ECHO

VOLUME 13 ISSUE 4 **APRIL 2024**

2024 EDUCATION CALENDAR

CONTENT AVAILABLE NOW

Registered Physician in Vascular Interpretation (RPVI) Online Review Course

An overview of all vascular imaging modalities for board review, introductory learning, or as a review for experienced imaging readers

MAY 2024

25th Annual ASCeXAM Review Course Virtual

Content Available May 6, 2024.

Jointly provided by ASE and the ASE Foundation

JUNE 2024

35th Annual Scientific Sessions

June 14-16, 2024
Oregon Convention Center
Portland, OR

Jointly provided by ASE and the ASE Foundation

SEPTEMBER 2024

SAVE THE DATE

4th Annual Advanced Imaging Techniques for Sonographers

September 7-8, 2024
Virtual Experience

Jointly provided by ASE and the ASE Foundation

OCTOBER 2024

SAVE THE DATE

12th Annual Echo Florida

October 12-14, 2024
Disney's Grand Floridian Resort & Spa
Orlando, FL

Jointly provided by ASE and the ASE Foundation

SAVE THE DATE

3rd Annual Echo in Pediatric & Congenital Heart Disease

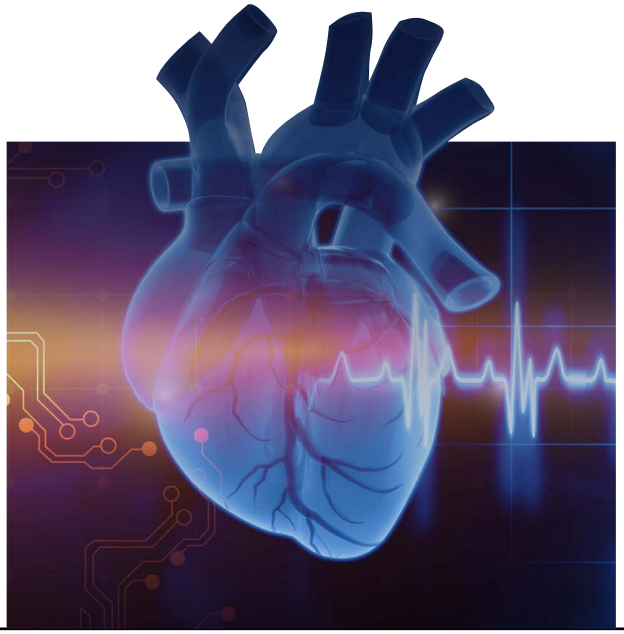
October 26-27, 2024
Virtual Experience

Jointly provided by ASE and the ASE Foundation

Discounted rates for ASE members. *To learn more and register, visit us at* ***ASEcho.org/Education***.

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

Contents



AMERICAN SOCIETY OF ECHOCARDIOGRAPHY

Meridian Corporate Center
2530 Meridian Parkway, Suite 450
Durham, NC 27713

ASEcho.org | ASEFoundation.org

Phone: 919-861-5574

Email: ASE@ASEcho.org

FOLLOW US

- @/ASE360
- Facebook.com/ASECHO
- YouTube.com/ASE360
- Instagram.com/ASE360
- Connect.ASEcho.org
- American Society of Echocardiography

Cover art: "Double Trouble" Double Chambered Left Ventricle with Accessory Muscle from the LV Apex to the Mid Septum Parallel to the Septum Creating a Small Paraseptal Chamber, Amanda Finamore, RDCS, Johns Hopkins, Baltimore, MD

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.

OUR ASE STAFF: THE HEART & SOUL OF ASE

Contributed by ***Benjamin W. Eidem, MD, FASE****, Director of Pediatric and Congenital Echocardiography, Mayo Clinic and Professor of Pediatrics and Medicine at Mayo Clinic College of Medicine, Departments of Pediatrics and Cardiology, Rochester, MN*

One of the highlights of being President of our Society is the opportunity to interact with our ASE staff on a daily basis. Dr. Alan Pearlman, ASE Past President and ASE Historian, in the recent issue of *Echo* Magazine, very elegantly detailed the history of our ASE staff development in the early years of our Society. As a corollary to this, I would like to introduce and highlight our amazing current ASE staff with hopes of educating our members on the tremendous support that they provide for us as a Society.

As the size and scope of our Society has grown, so has our ASE staff to fulfill our strategic mission. From a staff of only a handful of individuals in the early years of our Society, our current ASE staff has grown to almost 40 diverse and very talented members that I will detail in this President's Message *(see Table 1)*. In addition, I asked each of our staff members to also provide a "fun fact" about themselves that will enable our members to become better acquainted with each of them ***(noted in bold italics)***.

> "As the size and scope of our Society has grown, so has our ASE staff to fulfill our strategic mission."

From a leadership perspective, Robin Wiegerink ***(avid hiker)*** has been our Society's very talented CEO since ASE transitioned to employing our own staff. She has been at ASE for 25 (she also served in 1994) years and has been a remarkable leader throughout many eras of our Society's growth. Robin has had very capable leadership help from our Deputy CEO Andrea Van Hoever ***(an Iowa native who loves to explore cultures, foods, and nature)*** who has been at ASE for 22 years. Andrea is also the Deputy CEO of the ASE Foundation and oversees the Foundation and Guidelines & Research Departments. Meredith Morovati ***(avid UNC Tar Heel basketball fan)*** has been at ASE for 12 years and is ASE's Chief Business Strategy Officer. In addition to

TABLE 1

ASE 2024 STAFF*

	NAME	YEARS OF SERVICE	JOB TITLE
Management	Robin Wiegerink	25	Chief Executive Officer of ASE and ASEF
	Andrea Van Hoever	22	Deputy Chief Executive Officer of ASE & ASEF
Member Relations	Suzanne Morris	8	Chief Experience Officer
	Dennis Carpenter	<1	Director of Membership
	Christine Gil	2	Membership Recruitment Manager
	Danielle King	5	Member Services & FASE Manager
	Kit McGinley	1	Volunteer Manager
	Caroline Ward	2	Member Services & Publication Specialist
Education	Christina LaFuria	9	Vice President of Educational Activities
	Donald Bennett	3	Office & Product Specialist
	Liz Foster	4	Online Educational Activities Director
	Chloe Kattau	3	Virtual Learning Specialist
	Pam Riley	4	Meeting Department Specialist
	Danielle Urbina	<1	Director of Meetings
	Kerry Wilson	1	Education Specialist
Research	Lisé Blandino	4	Vice President of Science & Guidelines
	Rana Sharaf	1	Research Manager
	Melanie Sturgeon	2	Guidelines Research Specialist
External Relations	Meredith Morovati	12	Chief Business Strategy Officer
	Carolina Avary	2	Project Manager
	Samantha King	2	Director of Corporate Relations
Publications	Debbie Meyer	11	Director of Publications
	Andie Piddington	11	Deputy Managing Editor
Marketing & Advocacy	Angie Porter	9	Vice President of Communications & Public Affairs
	Kerry Burns	2	Digital Marketing Manager
	Natalie Costantino	2	Communications Project Manager
	Katherine Stark	<1	Director of Advocacy
	Kayla Van Ormer	1	Marketing Specialist
Operations & Finance	Tom Tyler	3	Chief Technology Officer
	Brandon Chatten	<1	Information Systems Manager
	Santana Barreiro	2	Human Resources Generalist
	Mary Carlson	1	Accounting Specialist
	Kim Pullen	2	Executive Assistant to CEO
	Deily Rodriguez	4	Data Quality Manager
ASE Foundation	Mary Carmody	7	Managing Director, ASEF & CoA-ACS
	Sophie Pumphrey	2	Foundation Specialist

**As of April 2024.*

connecting ASE strategy with business growth opportunities she also oversees our Publications, External Relations, and Marketing/Advocacy Departments. Suzanne Morris ***(loves watching soccer)*** has been at ASE for 7 years and is ASE's Chief Experience Officer overseeing our Membership Department as well as our Volunteer Services. Tom Tyler ***(avid gamer, comic, and Lego collector)*** has been at ASE for 3 years and is ASE's Chief Technology Officer. Tom has the very important role of overseeing our IT and Registry Department.

Our Education Department is led by Christina LaFuria ***(professional photographer)***. Christina's team includes Liz Foster ***(North Carolina nature lover)***, Kerry Wilson ***(avid reader and book collector)***, Chloe Kattau ***(small town Indiana native)***, Donald Bennett ***(avid gamer and computer builder)***, and Pam Riley ***(enjoys figure skating)***.

Our Marketing and Advocacy Departments are supervised by Angie Porter ***(avid thrifter from Ohio)*** and includes team members Natalie Costantino ***(loves North Carolina mountains and beaches)***, Kerry Burns ***(horror movie aficionado and music writer)***, and Kayla Van Ormer ***(avid crocheter and hiker)***.

ASE's Operations and Finance Department staff includes Kim Pullen ***(loves hiking with her dog)***, Santana Barreiro ***(travel & cooking enthusiast)***, and Mary Carlson ***(loves to relax with her dog, cat, and bunny)***.

Our ASE Publications Department is supervised by Debbie Meyer ***(has annual sculpture show on her family farm)***. Debbie is the Managing Editor for both JASE & CASE and is also the coproducer of *Echo* Magazine. Andie Piddington ***(sings in a capella group)*** works side-by-side with Debbie as the Deputy Managing Editor of CASE and JASE.

ASE's External Relations Department includes Director of Corporate Relations Samantha King ***(avid Seattle sports fan)*** while Carolina Avary ***(dedicated to human sciences)*** has the role of Product Manager.

Our ASE staff that are dedicated to the Membership Department include Danielle King ***(loves Charlotte, North Carolina)***, Christine Gil ***(loves craft and flea markets)***, Caroline Ward ***(plays the viola)***, and Kit McGinley ***(hangs out with partner Hayden and dogs Boulder and Joy)***. Caroline also has a role as publication specialist working on JASE and CASE.

ASE's Guidelines & Research Department is supervised by Lisé Blandino ***(admires art in all forms)*** and includes team members Rana Sharaf ***(world traveler)***, and Melanie Sturgeon ***(spouse of a pediatric cardiac sonographer)***.

> ASE is truly blessed to have such a talented staff that are not only dedicated to the strategic vision of our Society but also enable the daily myriad of ASE activities to move forward.

In addition to Tom Tyler, our ASE IT and Registry Department staff includes Deily Rodriguez ***(loves exploring local restaurants)***.

Finally, our Foundation Department is supervised by Mary Carmody ***(married high school sweetheart)*** and is also staffed by Sophie Pumphrey ***(plays music with friends)***.

ASE is truly blessed to have such a talented staff that are not only dedicated to the strategic vision of our Society but also enable the daily myriad of ASE activities to move forward. I hope that each of you take the opportunity, whenever possible, to interact with our amazing staff. I want to personally thank each ASE staff member for their service and countless contributions to our Society.

This article has been adapted from the April JASE article OnlineJASE.com

Benjamin W. Eidem,
MD, FASE
ASE President

Sonographer

VOLUNTEER OF THE MONTH-APRIL

Congratulations

Isaac Kwan, RDCS, ACS, FASE

UCSF Medical Center,
San Francisco, CA

Q
A

When and how did you get involved with cardiovascular ultrasound?

Ultrasound is actually my second career. After obtaining my bachelor's degree in film and television, I was unsuccessful in finding consistent work in the industry. A few years passed and my parents were concerned. They strongly encouraged me in looking at other careers. Since they were in the health industry themselves, it was natural for them to make the recommendation. Coming from an industry that was overly saturated, it was quite comforting to learn that sonographers are much needed. I enrolled in a program that taught a handful of modalities, but fell in love with cardiovascular ultrasound instantly. Looking back, I'm still behind a camera, storytelling, and working on my composition.

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

I moved back to the West Coast upon graduating from the sonography program and spent a few years creating new connections and opportunities. I worked in per diem and part time positions at local clinics and hospitals before I was lucky enough to be hired by University of California San Francisco Medical Center, as an adult cardiac sonographer. Currently in my eighth year at the institution, I've attained the position, Supervisor of the Adult Echocardiography lab.

When and how did you get involved with the ASE?

I joined ASE initially as a student, at the time it was a bit overwhelming and unfortunately without guidance, I didn't see the benefits and thought it would be more useful to spend my time focusing on the basics. I didn't rejoin the ASE until 2020, with the sole purpose to attend the Scientific Sessions. This was encouraged by Dr. Theodore Abraham. Unfortunately the pandemic derailed the convention and instead pivoted to the first virtual session. Nonetheless, it was an eye opening experience to see how much collaborative work is

> **"Volunteering with the ASE is the encouragement I needed to get me more involved with peers across the country."**

> “I’m excited to see where this leads us. I hope with AI, we can improve the quality of our studies all while decreasing physical scan time, thus leading to decreased injuries from long repetitive motion.”

done around the country. I knew I had to attend one in person to get the full experience. With continued support from Dr. Abraham and Monet Strachan at UCSF Medical Center, they inspired me to venture out of my comfort zone and into speaking engagements, volunteering at local echo related events, and obtaining my FASE.

Why do you volunteer for ASE?

Volunteering with the ASE is the encouragement I needed to get me more involved with peers across the country. It keeps me current in the industry allowing me to bring back and share what I’ve learned with the lab.

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?

I’ve been involved in the ASE through some micro-volunteering. I starting with a speaking engagement at the virtual Scientific Sessions. After attaining my FASE last year, it opened up a larger network where I assisted with a teaching lab as well as speaking at a panel at the Scientific Sessions. Although still very far from a natural public speaker, I’ve ventured outside my comfort zone and did something I never imagined. I’ve been quite fortunately to be given so many opportunities. This year I hope to join a committee.

What is your advice for members who want to become more involved in their profession or with the ASE?

The biggest benefit of being a member of the ASE comes to those who want to be more involved. Definitely attend a Scientific Sessions, it's not only motivating, but impressive to see how much more there is to cardiac sonography. It’s also a great place to network and mingle with others who are as dedicated to the field. Having a mentor is also beneficial, someone who can help guide and open up connections within the ASE. Lastly, obtaining FASE is a great start.

What is your vision for the future of cardiovascular sonography?

When I started my career, I was blown away with how quickly a 3D image could be processed and edited. Today, there has been a lot of talk in regards to Artificial Intelligence in healthcare and in echocardiography. We’re starting to see early signs of machine made measurements and identifying regions of interest. I’m excited to see where this leads us. I hope with AI, we can improve the quality of our studies all while decreasing physical scan time, thus leading to decreased injuries from long repetitive motion.

Interventional Echocardiography:

The Cardiac Anesthesiologist's Perspective

*Contributed by **Mary Beth Brady, MD, FASE**, and **Joseph Walpole, MD, PhD**, Johns Hopkins University School of Medicine, Department of Anesthesiology and Critical Care Medicine*

The operating room is unquestionably a dynamic environment. The structural procedural room is as well, but in a different way.

A MENTOR ONCE DESCRIBED Interventional Echocardiography as utilizing Google Maps during transcatheter procedures for structural heart disease and likened Intraoperative Echocardiography to utilizing printed directions for open cardiac surgical procedures. Both get you to your designated goal of optimal patient care, but the two journeys are quite different. For the cardiac anesthesiologist who practices interventional echocardiography, it is imperative to transition from one technique to the other.

To set the stage for this discussion, it is important to distinguish between the two fields. Intraoperative Echocardiography refers to the use of transesophageal echocardiography (TEE) as a standard tool for diagnosis and monitoring in the cardiac surgical operating room. Interventions requiring intraoperative TEE include, but are not limited to, coronary revascularization, valve procedures, organ transplantation, and complex combined procedures. These procedures take place in the very dynamic environment of an operating room. This imaging has been utilized in the perioperative arena since the 1970s. In 1998, the first perioperative TEE exam was administered to 243 cardiac anesthesiologists.[1] This early exam has since expanded to the well-known National Board of Echocardiography Examination of Special Competence in Advanced Perioperative Transesophageal Echocardiography.

As of 2023, passing this examination is a prerequisite for application to the American Board of Anesthesiology's certification in Adult Cardiac Anesthesiology.[2] ASE has recognized this field since 1993 through the Perioperative Echocardiography Council.

Interventional Echocardiography is a much newer field but one that is expanding exponentially. The term arose in 2009 in conjunction with the growth of transcatheter aortic valve replacements for the treatment of aortic stenosis. It requires specialized echocardiographic expertise in all aspects of transcatheter treatment options for structural heart disease, with specific focus on real-time imaging guidance and evaluation of device placement and function. Interventional echocardiographers are an integral part of every multidisciplinary heart team. The field has grown rapidly since 2009, and in 2023 ASE recognized this field with the establishment of the Interventional Echocardiography Council[3] as well as the *Recommendations for Special Competency in Echocardiographic Guidance of Structural Heart Disease Interventions*.[4]

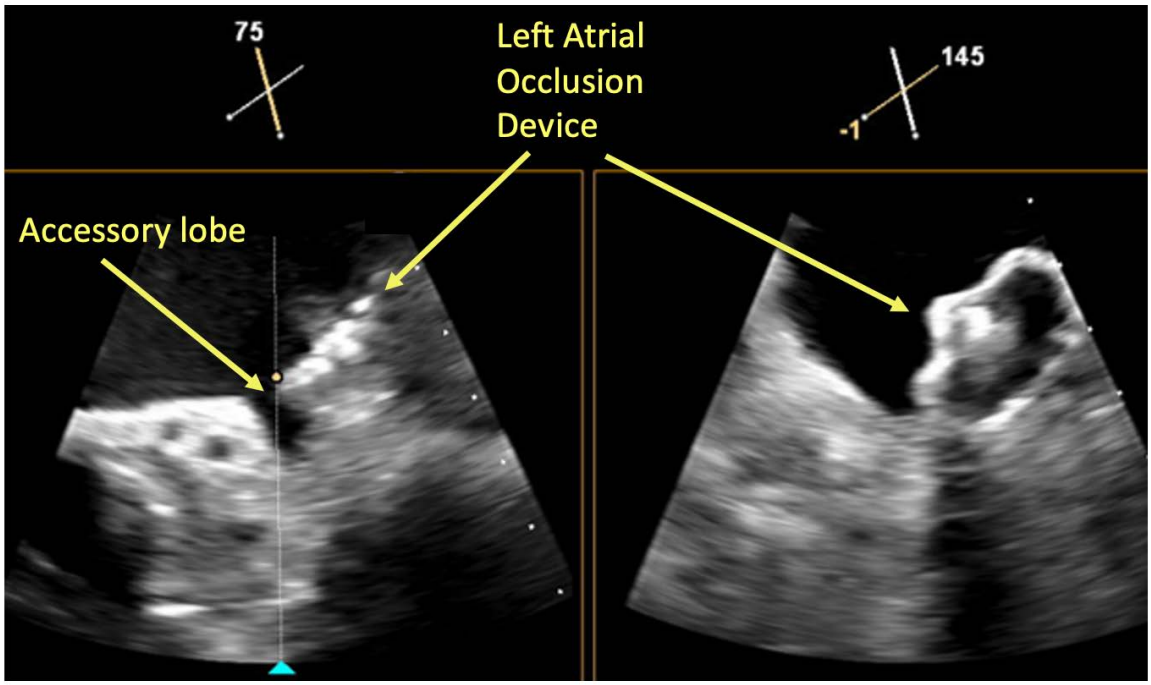
There are certainly many similarities and differences between the two worlds of intraoperative and interventional echocardiography. Intraoperative echocardiography requires precise anatomical evaluation, diagnostic skill, and unambiguous communication with surgical colleagues. With that said, the standard intraoperative assessment is pre- and post- procedure, with downtime occurring while on cardiopulmonary bypass (CPB). "Printed directions" with detailed, anatomic descriptions are reviewed and discussed between the surgeon and the cardiac anesthesiologist at case's start. On bypass, these plans are executed. Of course, intraoperative, open procedures provide the luxury of confirming or refuting a diagnosis via surgical inspection. Deviations from the original plan often occur but are usually not conducted with real-time echocardiographic assistance. At completion of CPB, additional echocardiographic evaluation is required. Echocardiographic expertise is necessary for any successful intraoperative program.

Interventional Echocardiography also requires tremendous echocardiographic expertise but in a slightly different manner. Although fluoroscopy may contribute to real-time decision-making, the echocardiographic imaging requirements are often continuous. Frequently, all eyes are on the interventional echocardiographer to diagnose, guide device placement, evaluate treatment benefit, revise treatment, rethink treatment options and perhaps, start all over again. There is no luxury of surgical inspection. The operating room is unquestionably a dynamic environment. The structural procedural room is as well, but in a different way. As mentioned, the need for echocardiographic imaging is near non-stop. Additionally, the procedure is ever-changing, requiring revision of any presumptive plan. As such, the multidisciplinary team must be flexible, skilled, and communicative; willing to try a different, previously unconsidered, path to treatment. It can be likened to a road closure noted on Google Maps, where one must constantly revise the route. Real time challenges include poor imaging, at baseline or because of device interference. Nontraditional echo views as well as complementary imaging techniques (i.e., intracardiac echocardiography) must be considered. Anatomical variations, not noted pre-procedurally, need to be addressed. As the case progresses, devices often need to be adjusted, removed, or reconsidered. Additional devices may be required. It is a constant "rerouting" of the original plan. Echocardiographic dexterity, flexibility, and confidence is imperative and, as is the case with intraoperative echocardiography, unambiguous communication is a necessity.

Frequently, all eyes are on the interventional echocardiographer to diagnose, guide device placement, evaluate treatment benefit, revise treatment, rethink treatment options and perhaps, start all over again.

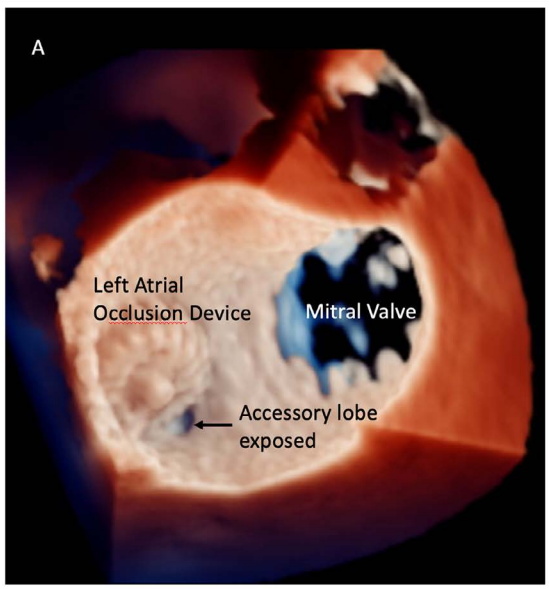
Although the two worlds are quite different, from a cardiac anesthesiologist's perspective, the transition to the transcatheter procedural suite from the intraoperative arena is usually uneventful. The terminology and the team members are the same. Whether repairing a mitral valve via an open procedure or via a transcatheter approach, all understand the language of lateral, medial, prolapse, restrictive, etc. Although the echocardiographic technology is the same for both procedural rooms, many might

FIGURE 1A

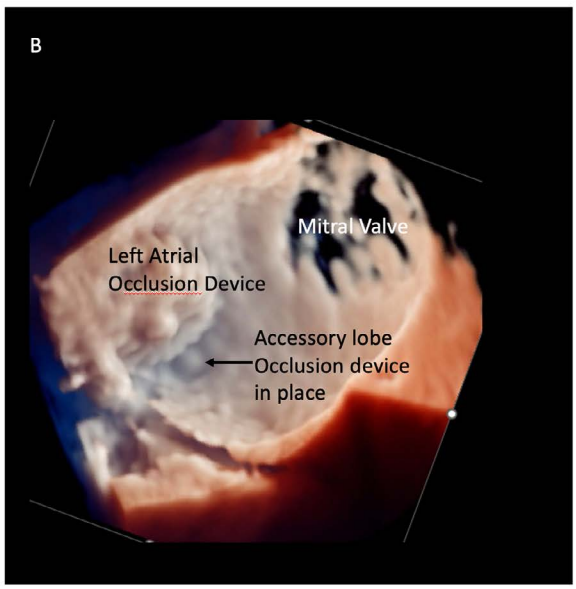


Orthogonal view of Left Atrial Occlusion Device in place.
Left Atrial accessory lobe noted in view on left.

FIGURE 1B

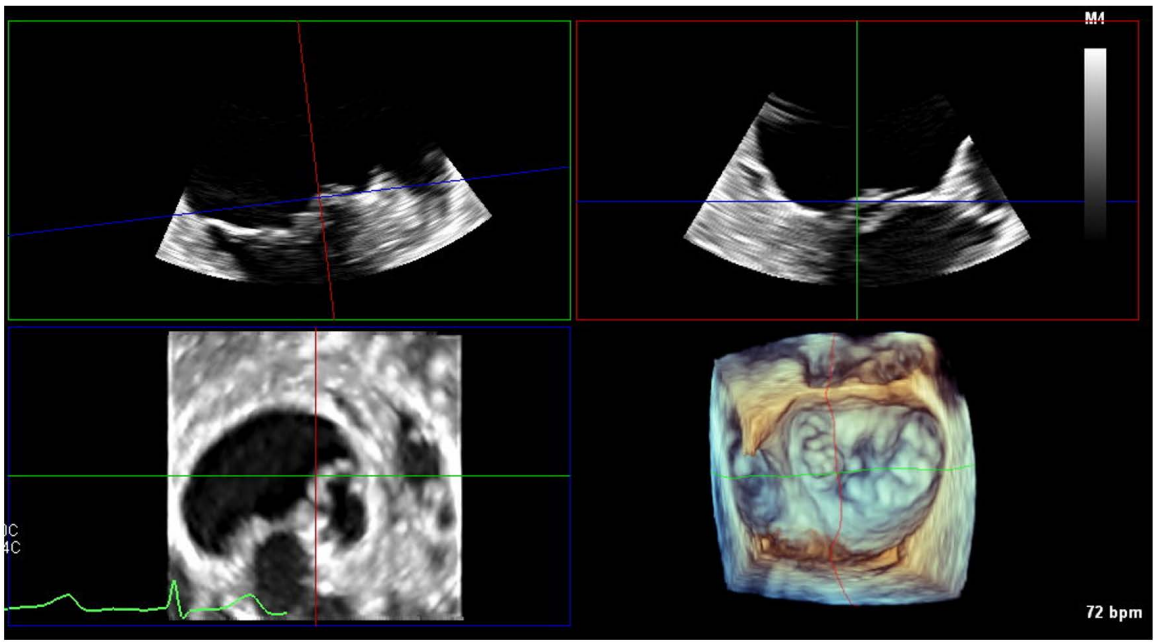


3D evaluation utilizing light source technology
A) View of LAAO device in place with accessory lobe exposed



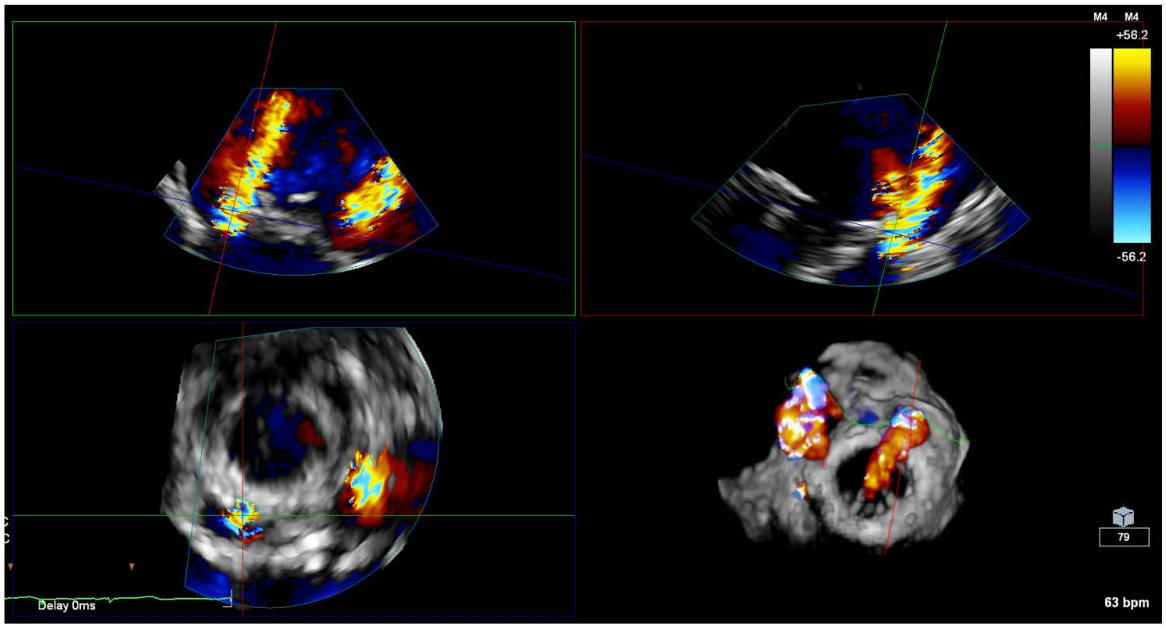
B) View of LAAO device in place and occlusion device covering accessory lobe

FIGURE 2



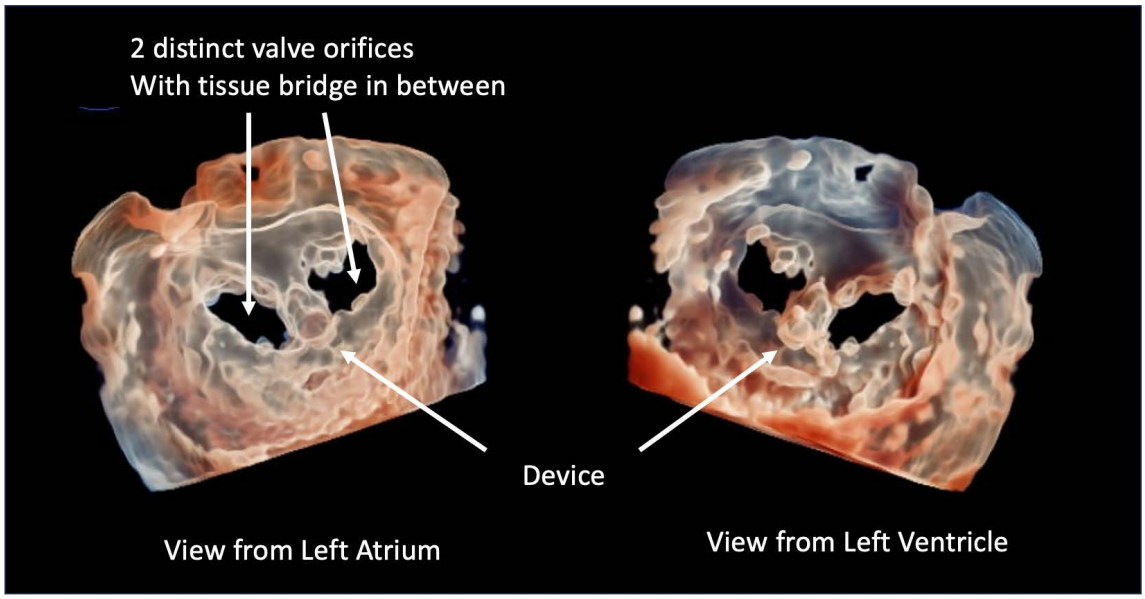
3D Multiplanar Reconstruction (MPR) to pinpoint location of mitral valve lesion

FIGURE 3



3D Multiplanar Reconstruction (MPR) with color to evaluate paravalvular leak

FIGURE 4



3D evaluation of a Mitral Valve Transcatheter Edge to Edge Repair utilizing tissue transparency tool
From the LA view, an adequate tissue bridge is noted as well as 2 distinct valve orifices.
From the LV view, the device is noted.

argue that interventional echocardiography requires even more dexterity with newer echocardiographic modalities: in particular all aspects of 3D echocardiography. *(Figures 1-4)* From an anesthesiologist's perspective, the team members are the same. For years cardiac anesthesiologists have worked closely with surgical colleagues in the operating room as well as with their cardiology colleagues in the interventional suites. Today, transcatheter structural procedures bring all members together in one room to form a true heart team, with cardiac anesthesiology as the one of the common threads tying the team together.

Of note, Interventional Echocardiography practices vary across institutions. Some rely heavily on cardiologists while others depend on cardiac anesthesiologists to provide echocardiographic guidance. This decision is multifactorial, but very often depends on compensation and staffing models. ASE recognizes that both medical specialties offer insight and expertise. The 2023 *Recommendations for Special Competency in Echocardiographic Guidance of Structural Heart Disease Interventions* support complimentary pathways.[4] Further, the ASE Interventional Echocardiography Council has leaders from both specialties on its Steering Committee.

As evidenced above, the fields of Interventional Echocardiography and Intraoperative Echocardiography have many similarities and, certainly, differences. While one is well established and the other is relatively new, both continue to evolve. From a cardiac anesthesiologist's perspective, it is exciting to be part of both worlds and part of the heart team.

References

1. Pearlman A. The National Board of Echocardiography – A Basis for Important Collaborative Accomplishments Echo magazine 2023;12(4):20-24 https://www.theaba.org/subspecialty-exam-type/adult-cardiac-anesthesiology-exam/

2. https://www.theaba.org/subspecialty-exam-type/adult-cardiac-anesthesiology-exam/

3. Quader N. Introducing the Interventional Echocardiography Council Steering Committee. Echo magazine 2023;12(1):9–11.

4. Little SH, Rigolin VH, Garcia-Sayan E, et al. Recommendations for Special Competency in Echocardiographic Guidance of Structural Heart Disease Interventions: From the American Society of Echocardiography. J Am Soc Echocardiogr 2023;36(4):350–65. https://www.asecho.org/ie-2/

Perioperative Echocardiography

Scientific Sessions Overview

*Contributed by **Richard Sheu, MD, FASE**, University of Washington Medical Center, Seattle, WA and **Kiran Belani, MD, FASE**, Northwestern Medicine, Chicago, IL*

Get ready to be swept off your feet as our thoughtfully curated talks unleash an explosive fusion of insights and revelations led by the brightest minds in the field.

BRACE YOURSELVES FOR an electrifying Annual Scientific Sessions in Portland, Oregon, as ASE features an all-new meeting format like never before. The Perioperative Echocardiography Council (COPE) is responsible for putting together five exciting sessions this year. These sessions promise paradigm-shifting discussions through the innovative landscape of echocardiography. As the demand for advanced perioperative care continues to rise, staying abreast of the latest techniques and technologies in echocardiography is paramount for healthcare professionals. Get ready to be swept off your feet as our thoughtfully curated talks unleash an explosive fusion of insights and revelations led by the brightest minds in the field.

Starting off our excellently assembled sessions, on Friday June 14, will be the riveting debate on the preferred imaging modality for transcatheter left atrial appendage occlusion procedures. Two heavyweight speakers will take the stage one after another and give their opponent their best knockout punch. An entertaining expert panel will also be present to provide cheers and jeers. Who wins? Who loses? Will intracardiac echocardiography eventually replace transesophageal echocardiography? Is this the beginning of the end of conventional interventional echocardiography? You get to decide!

On Saturday June 15, prepare to be dazzled by our stellar lineup of speakers who will electrify the stage with their visionary talks on primary fixes for primary mitral regurgitation.

A multidisciplinary heart team of cardiac anesthesiologists, cardiologists, and surgeons will simulate a real-life discussion for some of the toughest cases ever presented. Impress your colleagues by learning how to confidently predict surgical or procedural success simply based on non-invasive imaging-derived parameters.

The last three outstanding sessions offered by COPE will take place on Sunday, the final day of the conference. "Insidious interpretations" will tackle everything related to low gradient valvular diseases, such as etiology, prognosis, and updated imaging recommendations. The implications and diagnosis dilemma of low gradient mitral stenosis, a frequently encountered but rarely discussed disease, will also be closely examined. With the parent theme of "Global Echocardiography" in mind, rheumatic heart disease returns to spotlight in full force. An entire session is dedicated to the fundamentals of what to do with discordant echocardiographic data and why it is important to differentiate this pathology with degenerative disease. Roundtable discussion by international experts will then elucidate latest groundbreaking treatment options in their own part of the world. Finally, terrifying real-world cases of endocarditis will be showcased. Buckle up for an exhilarating ride through case-based presentations of the most awe-inspiring imaging techniques and technologies to not only size but also differentiate vegetation from other imitators. This session is the ultimate resource you need to confidently manage patients with endocarditis in the future.

Although the ASE Annual Scientific Sessions this year will only span a short three-day weekend, our program is designed to help attendees immerse themselves in a whirlwind of networking opportunities, forging connections that will propel your career to new heights. Whether you are a seasoned expert, a passionate researcher, or a curious newcomer, we are sure you will learn something at the COPE sessions that may reshape your practice in the future. Looking forward to seeing old friends and meeting new ones!

▶ **Register before May 8 to receive the best price on ASE 2024!**

35th Annual Scientific Sessions, An Interview with

Anitha Parthiban, MD, FASE, and Adam Dorfman, MD, FASE

*Contributed by **Rebecca C. Klug, BA, ACS, RDCS, (AE, PE), RT(R), FASE,** Instructor of Medicine Adult and Pediatric Cardiac Sonographer at Mayo Clinic Rochester, MN*

THE OREGON CONVENTION CENTER in Portland Oregon will be welcoming the 35th Annual Scientific Sessions of ASE in June. This year, the Pediatric and Congenital Heart Disease (PCHD) content is being led by Chair Anitha Parthiban, MD, FASE, and Co-Chair Adam Dorfman, MD, FASE. Here, they graciously share their insights on what went into the planning, as well as what we can look forward to as attendees. Thank you to both very busy physicians for the immense time, effort, and dedication they put in to create an extraordinary experience for our PCHD community.

This is an interactive process, and one of the primary goals is to be the conduit through which the members of our council can communicate their ideas and desires for the Sessions

1. When it came to planning this year's Scientific Sessions pediatric content, what were your goals?

Anitha and Adam: We came into this process viewing the role of Chair and Co-Chair as providing leadership and being responsible for creating the sessions, but also really being the voice of our community. This is an interactive process, and one of the primary goals is to be the conduit through which the members of our council can communicate their ideas and desires for the Sessions, which belong to all of us. The other essential goal is to continue the great progress we have made over time in making the PCHD portion of the Sessions inclusive and diverse. This has clearly made this meeting better over the years and it is crucial that this continues. We also wanted to ensure that we offer

a variety of content that would appeal to a diverse audience ranging from case-based discussions to innovative technology and hands-on learning.

2. Could you please share a broad overview on how the pediatric content will be organized this year? How do you think the shortened time frame and more interactive approach to the meeting will be integrated within the pediatric sessions?

Anitha and Adam: The Sessions are condensed to two and a half days, but there is still an abundance of pediatric and congenital content. In keeping with the format for the entire conference this year, the individual PCHD sessions are structured a bit differently than in previous meetings. Individual sessions will be 45 or 60-minutes long, compared to many 90-minute sessions in the past. There will be less emphasis on didactics and podium presentations, with the majority of most sessions allotted for panel discussions and audience participation. Those discussions will follow case presentations from a junior faculty member, fellow, or sonographer, who will use their case to raise pre-determined questions about the topic of the session. The moderators will wrap up the sessions with key take home messages. We are hopeful that this new format will be engaging, encourage a robust exchange of ideas and keep everyone focused and energized. We are proud to say that we have been able to incorporate pediatric and adult CHD (ACHD) content throughout every time slot of the entire course, including many exciting and interesting topics all day Sunday, and so we request that you plan your travel accordingly. In addition, this year the ACHD content is integrated into the PCHD sessions rather than separately. We will discuss lifelong care of our patients in many of the sessions, such as Ebstein anomaly, aortic valve disease, and problems with the Fontan circulation. The always popular Jeopardy competition will feature pediatric and adult CHD as well.

We are excited to see how the new format works within the PCHD portion of the meeting. We have many topics that will be well served by this format; a few examples include the "Nomenclature Fest," two case-based fetal sessions, and decision making for whether to go back "on pump" in the operating room. The panels will enable us all to learn from experienced colleagues and we can't wait to see the interactions within the panels.

Chair Anitha Parthiban, MD, FASE

3. How did you choose lectures and speakers to fulfill these goals?

Adam and Anitha: This was the most challenging task for us given the breadth and depth of talent and the energy we have in the PCHD community. We received several excellent proposals that we were able to incorporate into the sessions. We have worked hard to ensure diversity and inclusivity in our faculty. It is important that we all hear a variety of voices from the podium and stage that come from different places, different types of programs, and different backgrounds. The case-based format has allowed us to include many early career faculty and fellows, and we are excited to meet and hear from them. We are also proud to have excellent sonographer representation throughout the program.

4. What pediatric imaging learning labs are planned, why were those chosen, and how can attendees register for them?

Adam and Anitha: We have learning labs for 3D imaging ("Crop with Me") and strain imaging ("Quantify with Me"). These labs have been successful and very highly rated in the past. 3D and strain imaging are two areas that are particularly well suited to the hands-on workshop format. Drs. Pei-Ni Jone and

Co-Chair Adam Dorfman, MD, FASE

Dan Forsha have done brilliant jobs in the past in organizing these hands-on sessions and we are confident that they will again be productive and useful to the registrants. These two Learning Labs require additional registration that is available at the time of registering for the main conference. Be sure to look for these pediatric/congenital Learning Labs on Sunday afternoon when you register for ASE 2024! In addition, we will again have two DIY sessions, one for PCHD and one for ACHD which will offer hands on pediatric and fetal echocardiography as well as the opportunity to interact with experienced sonographers and cardiologists and learn imaging "tips and tricks." Additional registration is required for the DIY sessions as well.

5. As Chair, what has been the most exciting part of organizing the pediatric sessions?

Anitha: As Co-Chair last year, I was fortunate to work with Luciana Young and I learned a lot from her. Even so, the new format and vision for this year's Scientific Sessions was a bit nerve racking in that it challenged me to think differently and restructure the ideas that I had saved in my brain (and One Drive) over the last year! While I remain slightly anxious to see how our community receives the program, I am also excited at how it has ultimately turned out. I think we have some amazing topics and fantastic faculty this year. Notwithstanding the new framework that we had to adhere to, we were able to include all the content we felt was important and relevant to our community. I am thankful to have a phenomenal partner in Adam this year. He has been incredibly helpful every step of the way and I especially appreciate his thoughtful input and feedback.

6. As Co-Chair, what have you enjoyed most about your role in organizing this valuable educational event and what have you learned?

Adam: Working on the Scientific Sessions has been a tremendous experience. I have really enjoyed the entire process; the highlight is knowing that we are putting this program together as a service to our PCHD community and following in the footsteps of so many incredible colleagues who have taken on this role in the past. The other highlight has been working with Anitha. She has been an incredible leader and taught me so much about navigating this process. The learning points that stand out have been experiential, in working to advocate for our PCHD community while respecting the framework of the Scientific Sessions organization and the vision of the Program Chair, Dr. Federico Asch.

7. What are you are looking forward to most at the Scientific Sessions?

Adam: The Sessions will be the fruition of all the time we have spent to create this program and I can't wait! Every year I most look forward to seeing and networking with my colleagues from around the country. This year will be no exception. But in addition, I am so excited to see all of this work we have done on paper come into place live and to see how the new format works for our PCHD topics.

Anitha: The ASE Scientific Sessions has always been the most enjoyable meeting for me and this year in Portland will be no exception. As Adam has said, I look forward to seeing our giant Excel sheet materialize into energetic and engaging pediatric and congenital sessions where we learn from each other and perhaps even new ideas are born. Most of all I look forward to catching up with friends and colleagues and having fun.

▶ Register now to join us for these great PCHD sessions!

PEDIATRIC *Echocardiography*

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

In the early 1990s, ASE founded three Councils to represent three very important areas of echocardiographic practice. In the years that followed, other councils have been born, and – as the value of cardiovascular ultrasound in patient care continues to grow – the number and diversity of ASE Councils will surely continue to expand. The first three councils represented Cardiac Sonography, Perioperative Echocardiography, and Pediatric Echocardiography. The inception and evolution of Cardiac Sonography and Perioperative Echocardiography were discussed in several earlier articles in *Echo* magazine.[1-3] This article focuses on how the field of "Pediatric Echo" began.

As usual, identifying who was the first person to work in any discipline is difficult if not impossible, and pediatric echocardiography is no different. Often the first person to think of a new idea is not adept at implementing it, while sometimes the person credited with introducing a new application was a very effective proponent but was not the first to have used it. I do not know who was the "first" pediatric echocardiographer and am honestly not sure that it would be possible – or helpful – to claim to have identified such a person. Instead, I think it more relevant to acknowledge some of the early proponents of the value of echocardiography in children, and to discuss how they became involved in this field.

As usual, identifying who was the first person to work in any discipline is difficult if not impossible, and pediatric echocardiography is no different.

How to identify these pioneers? One obvious approach – and the one I've elected to follow – is to consider the pediatric echocardiography "gurus" (spiritual teachers) who were

selected by ASE's Council on Pediatric and Congenital Heart Disease to receive the Founders' Award for Lifetime Achievement in Echocardiography for Pediatric and Congenital Heart Disease. Now given every other year, this honor has been awarded to nearly 20 remarkable individuals. Time and space limitations do not allow me to discuss all of them. Instead, I've opted – arbitrarily – to focus on the first four recipients of the pediatric Founders' Award. In the order in which they received the Award, they are Stanley J. Goldberg, MD (1997), J. Geoffrey Stevenson, MD (1998), Roberta G. Williams, MD (1999), and Norman H. Silverman, MD (2000).

Stanley J. Goldberg, MD

In the "it's a small world, isn't it?" category, it turns out that Stan Goldberg and Harvey Feigenbaum were both undergraduate students at Indiana University (IU) in the 1950s. Dr. Goldberg told me that he was a year behind Dr. Feigenbaum, but did not get to know him until they were both medical students at IU in the latter half of the 1950s. I learned that in the mid-1960s, when Dr. Goldberg was a junior faculty member at UCLA, two engineers from the Bendix Corporation visited his laboratory and "said that they could make an ultrasound-tipped catheter that could be inserted into the left ventricle of an animal and used to measure flow." Although this was Dr. Goldberg's first encounter with ultrasound, he found the catheter difficult to steer and the signals hard to interpret. In the late 1960s, he ran into Dr. Feigenbaum at a meeting and learned that Dr. Feigenbaum and Dr. Richard Popp were using transcutaneous ultrasound to study the left ventricle. In the process of moving to Tucson in 1970 as Chief of Pediatric Cardiology at the University of Arizona (U of A), Dr. Goldberg asked the university to provide a Smith Kline Instruments echocardiographic device (the same equipment that Feigenbaum and Popp employed in their early studies in adults), which he used to evaluate his young patients. Dr. Goldberg visited the Feigenbaum laboratory and learned how to do better ultrasound exams in patients with congenital cardiac malformations. He said, "add me to the list of people who learned from Harvey."

Still active clinically, Dr. Goldberg's practice now focuses on patients with lipid disorders, a topic of lifelong interest. Early in his career at the U of A, he co-chaired a panel on "Pediatric Echocardiography" at the American College of Cardiology's 1976 Scientific Sessions and lectured on that topic at too many national and international meetings to name. He was one of the original members of the Society of Pediatric Echocardiography (SOPE), an organization founded in 1975 "To provide a unique environment for the pediatric and adult congenital echocardiography community to collaborate with other imaging societies to promote networking, education, advocacy, research, and program development," according to its Mission Statement. Dr. Goldberg must be credited not only for his many individual accomplishments, but also for having the vision to put together a remarkable group of pediatric cardiology innovators in Tucson. The group of Drs. Goldberg, Hugh Allen, and David Sahn (known by some as the "Desert Dynasty") made many original observations in children using novel echocardiographic techniques which they helped to develop. Interacting with other "echo enthusiasts" and ultrasound engineers was of high importance. In the 1970s, visitors to Dr. Goldberg's laboratory included Drs. Joe Kisslo, Art Hagan, Ned Weyman, and Lilliam Valdes-Cruz (who was later recruited to join the pediatric cardiology faculty at the U of A); all of them made important accomplishments in the echocardiography world. Notable visitors from Europe included Drs. Otto Daniels (Netherlands) and Lindsay Allen (England), as well as Charles Lancée, a bright young Dutch engineer from the Thoraxcentrum in Rotterdam who was part of the team that invented the multiscan approach to cross-sectional echocardiography. Drs. Sahn, Allen and Goldberg also worked with Walter Henry and Jim Griffith from

the National Heart and Lung Institute, who developed one of the first sector scanners. These collaborations allowed the Tucson group to use different real-time cross-sectional imaging systems to examine children with complex congenital heart disease. In 1975, Drs. Goldberg, Allen and Sahn published "Pediatric and Adolescent Echocardiography," the first text on that topic. Dr. Sahn served as ASE's sixth President and was the first pediatric cardiologist to hold that office. And, not surprisingly, Drs. Allen and Sahn were also recipients of the Founders' Award.

Dr. Jeff Stevenson graduated from Occidental College and received his MD degree from the Baylor College of Medicine in 1970. He did clinical training in pediatrics, and a fellowship in pediatric cardiology, at the University of Washington (UW). In 1974, he deployed to the Naval Regional Medical Center in San Diego, where he served as a staff pediatrician and pediatric cardiologist. During his tour of duty in San Diego, he was fortunate to interact with Dr. William F. Friedman, Chair of Pediatric Cardiology, who shared his interest in cardiac ultrasound. In 1976, Dr. Stevenson returned to Seattle as an Assistant Professor of Pediatrics on the tenure track in the Department of Pediatrics at the University of Washington (UW) School of Medicine. For almost 20 years, he was the Director of the Cardiac Ultrasound Laboratory at Seattle's Children's Hospital and Regional Medical Center.

Geoffrey Stevenson, MD

Dr. Stevenson was particularly active in the American Registry of Diagnostic Medical Sonography (ARDMS) and in ASE. He served two terms on ASE's Board of Directors and chaired the Pediatric Program for the Third Annual Scientific Sessions in 1982. This was the first Scientific Sessions at which pediatric/congenital heart disease sessions were included on each morning and each afternoon program, setting an important precedent. Jeff was also enormously helpful as an Associate Editor of JASE over the years 2008-2018, a period marked by substantial growth in the number of submissions focused on pediatric echocardiography. He was also a strong supporter of cardiac sonography. He served two terms on the Board of Directors of the American Registry of Diagnostic Sonography (ARDMS), chaired the ARDMS finance committee, and was active on a variety of ARDMS committees involved with examination development and certification. He was also a founding member of the International Cardiac Doppler Society, serving two terms as Treasurer of that organization.

Dr. Stevenson was one of the first clinical investigators to use pulsed Doppler echocardiography to evaluate intracardiac blood flow in children with a variety of disorders. In the 1970s and 1980s, pediatric cardiologists interested in cardiac ultrasound focused primarily on *imaging* anatomic features. Dr. Stevenson was among the first to appreciate the value of Doppler methods for distinguishing organized from disturbed intracardiac blood flow, and to focus on physiology and hemodynamics. In the ensuing years, echocardiographers learned that both anatomy and physiology are important, but it took some time for these initially disparate but inherently related elements to coalesce. His initial studies were done using a pulsed Doppler system developed in the UW Center for Bioengineering where a group of smart bioengineers, led by Donald W. Baker BSEE, were working to advance cardiac ultrasound technology. Initial studies, done with the help of sonographer Terryl K. Dooley, BS, employed a system that used time-interval histography to analyze the time course of Doppler shifts, a method that had important shortcomings but some clinical utility.

In the late 1970s, Dr. Stevenson worked with a brilliant young engineer named Marco Brandestini, BSEE, to evaluate the clinical applications of a digital multi-gate Doppler instrument that provided, for the first time, mapping of Doppler frequency shifts

(in color) onto standard M-mode echocardiographic records. Working with colleagues in Seattle, Jeff was the driving force behind a series of investigations that defined multiple clinical applications of Doppler ultrasound in children with a variety of congenital cardiac disorders. He also had a strong interest in using transesophageal echocardiography in the operating room. He and Dr. Greg Sorensen (chief of Cardiac Anesthesiology at Seattle Children's Hospital) and their cardiac surgical colleagues demonstrated the value of pediatric TEE during the repair of cardiac defects. For his important contributions to the value of intraoperative TEE in children, Dr. Stevenson was awarded the 1992 *Christian Doppler Award of Echocardiography* by the International Society of Intraoperative Cardiovascular Ultrasound.

Roberta G. Williams, MD

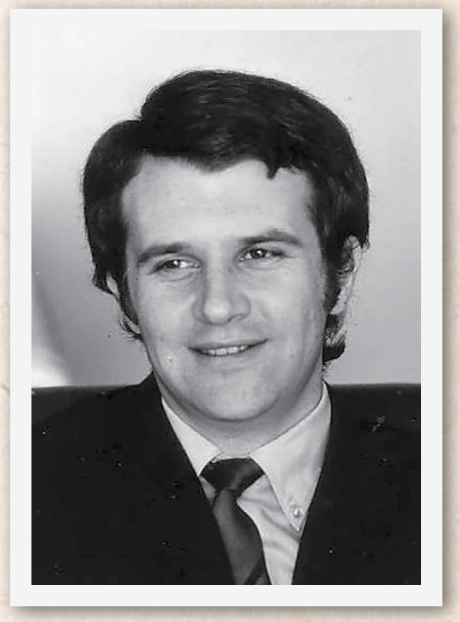
Dr. Roberta Williams grew up in Rocky Mount, NC. At age thirteen, she was examined by Dr. Helen Taussig, (one of the founders of the field of pediatric cardiology), a formative experience that led her to aspire to a career in cardiology. Appreciating the value of "North Carolina diversity," she earned her undergraduate degree from Duke and her MD from the University of North Carolina (UNC). As a senior in college, while working as a research assistant at UNC, she met Dr. Ernest Craige, the first Chief of Cardiology at UNC and a master clinician who was in the process of establishing several diagnostic techniques at UNC, including cardiac catheterization, vectorcardiography, phonocardiography, and pulse wave tracings. When Dr. Williams applied for a cardiology fellowship at Boston Children's Hospital (BCH) in the late 1960s, she already knew as much about heart sounds as the BCH faculty who interviewed her! After joining the BCH faculty in the early 1970s, she founded the echo laboratory, became the medical director of the surgical ICU, and worked in the operating room environment, correlating anatomic findings in children with congenital heart disease with the clinic consequences of the lesions identified. At the BCH, she had the good fortune to work with giants in pediatric cardiology and cardiac surgery, including Drs. Alex Nadas, Aldo Castañeda, and William Norwood.

Dr. Williams recalled that the echo lab at the Boston Children's Hospital was founded in 1972 with a grant from the AHA for $15,000, which paid for both a Hoffrell M-mode machine and her salary for the year. She was soon joined by pediatric cardiology fellows Fred Bierman and Stephen Sanders, and later by Steve Colan, who made important contributions to the lab and to the field of pediatric echocardiography. They utilized a multiple view approach, including the subxiphoid window, with wide active element transducers (long focus) and the ability to flip the image when viewing from below. They found the subxiphoid views to be the most effective in diagnosing infants with congenital heart disease. The echo lab team coordinated closely with angiography (Dr. Ken Fellows in Radiology) and the surgical team to improve diagnostic accuracy in an era when surgical repair in infants was undergoing rapid evolution.

Having demonstrated her investigative and administrative skills at Boston Children's Hospital, Dr. Williams encountered a series of opportunities to provide major leadership at other institutions. From 1982-95, she served as Chief of Pediatric Cardiology at the University of California, Los Angeles. In 1995, she returned to UNC-Chapel Hill as Chair of Pediatrics. In 2000, she moved back to Los Angeles as Chair of Pediatrics at the Keck School of Medicine at the University of Southern California (USC), also serving as Vice-President for Pediatrics and Academic Affairs at the Children's Hospital of Los Angeles. Notwithstanding her administrative responsibilities, Dr. Williams has remained focused on how to provide better care to young patients with heart disease, especially during the sometimes complicated "transitions" between fetal and neonatal life, and between adolescence and young adulthood. She was the founding medi-

cal director for the Center for Healthy Adolescent Transition at the Children's Hospital Los Angeles and continues to see patients in that center's clinic.

Despite her busy academic and clinical activities, Dr. Williams made time to contribute to many professional organizations. She was a member of the ASE's first Board of Directors (1976-80) and served as ASE's Treasurer (1981-83). She was also very active in the American Academy of Pediatrics (AAP), the American College of Cardiology (ACC), and the American Heart Association (AHA). Her CV lists far too many important committee assignments and task forces to mention, but I note that she chaired the AAP's Section on Cardiology, co-chaired several of ACC's Bethesda Conferences, served on multiple NIH panels, and functioned as an adviser to a long list of educational institutions. Between 2009-2020, she was a consultant to the National Aeronautics and Space Administration (NASA). Now freed of many administrative responsibilities, she continues to mentor trainees and junior faculty, and remains active in patient care.



Norman H. Silverman, MD

Dr. Norman Silverman spent his formative years in South Africa. Following studies at the University of the Witwatersrand in Johannesburg, he left Johannesburg to pursue specialty training. In 1972, he moved to the San Francisco Bay Area to begin residency and fellowship training in Pediatrics, and has never left. He spent two years as a Cardiology Fellow at the University of California, San Francisco (UCSF). In 1974, he moved to Stanford University as an Assistant Professor of Pediatrics; a year later, he rejoined the UCSF faculty, where he rose to the rank of Professor of Pediatrics in Residence and served until 2002 as the Director of UCSF's Pediatric Echocardiography Laboratory. In 2002, he returned to Stanford as Professor of Pediatrics (Cardiology).

Dr. Silverman reminded me that technical issues influenced his introduction to echocardiography at UCSF. The UCSF radiologists had access to an M-mode system, but they considered that recording and interpreting an ECG signal (needed for timing of events) were deal-breakers. Perceptively, Dr. Silverman noted that "if cross-sectional imaging had been developed first, I believe that echocardiography would have remained in the hands of the radiologists." He also recalled that in the early 1970s, he and Dr. Nelson Schiller (recipient of ASE's 2014 Lifetime Achievement Award) were both UCSF cardiology fellows. Norman noted, wryly, that he and Dr. Schiller "shared the instrument on a 9 to 5 basis, which meant that Dr. Schiller had the instrument from 9 am – 5 pm, and I was able to use it after 5 pm!"

Among Dr. Silverman's many accomplishments, several stand out. Working with faculty colleagues in pediatric cardiology, he devised the left atrial to aortic root (LA/Ao) ratio, for many years the standard method for assessing left-to-right shunt size in premature neonates with isolated patent ductus arteriosus. With the advent of two-dimensional (2D) echocardiography in the mid-1970s, he worked with Varian instruments (based in the Bay Area) to modify their large transducer in a manner that allowed him to use it in infants and small children. He and Dr. Schiller also realized that a 2D scanner could be used to examine the heart from the cardiac apex, and they described the use of apex echocardiography for measuring left ventricular volumes (using the "apical biplane method of discs") and for evaluating congenital heart disease. Their landmark work helped to establish the importance of "apical views" in both pediatric and adult echocardiography. As technology evolved and clinical applications continued to expand, his interests also broadened. He was one of the early champions of the use of echocardiography in the fetus, and he introduced fetal echocardiography to some of the current leaders in that field.

An enthusiastic teacher and mentor, he helped to

influence the early careers of many fellows with whom he worked, at both UCSF and Stanford, including Drs. Rebecca Snider, Gerard Martin, Michael Brook, Wayne Tworetzky, Mark Friedberg, John Simpson, and Meryl Cohen. For his exceptional skills as a teacher, Dr. Silverman was awarded ASE's 2008 "Excellence in Teaching in Pediatrics" award.

These four "founders" worked in different locations, with different equipment, different colleagues, and different clinical interests. However, their paths often crossed. Dr. Stevenson noted his appreciation for support provided by colleagues such as Drs. Goldberg, Allen, and Sahn in Arizona, and from Dr. Nils-Rune Lundstrom at Lund University in Sweden. Dr. Williams reminded me that early in their careers, Drs. Sahn, Silverman and she sometimes functioned as a "traveling show" extolling the virtues of different views of the heart. Using a linear array transducer with a long focus, Dr. Sahn emphasized the value of precordial views. Using a phased array transducer with a short and medium focus, Dr. Silverman was a proponent of apical views. Using a transducer with changeable short and long focus, Dr. Williams thought that the subcostal view was particularly helpful. Eventually, of course, they acknowledged that all three views were needed for a comprehensive assessment.

I believe that the careers of these four "founders" demonstrate some important common themes. First, while they came from different places and backgrounds, they were all captivated by opportunities to use novel non-invasive approaches to enhance their understanding of cardiovascular anatomy and function, and to provide a more sophisticated assessment of cardiovascular disease in children. This is particularly noteworthy because in the 1970s most cardiology specialists viewed cardiac ultrasound with great skepticism. Second, they understood the importance of technical excellence; "getting things done" was a goal, but "getting things done right" was even more important. Third, they all appreciated the importance of supporting each other and working with ultrasound engineers to make appropriate technical modifications needed to address the demands of examining children whose hearts were small and close to the transducer. A Venn diagram summarizing heart disease in children and in adults would show some overlap, but important differences between congenital and acquired disorders would be noteworthy. Technical factors often governed the conditions that could be evaluated and the speed of progress. The need for ultrasound probes with smaller footprints and higher carrier frequencies, the faster heart rates, the importance of right heart structures and the anatomic complexities in children required technical advances before the full value of echocardiography in children could be realized. That there were more adults than young children with heart disease meant that market forces encouraged technical developments in adult echocardiography before manufacturers focused on the equipment needed to study small children, whether in the outpatient setting, the operating room, or the maternal care clinic. Nevertheless, I'm struck that the founders of pediatric echocardiography, and the founders of adult echocardiography, shared the same motivation – to develop and employ novel non-invasive methods in order to enhance the care of their patients.

Acknowledgment: I'm indebted to Drs. Stan Goldberg, Jeff Stevenson, Roberta Williams, and Norman Silverman for their willingness to take some time to remind me of how they became interested in using cardiac ultrasound to enhance the care of children with heart disease, and for their friendship.

REFERENCES

1. Cardiac Sonography: How did this Important Profession begin? Echo magazine, August 2022, pgs. 21-24.

2. How did Cardiac Sonography become Cardiac Sonography? Echo magazine, October 2022, pgs. 23-27.

3. Perioperative Echocardiography: Novel applications in a new environment. Echo magazine, March 2023, pgs. 28-32.

LEVERAGING ARTIFICIAL INTELLIGENCE

TO ADDRESS PITFALLS OF MODERN ECHOCARDIOGRAPHY

Contributed by **Tony Gallagher, MBA, RDCS (AE, PE), FASE**,
Baptist Health Lexington, Lexington, KY

As healthcare steamrolls down the path of Artificial Intelligence (AI), we all need to remain acutely aware of the effect it will have on our various customers: patients, providers, and healthcare workers. Any progress in AI should be viewed through the lens of how these groups might be affected.

Questions like the following should be considered: "Will this enhance or improve the life of a patient?" "Will this advancement aid or hinder a provider arriving at a diagnosis?" and "Will the innovative technology simplify or complicate the job of the person performing the work?"

In the last decade, the field of ultrasonography has seen notable AI initiatives. This article will specifically refer to cardiac ultrasound. AI growth in the industry includes automated measurement of Doppler signals for vascular ultrasound that eventually translated to cardiac ultrasound and the creation of 3D images derived from sonographer-traced 2D images. Today, AI applications can perform standard image recognition, automatic measurements, and even disease state recognition, such as predicting heart failure or calculating valvular stenosis. AI-based ultrasound machines are currently being endowed with the same advanced features and capabilities as some of the more robust cardiac PACS systems.

Examples of new systems that have the potential to reduce the work of the healthcare worker and, at the same time, improve or maintain accuracy are:

1. Siemens is releasing a new cardiac ultrasound machine (the AcusonOrigin), that has image recognition capabilities and can automatically configure the Color Flow Doppler box appropriately for each cardiac valve. Then, it can also automatically place the spectral Doppler sample and measure Doppler signals in real time, saving the sonographer the time it takes to freeze, activate the measurement system, and perform multiple measurements. (Since this article was initially written, the Siemens Acuson Origin has received FDA approval.)
2. Us2.AI is an AI application that reportedly has the ability to automatically measure over 90% of the measurements performed in an echocardiogram. If this application proves its validity and reliability, it could reduce the time-to-perform an echocardiogram by as much as 10 to 15 minutes.

Ongoing research in the field of echocardiography, advancing technologies and increasing AI features have continued to increase the amount of data derived from an echocardiogram. Vendors are entering the field of advanced AI from different angles, each with unique features that promise to help facilities derive and compile an increasing amount of data. The question becomes, which AI features seem more beneficial and how can you leverage them and the increased amount of data to improve the work performed by the sonographer, increase the accuracy of the physician's diagnosis, and ultimately improve the life of the patient?

As an operations director, my perspective on how we should leverage AI is from the vantage point of quality, workflow, and capacity. To address these, we must discuss pitfalls that directly affect a cardiac ultrasound.

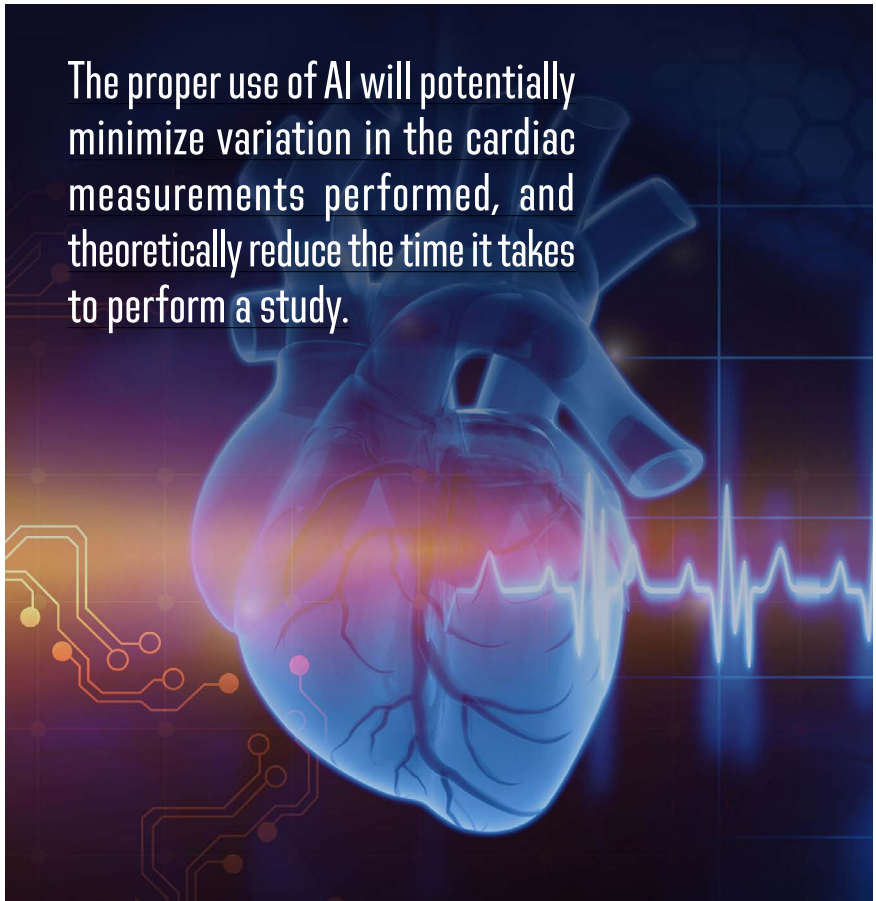
- Pitfall one, the environment: The performance of a Cardiac ultrasound is optimal when the sonographer can control the lighting, patient positioning as well as their own positioning to maintain proper ergonomics. However, most hospital-based echocardiograms are performed at a patient's bedside, where there is minimal environmental control. Practically speaking, you do not need AI to address this.
- Pitfall two, Intra-reader variability: Much of reading an echocardiogram has historically been qualitative, not quantitative. However, qualitative interpretation can lead to results variations among readers and increase the margin of error. As an example, echocardiography conferences usually have a meeting called 'Read-With the

Experts.' At these meetings, you will see that the qualitative interpretation of an echocardiogram can vary enough among physicians to change a diagnosis.

- Pitfall three, intra-sonographer variability: The overall quality of a cardiac ultrasound is very sonographer dependent. The sonographer performing the exam must make fine adjustments to optimize the image quality of each still image and cineloop that they capture and then perform on-screen measurements on those optimized images. There are multiple problems with this method of measuring, training, skill level and each individual's vision. Each of the adjustments can cause variances in the measurements performed. Every sonographer strives to do the best of their ability to ensure the highest image quality and most accurate measurements that they can for their patients. However, the variants in vision and training leave a scenario where there is no perfect or true standard.

LEVERAGING AI

There are currently around 350 measurements that are either performed or derived during an echocardiogram. Theoretically, a beneficial AI would be one that could accurately and consistently reproduce these measurements with at least the same accuracy as an experienced cardiac sonographer. Thus, mitigating Pitfall three. Over the past year, Baptist Health in Kentucky has been investigating the opportunity to leverage an AI application to mitigate intra-sonographer variability and standardize our cardiac measurement and quantification processes. The proper use of AI will potentially minimize variation in the cardiac measurements performed, and theoretically reduce the time it takes to perform a study. The measurement portion of an echocardiogram consumes roughly 30% of the duration of the study. If we can leverage an Artificial Intelligence application with the ability to perform all, or most, of the routine measurements performed in an echocardiogram. This could create a positive cascade that would help us maintain quality (due to the AI standardization), reduce the time-to-perform a study (as the measurement portion will be significantly reduced), and increase capacity.



From a healthcare operations viewpoint, an average echocardiogram takes 45-60 minutes to complete, including measurements. Leveraging an AI application has the potential to reduce that study time by 15+/- minutes. If a sonographer performs eight studies/shift, there is potential to conservatively recoup eighty minutes/shift. That time can be utilized to perform an extra echocardiogram per shift without a reduction in quality. Increased capacity without increasing staff equals increased revenue. The larger the number of cardiac sonographers in a facility, the greater the potential for operational efficiencies, which will likely result in increased revenue. Leveraging the right AI application has the potential to

1. Increase the diagnostic quality of echocardiograms, which is a win for patients and providers,
2. Increase capacity without additional staff, and
3. Increase revenue.

As Micheal Scott would say, that's a win, win, win.

This article was originally published in CXOTech.

ECHO

ASE'S MISSION

To advance cardiovascular ultrasound and improve lives through excellence in education, research, innovation, advocacy, and service to the profession and the public.