# SNACC NEWS

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President’s Message

Deborah J. Culley, MD
SNACC President

Welcome to the 2015 Annual Meeting edition of the SNACC Newsletter. The 43rd Annual Meeting of SNACC will take place in San Diego on October 22-23 and I would like to encourage all members to attend.

First, the votes are in and we have a new Secretary/Treasurer and member of the Board of Directors (BOD). As usual, there were multiple high quality applicants for each position. On behalf of the Board of Directors of SNACC it is my pleasure to congratulate Dr. Deepak Sharma on his election to a second term on the BOD, where he serves as Chair of the Education Committee, and Dr. Rafi Aritsan on his election as the 2015-2016 Secretary/Treasurer. Their terms start at the conclusion of the business meeting in San Diego.

The Annual Meeting provides members an opportunity to meet friends and colleagues in an environment filled with academic excellence. The Program Planning Committee for this year’s meeting, led by Dr. George Mashour, has created an interesting and stimulating program that begins on Thursday afternoon with a Mentoring Workshop on “Transition from Training to Practice,” moderated by Dr. Channanit Paisansathan; A Clinical Care Symposium on “Chronic Pain and the Neurosurgery Patient,” moderated by Dr. Irene Osborn; and a Basic Science Symposium that I have the privilege of moderating on one of my favorite topics, “Anesthetic Neurotoxicity in the Young and Elderly.” Learning and social opportunities extend into the evening with the Dinner Symposium on “Contemporary Multimodal Monitoring of the Brain,” which will be moderated by Dr. Martin Smith.

The formal Annual Meeting begins on Friday with the second annual Maurice Albin Keynote Lecture on “Consciousness and Anesthesia” by Dr. Michael Alkire. This will be followed by a Mini Symposium on “Neurologic Complications in the Perioperative Period” that will be moderated by Dr. Adrian Gelb. The very popular first of two poster sessions will follow and the morning ends with the Business Lunch and Award Presentations.

The afternoon program kicks off with a Mini Symposium moderated by Dr. Max Kelz on “The Unresponsive Patient,” that will be followed by another energy filled poster session. A Pro/Con debate on “The Perioperative Home and Neurosurgical Patients: Promises and Pitfalls,” moderated by Dr. Gregory Crosby caps off the main program. The Annual Meeting will conclude with meetings of the Special Interest Groups and a relaxing Wine and Cheese Reception.

When you sign up for the meeting, please take the opportunity to donate to the FAER Scholars Program. These donations are used to pay the registration for FAER Scholars to attend the Mentoring Session on Thursday and the Annual Meeting on Friday. In this way, you can directly support the development of our leaders of tomorrow. Please remember to book a room in the Manchester Grand Hyatt Hotel, which will be the SNACC headquarters hotel.

All good things come to an end and my tenure as President of SNACC concludes at the close of the business luncheon in October. At that time, I will be handing over the responsibility for SNACC to Dr. Andrew Kofke, a close colleague and personal friend. Andy is an energetic and hard-working advocate for neuroanesthesia and neurocritical care. I am confident the society will flourish under his leadership. My time on the BOD and Executive Committee have been fulfilling and fun. It has been a great honor to be President of SNACC, mostly because of the pleasure of working with the BOD and SNACC members and especially our junior colleagues and future leaders. The brain ROCKS and so does SNACC! Thank you for your support!

Register Now for SNACC’s 43rd Annual Meeting!

The 43rd SNACC Annual Meeting is coming up on October 22-23 in beautiful San Diego, California! Join peers, colleagues, educators, and exhibitors for this year’s premier event for the Society for Neuroscience in Anesthesiology and Critical Care. For more information, to register for the meeting and to make hotel reservation, click on the links below.

[Mobile Meeting Guide] [Online Registration] [Hotel Reservations] [Exhibitors]
Editor’s Corner

Reza Gorji, MD
Editor

I hope you enjoy this issue of the newsletter with contributors from many institutions. This issue has information on the SNACC Annual Meeting coming up on October 22-23 at the Manchester Grand Hyatt Hotel in San Diego, California. It promises to be very educational and productive.

The SNACC committees have been busy with their missions to further neuroanesthesia. Their respective reports are available for reading in this issue.

In this issue of the newsletter, I included the SNACC newsletter from November 1974. (See page 9.) It is amazing how much SNACC has evolved over the years.

A special thank you goes out to SNACC member Dr. Karina Castellon-Larios, Post Doctoral Researcher, Department of Anesthesiology, The Ohio State University, Wexner Medical Center in Columbus, Ohio. Dr. Castellon-Larios works closely with Association Manager, Sandra Peterson on every SNACC newsletter in translating articles into Spanish. We are so grateful for all that Dr. Castellon-Larios does for SNACC!

Hope you find this issue informative and of interest.
Best wishes to you all.

An Update from the Research Committee

William M. Armstead, PhD
Chair, Research Committee

A new initiative of the SNACC Research Committee will be the development of a web-based tool designed to foster collaboration amongst SNACC members. The intent is to have SNACC members enter information pertaining to their research interests and techniques. Through use of key words, members will be able to search for experts in a desired area. It is hoped that the members will use this web-based searchable directory to identify people who might answer specific research-based questions and/or begin new collaborations that result in co-authored manuscripts and grant submissions. As an example, my research interests will be listed, providing orientation as to the types of information that SNACC members may choose to enter into the respective topic areas of research techniques, current interests, etc. Roll out of this initiative should happen in the near future.

CLICK HERE to enter information pertaining to your research interests and techniques (member login required).

SNACC Periscope

Have you listened to the new audio segment on the website – the “Periscope”? A great resource for SNACC members available on SNACC’s website. Each session is 7-15 minutes. In each segment, the Education Committee interviews leading SNACC experts in various areas. CLICK HERE to view.

- July 2015
  Exploring Pediatric Neuroanesthesiology
  Sulpicio Soriano, MD

- June 2015
  Intra Arterial Drug Delivery to the Brain
  Shailendra Joshi, MD

- May 2015
  Oxygen Therapy in Acute Brain Injury
  Gary Fiskum, PhD
A Challenge to Communication in the Neurosurgical Suite

Marie Angele Theard, MD
Assistant Professor, Anesthesiology
Washington University School of Medicine

Space for equipment, multiple surgical teams, and the theoretical risk of infection are reasons neurosurgeons are requesting a 180° configuration for their neurosurgical procedures. This position change from the more proximal 90° configuration presents a challenge for the anesthesiologist on the other side of the room to remain an active participant of the surgical team. Historically, after induction of anesthesia, turning the patient (the head) 90° away from the anesthesiologist allowed room for large instrument tables, the surgical microscope, stealth navigation and today, intraoperative MRI (iMRI). Access to the airway to troubleshoot worrisome changes in respiratory status and prompt cooperation with planned and unplanned changes to the surgical plan, was easily achieved in this juxtaposition. In addition to the difficulty of addressing potential airway catastrophes, communication, an essential part of a well-functioning operating room team is limited in this 180° configuration. The Anesthesia Patient Safety Foundation, a strong advocate for the “systems” approach to patient safety supports continual discovery and improvement in patient care.1,2 As leaders in patient safety, appreciation of this position change and its potential impact on the best possible care of our patients are commensurate with our remaining successful in achieving this aim.

Arguments for the 180° configuration are notable: the transphenoidal approach for pituitary tumors and/or large intracranial tumors, involving the orbit for example, requires space for additional surgical teams and equipment leaving little room for the anesthesiologist and his/her equipment; surgical site infection in the neurosurgical patient can be especially hazardous given the proximity of the CSF and brain prompting increasing the space between non-sterile members of the operating room team and the craniotomy site. While limiting operating room traffic and filtered air ventilation systems help reduce airborne bacteria, proximity of “non-sterile” personnel (masks and hats minus surgical gown and gloves) as a cause of postoperative infection is so far, at best, theoretical.3 While these concerns cannot be dismissed, an awake craniotomy with the surgical site and surgeon angled 180° away from the anesthesiologist is inconceivable. The 90° configuration ensures patient safety by facilitating ongoing communication between the patient, neurosurgeon and anesthesiologist whose place near the patient’s airway secures the opportunity to promptly address potential airway emergencies.

Technological advances like wide screen TVs have dramatically improved our “over the shoulder” viewpoint of neurosurgery making the 180° arrangement seemingly innocuous. This detailed view keeps us in concert with the surgeon during every step of aneurysm clipping, for example, and may effectively appear to reduce the distance between team members. However, the five-six foot gap between anesthesiologist and neurosurgeon added to the multitude of operating room noises, amplifies the difficulty of communicating during these complex neurosurgical procedures.4 Intraoperative rupture of intracranial aneurysms occurs at a rate of 7-35% and contributes to considerable morbidity and mortality.5,6 While outcome after this catastrophic event depends on aneurysm location, morphology, history of rupture, surgical technique and experience, team preparedness in the face of intraoperative rupture may be life-saving.5 Temporary clipping requires consideration of time to prevent irreversible ischemia as well as neuro-protective strategies like pharmacologically-induced burst suppression and hypertension. Coordinated efforts from all members of the team including the surgeon, anesthesiologist and nursing staff during these precarious circumstances requires clear, ongoing communication to facilitate the opportunity for a good outcome. Communication was one of the six categories noted in Wong’s evaluation of contributory factors in adverse events in neurosurgery.7 Consequent recommendations from this group are full integration of the (World Health Organization) WHO Surgical Checklist which necessitates effective communication.

The surgical suite is one of the most dynamic environments of patient care and where a majority of adverse events in hospitalized patients occur.8 Nearly half of these events, costing between 17 and 29 billion dollars per year, are preventable.8 Poor communication in the operating room is a major contributor to these unwanted adverse events.9 The briefing and time-out requirement of the WHO Surgical Checklist establishes a forum of communication allowing anesthesiologists, surgeons and operating room staff the opportunity to discuss the operating room plan and possible contingencies.10 The welcomed reduction in morbidity and mortality has led to world-wide institution of this program. In a multi-center retrospective study with a
concurrent control group, Neily et al demonstrated a significant decline in mortality compared to controls (18% vs 7% decline) in hospitals following the WHO Checklist after medical team training.11 Crew Resource Management (CRM), adapted from the aviation industry and instituted as a part of medical team training in this study, empowers individual team members to speak up as patient concerns arise during surgery. The authors concluded that improved teamwork, derived from team training based on CRM, improved communication and contributed to improved patient outcomes.

Anesthesiologists are the ultimate guardians of surgical patients’ welfare and we must remain vigilant in our efforts to maintain patient safety throughout the perioperative period. Proficient communication is also vital to the operating room team’s ability to perform. Communication, recognized as a primary factor in ensuring patient safety as demonstrated by the establishment and success of “time out” proceedings, must continue throughout the entire surgical procedure. There is no question that the 180° configuration limits our ability to communicate in the operating room and in so doing may compromise patient care during the most critical of circumstances. It is absolutely essential that we, as neuro-anesthesiologists, are involved in decisions regarding patient positioning in the operating room. Presently, there is no “evidence-based” research which states that 90° is better than 180° in patient safety. However, I think that most will agree that during awake craniootomy procedures, communication between the entire operating room team is paramount to the patient’s welfare and not possible in the 180° configuration. At this time, with all aspects of the surgical process under scrutiny, consideration of the impact of the increasing 180° position on patient care compels us to convince our neurosurgical colleagues to return to 90.

References
SNACC Membership Report

Lauren Berkow, MD
Board Member-at-Large
Chair, SNACC Membership Committee

I would like to warmly welcome any new SNACC members reading this newsletter and thank all of our active members for supporting SNACC! The Membership Committee has been busy this past year reaching out to unpaid members to encourage them to rejoin SNACC. If you know of any lapsed SNACC members, please encourage them to rejoin and take advantage of many of the new features we have added to the SNACC website as well as the SNACC Mobile App. With new options of auto renewal, as well as group billing options on the website, membership renewal is easier than it has ever been!

The Membership Committee, along with the SNACC Board of Directors, created a new affiliation for international societies with similar interests to SNACC. The affiliation proposal is offered to any established society in Neuroscience, Neuroanesthesia and/ or Neurocritical Care. Affiliation with SNACC provides the partner organization the following benefits:

1. One year free SNACC membership to any affiliated society members who attend the SNACC Annual Meeting, with reciprocal benefits offered to any SNACC member attending the affiliate society’s Annual Meeting. This benefit would only apply for one meeting. Membership includes reduced (SNACC member) SNACC meeting registration rates (which would apply to the following year), as well as unlimited access to items 2-3 below.

2. Reciprocal access to the member only section of both the SNACC website and the affiliated society’s website (if applicable).

3. Subscription to the SNACC Newsletter, available in English and partially translated into Spanish.

We are proud to welcome and recognize ISNACC as the first SNACC international affiliate! To learn more about their organization, please visit www.isnacc.org. If any members know of other organizations who may be interested in becoming a SNACC affiliate, please let us know.

Finally, the membership committee has been working closely with the communication committee on new, innovative ways to connect with members using social media.

We look forward to seeing everyone at the Annual Meeting this year!

Authors Pay Close Attention to Impact Factors

James E. Cottrell, MD
Editor-in-Chief
Journal of Neurosurgical Anesthesiology

John Hartung, PhD
Professor, State University of New York
Associate Editor
Journal of Neurosurgical Anesthesiology

The Journal of Neurosurgical Anesthesiology (JNA) 2014 Impact Factor (2.99) was released on June 18, 2015, marking a 27% improvement over JNA’s 2013 Impact factor (2.347) with an increase in rank from 11th among 29 anesthesiology journals to 8th among 30 anesthesiology journals, and from 58th among 204 surgery journals to 37th among 198 surgery journals. From June 18, 2015 to date (August 3, 2015), JNA received 42 submissions for peer review (Clinical Investigations, Laboratory Investigations, Review Articles and Clinical Reports). During the same period of 2014, JNA received 27 submissions for peer review. So, a 27% increase in Impact Factor was quickly accompanied by a 55% increase in submissions.

Analogous evidence in the opposite direction, for a quick drop in submissions following publication of a decrease in Impact Factor, has been published by Phil Davis in reference to PLOS ONE.1 These results suggest that authors pay very close attention to Impact Factors when deciding where to submit manuscripts.

As Ray Charles sang, “Them that’s got are them that gets.” We’re hoping Ray’s adage will hold true for JNA...and that SNACC members will help JNA’s Impact Factor climb ever higher by submitting more of their most important research to JNA.

Reference:
A Message from the Education Committee

Deepak Sharma MD, DM
Chair, Education Committee

Your Education Committee continues to work hard to bring new educational material to you through the website, the newsletter and now the SNACC app on your smartphone. Have you had a chance to listen to the latest editions of the “Periscope”? Dr. Sulpicio Soriano, well known Pediatric Neuroanesthesiologist and ex-SNACC President was interviewed by Dr. Amie Hoefnagel in the segment titled, “Exploring Pediatric Neuroanesthesiology,” where he discussed how the subspecialty has advanced in the last several years and the future trends. In another edition, Dr. Shailendra Joshi was interviewed by Dr. Jack Buckley, where he shared his experiences with “Intra Arterial Drug Delivery to the Brain.” We would love to hear your thoughts about the “Periscope” and receive your suggestions about the topics and the experts you would like to listen to!

The task force for developing a tool for evaluating ACGME “milestones” for resident education in Neuroanesthesiology is making good progress. The task force members are senior educators with extensive experience in education and are being supported by an advisory committee. The task force anticipates completing the work by October 2016.

We have heard your appreciation of the Article of the Month segment being run by Dr. John Bebawy. We are grateful to the various experts who have contributed the critical commentaries on recently published clinical, translational, as well as basic research articles, of relevance to Neurosciences. We are glad that you find the monthly interactive Neuroanesthesia Quiz fun and interesting. Drs. Shobana Rajan and Shaheen Shaikh put in a lot of work to make sure that a new quiz is published for you every month. Drs. Arne Budde and Laura Hemmer are our experts behind the Interactive Clinical Case Discussions. Please feel free to encourage your residents/trainees to access the quiz and the case discussions from the SNACC website. Based on the Google analytics we know that the educational material on our website is being accessed by interested learners across the world.

As always, we would love to hear from you any suggestions, ideas or feedback you may have for the committee. Please feel free to email me at dsharma@uw.edu.
Presented below and going forward, the newsletter will be presenting educational material related to neuroscience, neuroanesthesia and critical care. We hope this proves educational to SNACC members. If you want to contribute materials to this section please email rgorji@gmail.com. Please make the subject line read: Neuromonitoring Case.

Cortical Mapping
Presenter: Reza Gorji, MD

The cerebral cortex of a patient was exposed during a craniotomy to map seizure foci. The patient had problems with aphasia but understanding words was not an issue. During seizures, hand function would be lost. What do the letters F, T, H and W signify? What does the term spike mean? Good luck and have fun.

Answer is on page 15.
SNACC's First Annual Meeting and Newsletter

November 12, 1974

FALL NEWSLETTER

Over 150 registrants participated in our first annual meeting in Washington, D.C. It was a success from the standpoint of both a teaching and scientific endeavor. A review of this meeting is currently being prepared for publication either within our newsletter or in the Anesthesiology Meeting Reports Section. Plans are currently being formulated for our next annual meeting which will be held in conjunction with the ASA meeting in Chicago.

A number of issues were discussed at our dinner-business meeting. Fresh from the success of annual meeting, a number of our members felt that its size was optimal and that some limits be placed upon future membership and meeting size. A consensus was reached directing our membership remain open for at least an additional year. It was a committee, chaired by Alan L. Smith and consisting of the executive committee was appointed to formulate plans for future membership policies. This committee will evaluate membership trends this year and the number of registrations for our next meeting in Chicago. Their report is due for consideration at our next annual business meeting.

It was decided that the format for the annual meeting remain the same. That means there will be two morning panels dedicated to intra-operative problems and the other to extra-operative problems. Your suggestions for panel topics should be directed to the Secretary. Time for the collaborative studies report will be also be included in the program, and the informal scientific sessions will remain unchanged in its format.

The ASA has requested through our president that a representative be sent to a meeting considering policies by which a formal affiliation with the various subspecialty groups in anesthesiology will be decided. A member of our executive committee will be appointed to represent us at this meeting.

The American Association of Neurological Surgeons Meeting will be held in Miami on April 6-10, 1975. Again we will be involved in a number of breakfast panels and there will be a scientific session devoted to neuroanesthesia. A call for abstracts (R.H. December 15th deadline) is enclosed. Dr. Peter J. Cohen and Steven Goyte will serve as referees for our part of the program.

Our growth as a society indicates the interest in an enhanced stature of neuroanesthesia and intensive care in the medical community. Your ideas and priorities for our society are important in establishing our directions during these important formative years. Please let your officers know what you think your society should be doing.

Respectfully submitted,

Harvey N. Shapiro, M.D.
Secretary-Treasurer

Enclosures: Current membership list
Call for abstract form
Fall newsletter
Interview with Hemanshu Prabhakar, MD

Reza Gorji, MD
Editor

In this issue of the newsletter, we are going to interview one of the great neuroanesthesiologist in India, Dr. Hemanshu Prabhakar. He is an additional professor in the Department of Neuroanaesthesiology and Critical Care at the All India Institute of Medical Sciences (AIIMS) in New Delhi. Thank you Dr. Prabhakar for agreeing to this interview.

Editor: Can you please describe your institution All Indian Institute of Sciences? Is there a neuroanesthesia program present for residents and fellows? Are you at a big referral center?

Dr. Prabhakar: The All India Institute of Medical Sciences (AIIMS), New Delhi, India, is a tertiary care referral center and has been in existence since 1956. AIIMS conducts teaching programs in medical and para-medical courses both at undergraduate and postgraduate levels and awards its own degrees. Teaching and research are conducted in 42 disciplines. Neurosciences Center is one of the seven centers that comprise this hospital. The Department of Neuroanaesthesiology and Critical Care, runs the three-year degree course, DM – Neuroanaesthesia, for both regular candidates (eight seats) and sponsored candidates (three seats). There is now a proposal of expansion of this program and the seats are likely to be increased in the near future. The department also provides short (six months) and long-term (six months to two years) training in neuroanaesthesia and critical care. The department is equipped with latest machines and gadgets and provides services to allied branches such as neurosurgery, neurology and neuroradiology. The department caters clinical service to six well-equipped neurosurgical OTs, a brain suite (MRI- OT), two neuro-cath Labs, two MRI facilities, One Gamma-Knife facility, one pain clinic and a pre-anesthetic check-up (PAC) clinic. AIIMS is one of the largest referral centers in the country.

Editor: How has neuroanesthesia changed in your view in the past decade and where do you see it in the next 10 years?

Dr. Prabhakar: Neuroanesthesia has changed and grown remarkably in the last decade. The awareness and need for dedicated neuroanesthetists has increased with the growth of neurosciences. In India, more neurosurgeons are now opting for trained neuroanesthetist when compared to those with limited experience in neurosurgical field. India is now seeing an upsurge of hospitals and centers dedicated to neurosciences and trauma. As a ‘superspeciality’, neuroanaesthesia is seeing increase in the number of neuroanaesthetists each year. More resident doctors now wish to take up neuroanaesthesia as their career. Neuroanaesthesia definitely has a great prospect in the future.

Editor: Do your neurosurgeons prefer to see a neuroanesthesiologist across the drapes?

Dr. Prabhakar: Yes, at all times.

Editor: Is research important in your institution?

Dr. Prabhakar: Research forms an important part of training at the AIIMS. Candidates pursuing the DM degree course are expected to conduct clinical research and submit their thesis at the end of three years. Non-academic resident doctors and trainees are also encouraged to conduct audit work and clinical studies during their training period.

Editor: Do you have a specialized area in the ICU for neurosurgical patients? Do neurospecialist cover the service?

Dr. Prabhakar: We have two neurosurgical ICUs (total 26 beds), one neurology ICU of five beds, more than two OTs for A I I M S is one of the largest referral centers in the country.
trauma patients, a twenty bed ICU for neurotrauma patients apart from providing resuscitation measures for neurological and neurosurgical ward patients.

**Editor:** Do you see an opportunity for ISNACC to collaborate with SNACC?

**Dr. Prabhakar:** ISNACC is now rapidly growing with the help of its active members. It has the honor of being the first international society to get affiliated to SNACC. ISNACC has started taking initiative for collaborative work and the introduction of the SNACC panel in the annual conferences of ISNACC is one such example. ISNACC members are now regularly participating in SNACC meetings and presenting their research papers. Some have even won the Travel Awards in the past few years. ISNACC can now look forward to academic collaborations and can be efficiently involved in multicentric trials and international research projects. Most of the centers where neuroanesthesia is being practiced have state-of-the-art infrastructure. Logistics can be worked out towards appropriate usage of resources and manpower. The possibility of an exchange program of resident doctors and faculties for the short-term can also be a great initiative between the two societies.

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**Attention SNACC Members!**

Are you using Internet Explorer (IE) as your browser to view the SNACC website? The problem lies with the Compatibility View Settings in Internet Explorer.

Follow these few simple steps on your computer and it will adjust so you can view the website correctly.

Visit the SNACC website home page ([www.snacc.org](http://www.snacc.org)), then Tools (or the gear icon, top right) -> Compatibility View Settings, please remove snacc.org from the list.

Normally compatibility view fixes display problems, but in this case, it is telling your browser to display SNACC in IE Version 7, which does not support the CSS needed to make the site display correctly.

Please contact us at snacc@snacc.org if you need any further assistance.

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**Welcome New Members**

**ACTIVE**

Jaime E. Arbelaez, MD .............................................. Miami, FL
Ian Beauprie, MD ...................................................... Halifax, NS, Canada
Miles Berger, MD, PhD .............................................. Durham, NC
Maria J. Carmona, MD, PhD ..................................... Sao Paulo, SP, Brazil
Ryan Field, MD ....................................................... Ladera Ranch, CA
Kevin Gingrich, MD ............................................... Frisco, TX
Sprague Hazard, MD .............................................. Hummelstown, PA
Andrew Herlich, MD ................................................. Pittsburgh, PA
Ulrike Hoffmann, MD, PhD .................................... Durham, NC
Isabelle A. Jean-Pierre, MD ....................................... Sunrise, FL
Carlo Mariotti, MD ................................................ Dartmouth, NS, Canada
Nicholas B. Nedeff, MD .......................................... Coconut Grove, FL
Rob Sanders, MD ..................................................... Madison, WI
Minghan Leo Tsay, MD ........................................... Brookline, MA

**SNACC FELLOW**

Veronica Crespo, MD ................................................. Durham, NC
Darreul Sewell, MBChB, FRCA ............................ Vancouver, BC, Canada
Sophia C. Yi, MD ..................................................... San Diego, CA

**SNACC RESIDENT**

Arney Abcejo, MD ............................................... Rochester, MN
Odmara Barreto Chang, MD, PhD ....................... Burlingame, CA
Aaron Norris, MD, PhD ........................................ St. Louis, MO
Carlos Rodriguez, MD ............................................ Miami, FL
Seelora Sahu, MBBS, MD ..................................... Chandigarh, India
Amlan Swain, MBBS, DA, DNB ............................ Chandigarh, India

**STUDENTS**

Shawn Reddy .......................................................... Houston, TX
Evidence-based Practice of Neuroanesthesiology – A Way Forward!

Indu Kapoor, MD
Assistant Professor
Hemanshu Prabhakar, MD
Additional Professor
Department of Neuroanesthesiology
All India Institute of Medical Sciences, New Delhi, India

Introduction
Evidence-based practice (EBP) in the clinical practice was formally introduced in 1992. The first EBP was started in medicine as evidence-based medicine (EBM) and later on spread to other fields such as nursing, psychology, education and library sciences. EBP involves conscientious decision making which is based on the available best evidence as well as preferences and patient characteristics. EBP got its reputation because of its reasoning on all procedures, medicines and treatment and assuring patient safety. EBP is to enhance and promote safe medical practice, and to offer guidance for diagnosing, managing or treating clinical conditions. These EBP parameters can be adopted to form guidelines or advisories. The components of guideline development include review and evaluation of published scientific evidence, meta-analytical assessments of controlled clinical studies, and statistical assessment of expert and practitioner opinion by formally developed surveys and informal evaluations of opinions obtained from invited or public commentary. Sources of these evidences are either literature-based or opinion-based. Literature-based sources include randomized controlled trials (RCTs), non-RCTs, controlled observational studies, uncontrolled observational studies, retrospective studies and case reports. However, opinion-based sources include consultants, survey opinions, invited sources, experts, open forum commentary and internet commentary.

Evidence-based Practice and Neuroanesthesiology

Neuroanesthesiology is a rapidly growing superspeciality which has achieved a remarkable growth in neuroanesthetic techniques and management. Despite all achievements, controversies are still present. Most of the multicentric trials conducted provide results which have very little clinical significance. Most randomized controlled trials (RCTs) focus on surrogate end-points rather than clinical or neurologic outcomes. According to the current clinical evidence, the target intracranial pressure (ICP) should be maintained < 20 mmHg, and cerebral perfusion pressure (CPP) should never exceed > 70 mmHg. The target CPP should be maintained between 50-70 mmHg; however, critical CPP is considered between 50-60 mmHg. The volatile anesthetic agents depress the cerebral metabolic rate in a dose-dependent manner. Sevoflurane causes less cerebral vasodilatation compared to isoflurane or desflurane. Though nitrous oxide is a potent cerebral vasodilator, no outcome studies demonstrate its deleterious effect. Total intravenous anesthesia (TIVA) received attention in neuroanesthesia as it avoids cerebral vasodilation. Intravenous agents, such as propofol, produce cerebral vasoconstriction and reduction in cerebral blood volume, cerebral blood flow and ICP, secondary to decrease in cerebral metabolic rate of oxygen consumption, while preserving cerebral autoregulation. Hyperventilation has a short-term, but profound, effect on CBF. It could be a lifesaving measure in the treatment of acute intracranial hypertension. However, if hyperventilation is used for a prolonged period, it has not been certainly shown to be beneficial to the patients. It has been observed that the patients who were hyperventilated had significantly worse outcomes than those on normal ventilatory rate. Presently, there is no evidence to suggest that it improves clinically relevant outcomes (death or neurologic disability). Mechanical ventilation and addition of positive end expiratory pressure (PEEP) can lead to an increase in ICP, though the higher level of PEEP that can be used safely without increase in ICP is up to 15 cm H2O. Hyperosmolar therapy, including mannitol or hypertonic saline, can rapidly reduce the ICP. Raised ICP can cause global ischemia or even brain death if it’s value crosses 50-60 mmHg. The brain contains 80% water, so the use of hyperosmolar agents to create an osmolar gradient between the systemic circulation and brain has a significant role. Hypertonic saline and mannitol do not cross the blood-brain barrier; hence, drawing water out of the injured brain. However, in the condition where the blood brain barrier is disrupted, these hyperosmolar agents will not be effective. The interstitial accumulation of mannitol is most prominent if used in continuous infusion, therefore it is recommended to use mannitol as repeated boluses than continuous infusion. There is no conclusive evidence that supports the role of hyperosmolar agents in saving lives or intercept disability. There is no distinct evidence at present to suggest whether mannitol or hypertonic saline is superior over another in reducing intracranial pressure.

Various positions are used during neurosurgical procedures, such as supine, prone, right- or left-lateral recumbent, park-bench, trendelenburg and reverse trendelenburg positions. Prolonged
supine position can lead to further increase in ICP over a period of time. Though prone position can be used to improve cerebral perfusion pressure in traumatic brain injury, it can lead to an increase in ICP due to increase in intra-abdominal pressure due to direct pressure over it. Lateral position without head elevation can lead to an increase in ICP. Trendelenburg position can lead to increased intracranial pressure, however, reverse trendelenberg position (30 to 40 degrees head up) reduces the ICP as long as mean arterial pressure is maintained.¹¹

Decompressive craniectomy is a neurosurgical procedure done for the treatment of raised intracranial pressure (ICP) in patients with traumatic brain injury. It has been observed that the decompressive craniectomy produces overall improvement of cerebral compliance by decreasing the ICP. There is no evidence from randomized controlled trials that supports the use of decompressive craniectomy to reduce unfavorable outcomes in adults. However, in the pediatric population, it reduces the risk of unfavorable outcomes and death.¹² Further studies are required to assess its influence on outcome.

Evidence for Brain Protective Strategies

There has been lot of research done to identify the neuroprotective strategies. However, no strong guidelines based on relevant clinical evidence are present. This may be due to the complexity of the mechanisms in cerebral ischemia. Most anesthesiologists agree that maintaining cerebral perfusion pressure and oxygenation is the most effective neuroprotective strategy. Earlier it was believed that hypothermia offers the neuroprotective effect. However, in recent large clinical trials, hypothermia failed to improve the neurologic outcomes.¹³, ¹⁴ The effect of mild hypothermia (32° to 35° C) on cerebral metabolic rate is much less, compared to deep hypothermia (18°-22° C), which is neuroprotective. Presence of persistent hyperglycemia after an episode of stroke increases the size of ischemic brain injury and worsens the outcome. The mortality rate decreases if the glucose levels are normalized after an acute ischemic episode. However, tight glucose control is associated with higher incidence of hypoglycemia.¹⁶ Corticosteroids are not advised in traumatic brain injury, as there is no strong clinical evidence to support its benefit.¹⁷ Two clinical trials have observed that low diastolic blood pressure in early ischemic stroke worsens the neurologic outcome.¹⁸, ¹⁹ Experimental evidence confirms the neuroprotective effect of inhalational agents in both global and focal ischemia. Preconditioning by inhalational agents is an additional mechanism of neuroprotection. Barbiturates also have neuroprotective ability. However, mixed results are published and its perioperative clinical efficacy is controversial. Propofol attenuates the level of S100 beta level (marker of brain injury) and improves neurological outcome.²⁰ Magnesium has been found to reduce the risk of delayed cerebral ischemia in subarachnoid patients because of its direct vasodilatory effect.²¹ There has been growing evidence of dexmedetomidine in neuroprotection, cardio-protection and reno-protection.²²

There are no formal guidelines present regarding intraoperative neuroprotection. Most of the clinical evidences are weak due to lack of large randomized controlled trials. The recommendations mainly consist of avoidance of deleterious interventions rather than beneficial measures.

Evidence and the Brain Trauma Foundation Guidelines

According to Brain Trauma Foundation (BTF) 2007 Guidelines, there is level one recommendation for not using steroids in traumatic brain injury because it leads to an increase in the mortality rate.²³

Unresolved Issues in the Practice of Neuroanesthesia

Multimodality monitoring is a practice by which a variety of brain monitors are utilized to deliver care, specific to the needs of the individual patient, in an attempt to minimize secondary injury and long-term disability. Despite being recommended by international guidelines, standard ICP monitoring may be insufficient for detecting all episodes of secondary brain injury.²⁴ Multimodality monitoring in neurocritical care is a complex undertaking, being very labour intensive and requiring continuous availability of high level technical support. However, multimodality monitoring for severely head injured patients has no effect on outcome.²⁵ Use of hypertonic saline gained popularity as it was believed to have more physiologic control of ICP.²⁶ A recent meta-analysis showed a higher rate of treatment failure or insufficiency with mannitol versus hypertonic saline. However, data is limited by a small number of patients and RCTs with inconsistent study designs.³ From the limited data available on the use of mannitol and hypertonic saline, it is suggested that hypertonic saline significantly reduces the risk of tense brain during craniotomy. A single trial suggests that an ICU stay and hospital stay are comparable with the use of mannitol or hypertonic saline.³⁰ The DECRAB trial suggests that decompressive craniectomy reduces ICP and ICU days; however, it does not improve the mortality and worsens functional outcome at six months.³² RESCUEicp [Randomised Evaluation of Surgery with Craniectomy for Uncontrolled Elevation of Intracranial Pressure] trail may clarify issues. Regarding barbiturate coma for refractory status epilepticus (RSE), there is lack of robust and randomized controlled evidence that can clarify the efficacy of propofol and thiopental sodium over each other in the treatment of RSE.³³ There is a need for large, randomized controlled trials for this serious condition. According
to a recent systematic review, there is no evidence that the use of induced hypothermia is associated with a significant reduction in mortality or severe neurological disability, or an increase in harm in patients undergoing neurosurgery. However, conventional cooling methods for inducing mild therapeutic hypothermia seem to improve survival and neurologic outcomes after cardiac arrest. There is an independent association between blood transfusion and poor outcomes. Cerebral blood flow dynamics and oxygen delivery are critical components in neurologic patients. In SAH patients, the target Hb concentration should be kept above 8-10 gm%. Most neurointensivists agree that Hb should be kept above 7gm%. Platelets should be considered only in presence of platelet dysfunction, regardless of platelet count. Fresh frozen plasma (FFP), Vitamin K and recombinant factor VII may have potential benefits, but their roles are unclear. the usual practice is to withhold DVT prophylaxis in the first 24-48 hours post trauma. Isolated mechanical methods may not be useful unless combined with pharmaco-prophylaxis. Vena cava filters, calf compression devices and enoxaparin may be useful. Seizure prophylaxis is commonly administered in subarachnoid hemorrhage (SAH), intracerebral hemorrhage, traumatic brain injury and post craniotomy patients. There are no RCTs to demonstrate efficacy of anti-epileptics in SAH and it is not preferred routinely in ICH. In TBI, phenytoin prophylaxis beyond a week offers no benefit.

Conclusion

Recent years have witnessed remarkable achievements in the field of neuroanesthetic techniques and monitoring, with evolving researches and excellent studies. However, a very small fraction of this work is of direct importance in clinical practice. At the same time, it has increased the financial burden and a lot of money is being pumped in for research. There are still many controversies existing in the management and care of patients with neurologic injury. Further large randomized controlled trials or multicentric trials may influence our thinking, decision making and practice in future. The evidence-based practice of neuroanesthesiology could be a way forward – rationalizing our thoughts and planning in terms of research in neurosciences.

References

Answer: F, T, H and W signify location of foot, tongue, hand and Wernicke's area. At a very basic level, the cortex is stimulated and potentials are detected over the cortex (cortex is mapped). Anything with the “spike” means that there is seizure activity. Primary seizure foci are just that; seizures that originate from a primary source rather than spread from another adjacent area like secondary and tertiary areas. After cortical mapping, it became obvious that when seizures spread beyond the primary area, loss of hand function, as well as expressive aphasia, occurred in the secondary and tertiary areas of the patient explaining preoperative problems. Wernicke's area is one of 2 areas of the cerebral cortex involved in speech production. It is names after Carl Wenicke, a German neurologist and psychiatrist. The other area is Broca's area. Dysfunction of Wernicke's area leads to aphasia with significant impairment of language comprehension, while speech retains a natural-sounding rhythm and a relatively normal syntax.
Emergency Neurological Life Support (ENLS)

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Emergency Neurological Life Support (ENLS) is a certified educational program that provides health care providers instruction regarding logical and efficient approaches to diagnosis and treatment of neurologic and neurosurgical conditions in the first hours of an emergency. Its purpose is analogous to that provided by ACLS for cardiac arrest or ATLS for resuscitation of the traumatically injured patient. It is a focused training and certification program designed by expert neurointensivists, neurosurgeons, anesthesiologists, emergency physicians, pharmacists, and nurses.

The primary goal of the course is to help healthcare professionals improve the care of patients with neurological emergencies. The course provides algorithmic protocols that list, explain, and justify important steps in managing a patient with a potential or perceived neurological emergency. Neurointensivists, neurosurgeons (both in practice and in training), emergency physicians, anesthesiologists, medical/surgical intensivists, pharmacists, and emergency and critical care nurses can all benefit from an organized approach respecting the peculiarities of nervous system injury, pathophysiology, and pharmacology.

The following topics are included in ENLS: Acute Non-Traumatic Weakness, Acute Stroke, Airway Ventilation and Sedation, Coma, Intracerebral Hemorrhage, Ischemic Stroke, Meningitis/Encephalitis, Resuscitation following Cardiac Arrest, Spinal Cord Compression, Status Epilepticus, Subarachnoid Hemorrhage, Traumatic Brain Injury, and Traumatic Spine Injury. ENLS also covers the following sub-topics: Elevated ICP and Herniation, Glasgow Coma Scale (GCS), Hunt Hess Classification of SAH, and World Federation of Neurological Scale.

ENLS participants qualify for a maximum of 15 AMA PRA CME credits upon completion. Beginning in October 2015, this course will also provide ACPE, ANCC and CECBEMS credits.

How do interested individuals and institutions access the ENLS course?

Online

Individuals can register online for the ENLS course directly. The user will be provided an account to access the course material and complete the certification exam at their own pace. Users have one year to complete the course. Individual pricing rates apply and vary by specialty and geographic location.

Group Purchases

Institutions can take advantage of reduced group pricing rates by purchasing a bundle of 25 or more access codes. To complete a group purchase, visit the NCS website and fill out a group pricing registration form. The institution will then receive an access code that is valid for the number of seats purchased. Individuals then take the course online at their own pace, or within the institution’s designated time frame. Codes are valid for one year.

Live Courses

Institutions can request an on-site live course facilitated by a certified ENLS Trainer. ENLS Trainers are clinicians with ENLS certification and extra training to prepare them to facilitate a live class. After the in-class ENLS learning experience, participants then complete online testing and certification exams. To schedule a live ENLS course, contact info2@neurocriticalcare.org. To learn how to become a Certified ENLS Trainer, visit the NCS website.

Residency Programs

Through participation in the ENLS course, residents will gain critical exposure to a comprehensive discussion of high yield neurological emergencies. The learning modules are presented in a clear and concise manner and are supported by treatment algorithms and evidence based peer reviewed manuscripts. The course addresses numerous cognitive residency milestones, many of which have previous-
ly proven challenging to address in standard training curricula. The credentialing process allows for objective assessment and documentation of trainee competence.

The following tables demonstrate how ENLS helps fulfill many ACGME milestones in the specialties of neurology, neurological surgery, emergency medicine and anesthesiology. This will allow you to view each milestone and the corresponding overlap of ENLS modules that are addressed in the course.

ACGME-ENLS Neurology Milestones
ACGME-ENLS Neurological Surgery Milestones
ACGME-ENLS Emergency Medicine Milestones
ACGME-ENLS Anesthesiology Milestones

NCS offers a special rate of $50 per resident for online access and course certification. Program directors can purchase a bundle of online course codes to distribute to their residents.

ENLS iBook

The ENLS iBook is a user-friendly reference and teaching tool for those who desire a more focused presentation of the ENLS protocols. The book bridges the gap between the ENLS manuscripts and the online ENLS protocols explaining the principal issues and thoughts between each protocol step. Each chapter is hyperlinked to all of the various tables and chapters for easy reading. The ENLS iBook can be purchased individually or by institutions in bulk.

For more information on ENLS, please contact the Neurocritical Care Society’s Executive Office at info2@neurocritical-care.org or 952-646-2033.