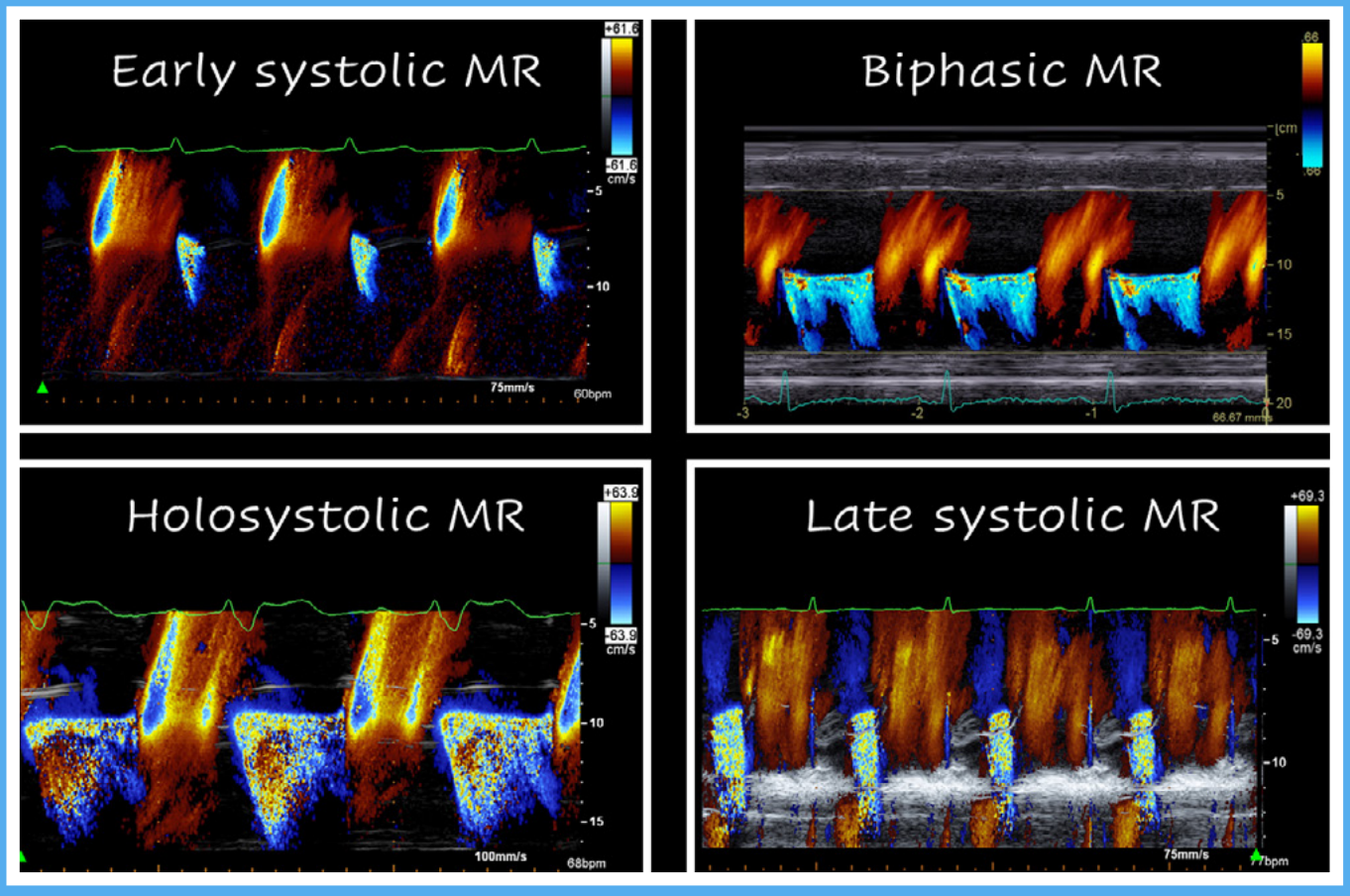
ECHO



VOLUME 12 ISSUE 3 **MARCH 2023**

2023 EDUCATION CALENDAR

MARCH

Advanced Echo: Echo Access Virtual Experience

Featuring the best content from Echo Hawaii and State-of-the-Art Echocardiography

Content Available March 21, 2023

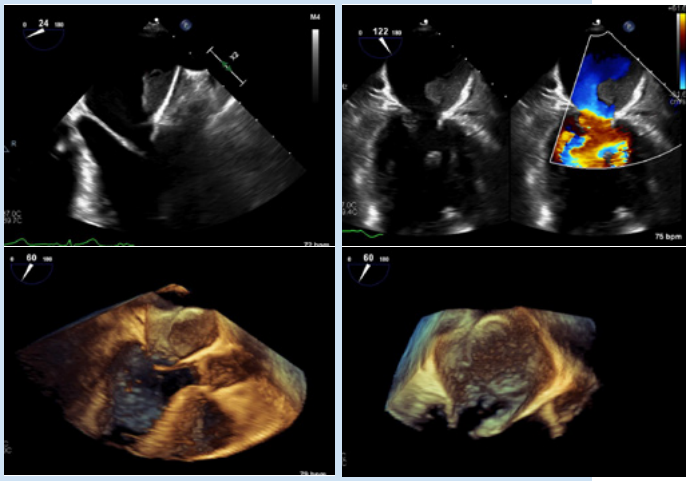
Jointly provided by ASE and the ASE Foundation

MAY

24th Annual ASCeXAM/ReASCE Review Course | VIRTUAL

Content Available May 8, 2023

Jointly provided by ASE and the ASE Foundation



JUNE

34th Annual Scientific Sessions

June 23-26, 2023
Gaylord National Resort & Convention Center
National Harbor, MD

Jointly provided by ASE and the ASE Foundation

OCTOBER

11th Annual Echo Florida

October 7-9, 2023
Disney's Yacht & Beach Club Resort
Orlando, FL

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This text also appears in the March JASE. ***OnlineJASE.com***

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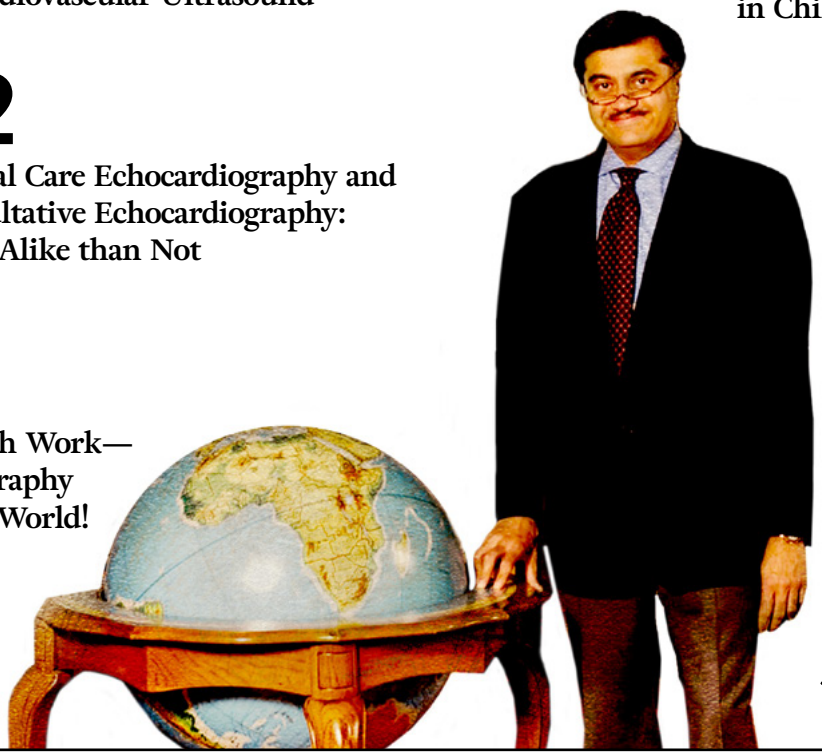

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Cover art: "Timing is Everything" Bonita Anderson, DMU (Cardiac), MAppSc (MedU/S), ACS, FASE, The Prince Charles Hospital, Brisbane, Australia

EDITORS' NOTE

ASE is very grateful to our members who contribute to *Echo* magazine and values their willingness to share personal insights and experiences with the ASE community, even if they may not be in total alignment with ASE's viewpoint.

SONOGRAPHER CHALLENGES TODAY

*Contributed by **Keith Collins, MS, RDCS, FASE**, Lead Cardiac Sonographer overseeing New Technology at Northwestern Medicine, Chicago, IL, and current ASE Council Representative on the Executive Committee of the Board of Directors and **Stephen H. Little, MD, FASE**, Cardiology Fellowship Program Director at Houston Methodist Hospital, System Director for Structural Heart, Professor of Medicine, Weill Cornell Medical College, Cornell University, and Adjunct Professor at Rice University in the Department of Bioengineering*

Keith Collins, MS, RDCS, FASE

As we move beyond the global health crisis caused by COVID-19, we must adjust to a changing healthcare delivery environment, a significantly altered workforce, and the seismic shifts that have changed how we educate, train, and mentor cardiovascular sonographers. With new demands (and opportunities), many sonographers have reevaluated their careers, their career trajectory, and work/life balance, leading some to join the "Great Resignation." Sonographers, as frontline specialists in providing great care, face specific challenges which directly impact the service we deliver to our patients. ASE is committed to the important partnership between sonographers and physicians and is focused on better understanding these challenges in order to provide more support to our members and the field at large.

"With new demands (and opportunities), many sonographers have reevaluated their careers, their career trajectory, and work/life balance"

From observing and listening to sonographer leaders across the country, a list of recurrent concerns for cardiovascular sonographers has emerged. While this list is not exhaustive or comprehensive, it does serve as a touchstone to define priority concerns of sonographers, and to focus the actions of ASE. Sonographer leaders have thoughtfully identified the following concerns for discussion, stakeholder engagement, and where possible, action:

1. Supportive leadership, promoting quality over quantity. The importance of healthcare administration support for Quality Assurance efforts, and enough time to perform a complete echo with reporting, cannot be overstated. With a smaller, changing workforce, many labs are seeing an increase in overuse injuries. Therefore, the need for recurrent training on proper scan techniques and ergonomic optimization to avoid workplace related musculoskeletal disorders (WRMSD) is paramount. To directly address this alarming trend, the ASE Cardiovascular Sonography Council is in the process of writing a sonographer-led practice guideline document to avoid WRMSD. ASE is also partnering with eight ultrasound organizations as part of the Grand Challenge coalition to gather longitudinal research and solutions for reducing or eliminating WRMSD in our field (WRMSD Grand Challenge). ASE has published two recent sonographer-led articles in the October 2022 Echo magazine and held a webinar (free on ASE's YouTube) to spread awareness. ASE's Advocacy Committee works to protect coding and charges for our services, which further protects our time for a sufficient study. As our comprehensive studies continue to lengthen (advanced imaging, reporting), sonographers are tasked to do more in the same time period. The ASE Echo Lab Medical and Technical Directors Forum addresses these topics and works to find solutions which allow appropriate time for a thorough exam. ASE representatives also serve on the board of the Intersocietal Accreditation of Echo Labs (IAC-Echo) to help drive appropriate lab standards and conditions for quality-related labs.

2. Continued support for education and training efforts. With sonographer shortages of historic measure, echo labs are hiring more new graduates and travelers to cover the workload. There is a greater range of skill-sets and thus, increased need for skill development and training, particularly to be adept at advanced imaging techniques, such as contrast, 3D, and strain imaging. ASE Learning Hub houses comprehensive, approachable, and practical training for these topics. However, in-house learning has shifted to online meetings, which can limit active mentoring, particularly with advanced techniques. In response, ASE has developed a user-friendly virtual course on these techniques, complete with how-to images and videos. This resource is available on the ASE Learning Hub (Advanced Imaging Techniques: A Virtual Experience). In addition, ASE's State-of-the-Art Course offers hands-on sonographer training, as well as sessions at ASE's Annual Scientific Sessions (June 23-26, 2023, in National Harbor, Maryland). ASE also supports sonographer development and excellence in the area of research. ASE has supported sonographers through the Brian Haluska Sonographer Research Award Competition, and with our CASE journal featuring sonographer led cases, "Sonographer Sound-Off" tips, and quizzes to showcase their role in diagnosis.

3. Diminished physician interaction with sonographers. In most labs, interacting with physicians offers opportunities for feedback, provides continued education, and is a crucial element of quality assurance. With social distancing measures, many physicians and sonographers have reluctantly accepted the new-normal status of lab separation. As echo labs across the nation experience increased caseloads and decreased staffing, the opportunity for direct, constructive feedback is even more challenging. Usually direct interaction encourages active scanning, thorough cardiovascular interrogation, and builds trust between all members of the cardiac and vascular lab teams. The loss of this interaction can negatively impact study quality, team

cohesion, and the shared-mission ethos that is common in many high-performing labs. Ultimately, this erosion of the team contributes to reduced job satisfaction for sonographers and physicians – at a time when the reduced workforce is already a critical concern. By highlighting this issue, ASE hopes to remind all about the value of the human interaction between specialists within the cardiac and vascular labs. Even in the busiest of healthcare settings, the echo lab has often been the best example of camaraderie leading to quality.

4. Providing opportunities for growth and career development. Cardiovascular sonographers wish to be respected by healthcare administration, want a pathway for professional growth, deserve competitive compensation, and require support for continued professional development. Alarmingly, many sonographers have made career decisions to leave patient care. Often the only options for professional development are promotion to a lab manager position or transitioning to employment within other healthcare industries. As an organization, ASE has looked at ways to encourage growth tracks in the career of sonographers. ASE endorses career ladders for sonographers, as well as recognition and utilization of sonographers with the Advanced Cardiac Sonographer (ACS) credential. ASE was the founding organization for the COAACS which supports schools to provide an educational pathway to getting ACS credentials and also now provides educational materials for those wanting to study for Cardiovascular Credentialing International's ACS credentialing exam. ASE also advocates for sonographers in building their skills outside the lab by offering leadership roles within ASE – such as the six sonographers now enrolled in ASE's Leadership Academy. ASE also has two sonographers at the Executive Committee level (Council Representative and Secretary), as well as sonographers serving on the Board of Directors, chairing Councils, committees, and Guideline documents, all providing ways for sonographers to build and showcase their leadership skills. ASE promotes sonographers as integral partners and pushes for institutional support of this field.

ASE is always interested in supporting cardiovascular sonographers and wants to hear from you directly. Are there other ways ASE can encourage sonographers to stay in the field and continue along a rewarding career pathway? Please feel free to contact the ASE Sonography Council representatives or post on ASE Connect to provide your experiences and feedback.

"ASE is committed to the important partnership between sonographers and physicians and is focused on better understanding these challenges in order to provide more support to our members and the field at large."

Stephen H. Little, MD, FASE
ASE President

This text also appears in the March JASE. OnlineJASE.com

Meet Me at the 2023 ASE Scientific Sessions National Harbor:

Foundations and the Future of Cardiovascular Ultrasound

*Contributed by **Madeline Jankowski, ACS, RDCS, FASE**, Advanced Cardiac Sonographer and Research Associate at Northwestern Memorial Hospital in Chicago, Illinois*

ASE'S 34TH ANNUAL SCIENTIFIC SESSIONS will be held in National Harbor, June 23-26, 2023. This year, Dr. Jim Kirkpatrick and I were delighted to design a course to welcome folks at all stages of their echo careers. We strived to embody the theme, *Foundations and the Future of Cardiovascular Ultrasound*, to encompass our own trajectories at ASE, starting by laying building blocks of knowledge followed by being inspired by and giving back to the future of our field. Registrants can receive up to 29.75 CME/MOC credits, and registration is open NOW! Sessions in two plenary rooms will be live streamed for virtual attendees, but the opportunities to connect and inspire in-person continue to grow each year.

This year's Scientific Sessions will begin on Friday afternoon, June 23, beginning with some fundamental bootcamps, Intersocietal Accreditation Commission (IAC), and Cardio-Oncology. The legislative Value Summit – a highlight of coming to the Washington, DC area will also take place on Friday afternoon. The selected panels have such broad experience with these selected groups; you will come away having a better understanding of how to implement these topics in your lab after this session. The other Friday sessions are followed by the council meetings and the Welcome Reception at Bobby McKey's – the perfect time to network with ASE colleagues from your specialty and beyond!

On Saturday, June 24, we have fan favorites and new content to enjoy. Our exhibit hall opens on Saturday, which now will highlight our new session room – the Arena! This platform will allow sessions to be more interactive – with debates, heart-team cases, and more. Closer to the exhibitors, you will be able to cover more area while still getting to see your favored lectures! Join us Saturday morning to celebrate ASE's award winners and FASE recipients, as well as hearing the Edler lecture from our immediate past president, Dr. Raymond Stainback. We're also bringing back the fan favorite – ShowCASE – a session on the best of CASE with rapid fire presentations, chaired by CASE Editor-in-Chief Dr. Vince Sorrell.

Saturday will also feature Sonographer Student Career Day. Are you an ultrasound student or looking for the next new gig? Students who register with their school email address can attend free on Saturday and enjoy a career fair and other opportunities to grow professionally. Are you an institution looking to hire more sonographer staff? Contact ASE about the opportunity to host a space at the career fair! In an age of such frequent and expected connection, ASE wants to help connect sonographers with peers and careers that they are valued and inspired by. For early and mid-career sonographers, smaller, intimate sessions on CV building and "What do I need to do to be considered for Leadership Academy" will be held – allowing you to ask questions to the experts who have sat on both sides of the desk in these situations!

Sunday, June 25, begins with our esteemed Gardin Lecture, which will be given by Dr. George Mensah, Director of The Center for Translation Research and Implementation Science (CTRIS) at the National Heart, Lung, and Blood Institute (NHLBI), part of the National Institutes of Health (NIH). With a background in cardiology as a hypertension specialist and passion for public health, Dr. Mensah's work focuses on addressing research translational gaps to better maximize the impact of the work we do every day preventing and treating heart, lung, and blood diseases. We are incredibly excited to learn from Dr. Mensah at this year's ASE Gardin Lecture. Sunday will also highlight a new set of sessions called "Read with Me." This will allow individuals to go to the "reading room" of the specified institution and simulate reading a case with a luminary cardiologist, like you're sitting in the lab. The Pediatric Jeopardy session – featuring luminaries fighting for the crown – will be brought back by popular demand on Sunday afternoon.

The ASE Foundation will hold the annual Research Awards Gala on Sunday night, with the theme "All the Colors of the World." Guests are encouraged to buy a ticket and to dress in their home culture's fashion. We want to celebrate the diversity and international comradery of our membership. This night always brings us together to celebrate the incredible achievements of our peers in echo and our own close-knit relationships within our field.

Monday, June 26, will have a full day of exciting sessions to wrap up the conference, including the Young Investigator's Competition, a *New England Journal of Medicine* case conference, pediatric research highlights session, and the medical and technical director's forum. University of California San Francisco's Dr. Rima Arnoult will present the 24th Annual Feigenbaum lecturer. As a leader in the field of artificial intelligence, her work is helping us harness the power of big data to guide clinical and research practice. For those who usually spend time in committee meetings, this year's sessions will be lighter on volunteer activities, per the feedback we received from attendees.

DIY sessions will allow attendees to get their hands on the probe and learn scanning techniques in a real-time setting.

On Saturday, Sunday, and Monday, hands-on Do-it-Yourself (DIY) scanning sessions and computer-based learning labs will be held for many specialties. Learning labs will be open to registrants only, for an additional fee, so make sure to sign-up early! These learning labs include basic and advanced 3D cropping, basic and advanced strain imaging, hemodynamics, and pediatric sessions. DIY sessions will allow attendees to get their hands on the probe and learn scanning techniques in a real-time setting. These sessions will be available for pre-registration, at an additional cost, but walk-in registration is possible if spots are available.

We are thrilled to have Drs. Federico Asch and Carol Mitchell as our Abstracts Chairs, and we look

forward to seeing your submissions for scientific abstracts and clinical case presentations. This is a great opportunity to showcase your research on an international level. On Saturday and Sunday, we will be bringing back the early morning case and abstract presentations. Many abstracts and cases that are accepted may have the opportunity to present their work live as well as receive feedback from the session chairs. We hope to encourage future researchers and presenters by having more opportunities to present to an audience of peers. We will also be highlighting new ASE guidelines by hosting sessions for attendees to meet some of the guideline authors as well as ask their pressing questions, including the new interventional echo and evaluation of rheumatic heart disease guidelines.

I could not be more delighted to come back to National Harbor in 2023. In the ten years since our last meeting at the Gaylord National, the neighborhood and feel of the whole area has been elevated. In the immediate area around the conference center, there are many interesting restaurants and bars of all types to try. The National Harbor waterfront is such a lovely, family friendly space to spend time: riding the Ferris wheel, walking the statue tour, seeing the man in the sand – just to name a few. Sticky Situations Honey Shop was a favorite of Dr. Kirkpatrick and me. We not only got to taste all different flavors of fresh honey, we discussed the science around making honey with shop owner and honey enthuiast! The piano bar, Bobby McKey's was also a favorite, with live music and a fun atmosphere all nights of the week and the location of the Welcome Reception on Friday evening. Alternatively, you can take a short water taxi ride from the National Harbor dock to historic Alexandria, for a fun adventure outside of the Gaylord property. Whether in National Harbor or close by Alexandria, Georgetown, or Washington, D.C., you will find plenty to do with family, friends, and colleagues from near and far.

Dr. Kirkpatrick and I have directed our passion for echo and teaching into making the 2023 ASE Scientific Sessions special for everyone. We thank the Scientific Sessions Planning Committee, our predecessors Drs. Sharon Mulvagh and Carol Mitchell, our tireless ASE staff, and of course all of you. We can't wait to see you in National Harbor June 23-26, 2023.

Sonographer

VOLUNTEER OF THE MONTH- MARCH

Congratulations

Cody Frye, BA, RDCS, FASE

Sanger Heart and Vascular Institute- Atrium Health
Charlotte, NC

Q
A

When and how did you get involved with cardiovascular ultrasound?

My father was a cardiac sonographer in the US Navy and later ran his own mobile cardiac ultrasound company. Even though he has changed careers he still loves to talk about cardiac physiology and all the new advancements in our field. When I decided to go back to school for cardiovascular ultrasound it was because I remembered how much he enjoyed that career.

What is the name and type of facility/institution at which you work, and what is your current position?

I am privileged to work with the exceptional team at the Sanger Heart and Vascular Institute at Atrium Health (Advocate Health) in Charlotte, North Carolina. I am the Education and Quality Manager for the greater Charlotte region which is home to approximately 100 sonographers at over 20 sites.

When and how did you get involved with the ASE?

I was an ASE member as a student, but I did not become involved with the ASE until a few years ago when I applied to be on a committee. I was motivated by the encouragement of physicians and other ASE members who were involved and who exemplified leadership by supporting my career.

> **“I have met so many outstanding people and there is a depth in my career that would be missing without my participation in ASE as a volunteer.”**

Why do you volunteer for ASE?
I have met so many outstanding people and there is a depth in my career that would be missing without my participation in ASE as a volunteer. I hold myself to higher standards because of what I learn from my participation and the connections I have made, and this elevates my team and the care we can provide for our patients.

What is your current role within ASE? In the past, on what other committees, councils or task forces have you served and what have you done with the local echo society?
Currently, I am in the 3rd cohort of the Leadership Academy. It is, in short, AMAZING. Though we have just begun, the value has already translated to practical work application. I have been on the faculty for: the ASE Scientific Sessions for the past two years and will be this year as well (hope to see you in Maryland!!), the 2022 Advanced Imaging Techniques: A Virtual Experience and the Emerging Echo Enthusiasts SIG. I currently serve on the Industry Round Table Committee and the Image Guide Registry Committee. I also volunteer as a mentor in the mentor match program which pairs someone who is involved with ASE with someone who wants to get more involved. I have found this program extremely rewarding, and I cannot wait to see my new friend in person at the Scientific Sessions!

What is your advice for members who want to become more involved in their profession or with the ASE?
Do not wait! There are many ways to get involved no matter what your level of experience or availability. If you don't know where to start, take the first step and become an ASE member or come to the Scientific Sessions and network. Tell someone you want to get involved and then BUCKLE UP!! You are in for an exciting ride!

What is your vision for the future of cardiovascular sonography?
Cardiovascular sonographers are inherently curious, adaptable, and ambitious. I have no doubt that if we continue to cultivate our character and broaden our collective perspective through volunteerism and education, we will be well equipped to integrate the new technologies and demands of the future. We have a responsibility to advocate for our profession and for our patients, and there is no better way to have our voices heard than by participating in the ASE.

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Critical Care Echocardiography and Consultative Echocardiography:

More Alike than Not

Contributed by ***Seth Koenig, MD*** *and* ***Paul Mayo, MD, FASE***

Both intensivists without cardiology subspecialty training and cardiologists who provide critical care services may use CCE.

AS TWO MEMBERS of the steering committee of the new ASE Critical Care Echocardiography (CCE) Council, we thought it would be interesting to compare and contrast critical care echocardiography with consultative echocardiography. Critical care echocardiography is, by definition, performed at the bedside of the patient by the critical care clinician who is responsible for all aspects of image acquisition, image interpretation, and immediate application of the results to the management of the case. Standard echocardiography uses a different workflow, where the examination is ordered by the critical care team but is performed by a cardiology service with expertise in echocardiography. Typically, image acquisition is performed by a capable echocardiography sonographer and the image set is interpreted by a cardiology consultant who is offsite from the intensive care unit (ICU). The results are then transmitted to the care management team. We refer to this traditional workflow pattern as consultative echocardiography.

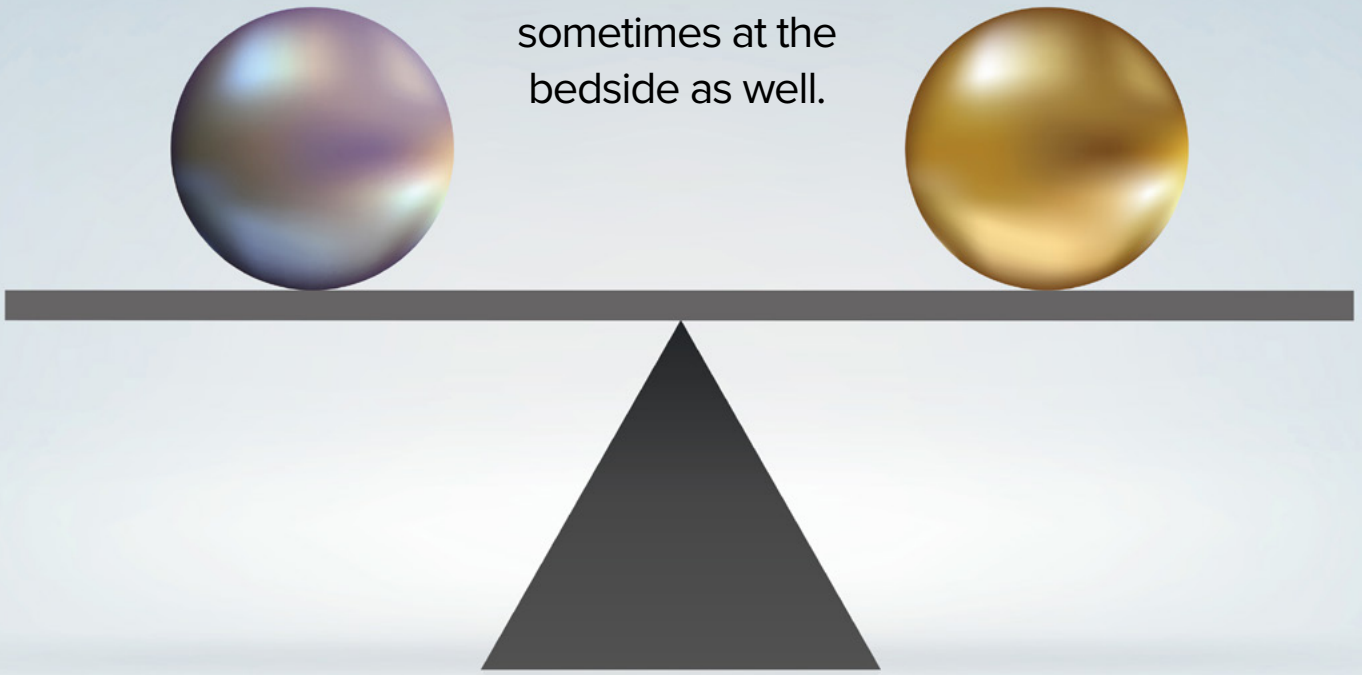
CCE is agnostic regarding the training background of the critical care clinician who performs the examination at the point of care. Both intensivists without cardiology subspecialty training and cardiologists who provide critical care services may use CCE. The key part of the definition is that both groups are frontline clinicians who personally perform the bedside echocardiography examination at point of care. The extent of the examination is determined by the clinical situation and the training level of the operator. The examination is performed initially for diagnosis and then serially, to assess interventions, and to guide further management of the critically ill patient.

The ultrasound machines used for CCE are often small footprint cart mounted machines for ease of use in the fast moving and space constrained ICU or other acute care environments, such as the emergency department. Recent generation machines have excellent image quality, full Doppler function, and transesophageal capability. Most machines used for CCE lack 3D, strain, and other capabilities, such as stress and contrast protocols that are typically present in high-end echocardiography laboratory machines. Adequate CCE capability requires that the echocardiography machine be physically present and immediately available in the ICU and emergency department 24/7.

The physical aspects of image acquisition and the standard views are identical for the two types of echocardiography, with the only difference being that for CCE, the bedside clinician performs the scan and not a echocardiography sonographer. Mastery of image acquisition is therefore a key requirement for the intensivist who uses CCE, whereas the consultative cardiology echocardiographer will generally rely on the sonographer to acquire the image set. Image interpretation is a shared competence required both for CCE and consultative echocardiography with the former occurring at the bedside and the latter in the echocardiography laboratory reading room although sometimes at the bedside as well.

Where the two disciplines diverge depends on whether the critical care clinician has basic or advanced level training in CCE. It is a given that cardiologists who provide consultative echocardiography services to an ICU team are fully certified at echocardiography as defined by the National Board of Echocardiography (NBE) or having fulfilled requirements that have been determined by their professional societies. For CCE, the critical care clinician may have competence in basic or advanced CCE. The former, which is now in widespread use in the critical care community, utilizes a limited number of views to identify imminently life-threatening forms of shock, to categorize the cause of shock, and to guide

Image interpretation is a shared competence required both for CCE and consultative echocardiography with the former occurring at the bedside and the latter in the echocardiography laboratory reading room although sometimes at the bedside as well.



management of hemodynamic failure. It is productively combined with other aspects of point of care ultrasound such as thoracic, abdominal, and vascular imaging using a whole-body ultrasound approach.

Some critical care clinicians choose to become competent in advanced CCE. The cognitive base of advanced CCE and consultative echocardiography is similar. For example, intensivists who prepare for the NBE CCEeXAM, as a requirement for NBE certification in advanced CCE, must have full knowledge of much of the material found in the standard texts on echocardiography that are relevant to preparation for the ASCeEXAM taken by cardiologists.

Important differences in the cognitive base do exist. The CCE operator will have knowledge of the various methods for determination of volume responsiveness, skill at identification of ventilator associated heart-lung interactions that are relevant to ventilator management, and capability at rapid serial measurement of therapeutic interventions, whereas these are not a standard part of consultative cardiology echocardiography. On the other hand, assessment of complex congenital heart disease, stress echocardiography, sophisticated evaluation of artificial valves, or timing of valve replacement/repair are some examples of subjects that are in the domain of consultative echocardiography. The intensivist who uses CCE is mindful of the need to partner with their cardiology colleagues when it comes to evaluation of problems that are not within their scope of practice and vice versa.

CCE at both basic and advanced level is routinely combined with other aspects of critical care ultrasound (CCUS) defined as imaging of thoracic, abdominal, and vascular structures, as well as the use of ultrasound for procedure guidance. Competence in CCE requires competence in CCUS, so the NBE CCEeXAM includes questions on CCUS.

At present, what defines competence in basic CCE has not been well established by the critical care community. The NBE and the ASE will be involved with the process of developing standards for basic CCE in partnership with the stakeholding professional societies and fellowship training programs.

We see great promise with the new ASE CCE council, as it will bring the critical care cardiology community into close partnership with the intensivist CCE community while under the umbrella of the ASE.

Transesophageal echocardiography (TEE) is a standard part of CCE. In Europe, TEE is considered a routine part of the skill set of the critical care specialist who is trained in CCE, and the use of TEE by critical care clinicians is becoming more widespread in the United States.

The critical care cardiologist is an advantageous position when it comes to CCE, as they are already competent in echocardiography on account of their cardiology training. All they need to do is adapt their skill to the needs of the critically ill patient. However, additional training in CCUS may be required to achieve competence to meet the diagnostic and management challenges of the critically ill patient. As to the intensivist, skill at basic CCE and CCUS is commonly a component of a training fellowship in critical care medicine. The additional training required to achieve competence for NBE certification in CCE is a challenging proposition. Over 1300 intensivists have taken the CCEeXAM to date with an increasing number fulfilling the additional requirements for NBE in CCE.

We see great promise with the new ASE CCE council, as it will bring the critical care cardiology community into close partnership with the intensivist CCE community while under the umbrella of the ASE.

Global Health Work—

Echocardiography Around the World!

Contributed by ***Shiraz Maskatia, MD, FASE; Rita France, RDCS, RDMS, RT, FASE; Jimmy Lu, MD, FASE; Seda Tierney, MD, FASE; Jennifer Hake, RDCS (PE, AE), RDMS (FE), FASE***

These trips put in perspective how fortunate we are and how much we take for granted not only in our work but in our daily lives.

-Mark Gelatt, MD

THIS MONTH, our focus is on global health work being done by pediatric cardiologists and sonographers. The intent of this article is to not only describe various opportunities and paths to involvement, but also to to inspire readers to keep a global framework in mind in their standard line of work. To that end, at-large members of the Pediatric and Congenital Steering Committee reached out to colleagues who have been actively working internationally. Photos of some of these international teams follow the responses of these role models.

INTERVIEWEES

Mark Gelatt (MG), MD, Assistant Professor of Pediatrics, University of Missouri - Kansas City
David Adams (DA), ACS, RCS, RDCS, FASE, Staff Sonographer, previously of Duke University Medical Center, Durham, North Carolina
Andrea Beaton (AB), MD, Associate Professor of Pediatrics, University of Cincinnati Medical Center
Amy Sanyahumbi (AS), MD, Assistant Professor of Pediatrics, Baylor College of Medicine
Craig Sable (CS), MD, Professor of Pediatrics, George Washington University School of Medicine

Q: How did you start to get involved with global health?

MG: Some of the nurses and intensivists at my hospital had gone on trips and needed a pediatric cardiologist for an upcoming trip to Sarajevo, Bosnia. I volunteered and joined a two-week mission trip in May 1998. Once my children were older and had moved out, I found that I had more time and have gone on several more trips to Honduras, Ecuador, Nigeria, DRC, and the Middle East.

DA: Working at Duke since 1979 and being active in the ASE I know a lot of people. Since 2007 I have made time to do mission trips as a way of giving back. Now that I'm retired, I do three to four a year.

AB: Our research partnership with the Rheumatic Heart Disease Research Collaborative in Uganda (RRCU) started informally in 2011. I was completing my fellowship project, focused on understanding the undiagnosed burden of rheumatic heart disease (RHD) in Uganda. This research built off of a long-standing clinical partnership between the Uganda Heart Institute (Peter Lwabi) and Children's National Medical Center (Craig Sable).

AS: Global health was always in my career path, even before cardiology! I accepted my first global health position after finishing pediatrics training. I worked for two years in Malawi as part of the inaugural group of physicians with the Baylor Pediatric AIDS Corps (now the Baylor Global Health Corps). I returned to Malawi for a two-year NIH/ Fogarty Clinical Research Fellowship to study cardiac sequalae in children with HIV. I then accepted a position with Baylor College of Medicine with the intent of continuing my career in global health. Over the years, I have been fortunate to obtain funding (including NIH / Fogarty K01) to continue my research, clinical care and capacity building in Malawi, and have been based in Malawi for the past five years.

My work is driven by a strong desire to reduce the burden of RHD in our lifetime. RHD affects over 40 million people globally and the vast majority of those affected live in low-and-middle income countries.

-Andrea Beaton, MD

Mark Gelatt, MD and colleagues on a global health event to Lubumbashi, Democratic Republic of the Congo in September 2022

CS: We have been doing mission trips to Africa, primarily Uganda, since 2002. We started doing open heart surgery in 2007 and cath in 2013. The local team is now proficient at doing cath and surgery; we continue to do yearly missions to augment skills of local team members.

Andrea Beaton and colleagues in Uganda

Q: What does your involvement entail?

MG: The major role is to perform pre-operative examinations and echocardiograms. In addition, the cardiologist is needed for post-operative assessment and care. I find the most difficult aspect of this is the need to triage a limited resource—which patients to send for surgery.

DA: Everything from being a team member to leading trips to organizing other groups of sonographers to go when I can't. I started on RHD screening trips but quickly switched to training nurses/physicians in-country to screen their own patients.

AB: The RRCU truly is a collaborative research group, which has included investigators from over 30 countries. Dr. Emmy Okello and I co-lead the RRCU and have worked together to establish infrastructure for high-quality research. Critical to this relationship has been a common vision to reduce the burden of RHD globally, community-engagement in study design and conduct, and a focus on capacity building and training of early career researchers.

AS: I lead research projects, provide clinical care, and focus on education and capacity building in Malawi. My research focuses on RHD and acute rheumatic fever. I co-direct the Pediatric Cardiology clinic at a busy public hospital, and supervise inpatient cardiology consults.

CS: I have been to Uganda around 40 times. The first 10 years were primarily focused on capacity building and training. Much of our training is focused on the most important factor...nursing empowerment. We also focused on building strong relationships with government leaders...We have added a major research component to our work, focused on RHD prevention. We have a large joint research unit that includes colleagues from Uganda, US, South Africa, Brazil, Australia, and India. We have been fortunate to receive two large AHA SFRN awards), two large NIH grants, several Thrasher awards and multiple donations from foundations. We have over 50 joint publications including a recent NEJM RCT. Dr. Andrea Beaton is PI for many of these projects.

Q: Who is the sponsoring organization? How are trips like this funded?

MG: All of my trips have been with The Novick Cardiac Alliance and its predecessor. There are a variety of sources, including the local government, charities and foundation grants. On a recent trip to Lebanon to provide surgery to Syrian refugee children the hospital costs were covered by UNHCR. Travel, lodging and most meals are provided with the volunteer picking up incidentals and some meals.

DA: I was lucky to go on the first few ASE Foundation sponsored global health events. People can also apply for the Adams Service Award when applying for an ASE Foundation global health event. I've also worked with many other NGOs like Team Heart,

David Adams and colleagues on a global health event in to the Philippines in 2016.

Heart-to Heart, CardioStart, etc. Most of the time we pay for airfare and the organization or country covers room & board.

AB: The RRCU is a funded through academic research grants (National Institutes of Health, American Heart Association, Thrasher Research Fund, etc.) and a series of foundation and private donors, who help us fill in the gaps and ensure a sustainable infrastructure between funding cycles. The day-to-day operations of our research team are carried out by the Ugandan team, which has expanded to include over 30 fulltime research staff. Our U.S.-based team provides complementary support for program administration, research oversight, and data management and partners on obtaining new research and private funding.

AS: NIH provides salary support for my research. I also do 25% clinical work in the U.S.

CS: We have had multiple funding sources of our mission trips and research. These include Larry King Cardiac Foundation, Gift of Life International, Karp Family Foundation, Samaritan's Purse Children's Heart Project, Huron Philanthropies, Philips Foundation, GE Foundation, Edwards Life Sciences, Thoracic Surgery Foundation, many grateful families, and my own nonprofit – Heart Healers International.

Q: What drives you to participate in these trips?

MG: Several things. I enjoy traveling and working with and meeting healthcare providers from different backgrounds. I think it is beneficial to be pushed out of one's comfort zone and being required to be innovative and resourceful. These trips put in perspective how fortunate we are and how much we take for granted not only in our work but in our daily lives.

DA: You go thinking that you are the "expert" but find out early that you learn more from the patients and colleagues in whatever country you are in.

AB: My work is driven by a strong desire to reduce the burden of RHD in our lifetime. RHD affects over 40 million people globally and the vast majority of those affected live in low-and-middle income countries. Historically, RHD has been under the radar, yet there is much to be done to improve prevention, early detection, and treatment. Our research team works across the translational spectrum to find new approaches and to develop ways to implement the knowledge we already have, to improve outcomes today. We also focus on global advocacy for RHD, trying to raise the profile of this largely preventable disease.

AS: I think everyone has a right to health. With only two pediatric cardiologists (myself included) in a country of 20 million people, there is a huge need for pediatric cardiac care for children with both

congenital and acquired heart disease. I feel that I am contributing to closing this care gap in a meaningful way.

CS: I was struck on my early visits to sub-Saharan Africa that having a VSD or TOF should not be death sentence to over 90% of the world's children when we have 99% survival after surgery. Adding this to there being three children with preventable RHD for everyone with CHD has driven me and my colleagues to try to change the equation.

Q: Please share with us your most rewarding experience on a mission trip.

MG: Not surprisingly, the rewards are similar to what we all experience in our daily practice—following symptomatic children with CHD from the preoperative evaluation through their recovery period. I've had the opportunity to return to a location and see previously quite symptomatic children who, post-operatively, are now thriving.

DA: No way to pick just one. Many missions have been with a surgical team performing life-saving valve surgery. Seeing how grateful the patients and their families are is amazing.

AB: The most rewarding part of this collaboration has been watching the growth of the RRCU over the last 10 years. This has included both the broadening of local leadership in Uganda on the physician, nursing, and administrative teams and incredible generosity in mentorship and partnership by international collaborators who have supported our work and vision.

Many missions have been with a surgical team performing life-saving valve surgery. Seeing how grateful the patients and their families are is amazing.

-David Adams (DA), ACS, RCS, RDCS, FASE

AS: One of the most rewarding experiences has come through the training and capacity building work that I do. I helped to train and mentor Treasure Mkaliainga, a Malawian clinical officer, in pediatric echo and clinical care. He now leads the cardiology service at the main public hospital and has helped to diagnose and treat thousands of children with heart disease.

CS: In March 2020, we were in Uganda for an RHD mission at the beginning of the COVID pandemic and had to leave before we could do surgeries. The local team did the cases without us with 100% survival.

Craig Sable, MD and colleagues in Uganda with Gift of Life international

Getting Started in Perioperative Echocardiography-Related Research:

The Why, When, and How

*Contributed by **Lisa Rong, MD, MSCE, FASE, FACC**, Cardiothoracic Anesthesiologist, Associate Professor of Anesthesiology at Weill Cornell Medicine, New York, NY and **Himani Bhatt, DO, MPA, FASE, FASA**, Associate Professor of Anesthesiology, Perioperative and Pain Medicine at Mount Sinai, and Director of Cardiac Anesthesiology at Mount Sinai St. Morningside-West Medical Centers, New York, NY*

Research is often multidisciplinary involving many people with varying backgrounds including physicians, nurses, students and trainees, and researchers.

RESEARCH HAS HISTORICALLY been one of the important cornerstones of academic medicine along with clinical expertise and teaching. The desire to help others and improve patient care and outcomes motivates many young physicians to embark upon "answering a question." For this reason, research can be very stimulating and help bridge the gap that exists between the clinical and scientific world. Furthermore, participation in research can not only enable physicians to evaluate and advance their own practices but is essential in their promotion. Research is often multidisciplinary involving many people with varying backgrounds including physicians, nurses, students and trainees, and researchers. This allows for a richer experience and improves the understanding of team dynamics and communication skills.

Echo-related research adds a whole different facet to a question; often, the utility and application of echocardiography can be used for diagnosis, intraoperative guidance, and to determine patient outcomes. In addition, advancements in technology for echocardiography enables the clinician to have multiple qualitative parameters to employ within a research project bringing not only opportunities, but also challenges.

Recently, there has been an even greater emphasis on publications and funding for research projects as a currency for promotion and advancement. However, for many junior physicians, clinical expertise and board certification has been the main goal thus far. When they reach the end of clinical training, then comes the expectation to be academic and conduct "research." This may be

a confusing and intimidating task, and the goal of this article is to provide insights on how to get started on a project and how to look for funding. Before getting started, it is important to keep in mind the basic stages of a research project (Table 1) and some key components that are important.

The Idea

Before you begin down a research pathway, you need a good idea and well-defined hypothesis and aims. Your first project should be simple and feasible. The research question should go over the who (patient population), what (intervention, outcomes), and why (clinical relevance). Often echo research is observational and comparing two groups of patients or describing the outcome after the intervention. It is important that, regardless of outcome whether or not the null hypothesis is proven, the result be interesting to the audience. For echo research, your idea should balance novelty with well-established methods. After doing a comprehensive literature search in the area of your interest, you should try to find a small "gap in the literature" that you can address.

Your Team

Research is a team sport and many members are needed for success. Understandably, most clinicians do not have an extensive research background, it is important to seek out a "coach," or someone who has expertise in your field. When approaching this senior researcher, is important to have a well formulated research idea to present to have tailored feedback and coaching. This may be one person, or a multidisciplinary team who provide expertise in different areas of your project.

Recently, there has been an even greater emphasis on publications and funding for research projects as a currency for promotion and advancement.

The Data

You should consider the data that you have or data that you need to collect prospectively. Existing echo databases may lack completeness and be of a variable quality unless there is a specified institutional protocol, and it is important to know what kind of data there is already. If the data is not sufficient or of poor quality, it may be necessary to collect prospective data with the understanding that this will be more time and resource consuming. You should be able to look at your data to assess outliers, and perform simple comparisons with the data (such as a paired t-test) to compare different echo

Table 1: Stages of a Research Project

1. **Idea** – come up with a hypothesis
2. **Team** – formulate a team
3. **Protocol** – produce a description of methodology Get approval by appropriate committee (IRB) Formulate appropriate data collection tool
4. **Execute** – carry out the plan
5. **Data collection** – collect any data using collection tool Re-evaluate variables intermittently to make sure objective is met
6. **Analysis** – evaluate data Acquire help of statistician as needed
7. **Dissemination** – decide on method to share findings (ie. presentation, meeting, publication)
8. **Create manuscript** – write up work Consider which journal to guide format
9. **Submission** – submit manuscript based on journal requirements

values between two groups. Consulting with a statistician is recommended to check your results. Your hypothesis should drive the statistical analysis and you should be wary of multiple testing that does not make clinical sense.

The Audience

Echocardiography is used in an intersection of fields of general cardiology, imaging, cardiac surgery, and cardiac anesthesiology. There are numerous journals in each of these fields, and it important to determine early on, which audience your study will be directed to, and the clinical impact it will have for each field. As cardiac anesthesiologists, we have submitted manuscripts to journals in all of these fields. There are different nuances that journals in these various fields are looking for, and understanding what they are will be paramount to your success.

Challenges

Clinicians, especially young physicians, can face many challenges in conducting research. First of all, many clinicians lack time and support. Therefore, it is important to find a person who is going to help you and serve as a mentor. Time and feasibility in a busy operating room setting can present limitations and it is important to plan for this in advance (ie. intraoperative assessment vs. off-line applications and calculations). Also, involving the operating room team namely the surgical team can foster support to carry out the research plan more effectively.

Another challenge that clinicians face is inadequate research training in their programs. Clinicians are foremost trained to be clinicians; skills needed for research such as method development, statistical knowledge, and data analysis and interpretation are not taught in their programs. Furthermore, access to these expertise (ie. research coordinators and statisticians) can be an additional obstacle despite desire and enthusiasm. This is the reason that a well

Your first research project may be the most difficult where you learn the most about all aspects research, from idea formulation to manuscript preparation.

formulated idea with a good team to help effectively orchestrate the research plan is important. Additionally, many team members, especially in a multidisciplinary team, can have multiple contacts which can serve as great connections to conduct any research project.

Conclusion

Research can be extraordinarily rewarding when you add to the literature and provide new insights to the improving patient outcomes and care. It requires a commitment, passion, and a start-up cost. It is a zero-sum game where the only definition of success is if you bring your project 100% to completion. Your first research project may be the most difficult where you learn the most about all aspects research, from idea formulation to manuscript preparation. You should continue your trajectory by solidifying and reinforcing your "hands on" learning with mentored career development programs. Many of these are offered by national organizations such as the American Society of Echocardiography (ASE), American Heart Association (AHA), and the Society of Cardiovascular Anesthesiologists (SCA), and many academic institutions also have internal programs for faculty development. These are highly encouraged as you will need a strong foundation in research in areas that are not easily acquired on the job. This will enable your research success and a possible long-standing research career if you so choose.

REFERENCES

Jacob H. "Why all doctors should be involved in research." BMJ 2016. 352:i164.

Taylor AK and Purdy S. "How to get involved in research as a medical student." BMJ 2017. 356: i6593.

Reeves S, Kuper A and Hodges BD. Qualitative research methodologies: ethnography. BMJ 2008. 332: a1020.

Murphy B. "Getting started with medical research? What future doctors must know. Retrieved at http://www.ama.assn.org/

Cheuk-Man Yu. "Challenges and opportunity in the era of quantitative echocardiography". Echo Res Pract. 2017 Dec; 4(4): E3–E6.

Progress Through Partnership:

Perspectives from Pediatric Disciplines on the ASE Recommendations for Cardiac Point-of-Care Ultrasound in Children

In 2020, ASE published recommendations regarding the role of the Echocardiography Laboratory (Echo Lab) in Adult Cardiac Point-of-Care Ultrasound (POCUS) education.[1] Shortly thereafter, a multidisciplinary task force was developed to explore the unique considerations for pediatric Echo Lab involvement in pediatric cardiac POCUS. Recently published ASE recommendations developed by this taskforce attempt to define cardiac POCUS scope of practice and identify important opportunities for echo lab and pediatric cardiologist support of POCUS initiatives.[2]

As co-authors of the recommendations, we recognize that our singular voices are insufficient to account for all the perspectives within our respective communities. Yet, the process of working together has illuminated a singular goal ultimately guiding their development: to improve the care of sick children. This article explores how the recommendations were influenced by both shared and unique experiences as clinical providers across different pediatric subspecialties, and might change our individual and collective care of children moving forward.

The Pediatric Cardiology Perspective

*Contributed by **Alan Riley, MD**, Baylor College of Medicine, Texas Children's Hospital*

With more portable ultrasound devices in the hands of non-traditional imaging medical providers, there can be a natural initial response that cardiac POCUS is a direct assault upon cardiology scope of practice and revenue streams. It is informative to remember the origins of echocardiography in cardiology were initially viewed as an attack upon radiology services. When Dr. Harvey Feigenbaum, considered "the father of echocardiography," was trying to advocate for a larger cardiologist role in cardiac imaging, the response was purportedly blunt and dismissive from the then-chair of the American College of Radiology, Harold Schwinger, MD:

"We can't allow that. We are medicine's imagers."[3]

Not surprisingly, Dr. Feigenbaum cites this conversation as one of the final inspirations to create the American Society of Echocardiography in 1975. The organization has a subsequent long track record of collaboration outside of cardiology with multi-disciplinary leadership and via multi-disciplinary guideline statements.

Due to the broad variety and technical imaging needs unique to pediatric congenital and acquired heart disease, pediatric cardiologists have a distinctive task in the growth of cardiac POCUS. In this month's JASE, the recommendations[2] provide the best available guidance for the use of pediatric cardiac POCUS by non-cardiologists while also providing a framework for pediatric cardiologists to deliver collaborative leadership. With the goal of partnering to optimize patient safety and outcomes, pediatric echocardiographers and sonographers can help colleagues within their own communities and institutions build robust training initiatives, competency assessments, and quality assurance programs. While we all agree on the wisdom of collaboration, this document can be used in tandem with the 2020 ASE Recommendations for Echocardiography Laboratories Participating in Cardiac POCUS and Critical Care Echocardiography Training[1] to identify adequate time and resources to support these efforts and maintain their health and longevity.

This document does not address specifically how pediatric cardiologists can use cardiac POCUS themselves. Cardiology expert use of cardiac POCUS, particularly in non-emergent settings, is not defined. The potential of cardiac POCUS in hands of pediatric cardiologists to improve medical management, patient satisfaction, family counseling, and/or outpatient clinic efficiency needs further exploration.[4,5] It is also evident that pediatric cardiologists have much to learn from pediatric subspecialty colleagues about innovative bedside ultrasound evaluations. The use of bedside lung ultrasound[6] or multi-system organ ultrasound protocols[7] in volume status assessments seem like ultrasound imaging protocols that could possibly translate well to clinical use in the echo lab, cardiology clinics or acute care cardiology units. Ultrasound is becoming a common language in modern pediatric medicine, and collaborative uses of ultrasound across disciplines seems to be the future.

The Pediatric Critical Care Perspective

Contributed by ***Thomas Conlon, MD****, Children's Hospital of Philadelphia*

Over the past two decades, critical care professionals primarily learned ultrasound as a procedural adjunct. Now, ultrasound machines are ubiquitous among the technologies encountered in the pediatric intensive care unit and are incorporated in both procedural and diagnostic applications, including evaluation of the heart. Literature supports the rapid acquisition of ultrasound skill by non-imaging specialists[8] and the discovery of new information[9] facilitating rapid assessment and timely targeted interventions improving outcomes.[10] Critical care physicians and cardiologists have a shared love of physiology only superseded by our real-time need-to-know physiology.

The publication of the ASE recommendations regarding the role of adult[1], and now pediatric Echo Labs[2] in supporting cardiac POCUS program development integrates not just divisions, but communities. They open conversations that may be difficult but are necessary in achieving our shared goals of optimized care delivery. We must be willing to engage in these

> **POCUS presents an exciting opportunity to qualify and quantify educational outcomes and model methods of developing competencies when integrating new technologies in clinical care.**

conversations. Studies suggest that, among POCUS learners, prominent perceived barriers to POCUS implementation include a lack of experts available for training and supervision.[11] Interestingly, our recent survey of pediatric Echo Lab leadership identified a lack of willingness or interest among POCUS learners to receive training from cardiologists.[12] The recommendations establish a framework to begin and guide community communication and collaboration.

The ASE recommendations also attempt to set forth suggestions for cardiac POCUS training and translation to clinical practice. Within the Echo Lab survey, a prominent concern among cardiology colleagues is the risk of mis- or missed diagnosis by POCUS providers.[12] Currently there are no definitions of POCUS competency across clinical applications and therefore no methods of competency measurement and no standards for training. Yet how much of what we "do" have definitions and validated measures of competency? POCUS presents an exciting opportunity to qualify and quantify educational outcomes and model methods of developing competencies when integrating new technologies in clinical care. The widespread agreement among Echo Lab leadership regarding involvement in defining and delivering POCUS education is how this opportunity might best become a reality.

We are far from widespread dissemination of reliable and sustainable POCUS programs, but the most efficient and effective method of reaching our destination is by going there together.

The Pediatric Anesthesiology Perspective

Contributed by ***Wanda C. Miller-Hance, MD****, Baylor College of Medicine, Texas Children's Hospital*

Approximately 6 million pediatric patients in the United States undergo anesthesia care annually, a quarter of them being infants.[13] This figure represents a staggering 10% of American children. Over time, technological and quality advances have significantly improved the safety of anesthesia in children.[14] However, despite a favorable safety profile and low rates of complications, the pediatric age group is recognized as a vulnerable population during anesthesia care. Children are well known to have the potential for critical events requiring a high level of vigilance, preparedness, and immediate response to institute interventions that limit morbidity and, in some cases, can even be lifesaving.

Anesthesiologists have been quite familiar with the principles of ultrasonography, have made significant contributions to perioperative ultrasound and taken advantage of this technology for many years. Notable applications include those regarding vascular access, regional anesthesia, and transesophageal echocardiography. The important role that POCUS plays in perioperative medicine to assist patient management has also been demonstrated and continues to be recognized.[15] Yet, the widespread adoption of cardiac POCUS in pediatric anesthesia and respective training efforts

have lagged behind other pediatric fields. This is even though a significant number of acute perioperative events in children revolve around the respiratory and cardiovascular systems and are likely to benefit from the goal-directed immediate real-time assistance that cardiac POCUS can provide in these settings.

Pediatric anesthesiology has been, and continues to be, at the forefront and a leading voice in safety and quality in children. The recent publication addressing pediatric cardiac POCUS[2] will undoubtedly foster additional interest and promote further implementation of this modality within the pediatric perioperative environment. The recommendations are also likely to stimulate the exploration of unique aspects of the cardiac POCUS practice in pediatric anesthesia and expanded applications in the perioperative care of children.

The fact that the development of these guidelines was a combined effort of several disciplines, integrating various types of expertise, and recognizing potentially different applications, should assist in conquering usual obstacles and barriers when technology customary to different medical fields is used or shared. This common ground effort among pediatric subspecialties should correspondingly promote a culture of interdisciplinary collaboration, knowledge, and learning in general.

> **“The recent publication addressing pediatric cardiac POCUS will undoubtedly foster additional interest and promote further implementation of this modality within the pediatric perioperative environment.”**

As the adoption of cardiac POCUS continues to evolve, several aspects will require ongoing appraisal. These include the quantitative impact of the exam findings on clinical practice and patient outcome, and the frequency of diagnostic errors associated with study interpretation and inappropriate interventions.

The Pediatric Emergency Medicine Perspective

*Contributed by **Charisse Kwan, MD**, University of Western Ontario, Children's Hospital, London Health Sciences Centre*

Point of care ultrasound performed by pediatric emergency medicine (PEM) physicians has increased dramatically in clinical importance during the past three decades. Currently, all emergency medicine residency programs in Canada and the United States are required to teach ultrasound in their curriculum, and 95% of pediatric programs queried reported using emergency ultrasound within their practice setting by 2011.[16] Accordingly, there has been progressive growth of scientific literature demonstrating the benefits to quality of care, and the ability of emergency physicians to accurately interpret focused ultrasound exams.

However, over the years, PEM POCUS physicians have struggled to educate themselves and others within the subspecialty without the support and guidance of our pediatric subspecialty colleagues. As such, the definition and limitation of applications as well as learning curves and competency standards have been slow to develop. The publication of the ASE recommendations[2] is a welcome, needed, and highly anticipated document supporting collaboration between our cardiology colleagues and POCUS physicians from

an ever-expanding number of pediatric subspecialties. Through many hours of thoughtful discussion amongst experienced cardiologists and POCUS physicians, it suggests basic standards for POCUS cardiac imaging, training, and competency. These pediatric recommendations (along with the adult POCUS cardiac recommendations)[1] are the first of their kind, soliciting consensus across so many of the pediatric subspecialists and attempting to define training and competency in cardiac POCUS imaging.

It is my hope that, with this publication, future work in POCUS cardiac imaging will foster seamless partnerships amongst POCUS physicians and cardiologists in an effort to optimize patient-centered care. It also hopefully serves as a blueprint for other subspecialty collaborations not just in ultrasound, but also in the integration of other technologies that, when shared, may improve the care of children everywhere.

Integrating Cardiac POCUS Perspectives

The question "why" cardiac ultrasound has been asked and answered within our respective specialties. The question "how" cardiac ultrasound is more nuanced. The cardiology community once themselves asked, and worked diligently to answer, this question. Thus, the cardiology community is best positioned to support cardiac POCUS initiatives and facilitate translation of education to life-saving care. Non-cardiology communities learning cardiac POCUS must embrace responsibilities for proper governance ensuring that the ideals of quality care are rendered at the bedside through the development competent cardiac POCUS imaging providers. As reflected within the critical care, anesthesiology and emergency medicine perspectives, learner populations may be at very different places within and between specialties regarding implementation needs. These recommendations[2] were designed to provide a framework acknowledging the need for open discussion incorporating local contextual elements to both define and achieve successful cardiac POCUS implementation. Only through open discussion and collaboration will we be able to realize our shared goal of improved outcomes for the children we serve.

REFERENCES

1.Kirkpatrick, J.N., et al., Recommendations for Echocardiography Laboratories Participating in Cardiac Point of Care Cardiac Ultrasound (POCUS) and Critical Care Echocardiography Training: Report from the American Society of Echocardiography. J Am Soc Echocardiogr, 2020. 33(4): p. 409-422 e4.

2.Lu, J.C., et al., Recommendations for Cardiac Point-of-Care Ultrasound in Children: A Report from the American Society of Echocardiography. J Am Soc Echocardiogr, 2023. 36(3): p. 265-277.

3.Pearlman, A.S. and H. Feigenbaum, 23rd Annual Feigenbaum Lecture: History of Echocardiography: A Personal Perspective. J Am Soc Echocardiogr, 2022. 35(12): p. 1202-1213.

4.Ip, F.H.L., M. Hay, and S. Menahem, Impact of echocardiography on parental anxiety in children with innocent murmurs. J Paediatr Child Health, 2020. 56(6): p. 917-921.

5.Rauser-Foltz, K.K., et al., Utility of expert focused cardiac ultrasound in paediatric cardiology outreach clinics. Cardiol Young, 2019. 29(12): p. 1468-1473.

6.Cantinotti, M., et al., Prognostic Value of a New Lung Ultrasound Score to Predict Intensive Care Unit Stay in Pediatric Cardiac Surgery. Ann Thorac Surg, 2020. 109(1): p. 178-184.

7.Rola, P., et al., Clinical applications of the venous excess ultrasound (VExUS) score: conceptual review and case series. Ultrasound J, 2021. 13(1): p. 32.

8.Spurney, C.F., et al., Use of a hand-carried ultrasound device by critical care physicians for the diagnosis of pericardial effusions, decreased cardiac function, and left ventricular enlargement in pediatric patients. J Am Soc Echocardiogr, 2005. 18(4): p. 313-9.

9.Kutty, S., et al., Transthoracic echocardiography in pediatric intensive care: impact on medical and surgical management. Pediatr Crit Care Med, 2014. 15(4): p. 329-35.

10.Kanji, H.D., et al., Limited echocardiography-guided therapy in subacute shock is associated with change in management and improved outcomes. J Crit Care, 2014. 29(5): p. 700-5.

11.Conlon, T.W., et al., Diagnostic Bedside Ultrasound Program Development in Pediatric Critical Care Medicine: Results of a National Survey. Pediatr Crit Care Med, 2018. 19(11): p. e561-e568.

12.Conlon, T., et al., The Role of the Pediatric Echocardiography Laboratory in Supporting Point-Of-Care Ultrasound (POCUS) Initiatives: A Survey from the American Society of Echocardiography Task Force on Cardiac POCUS in Children. J Am Soc Echocardiogr, 2022.

13.Sun, L.S., et al., Feasibility and pilot study of the Pediatric Anesthesia NeuroDevelopment Assessment (PANDA) project. J Neurosurg Anesthesiol, 2012. 24(4): p. 382-8.

14.Kurth, C.D., et al., National pediatric anesthesia safety quality improvement program in the United States. Anesth Analg, 2014. 119(1): p. 112-121.

15.Adler, A.C., et al., Point-of-care ultrasound in pediatric anesthesia: perioperative considerations. Curr Opin Anaesthesiol, 2020. 33(3): p. 343-353.

16.Marin, J.R., N.S. Zuckerbraun, and J.M. Kahn, Use of emergency ultrasound in United States pediatric emergency medicine fellowship programs in 2011. J Ultrasound Med, 2012. 31(9): p. 1357-63.

PERIOPERATIVE ECHOCARDIOGRAPHY–
Novel Applications in a New Environment

Contributed by **Alan S. Pearlman, MD, FASE**, ASE Past President, and Editor-in-Chief, Emeritus, *Journal of the American Society of Echocardiography* (JASE)

Although ASE was founded by a group of cardiologists, the organization has been enriched by inclusion of many other practitioners who use cardiovascular ultrasound as a central part of their professional activities. In recent articles in *Echo magazine*, I've focused on cardiac sonographers. I'd like now to turn to cardiac anesthesiologists, who also have made many important contributions to patient care and to the ASE. It's worth reiterating that from the start, ASE's founding president Harvey Feigenbaum emphasized that he did not want ASE "to be a total cardiac organization," and that "anybody who's willing to do a good job at cardiac ultrasound, irrespective of their training or their label, is welcome to be part of this organization."[1]

I'm struck that "perioperative echocardiography" exemplifies the value of collaboration between different specialists who realized that by using ultrasound technology, they could take better care of their patients. Early on, a few cardiologists were asked to come to the operating room (OR) when surgeons suspected a cardiac problem during a surgical procedure. This approach was undoubtedly helpful in selected cases, but surgeons were sometimes apprehensive about having cardiologists "scrub in" to perform transcutaneous or epicardial scanning in the OR during a sterile procedure. Furthermore, cardiologists had their own clinical responsibilities in the inpatient and outpatient settings, and were not eager to spend time in the OR,

I'm struck that "perioperative echocardiography" exemplifies the value of collaboration between different specialists who realized that by using ultrasound technology, they could take better care of their patients.

sometimes having to wait or to return to provide further assistance. Although echocardiographic assessment could be performed in the OR, and while the findings could be quite helpful, it became quickly apparent that depending on epicardial scanning by a cardiologist was not a practical approach in the OR setting.

The development of transesophageal echocardiography (TEE) allowed dramatic changes in how cardiac ultrasound was used in the OR, and by whom. In the mid-1970s, a young, innovative cardiologist – Dr. Lee Frazin – fashioned a novel device. At the time a junior faculty member at the Loyola University Stritch School of Medicine in Chicago, Dr. Frazin noted that M-mode echocardiographic studies were often technically limited in patients with chronic obstructive pulmonary disease or obesity. He reasoned that if an echocardiographic transducer could be passed into the esophagus, then diagnostic images could be obtained from behind the heart rather than through the anterior precordium. While the probe he designed and developed was rudimentary and the findings were not well suited to examining the left ventricle (LV) and valves, Frazin did establish the feasibility of "transesophageal echocardiography" in 1976.[2] And this was a key step in the evolution of "perioperative echocardiography."

The development of transesophageal echocardiography (TEE) allowed dramatic changes in how cardiac ultrasound was used in the OR, and by whom.

Some readers might wonder "why the term perioperative echocardiography?" Wouldn't "intraoperative echocardiography" be more accurate? Indeed, in the late 1970s and early 1980s, some cardiologists who did perform echocardiographic imaging in the OR believed that they were indeed performing "intraoperative echocardiography." However, colleagues who specialized in cardiovascular anesthesiology viewed things from a somewhat different perspective. They made the point – correctly, I believe – that anesthesiologists are "perioperative physicians." An important segment of their work is indeed done IN the OR, but cardiovascular anesthesiologists are also responsible for preparing the patient for surgery (including administering sedative medications and establishing adequate ventilation), sometimes before the patient is taken into the OR, and they are also responsible for supervising and treating the patient during recovery from anesthesia, often after they have been moved from the OR to a recovery unit. Also, proper patient management in a "peri-operative" setting might on occasion require the use of echocardiography. From this very appropriate perspective, it makes sense that a perioperative physician using cardiac ultrasound would be employing "perioperative echocardiography."

The evolution of TEE as a technique that might be used advantageously in the OR involved several sites. In 1980, at the Albert Einstein School of Medicine in New York, cardiologists Masayuki Matsumoto and Joel Strom and their colleagues described the use of TEE to monitor LV performance during open heart surgery.[3] In Hamburg, Germany, Drs. Michael Schlüter and Peter Hanrath and their colleagues initially used an M-mode transducer mounted within the tip of a conventional gastroscope to examine patients with obesity, emphysema, or chronic obstructive pulmonary disease, patients similar to those that motivated Frazin's initial studies. Subsequently, with the assistance of Jacques Souquet, PhD, a remarkably prescient scientist who – during a long and accomplished career – held several important positions in the ultrasound industry, Dr. Hanrath and his colleagues were able to use a 2D TEE probe to record cardiac images in 26 patients.[4] About the same time, in Palo Alto, California, the Varian corporation – working with Dr. Souquet – was developing and testing phased array 2D scanners.

To evaluate the clinical value of 2D TEE, ultrasound engineers at Varian worked with Dr. Nelson Schiller at the University of California, San Francisco (UCSF) and Dr. James Seward at the Mayo Clinic.

Three colleagues from UCSF provided some helpful details. Dr. Nelson Schiller, a friend whose accomplishments, energy, and novel insights I've admired for more than 40 years, was the 2014 recipient of ASE's Physician Lifetime Achievement Award. Dr. Mike Roizen – who I've known since we both attended Williams College many years ago – became the Chair of the Anesthesiology Department at the University of Chicago in 1985, went on to serve as Dean of the School of Medicine at SUNY Upstate, and became the first Chief Wellness Officer at the Cleveland Clinic. Dr. Mike Cahalan, with whom I had the good fortune to work in writing a 2002 guideline document on training in perioperative echocardiography,[5] received ASE's 2015 award for Outstanding Achievement in Perioperative Echocardiography. Dr. Cahalan became Chief of Anesthesiology at the University of Utah in 2001, and in a 2015 presentation at his department's Anesthesiology grand rounds, he discussed how he became involved in using TEE in the OR. [6] In the early 1980's, Dr. Peter Kremer (one of Dr. Hanrath's star cardiology fellows) came to UCSF to work in the echo lab with Dr. Schiller. Dr. Kremer brought with him – in his backpack – an m-mode TEE probe which he hoped to use in his studies at UCSF. Apparently, the UCSF cardiology fellows as well as Dr. Schiller were reluctant initially to get involved in the "invasive" use of ultrasound. Dr. Schiller contacted the UCSF chair of Anesthesiology, who sent Dr. Kremer to speak with Dr. Cahalan, at the time a young Anesthesiology faculty member investigating different anesthetic agents, thinking that Kremer might be able to evaluate TEE in the anesthetized patients participating in Cahalan's study. Long story short, Dr. Cahalan quickly recognized the value of TEE as a cardiac monitor, and he became an early proponent of intraoperative TEE. Dr. Schiller, who realized the value of this novel approach to intraoperative assessment of cardiac function, was very supportive and an important collaborator.

Dr. Cahalan quickly recognized the value of TEE as a cardiac monitor, and he became an early proponent of intraoperative TEE.

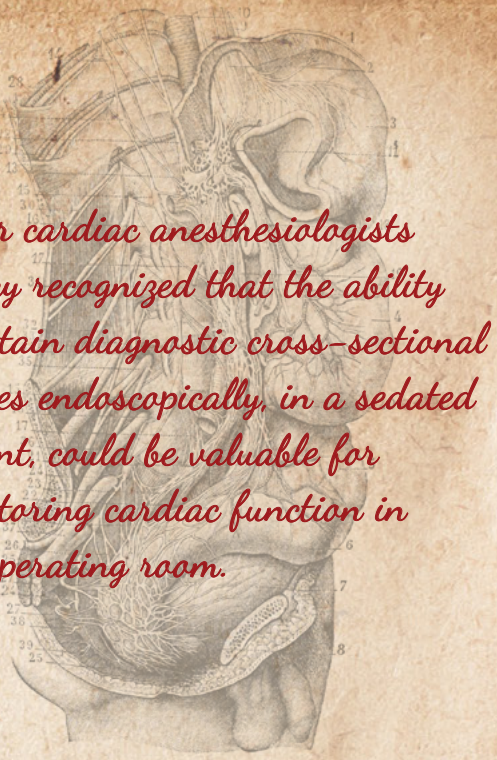
At UCSF in the early 1980's, Drs. Roizen and Cahalan took advantage of their access to 2D-TEE technology to study patients in the OR during cardiac and major vascular procedures. Dr. Roizen reminded me that in 1981, at the national meeting of the Society of Vascular Surgeons, he showed the 2D-TEE findings in a patient who developed an anaphylactic reaction during aortic reconstruction surgery, and its successful management. Drs. Roizen and Cahalan noted that TEE findings led to meaningful changes in the care of some patients, and thought that using 2D-TEE in the OR resulted in shorter ICU stays and less perioperative morbidity. A few years later, Dr. Cahalan was able to spend a sabbatical year in Europe, learning more about TEE. At the time, the Hamburg program was undergoing changes, so he chose to work with engineers Charles Lancée and Nicolaas ("Klaas") Bom and cardiologist Dr. Jos Roelandt, the head of the Echo Lab, at the Thoraxcentrum in Rotterdam. This group was very active in developing and applying innovative transducer technologies. Dr. Cahalan returned to UCSF convinced of the value of TEE as a practical intraoperative method for monitoring cardiac performance in real-time.

Other cardiac anesthesiologists quicky recognized that the ability to obtain diagnostic cross-sectional images endoscopically, in a sedated patient, could

be valuable for monitoring cardiac function in the operating room. Hence, the intraoperative use of TEE caught on quickly at several major medical centers in the United States. In discussing a few examples, if I've inadvertently failed to mention others, my apologies to those investigators whose names I failed to acknowledge. Readers interested in a more extensive discussion of the "Evolution of Perioperative Echocardiography" may find it helpful to review chapter 11 in the 6th edition of *Kaplan's Cardiac Anesthesia.*[7]

Once the potential value of a "new" technique is apparent, its use generally spreads quickly to "early adopters" and eventually becomes part of general clinical practice. I believe that intraoperative TEE took such a path. In the 1980s, the ability to examine both global and regional LV systolic wall motion and wall thickening in real time was of major interest. At Johns Hopkins, cardiologists Eric Topol and Jim Weiss and their colleagues used intraoperative TEE to document improvement in regional LV wall motion after coronary revascularization.[8] At the Mount Sinai Medical Center (New York), anesthesiologists Steven Konstadt and Daniel Thys, collaborating with cardiologist Martin Goldman, used intraoperative TEE to evaluate for myocardial ischemia.[9] At UCSF, anesthesiologists John Smith and Mike Cahalan and their colleagues compared the ability of 2D TEE and electrocardiography for detecting intraoperative myocardial ischemia.[10] At Duke University, anesthesiologists Fiona M. Clements and Norbert De Bruijn, with the support of cardiologist Joseph Kisslo, described the use of 2D TEE to evaluate regional LV wall motion in the perioperative setting.[11]

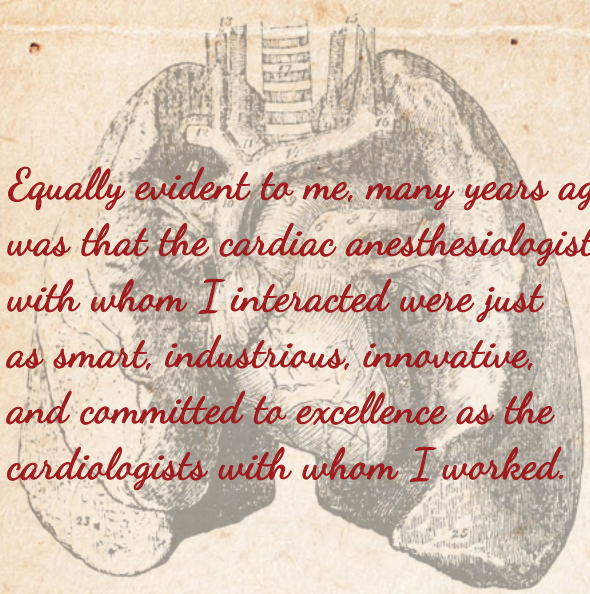
Additional applications soon followed. As noted above, anesthesiologist Michael Roizen and colleagues at UCSF used 2D TEE, starting in 1980, to monitor LV size and function in patients undergoing intraoperative aortic occlusion at different levels.[12] In Japan, at the Saitama Medical School, cardiac surgeon Ryozo Omoto and his colleagues were early proponents of transesophageal Doppler color flow mapping; initially, they used this technique to visualize dissecting thoracic aortic aneurysm.[13] At the Cleveland Clinic, cardiologist William Stewart and cardiac surgeon Delos M. Cosgrove used epicardial



Other cardiac anesthesiologists quicky recognized that the ability to obtain diagnostic cross-sectional images endoscopically, in a sedated patient, could be valuable for monitoring cardiac function in the operating room.

2D echo (and – subsequently – 2D TEE) to examine the mechanisms of mitral valve dysfunction in patients with mitral regurgitation undergoing surgical mitral valve repair.[14, 15]

The evolution of perioperative echocardiography highlights the importance of having the right technique to use in the right place at the right time. Cardiologists who generally employ echocardiography in the inpatient and outpatient settings know that much of the early history of cardiac ultrasound was written by investigators using M-mode techniques. Although dependence on M-mode declined with the development of real-time sector scanning and Doppler techniques, it is fair to note that M-mode echocardiography continues to have some important clinical value. [16] While initial intraoperative TEE studies performed using M-mode technology did provide unique and clinically useful measures of LV dimensions and systolic function, this methodology was not ideal for use during surgical procedures. One obvious shortcoming was the limited spatial sampling and inability to visualize some of the LV wall segments, or to appreciate the complexity of chamber and valvular anatomy. Another – and equally important – shortcoming was the reality that M-mode findings are not nearly as easy to understand as tomographic cross-sections. Cardiac



Equally evident to me, many years ago, was that the cardiac anesthesiologists with whom I interacted were just as smart, industrious, innovative, and committed to excellence as the cardiologists with whom I worked.

surgeons could easily recognize a short axis view at the mid-ventricular level and could quickly "see," for example, global hypokinesis or regional dysfunction or a small, hyperdynamic heart. In a patient in the OR with hypotension, these different findings might suggest – respectively – the effect of an anesthetic agent, or regional ischemia, or hypovolemia. The development of 2D TEE was important not only because it expanded the applications of perioperative echocardiography, but also because cardiac surgeons found it easy to understand the images and to recognize the relevant findings quickly.

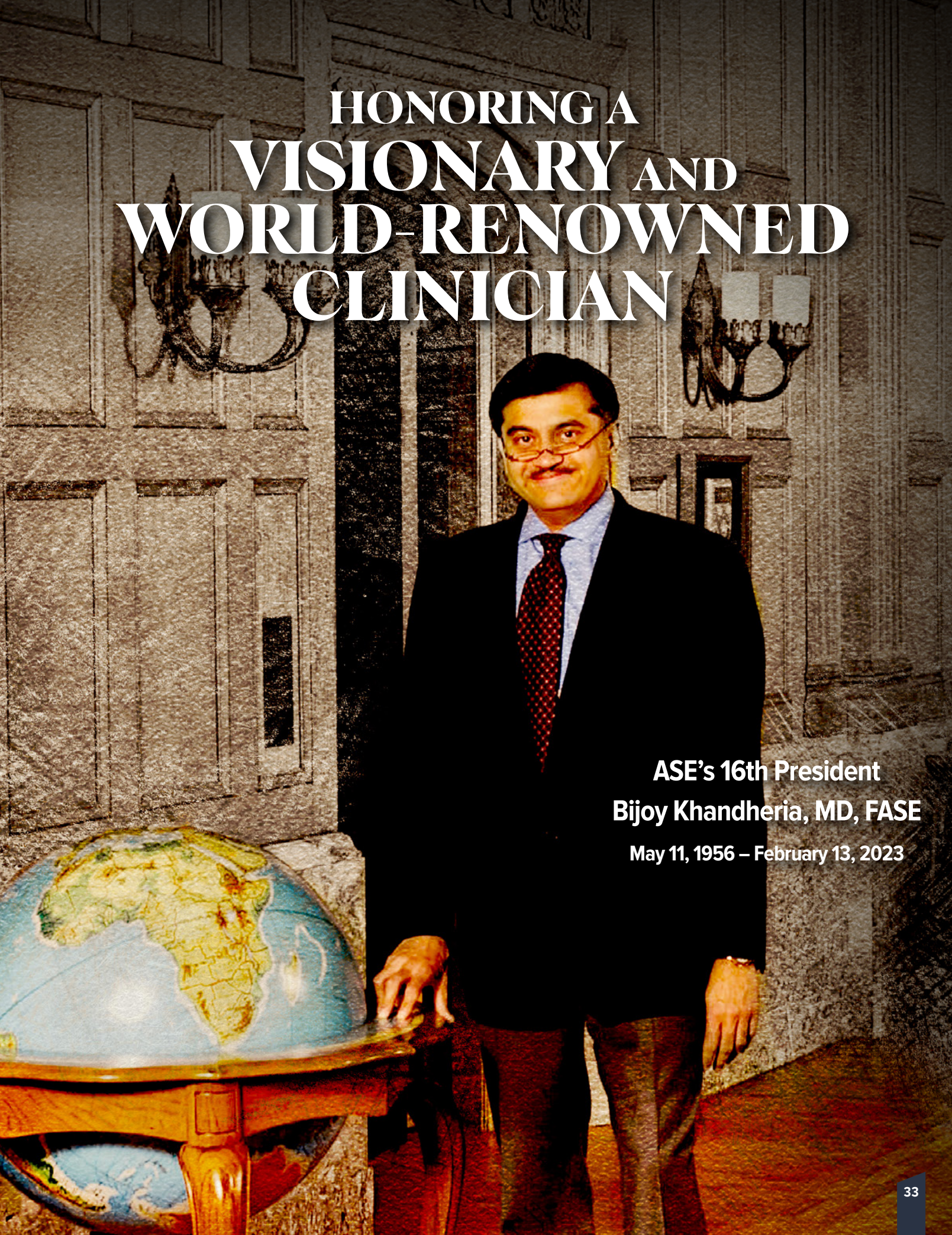
The clinical applications of intraoperative TEE have expanded greatly and discussing these in detail is beyond the scope (and space limitations) of this article. What seems quite apparent is that the evolution of transesophageal imaging and Doppler blood flow assessment provided an ideal tool for use in the perioperative environment. Equally evident to me, many years ago, was that the cardiac anesthesiologists with whom I interacted were just as smart, industrious, innovative, and committed to excellence as the cardiologists with whom I worked. The operating room was an ideal setting for a new tool and a new group of users to make novel and important contributions to patient care. And including cardiac anesthesiologists as very active participants in ASE activities has been a win-win-win situation for the caregivers, for the organization, and – most importantly – for our patients.

ACKNOWLEDGMENT

I want to express my gratitude to my friends and colleagues (listed alphabetically) Eugene A. Hessel II, MD (University of Kentucky), Michael F. Roizen MD (Cleveland Clinic Foundation), Nelson B. Schiller MD (University of California, San Francisco), and Daniel M. Thys MD (Columbia University) for their willingness to tutor me on many of the details discussed in this short article.

1. ASE 2022 Scientific Sessions – Now They are History. ECHO Magazine 2022, vol. 11, issue 7, pages 18-20.
2. Frazin L, Talano JV, Stephanides L, et al. Esophageal Echocardiography. Circulation 1976;54:102-8.
3. Matsumoto M, Oka Y, Strom J, et al. Application of Transesophageal Echocardiography to Continuous Intraoperative Monitoring of Left Ventricular Performance. Am J Cardiol 1980;46:95-105.
4. Schlüter M, Langenstein BA, Polster J, et al. Transoesophageal Cross-Sectional Echocardiography with a Phased Array Transducer System: Technique and Initial Clinical Results. Br Heart J 1982;48:67-72.
5. Cahalan MK, Abel M, Goldman M, et al. American Society of Echocardiography and Society of Cardiovascular Anesthesiologists Task Force Guidelines for Training in Perioperative Echocardiography. J Am Soc Echocardiogr 2002;15:647-52.
6. Legacy of Dr. Michael Cahalan / Anesthesiology Department. https://medicine.utah.edu/anesthesiology/history/cahalan. Accessed 11/25/22.
7. Hessel EA II, Klimkina O, Cahalan MK. Evolution of Perioperative Echocardiography. Chapter 11, pages 298-314 in Kaplan's Cardiac Anesthesia, Elsevier.
8. Topol EJ, Weiss JL, Guzman PA, et al. Immediate improvement of dysfunctional myocardial segments after coronary revascularization: Detection by intraoperative transesophageal echocardiography. J Am Coll Cardiol 1984;4:1123-34.
9. Konstadt S, Goldman M, Thys D, et al. Intraoperative diagnosis of myocardial ischemia. Mt. Sinai J Med 1985;521-5
10. Smith JS, Cahalan MF, Benfiel DJ, et al. Intraoperative detection of myocardial ischemia in high-risk patient: Electrocardiography versus two-dimensional transesophageal echocardiography. Circulation 1985;72;1015-21.
11. Clements F, deBruijn NP: Perioperative evaluation of regional wall motion by transesophageal two-dimensional echocardiography. Anesth Analg 1987;66:249-61.
12. Roizen MF, Beaupre PN, Alpert RA, et al. Monitoring with two-dimensional transesophageal echocardiography. Comparison of myocardial function in patients undergoing supraceliac, suprarenal-infraceliac, or infrarenal aortic occlusion. J Vasc Surg 1984;1:300-5.
13. Takamoto S, Omoto R. Visualization of thoracic dissecting aortic aneurysm by transesophageal Doppler color flow mapping. Herz 1987;12:187-93.
14. Stewart WJ, Currie PJ, Salcedo EE, et al. Intraoperative Doppler color flow mapping for decision-making in valve repair for mitral regurgitation. Technique and results in 100 patients. Circulation 1990;81:556-66.
15. Stewart WJ, Salcedo EE, Cosgrove DM. The value of echocardiography in mitral valve repair. Cleve Clin J Med 1991;58:177-83.
16. Feigenbaum H. Role of M-mode Technique in Today's Echocardiography. J Am Soc Echocardiogr 2010;23:240-57.

HONORING A VISIONARY AND WORLD-RENOWNED CLINICIAN



ASE's 16th President

Bijoy Khandheria, MD, FASE

May 11, 1956 – February 13, 2023

Contributed by Renuka Jain, MD, FACC, FASE and Matt Umland, RDCS, FASE

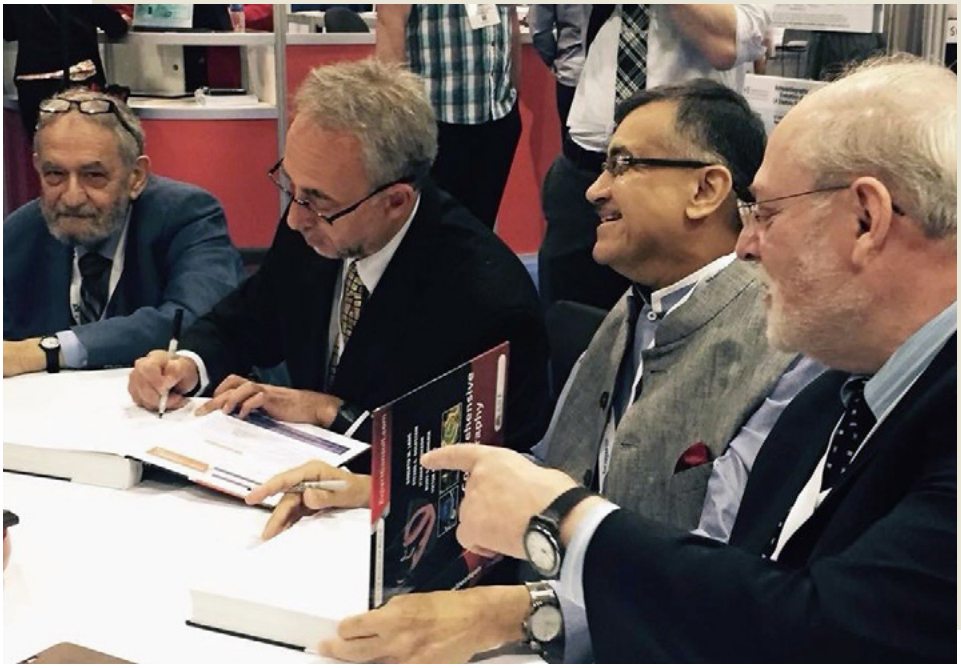
"Bijoy invited me to my first echo meeting decades ago, and it sparked by career in ASE and echocardiography" –

countless physicians and sonographers have said those words to us in the last few weeks, since Bijoy Khandheria's untimely passing. It is a testament to Bijoy's unique ability to recognize talent and give physicians and sonographers the opportunity to showcase their talent on national and international stages. He excelled at planning echo courses, inviting new and upcoming echo leaders, and gathering a group of expert faculty. Seeing him speak at a meeting was something magical – no matter what the city or the country, he engaged the audience, teaching echo in a way that was deeply meaningful to attendees, deeply personal – offering his time and individual dedication to each attendee's learning. It was this same attention and detail that he offered for us – looking back, we can see Bijoy's guiding force in projecting our careers forward.

Bijoy was passionate about echocardiography education – believing that echocardiography was the core of clinical cardiology. He was an early adopter of transesophageal echocardiography (TEE) and early teacher of it as well – in his research publications and in-person TEE workshops, he taught others about performance and safety of TEE. Among the many echo textbooks he authored, the first TEE textbook was published in 1989, *Transesophageal Echocardiography: A New Window to the Heart*. As a co-editor of *ASE's Comprehensive Echocardiography* textbook, he invited sonographers and physicians world-wide to share their expertise in succinct and clinically focused chapters highlighting core echocardiography principles.

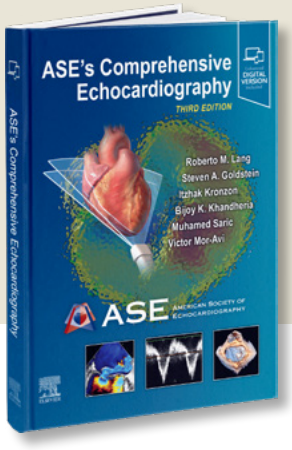
Bijoy also revolutionized echocardiography education and expanded quality echocardiography courses throughout the country. His goal was to bring state-of-the art echocardiography to every conference. He changed the paradigm of echocardiography education with the introduction of "learning labs." Early on, he recognized the potential of computer-based learning in echocardiography education. He wanted to change the way conferences were held, introduce new learning opportunities and ways to educate echo. This vision included sonographers – the sonographer-physician combination is still an essential element of learning labs. Bijoy first brought computers into echocardiography courses about 20 years ago, debuting the learning lab at the State-of-the-Art Echocardiography course in Scottsdale, Arizona. The original learning labs focused on teaching echocardiography in a new format that invited the audience to participate. He drew in audiences, with his quick wit and stories, encouraging them to be an active part of learning. This format was case-based and echocardiograms were loaded throughout the

Learning Lab at "Echo Milwaukee 2016: Echocardiography is still the heart of Cardiology". Learning Lab with Bijoy Khandheria (left), Matt Umland (center), Denise Ignatowski (sitting, right)



Book Signing for ASE's Comprehensive Echocardiography 2nd edition textbook at the ASE 2015 Scientific Sessions with editors *(left to right)* Itzak Kronzon, Victor Mor-Avi, Bijoy Khandheria, and Roberto Lang.

Below is the latest ASE textbook, of which Bijoy Khandheria also served as a co-editor.



year. We would load cases that highlighted measurements, basic to advanced hemodynamics, and new techniques (such as 3D echo or strain, still in its infancy back then). The early strain workshops taught technique, before strain was used clinically. As structural imaging grew, so did the field's presence in learning labs. Computer-based learning labs always sold out quickly, and always drew a crowd – it was an amazing resource, to review cases with experts, to learn how to measure and interpret echoes from sonographers, to review real echoes at one's own pace. In learning labs, he would put people on the spot, not to be punitive, but to draw faculty and attendees out – to welcome them into the learning process in a more active role.

Bijoy's other passion, as a son of India, was to extend echocardiography education all over the world. His legacy extends to the continents of Australia, Asia, Africa, North and South America. Would he have started Echo Antarctica? Seems like an idea that would come from him. His vision was to bring world-class echocardiography to developing countries - the same style of computer-based learning was made available in Hong Kong, Kenya, and South Africa. He built connections with cardiology trainees and professors world-wide, and the echo community grew. As an ASE President from 2005 to 2006, he was instrumental in expanding the role of ASE worldwide.

Some of the best life lessons we learned from spending time with Bijoy in learning labs – life lessons stated here in the short, staccato phrases that he used in email and text messages. Be punctual. Be prepared. Always show the best images. Embrace new technology. Take complex things and explain them simply. Be practical. Teach from cases, from the "real world." Echo is the heartbeat of cardiology and the window into cardiology. Clinical medicine is the basis by which the utility of echo technology is judged. Echo is a consult service, in and of itself. Engage people around you – stimulate their learning. Teach but also have fun. Never take short-cuts on echo quality. Messaging is important – how you frame things is crucial. Use every advantage you have. Don't be afraid to fail. Over-promise AND over-deliver.

No matter what the city or the country, he engaged the audience, teaching echo in a way that was deeply meaningful to attendees, deeply personal – offering his time and individual dedication to each attendee's learning

One of Bijoy's enduring legacies will be his mentorship and sponsorship of countless physicians and sonographers in echocardiography. He invited people into echocardiography, ASE, education – and opportunities were always rewarded with more opportunities. For us, mentorship was direct at the beginning. We learned not only echocardiography but also how he approached

Learning Lab Faculty from Aurora St. Luke's Medical Center at ASE State-of-the-Art Echocardiograpy 2020. Including *(left to right)* Matt Umland, Sarah Roemer, Chris Kramer, Bijoy Khandheria, Hillary Huisheree, Renuka Jain, Abby Kaminski, McKenzie Schweitzer, and Kelly Pesek.

people, how he took care of patients and also took care of referring physicians, of sonographers, of the lab. He would gradually take a step back as his confidence in you grew, allowing you to showcase skills and build upon what you have learned. One day, you would realize that you were standing alone in a room, fully prepared for the challenges that lay ahead, realizing how much he had trained you for whichever room you stood in. Yet, he was always a phone call or a WhatsApp message away. Bijoy is irreplaceable as a mentor, teacher, and friend - we are deeply humbled to continue his legacy of education worldwide.

Remembering Bijoy Khandheria

Contributed by Roberto M. Lang, MD, FASE

Dr. Khandheria was an outstanding physician and echocardiographer. I was lucky to have the opportunity to interact and work with him for the last 20 years. Dr. Khandheria will always be remembered for his excellent communication skills and great sense of humor that was present in every lecture he delivered. He was extremely effective in his lectures because he had the unique skills to communicate complex concepts in a simple, direct, and humorous manner. His organizational skills were unique. He always combined superb clinical judgment with an extraordinary clinical database and an unusual degree of compassion for his patients. As important as his teaching abilities were his mentoring capabilities. I have always been greatly impressed by his efforts supporting house officers, cardiology fellows, and young faculty members alike in multiple academic activities. Indeed, many years ago he invited me to lecture in one of the legendary Mayo Echo courses. This opportunity opened many doors for me. He always performed these tasks diligently, enthusiastically, and with enormous patience.

I have had the opportunity to listen to many of his lectures in multiple regional, national, and international venues. He always received the highest rankings as a speaker. Most courses organized by Bijoy were case based. He always knew which cases were noteworthy and have educational value. His organizational skills were superb. He always will be one of the best organizers of educational courses in cardiac imaging. He was definitively an innovator, he started "teaching labs" in which echocardiography was taught using computers and started with the idea of teaching different topics using short cases. Bijoy has worked closely with me throughout the years as one of the senior authors of the three editions of the ASE Comprehensive Echocardiography textbook. He definitively was an excellent author and brilliant editor.

Bijoy was always a staunch supporter of sonographers. Under his guidance, both the Mayo Clinic as well as the Aurora Health Care Center echocardiographic laboratories were considered among the best in the nation. Not surprisingly, multiple cardiologists from abroad elect Dr. Khandheria's institution for post-grad-

uate training. Bijoy loved ASE and for over two decades he worked tirelessly on behalf of our Society in every role imaginable.

Bijoy wrote very short and to the point e-mails. I don't believe I ever received an email from him that exceeded 10 words. And believe me I received hundreds of e-mails throughout the years. But this changed twice a year...On every Jewish Holiday for years he remembered to send a very sweet and long celebratory e-mail...I know he did the same for all his friends. He was a dear friend and will be missed by all of us.

Bijoy left us all to soon, but individuals like him will definitively leave a lasting impact in the profession we all love. Let his memory be a blessing for all of us.

Some Things I Learned from Bijoy Khandheria

Contributed by Alan S. Pearlman, MD, FASE

Bijoy Khandheria was an extraordinarily accomplished individual who touched many lives. His skills as a teacher, an investigator, an organizer, and – perhaps most meaningfully to him, as a physician, have been the subject of many comments by others. I'd like to add a couple of my own personal memories.

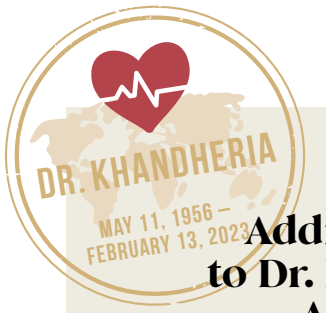
It's hard to identify Bijoy's most important contributions. He was certainly a remarkably effective teacher, not surprisingly since he was an honors graduate of the Tajik-Seward School of Teaching. Know your topic. Speak at a level appropriate to the audience. Speak clearly and with enthusiasm. When possible, involve the audience. Never compromise on the quality of the images you show.

I was fortunate to be one of Bijoy's many friends. Generously, he invited me to lecture at several CME meetings that he organized. When you live in Seattle, it's tough to pass up an invitation to speak at a late Fall or Winter meeting in Scottsdale. Even better than the weather was the opportunity to meet bright young echo gurus such as Ted Abraham, Steve Lester, and Partho Sengupta (I've listed them alphabetically) and visiting stars such as Jeroen Bax and Pepe Zamorano. At a time, Bijoy and I shared a number of interests, but he always gave me the opportunity to lecture on those topics rather than saving them for himself. From my perspective, one of his many admirable qualities was his modesty. He prefered to stay out of the spotlight, was not a self-promoter, and worked to help younger colleagues get noticed.

I learned some other important things from Bijoy. He was very enthusiastic about digital technology and a dedicated Mac user. Early on, I used a PC, but realized that I was not smart enough to remember when to use "right click" or "left click." The Mac was intuitive, no need to read instruction manuals. Bijoy was my "Mac guru," and it was he who urged me to become "ASE's first electronic President" by writing, in 1996, the first President's Message that I composed and transmitted electronically. I wrote this article on a laptop while recovering from some minor surgery; it was submitted digitally and never printed on paper until it was published in JASE.

Notwithstanding his many skills, Bijoy was not very adept at sitting still! He traveled widely (perhaps not in the Jim Thomas league, but close!) and very efficiently. While he was always nicely dressed, I would bet that he rarely if ever checked a large suitcase. He taught me about packing cubes, about bringing less rather than more, and using time efficiently. I remember flying back to the U.S. with him from a meeting in Osaka. This was back in the day when I had accumulated a lot of airline miles traveling back and forth from Seattle to Washington D.C. for ACC committee meetings and advocacy activities. The organizers of meeting in Osaka had purchased me a business class seat, and I figured that the long flight from Osaka to San Francisco was a perfect excuse to upgrade. Bijoy and I were both on the same flight, and we both had first class seats on a 747. As I recall, there were 16 seats and four flight attendants, but only three passengers – Bijoy, me, and some other guy. I figured that I could enjoy as much caviar and champagne as possible. But Bijoy, who ate carefully and did not drink alcohol, had his pre-ordered dinner, went to the lavatory to change into pajamas, and got a good night's sleep so that he could do a full day's work once he landed.

Bijoy was not just a world traveler, but an intercontinental educator. He worked with investigators from many different parts of the world. I remember, during my term as JASE Editor, reviewing manuscripts that Bijoy had co-authored with investigators from places as far from Milwaukee as Australia, India, Italy, and South Africa. It seemed that Bijoy knew everyone, and everyone knew Bijoy. I will miss him and cherish his memory. And I'll be in good company.



Additional Tributes to Dr. Khandheria from ASE Members

Editor-in-Chief of the *Journal of the American Society of Echocardiography*, Patricia A. Pellikka, MD, FASE, is writing a tribute on Dr. Khandheria that will appear in an upcoming issue of JASE.

Bijoy made huge contributions to echocardiography. He was almost always on the road speaking somewhere in the world. I always considered Bijoy to be a close friend. When he was chief of cardiology at Mayo Clinic Scottsdale, he invited me to be a visiting member of the staff for the month of February. I did that for four years. That sealed our friendship forever.

–Harvey Feigenbaum, MD, FASE

Bijoy was a wonderful and unique individual with a personality that was even bigger than most of us in echocardiography. He was a tireless teacher and a fine dinner partner as well. As is said in many traditions, "A good name is beyond gold."

–Richard L. Popp, MD, FASE

We all have our own fond memories to share of Bijoy. He was always a good friend who enjoyed life and often reached out with good wishes. He was a very special person who will be missed greatly by his friends and colleagues, but will always be in our hearts.

–Harry Rakowski MD,FRCP, FACC, FASE

At several venues, as early career faculty, I was treated with genuine kindness and special attention from Bijoy. It is so unfortunate that we rarely tell people what they meant in our lives until it is too late.

–Jonathan R. Lindner, MD, FACC, FASE

When I had just started as junior staff, Bijoy invited me to the Mayo-SOTA, one of my very first meetings as a speaker. He was so gracious and kind. It was a transformative event for me. I will miss him.

–Judy W. Hung, MD, FASE

For younger and international folks, he was an icon and role model. We learned plenty from his witty teachings.

–Kian Keong Poh, MA, MMed, FRCP, FAMS, FACC, FASE

His energy was amazing and inspired me in early career. I clearly recall the emotions and tenor of his 2006 President's Address like no other - enthusiasm, sheer joy in serving, honor, humility & dedication. He will be missed!

–Raymond F. Stainback, MD, FASE

Besides being an extraordinary academician, he was a great human being always willing to help anybody.

–Satish Parashar, MD, FACC, FCSI, FIAE
Indian Academy of Echo (IAE)

Bijoy was a superb echocardiographer, gifted speaker, and productive clinical investigator. More importantly he was a good person who was very generous with his knowledge, his lecture material, and his wit. We are all better for knowing him.

–Anthony N. DeMaria, MD, FASE

Bijoy was always a visionary and contributed so much to our field. He certainly will be missed.

–Patricia A. Pellikka, MD, FASE

Bijoy's passion for teaching, and his humor, were always a joy to experience. He will be greatly missed by so many.

–Stephen H. Little, MD, FASE

For the last five years he was one of my dependable go to guest editors for JASE. Whenever asked to serve his response was always "send it along, happy to help out." I will miss him.

–Michael H. Picard, MD, FASE

Bijoy was such an exciting, innovative clinical researcher from his first appearance as a young investigator at ASE many years ago. A real loss to our field....

–Benjamin F. Byrd, III, MD, FASE

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