IN THIS ISSUE:

Note from the Editor .......................................................... P. 2
By Matthew Koenig, MD

President’s Column ........................................................... P. 3
By J. Claude Hemphill III, MD

NCS Research Training Fellowship ................................. P. 4
By Jose Suarez, MD

Annual Meeting Scientific Sessions ............................... P. 5
By Kevin Sheth, MD

Fun Things to Do in Seattle .............................................. P. 6-7
By Kyra Becker, MD

Annual Meeting Social Calendar ................................... P. 8
By Arash Afshinnik, MD

Making the Transition to Fellowship ............................. P. 9
By Saei Izy, MD

NCS Members Set Sail .................................................... P. 10
By Cherylee Chang, MD

First NCS Annual Meeting Fun Run ............................. P. 11
By Jennifer Robinson, ACNP

Connect with NCS in Social Media ............................... P. 12
By Aarti Sarwal, MD

Single-Year Neurocritical Care Fellowships .................... P. 13
By Paul Vespa, MD

Barbiturates and Palliative Care .................................. P. 14
By Jessica McFarlin, MD

SET POINT Tracheostomy Trial ................................. P. 15
By Robert Kowalski, MD

Anti-NMDA Receptor Encephalitis .............................. P. 16
By Mehrnaz Pajoumand, PharmD

Advocacy Committee Upcoming Goals ......................... P. 17
By Sarah Livesay, APRN

Bedside Continuity of Care for Nurses ......................... P. 18
By R. Kelsey Halbert, RN

Neurocritical Care in Japan ........................................ P. 19
By Masao Nagayama, MD

Neurocritical Care News Briefs .................................. P. 20
By Michel Torbey, MD

Coming Up in Neurocritical Care ................................ P. 21
By Eelco Wijdicks, MD

Journal Watch ................................................................. P. 22-23
By Susanne Muehlschlegel, MD

Tech Corner ................................................................. P. 23
By Susanne Muehlschlegel, MD

Oklahoma University Neuro ICU .............................. P. 24-25
By Ryan Hakimi, MD

Classified Section ........................................................... P. 26
Note From the Editor

Colleagues:

I want to welcome you to the NCS Annual Meeting issue of *Currents*, the official quarterly news magazine of the NCS. For those of you attending the meeting, once again *Currents* will be printed in full color glossy format and distributed to all registered attendees along with the registration package. For those NCS members not fortunate enough to attend the Annual Meeting – and meeting attendees who prefer the on-line format – it will also be available on-line in the e-magazine format and as a downloadable pdf file. Either way, I hope you enjoy this issue of *Currents*.

This year, the NCS is celebrating the twelfth anniversary of our Annual Meeting. The first NCS annual meeting was held in Phoenix, AZ in 2003 and we will be returning to Arizona next year for lucky number 13. Not surprisingly, this issue of *Currents* focuses on activities programmed during the Annual Meeting – educational, social, and scientific. I had the privilege of serving on the Annual Meeting Planning Committee this time around, so I can personally attest to the amount of volunteer work put in by a large and dedicated group of NCS members to plan the scientific and educational programs, social events, fundraising, line up speakers, etc.

A feature article by Kevin Sheth, MD in this issue discusses the scientific sessions of the Annual Meeting and contains valuable information about the new electronic format poster sessions this year. Check out Kevin’s article for the details and instructions for how to attend the professor-led poster sessions or access posters electronically. Also new this year will be a session of late breaking abstracts. These abstracts really will be hot off the press because – as of this writing – they are in the process of being selected.

Another really valuable supplement to the Annual Meeting program contained in this issue of *Currents* is the two-page spread of fun activities to do in Seattle outside of the meeting program. Every year, *Currents* has included an article written by an NCS member who resides in the host city. I wrote the first one for the Baltimore meeting way back in 2007. Maybe one day, I’ll get to write one for Honolulu (hint, hint). This year, Kyra Becker from the University of Washington – Harborview Medical Center wrote a fantastic survey of outdoor activities, tourist destinations, restaurants, bars, and obscurities for meeting attendees with diverse interests. Reading her article got me psyched to check out some new sights in Seattle this year.

Sticking with the social calendar, check out Arash Afshinnik’s overview of the social events planned during the Annual Meeting, including a music-themed banquet at the Experience Music Project Museum and a pub crawl through Pioneer Square. The Annual Meeting will also host some healthy activities for a change, including a 5K fun run on Saturday morning. Don’t worry – it’s not the morning after the banquet or the pub crawl.

In non-Annual Meeting related news, the NCS also announces the application process for the first Neurocritical Care Research Training Fellowship in this issue. This NCS-sponsored research training grant aims to help support mentored research by a junior investigator in neurocritical care-related areas.

I also want to introduce a new editor for the Fellow’s Corner column. Since our prior editors have all had a bad habit of graduating, we needed to bring in some fresh blood. In this issue, Saef Izzy, MD, a first-year neurocritical care fellow at Massachusetts General Hospital and Brigham and Women’s Hospital takes his maiden voyage into NCS journalism.

I hope you enjoy this issue. As always, if you have suggestions on improving *Currents* or want to contribute, please email me at mkoenig95@gmail.com. I’m also on the lookout for future *Currents* cover 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 graciously submitted by Andy Shirley, ACNP, a neurocritical care nurse practitioner at the Queen’s Medical Center in Honolulu, HI. The photo was taken on the North Shore of Oahu at sunset. For more of Andy’s amazing photography, check out his website at [http://www.andyshirleyphotography.com](http://www.andyshirleyphotography.com)

Cheers,

Matthew Koenig, MD, FNCS
Editor-in-Chief
The Future of Neurocritical Care
By J. Claude Hemphill III, MD, MAS, FNCS

A couple of months ago, I was interviewing candidates for neurocritical care fellowships. When I inquired if they had any additional questions, several asked the same thing: “You’re the President of the NCS. What do you think is important for the future of neurocritical care?” In truth, I have been thinking about this for the past two decades, ever since I started my neurocritical care fellowship in 1994.

Back then the questions were different: What is a neurointensivist? Will hospitals buy-in to the value of neurocritical care? Why do you need neurocritical care given that there is no treatment for stroke and not even guidelines for the management of traumatic brain injury? Clearly the future for neurocritical care was bright back then, even if we did not fully realize it. I figured that I owed the current fellowship applicants and myself a thoughtful answer about where we are going from here.

It has been a singular privilege and pleasure to serve as your President and, as of the Seattle Annual Meeting, I will be stepping down and assuming the role of Immediate Past-President. From the genesis of the society, the NCS has been distinguished by the passion, clarity of vision, and ability of its members to bring forth new initiatives. A few years ago, I was talking to Cheryl Chang, our third president, and I told her that I felt a little like John Quincy Adams (remember him, the sixth President of the United States). The NCS founding “fathers” had left their indelible mark and had launched the society on a strong course forward.

The question we had in 2001 was whether a Neurocritical Care Society was needed and could be successful. Question answered. Now, the NCS is at a different stage and the task in some ways is more daunting and less flashy: maintain and expand the society while meeting our Vision and Mission Statements, and to make sure that we continue to work in a multidisciplinary and collaborative way, avoiding concerns of personal or small group self-interest. No Andrew Jackson or Civil War, please.

So what is the future of neurocritical care? The past 20 years or so has been about developing the science, education, and training of the field. I believe that several distinct areas will be of high importance to the future and the NCS should be the leader.

1. **Informatics:** This is not about data mining. It’s about understanding and exporting expertise. Neuromonitoring is central to neurocritical care and informatics is the way we use the data. I believe that this, even more than new pharmaceuticals and devices, will be the major scientific advance for neurocritical care in the next 20 years.

2. **International:** This means worldwide. Not U.S., not Europe, not South America, not Asia. Everywhere. Neurocritical care delivery may be different around the globe, but the need for standards, education, and collaboration in research, teaching, and training is uniform. Our shared vision is more substantial than our differences.

3. **Value:** Cost is how much we pay for something. Value is what we care about. The NCS must play a central role in ensuring that neurocritical care is value-added and articulating this to patients, families, hospitals, payers, and regulatory agencies. This applies to quaternary care referral hospitals in urban U.S. cities and rural clinics in developing nations.

There are forces against us. In the U.S. especially, there are complicated turf battles across some societies that threaten to undermine quality and collaboration. Money is at the root of much of this. Regulatory agencies are making policy decisions about paying for clinical services and funding of research that undermine development. The absence of “Level 1” evidence still drives some into nihilism. But none of this is really new.

The fact that the NCS is inherently multidisciplinary and does not represent solely a single physician, nursing, or other group places the society in a unique position to advocate for the field as a whole. But we have to ensure that we see ourselves as a cohesive group arising from many different individual areas of interest.

Winston Churchill said that “history is written by the victors.” Well, it is wonderful to be able to reflect back on the past twenty years of neurocritical care and know that we won. We did not beat anyone else (and this is not our ethos), but rather we were victorious in developing and organizing a field which has demonstrated need and value. Many of these efforts came through the NCS but many others deserve great credit in other societies and institutions throughout the world. As I look out and see the selfless passionate energy of the multidisciplinary membership of the NCS, I am confident about the future of neurocritical care. Thank you.

J. Claude Hemphill III, MD, MAS, FNCS
President, Neurocritical Care Society
The NCS is pleased to announce a research training fellowship for physicians, nurses, pharmacists, and other neurocritical care providers. This program was envisioned due to the high demand for clinical services, struggle for departmental support, and difficulty establishing mentorship relationships for young practitioners that makes the pursuit of research careers difficult. The direct goal of this program is to foster the development of close mentorship ties, protection of research time, pursuit of research training, and generation of preliminary data necessary to apply for additional scientist development training grants.

This program is, therefore, aimed at promising applicants who are seeking a career in clinical or translational research in neurocritical care and ultimately wish to become independent investigators. Unlike longer training programs, this program is focused on identifying a single year that will allow the time and support to compete effectively for longer training opportunities. It is expected that, at the end of the project, the trainee will be in the process of submitting applications for national, peer-reviewed funding mechanisms to continue the research and research training.

NCS has the stated mission to foster clinical, experimental, and outcomes research focused on developing innovative and cost-effective medical and surgical interventions for acute neurological disorders. Although any research pertaining to acute central nervous system injuries or critical care will be considered, special weight will be given to projects that relate directly to issues important to patients with neurological critical illness.

Eligibility
For the purpose of this fellowship, research is defined as patient-oriented research conducted with human subjects, or translational research specifically designed to develop treatments or enhance diagnosis of neurocritical care illnesses. These areas of research include epidemiologic or behavioral studies, clinical trials, studies of disease mechanisms, the development of new technologies, and health services and outcomes research.

The applicant must be an NCS member in good standing (regardless of nationality or country of residency) interested in an academic career with independent research funding. The award is available for members in all disciplines (physicians, nurses, pharmacists, PhD researchers, etc.) but is meant for early career individuals (within 5 years of completion of terminal degree or training). For physicians, this is best suited to add a supplemental year to fellowship training before entering the first academic position. For other applicants, this award may more likely be used to remove clinical responsibilities for an existing position.

Award
The fellowship will be awarded to one (1) applicant for one (1) post-graduate year. Although applicants in-training may apply, the award year is not to be used during years of training (fellowship, nursing school, pharmacy residency, etc.). $70,000 of support for the applicant including salary and research +10% indirect cost to the institution will be awarded. The award is not intended to cover all the costs for the fellowship year. It is expected that the sponsoring institution contributes time and additional research/salary support. Supplementation of the stipend with other grants or by the sponsoring institution is permissible, but fellows may not accept other fellowships, similar awards, or have another source of support for more than 50 percent of their salary. The stipend cannot be used to support clinical fellowship, graduate school, or residency training. Funding initiation is flexible to begin from January 1, 2016 to July 1, 2016 depending on the applicant’s situation.

The requirements for the fellowship include:
1) An identified mentor who is an established investigator with independent funding
2) Protected research time by the applicant’s department of at least 75%
3) Career training/development program with specific goals
4) Identified research project
5) Clear evidence of institutional support to cover salary gap and research costs

Application Procedure
In order to limit applicant effort, the applicants are asked to submit a two (2) page letter of intent by January 1, 2015.

The letter should include:
1) A description of the applicant’s goals for a research career and their qualifications for beginning training in research
2) A concise description of the project and a strategy for completing the proposed project
3) Identification of a mentor(s) including the mention of the mentor’s qualifications and area of expertise. A description of how the mentor’s expertise will tie into the project should be included if the mentor’s area of research is dissimilar to the project. Mentors can be located at any institution as long as a clear mentorship plan is outlined.
4) A strategy for transitioning this work to a longer training grant opportunity

A letter of support (one page) from the applicant’s department chair expressing support for the terms of fellowship should accompany the applicant’s letter of intent.

Evaluation and Selection
Letters of intent will be reviewed by a Research Task Force to select applicants who will be invited to submit a full proposal.

Deadline and Address
Letters of intent and supporting letter must be received by midnight (CST) January 1, 2015. Notification to prospective applicants to submit a full proposal will be on or before February 1, 2015. Final funding decisions and notifications will be announced at the 2015 NCS Annual Meeting. All letters must be submitted to the NCS at 5841 Cedar Lake Road, Suite 204, Minneapolis, MN 55416.

For questions, contact members of the NCS Research Task Force: Jose Suarez, MD (jsuarez@bcm.edu), J. Javier Provencio, MD (proven@ccf.org), Michael Diringer, MD (diringerm@neuro.wustl.edu), Susanne Muehlschlegel, MD, MPH (Susanne@muehlsch.de), or J. Claude Hemphill III, MD (chemphill@sfg.ucsf.edu).
Scientific Program at the 2014 NCS Annual Meeting to Offer Several Highlights

By Kevin Sheth, MD

On the heels of a big year in neurocritical care – including another successful research conference and the Neurocritical Care Research Network’s PRINCE Study – several new highlights at the NCS Annual Meeting will uniquely showcase the high quality science that is taking place within our community.

After a successful session one year ago, and in the context of the new NCS Neurocritical Care Research Training Fellowship, the meeting will begin with a focused session for young and aspiring investigators. Unlike the other break-out sessions, this session required an application. Participants will interact with scientific leaders in small group sessions to work through project proposals, identify scientific and career challenges, and to build a support network to maximize success.

The NCS will also highlight dedicated sessions for progesterone in traumatic brain injury and temperature modulation in cardiac arrest, two of the biggest stories of the year. In addition, an exciting Translational Neurocritical Care Science Symposium is scheduled for the afternoon of Friday, September 12. The theme is a comprehensive tour through the most cutting edge work being done in intracerebral hemorrhage. The symposium features international leaders in global epidemiology, genetics, clinical trials, and the immunology of intracerebral hemorrhage. Do not miss this special symposium.

Of course, no meeting would be complete without the exciting science generated by our membership. The NCS has been committed to the dissemination of interactive science that facilitates real time exchange of ideas while minimizing the burden of traditional poster presentations methods.

For the first time, abstract poster presenters will share their results via electronic posters on all three nights of the meeting via flat screen televisions. Each session will be moderated by professors selected to promote lively interaction between presenters and attendees. To further facilitate and continue discussion, attendees will be able to interact with presenters at the electronic poster (e-poster) café located in the exhibit hall.

Our goal is to make the e-poster café the place to preview your poster, meet with a professor, and most importantly to talk science with fellow NCS members. Attendees will also have access to abstracts online through web based viewing, and an interactive app for your devices. While quality continues to improve, our society’s science enjoys broad representation from all professional groups at all levels of experience.

We will continue to offer two prizes, the Outstanding Abstract Award and the Christanne Wijman Young Investigator Award in honor of Dr. Wijman’s commitment to training young scientists and clinician-scientists. For the first time, the Annual Meeting has reserved a limited number of presentations for late breaking abstracts, a forum for compelling, hot-off-the-press data to be disseminated to our membership first.

All of the new improvements are expected to significantly enhance the science program. If you happen to see members of the Science Committee, Marion Buckwalter, Nerissa Ko, Hooman Kamel, Luke James, or Arash Ashfinnik, please be sure to thank them for their tremendous contributions towards this effort.

We hope to see you at the scientific session at the Annual Meeting because your participation is what makes these sessions fun.

Kevin Sheth, MD is chief of the Division of Neurocritical Care and Emergency Neurology at Yale New Haven Hospital. He also programmed the scientific sessions for the NCS Annual Meeting Planning Committee.

E-POSTER SCHEDULE BY CATEGORY

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<th>Kiosk</th>
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<td>Medical issues in the Neuro ICU</td>
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<td>ICU organization and technology</td>
<td>Head and spine trauma/Ischemic stroke/ICU organization and technology</td>
<td>Intracerebral hemorrhage</td>
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<td>5</td>
<td>Temperature management</td>
<td>Ischemic stroke</td>
<td>Disorders of consciousness/Perioperative management/Pediatric Neuro ICU/Muscle and nerve disorders</td>
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<td>6</td>
<td>Ischemic stroke</td>
<td>ICU organization and technology</td>
<td>Disorders of consciousness</td>
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<td>7</td>
<td>Seizures/ Temperature management</td>
<td>Ischemic stroke</td>
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<td>Late breaking abstracts</td>
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Seattle, the Emerald City, is green because of its abundant rainfall. And while it does rain frequently in Seattle, the actual amount of rainfall is much less than almost all of the east coast cities. And September usually delivers the best weather Seattle has to offer—sunny skies and warm temperatures.

History and Historical Sights/Sites
Seattle was settled in 1853, a relatively young city by any standards. Logging was the first major industry. Technology and coffee have replaced logging and Seattle is home to Microsoft, Amazon.com, T-Mobile, and Starbucks. The World’s Fair was held in Seattle in 1962. Seattle Center and the Space Needle were both built for the occasion and are worth a visit. An entertaining look back at Seattle’s History is provided on the Seattle Underground Tour, which takes place in Pioneer Square. Pike Place Market was Seattle’s first farmer’s market, founded in 1907—it is a tourist must.

New Attractions
The Seattle Big Wheel was recently built on the Seattle waterfront. It provides some of the best views of Seattle and is a beautiful addition to the Seattle skyline. Safeco Field is the home of the Seattle Mariners, and they will be in town playing the Athletics during the Annual Meeting. The views facing west from the upper stadium seats are spectacular. Century Link Field (the “Clink”) is next to Safeco Field and is home to the Seattle Seahawks, 2014 Super Bowl Champions. For soccer fans, the Seattle Sounders also play at Century Link Field and will be hosting Real Salt Lake on September 12.
Things to Do in Seattle
the Annual Meeting

Arts and Culture
The Seattle Art Museum (SAM) is worth a visit for its permanent holdings. The Olympic Sculpture Park is a wonderful and recent addition to the city. There is a beautiful Chihuly Glass Garden at Seattle Center. The Experience Music Project (EMP) is a unique building designed by Frank Gehry and financed by Paul Allen. The building is designed to resemble a smashed guitar and houses a museum of rock-n-roll memorabilia. A Science Fiction Museum has also been added to the complex.

In addition to being the home of Nirvana and "grunge" music, Seattle also boasts many notable jazz musicians, including Quincy Jones, Ernestine Anderson, and Ray Charles. Good jazz can be seen at many venues around town, including Tula’s Jazz Club and Dimitriadis Jazz Alley (Diane Schuur will be playing during the meeting). The Showbox and the Showbox SoDo host current artists and musicians from genres such as rock, pop, rap, and hip hop. The Triple Door is one of the best music venues in town – check out their schedule on-line.

For the Family
The Seattle Science Center provides hands-on experience for the kids. The Seattle Aquarium (on the Waterfront) and the Seattle Zoo (in the Greenlake neighborhood) are also worth a visit. And as kitschy as it may seem, Ride the Ducks, an amphibious tour of Seattle, is a blast. A visit to the Hiram M. Chittenden Locks (aka Ballard Locks) is also a must for out-of-towners. Watch boats passing from the Puget Sound to Lake Union and observe salmon climbing the fish ladders from an underwater viewing room. Don’t forget to visit The Troll underneath the Fremont Bridge. The Seattle Public Library is also a work of art – designed by Rem Koolhaas.

For the Adventurous
Seattle is all about the water and the mountains. Ride the water taxi from downtown to Alki Beach, ride a ferry to Bainbridge Island, or rent kayaks on Lake Union or at Alki Beach (at the water taxi terminal). There is a large beach at Golden Gardens Park and Discovery Park provides an opportunity for a nice and easy hike through the forest to the water. The Washington Park Arboretum is also a beautiful place to take a walk and enjoy the natural beauty of the water. You can also explore the arboretum by canoe (rentals are available to the public at the UW Waterfront Activities Center). Don’t miss the Japanese Garden within the Washington Park Arboretum grounds.

If you have time to go further afield, visit Mt. Rainier, Mt. St. Helens, the Olympic Peninsula, or the San Juan Islands. For the ultimate “gear experience,” visit the REI Flagship Store.

Food
Seafood, seafood, seafood! Classic Northwest cuisine can be found at the Dahlia Lounge. Good food with great views can be found at Canlis, Salt’s on Alki, Ray’s Boathouse in Ballard, and Anthony’s Home Port downtown or Palisades in Magnolia. Trendy and noteworthy restaurants include The Walrus and the Carpenter in Ballard, The Whale Wins and Rock Creek in Fremont, Silka & Spruce in Capitol Hill, Bar Sajor in Pioneer Square and, Spinasse in Capitol Hill.

Pacific Northwest oysters are a special treat – try them at the Brooklyn Seafood, Steak, and Oyster House, Elliott’s Oyster House on the Waterfront, or Taylor Shellfish Farms in Capitol Hill. Be sure to sample Dungeness crab, fresh salmon and fresh halibut no matter where you eat. For the carnivores, the Metropolitan Steak House, El Gaucho, and Daniels’ Broiler are Seattle favorites. Miller’s Guild is a new steak house with good reviews. For sushi, try Shiro’s in Belltown or Nishino in Madison Park. For pizza, try Serious Pie downtown, Delancey in Ballard or Phoenicia on Alki. For Mexican, try La Carta de Oaxaca in Ballard or Fonda La Catrina in Georgetown.

Cocktails and Nightlife
There are a number of good “speakeasies” in Seattle, where a cocktail is a work of art. Try Bathtub Gin in Belltown, Tavern Law, Needle and Thread, and Knee High Stockings in Capitol Hill.

The Pink Door at Pike Place Market often has interesting cabaret, burlesque, and trapeze acts. Teatro Zinzanni is an amazingly weird and fun dinner show. The Rock Box on Capitol Hill has private karaoke rooms. If you are looking for a dive bar with karaoke, there are numerous options around town. For the ultimate dive bar with great pinball (but no karaoke), try Shorty's in Belltown.

Kyra Becker, MD is a neurointensivist and Stroke Neurologist at Harborview Medical Center in Seattle. She is an invited guest writer for Currents.

Kyra Becker, MD
a neurointensivist and Stroke Neurologist at Harborview Medical Center in Seattle. She is an invited guest writer for Currents.
As of this writing, the NCS Annual Meeting is only a month away. It's time to start thinking about what to bring. So, let me see... laptop, check... suits and sleepwear, check... iphone charger, check... party hat... this year is a must.

The Annual Meeting Planning Committee has designated fun and social networking as a top priority for this year’s meeting. Thus, the Social Committee was created. Our goal is to provide members an opportunity to share good times, make new friends, and take a well-deserved break from work for some fun. I invite each of you to attend every event and to bring a friend.

**Welcome Reception:** Wednesday, September 10, Time: 5:00 to 6:30 PM / Location: Cascade Room

Let’s start the meeting off by reuniting with old friends and sharing a drink with new ones. The NCS would like to welcome each member to this year’s meeting by hosting a welcome reception. We invite each member to reunite with friends here, catch up, and say hello since the last meeting.

**Pub Crawl:** Thursday, September 11, Time: 8:30 PM / Location: Pioneer Square

It has been a full day of science and you are now ready to take a break. Let’s venture out and experience one of the city’s major venues with friends new and old... Pioneer Square. Plan on meeting in the hotel lobby by 8:30 PM. We will walk two blocks to the local light rail station (Westlake – runs until 1AM). Next, a quick five-minute train ride and we arrive in Pioneer Square. Four well known “drinking fountains” have been chosen to wet our whistle. If you can’t make it at 8:30 PM, no problem – join the group anytime. Link to a map of the Pub Crawl: http://bit.ly/1sFjsM

**Fun Run:** Saturday, September 13, Time: 6:30 AM / Location: Olympic Sculpture Park

After a few days of eating out and a few days of being at the conference, we all begin to feel a little sluggish. Not to worry, we’ve got just the event for you. Join us Saturday morning before the conference for a run through one of Seattle’s main attractions, Olympic Sculpture Park. Located only a mile away from the Westin Hotel, the Fun Run is a three-mile run or one-mile walk designed to take you through the scenic waterfront while giving you a chance to stretch your legs.

Many have pre-registered, so spots are limited for on-site registration. Details for on-site registration are coming soon!

Links to maps of the route:
Run: http://www.mapmyrun.com/routes/view/336495163
Walk: http://www.mapmywalk.com/routes/view/387779094

**Experience Music Project (EMP) and NCS Banquet:** Saturday, September 13, Time: 7 PM to midnight / Location: EMP Museum

This year, the NCS Banquet will be located at our best venue yet, the EMP Museum. The EMP is a non-profit, leading-edge museum dedicated to fueling contemporary pop culture. Doors open at 7 PM with music provided by Bubba’s Taxi and Seattle’s best DJ while Wolfgang Puck hosts our catering. For banquet attendees, the EMP Museum will host many amazing interactive music-based experiences such as:

**NCS “Rising Star” Auction:** This year, Bubba's Taxi joined by Stephan Mayer from The Codes have put together an auction you can’t miss. Choose from one of the pre-listed songs and show the NCS what your day job could have been. With a live band as your backup, sing and show us you’re a Rising Star.

**Sound Lab:** You and your friends have access to twelve acoustically isolated rooms known as studio pods, contained within which are interactive devices, gear, and traditional instruments. You bring the energy and creativity.

**On Stage:** Participants will get to step into the spotlight to perform one of five songs before a virtual audience. If you’re a novice or expert, it doesn’t matter because optional pre-programmed equipment makes you the star on stage.

**Exhibits:** Explore with your friends multiple museum exhibits such as "Nirvana: Taking Punk to the Masses," "Hear My Train A Comin’: Hendrix Hits London," or "Spectacle: the Music Video."

This year’s meeting is filled with opportunities to interact with members, create new friendships, and have fun. I hope you enjoy these events and we look forward to seeing everyone at the Annual Meeting.

Arash Afshinnik, MD is a neurointensivist at Ochsner Health System in New Orleans, LA and chair of the Social Committee of the NCS Annual Meeting Planning Committee. He is an invited guest writer for Currents.
Transition to Neurocritical Care Fellowship: It Doesn’t Happen in a Day

By Saef Izzy, MD

Historically, neurologists proved to be the missing link between the medical intensivists and neurosurgeons in taking care of critically ill brain-injured patients. Their availability at the bedside and broad knowledge base enabled them to achieve the right balance. The culture of neurosciences has evolved since the first Neurosurgical ICU was started by Dandy at Johns Hopkins in 1932.

Our understanding of consciousness disorders and other acute neurological conditions has matured through efforts attributed to pioneers like C. Miller Fisher, Fred Plum, and Raymond Adams. The need for knowledgeable, available physicians to attend to this cohort of patients has been well established with the work of many who followed Dandy. Looking back, mentors like Allan Ropper were the first to define the transition from classical neurology into the current model of neurocritical care training. This field represents the perfect marriage of unique clinical skills and high-tech investigative methods that culminate in a step-wise, deductive approach. A well-structured training scheme is required to produce such a breed of physicians.

As fellows, we are directly involved in taking care of critically ill patients where immediate and decisive measures have the potential to steer patients’ outcomes, and thus to possibly prevent looming tragedies or serious disability. On a daily basis, we are put face-to-face with a wide range of acute conditions, some we were acquainted with during years of residency and others we have yet to decipher.

The preparedness of neurology residents to transition to neurocritical care fellowship is rather variable, but by-and-large dependent on the presence of a dedicated Neuro ICU, training curriculum, and UCNS board certified faculty. To learn more about this transition, I interviewed clinical fellows from Neuro ICUs across the country to tell us more about their experience and the challenges they faced during this phase of their training.

Marcy Ogwood, DO, first year Neurocritical Care Fellow, Cleveland Clinic: “Transitioning to a new year in training is always difficult, but so far I have found the move from neurology resident to a neurocritical care fellow to be the most challenging. As a chief resident, I was confident running the show with ease and always looked forward to teaching fellow residents and students. Now that I’m in the ICU, I feel completely underprepared. Before starting, I studied the landmark trials and guidelines for the management of neurologic emergencies. In doing so, I completely underestimated the transition I was about to face. I had to transition from brain, brain, and more brain, to medicine, a slightly foreign concept. I remain optimistic that in the next couple of months, I will catch up with the steep learning curve, much like I did during residency. Hopefully, I will begin to live up to the title “Fellow” and once again, I will be at the top of my game.”

Fawa Almufti, MD, second year Neurocritical Care Fellow, University Hospital of Columbia and Cornell: “As intimidated as my co-fellows and I were about starting fellowship, the transition was a smooth one. During the first two weeks, we were immersed into the Neuro ICU boot camp that encompassed essential critical care topics, airway management training, and a Neuro ICU day-shift rotation where we learned to manage both rare and bread-and-butter neurologic emergencies. We were also supervised in placing central lines and emergent intubations, etc. We quickly learned to become proficient in procedures and to manage our critically ill patients. Looking back over the past twelve months, the journey to becoming a neurointensivist has been an amazing one. It was not so much about re-learning medicine from scratch as it was refreshing our memories about important topics in critical care.”

Edilberto Amorim, MD, Neurocritical Care Fellow, Massachusetts General Hospital / Brigham and Women’s Hospital: “Connecting with your co-fellows, nurses, neurology as well as neurosurgery residents will make your calls overnight so much better. Don’t miss the cook-outs, happy hours, and weekend getaways when you have a chance. Time in fellowship is tight, so keeping up with research is challenging. It is crucial to identify mentors that are approachable, and more importantly, to pick projects that are realistic with your schedule.”

Parmod Gupta, MD, first year Neurocritical Care Fellow, Baylor College of Medicine: “I joined my residency with an open mind. My first month as an intern was in the neurointensive care unit, and I felt particularly overwhelmed with the pathology, which I had not encountered during my medical school rotations. Being a resident at a level I trauma center, we managed many challenging traumatic brain injury patients, complex neurosurgical and neurointerventional cases. My Neuro ICU experience during residency helped me seal my decision to pursue a career and made me very much capable of handling any acute medical issues. Now, starting fellowship I feel very comfortable during the transition and looking forward to more progress in the next two years.”

For residents going to neurocritical care fellowship, spending a couple weeks with anesthesia to practice lines and intubations in the last few months of residency is time well spent. Joining the code team is also a great chance to brush up on ACLS skills. We get plenty of “action” during fellowship, but a little extra practice before your first herniating patient in fellowship doesn’t hurt.

I hope that this quick guide to transitioning from neurologist to intensivist is advantageous. We always have to keep in mind during such intense training that we need to cultivate our teamwork and leadership skills and become better decision makers under adverse conditions. Always remember, it’s a learning curve, it doesn’t happen in a day.”
Halyard, gooseneck, jib, mainsail, luff… Do these terms sound familiar to you? If you are a sailor or interested in becoming a sailor, this is an event for you. We are starting to plan an off-shore meeting in the British Virgin Islands and are looking for a group of interested members to gather at the Annual Meeting in Seattle.

Our goal is to plan a bareboat charter of a group of boats, i.e., a flotilla, in the British Virgin Islands for 2016. This potential joint session with DGNI and NCS will be called Brain Waves: Controversies in Neurocritical Care. Our discussion point: when reaching the lands-end of evidence-based medicine, we sail into uncharted territory.

If you don’t sail and want to, you can still grab a berth on-board. Some of you are seasoned sailors who can captain his/her own boat, but options include choosing to share a charter or to charter a captained boat for our flotilla. Family and friends will be welcome.

Each night after reaching port, a boat and its captain and crew will sponsor a lecture on board at anchorages such as Virgin Gorda, Jost Van Dyke, Peter, Cooper, and Salt Islands. An example itinerary would be day 1 - Tortola to Norman Island including the Bight with the Treasure caves and the Indians to snorkel; day 2 - Norman Island to Cooper Island; day 3 - Cooper Island to Virgin Gorda with a visit to the famous Baths for lunch; day 4 - Virgin Gorda to Trellis Bay / Scrub Island; day 6 - Jost Van Dyke; day 7 - back to Tortola.

We will be working on CME for this meeting with tentative topics such as marine neurotoxins, controversies and treatment of refractory status epilepticus, refractory intracranial hypertension, indications for interventional thrombectomy and thrombolysis, treatment of cervical or intracranial arterial dissection, anticoagulation after trauma or intracerebral hemorrhage, and other topics.

Stay tuned for more information about our first meeting or email cchang@queens.org or julian.boesel@med.uni-heidelberg for more information.

Cherylee Chang, MD is a neurointensivist at the Queen’s Medical Center in Honolulu, HI and past-president of the NCS. Julian Bösel, MD is a neurointensivist at the University of Heidelberg in Germany and a member of the German DGNI-affiliated research group IGNITE. They are invited guest writers for Currents.
New at the Annual Meeting: 5K Fun Run and One Mile Fun Walk to Benefit NCS Research Fund

By Jennifer Robinson, APRN and Susanne Muehlschlegel, MD

Pack your running shoes for Seattle! The NCS Annual Meeting this year has a new and active twist. On Saturday, September 13, we invite you to join us for a friendly 5K Fun Run or One Mile Fun Walk. The course is designed to start and finish just outside of the beautiful Olympic Sculpture Park, about one mile from the conference hotel. We promise it will be scenic, flat, and include waterfront running the whole way. We will be finished just in time to make it back for the morning session.

The idea was born at last year’s Annual Meeting in Philadelphia during a “Rocky Remembrance” run to the Rocky Statue. The goal is to make this run/walk inclusive for everyone and create a conference event that promotes fitness and camaraderie (think: networking) and provides a unique experience of the beautiful Seattle waterfront. Proceeds will go to the NCS Research Fund. Every participant counts, including family members.

Please register with your Annual Meeting registration to guarantee your spot. We will only have a very limited number of bibs available for on-site registration. We are currently working on securing a sponsor so that we can also provide race tee shirts for all participants, so stay tuned. The early start time was chosen so that no educational parts of the conference will be missed. This run is also a great, unique networking opportunity, so don’t miss out. Walk or run, as you like.

We hope that this advance notice serves as motivation to start your walking and running training. We will see you at the start line.

Susanne Muehlschlegel, MD and Jennifer Robinson, APRN are active members of the NCS Annual Meeting Planning Committee and invited guest writers for Currents.

Details:
Saturday, September 13, 2014
6:30 AM start (an earlier arrival is highly recommended)
Walkers will start immediately after the runners
Register on-line with your Annual Meeting registration
Feel free to register yourself and any guests
Fee $35 per person

1 Mile Fun Walk Map

5K Fun Run Map
Getting Social with the NCS Using Social Media

By Aarti Sarwal, MD

Social networks like Facebook and Twitter have given us a platform to connect, communicate, and share content. Using these applications can be overwhelming even for the seasoned computer user, however. Proper use of these platforms can help us connect in a changing world where the internet is becoming an integral part of our evolving societal structure. This article provides an introduction to resources for getting started with Facebook and Twitter and guidance on how to use these two popular platforms to reach out to your NCS colleagues and other neurocritical care professionals.

Facebook

Facebook is essentially a dynamic website where you can change the content in real time. It can be accessed via www.facebook.com or using the Facebook app on a smart phone. Starting an account is free. Facebook interaction rests on using your validated email and real name and affiliations so you should choose wisely what personal information you display on your Facebook page. You can go to www.facebook.com/help to go through a stepwise tutorial on using Facebook and choosing privacy settings. Tips for safe use of Facebook can also be found using the search terms “how to stay safe on Facebook.”

Interacting with the NCS Using Facebook

- Find the NCS Facebook page using any search engine or by clicking the Facebook icon on the NCS website www.neurocriticalcare.org.
- Just below the NCS logo at the top of the page, click the “like” button. Once you “like” the Facebook page, you will get notifications of any new posts on your timeline and the page will appear on your “home” menu on the left side of the screen.
- The top right side of the page will allow you to post comments, news, and views.
- You can browse the timeline to see available posts arranged chronologically. When you see an interesting post, you can use the toolbar just below the post to “like,” “comment,” or “share.” You can “like” the post to show your interest. “Comment” will allow you to post a reply to another post. “Share” will allow the post to be visible on your timeline to allow your friends to see it.
- The top left of the page can help you “invite” your friends on Facebook to like the NCS page.
- Use discretion and professional language when posting, commenting on posts, or sharing personal information. Remember these posts are publicly visible along with the name and profile link of the person posting them.

Twitter

Twitter is a micro-blogging service that allows users to broadcast short messages (called “tweets”). Each user has a set of other users (called “followers”) who receive their messages; those who a user follows are called “friends.” Each tweet can only be up to 140 characters in length and the default setting in Twitter is to allow all tweets to be publicly visible. Like Facebook, you can access Twitter on the internet at www.twitter.com or the Twitter app on a smart phone. For users who do not have smart phones, Twitter also has extensive support for SMS, which can send tweets over text message. Creating an account is free. You will create a Twitter name, which is how people will tag you in tweets and ultimately how you will be known on Twitter. You can go to support.twitter.com and use the available topics to get familiar with Twitter.

When you post something, it is called a “tweet.” When you repost something from another user, it is a “retweet.” “Trending topics” are popular topics being discussed by many users. You can “favorite” a tweet by clicking on the star symbol. “Hashtags” (#) are a tool to make topics more searchable. To create a hashtag, place # before a word. Hashtags are a useful way to get your tweet seen by people who are interested in its main subject. You can search terms, keywords, and people by entering them into the toolbar at the top of the page.

You can send a reply to a tweet that is visible to all by hitting the “reply” button on any tweet. Type your message into the box that pops up and click “tweet.” You can use Tweeple (computer) or TwitPic (smartphone app) to post pictures on your tweets. WeFollow is a website that allows you to add yourself to a listing of Twitter users based on tags you find interesting.

Interacting with the NCS Using Twitter

- Find NCS at @neurocritical on Twitter. Just below the logo panel, on the top right corner of the page, click “follow.” When you follow the NCS, all tweets posted by the NCS or tweets in which the NCS was tagged will display on your home page.
- You can use # (“discover”) on the top left corner of toolbar to search for relevant topics. The search items will display all tweets that used the hashtagged keyword in Twitter. Searching for #ICU, for example, will bring up multiple tweets that reference the ICU. Using the menu on the left of the screen, you can tailor this search to include only people with ICU in their Twitter name, photos tagged with ICU, or news with keyword ICU in it.
- You can tag the NCS on a tweet by “composing a new tweet” and adding @neurocritical to the message. Remember, you use @ to send your tweet to a specific account and # to tag a specific keyword to your tweet.

Social Media Etiquette

Facebook and Twitter represent online communities so the etiquette and courtesy that are exercised in real life communications should be considered when using these social platforms, especially within a professional organization. Retweets, replies, comments, and sharing are ways of engaging in conversation. Posting intentionally vague messages to grab attention, chronic complaining, meaningless calls to action, over-sharing, and posting too frequently are examples of poor etiquette.

Use restraint when posting pictures or tagging other people in your posts or tweets. Be mindful of privacy and personal choices of other people in pictures you post. Review and update your privacy and visibility settings frequently. The ephemeral nature of a tweet and brevity of messages makes it even more important to pay attention to choice of words. The content of information you get from social media should not be a substitute for academic discipline.
The United Council for Neurologic Subspecialties (UCNS) oversees the accreditation of fellowship training programs in Neurocritical Care and administers the Neurocritical Care board examination. The UCNS has undergone significant growth in the past three years, in large part due to the success of Neurocritical Care.

There are now 1,080 diplomates in Neurocritical Care and 49 accredited Neurocritical Care fellowship training programs. The growth of the subspecialty has been a high point for the UCNS. There continues to be growing interest in trainees from Neurology and from other specialties including Neurosurgery and Internal Medicine.

As such, the leadership of the three sponsoring organizations – namely the NCS, the Critical Care and Emergency Neurology Section of the American Academy of Neurology (AAN), and the Society of Neurosurgical Anesthesia and Critical Care (SNACC) endorsed a plan to modify the fellowship training requirements for trainees coming from specific backgrounds.

This plan calls for a one-year fellowship training program for selected trainees that have had substantial critical care training as part of a prior fellowship or residency. This one-year track applies to prospective fellows who have already completed a Critical Care fellowship in Anesthesia-Critical Care, Pulmonary Critical Care, Surgery Critical Care, or a residency in Neurosurgery.

Prospective fellows applying for the one-year Neurocritical Care fellowship training track need to be formally enrolled in a UCNS-approved Neurocritical Care fellowship program that starts on July 1, 2014 or after. The one-year track is not retrospectively approvable for fellows who are currently in training. At present, Neurosurgery residents must have already completed residency training and all other trainees must have already completed their primary fellowship training before being eligible for the one-year track.

The one-year track carries specific time restrictions and focus for training. The Neurocritical Care fellowship training is meant to be complementary to the candidate’s prior training during fellowship or residency. Hence, the total duration of training in critical care is meant to remain a minimum of two years, which is in concert with the two-year requirement of Neurology residency-trained fellows.

The one-year track enables greater flexibility in selection of candidates and broadens the background of future practitioners in neurocritical care. The one-year track also encourages strong cooperation and collaboration with our neurosurgical colleagues, and permits the neurosurgery trainee to complete fellowship within a reasonable period of time. The hope is to encourage neurosurgeons to enter into academic positions that feature neurocritical care.

Paul Vespa, MD is the current Chair of the United Council for Neurologic Subspecialties. He is also a member of the NCS Board of Directors and a neurointensivist at the University of California Los Angeles. He is an invited guest writer for Currents.
Barbiturate Anesthetics and Palliative Withdrawal of Life Support

By Jessica McFarlin, MD

Neurocritical Care Ethics is a recurring column in Currents that focuses on a case-based approach to medical ethics in neurocritical care. In this column, members of the NCS Ethics Committee discuss the ethical implications of cases submitted by NCS members. To submit a case, please email de-identified information to Fred Rincon, MD, chair of the NCS Ethics Committee, at fred.rincon@jefferson.edu.

Case: An 18-year-old female presents to an outside hospital complaining of headache and neck stiffness. She had a decline in her mental status in the Emergency Department, requiring intubation. A CT scan of the head showed diffuse subarachnoid and intraventricular hemorrhage with cerebral edema. On arrival to the Neuro ICU, her GCS was 3T. Her pupils were 5 mm and non-reactive and her cough, corneal, and gag reflexes were intact.

Over the next several days, attempts were made to control refractory intracranial pressure with hyperosmolar therapy, induced hypothermia, deep sedation, paralytics and – as a last resort – pentobarbital. She was not a candidate for operative interventions. Despite maximal therapy, the patient continued to have ICP in the 30s and her condition declined.

Her parents, now her surrogate decision makers, were told that her injury was not survivable. They understood their daughter was dying and requested that medical therapies be stopped. They desired their daughter to be an organ donor. Her parents did not want to delay her death for an extended time period while waiting for the pentobarbital to metabolize in order to meet criteria for donation after brain death.

Instead, they elected to discontinue the use of mechanical ventilation while still on pentobarbital and, knowing she would likely die within one hour, proceed with donation after cardiac death. Uncertain of the ethical questions surrounding withdrawal of support while using pentobarbital, the Neuro ICU team contacted the hospital Ethics Committee.

Although most deaths in an ICU occur after a decision to limit life support, withdrawal of life-sustaining measures still creates many ethical concerns for the care team and patient surrogates. Recognizing this, groups such as American Thoracic Society have worked to create a general consensus related to the withdrawing and withdrawing of life-sustaining therapy.

• The goal of withdrawing life-sustaining therapies is to remove treatments that are no longer desired and do not provide comfort
• Withholding life-sustaining therapies is morally and legally equivalent to withdrawing them
• Actions whose sole goal is to hasten death are problematic
• Withdrawal of life-sustaining treatment is a medical procedure and requires consent and disclosure

In the case above, the medical team worked to ensure they were making decisions that were consistent with these principles. Through excellent communication, empathy, and honesty, this family understood that continuing medical care was futile. Acting as the patient’s legal surrogate decision makers, her parents elected to remove treatments that were no longer desired. The team worked to ensure comfort at the end of life without hastening death. The team also worked to include the family through disclosure of and consent for the care provided at the end of life.

The use of pentobarbital to manage refractory ICP creates a special case during withdrawal of mechanical ventilation as it may be seen to hasten death by preventing respiration without offering benefit. The literature offers a wide view of the use of neuromuscular blockade and anesthetics – including pentobarbital – in the setting of withdrawal of life support.

Two primary concerns exist regarding pharmacologic paralysis and anesthesia at the end of life. The first is the fear that paralysis may mask patient discomfort. The second concern is that the use of the drug removes the plausibility of survival without mechanical ventilation. For these reasons, as a general rule, guidelines suggest that neuromuscular function be restored prior to cessation of mechanical ventilation. However, this case reveals an exception to this rule that is agreed upon in the literature.

Withdrawal of life support can ethically occur in the presence of pharmacologic neuromuscular blockade if death is both rapid and certain after the removal or the ventilator AND if the burden to the patient and family of waiting for the blockade to diminish exceeds the benefit of allowing for better assessment of comfort. For this patient, the team agreed that death would be rapid and certain regardless of the use of pentobarbital and that the burden of waiting many days to reverse the effects of the drug did not outweigh the benefit. The ethics consultant helped the critical care team reach a consensus to withdraw mechanical ventilation in the presence of pentobarbital. After withdrawal, the clinical skill and judgment of the team should guide the use of sedatives and analgesia to ensure comfort.

A decision to withdraw life sustaining treatments is best done when there is consensus among surrogate decision makers and the critical care team. This case highlights the importance of engaging in difficult discussions to ensure everyone understands the complexity of the decisions being made. Clinicians may apply personal values rather than data and ethical principles when making decisions regarding care near the end of life.

In this case, the hospital ethics team helped to resolve concerns about the appropriate course of withdrawal and better understand legal and ethical issues surrounding donation after cardiac death. The ICU team developed a plan to withdraw mechanical ventilation while on pentobarbital and this patient was able to donate organs following cardiac death. Consulting experts such as ethicists and palliative care providers can help ensure all members of the care team and family have a voice during this difficult time.

Jessica McFarlin, MD is a neurointensivist at Duke University Medical Center and a member of the NCS Ethics Committee. She is an invited guest writer for Currents.
A group of 20 medical centers is to begin enrolling patients this fall in a randomized trial to assess for a long-term functional outcome benefit with early percutaneous tracheostomy in ICU patients with severe stroke. The study will evaluate tracheostomy within five days of the start of mechanical ventilation (“early”) versus after day 10 of ventilation (“standard”). Aside from functional status, the phase III trial will evaluate duration of ICU and hospital stay, adverse events, cost of care, duration of mechanical ventilation, mortality, and possibly sedation and analgesia use, as well as intracranial pressure.

“A positive result in terms of functional outcome would be a strong argument to perform early tracheostomy after brain injury in patients predicted to need prolonged intubation,” said Dr. David Seder, Assistant Professor of Medicine at the Tufts University School of Medicine, and the lead investigator on the trial in the U.S. “A neutral primary endpoint but lower cost of care would be a valid argument for early tracheostomy, as would other positive secondary endpoints.”

The so-called SETPOINT 2 (Stroke-related Early Tracheostomy vs. Prolonged Orotacheal Intubation in Neurocritical care Trial) study is a collaboration between the NCS Neurocritical Care Research Network and the German neurocritical care society DGNI-affiliated Initiative of German NeuroIntensive Trial Engagement (IGNITE).

The study is planned to begin enrolling participants in October, with a target of 380 patients over two years at 10 medical centers in the U.S. and 10 in Germany.

SETPOINT 2 follows the pilot phase of the study, conducted at the University of Heidelberg in Germany. That phase, with results reported in Stroke in 2013, found no difference in ICU length of stay between the early tracheostomy and standard treatment groups, but did find higher levels of sedation, higher mortality, and worse functional status (modified Rankin Scale score) in the standard treatment group.

Investigators in that study, including Julian Bösel, MD of the University of Heidelberg, were cautious in describing the mortality findings among the 60 patients randomized to the early versus standard tracheostomy groups. The authors surmised assignment to early tracheostomy may have made physicians and patient families less likely to opt for withdrawal of ventilation in these patients. They also hypothesized that ICP management in the early tracheostomy group may have played a role in the improved mortality for those patients.

Dr. Bösel is the principle investigator of the SETPOINT 2 trial. The larger, phase III trial may elucidate effects of early tracheostomy on patient survival, said Dr. Seder, a neurointensivist who is Division Director of Neurocritical Care at the Maine Medical Center.

“Another important variable that will be considered is the reason for and timing of withdrawal of life support in patients that die, to address the concern that the mortality benefit was actually due to less withdrawal of life support measures in the early trach group,” he said.
Anti-NMDA receptor encephalitis, referred to throughout history as “demonic possession”, is an autoimmune-mediated neurological disease that afflicts both children and adults. It was first described in 2007 in a cohort of 12 women presenting with a severe neuropsychiatric syndrome, ovarian teratoma, and autoantibodies targeting NMDA-type glutamate receptors. These receptors are found in the post-synaptic membranes and are important in synaptic transmission.

The exact incidence of anti-NMDA receptor encephalitis is unknown, but it appears to be more frequent due to the increasing number of case reports. It commonly presents in young females of reproductive age, but has been reported in males and females of all ages. Almost one half of cases in young women are associated with tumors, which are usually ovarian teratomas. However, in the pediatric patient population, tumors are not as common.

Antibodies against the NR1 subunit of the NMDA receptor are associated with a characteristic syndrome that develops in several stages of illness and recovery. A majority of patients have prodromal symptoms lasting five to 14 days and consisting of headache, fever, nausea, vomiting, diarrhea, or upper respiratory-tract symptoms. The prodromal phase is then followed by three distinct phases.

The psychotic and/or seizure phase usually manifests in a period of less than two weeks, where patients develop psychiatric symptoms. Some of the more common manifestations include anxiety, insomnia, mania, grandiose delusions, fear, and paranoia. It is more difficult to discern the behavioral changes in young children since they often present with temper tantrums, hyperactivity, or irritability in contrast to psychoses. Patients may also exhibit seizures, which are more frequently tonic-clonic and may be deemed refractory to conventional medical management.

During the unresponsive phase, patients are usually hospitalized since they are unable to follow verbal commands. Finally, the hyperkinetic phase is associated with autonomic instability along with cardiac arrhythmia and hyper- or hypothermia. Other manifestations that may be present include dyskinesias, extrapyramidal symptoms, lip-smacking, sustained jaw movements, and clenching of teeth. This can last anywhere from two to 40 weeks.

The clinical diagnosis of anti-NMDA receptor encephalitis can be difficult due to differences in clinical presentation and the long period of symptom development. In half of patients, MRI yields unremarkable results. More recently, laboratory techniques have been developed to detect autoantibodies directed against synaptic proteins, which has allowed for improvement in achieving a more accurate diagnosis.

The extracellular N-terminal domain of the NR1 subunit, which is the key epitope, is conformational so that it is not detected by more conventional immunoassays such as ELISA. Therefore, a cell-based assay (CBA) that preserves the conformational epitope was developed. A positive test occurs when antibodies are detected by CBA during initial testing of patient serum. Testing of the CSF is not necessary. Nevertheless, further testing of CSF may be warranted with a negative result to optimize sensitivity since CSF antibody titers have been demonstrated to be higher than serum levels in affected patients. Antibody titers are usually higher in patients with tumors than those without tumors.

In cases where anti-NMDA receptor encephalitis is due to a tumor such as a teratoma, removal can be curative. In addition to tumor removal, intravenous immunoglobulin (IVIG) or IV corticosteroids can lead to resolution of neuropsychiatric symptoms within a few weeks. Regardless of the presence of a tumor, medical management includes administration of immunotherapy. Primary management should usually begin with intravenous steroids and plasmapheresis.

In the event of treatment failure, clinical deterioration, or relapse, the patient should receive second-line treatment with rituximab, cyclophosphamide, or both. In a multi-institutional cohort study of more than 500 patients, investigators found that most patients respond to immunotherapy. They also found that, when first-line treatment fails, administration of rituximab or cyclophosphamide is usually effective.

The psychiatric symptoms can be treated with typical and atypical antipsychotics, however they should be used cautiously as they can aggravate movement disorders in later stages of disease progression.

If treatment is promptly initiated, the prognosis is generally favorable. Recovery can take more than three years and some patients may not return to their normal level of motor and cognitive function prior to illness. If treatment is delayed or ineffective, mortality can reach up to 100%. In these cases, patients will die from autonomic instability or complications of a prolonged ICU hospitalization.

Mehrnaz Pajoumand, PharmD is a clinical pharmacist at the University of Maryland in Baltimore. She is a member of the NCS Pharmacy Committee and an invited guest writer for Currents.
The NCS Advocacy Committee – under the leadership of co-chairs Tamer Abdelhak and Sarah Livesay – is working to continue the mission of the NCS to promote the work of neurocritical care professionals and to improve the general public’s knowledge and recognition of the field of neurocritical care. The committee’s work is currently focused on developing outreach efforts to trainees for ENLS, potential membership, and external rotations as well as developing a media relations arm of the NCS.

To improve patients’, families’, and the general public’s awareness of the important work of the neurocritical care team, the Advocacy Committee will also be creating toolkits of neurocritical care fact sheets and patient handouts. These documents will build from the website resources developed by the Communications Committee. The documents will be easily accessible and printable by the general community seeking information about the field of neurocritical care.

The toolkits will also be easily printable by the neurocritical care team treating the patient at the bedside. The committee views this as a first step towards creating an NCS sponsored neurocritical care patient information guide that could be ordered by units across the nation for distribution to patients and families receiving neurocritical care.

Working on the same goal of educating the public is interaction with the media. As NCS members complete trials to move the field forward and advise on important neurocritical care issues in the media, society will benefit from a media contact process for invited commentary and NCS sponsored press releases. These will target both local media outlets as well as national media.

The committee is working with the NCS leadership and management to develop a process for a timely and effective relationship with the media. To capitalize on media outreach efforts done in years past by NCS members, we will be developing a library of archived media articles and events to be placed on the NCS website. This archive will also promote the NCS and improve the level of recognition and support by public and philanthropic organizations.

Finally, the Advocacy Committee is working closely with the NCS Emergency Neurological Life Support (ENLS) Committee to develop a marketing brochure that will be used to distribute to potential medical professionals that seek specialized training in management of neurological emergencies. This brochure should be available shortly after the NCS Annual Meeting.

We thank all our members for their continued support and advocacy efforts to promote the NCS and care of patients with catastrophic neurological conditions. Please do not hesitate to reach out to the committee if you have any additional thoughts or suggestions for NCS advocacy.

Tamer Abdelhak, MD is a neurointensivist at Henry Ford Hospital. Sarah Livesay, MSN, APRN, CNP is a neurocritical care advance practice nurse at the University of Cincinnati. They are the current co-chairs of the NCS Advocacy Committee.
Anti-NMDA receptor encephalitis is a rare clinical phenomenon that is gaining increased awareness. The diverse nature of the syndrome entails multidisciplinary management. Often these patients can remain in the ICU for months at a time, which can create the opportunity for the bedside nurse to become the continuum of care and greatly impact the experience for the patient, the family, and the treatment team.

In the Neuro ICU at our hospital, it is common for our nurses to assign themselves as primary caregiver for patients with an anticipated long stay in the unit. This gives the nurse an increased ability to recognize subtle changes in the patient’s condition and presentation, and fosters an improved relationship with the family. Bedside nursing is the constant face in the revolving environment of neurointensivists, physicians, residents, APRNs, PAs, students, and therapists.

I had the opportunity to be the primary nurse for a patient transferred to our facility with an eventual diagnosis of anti-NMDA receptor encephalitis. It was the first time any of the nursing staff had encountered this diagnosis, so immediately some of the nursing staff researched and printed articles, adding them to the patient’s chart.

This particular case proved to be mostly refractory and she did not initially respond to first- or second-line immunosuppressive therapies. During her ten-month stay in the ICU, she remained mostly in a catatonic state marked with violent autonomic dyskinesias. During these storms, the patient would present with severe hemodynamic changes, with temperature as high as 107 degrees Fahrenheit, heart rate in the 140s, systolic blood pressure in the 180s, respiratory rate in the 50s, and oxygen saturation down to the 80s.

This paroxysmal sympathetic hyperactivity is a trademark of the anti-NMDA receptor encephalitis syndrome. The medical team devised an algorithm for sedation to stabilize the patient during these events. My experience caring for this patient gave me insight into the triggers for these paroxysmal sympathetic hyperactivity storms and frequently I was able to prevent or mitigate them by increasing surface cooling and administering the first step of the sedation algorithm.

Handoff for this patient could be extremely time-consuming but necessary for continuity of care. I developed a written report that included all of the immunosuppressive therapies by date, as well as the last time the patient required sedation and surface cooling. The list of data and interventions became not only useful for bedside nursing but also for residents and students.

The patient’s family was vigilant in their attendance and interaction with the multidisciplinary team. Normally, we would limit the number of visitors in the ICU to two at a time, but it was an easy exception to make for this family. They were always gracious and respectful of the staff and would be present and involved in daily rounds. Following the lead of the nursing staff, the family would engage with the patient despite her inability to respond. They were present through the dyskinetic storms, helping the nurses keep her safe in the bed while we administered sedation.

Prior to admission to our facility, the patient’s oldest brother became conservator and was constantly researching the syndrome. In the ten months of her stay, there was rarely a day when the family was not at the bedside and, when they were unable to come in, they would frequently call for updates. They spent all of the holidays at the hospital, transforming the family lounge into elaborate buffets. We became part of their family. They all took great initiative in patient care and would frequently have “spa days” where they would do the patient’s hair and nails. Hence, it was a sad day when it was decided to cut her hair given the frequency of EEG monitoring.

The latter part of this patient’s stay was sullied by the realization that she would never make any significant clinical improvement, and then she suffered hemorrhagic cystitis attributed to side effects of cyclophosphamide. The patient arrested and required laparoscopic decompression with multiple washout surgeries and vasopressor support. I was in attendance at the family meetings that addressed goals of care, code status, and eventually the decision to withdraw care. Vasopressor support was discontinued and the ventilator was removed. My final role was to educate the family on what to expect as these interventions were stopped and to help prepare them for her death, which came quickly and quietly.

Not a day goes by that I do not think of her, and not a week goes by that I do not have some sort of communication with her family. I have since been the primary nurse for another patient with anti-NMDA receptor encephalitis, and have given in-services to the regular neurology floor nurses on the disease, its treatment, and nursing care. This whole experience has impacted me significantly and has helped focus my career path. And the patient’s brother, having witnessed nursing care for all those months, has decided to go back to school and become a nurse.

Kelsey Halbert, RN is a neurocritical care nurse at Yale New Haven Medical Center and a member of the NCS Nursing Committee. He is an invited guest writer for Currents.
Neurocritical Care in Japan: History, Current Status, and Perspectives

By Masao Nagayama, MD, PhD

Last year, the Japan Society of Neurological Emergency and Critical Care (JNE) officially formed an affiliation with the NCS. The JNE is a prestigious academic society in the field of neurocritical care in Japan. Commemorating this affiliation, I would like to introduce a brief history, current status, and directions forward in the near future for the JNE.

The JNE was previously known as the Japanese Congress on Neurological Emergencies. The current President of the JNE is Professor Tohru Aruga, MD, PhD. Professor Aruga is also the Immediate Past President of the Japanese Association for Acute Medicine. The President-Elect of the JNE is now Professor Hiroyuki Yokota, MD, PhD.

Japan is one of the most advanced countries in the fields of basic science and clinical practice including neurology, neurosurgery, emergency medicine, and intensive care medicine. Historically, the Japanese Society of Neurology and Psychiatry was founded in 1902, however, the majority of members were psychiatrists. In 1948, the predecessor of the current Japan Neurosurgical Society was founded. In 1960, the current Japanese Society of Neurology was established. As might be expected, many Japanese neurologists at that time devoted their time to classical neurology. In 1973, the Japanese Association of Acute Medicine was founded and the Japanese Society of Intensive Care Medicine was founded in 1974.

Recognizing the need for a multidisciplinary specialized approach not only to stroke but also to other neurocritical care conditions and diseases, the JNE was founded in 1992 – actually ten years earlier than the formation of the NCS. Currently, members of JNE have increased to more than 300 renowned physicians and surgeons in the fields of emergency medicine, neurosurgery, neurology, intensive care medicine, resuscitation, and so on. Thus, the JNE is an exclusive multidisciplinary academic society in the field of neurocritical care in Japan.

Reflecting the high morbidity and mortality of stroke in Asian countries including Japan – which exceed those of myocardial infarction – many physicians are enthusiastically involved in stroke care and research. This is especially true since the advent of recombinant tissue plasminogen activator and the publication of the official evidence-based stroke guidelines in 2004 and 2009.

The first stroke intensive care unit was founded in 1969 at the Research Institute for Brain and Blood Vessels-Akita, which was followed by the National Cerebral and Cardiovascular Center in 1979. There are many stroke care units in Japan now, but it was not until 2007 that I founded the first Neurologic and Neurosurgical ICU in Japan at the Yokohama Stroke and Brain Center. I was most influenced by Professor Eelco Wijdicks and the Neuro ICU at Saint Mary’s Hospital, Mayo Medical Center where I visited in 1998 during my work as a Postdoctoral Associate in the Department of Neurology at the University of Minnesota Medical School.

Recently, interdisciplinary interest in neurocritical care is very rapidly rising among physicians, especially after the official publication of the first-ever Neuroresuscitation Guidelines for broad aspects of neuroemergency and neurocritical care, which was published as part of the Japan Resuscitation Council (JRC) Resuscitation Guidelines in 2010. The revised guidelines will be published next year. The Guidelines Committee Chair is Professor Tetsuya Sakamoto, MD, PhD.

One of the most important characteristics of critical care neurology in Japan might be the commitment to prevention of life-threatening neurocritical conditions or diseases. I described in my first Japanese textbook, titled Handbook of Critical Care Neurology (2006), that critical care neurology should commit not only to conditions or diseases that require neurointensive and neuroemergency care but also to prevention of life-threatening neurological conditions or diseases.

Since the end of last year, the JNE has taken important steps forward in affiliation with the NCS and introduction of an organized fellowship with high standards for requirements and criteria, Fellow of the JNE (FJNE).

Regarding affiliation with the NCS, contributions by Dr. Gene Sung, Immediate Past President of the NCS, and Dr. Katja Wartenberg, former Chair of the NCS International Committee, were greatly appreciated. During the 28th Annual Meeting of the JNE in Atami City this July, a small ceremony was held to celebrate the affiliation of the two societies, during which Professor Tohru Aruga, President of the JNE, and Professor Thomas BLECK, founding president of the NCS, made speeches and exchanged memorial souvenirs.

We are aware of the need for multidisciplinary and international collaboration which is reflected in the clinical practice and research in epilepsy-related organ dysfunction syndrome (Epi-ROD) and prevention of sudden death in stroke, for example. We are honored for this collaboration with the NCS and we would like to rapidly increase awareness of the NCS in Japan and other Asian countries, which would contribute to recruiting new NCS members. Also, we are contributing to the mission of the NCS through collaborative research, including the PRINCE study, formulation of evidence-based guidelines, and authoring text books.

Masao Nagayama, MD, PhD is a Professor in the Department of Neurology and the Center for Stroke and Neurocritical Care at the International University of Health and Welfare, Atami Hospital. Dr. Nagayama was chair of the 28th Annual Meeting of the JNE and is chair of the Joint Committee on Neuroresuscitation Guidelines. He is a member of the NCS International Committee and an invited guest writer for Currents.
As the summer is winding down and you are starting to get busy, just remember that the NCS Annual Meeting is around the corner. As always, the Annual Meeting is a great set-up for you to review the latest updates in neurocritical care while catching up with friends. As you are registering for the meeting, take a moment to renew your membership and take advantage of the discounted registration fee.

This year at the Annual Meeting, we are going to have for the first time an NCS central booth where you get the chance to meet the leaders in your field, fellowship directors, journal editors, and get some one-on-one time with them.

There is also a lot for you to do in Seattle outside of the Annual Meeting, from attending a Katy Perry concert to watching a University of Washington Huskies football game. If you like to dance, you should try the Havana Club and BalMar. Both are highly recommended by Zagat. If you are looking for a good steak, you should try El Gaucho or Metropolitan Grill. For a good coffee, remember to visit Pike Place Market, the oldest famer’s market in the U.S. and site of the first Starbucks. This is just a sampler from what the city has to offer.

On the social front, this has been a busy summer for NCS members. Soojin Park, MD is moving to the neurocritical care program at Columbia University. Sherry Chou, MD is moving to the neurocritical care program at the University of Pittsburgh. Hopefully she doesn’t become a Steelers Fan!! Tamer Abdelhak, MD is also moving to Southern Illinois University as an Associate Professor and Director of the Neurocritical Care Division. We wish our NCS members all the best in their new endeavors.

As always any information or news you would like to report can be sent to me at michel.torbey@osumc.edu. You can also contact me if you are interested in getting more involved in the society or if you have ideas on how the society can further help you.

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**COMPLIMENTARY CME/CE ACTIVITY**

**Targeted Temperature Management (TTM) in Acute Neurologic Injury**

**FEATURED FACULTY**

Chad Miller, MD  
Associate Professor of Neurology and Neurosurgery  
Wexner Medical Center  
The Ohio State University  
Columbus, OH

Michelle Hill, BSN, RN, CNRN, CCRN, SCRN  
Clinical Educator of Neurocritical Care  
Riverside Methodist Hospital  
Columbus, OH

**PROGRAM OVERVIEW**

This activity is targeted to the multidisciplinary team treating and caring for patients undergoing Targeted Temperature Management (TTM) for acute neurological illnesses in the critical care setting, specifically post cardiac arrest, brain injury traumatic brain injury, acute ischemic and hemorrhagic stroke, hepatic encephalopathy and fever control. It provides detailed practical approaches on the delivery of TTM: induction, maintenance, rewarming and maintenance of normothermia in different settings and acute neurological illnesses. Complications and anticipated side effects of cooling are discussed to maximize the benefit of cooling for approved indications.

**TARGET AUDIENCE**

This program has been designed for practicing physicians, physicians in training, advanced practice and staff nurses, pharmacists, physician assistants, clinical nurse specialists, emergency care providers, including EMTs and paramedics; researchers, students, all professionals providing care in the critical care setting.

CME/CE Credit provided by AKH Inc., Advancing Knowledge in Healthcare  
This activity has been approved for AMA PRA Category 1 Credit™. This activity is awarded ANCC, and AANP credit; see final CE activity announcement for specific details.

Please visit www.neurocriticalcare.org after the annual meeting September 10-14th, 2014 to participate and for full accreditation information.

**Commercial Support**

This activity is jointly provided by AKH, Inc, Advancing Knowledge in Healthcare and the Neurocritical Care Society.

This activity is supported by an educational grant from The Global Science Center for TTM underwritten by Bard Medical.
The journal encourages submission of full supplements. This is an ideal vehicle to write up what transpired at one-day meetings but also major symposia. It is also perfectly suited to publish consensus statements. The October issue of *Neurocritical Care* will have a consensus statement on multimodality monitoring. ‘Multimodality’ is a new medical term, previously used in other disciplines, and is pervasive. The term, however, does signify what neurointensivists do – looking at something from different angles and combining the information.

This supplement on multimodality monitoring is the result of a major effort by several participants and led by a neurosurgeon, Peter LeRoux, and a pharmacist, Gretchen Brophy. Multimodality monitoring here includes clinical evaluation, monitoring of systemic hemodynamics, intracranial pressure, cerebral metabolism, cerebral perfusion pressure, cerebrovascular autoregulation, and systemic and brain oxygen. Several tests using electrophysiology are reviewed.

There are also papers on nutrition and glucose, hemostasis and hemoglobin, temperature and inflammation, and biomarkers of cellular damage and degeneration. It has recommendations on ICU processes of care and quality assurance, informatics integration and display, how to use resources for monitoring in emerging economies, and future directions with new, exciting technologies. The summary statement will be simultaneously published in the journal *Intensive Care Medicine* (also a Springer journal). Not to be missed.

The regular journal issue will have several interesting papers on mechanical ventilation. Roth *et al.* from the Department of Neurology in Kassel, Germany report patients with prone positioning to treat severe ARDS. They conclude that a significant elevation of ICP was seen during prone positioning although cerebral oxygenation was not compromised according to brain tissue oxygenation monitors. This is new material because very few studies have addressed the effect of prone positioning on ICP.

Another study by Marhong *et al.* explores the use of lung protective ventilation and comes from the Department of Medicine in Toronto, Canada. This study surprisingly shows that in mechanically ventilated patients with subarachnoid hemorrhage, the protective ventilation thresholds were not met in a third of the patients with ARDS. The authors suggest that the attending physicians might have had concerns with permissive hypercapnia in these patients who had increased intracranial pressure. This is clearly a thought-provoking paper. Both of the above-mentioned papers are further fleshed out in a nice editorial by Gregory Kapinos.

Finally, the journal has important papers on the use of automated quantitative pupillometry. Accuracy of the assessment of pupillary reactivity is important because, in many conditions, the absence of pupillary responses in an adequately resuscitated patient correlates with a high likelihood of a poor outcome or disability. Suys and colleagues from the Neuroscience Critical Care Research Group in Lausanne present a small series of comatose patients after cardiac arrest and found quantitative pupillary responses were more accurate than standard pupillary responses. A pupillometer is more often used in neurosciences units and, therefore, these experiences are welcome.

I encourage the readers of the journal to publish their data and these studies are quite relevant for clinical practice and thus support the mission of the journal. So, this sums up the big package. Look for it on-line and at the Annual Meeting.
Pilot Study of Desmopressin to Improve Platelet Activity after Intracerebral Hemorrhage

The authors sought to test the hypothesis that desmopressin (DDAVP) improves platelet activity after acute intracerebral hemorrhage (ICH) without major safety concerns. DDAVP releases von Willebrand factor (vWF) from endothelial cells and, in other studies, has been shown to improve hemostasis. This single-center pilot study enrolled 14 ICH patients with a mean age of 67±15 years with known aspirin use or reduced platelet activity on the VerifyNow aspirin point-of-care test. Fifty percent (14/28) of eligible patients were enrolled. All enrolled subjects received DDAVP 0.4 mcg/kg IV for 30 minutes while receiving other routine care, including admission to a Neuro ICU. DDAVP infusion started at a median of 12.25 (IQR 5.7-23.1) hours after ICH onset. The change in the Platelet Function Analyzer-epinephrine from baseline to one hour after the start of DDAVP was the primary outcome and decreased from 192±18 to 125±15 seconds (p=0.01). The authors felt that this finding was consistent with resolution of aspirin effect, but did not comment on their reasons.

One patient had a paradoxical increase in the test with no hematoma growth. The vWF antigen (secondary outcome), increased from 242±96% to 289±103% activity (p=0.004), increasing in every patient. Acute adverse events were also documented and included hypotension in one patient (7%), and fever within 6 hours of infusion in another patient. Mean change in serum sodium from baseline to follow-up 12-24 hours later was 0.6 mEq/L. The largest decrease included a 3 mEq/L drop from 138 to 135 mEq/L on the day of DDAVP administration in a single patient.

Of seven patients receiving DDAVP within 12 hours of ICH onset, the median change in hematoma volume was -0.5 (IQR -1.4 to 8.4) ml. Two had hematoma growth. Clinical outcome at three months using the modified Rankin Scale (mRS) was obtained in 12 (86%) patients. Of these, four patients had an mRS ≤1, one had an mRS of 3, and 3 had an mRS of 4. Four patients died, two from withdrawal of care before hospital discharge and two from cardiac arrest between the one- and three-month follow-up.

This pilot study showed feasibility of a single DDAVP infusion, which was well tolerated in this small patient sample, and was associated with improved measures of platelet activity and increased vWF antigen at a single time point. Questions that remain to be answered are how the changes in platelet activity level and vWF antigen compare to a control population in whom aspirin is simply stopped upon presentation. The authors did not evaluate whether any of the enrolled aspirin patients may have been aspirin-resistant to begin with – a potential confounder given that the inclusion criteria were aspirin use or reduced platelet activity on the VerifyNow aspirin test.

Furthermore, while DDAVP was given only once, the authors did not recheck platelet activity and vWF antigen to confirm that the changes were long lasting and not only transient. Hematoma growth was halted in some patients, but not in others, and this finding remains to be studied in a randomized placebo-controlled trial. Given the lack of treatments to control hematoma growth while also affecting the clinical outcome, DDAVP is an attractive therapeutic agent for ICH patients on aspirin. Whether it may also be feasible or potentially beneficial in ICH patients on clopidogrel has not been addressed.

Simvastatin Fails to Improve Six Month Outcomes after Aneurysmal Subarachnoid Hemorrhage

In prior single center studies, pleiotrophic effects of high dose acute statin therapy have been speculated to account for reductions in vasospasm-related infarctions and improved clinical outcomes for aneurysmal subarachnoid hemorrhage patients. This phase three blinded and randomized multi-center international trial sought to determine if a 21-day course of daily simvastatin (40 mg) would improve six-month functional outcome in acute subarachnoid hemorrhage patients as measured by the mRS.

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Eligible patients suffering subarachnoid hemorrhage were randomized in a 1:1 fashion to simvastatin or placebo within 96 hours of aneurysm rupture. Enrollment occurred at 35 international sites over six years. Enrollment was halted for a 20-month period for resolution of issues related to regulatory labeling of the study drug. The majority of the recruitment and all post-break enrollments occurred at sites in the United Kingdom. Patients with poor prognosis, previously on statins, exhibiting renal or hepatic failure, suspected substance abuse, or poor premorbid condition were not eligible for randomization.

The primary outcome was assessed through a six-month self-report survey. Planned secondary outcomes included death, per protocol mRS outcome, and incidence of delayed ischemic deficit. 803 total patients were enrolled with >97% of each cohort eligible for six-month analysis. Study groups were similar with respect to World Federation of Neurosurgical Societies Score, Fisher Grade, incidence of hydrocephalus, and time to enrollment (1.7 days).

A favorable outcome (mRS ≤2) at six months was observed in 72% of patients in both cohorts (OR 0.97, 95% CI 0.75-1.25, p=0.809). Outcomes for discharge and per-protocol analysis were also similar between groups. No differences were noted between groups for planned secondary outcome measures. 64 total cerebral infarcts were noted (radiographically confirmed rates: 16% simvastatin and 17% placebo). No disparities were noted in the rate of transaminase elevation or other adverse outcome measures.

Despite the promising results of prior small studies, the STASH trial represents the largest multi-center trial evaluating the acute impact of statins on subarachnoid hemorrhage outcome. The results do not suggest a benefit for statin use. The rate of good outcomes is high in this study and may have lessened the chance to observe a statin-related benefit. Similarly, the incidence of stroke is surprisingly low, likely resulting from the lack of scheduled neuroimaging in the protocol and poor detection of asymptomatic events. While mRS is an appropriate and standard clinical measure, it is not clear if it is reflective of the burden of subclinical infarction and resultant cognitive impairment that may be impacted by simvastatin treatment.
SonoAccess – Free Ultrasound Video App for the ICU

By Susanne Muehlschlegel, MD, MPH

Critical care ultrasound has been a rapidly growing field and I can’t think of a single day in the ICU anymore during which I don’t use ultrasound: bedside echos, inferior vena cava insonation to assess volume status/responsiveness, lung ultrasound, checking for pneumothorax post central line placement, or simply ultrasound-guided line placements.

This free app for the iPhone is an interactive learning video app by the ultrasound company SonoSite which is extremely useful for every day use at the bedside.

While it is designed only for the iPhone and iPod Touch, it does work on the iPad as well, but requires iOS 4.3 or later. It contains a large library of on-demand videos of various ultrasound scanning techniques.

The initial screen after opening the app gives the user the choice between many different specialties. After choosing “Critical Care,” the user can choose on a menu on the bottom between “Coach,” “Cases,” “Images,” and “Guides.” The “Coach” menu option provides free access to many high-resolution 3D-animation or real videos for “how to” techniques: for example “lung sliding” to check for pneumothorax.

Choice of arrays, position of the array, identification of landmarks and much more are demonstrated during the animation and explained by voice. “Cases” includes several fun and interactive learning options using exactly that: cases (including sound bites). It also includes a general review of several scanning techniques prior to going into specific case modules. One example is the review of different cardiac views during a bedside echo, followed by a demonstration of several normal and abnormal findings on echo.

“Images” does not include any videos, but allows a “flashcard-like” review of certain views. Clicking on the image provides the answer to the ultrasound view and its structures. Finally, “Guides” include a SonoSite specific overview of knobology, image review and export, and other technical guides, but are helpful for SonoSite ultrasound machines only.

In the App Store, the SonoAccess app has only received a two-star review, but this appears to have been due to frequent crashing when navigating between images in a prior version, which supposedly has been fixed in this latest version 1.5.2.

For more information visit the App Store, or the SonoSite webpage:
http://www.sonosite.com/education/sonoaccess
Under the leadership of David Gordon, MD, Chairman of Neurology, Oklahoma University Medical Center’s (OUMC) Neurosciences Intensive Care Unit (NSICU) was one of the first of six inpatient teams to be developed. Dr. Gordon recruited Ryan Hakimi, DO from Duke following his completion of a two-year Neurocritical Care and Stroke fellowship to establish Oklahoma’s first NSICU at the state’s only Level 1 Trauma Center. OUMC is located in Oklahoma City, a city with a population of about 600,000 and a metropolitan population of 1.5 million.

The NSICU opened in the fall of 2009, admitting six patients in the first five hours of operation. Since that time, the NSICU has grown into the second largest ICU service at OUMC. Hakimi led the expansion of services in this closed-model NSICU by becoming the primary admitting service for essentially all neurological and neurosurgical patients except for elective neurosurgical post-operative patients. By collaborating with his wife, Andrea Hakimi, DO – Director of Epilepsy at the time – the service grew with the establishment of continuous video EEG monitoring in 15 of the 17 NSICU beds, a service not provided anywhere else in Oklahoma.

Further expansion came with the development of the post-cardiac arrest therapeutic hypothermia team, leading the NSICU to be the first responder and admitting service for all out-of-hospital cardiac arrest patients who present to the Emergency Department. Dr. Hakimi worked with the state’s largest EMS transport system to simplify the criteria for therapeutic hypothermia, writing the protocol that was adopted throughout the state and includes carrying iced saline on all ambulances.

Partnering with Steve Hoover, MD, Director of Neurointerventional Services, a board certified vascular neurologist and neurointensivist, the OUMC NSICU now admits approximately 150 subarachnoid hemorrhage patients per year. Due to the large volume of neurointerventional patients, Dr. Hoover was able to start a two-year Neuroendovascular Surgical Neuroradiology fellowship, which will be graduating its first two fellows. One of these fellows, Ankur Garg, MD, will be staying on as an Assistant Professor in the Department of Neurology.

Dr. Hakimi recruited neurointensivist Bappa Ray, MD from UT Southwestern who, together with Mehmet Ozcan, MD, an anesthesiologist and neurointensivist, comprise the four attending neurointensivists. The NSICU team has been vitally dependent on advance practice providers to achieve its expansion. Currently, the NSICU team has three such providers, Emma Fields, APRN-CNP, Kevin Wheelock, PA-C, and Amber Draper, APRN- CNS. Together with resident physicians, speech therapists, occupational therapists, physical

*Continued on page 25*
The Featured Program column seeks to enrich the outlook of NCS members by highlighting programs that are undertaking innovative approaches to the practice of neurocritical care. If you are interested in contributing an article, please contact me at rgeocadin@jhmi.edu.

In this issue, we feature the expanding neurocritical care program at Oklahoma University Medical Center.

- Romergryko Geocadin, MD, Section Editor

**Neurosciences ICU Continues to Expand**

therapists, respiratory therapist, dieticians, pharmacists, and neurology trained nurses, the NSICU functions as a true multidisciplinary team.

Collaboration with other departments has been a key to the success of the NSICU under Dr. Hakimi’s direction. Collaborating with the OUMC Department of Neurosurgery allowed for development of trust in the NSICU team managing external ventricular drains and the creation of the OUMC Hemicraniectomy Protocol for malignant large vessel ischemic strokes.

Further work with the OUMC Department of Radiology led to urgency-based protocols for MRI that gives OUMC the ability to get stat brain or spine MRI within 90 minutes, 24 hours a day and seven days a week. With its growing volume of subarachnoid hemorrhage, the OUMC Vascular Medicine Lab grew to seven technologists offering all arterial and venous studies, including transcranial Doppler ultrasound, seven days a week.

Quality-based improvements have been a source of pride for the NSICU, leading to a risk-adjusted mortality ratio of 0.58, a subarachnoid hemorrhage mortality rate of less than 10%, and a patient satisfaction score of 90%. With these advances, in November 2012, OUMC earned the distinction of an American Heart Association Comprehensive Stroke Center.

In August 2014, the NSICU will be moving to a state-of-the-art new ICU within OUMC. These rooms will be complete with the latest in healthcare technology designed to provide unsurpassed care for neurological patients.
### Job Opportunities (as of August 13th, 2014)

For full details on all available positions including position descriptions, applicant requirements and further contact information, visit our website at http://www.neurocriticalcare.org/jobs/job-opportunities.

#### International

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<td>Neurocritical Care Specialist</td>
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#### Arizona

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<td><a href="mailto:joan.kilmartin@jcl.com">joan.kilmartin@jcl.com</a></td>
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<td>Assistant or Associate Professor, Division and Stroke Center</td>
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#### Connecticut

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<tr>
<td>APRN/PA Opportunity</td>
<td><a href="mailto:kevin.sheth@yale.edu">kevin.sheth@yale.edu</a> and <a href="mailto:david.greer@yale.edu">david.greer@yale.edu</a></td>
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#### Delaware

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<td>Neurointensivist</td>
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<td><a href="mailto:brian.g.lee@medstar.net">brian.g.lee@medstar.net</a></td>
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<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurocritical Care Faculty</td>
<td>Sheila Bixler at <a href="mailto:Sheiha@jordanmc.com">Sheiha@jordanmc.com</a></td>
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#### Louisiana

<table>
<thead>
<tr>
<th>Position Description</th>
<th>Contact Information</th>
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</thead>
<tbody>
<tr>
<td>Neurocritical Care Specialist</td>
<td><a href="mailto:profrecruiting@ochsner.org">profrecruiting@ochsner.org</a></td>
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#### Michigan

<table>
<thead>
<tr>
<th>Position Description</th>
<th>Contact Information</th>
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</thead>
<tbody>
<tr>
<td>Neurinterventionalist</td>
<td><a href="mailto:brackenridge@spectrumhealth.org">brackenridge@spectrumhealth.org</a></td>
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</table>

#### New Jersey

<table>
<thead>
<tr>
<th>Position Description</th>
<th>Contact Information</th>
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</thead>
<tbody>
<tr>
<td>Critical Care Neurologist</td>
<td><a href="mailto:zhangt@usnj.edu">zhangt@usnj.edu</a></td>
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#### New Mexico

<table>
<thead>
<tr>
<th>Position Description</th>
<th>Contact Information</th>
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<tbody>
<tr>
<td>Neuro Critical Care with Stroke</td>
<td><a href="mailto:HYonas@salud.unm.edu">HYonas@salud.unm.edu</a></td>
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</table>

#### New York

<table>
<thead>
<tr>
<th>Position Description</th>
<th>Contact Information</th>
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<tbody>
<tr>
<td>Neurocritical Care Attending</td>
<td><a href="mailto:HYonas@salud.unm.edu">HYonas@salud.unm.edu</a></td>
</tr>
</tbody>
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**For full details on all available positions including position descriptions, applicant requirements and further contact information, visit our website at http://www.neurocriticalcare.org/jobs/job-opportunities.**
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<tr>
<th>Location</th>
<th>Position</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ohio</strong></td>
<td>Neurointensivist – Columbus, Ohio - Riverside Methodist Hospital</td>
<td>Send resume to: Ilene Morrow at <a href="mailto:Ilene.morrow@ohiohealth.com">Ilene.morrow@ohiohealth.com</a></td>
</tr>
<tr>
<td><strong>Pennsylvania</strong></td>
<td>Advanced Practice</td>
<td>Send resume to: <a href="mailto:Meredith.Kirkpatrick@uphs.upenn.edu">Meredith.Kirkpatrick@uphs.upenn.edu</a></td>
</tr>
<tr>
<td></td>
<td>Nurse Practitioner or Physician Assistant</td>
<td>Apply online at: <a href="http://www.pennmedicine.org/careers">http://www.pennmedicine.org/careers</a></td>
</tr>
<tr>
<td></td>
<td>Neurohospitalist - Pittsburgh - The University of Pittsburgh Physicians (UPP)</td>
<td>Send resume to: Lawrence Wechsler, MD Chair, Department of Neurology 3471 Fifth Avenue, Suite 811 Pittsburgh, PA 15213</td>
</tr>
<tr>
<td><strong>South Carolina</strong></td>
<td>Neuro ICU Physician - Charleston - Medical University of South Carolina</td>
<td>Apply online at: <a href="http://academicdepartments.musc.edu/hr/university/career_opps/index.htm">http://academicdepartments.musc.edu/hr/university/career_opps/index.htm</a></td>
</tr>
<tr>
<td><strong>Utah</strong></td>
<td>BC/BE Neurocritical Care Specialist—Intermountain Medical Center</td>
<td>Send CV to: Wilf Rudert 36 S. State Street, 21st Fl Salt Lake City, UT 84111</td>
</tr>
<tr>
<td></td>
<td>Neurohospitalist - Salt Lake City - Intermountain Healthcare Medical Group</td>
<td>Contact: Intermountain Healthcare, Attn: Wilf Rudert at <a href="mailto:PhysicianRecruit@mail.org">PhysicianRecruit@mail.org</a></td>
</tr>
<tr>
<td><strong>Virginia</strong></td>
<td>Neurohospitalist - Assistant/Associate Professor - Charlottesville - University of Virginia</td>
<td>Apply online at: Job Posting 0611052, <a href="https://jobs.virginia.edu/">https://jobs.virginia.edu/</a> or <a href="http://www.click2apply.net/q26xwkm">http://www.click2apply.net/q26xwkm</a></td>
</tr>
<tr>
<td></td>
<td>Neurointensivist - Falls Church - Inova Fairfax Hospital</td>
<td>Contact: Laiith Altaweed, Neuroscience ICU Director at <a href="mailto:laith.altaweed@inova.org">laith.altaweed@inova.org</a></td>
</tr>
<tr>
<td><strong>Wisconsin</strong></td>
<td>Neurohospitalist/Acute Care Neurology Physician</td>
<td>Contact: <a href="mailto:krassei.lavonne@marshfieldclinic.org">krassei.lavonne@marshfieldclinic.org</a> Dynamic Practice Opportunity for Neurology Specialists &amp; Sub Specialists - Milwaukee Apply online at: <a href="http://www.click2apply.net/3wtmz23">http://www.click2apply.net/3wtmz23</a></td>
</tr>
<tr>
<td><strong>Texas</strong></td>
<td>Acute Care Nurse Practitioner or Physician Assistant</td>
<td>Send CV to: <a href="mailto:Kiwon.Lee@uth.tmc.edu">Kiwon.Lee@uth.tmc.edu</a> Neurointensivist - Galveston - University of Texas Medical Branch Send resume to: John Sealy at <a href="mailto:anbhardw@utmb.edu">anbhardw@utmb.edu</a> Neurohospitalist - Abilene - Hendrick Medical Center Contact: John McMahan at <a href="mailto:jmcmahan@ehendrick.org">jmcmahan@ehendrick.org</a> Neurocritical Care Specialist - El Paso - Texas Tech University Health Sciences Center Apply online at: <a href="http://jobs.texastech.edu/">http://jobs.texastech.edu/</a> Registered Nurse – Surgical ICU—Methodist Hospital Apply online at: <a href="https://hca.taleo.net/careersection/jobdetail.flt?job=02531-53826&amp;lang=en&amp;sns_id=gmail">https://hca.taleo.net/careersection/jobdetail.flt?job=02531-53826&amp;lang=en&amp;sns_id=gmail</a></td>
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<tr>
<td><strong>California</strong></td>
<td>Neurocritical Care Fellowship Program - Stanford</td>
<td>Contact: Haihong Nguyen at <a href="mailto:haihongn@stanford.edu">haihongn@stanford.edu</a></td>
</tr>
<tr>
<td><strong>Connecticut</strong></td>
<td>Yale New Haven Hospital Neurocritical Care Fellowship - New Haven</td>
<td>Contact: Kevin Sheeh, MD FAHA at <a href="mailto:cathyro.corso@yale.edu">cathyro.corso@yale.edu</a></td>
</tr>
<tr>
<td><strong>Illinois</strong></td>
<td>Neurocritical Care Fellowship - Chicago</td>
<td>Contact: Danielle Hill, MBA at <a href="mailto:Danielle_C_Hill@rush.edu">Danielle_C_Hill@rush.edu</a></td>
</tr>
<tr>
<td><strong>Maryland</strong></td>
<td>Neurocritical Care Fellowship - Baltimore</td>
<td>Contact: Neeraj Badjatia, MD MS FCCM at <a href="mailto:nbadjatia@umm.edu">nbadjatia@umm.edu</a></td>
</tr>
<tr>
<td><strong>Michigan</strong></td>
<td>University of Michigan Fellowship Training in Neurocritical Care</td>
<td>Contact: Venkatakrishna Rajajee, MD at <a href="mailto:venkatak@med.umich.edu">venkatak@med.umich.edu</a></td>
</tr>
<tr>
<td><strong>Missouri</strong></td>
<td>Neurocritical care fellowship at Washington University - St. Louis</td>
<td>Contact: Rajat Dhar, MD at <a href="mailto:dharr@wustl.edu">dharr@wustl.edu</a></td>
</tr>
<tr>
<td><strong>Texas</strong></td>
<td>Neurocritical Care Fellowship - Houston</td>
<td>Contact: Diana Saavedra at <a href="mailto:Diana.L.Saavedra@uth.tmc.edu">Diana.L.Saavedra@uth.tmc.edu</a> Interventional Neurology Fellowship - Irving Contact: Dan Iliff at <a href="mailto:daniel.iliff@hcahealthcare.com">daniel.iliff@hcahealthcare.com</a></td>
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