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Association of University Anesthesiologists
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Long-Haul Flights, Foreign Tongues, and Joint-Ventures

Is There Value to Global Engagement for Academic Anesthesiologists?

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Anesthesiologists have long engaged in global outreach. In 1958, Project HOPE launched SS Hope, a hospital ship, that travelled the globe with many an anesthesiologist on board in the provision of humanitarian care. Around the same time, the World Federation of Societies of Anesthesiologists (WFSA) was organizing and today comprises more than 130,000 physicians with a mission to improve global training, safety, and quality standards in perioperative care. Nearly 50 years later the traditional model of global volunteerism and outreach has morphed dramatically into strategic institutional investment by U.S. academic health science systems with the triple aim of clinical care, education, and research.

Across the country, institutional leadership continues to beat the drum of global engagement. The ASA recently signed a Memorandum of Understanding for deeper collaboration with the Chinese Society of Anesthesiologists and the Association of University Anesthesiologists (AUA) is now admitting international members. The American Board of Medical Specialties (ABMS), the ACGME, and the Joint Commission have robust international operations. SS Hope pioneer Robert Crone, a pediatric anesthesiologist and intensivist helped found Harvard Medical International (HMI, now Partners International) in 1997. AUA member John Ulatowski currently serves as the Executive Medical Director of Johns Hopkins Medical International. These organizations function as integrators for the ambitious global missions of two premier U.S. medical centers. Their activities run the gamut of education, research development, consultative patient care, and collaborative engagement on quality improvement and strategic planning. These are just a few examples of substantial resource investments by major U.S. academic centers to produce high impact activities abroad while enhancing international brand recognition. Academic anesthesiologists are very well positioned to be leaders and implementers in the global domain given the interdisciplinary nature of the work that often entails projects on procedure-focused service lines.

Satellite campus development, including joint-venture hospitals, is another front for global endeavors. The Duke – National University of Singapore Graduate Medical School was established in 2005 with substantial local investment to develop a physician scientist model in Singapore and catalyze regional biomedical research and innovation. At the same time, the ABMS and the Singapore Ministry of Health collaborated to develop local standards for clinical training that resulted in ACGME accredited anesthesiology training programs for which the American Board of Anesthesiology (ABA) is presently helping to develop a certifying exam.

In 2001, Weill Cornell Medical College founded a full-fledged medical school in Qatar that has graduated more than 170 physicians with U.S. equivalent credentials; and in 2015, the Cleveland Clinic Foundation will open a full service hospital in Abu Dhabi with clinical leadership drawn from the U.S. campus.

Most acknowledge that academic anesthesiology in the United States is under siege. The time is ripe for global engagement as another avenue to enhance our specialty. Global activities are of major interest to students, trainees, and junior faculty. A recent survey of U.S. anesthesiology residents and fellows revealed that more than 70% of those surveyed agreed that a global health residency track would influence

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program ranking and expressed strong interest in fellowship opportunities that include global exposure. Global tracks have become standard fare in areas such as internal medicine and are gradually evolving in anesthesiology. Cornell, Stanford, and Vanderbilt are among leading departments that offer a global anesthesia fellowship and have formalized global activities in the department. Global opportunities serve to enhance the academic reputation of an academic department, afford junior faculty the chance to develop an international presence at an early career stage, and help to attract top trainees in an exceptionally competitive landscape.

On the research side, leading anesthesiology laboratories continue to attract research fellows from across the globe. Increasingly these fellows are self-funded from sponsoring organizations in their home countries. For example, the Chinese Society of Anesthesiologists funds visiting scholars from top institutions to go abroad for clinical and laboratory projects. In contrast to years past when a primary objective for many scholars was to secure U.S. training or long-term research post, most of today's global scholars plan to take newly enhanced clinical and research skills back home to develop the specialty locally and often assume leadership positions. This arrangement, particularly when multiple scholars come from the same institution under the auspices of structured health system or department engagement, serves as a robust construct for ongoing international collaboration.

Many fundamental anesthesia, pharmacology, and perioperative research questions stand to benefit from cross-border studies. The volume of data that could be leveraged in clinical research from collaborations with high population centers through multi-institutional academic projects is phenomenal. Some centers in China, for example, have IT systems for patient data from integrated hospital networks that rival many U.S. systems. At a time when research funding in the U.S. is tight, other nations are pouring substantial funds into cutting edge science as a primary economic development tool. Moreover, the pharmaceutical and medical device industry is now a global industry with increasing opportunities offered by global biomedical enterprises for funding of cross-border scholarly activity. Global corporate support will naturally go to those Departments with an established institutional track record of productive engagement with the foreign markets of interest.

Clinical innovation centers are sprouting up in health systems nationwide. They are inspired in part by the ACA Transforming Clinical Practices Initiative, the NIH Center for Advancing Translational Studies and the financial benefits to institutions that come from marketable products. Innovation is a two-way street and global exposure both catalyzes idea generation and provides a setting for experimentation. A U.S. trained surgeon in South Sudan led the development of one of the world's first 3D printing prosthetic lab as part of an outreach program. Anesthesiologists have been leaders in programs such as tele-directed Liver Transplantation in India by the Children's Hospital of Philadelphia, the Kepler robotic intubation system and Anesthesia Pre-Cockpit for remote preoperative consultation from McGill University, and the broad collaboration project of the Anesthesia Toolbox housed with CollectedMed at Columbia University. These endeavors bridge the academic, clinical, and translational research areas, are multidisciplinary, and support the type of entrepreneurial opportunities so fervently encouraged by academic health systems today. The programs are inarguably stimulated by collaborations with international centers in resource-constrained environments where the demand for disruptive innovation is acute and the measurable impact rapid and dramatic. As academic anesthesia departments support and participate in these projects the resulting innovations stand to enhance local missions in a feedback loop.

Academic anesthesiologists are constantly reminded of the need to demonstrate value to remain relevant in a rapidly transforming care delivery system. Much of this value-adding engagement will take place outside of both the operating room and the laboratory in the areas of quality, safety, and performance optimization. Leading global endeavors for the health system provides one unique platform to demonstrate value. The perioperative realm is relatively untouched on the global front as compared to basic and social sciences, public health, and primary care. This affords a virtually blank slate and a global laboratory for implementation science. Joint-venture hospitals and consultative engagements typically provide a well-funded platform (often backed by deep-pocketed investment groups) for rapid trial implementation of experimental paradigms such as the perioperative surgical home, without disrupting entrenched local practices. International referral patients can provide an additional source of clinical revenue and further enhance clinician reputations. Global projects in perioperative process improvement and hospital strategic planning provide a construct for anesthesiologists to collaborate across schools (e.g. nursing, policy, management, public health) and in doing so propel the anesthesiology department to the frontlines of a university-wide international effort. In this regard, a "clinical service" department can be transformed into a vital thread in the fabric of the university.

Karen Domino eloquently articulated in the 2014 Rovenstine Lecture that "As anesthesiologists, we can't have our heads in the sand … all of us, regardless of country or type of practice, need to take a leadership role in addressing these changes so that our specialty of anesthesiology will advance in the 21st Century. The clock is ticking, and we need to act now." There certainly are inherent risks and challenges to diverting resources and attention to foreign lands. Anesthesiologists are nonetheless among the most adaptable and resourceful of academic physicians. The time is ripe for us to support institutional missions abroad and to further codify the many informal programs that exist in our departments today. To dismiss the globalization of academic medicine as a fad embraced by enthusiasts who enjoy foreign travel and dabble in foreign tongues, is to throw away a tremendous long-term opportunity for advancement of our specialty.

Don't Miss Your Chance to Present Your Original Research to the Leaders in Academic Anesthesia at the AUA 62nd Annual Meeting!

You still have time to present your original research to the leaders in academic anesthesia at the AUA 62nd Annual Meeting. The submission deadline is Tuesday, January 6.

- **SHOWCASE** your original clinical and basic science research at the AUA 62nd Annual Meeting, April 23-25, 2015, in Nashville, Tennessee.
- **COMPETE** for multiple abstract awards available to junior faculty and residents, including two Junior Faculty Research Recognition Awards, two $1,000 Resident Travel Awards, and the $1,000 Margaret Wood Resident Prize for Research Excellence. Plus, the best clinical science and best basic science poster presentations will be recognized!
- **PLAY** your part in advancing the art and science of anesthesiology, surrounded by the vibrant energy of Music City!
- **SUBMIT** your abstract to the AUA 62nd Annual Meeting by Tuesday, January 6 and present your research before the leaders in academic anesthesia. The submission deadline is Tuesday, January 6. **Submit your abstract today!**

Join us April 23-25 at the Loews Vanderbilt Hotel in Nashville, Tennessee!

For more information or to register, visit **auahq.org/aua-annual-meeting**.

AUA 62nd Annual Meeting • April 23–25, 2015

Loews Vanderbilt Hotel, Nashville, Tennessee

hosted by Vanderbilt University Medical Center

Abstract submission site opens Friday, October 24, 2014

Submission deadline: Tuesday, January 6, 2015

Call for Abstracts

AUA
Association of University Anesthesiologists

For additional information, visit auahq.org/aua-annual-meeting

Renew Your AUA Membership for 2015 Today!

Log in to the AUA Members Only Portal to Renew at http://auahq.org/mem/members.php

2015 Membership Renewal Deadline: Wednesday, December 31, 2014

AUA Call for Member Nominations: Submit Candidates to AUA by January 20!

Association of University Anesthesiologists members are now invited to nominate candidates for membership to the Association for 2015

Nominations will be accepted via the online nomination site until **Tuesday, January 20, 2015 at 11:59 pm Pacific.**

Qualifications for Nomination

Candidates for membership should be either of the following:

- An individual who occupies and has occupied a faculty position in anesthesiology in a medical school or its affiliated teaching hospital for at least 24 months, following completion of residency training in anesthesiology; or
- An individual whose work as an anesthesiologist, teacher, or investigator has demonstrated success in academic anesthesia or an individual who has shown a continued productive interest in and contribution to academic anesthesia.

Exceptions to the residency qualification shall be made at the discretion of the Executive Council when either of the following two conditions applies:

- The candidate has had a course of graduate training in anesthesia of a high standard; or
- The candidate has shown a continued interest in and contribution to academic anesthesia.

Log in to the **AUA Members-Only section** for additional information on the nomination process or to submit your nomination. The AUA Membership will vote on nominees recommended by the AUA Council at the AUA Annual Business Meeting on Friday, April 24, 2015. Please contact the AUA office at 415-296-6950 or **aua@iars.org** with any questions.

AUA NOMINATION SITE NOW OPEN!

Submission Deadline: Tuesday, January 20, 2015 at 11:59 pm Pacific

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Take Your AUA Membership to the Next Level! Apply to Serve on a Committee

The Association of University Anesthesiologists is now inviting members to join and serve on AUA committees. Represent the membership in an area of your interest and take an even more involved membership role.

The following committees are currently seeking new members:

- Scientific Advisory Board
- Educational Advisory Board
- Website and Communications Committee – *4 Openings!*

The responsibilities of these committees are as follows:

- Scientific Advisory Board: Responsible for planning the scientific program of the AUA Annual Meeting.
- Educational Advisory Board: Responsible for planning the educational program of the AUA Annual Meeting.
- Website and Communications Committee: Responsible for production of the AUA newsletter and production and maintenance of the AUA website and other technological communications.

If you are interested in serving on one of these committees, please submit your name, email, committee of interest, a one-page cover letter outlining your interest and contribution to the committee along with a short CV to Meghan Whitbeck at **AUAmeetings@iars.org** by January 30, 2015. For EAB submissions only, CV submissions should only include accomplishments since 2010. In the subject line of your email, please include the name of the committee you are applying to join.

New committee members will be notified following the submission deadline and those accepted will begin their term on the committee following the AUA 62nd Annual Meeting, April 23-25, 2015, in Nashville, Tennessee.

For more information on the Association of University Anesthesiologists and its committees, visit **www.auahq.org**.

Join A Committee Today!

EAB: Measuring Knowledge in Anesthesia

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When you think about any test you've taken throughout your years of schooling – from kindergarten through residency and fellowship training to board certification – they all focused on measuring what you knew about a subject you had been taught or a skill you had been trained to perform. As an instructor, you regularly create and administer tests to your residents or fellows that are intended to measure whether they have mastered the knowledge and skills they'll need to be an independently practicing anesthesiologist. Psychometrics is the science of measuring mental capacities and processes, which includes the knowledge, skills and abilities learned through both formal and informal instruction and training. Beyond those who are regularly engaged in the work of test development, few people are familiar with the principles and processes that underlie the development of high-quality tests. An overview of the three foundational psychometric principles of test development and how these principles are used to create psychometrically sound tests are presented. The three questions most often asked by candidates about the ABA's examinations are addressed:

- How are ABA exams developed?
- How does the ABA determine who passes its exams?
- How does the ABA ensure that its pass/fail decisions are fair and accurate?

The Foundational Principles of Psychometrics

Psychometrics is the science of measuring mental capacities and processes, which includes measuring knowledge, skills and abilities in anesthesia and its related subspecialties. The science of psychometrics is central to the test development process and many test developers have extensive academic training in psychometrics. Test development organizations, including the ABA, are guided by the *Standards for Educational and Psychological Testing* (The Standards). The Standards, which are jointly published by the American Educational Research Association, the American Psychological Association and the National Council on Measurement in Education, represent the gold standard in testing and test development practices in the United States and in many other countries.

The Standards provide extensive guidance to test developers in three areas: the foundational principles that underlie all testing and test development; operational topics related to test design, development and evaluation, as well as test administration, scoring, reporting and interpretation; and testing applications (e.g. psychological testing, educational testing and workplace testing).

The three foundational principles addressed by The Standards are validity, reliability and fairness. Validity refers to the degree to which theory and evidence support the intended use of tests and the scores they produce. Validity is the most fundamental consideration when developing and evaluating the quality of a test and the appropriateness of its intended use. It is important to note that a test is not valid in and of itself; rather, a test and the scores derived from it may be highly valid for one purpose, but much less valid for another. For example, scores on the ABA's BASIC Exam are intended to measure whether a resident has a level of basic anesthesia knowledge expected of residents by the end of their CA-1 year of training. BASIC Exam scores are highly valid when used by the ABA and residency programs to make this judgment. However, it would be a much less valid use of the BASIC Exam scores if they were used to select among applicants for a fellowship program at the end of a resident's CA-3 year.

Statistics provide some evidence to support the validity of a test; however, the validity of a test cannot be established by a single statistic. Instead, validity should be thought of as an argument that a test developer makes over time based on evidence gathered from a variety of sources. Some specific forms of evidence that the ABA uses to support the validity of its exams include:

- Statistical relationships of scores on different exams within the ABA's examination system, (i.e. ITE, Part 1 and Part 2 Exam scores)
- Statistical indicators of the quality and fairness of the exam questions
- The qualifications of the exam developers and question authors
- The process used to develop the exams
- Experts' judgment on the extent to which the content of the exams matches the knowledge, skills and abilities that the ABA intends to measure.

Reliability refers to the reproducibility of test scores. When a test is designed to measure specific knowledge, skills and abilities, it should produce the same score for an examinee over multiple administrations of the test, assuming that the examinee's level or knowledge or skill has not changed between the different administrations of the test. Unlike validity, the reliability of a test can be evaluated by a single statistic – a correlation coefficient. It is often impractical to administer two forms of the same exam to an examinee or to administer the same form of the exam to an examinee on separate occasions. For this reason, test developers often use measures of internal consistency to estimate the reliability of a test form. These methods of estimating reliability will be discussed in more detail below.

Fairness refers to the equitable treatment of examinees in terms of their opportunity to fully and accurately demonstrate their abilities with respect to the knowledge, skills and abilities being measured by the test. Fairness is typically viewed in three ways: lack of bias; equitable treatment in the testing process; and opportunity to learn. Fairness as lack of bias means that test developers have carefully evaluated that test to ensure that there are no systematic score differences among groups

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of candidates (e.g. males vs. females) that can be attributed to factors that are unrelated to the knowledge, skills and abilities being tested. Fairness as equitable treatment in the testing process most often involves examinees with disabilities covered by the Americans With Disabilities Act that need a reasonable accommodation in the administration of the test to ensure that they have the same opportunity to demonstrate their ability as all other examinees. The ABA also honors requests to have an exam administered on an alternate date due to the religious obligations of the examinee as a matter of ensuring equitable treatment in the exam process. Fairness as opportunity to learn involves careful review and evaluation of exam questions by subject matter experts to ensure that the questions, in fact, measure knowledge, skills and abilities that the examinee should have had an equal opportunity to learn and can be reasonably expected to know.

"The development of high-stakes, summative examinations start with two key documents: a content outline and an examination blueprint."

The second area in which The Standards provide guidance to test developers relates to the operational issues involved with test design, development and evaluation, as well as test administration, scoring, reporting and interpretation.

How are the ABA's exams developed?

The development of high-stakes, summative examinations start with two key documents: a content outline and an examination blueprint. For ABA examinations, the content outline defines the full scope of knowledge, skills and abilities that a diplomate of the ABA must know and be able to do. There is a separate content outline associated with each ABA certification exam, which defines the scope of the practice in the specific practice area, i.e., general anesthesia (primary certification) or subspecialty certification (critical care medicine, pain medicine or pediatric anesthesiology). All ABA content outlines are "living documents" that are regularly updated as the field of anesthesiology evolves. The ABA board of directors reviews and ultimately must approve all changes to the content outlines, but suggested changes can come from any member of the ABA's diplomate corps at any time. Suggested changes are received by the Secretary of the ABA, who forwards them to the ABA's Exams Committee for review and recommendation to the full board. All of the ABA's content outlines can be found on the ABA's website at **www.theABA.org**.

The exam blueprint provides the specific balance of knowledge, skills and abilities to be tested on each form of the exam form across the content outline. This ensures that each form of the exam is equivalent in terms of the depth and breadth of content knowledge being tested and, as a result, the difficulty of the exam forms as a whole. Ultimately, it should not matter to examinees which form of the exam they are administered; the exam blueprint helps the ABA ensure that all forms are structurally equivalent, both within a single exam administration event and across examination years.

The ABA develops all of its certification exams with the assistance of a large group of question authors, reviewers and examination committee members, all of whom are diplomates of the ABA that are also highly-qualified and respected subject matter experts (SMEs) with respect to the content of the exam they help develop. Using the questions developed and reviewed by these SMEs each exam committee is responsible for constructing multiple forms of the exam according to the specifications of the exam blueprint.

How does the ABA determine who passes its exams?

High stakes examinations used in professional certification must have a defensible passing score, known as a cutscore. This score, which separates examinees who pass the exam from those who fail, must be determined in a scientific way that is consistent with the purpose and nature of the examination, as well as accepted psychometric practice.

For all ABA examinations, the cutscore defines the minimally acceptable performance on the examination, which translates to the minimally acceptable level of proficiency in knowledge, skills and abilities being tested. Examinees that score at or above the cutscore will pass the examination. Examinees that score below the cutscore, even by one question, will not.

Standard-setting procedures are of two general types: criterion-referenced (absolute) standards and norm-referenced (relative) standards. Absolute standards define a minimal score needed to pass the exam, even if all examinees or no examinee achieves that score. Relative standards define the cutscore in terms of acceptable passing or failure rates. The ABA uses the Hofstee Method for all its standard setting studies; this method is referred to as a "relative-absolute compromise method." Standard-setting panels typically include 12 diplomates certified in the content area of the exam. The Hofstee Method asks each panelist individually to make four judgments:

- lowest acceptable percent-correct cutscore (criterion-reference)
- highest acceptable percent-correct cutscore (criterion-reference)
- lowest acceptable pass rates (norm-reference)
- highest acceptable pass rates (norm-reference)

A graph with the range of possible cut scores along the X-axis and possible pass rates along the Y-axis (a descending curve) is made based on the actual examinee score data. The means of these four judgments are plotted against the graph by plotting the average lowest and highest acceptable cut scores along the X-axis and the average lowest and highest acceptable pass rates along the Y-axis. A straight line is then drawn connecting where the average highest acceptable cut score and the average highest acceptable passing rate intersect

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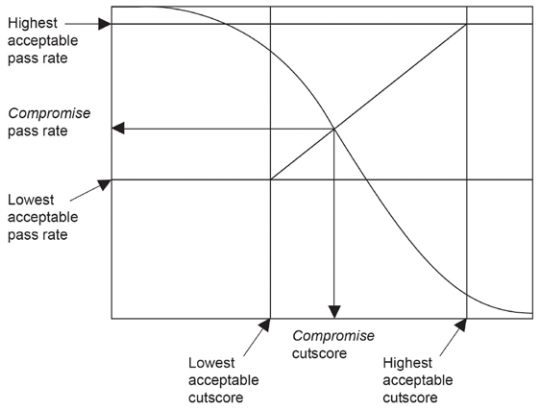
and where the average lowest acceptable cut score and the average lowest acceptable passing rate intersect. The panel's recommended cut score is located where the straight line intersects with the descending curve made based on the actual score data (see the graph below).



The ABA uses the Hofstee Method as its standard-setting method because it is time efficient and uses a multi-stage process that allows the standard-setting panel members to see the impact of their initial cut score recommendation would have on the examinees and to consider adjusting their recommendation before finalizing it. It is important to note that standard-setting panels only provide a recommended performance standard to the board based on their deliberations through the Hofstee Method. Ultimately, performance standards are always a policy decision that is made by the ABA directors.

How does the ABA ensure that its pass/fail decisions are fair and accurate?

The ABA undertakes many psychometric procedures to ensure the fairness and accuracy of the decisions it makes with respect to who passes and who fails its exams. Among these procedures is adherence to accepted conventions in evaluating the performance of the individual items on each exam after it has been administered and before scoring is finalized.

For every ABA examination a Preliminary Item Analysis (PIA) is conducted. The PIA provides several useful statistics to evaluate the quality of the individual items, the quality of the overall exam and to identify any items that did not perform as expected so that they can be evaluated more thoroughly and, if necessary, removed from the scoring process. Three statistics provided by the PIA are item difficulty, item discrimination and the overall exam reliability.

The item difficulty is the proportion of examinees that answered the question correctly. The item difficulty index or p-value ranges from 0.0 to 1.0 with high numbers indicating more easy items and lower numbers indicating more difficult items. Ideally, most of the questions on the exam will have p-values above 0.15 and below 0.90; questions that are either very easy or very difficult provide little information to inform the estimates of the examinees' abilities.

The item discrimination index is the correlation between the examinees answers on each item and their total scores on the full exam. The item discrimination index is the point-biserial correlation (rpb) between the dichotomous item responses (1 if answered correctly and 0 if answered incorrectly) and the continuous total score on the exam. The discrimination index ranges from -1.0 to 1.0. Generally, item discrimination indices should be 0.15 or higher. A negative item discrimination index means that the examinees that answered the item correctly had lower total scores on the exam than did those examinees that answered the item incorrectly. Negative item discrimination indices can indicate that the item may have been mis-keyed or had more than one best answer; subject matter experts review these items in a process that is called key validation.

If the subject matter experts determine that the item was mis-keyed, the key is corrected before scores are finalized. If the negative item discrimination is due to the response options including more than one best answer the item is removed from the scoring process before scores are finalized. If it is determined that the keyed response is correct and that it is the single best answer to the question the item will be included in scoring; it may simply be that the more able examinees "over thought" the question and the examinees that answered the item correctly should not be penalized simply because the item performed in an unexpected way.

Reliability estimates for all ABA written examinations are measures of internal consistency and are calculated as split-half correlations. As the name suggests, the items on the full-length exam are randomly divided to create two half-length exams and a total score is calculated for each half of the exam. The split-half reliability is the correlation between these two total scores. This method produces an estimate of internal consistency with values ranging from 0.0 to 1.0 with high values indicating that the examination is likely to correlate with alternate forms, which is a desirable characteristic for exams. For high-stakes exams like the ABA's, reliabilities should be 0.80 or above. The ABA's exams typically achieve reliabilities in the 0.82 to 0.94 range.

Conclusion

The foundational psychometric principles of validity, reliability and fairness discussed above are critical concepts for every test developer to be aware of and to adhere to, whether they are creating high-stakes or more informal assessments. By paying close attention to these issues when designing its exams, as well as the operational aspects of designing psychometrically sound tests the ABA can assure its candidates, diplomates and the public that the results of the exams, and the certification decisions that are made based on those results are fair and accurate.

References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (2014). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.

SAB: New Developments in Cardiocerebral Resuscitation

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Cardiac arrest is a significant health care problem due to both its high incidence and low survival rate. In the United States alone, 350,000 out-of-hospital cardiac arrests (OHCA) are estimated to occur every year,[1] with comparable numbers in Europe.[2] Despite regional variations overall chances for neurologically intact survival remain very low between 5 and 10%.[3] Taken together, this results in a similar death toll as two Boeing 747 crashes per day (!) on each continent.[2] While most OHCAs have primarily cardiac causes,[4] predictors of survival are immediate bystander CPR, a shockable rhythm, early defibrillation, and return of spontaneous circulation (ROSC) in the field.[5] The in-hospital scenario is only marginally better. According to a British registry,[6] the incidence of in-hospital cardiac arrest is estimated to be 1.6 cardiac arrests per 1,000 hospital admissions with 17% being in a shockable rhythm vs 72 % in PEA/asystole. Overall survival rates are just below 20%, with 49% for shockable rhythms and 11% for non-shockable rhythms. About half of the in-hospital arrests happen on regular wards, between 5 and 10% in intensive care and coronary care units. Similar to the OHCA situation, immediate action by trained personnel is imperative for success.[7]

> *"About half of the in-hospital arrests happen on regular wards, between 5 and 10% in intensive care and coronary care units."*

The 2010 AHA CPR guidelines (**www.heart.org/eccguidelines**) emphasize several key points: 1) High quality CPR, (i.e. a rate of at least 100 compressions per min.), a compression depth of at least 2 inches, and complete chest recoil; 2) no unnecessary interruptions of chest compressions; and 3) normoventilation.

High Quality Chest Compressions

According to Idris et al., ROSC and survival are highest at compression rates between 100 and 130 per min.[8] Another study has shown a linear relationship between compression depth and survival with chest compressions of only 1 inch depth resulting in 50% lower survival rate.[9] Incomplete chest recoil translates into increased intrathoracic pressure which leads to both lower cardiac output and increased intracerebral pressure, both of which severely decrease cerebral perfusion.[10] The good news is that incomplete recoil or 'leaning' can be prevented with the correct hand technique[10] and through proper training.[11]

Uninterrupted Chest Compressions

Data from the study by Edelson et al. also suggest that chest compressions should not be interrupted for more than 10 sec.[9] Preshock pauses of 30 sec, for example, led to a 60% lower shock success compared to pauses < 10 sec. The emphasis on high quality, uninterrupted CPR is also reflected in the 2010 change from A-B-C to C-A-B: instead of starting with airway assessment and breathing the provider should initiate chest compressions immediately. Biphasic shocks should be delivered only once at a time instead of as a stack of three previously.[12] Rea et al., for example, could show a 24% increase in ROSC at hospital arrival, and a 40% increase in hospital discharge and one-year survival when shocks were limited to one time, allowing for immediate continuation of chest compressions instead of prolonged pauses.[13] The diminishing probability of a second or third shock to be successful after a first shock has failed does not justify prolonged pauses.

> *"Incomplete chest recoil translates into increased intrathoracic pressure which leads to both lower cardiac output and increased intracerebral pressure, both of which severely decrease cerebral perfusion."*

Normoventilation

Just as complete recoil is crucial to lower intrathoracic pressure over time, so is limiting positive pressure ventilations to a rate of 6 to 8 per min. A porcine study by Aufderheide et al. could show that it is not the hypocapnia but higher intrathoracic pressures over time that contribute to a dramatically decreased survival after cardiac arrest and CPR when animals were hyperventilated.[14]

Adjunct Devices

A more efficient utilization of the heart and chest to pump blood during CPR and to lower intracranial pressure to increase cerebral blood flow at the same time are the target of two newer adjunct devices that work synergistically by lowering intrathoracic pressure during CPR. 'Active Compression-Decompression' (ACD),[15] not dissimilar to a toilet plunger,[16] is currently only FDA-approved for an automated version whose decompression does not exceed normal chest levels. Although case reports have described rare complications such as tension pneumothorax[17] or liver laceration,[18] neither of these are unique to mechanical vs. manual chest compressions. On the other hand, mechanical devices enable reliable compressions of constant rate, depth and location which avoids inconsistencies of manual compressions, provider fatigue[19] and injury,[20] and at the same time free up personnel for other tasks.[21] Most importantly, however, ACD works in tandem with the so-called 'Impedance Threshold Device' (ITD)[22] which should be placed between a

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tight sitting face mask or the endotracheal tube on one and the Ambu bag or ventilator on the other end as early as possible during CPR. The ITD opens for spontaneous or positive pressure ventilation and/or for negative intrathoracic pressures of minus 10 mmHg or lower. ACD and ITD synergistically result in largely improved systemic blood pressures and cerebral perfusion during CPR in animal models[22] and in patients.[23] Their combination has been shown to improve neurologically intact survival in cardiac arrest patients by 50% on hospital discharge with MRS scores comparable to the control group one year later.[24]

In summary, cardiac arrest and delivering immediate and high quality CPR remains the focus of a significant effort in both education and translational research in this area. Because of its high incidence and currently still dismal overall survival rates any improvement in cerebral perfusion and resuscitation has the potential to safe thousands of lives each year. It is in our hands. Stay tuned!

References

1. Nichol G, Soar J: Regional cardiac resuscitation systems of care. Curr Opin Crit Care 2010; 16: 223-30.
2. Böttiger BW, Van Aken HK: Saving 100,000 lives each year in Europe. Best Pract Res Clin Anaesthesiol. 2013; 27: 291-2.
3. Nichol G, Thomas E, Callaway CW, Hedges J, Powell JL, Aufderheide TP, Rea T, Lowe R, Brown T, Dreyer J, Davis D, Idris A, Stiell I: Regional variation in out-of-hospital cardiac arrest incidence and outcome. JAMA 2008; 300: 1423-31.
4. McNally B, Robb R, Mehta M, Vellano K, Valderrama AL, Yoon PW, Sasson C, Crouch A, Perez AB, Merritt R, Kellermann A, Centers for Disease C, Prevention: Out-of-hospital cardiac arrest surveillance — Cardiac Arrest Registry to Enhance Survival (CARES), United States, October 1, 2005--December 31, 2010. MMWR Surveill Summ. 2011; 60: 1-19.
5. Sasson C, Rogers MA, Dahl J, Kellermann AL: Predictors of survival from out-of-hospital cardiac arrest: a systematic review and meta-analysis. Circ Cardiovasc Qual Outcomes 2010; 3: 63-81.
6. Nolan JP, Soar J, Smith GB, Gwinnutt C, Parrott F, Power S, Harrison DA, Nixon E, Rowan K, National Cardiac Arrest A: Incidence and outcome of in-hospital cardiac arrest in the United Kingdom National Cardiac Arrest Audit. Resuscitation 2014; 85: 987-92.
7. Fennelly NK, McPhillips C, Gilligan P: Arrest in hospital: a study of in hospital cardiac arrest outcomes. Ir Med J 2014; 107: 105-7.
8. Idris AH, Guffey D, Aufderheide TP, Brown S, Morrison LJ, Nichols P, Powell J, Daya M, Bigham BL, Atkins DL, Berg R, Davis D, Stiell I, Sopko G, Nichol G, Resuscitation Outcomes Consortium I: Relationship between chest compression rates and outcomes from cardiac arrest. Circulation 2012; 125: 3004-12.
9. Edelson DP, Abella BS, Kramer-Johansen J, Wik L, Myklebust H, Barry AM, Merchant RM, Hoek TL, Steen PA, Becker LB: Effects of compression depth and pre-shock pauses predict defibrillation failure during cardiac arrest. Resuscitation 2006; 71: 137-45.
10. Aufderheide TP, Pirrallo RG, Yannopoulos D, Klein JP, von Briesen C, Sparks CW, Deja KA, Kitscha DJ, Provo TA, Lurie KG: Incomplete chest wall decompression: a clinical evaluation of CPR performance by trained laypersons and an assessment of alternative manual chest compression-decompression techniques. Resuscitation 2006; 71: 341-51.
11. Fried DA, Leary M, Smith DA, Sutton RM, Niles D, Herzberg DL, Becker LB, Abella BS: The prevalence of chest compression leaning during in-hospital cardiopulmonary resuscitation. Resuscitation 2011; 82: 1019-24.
12. Link MS, Atkins DL, Passman RS, Halperin HR, Samson RA, White RD, Cudnik MT, Berg MD, Kudenchuk PJ, Kerber RE: Part 6: electrical therapies: automated external defibrillators, defibrillation, cardioversion, and pacing: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2010; 122: S706-19.
13. Rea TD, Helbock M, Perry S, Garcia M, Cloyd D, Becker L, Eisenberg M: Increasing use of cardiopulmonary resuscitation during out-of-hospital ventricular fibrillation arrest: survival implications of guideline changes. Circulation 2006; 114: 2760-5.
14. Aufderheide TP, Sigurdsson G, Pirrallo RG, Yannopoulos D, McKnite S, von Briesen C, Sparks CW, Conrad CJ, Provo TA, Lurie KG: Hyperventilation-induced hypotension during cardiopulmonary resuscitation. Circulation 2004; 109: 1960-5.
15. Lurie KG: Active compression-decompression CPR: a progress report. Resuscitation 1994; 28: 115-22.
16. Lurie KG, Lindo C, Chin J: CPR: the P stands for plumber's helper. Jama 1990; 264: 1661.
17. Hutchings AC, Darcy KJ, Cumberbatch GL: Tension pneumothorax secondary to automatic mechanical compression decompression device. EMJ 2009; 26: 145-6.
18. de Rooij PP, Wiendels DR, Snellen JP: Fatal complication secondary to mechanical chest compression device. Resuscitation 2009; 80: 1214-5.
19. Ochoa FJ, Ramalle-Gomara E, Lisa V, Saralegui I: The effect of rescuer fatigue on the quality of chest compressions. Resuscitation 1998; 37: 149-52.
20. Jones AY, Lee RY: Cardiopulmonary resuscitation and back injury in ambulance officers. Int Arch Occup Environ Health 2005; 78: 332-6.
21. Keseg DP: The merits of mechanical CPR: Do mechanical devices improve compression consistency and resuscitation outcomes? JEMS 2012; 37: 24-9.
22. Lurie KG, Voelckel WG, Zielinski T, McKnite S, Lindstrom P, Peterson C, Wenzel V, Lindner KH, Samniah N, Benditt D: Improving standard cardiopulmonary resuscitation with an inspiratory impedance threshold valve in a porcine model of cardiac arrest. Anesth Analg 2001; 93: 649-55.
23. Plaisance P, Lurie KG, Payen D: Inspiratory impedance during active compression-decompression cardiopulmonary resuscitation: a randomized evaluation in patients in cardiac arrest. Circulation 2000; 101: 989-94.
24. Aufderheide TP, Frascone RJ, Wayne MA, Mahoney BD, Swor RA, Domeier RM, Olinger ML, Holcomb RG, Tupper DE, Yannopoulos D, Lurie KG: Standard cardiopulmonary resuscitation versus active compression-decompression cardiopulmonary resuscitation with augmentation of negative intrathoracic pressure for out-of-hospital cardiac arrest: a randomised trial. Lancet 2011; 377: 301-11.

Anesthesia Patient Safety Foundation Announces the Procedure for Submitting Grant Applications

Deadline to Submit the Letter of Intent (LOI) for an APSF Grant Award to Begin January 1, 2016 is: March 2, 2015

- LOI will be accepted electronically beginning January 21, 2015.
- The maximum award is $150,000 for a study conducted over a maximum of 2 years to begin January 1, 2016.
- Based on the APSF's Scientific Evaluation Committee's evaluation of these LOIs, a limited number of applicants will be invited to submit a full proposal.
- Investigators will be notified of the status of their LOI electronically on Thursday, May 15, 2015.

For more information or to submit a grant to APSF, visit **www.apsf.org/grants.php**.

SAVE THE DATE: WEDNESDAY, SEPTEMBER 9, 2015

APSF-SPONSORED CONFERENCE
Implementing and Using Emergency Manuals and Checklists to Improve Patient Safety

Royal Palms Resort and Spa (Phoenix, Arizona)

There is a need for anesthesia professionals and other members of the perioperative care team to move towards the acceptance of cognitive aids (emergency manuals, checklists) and away from the traditional reliance on memory and the cultural perception of individual perfection. The reality is no one can function as the lone expert recalling every procedure and drug dose from memory. Successful patient care in the perioperative period that has previously been considered to be the exclusive responsibility of an individual's knowledge and skill is no longer optimal because human memory is limited and fallible, especially under stress.

If you are interested in attending this conference, please contact Dr. Stoelting (**stoelting@apsf.org**) for registration details.

Society of Critical Care Medicine is the Largest Multidisciplinary Organization to Focus on Critical Care in the World

Michael H. Wall, MD, FCCM
JJ Buckley Professor and Chair
Department of Anesthesiology,
University of Minnesota
Chair-Elect, SCCM Anesthesiology Section
Minneapolis, Minnesota

The Society of Critical Care Medicine (SCCM) is the largest multiprofessional organization that is completely focused on multidisciplinary critical care in the world. The SCCM has over 15,000 members representing more than 100 countries worldwide. The SCCM's mission is to "secure the highest quality care for all critically ill and injured patients. The society envisions a world in which all critically ill and injured persons receive care from a present integrated team of dedicated trained intensivists and critical care specialists. Further, the society maintains that the Right Care, Right Now™ is best provided by an integrated team of dedicated experts directed by a trained and present physician credentialed in critical care medicine (an intensivist). Right Care, Right Now™ means that the right care is delivered at exactly the right moment to achieve optimal patient outcomes." (**SCCM.org**)

"The SCCM provides numerous educational products and opportunities. The 'flagship' activity is the Annual Congress that occurs in January or February."

The SCCM was founded in 1971 by a group of legendary intensivists such as Max Harry Weil, Peter Safar, William C. Shoemaker, and Ake Grenvik among many others. Anesthesiologists have been involved since the beginning of the SCCM and many anesthesiologists have served as president of the society, on the Council (or Board of Directors), and have served as chairperson of major committees such as the Program and Strategic Planning Committee.

The SCCM is divided into many subspecialty (anesthesiology) and area of interest (research) sections, and the easiest way to become involved or to volunteer is to join one to three sections that interest you!

The SCCM provides numerous educational products and opportunities. The "flagship" activity is the Annual Congress that occurs in January or February. The Congress is packed with a variety of learning opportunities from lectures, panels, PBLDs, and hands-on workshops. In addition, the Society sponsors meetings/courses and has educational material for Adult and Pediatric Board Prep and Review, Critical Care Ultrasound,

"The ACCM produces guidelines and practice parameters and honors individuals who show excellence and commitment to critical care with the title of Fellow of the ACCM (FCCM)."

ICU Management, and review courses as well as online continuing education. The SCCM also developed and teaches a Fundamentals of Critical Care Support (FCCS) course that trains non-intensivists on the management of a critically ill patient for the first 24 hours. This concept has expanded to a Pediatric FCCS, Fundamentals of Disaster Management (FDM) as well as a Resident ICU (RICU) course that prepares residents the basics of critical care. Several of their courses are taught in a number of languages and in many countries across the globe.

The SCCM publishes two of the leading journals in the specialty: Critical Care Medicine and Pediatric Critical Care Medicine. In addition, there are several newsletters, briefs, and social media sites to keep members informed of the changes in this dynamic field of medicine.

SCCM is also involved in many research, quality, advocacy and guideline development projects in all aspects of critical care from bench to bedside. Probably the most important include the "Surviving Sepsis Campaign. International Guidelines for Management of Severe Sepsis and Septic Shock: 2012" (CCM 2013 41(2) 580-637) and the "Clinical Practice Guidelines for the Management of Pain, Agitation, and Delirium in Adult Patients in the ICU" (CCM 2013 41: 263-306).

Finally, the SCCM created the American College of Critical Care Medicine in 1988. The ACCM produces guidelines and practice parameters and honors individuals who show excellence and commitment to critical care with the title of Fellow of the ACCM (FCCM).

SCCM is the leader in multidisciplinary critical care and is a fantastic organization for all anesthesiologists with an interest in resuscitation and critical care to join!

Registration and Housing Now Open for the AUA 62nd Annual Meeting!

Register Early and Save on 3 Days of Energizing Education Sessions in Nashville and Book Your Hotel Today!

Registration and housing for the AUA 62nd Annual Meeting, held March 23-25, 2015, in Nashville, Tennessee, is now open. Be sure to reserve your spot and save with the special early registration rate.

At the AUA 62nd Annual Meeting, you will gain valuable learning opportunities, exchange ideas and develop new methods for teaching anesthesia. Hosted by Vanderbilt University Medical Center, the Annual Meeting will offer an in-depth look at Vanderbilt University Medical Center's cutting-edge programs and advancements in the practice of anesthesia. You will also discover original investigations in the clinic and laboratory, presented by peers and colleagues, during three days of Moderated Poster Discussion Sessions.

We hope you will take advantage of the wide variety of stimulating education sessions, developed by the Educational Advisory Board (EAB), Scientific Advisory Board (SAB) and Host Institution, while networking with your peers and colleagues. A preliminary program schedule is also now available as well as more information about the Host Institution on the AUA website. Below you will find important information regarding the AUA 62nd Annual Meeting.

AUA 62nd Annual Meeting Location

Headquarters Hotel
Loews Vanderbilt Hotel
2100 West End Avenue
Nashville, TN 37203

Important Deadlines for Attendees

Abstract Submissions

2015 Abstract Submission Site Now Open
Submission Deadline: Tuesday, January 6, 2015

Registration

Registration Now Open
Early Registration Deadline: Friday, March 27, 2015
Online Registration Deadline: Thursday, April 16, 2015

Hotel Reservations

Housing Now Open
Housing Closes: Wednesday, March 25, 2015

Schedule-at-a-Glance

2015 Schedule-at-a-Glance Now Available
View the program details **here.**

Photo courtesy of Nashville Convention and Visitors Corp.

The Parthenon in Centennial Park is a full-scale reproduction of the famous Greek temple and adjacent to Vanderbilt campus.

Special Events at the AUA 62nd Annual Meeting

Thursday, April 23, 2015
Resident and Junior Faculty Meet and Greet Reception
Loews Vanderbilt Hotel
5:00 pm – 6:00 pm
The Resident and Junior Faculty Meet and Greet Reception gives residents and fellows an opportunity to meet their peers and the AUA Council Members in an informal setting.

Welcome Reception
Loews Vanderbilt Hotel
6:00 pm – 8:00 pm
Join your friends and colleagues for a perfect beginning to the AUA 62nd Annual Meeting. This Thursday evening reception offers an opportunity to relax and is an ideal opportunity to catch up with friends and colleagues.

Friday, April 24, 2015
Explore Downtown Nashville
Attendees are encouraged to explore Downtown Nashville! Busing will be available on a loop at the conclusion of Friday's education sessions for attendees wanting to experience Downtown Nashville's music and food scene.

Saturday, April 25, 2015
Social Event Reception and Dinner
Country Music Hall of Fame® and Museum
Reception: 6:00 pm – 7:00 pm
Dinner: 7:00 pm – 10:00 pm
Unwind with peers and colleagues and take in some music history at this year's Social Event Reception and Dinner at the Country Music Hall of Fame® and Museum on Saturday, March 25, from 6:00 to 10:00 pm. Attendees will be given access to the museum during the reception. To learn more about the Social Event Reception and Dinner, visit **http://auahq.org/2015-social-event-reception-and-dinner/**. Don't miss this lively event!

Program Updates and More Information

Visit the AUA Annual Meeting website at **http://auahq.org/aua-annual-meeting/** for program updates and what to do and see in Nashville.

Register today!

See You in Nashville!

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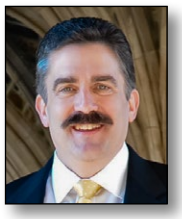

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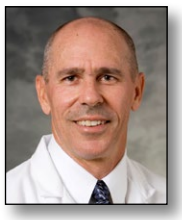

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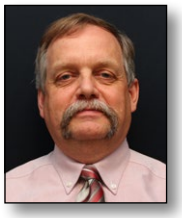

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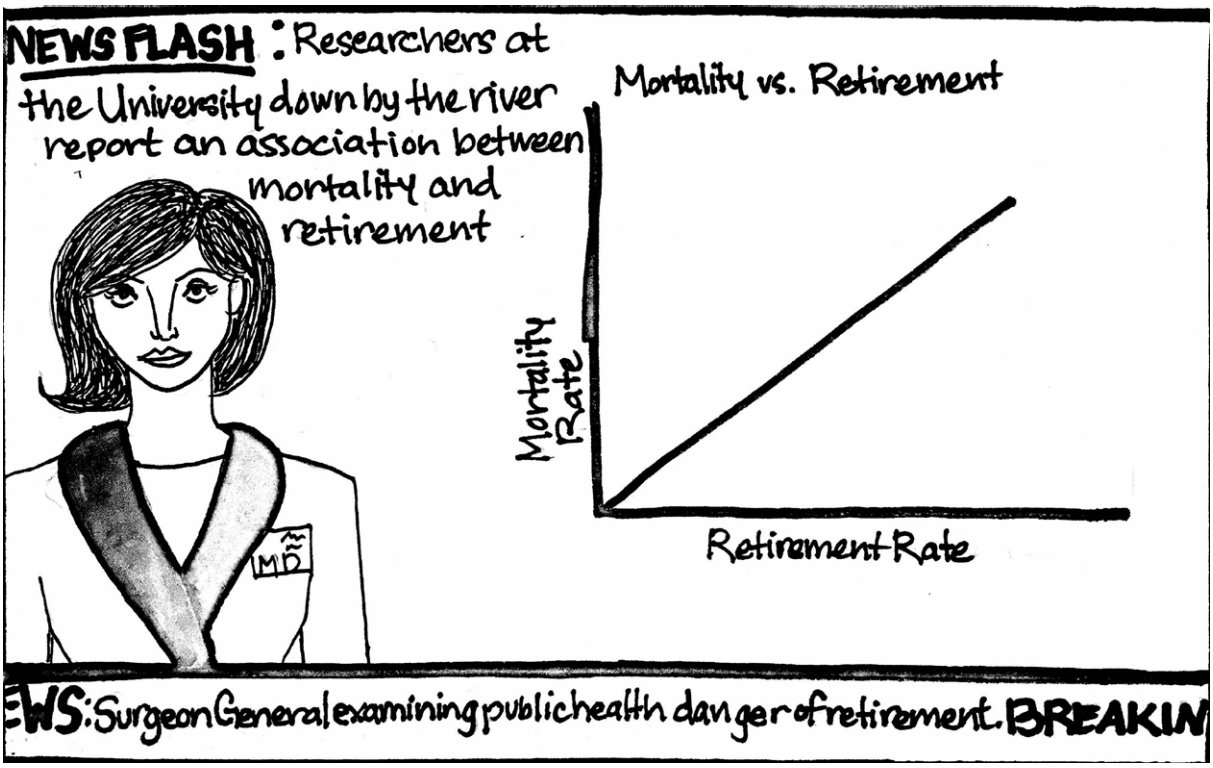

Cartoon by Elise Kofke

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