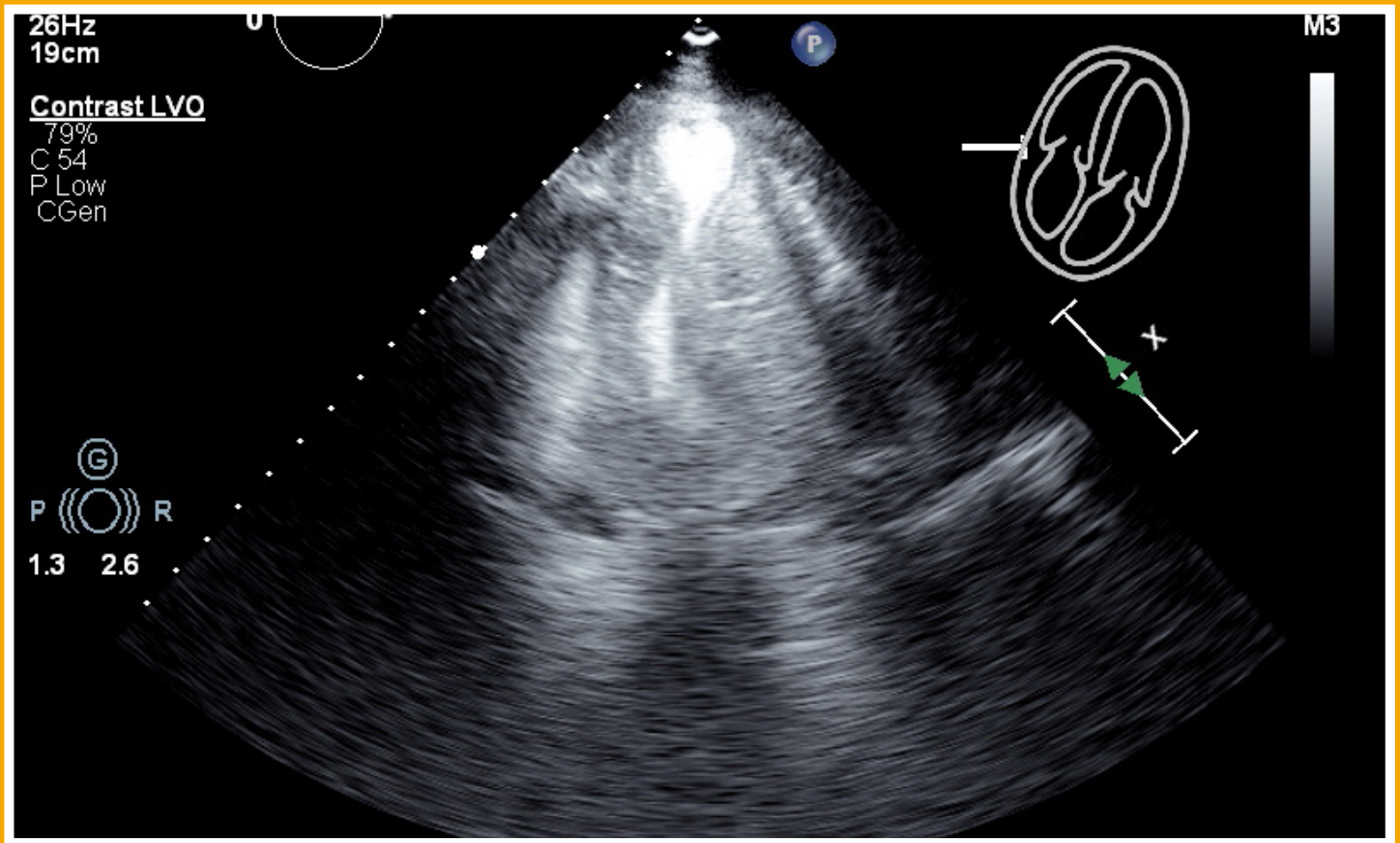


ECHO



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2022-2023 EDUCATION CALENDAR

DECEMBER

Advanced Imaging Techniques: A Virtual Experience

December 3-4, 2022

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JANUARY

32nd Annual Echo Hawaii

January 16-20, 2023

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FEBRUARY

35th Annual State-of-the-Art Echocardiography

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MAY

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JUNE

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

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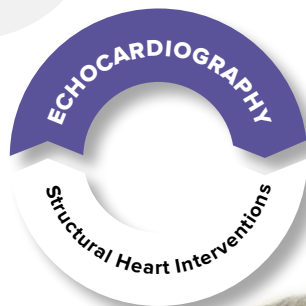
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The Big Data Business



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The Impact of Structural Heart Intervention on the Field of Sonography



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Interview with a Traveling Sonographer: Alyce Holt, RDCS (AE,PE)



17

Cardiac Sonography: Evolving Training Programs and Expanding Professional Opportunities

AMERICAN SOCIETY OF ECHOCARDIOGRAPHY

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Cover art: "Heart in My Heart" Dawn Rufus, BS, ACS, RDCS, Atrium Health, Charlotte, North Carolina

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.

THE BIG DATA BUSINESS

Contributed by **Stephen H. Little, MD, FASE**, is the Cardiology Fellowship Program Director at Houston Methodist Hospital, System Director for Structural Heart, and Professor of Medicine, Weill Cornell Medical College, Cornell University

“It is a capital mistake to theorize before one has data.”

*Sherlock Holmes in
“A study in Scarlet” by
Sir Arthur Conan Doyle*

Everyone is looking to data for value and solutions. All sectors of industry, including Energy, Finance, Education, Manufacturing, Entertainment, and Healthcare are grappling with how to capture and harness the digital data that now floods these fields (Figure 1). Defining just who gets to record, store, analyze, monetize, and utilize such data are important questions being actively explored. The ASE has not historically been in the data business—in fact, few healthcare organizations have. But the time has come, so we must prepare, plan, and prioritize.

What is big data? In general, the term is used to refer to data sets that are huge in volume, growing exponentially, and too complex to be dealt with by traditional data-processing approaches. Often such data is characterized with an attempt to quantify the important V's: Volume, Variety, Value, Velocity, and Veracity (Figure 2).

Within all of healthcare, this data evolution is driving change, and no specialty will be influenced more than cardiovascular imaging. If we reflect upon just the data that flows through an echo lab, we see an enormous volume of personal health information, provider orders and preferences, billing submission and payment data, and of course disease specific digital image data—to list just the most obvious data elements. Considering the emerging applications to interact with imaging data, including those employing artificial intelligence (AI) to assist image capture, image organization, functional quantitation, and report generation, we see that echocardiography will continue to be influenced (likely profoundly) by the data we create and manage. As the tough questions about data management, ownership, and stewardship take center stage, ASE needs to be fully engaged in the discussion. In short, it's better to be on the train than in front of the train.



As a professional society we recognize both the opportunities and challenges that big data will bring to our membership. Already we have seen the impact of big data issues within our core missions of Research, Education, and Advocacy. Our Image-Guide Registry team has successfully managed many specific issues and made tremendous progress towards creating a powerful digital image repository of specific cardiac disorders. In addition, our AI Forum in New York City last March included key discussions about the promise of these powerful data-driven imaging solutions, while recognizing the potential pitfalls and ethical concerns regarding patient imaging data (a summary can be found in the June issue of *Echo Magazine*). However,

“There were 5 exabytes of information created between the dawn of civilization through 2003, but that much information is now created every two days.”

*[1 exabyte_1billion gigabytes]
Eric Schmidt, Executive
Chairman at Google*

these activities reveal the need for clear policies regarding data ownership, access, and value. From ongoing discussions with our Industry Round Table (IRT) partners, it is clear we are at the beginning of an important journey to develop robust, protected, and ethically responsible digital image data resources.

Thankfully, ASE is a large organization with very diverse talents and expertise. One of our strengths is that collectively we can bridge institutional barriers with consensus and collaboration in ways that an individual member could not. As such we will rely on our members (and likely a few consultants) to help set our priorities as we create new policies and practices that acknowledge the big data

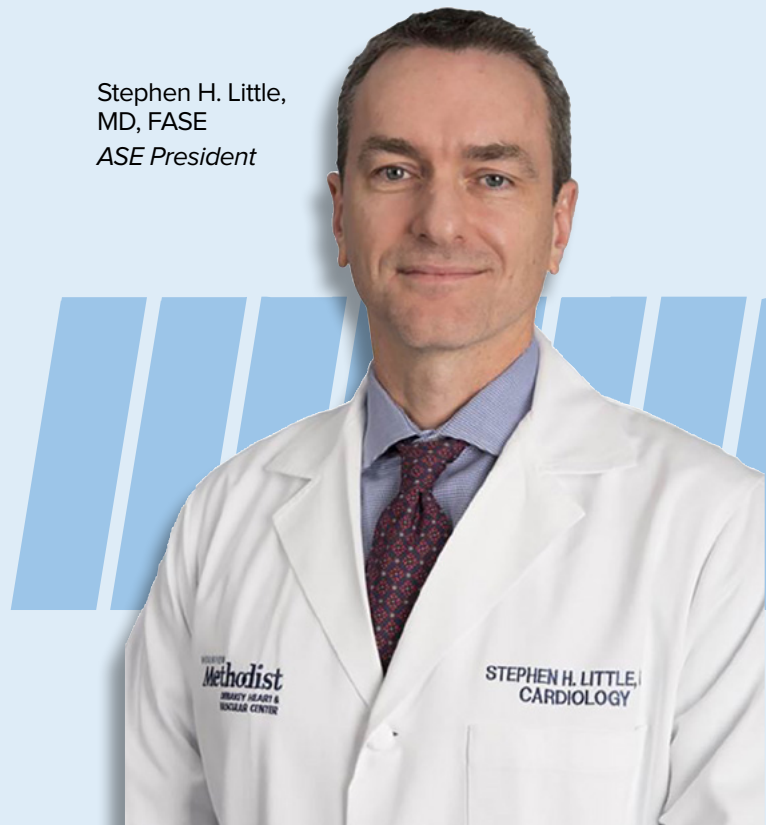


FIGURE 1

world. Dr. Theodore Abraham (ASE Vice President) will chair a new task force charged with providing the early direction for these ASE efforts. Considering the many stakeholders and a myriad of viewpoints and implications—this will be no easy task. We are grateful for the efforts of this first task force and the focused work to follow.

The quotes by Sherlock Holmes and Eric Schmidt helped me to appreciate our current place in human history. The data now available to us is massive, incredibly exciting, and a bit daunting. So, we begin our journey with enthusiastic first steps.

Stephen H. Little,
MD, FASE
ASE President



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

The Impact of Structural Heart Intervention on the Field of Sonography

Contributed by **Ken Horton ACS, RCS, FASE**, and **Elaine Shea ACS, RCS, RCCS, FASE**



THROUGH THE HISTORY of echocardiography, the field has faced, embraced, and implemented many changes and new technologies. Three-dimensional echo and global longitudinal strain are two of the latest examples of new technologies that we have seen go from the early stages of implementation to being utilized daily. Over the past 15 to 20 years there has been an

explosion in the field of structural heart interventions. These developments have already impacted echo laboratories around the globe. If it has not affected your echocardiography laboratory yet, it will in the future. There is not a single structure in the heart that has not been

part of this expansion of services. There is now a man-made device that can be placed in every valve, septum, chamber, and great vessel of the heart. The field of structural heart interventions has changed the way we image the heart. It has changed the workflow in the echocardiography laboratory and has required sonographers to have a better understanding and increased knowledge base of cardiac anatomy, physiology, and hemody-

namics. It has and will continue to change the way we train both new sonographers who are beginning their career as well as experienced sonographers, regardless of how long they have been scanning.

It is an interesting relationship between echocardiography and the field of structural heart interventions. As interventionalists come up with new devices and strategies to repair diseased valves, it forces echocardiographers to look at the valves in ways we never have before. And, as echocardiographers get a better understanding about valve anatomy and how to better visualize the valves, it allows the interventionalist to develop new options for treating valve disease. As an example, a manuscript recently published in *EuroIntervention* demonstrated that the tricuspid valve has three leaflets only 54% of the time and can have five or more leaflets.¹ This has major implications on how to approach an edge-edge repair of the tricuspid valve. Also, recent advances in the assessment of the tricuspid regurgitation have led to a new proposed criteria for categorizing tricuspid regurgitation severity by adding two new categories termed massive and torrential.² There is a very symbiotic relationship between the interventionalists and echocardiographers that make them both better (*Figure 1*). This increased understanding of how to diagnose and treat cardiac structural disease results in increased

Over the past 15 to 20 years there has been an explosion in the field of structural heart interventions.

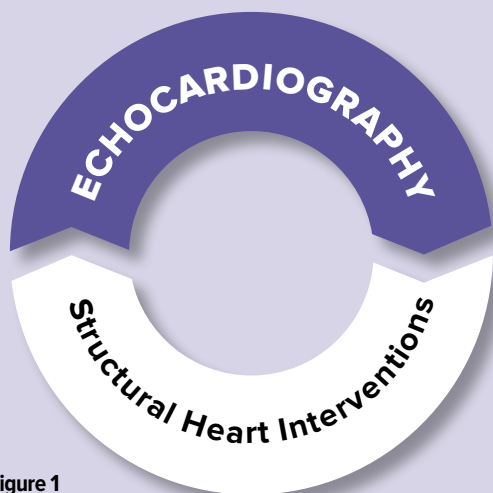


Figure 1

treatment options for our patients to consider, better patient care and outcomes.

The structural heart team consists of a multi-disciplinary team of caregivers that review patient history, evaluate diagnostic data, and develop treatment options for patients with heart disease. Sonographers are a vital part of the heart team at an institution with a structural heart program. However, structural heart interventions have become so common that all sonographers must have an understanding that the patient they are scanning may be a candidate for a structural heart device that is in the research stages or already clinically approved. The sonographer is often the first person to determine that the patient might meet the criteria for a structural heart intervention and may be required to notify the physician or valve coordinator that the patient may be a candidate for a structural heart intervention.

Imaging Considerations

Two-Dimensional (2D) echo has always been the foundation of assessing valve disease, but sonographers must now build on that foundation with improved three-dimensional (3D) and global longitudinal strain (GLS) skills. Transthoracic and transesophageal 3D echocardiography is used extensively in the screening, periprocedural and follow-up echocardiograms of patients being evaluated for or undergoing structural heart interventions. Global longitudinal strain has been shown to be helpful in the timing of the intervention as well as having predictive value in outcomes and post-procedure remodeling.³ Sonographers must have a strong understanding of both 3D and GLS image acquisition and analysis. Sonographers are often called upon to

assist with transesophageal echocardiography during the initial assessment or with intraprocedural imaging, so a strong understanding of TEE views and real-time image manipulation and postprocessing are required skills at institutions performing structural heart interventions. A strong knowledge of imaging protocols and study requirements enables the sonographer to assist the physician in ensuring the required images and information are obtained. Sonographers must also have a strong understanding of cardiac hemodynamics and understand the physics of flow dynamics. They must understand echocardiographic measurements and calculations such as PISA, the continuity equation and quantitative Doppler calculations as well as the limitations of these measurements and calculations. This type of advanced knowledge and skills falls well within the scope of the Advanced Cardiac Sonographer (ACS). Sonographers should be encouraged and provided time to stay current with publications and guidelines related to structural heart assessment and interventions.

Workflow Issues

There are increased workflow challenges for echo labs that support the structural heart team. The echocardiogram of a patient being assessed for a structural heart intervention may exceed 120-130 images and take up to an hour and a half or longer to complete. Follow up echocardiograms on these patients can also be lengthy so changes to outpatient scheduling will be needed to accommodate the longer studies. This can have a dramatic impact on staffing and scheduling. Echo lab managers should be prepared to accommodate these scheduling and staffing challenges.

There are often detailed protocols developed by the device sponsor that must be followed when performing the echocardiogram. The sponsors may prefer that a specific sonographer or group of sonographers perform the studies. In addition, the Institutional Review Board and/or the regulatory department may require specific research training (i.e., CITI Program certification) before a sonographer can participate in these research trials. All these requirements can affect the workflow of the lab as well as the staffing and scheduling needs.

Cath Lab Considerations

Another area that sonographers are being used more frequently is in the operating room, cath lab or hybrid suite where they are assisting with peripro-

cedural imaging. This can require a sonographer to be out of the department for several hours each day as some of the procedures can take up to four to six hours. A busy structural heart center will require a separate assignment for the sonographer(s) covering these cases.

Radiation safety is a vital concern for cath lab personnel. Studies have shown that the staff who are positioned near the image intensifier (head of the cath lab table) where the echo equipment and personnel are usually located, receive the highest levels of radiation exposure.⁴ To minimize exposure, echo staff that are assigned to the cath lab should receive additional training on radiation safety as well as be provided the proper radiation safety protective equipment (shields, lead aprons, thyroid collars, and leaded glasses). They should also be part of the institution's radiation monitoring program. Sonographers will be operating in and navigating around sterile fields so they should be educated on the sterile technique practices required in these environments. The prolonged standing and the wearing of the radiation protective equipment can lead to work-related musculoskeletal disorders. Echo lab managers

Sonographers are working at a higher skill level than ever before, and this role requires much more training, experience, and education.

should work with the institution's Radiation Safety Officer and Employee Health staff to develop a plan to minimize the impact of radiation exposure and work-related musculoskeletal disorders.

Summary

The role of the cardiac sonographer has evolved from working independently to being part of a multidisciplinary team. Sonographers are working at a higher skill level than ever before, and this role requires much more training, experience, and education. Sonographers that hold the credential of Advanced Cardiac Sonographer (ACS) have demonstrated the knowledge needed to practice at these advanced levels. Today, echo labs must become more strategic and creative in the training and staffing of all their sonographers. The field of interventional echocardiography is constantly evolving, and it seems inevitable that we will continue to embark on new methods to evaluate and treat the heart using cardiac ultrasound.

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Sonographer
VOLUNTEER
OF THE MONTH

Congratulations
Triston Thompson, BS,
ACS, RDCS, RVT, FASE
Baylor St. Luke's Medical
Center, Houston, TX



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

I am currently the Imaging Manager in Non-Invasive at the Baylor St. Luke's Medical Center in the Texas Medical Center. I have been with this organization for almost 10 years. Before this position I was the Lead Cardiac Sonographer and Technical Director at the same hospital. Also, I did my clinical

rotation as a student at this very hospital so I feel a sense of kinship to the staff here. I am also a Clinical Specialist for Lantheus Medical Imaging and faculty at the Houston International College.

When and how did you get involved with cardiovascular ultrasound?

After leaving high school in Jamaica, I enrolled as a pre-med Chemistry major at Grambling State University in Louisiana. At the beginning of my sophomore year, my financial situation became uncertain. I started to doubt that I would ever be able to realize my dream of attending medical school after graduation. Unable to complete my degree, I moved to Houston, Texas, to pursue other options. After moving, Carol Williams and Dr. Marilyn Douglas-Jones suggested that I consider echocardiography since it is closely related to my expressed area of interest. I went to the Cardiotech Ultrasound School (now Houston International College) for a tour. There I met the director of the program, Joan Douglas, who shared with me her many years of experience in echocardiography and showed me my first echo image. I became incredibly intrigued with this new technology and needed to know more about cardiac ultrasound given my family history of heart disease.

“

I remember feeling so inspired about attending the different talks and seeing the new technologies on display.

”

display. It was so inspiring to be in the same room with people who have contributed so much to the field. I went back to my lab feeling challenged to know and do more in the field of echo so I could in turn inspire my lab and my students.

When and how did you get involved with the ASE?

I first joined the ASE in 2016 and attended my first Scientific Sessions in 2017. I acted on the recommendation of our medical director and immediate past president of the ASE, Dr. Raymond Stainback. He is an advocate for continuing education for sonographers and fellows so with his support I went to my first ASE Scientific Sessions in Baltimore, MD. I remember feeling so inspired about attending the different talks and seeing the new technologies on

Why do you volunteer for ASE?

After attending my first meeting and after witnessing sonographers presenting on complex topics with confidence at great depth, I became inspired to get more involved. My life has changed drastically since my first meeting. My interest continues to grow the more my knowledge expands and I want to keep getting involved so I can help inspire other sonographers to see the world of echo beyond what they already know. This will challenge them to become better sonographers.

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 currently serve on the education committee. I also serve on the cardiac sonographer and vascular ultrasound/circulation tracks for the Scientific Sessions Program Committee. I am a member of the Greater Houston Society of Echocardiography and Vascular Ultrasound and serve on the Membership committee. This organization is full of incredibly smart doctors and sonographers from in and around the Houston area. Most of the members are from the hospitals within the Texas Medical Center so it often feels like we are all family and in a lot of cases, we have all worked together at one point or another.

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

Getting involved is a great way of becoming more motivated to expand the scope of your knowledge and face challenges head on. There are countless growth and networking opportunities. When you are involved, you become a part of something bigger than yourself for a cause that will change the world of medicine for the better. The people you will meet could be the catalyst that brings about growth and change in your personal and professional life.

What is your vision for the future of cardiovascular sonography?

I am always amazed by the new discovery's technology has to offer. With every new technological advancement or software development, comes a new way of thinking about cardiovascular management with the help of diagnostic testing. Still there is room for us to grow. There are many people who still have no idea what an echo is, and so many people who need the answers we can now provide. I see cardiovascular sonography making an even bigger impact on medical therapy and being more accessible to the patients around the world who need it. I also see the role of sonographers expanding in the sense that they work even more closely with cardiologists in an advanced healthcare professional capacity.

I see cardiovascular sonography making an even bigger impact on medical therapy and being more accessible to the patients around the world who need it.

Interview with a Traveling Sonographer: Alyce Holt, RDCS, (AE,PE)

Interview conducted by: **Seda Tierney, MD, FAAP, FASE, FACC, FAHA**, Stanford Medicine Children's Health



Q: How much experience did you have before you began to work as a traveling sonographer?

A: I only had 12 months of experience before I began to travel. It was 12 months in a pediatric cardiology clinic that also serviced the pediatric patients in the main pediatric and adult hospital.

Financial gain and gaining experience is what motivated me.

Q: What motivates you to take travel assignments? Is it a desire to see different parts of the world? Or financial benefits?

My motivation is financial benefits, but most important for me is the desire to explore different parts of the U.S. In turn the financial benefits and freedom allows me to travel internationally as well!

Q: What made you start traveling (if you were previously in a lab)? Is there anything your lab director could have done differently to get you to stay?

A: Financial gain and gaining experience is what motivated me. The lab I was in was amazing, but I knew I couldn't get the experience there and I was tired of living check to check. There was nothing that would have made me stay.

Q: Do you generally feel welcome by the staff at your travel sites?

A: I feel welcomed for the most part by the staff. As with any new position, it takes a while for people to get to know you and see that you are skilled. A likeable personality is a big plus to have as a traveler.

Even though you are hundreds and sometimes thousands of miles away from people and things that are familiar, you are able to overcome that distance and loneliness to become a more independent person.

Q: What is the biggest drawback to being a traveling sonographer?

A: The biggest drawbacks of being a traveler is having to make new friends every three to 12 months. Also, being away from your friends and family for extended periods of time, dating can be tough, and sometimes you can get lonely.

Q: What is the best thing about being a traveling sonographer?

A: The best part for me about being a traveler is also the same as the drawbacks! Even though you are hundreds and sometimes thousands of miles away from people and things that are familiar, you are able to overcome that distance and loneliness to become a more independent person and learn how to navigate foreign places all on your own. You get to explore and try out new areas of the country and see if it is fit for you. Making new friends everywhere you go is a plus too! You can meet people who will be in your life forever.

Q: What was the biggest surprise about being a traveling agent? Was there something that you didn't expect?

A: My biggest surprise is that I actually love traveling for work! It was initially something to do for extra money and to gain experience.

Q: With how many travel agencies do you keep your profile active in order to keep yourself continuously employed?

I have my profile with four different agencies. However, for the past six years I've only taken contracts with one company. I go with whoever gets me what and where I want.

Q: Have you been able to find assignments as often as you needed or wanted them? Have you been able to stay continuously employed? If so, have you always had pure pediatric echo positions or have you also worked adult or split labs?

A: I have always gotten the assignments that I want. The assignments that I want are not always posted, that is why I will typically stay somewhere for 9-12 months until a great opportunity presents itself. My basic requests are pediatric only, major pediatric institutions, and a major airport within a 30-minute drive. I have been lucky enough to have all my assignments meet that. Being able to secure all major pediatric institutions which has allowed me to gain a wide range of experience with congenital heart disease has made it easy for me to have consistent work and only work in pediatric only labs (I mean of course you have your occasional congenital adult patients that come through pediatric cardiology). I will always have an assignment lined up before I am done with the current assignment, the only gaps I have between contracts are weeks that I personally decide not to work so I can visit family and travel for fun.

Q: How do you navigate all of the different echo PACS and electronic medical record systems?

A: The same PACS system and EMRs are used across most facilities. When you come across a system you have never used before, they tend to be user friendly. Also, you will typically have a couple of days of orientation for that system (modules or in class training depending on facility)

Q: How important has it been to be familiar with different equipment, different PACS and EMR systems to obtaining a position? Has this been a barrier, or are institutions willing to provide instruction and a reasonable time for a learning curve?

A: It is helpful to have some experience with PACs or EMR systems before traveling so it will be a smooth transition into each facility. I don't feel like it is a must if you are a fast learner. If you are not a fast learner, I would suggest learning at least one PACS and EMR system to just familiarize yourself. However, facilities will understand that you will not know how to navigate EVERY system or EVERY machine. So, I wouldn't worry too much about it.

Q: Has it been a barrier to being a dominant right or left-hand scanner?

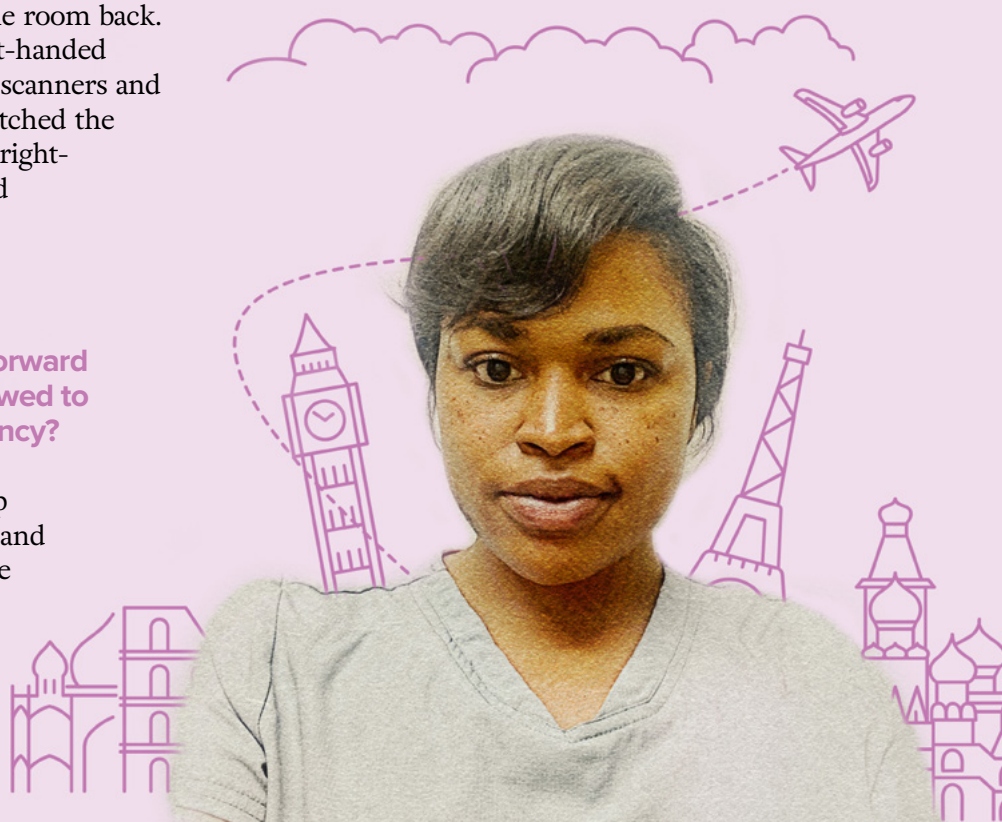
A: It has never been an issue for me being a dominant left-handed scanner. I have personally seen where a right-handed scanner in a left-handed lab was negatively looked at because the sonographers hated having to scan behind them because they would have to switch the room back. I was at a facility where half were left-handed scanners and half were right-handed scanners and we all never complained. We just switched the room each time or you would use the right-handed setup room or the left-handed setup room that day. So, all in all, it hasn't been a big deal.

Q: Are you limited to straight-forward clinic echoes or are you allowed to operate at the top of your proficiency?

A: I am allowed to work at my top proficiency. I am a fast learner and my skill level is pretty good. There are some travelers they will only let do normal anatomy in clinic and never go inpatient or

scan complex patients. Typically, a facility will feel you out in the first few weeks to months. When the physicians feel comfortable for you to do complex patients then you will be able to do those tougher cases. For example, one facility told me that I would have to wait six months to go inpatient and do complex cases. Within six weeks I was inpatient in the cardiac ICUs. So, it is traveler dependent on what you are limited to.

It is helpful to have some experience with PACs or EMR systems before traveling so it will be a smooth transition into each facility.



Q: Have you been asked to teach other sonographers or fellows?

A: I am always asked to teach new travelers, sonographers, and fellows. Depending on my workload or my day I will happily teach, but I have expressed before that I do not want to teach and I was not made to do so. It is a preference.

Q: How often have you taken call?

A: Majority of pediatric facilities do not allow you to take call. I had to take a few times at a facility (it was my second time there and they trusted me), but I never got called in. It is possible that you may have to do call depending on how short staffed and overworked the facility is.

Q: Have you ever had any issues with housing, travel or safety?

A: I have never had an issue with housing (provided by the company or that I found myself). I have heard stories of a company putting travelers in a bad area, but you can always look up the housing prior to and let them know that it doesn't look safe and send them suggested housing. As far as issues with travel and safety, you just have to be aware of your surroundings and try to do as much research on that area as you can prior to going there.

Q: Do agencies cover pay and benefits? What happens between employment opportunities?

A: Agencies will cover hourly pay, housing, meals, and incidentals, and sometimes travel to and from assignment (gas money or plane ticket). You can take the housing stipend and find your own housing. Very few companies will give you a rental car. Most companies provide health benefits (these are typically the bigger companies). Depending on the company, the packages are laid out differently but overall, the same end amount.



Q: Who are generally more difficult to win over- sonographers or providers?

A: The sonographers are generally more difficult to win over in my experience. If you give the providers the images and quality they want and show them that you are passionate, they are very easy to get along with.

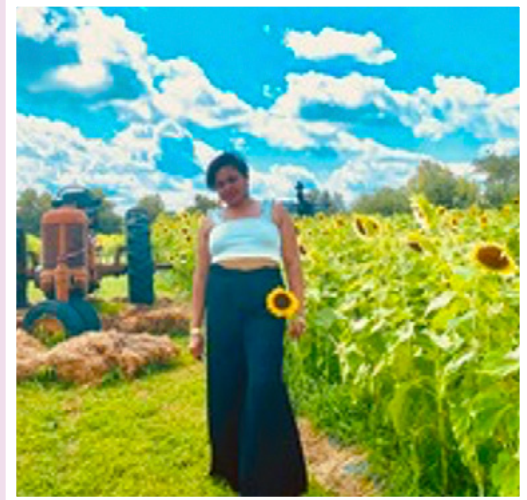
Q: What steps or processes are most helpful for getting you acclimated to a new lab and learning protocols?

A: Scanning protocols are 95% the same in every lab. Workflow protocols are easy to follow. After a week or two you will be able to operate everything flawlessly. I have never been to a new facility where it was much different than the previous.

Q: What do you do to build trust and establish yourself in a different lab?

A: I have a very bubbly and social personality and I show up to do my job and don't get involved in work politics. So, I don't have a hard

*Just be yourself
and they will
like you...*



time establishing myself and gaining trust. I typically will get to know people and figure out each individual personality (sonographer and provider) so I can determine how to approach them. At first, they will think I'm shy and not talkative. They soon learn I am the exact opposite. Just be yourself and they will like you, don't try to be someone you are not. I can't stress this enough: stay out of people's business and don't gossip. That is a sure way to not get extended and mess up future contracts because someone knows someone at the next place.

Q: *What is your best advice to someone who is considering traveling?*

A: My best advice to anyone considering traveling: it's not what you think it is. Yeah, the pay is great and all, but sometimes it can be a little rough. Moving from place to place every few months and being away from loved ones can take a toll. I still love it and would do it all over again in a heartbeat. Just take the leap!! You never know if it's for you if you don't try!



CARDIAC SONOGRAPHY: *Evolving Training Programs* AND *Expanding Professional Opportunities*

A previous article in *Echo* magazine¹ discussed how, in the 1960s and 1970s, cardiac sonographers became cardiac sonographers. During these “early days” of echocardiography, a relatively small number of enthusiastic investigators in a relatively small number of laboratories were evaluating various clinical applications of echocardiography and working to persuade their (often skeptical) colleagues that echocardiographic findings could enhance the care of their patients. The cardiac sonographers who entered the field of echocardiography during this period were generally young, enjoyed working with patients and doctors (back then they were not called “clients” and “providers”), had some experience in one or another medical field or a solid background in the sciences, and were eager to learn how to use this new diagnostic technique and to understand how the findings contributed to patient care.

As echocardiography gained widespread acceptance, the value of – and need for – skilled cardiac sonographers became increasingly apparent. And so did the need to train and hire more of them. As discussed previously,¹ on-the-job training gave way to educational courses of gradually increasing length and completeness. Soon it became evident that the most comprehensive training would be achieved through formal educational programs. Creating a complete and accurate list of early educational programs would be difficult at best, but the different ways in which formal educational programs



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



began is illustrated by two programs that started in the 1970s.

One approach was based on existing training programs for radiologic technologists, in which trainees were immersed in basic courses for the first year. In the second year of studies, they could opt to specialize in one or another clinical discipline such as diagnostic radiology or nuclear medicine or radiation therapy or diagnostic ultrasound. In the early 1970s a cardiovascular technology program was started at Grossmont College, a community college located east of San Diego in El Cajon, CA. After completing a one-year core curriculum, students in this program were able to develop clinical skills in one of three areas: invasive (Cath lab), noninvasive (which included ECG and echocardiography), or vascular technology.

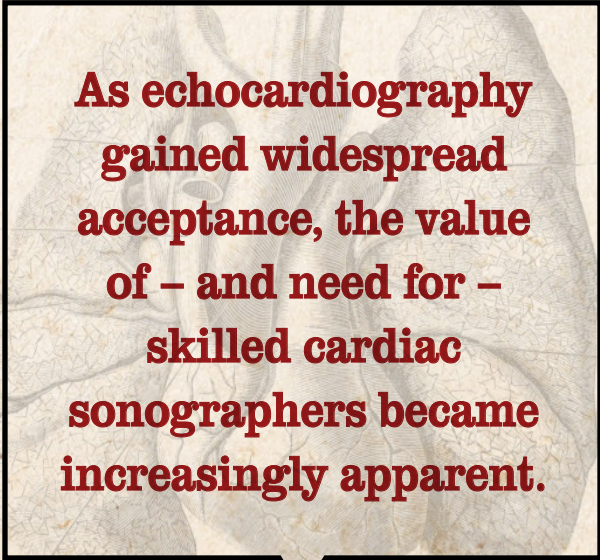
An alternate approach focused on training in diagnostic ultrasound. Training programs that were not “radiology based” had a practical appeal because diagnostic ultrasound does not involve ionizing radiation, and because diagnostic ultrasound is used by a range of different clinical specialties. The first four-year baccalaureate program in diagnostic ultrasound was founded in 1974 at Seattle University, a private Jesuit school in downtown Seattle, WA, by Joan Baker MSR, RDMS, RDCS. Joan (whose training included both nuclear medicine and ultrasonography) was asked to take responsibility for the university’s Department of Allied Health, which included baccalaureate level programs in five disciplines: medical technology, radiation therapy, cytotechnology, nuclear medicine, and ultrasound. Initially, the allied health program at Seattle University was based administratively in the Department of Engineering; subsequently the program was housed in

the College of Nursing. I’m personally familiar with this program because some of the very best sonographers who worked in the laboratory I directed at the University of Washington (between 1978 and 2006) were students – and subsequently teachers – in the Seattle University program.

Responsibility for oversight of medical educational programs also evolved over the years. In the early 1970s, a request to establish the new profession of diagnostic ultrasound technology was submitted to the American Medical Association (AMA) by the American Society of Ultrasound Technical Specialists (ASUTS) and accepted by the AMA’s Allied Medical Emerging Health Manpower Division. Having recognized the

profession of “ultrasound technical specialist,” the AMA’s Allied Medical Emerging Health Manpower Division required the ASUTS (which later evolved into the Society of Diagnostic Medical Sonographers, SDMS) to address a series of tasks, including developing a relevant job description for the ultrasound technical specialist, and describing training programs for accreditation. The AMA’s Department of Allied Medical Professions and Services,

which became known as the Committee on Allied Health Education and Accreditation (CAHEA), worked with the ASUTS to develop the Essentials of an Accredited Educational Program for the Diagnostic Medical Sonographer. A group of collaborating organizations, which included the American College of Cardiology, the American College of Radiology, the American Institute of Ultrasound in Medicine, the AMA, the American Society of Echocardiography, the American Society of Radiologic Technologists, and the SDMS, were involved in drafting the Essentials, which was finally approved in 1982. The Joint Review Com-



As echocardiography gained widespread acceptance, the value of – and need for – skilled cardiac sonographers became increasingly apparent.

mittee on Education in Diagnostic Medical Sonography (JRCDMS) was formed and initially responsible for accrediting educational programs in diagnostic medical sonography. In 1982, the educational program at Weber State University (a public university in Ogden, Utah) was the first diagnostic medical sonography program to be accredited. Over the next ten years, JRCDMS accreditation was granted to a total of 56 ultrasound schools. Of these, 37 were based in academic institutions, 18 were hospital-based, and one was a proprietary organization.²

The CAHEA ceased to exist in October 1993 and was succeeded by the Commission on Accreditation of Allied Health Educational Programs (CAAHEP). As noted previously,¹ the CAAHEP includes Committees on Accreditation for a wide range of medical professions. The three most relevant to cardiac sonography are the Joint Review Committee on Education in Cardiovascular Technology (JRC-CVT), the Joint Review Committee on Education in Diagnostic Medical Sonography (JRC-DMS), and the Committee on Accreditation for Advanced Cardiovascular Sonography (CoA-ACS). According to its 2021 Annual Report,³ CAAHEP had accredited 2,241 programs in 27 different professions by the end of the 2020-2021 fiscal year. As of June 30, 2021, CAAHEP had granted accreditation to a total of 397 programs in Diagnostic Medical Sonography, 97 programs in Cardiovascular Technology, and two programs in Advanced Cardiovascular Sonography. Note that these data apply to accreditation of *educational programs*; ASE also strongly supports accreditation of *echo laboratories* and *credentialing of cardiovascular sonographers*.

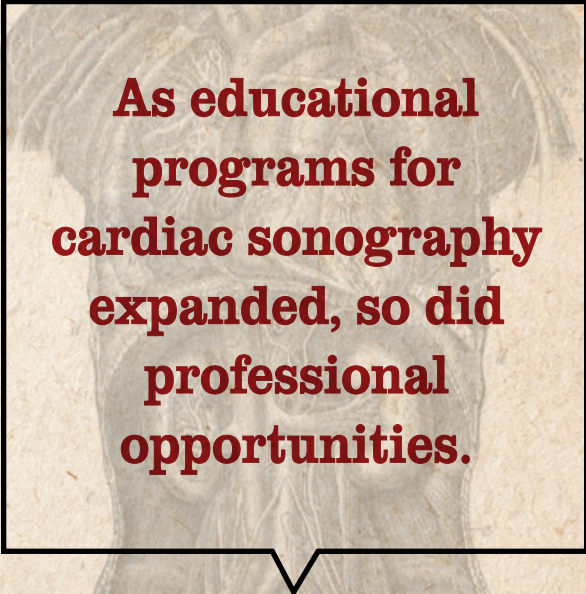
As educational programs for cardiac sonography ex-

panded, so did professional opportunities. In the 1970s, cardiac sonographers used early ultrasound instruments to examine patients with known or suspected heart disease. As instrumentation advanced, sonographers had the opportunity to employ new techniques: two-dimensional echocardiography, spectral Doppler, color Doppler flow imaging, three-dimensional echocardiography, speckle-tracking assessment of myocardial strain, and so forth. Advances in

technology and expanding clinical applications required continued learning. As laboratories became busier, some experienced sonographers took on administrative roles, with responsibilities for laboratory organization, quality control, and ongoing education of their more junior colleagues. Importantly, sonographers did not just teach other sonographers – countless cardiology fellows and physicians have been educated by their sonographer colleagues. In

ideal settings, this has been a two-way street; sonographers have helped physicians to learn the nuances of data acquisition and enhanced the physicians' skills at interpreting ultrasound images as well as flow velocity and strain recordings. At the same time, sonographers have also learned some clinical medicine from their physician partners, which has helped them to obtain clinically pertinent images and related data.

Professional opportunities for cardiac sonographers also have expanded. Some sonographers have taken on primarily supervisory roles. Others have taken positions in industry, serving as applications specialists helping to familiarize users with new equipment and diagnostic capabilities. Some sonographers, working in industry with ultrasound engineers, have provided important input into the development new technology. Others have worked with physician “luminaries”



As educational programs for cardiac sonography expanded, so did professional opportunities.

to refine new clinical applications. Clinically based sonographers have taken on responsibilities for quality control, writing protocols, and helping to assure that laboratory performance is consistent with requirements for laboratory accreditation. Some sonographers have served as educators in sonography schools in their area. Others have moved away from the clinical arena and become active in research studies, not only in busy academic laboratories but also in “core echo laboratories” involved in multi-center study design, data collection and analysis, and manuscript preparation.

In recent years, I have been gratified to see more published manuscripts written – very effectively – by cardiac sonographers. I’ve lamented the reality that most sonographers are not rewarded for writing manuscripts, not given time to write manuscripts, and not promoted because they have written first-author publications. Notwithstanding these obstacles, it has been clear to me that sonographers are certainly knowledgeable enough, smart enough, and organized enough to take an active role in research and to write and publish high-quality papers in high-impact journals. I hope this trend will continue to expand.

In the early 2000’s, the need for cardiac sonographers able to practice at an advanced level led ASE to form an Advanced Practice Sonographer Task Force,⁴ chaired by Carol Mitchell PhD, RDMS, RDCS, RVT, RT(R), FASE. In 2009, this Task Force proposed professional roles for an Advanced Cardiovascular Sonographer (ACS), who would ensure that “a proper echocardiographic examination is performed on every patient.”⁵ Depending on the laboratory’s needs and environment, an ACS might review the clinical indications for a clinical echo study, review the recorded images for quality and completeness, and assist the clinical sonographer – when needed – to obtain additional data. Providing in-service educational opportunities for laboratory staff might be another role. In some centers, the evolution of structural heart programs has provided additional opportunities for advanced cardiac sonographers with substantial clinical experience and technical expertise to be involved in

interventional procedures as members of the Heart Team. Dr. Mitchell has emphasized that while an ACS “would not practice independently but would always work under the supervision of one or more physician echocardiographers,”⁵ they must have considerable knowledge and technical skills and must meet one of the prerequisites for the Cardiovascular Credentialing International (CCI) ACS Certification Examination. An editorial comment accompanying Dr. Mitchell’s article re-emphasizes the potential roles for an ACS and discusses some potential obstacles (generally related – as usual – to reimbursement issues).⁶

The prerequisites for sitting for the CCI ACS board examination have evolved from those listed in Dr. Mitchell’s 2009 article;⁵ for those readers interested in the details, [the specifics can be found online](#).

To summarize, over the past 50 years, educational programs in cardiac sonography have expanded and evolved considerably, and so have job opportunities. Given the dynamic nature of cardiovascular ultrasound, and the continual enhancements in instrumentation and expansion of clinical applications, these trends seem likely to continue.

ACKNOWLEDGMENT

Once again, I must express my gratitude to Joan P. Baker MSR, RDMS, RDCS, and to Carol K. C. Mitchell PhD, RDMS, RDCS, RVT, RT(R), FASE, for their remarkable expertise, support, and willingness to tutor me on many of the details discussed in this short article.

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