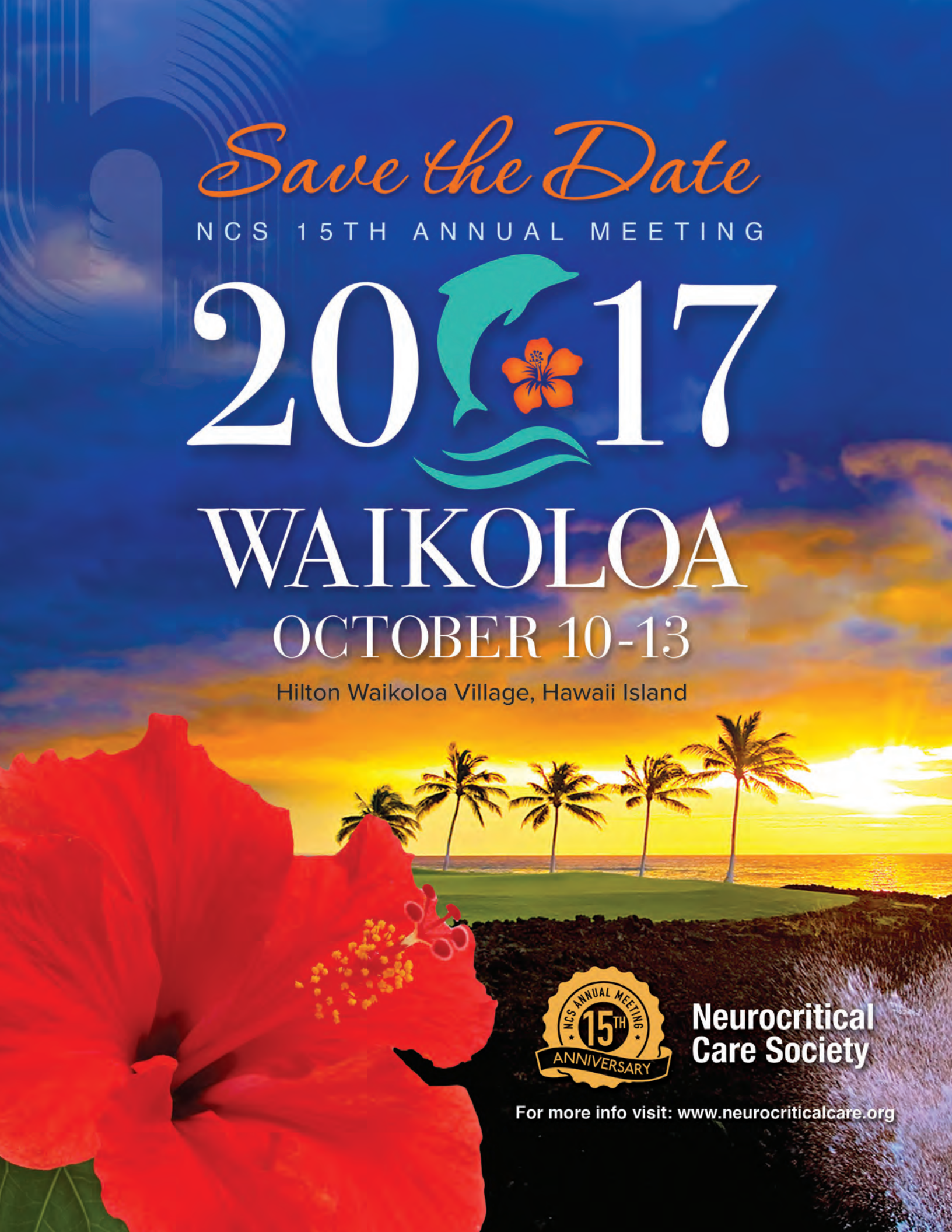
Virginia

Neurointensivist - Inova Fairfax Medical Center (IFMC)
Contact: Stephanie Woodley
stephanie.woodley@inova.org

Wisconsin

BC/BE Neurologist - Marshfield Clinic
Contact: LaVonne Krasselt, Physician Recruiter, **krasselt.lavonne@marshfieldclinic.org**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