

ECHO

**ECHO IN CANCER:
ARE WE ANSWERING
THE NEED?**

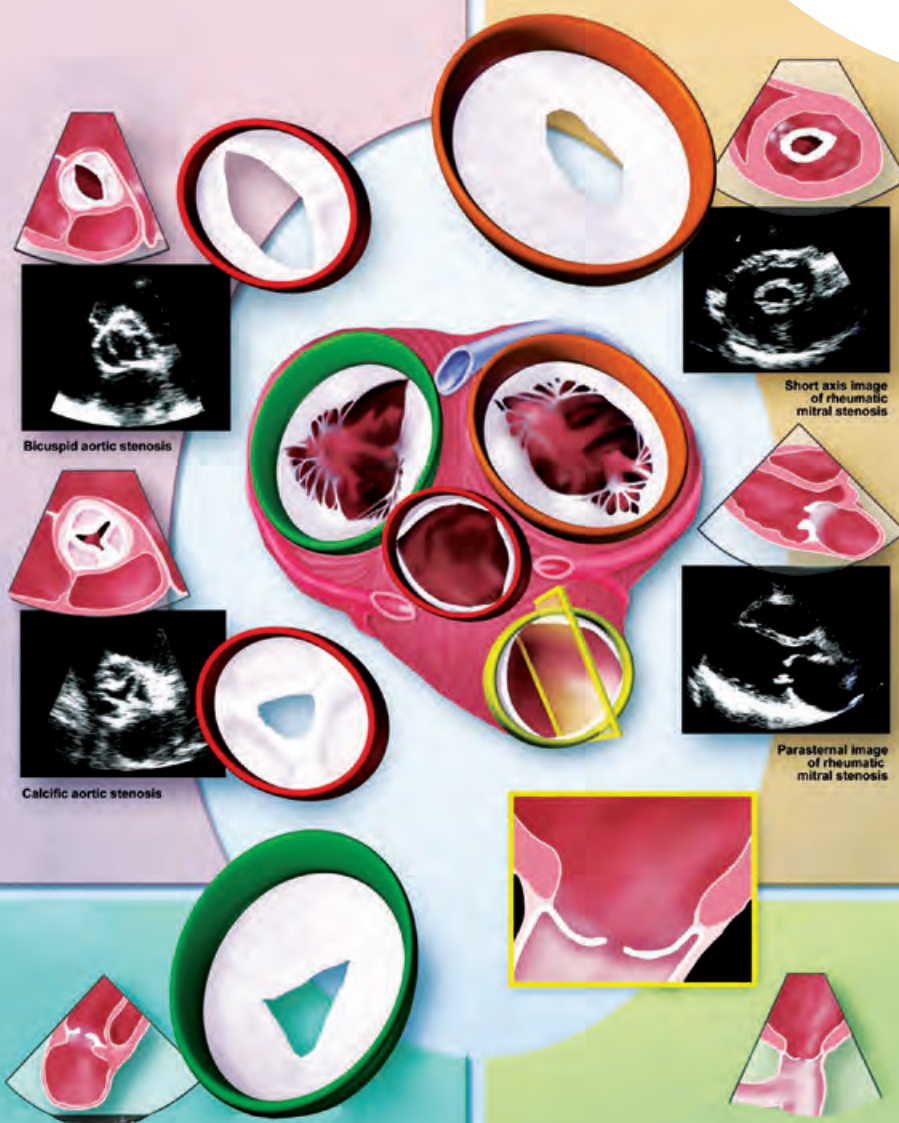
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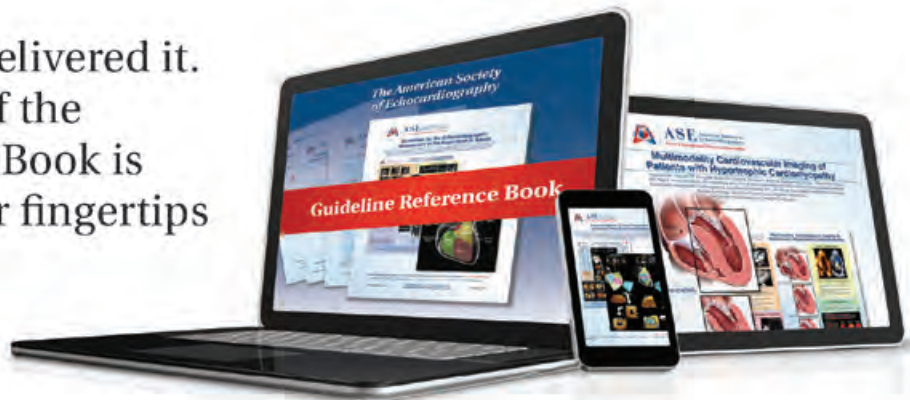


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VOLUME 3, ISSUE 1 | OCTOBER 2014

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ABOUT ASE

The American Society of Echocardiography (ASE) is a professional organization of physicians, cardiac sonographers, nurses, and scientists involved in echocardiography, the use of ultrasound to image the heart and cardiovascular system. The Society was founded in 1975 and is the largest international organization for cardiovascular ultrasound imaging.

ASE'S MISSION

ASE is committed to excellence in cardiovascular ultrasound and its application to patient care through education, advocacy, research, innovation and service to our members and the public.

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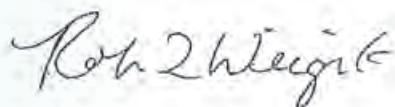
The image on the cover comes from ASE's Guideline poster "Echocardiographic Assessment of Valve Stenosis."

ASE MEMBERS:

Most of my friends would attest to the fact that I am a reluctant embracer of new technology. I tend to wait until I'm sure it's going to be something I'll use before I make the effort to buy or install a new program. This week there were a couple of milestones: first, I used Microsoft OneNote to share the 2015 budget draft with staff so we could edit the same version without having to verify that we were editing the "latest" copy – what a revelation! Then, I could be found gathered around one of my staff member's iPads getting a "tour" of an apartment in Buenos Aires, Argentina. (Rhonda Price is engaged in our first staff foray into telecommuting on a day-to-day basis. She's in Argentina for a three-month stint to learn more about the South American cardiology community by immersing herself in their culture, building new relationships and recruiting new ASE members, while getting the opportunity to renew and recharge after nine eventful years on ASE's staff.) I also read some interesting blogs this week, including postings from Rhonda detailing her trips to Chile and Uruguay and a few from Dr. Weissman regarding his recent trips to India and Mexico as he starts serving as ASE's global ambassador in his role as ASE's president. Finally, I got a preview of the new tablet-based version of our guidelines (it's really cool!) by ASE's COO, Hilary Lamb, and later walked around our office complex while waiting (im)patiently for my Fitbit to vibrate and let me know that I had reached my daily wellness goal.

This issue features articles that focus on this new era of technological adaption – from the advances in strain, to the way echo is being used to monitor cancer treatments, to how data-capturing will influence the cardiovascular practice. It also has an article based on answers to Casey Blu's query to members asking about new technologies they are using in practice and at home.

This is an exciting time for the Society as we endeavor to embrace the challenges facing the medical profession from the rapidly-changing technological advances and innovations. Based on our leadership's optimism about technology (see page 6) and my recent personal advances from being a semi-Luddite, I am confident we are prepared to engage and thrive in this brave new world.



Robin Wiegerink, MNPL, ASE's CEO

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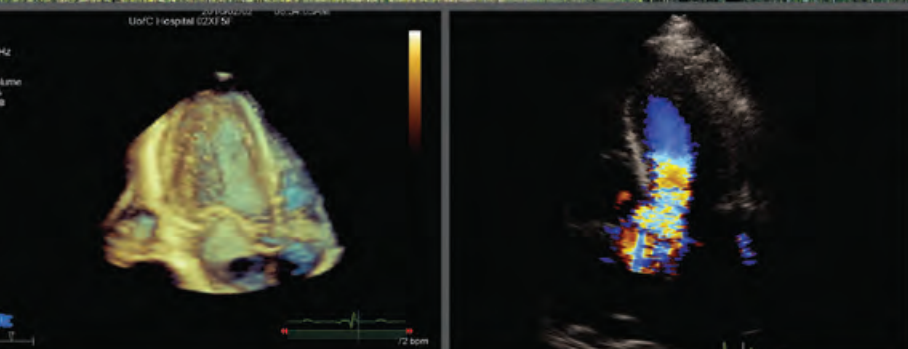
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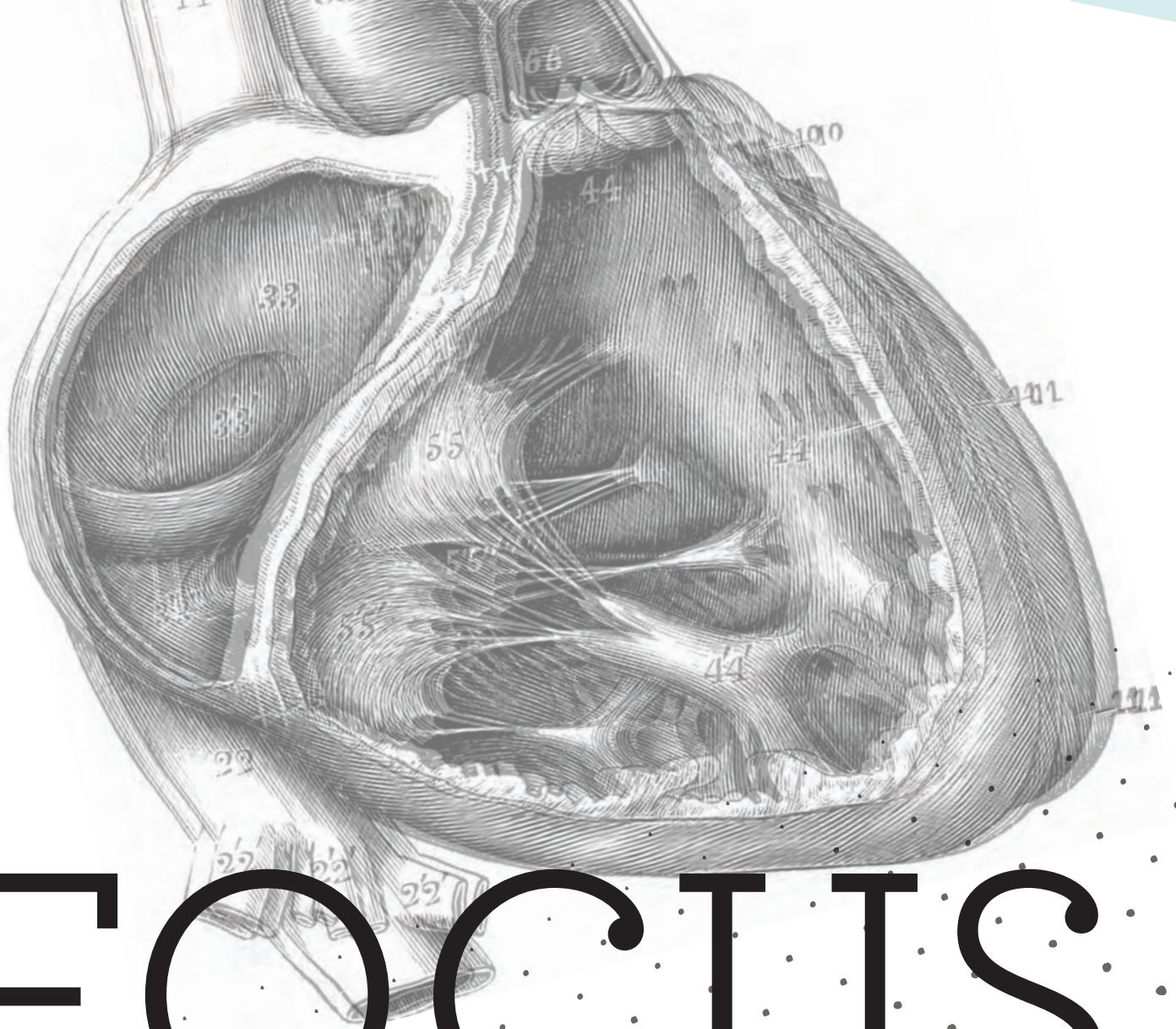
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EDITOR'S NOTE:

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.

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FOCUS ON LEADERSHIP

What Was Your Take-Away from ASE's 2014 Strategic Planning Retreat in February on How Technology and Healthcare are Changing, and How This Will Affect the Society and Its Members?

ASE'S 2014-2015 EXECUTIVE COMMITTEE RESPONDS



// NEIL J. WEISSMAN, MD, FACC, FASE
President

MedStar Health Research Institute

I was impressed with how quickly the world is changing and how change opens up so many opportunities for ASE. Change is happening at a more rapid rate, whether we are discussing technology or the manner in which we deliver care. While change can be difficult, it also opens up possibilities for ASE to take a leadership role. Who better to create the future of cardiovascular ultrasound than us! We can help the medical community figure out how to use new technology, where to use it, when to use it, and who should be using it, all with the goal of improving patient care. I am also excited that it opens up so many new possibilities for an expanded use of cardiovascular ultrasound – new clinical settings with more, non-traditional users. The spectrum of 'echo' is going to be much wider, while further pushing advanced echo technology, maintaining the need for a complete comprehensive exam, and expanding the use of focused ultrasound for point of care clinical decisions.



// SUSAN E. WIEGERS, MD, FACC, FASE
President-Elect

Temple University School of Medicine

Dr. Weissman started the retreat off by showing some videos which predicted a near future where patients used mobile devices to take their own vital signs, were receiving care from their doctor remotely, and pharmacies sent patients text updates to remind them to take their medicines. He also outlined the incredible growing medical needs in developing countries and here in the United States with climbing rates of obesity and diabetes. Then members of the board talked about changes in their hospitals; many of them becoming the insurers for their employees and tracking their staff's wellness measurements. From my perspective, it is clear that the world of medicine and technology will continue to merge and intersect in exciting ways. I, and the other leaders at the retreat were energized by considering all the new applications of cardiovascular ultrasound medicine and its potential expansion through its ease of use and benefits to patient diagnosis. I think our members, already being experts in using technology for patient care, will be early adapters and even developers of many of these new paradigms. It looks like the future is bright for ASE and its membership if we work to embrace these changes and be welcoming to the new users who will be increasingly using echo in the future. As the result of the retreat, I am chairing a new taskforce which will soon be holding a focus group of non-traditional users. Gathering these types of insights will help the Society better adjust to meet these needs and enhance our current offerings.



// ALLAN L. KLEIN, MD, FACC, FASE
Vice President
Cleveland Clinic

There are many healthcare forces affecting how we are practicing in 2014. There is a constant demand for clinical productivity, better value, and improved patient satisfaction. In addition, we can anticipate future cutbacks to imaging and bundled care, as well as things we do not know about yet. These forces are not going away any time soon. As a Society, we have to face these challenges head on. New technologies will help us adapt to these challenges.

I would like to give you an example of how technology has influenced my busy out-patient valve practice. Let's take the stethoscope which has been around for over 100 years. We use it on a daily basis to diagnose heart murmurs. For the last five years, I have routinely added the hand-held focused ultrasound exam as an extension of my physical exam. This "quick" echo-assessment is done right after auscultation is performed with the patient already in the left lateral position. The hand-held focused ultrasound exam serves three roles: **(1)** to confirm my clinical acumen; i.e., whether there is a severe mitral regurgitation; **(2)** to show the patient and the family the correct diagnosis; and **(3)** to increase patient satisfaction through the powerful use of technology. At the same time, I am providing both good quality and low cost (actually no charge yet; hopefully in the future) in my practice. This is one example of how clinicians will have to adapt to the increased demands on their time. In the future, I would envision that the cardiologist will walk into the examining room with a wireless smart phone-sized ultrasound device clipped to their belt (if they have one), a tube of jell, and a miniaturized transducer and electrodes in their lab coat to do a quick echo and EKG.

Another major technologic advance will be automation of measurements in order to make the sophisticated techniques, such as 4D and deformation imaging, much quicker. I can easily imagine a time that much of the imaging measurements for TAVR or the e-clip will be automated instead of the tedious and protracted measurements done after the TEE.

The modern echo world of today, like the old rock and roll "Wayne's World" of the 80's, will have to adapt to the rapid changes in appropriateness criteria, decreasing reimbursements, and more scrutiny by payers in order to stay ahead of the curve. Smart and efficient use of technology will help ASE face those shifting healthcare forces.



// SHERIF F. NAGUEH, MD, FACC, FASE
Treasurer
Houston Methodist Hospital

There have been several recent developments in technology that have the potential to influence the day-to-day practice of echocardiography. These include the availability of miniature imaging devices, pocket size devices that can be used by many clinicians during their clinical evaluations, be it in the outpatient clinic or during hospital rounds. These devices provide decent images of the heart and can be of value as a quick rule-out of serious problems based on the setting as pericardial effusion or hypotension when a large myocardial infarction is suspected. Thus echocardiography will garner more attention from non-traditional users. This is an important opportunity for the ASE community to reach out to these users to better understand their educational needs at all levels from the student level to the board certified physicians. ASE will reach out to these communities to better understand their educational needs and develop clear criteria when a complete and comprehensive echocardiographic examination is essential. There are also exciting new developments with robots being used to acquire cardiac and vascular images. The latter approach is appealing as it can extend the utility of echocardiography to remote settings where access to standard medical care is limited. This offers a unique opportunity to ASE as it can help physicians navigate and better understand the advantages and limitations to robotic imaging.



// KENNETH D. HORTON, RCS, RDCS, FASE
Secretary

Intermountain Healthcare

As one of the two sonographers on the Executive Committee, I was quite interested in Dr. Weissman's vision for the Society as well as the impending changes to our profession both in terms of technological changes and the emerging users of ultrasound, specifically echocardiography.

It is very apparent that the sustainability of echocardiography will rest on proving its value compared to the other imaging modalities available.

It was refreshing to see that the ASE is taking a proactive role in preparing for these changes by focusing on demonstrating the value of echocardiography, remaining on the forefront of education and the infusion of new technology into clinical practice, as well as positioning the organization as the premier source of cardiovascular ultrasound education for emerging users from other medical disciplines such as the intensive care units and emergency rooms.

These are exciting times for the sonographers in our organization as we will be on the front line of a lot of these changes especially in terms of using new technologies and perhaps in teaching personnel from other disciplines the art of scanning a cardiac patient. I urge all the sonographers in our organizations to keep abreast of the changes and take an active role in being part of this transformation.



// JOE KREEGER, RCCS, RDCS, FASE
Member-at-Large

Children's Healthcare of Atlanta

Technology is changing very rapidly with full-sized ultrasound systems becoming more compact; the newest systems having wireless connectivity standard with faster processing, increasing user productivity. Handheld devices are becoming commonplace in the hands of nontraditional and emerging users (emergency medicine physicians, intensivists, perinatologists, neonatologists, etc.). All of this while echocardiography is falling squarely in the sights of Congress for reimbursement reduction.

The stage is set for the ASE to expand its role in guideline development, training, and support for nontraditional and emerging users. As the cardiovascular ultrasound experts, I feel it is our duty to spearhead this endeavor, maintaining the high standards in quality education and skill development that its members are accustomed to. Advocacy is priority one and will continue to be at the core of what ASE represents, for echocardiography will always maintain its place at the top of diagnostic cardiovascular testing and monitoring. However, it cannot be overstated that ASE's members are the absolute foundation of its strength in advocacy, so your continued support in the advocacy campaign is crucial.



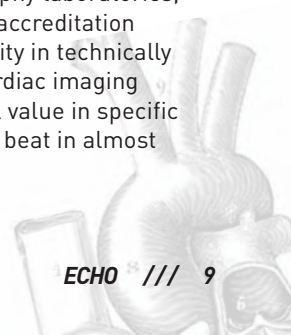
// BENJAMIN F. BYRD III, MD, FASE
Past President

Vanderbilt University Medical Center

I left the 2014 ASE Strategic Planning Retreat excited about improvements in technology which will advance echocardiography over the next few years – and about changes in healthcare which will emphasize the importance of echocardiography as the value choice in cardiac imaging.

1. Technology improvements include standardization of strain echocardiography techniques, better 3D echocardiography imaging, advances in transducer design that will improve the quality of hand-held echocardiography, and advances in digital image archiving that will make each individual patient's echo images more easily transferable between medical centers (reducing the need for repeat studies).

2. Health care changes include wider application of focused echocardiography to patient care worldwide by physicians and sonographers outside traditional echocardiography laboratories, payers' encouragement of quality improvement measures such as IAC-Echo accreditation (including tracking appropriate contrast usage to provide optimal image quality in technically difficult patients), and competition between cardiac imaging techniques to determine which provide optimal value in specific clinical situations (echocardiography is hard to beat in almost every case!). ♥





TECHNOLOGY

Contributed by Deborah R. Meyer, M. Ed, JASE Managing Editor

"Basically, if it can be done via a chip, I will do it," said sonographer Michael Adams, RDCS, FASE, who works at Baylor St. Luke's Medical Center, Texas Heart Institute. "I am fascinated by technology, which is one of the reasons I do what I do."

Adams was one of several members who contributed their thoughts for this article on how ASE members are using technology in their professional and personal lives. At ASE's 2014 strategic planning retreat in February, the Executive Committee (see related article on page 6) and Board of Directors spent a lot of time considering how technology and healthcare are changing and how this will affect our Society and its members. Exploring which technologies are part of the fabric of our members' lives is helping us expertly hone our strategic plan on this expanding arena.

The list of Adams' daily arsenal includes three laptops (Mac, PC, Linux) and a PC workstation for his office; an iPhone with many apps, including the ones produced by ASE, Heart sounds simulators, Facebook, and LinkedIn, plus streaming apps for music, video, education, webinars, seminars, meetings, and echo reading. "I also have a Kindle HDX that has remote access to all my computers, assuring that I am never away from info or apps that I might need," said Adams, who calls himself a "bleeding edge" kind of guy.

"Bleeding edge," as defined by dictionary.com (which also has a useful app!) is "the very forefront of technology." Further research suggests that this is a combination of leading edge and cutting edge and hints that such early adapting can also have some pain points. But, as the members we interviewed for this piece attest, it can be well worth it.

Hollie Carron, RDCS, FASE, an ASE Board member and sonographer at Children's Medical Center Dallas, finds modern technology to be "fabulous."

She said, "Sometimes the reading physicians will send us text messages with instructions while we are still scanning. One of our colleagues even has a wristwatch that accepts her texts so she can see them as she is scanning. Now that is a great application of technology!" Carron also loves the fact that even as she is acquiring patient images, the studies are being sent to the Picture Archiving and Communication System (PACS).



"I am fascinated by technology, which is one of the reasons I do what I do."

Brian Soriano, MD, FASE, from Seattle Children's Hospital, loves technology but does not want to be dependent on it. "If the power goes out, I'll still need to take care of patients," Soriano said. "Social networking is so incredibly pervasive that it is becoming more challenging to keep clear boundaries between personal and work avenues. For example, a lot of my patients' families love communication by email, even when they

are aware that it is potentially unsecure." Soriano continued, "A recent podcast I listened to noted how some people always have two mobile phones, one for work and one for personal use." His personal iPhone has several apps, including Waze, which provides community-based, real-time traffic information,

and RunKeeper, which helps him track outdoor fitness activities. "And yes," Soriano said, "I have Angry Birds."

For Brian Fowler, BS, RVT, FASE, the biggest question in his mind is how to utilize all these new technologies safely and protect confidentiality in healthcare. "It would be easy to inadvertently disclose patient information and violate HIPAA laws with these methods, so it would be important to remove patient identifiers before broadcasting images," said Fowler, the Vascular Technical Director at OhioHealth Heart and Vascular Physicians in Columbus, Ohio. "Also, most healthcare systems prohibit the use of personal cellular devices to send images of patients of any kind. Going forward, I believe that the use of cellular devices should be reconsidered, as it will help standardization of imaging throughout our ever-growing healthcare networks."

Currently responsible for the quality and consistency of a number of vascular laboratories across Central and Southern Ohio, Fowler finds the most challenging part of his job to be in the right place at the right time. "I often joke about wishing that I could clone myself," Fowler said. "iPhone's FaceTime application could conceivably be a way to solve this problem. It has the potential for me to virtually sit-in on difficult ultrasound studies."

Seconding the value of FaceTime is ASE Board Member Benjamin Eidem, MD, FASE, of the Mayo Clinic, College of Medicine in Rochester, Minnesota, who also uses it to collaborate with other physicians and to interact with patients when in-person communication is not possible.

"My iPad provides instant access to hospital EMR and all imaging studies," Eidem said. "iPads have become

CONTINUED

a standard part of hospital rounds and provide access to medical records and imaging studies from home. And the iPhone provides easy and instant access to applications for patient care such as Echo Z-scores and the ASE app." This does make a healthcare provider's life easier and, as Eidem pointed out, it directly impacts patient care in several ways. "It facilitates optimal clinical and surgical decisions made on rounds. It enables more efficient and appropriate interventions in situations where this patient information is vital, such as patient emergencies, and it promotes quality and patient safety due to constant availability of patient data."

Ross Hoffman, MD, at the University of Central Florida College of Medicine in Orlando, Florida, is a huge fan of an app that helps him read echoes. "It enables me to review echo images in the mobile setting, retrieving images from the cloud, through a HIPAA secure browser-based solution. There is no need for me to deal with the lag/sluggishness of the hospital's portal/VPN," said Hoffman, who uses the app on the iPhone and tablet but prefers the tablet. In any case, Hoffman said the app's flexibility and ease of use allows him to be more efficient and precise with communications. "Using a single click tab, I can share the study with colleagues for consultation, surgical referral consideration, etc.," said Hoffman, who also cherishes how using the app helps him engage patients and their families by pulling up images on the tablet.

While at work, Brian Fey, BA, RDCS, FASE, who is resource coordinator at Cardiac Graphics, an echo lab in Chicago, Illinois, has plenty of computer and phone access and typically does not carry anything other than his pager. "I feel like my phone can be a distraction while at work, plus it's kind of bulky," Fey said. "When I am not at work, I rely heavily on my phone (HTC One) to keep up with work e-mails and to log into our hospital system if needed. And I have the ASE guidelines app on my phone." Fey said that he uses his phone to do just about all the things that help keep him informed, including checking on traffic, weather, sports, listening to music and the radio, maintaining his calendar, paying bills, and ordering things. "My phone is my life source." The day Fey was sharing his thoughts via email, he could not get his HP laptop to boot up. "Ugh."

Amer Johri, MD, FASE, has a particular interest in how technology is changing the medical landscape and how it affects his practice and often posts on this subject pointing readers to his twitter account @amerjohri.

He has also recently written a book that was not published in the traditional manner but is an iBook on adult congenital heart disease.

Johri, who works at Queen's University in Bath, Ontario, Canada, said, "I use social media as a method for professional outreach and education in my community. The definition of community has changed with social media as it is not limited to a geographic region. Many of my followers are non-medical people from my city. Another portion are inter-disciplinary colleagues from my hospital. Some are medical professionals from around the world. What is common to this community is an interest in what I have to say: my viewpoint on cardiovascular health from an imager's perspective." Active in the area of point-of-care ultrasound and how miniaturization is changing how ultrasound is done and by whom, Johri believes that technology is used to enhance our traditional approaches, such as the physical exam, but cannot replace it in many instances.

"Implementation of new technologies must be guided by established organizations such as ASE," said Johri. ❤️

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For better or worse, we are wed to our smart phones, tablets, and technological toys. In light of our mission of making it easier for our members to deliver excellent patient care, navigate their professional educational needs, network throughout the world, and plan their participation in ASE's scientific events, we offer apps. We currently have several helpful apps for you to download for free or at minimal cost: iASE Guidelines, live courses, Connect@ASE, Echo Appropriate Use Criteria, and an iOS-only version of the JASE app. All ASE developed apps are available at the Apple iTunes store and the Google Play Store by searching for "American Society of Echocardiography". Details are at <http://asecho.org/apps/>



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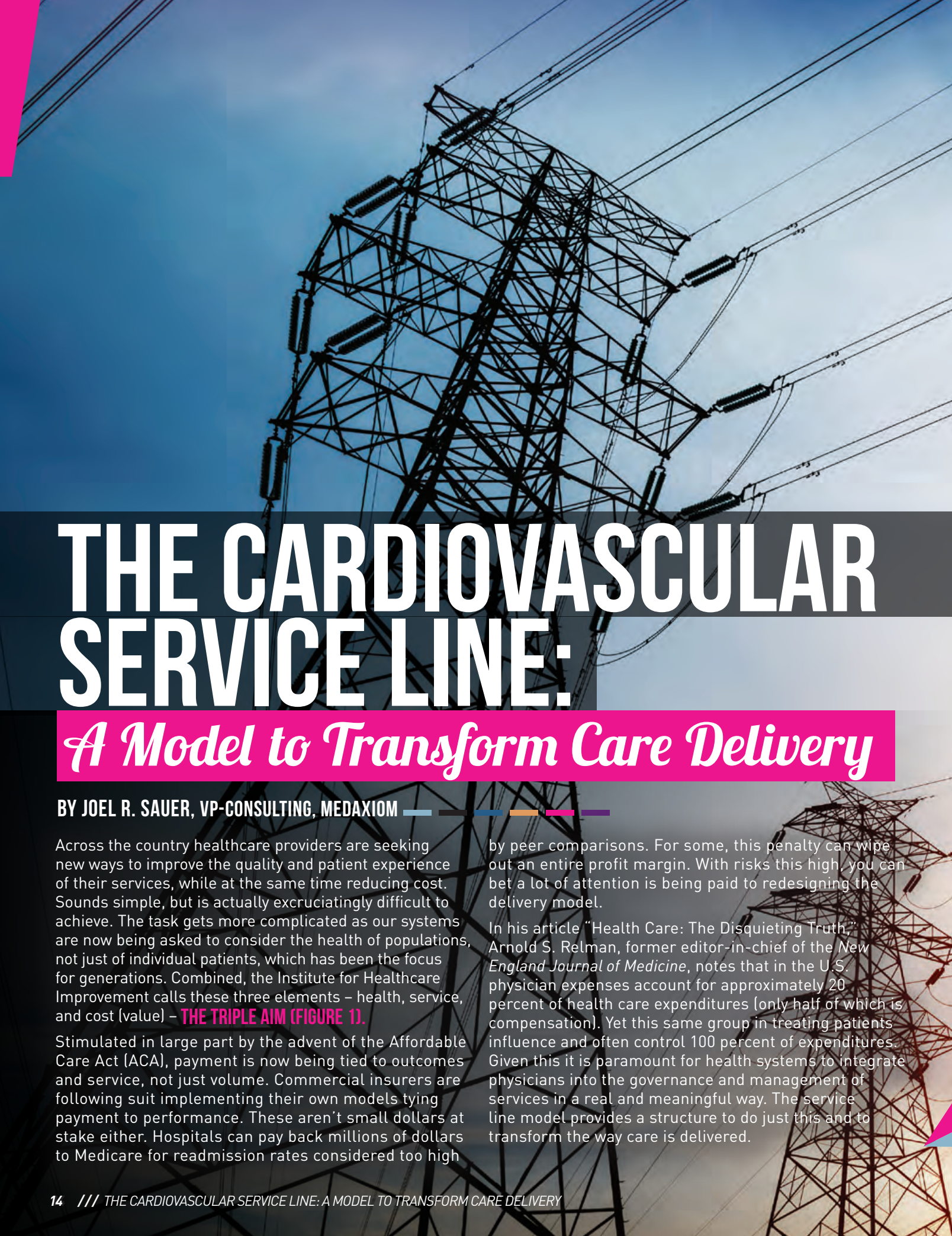
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THE CARDIOVASCULAR SERVICE LINE:

A Model to Transform Care Delivery

BY JOEL R. SAUER, VP-CONSULTING, MEDAXIOM

Across the country healthcare providers are seeking new ways to improve the quality and patient experience of their services, while at the same time reducing cost. Sounds simple, but is actually excruciatingly difficult to achieve. The task gets more complicated as our systems are now being asked to consider the health of populations, not just of individual patients, which has been the focus for generations. Combined, the Institute for Healthcare Improvement calls these three elements – health, service, and cost (value) – **THE TRIPLE AIM (FIGURE 1)**.

Stimulated in large part by the advent of the Affordable Care Act (ACA), payment is now being tied to outcomes and service, not just volume. Commercial insurers are following suit implementing their own models tying payment to performance. These aren't small dollars at stake either. Hospitals can pay back millions of dollars to Medicare for readmission rates considered too high

by peer comparisons. For some, this penalty can wipe out an entire profit margin. With risks this high, you can bet a lot of attention is being paid to redesigning the delivery model.

In his article "Health Care: The Disquieting Truth," Arnold S. Relman, former editor-in-chief of the *New England Journal of Medicine*, notes that in the U.S. physician expenses account for approximately 20 percent of health care expenditures (only half of which is compensation). Yet this same group in treating patients influence and often control 100 percent of expenditures. Given this it is paramount for health systems to integrate physicians into the governance and management of services in a real and meaningful way. The service line model provides a structure to do just this and to transform the way care is delivered.

// The Service Line Model

Historically, hospitals have been organized around departments or services. Think echo lab, or catheterization lab. By contrast, the Service Line is organized around programs or patient types, regardless of patient disposition (inpatient, outpatient, ambulatory care) or location. In short, the Cardiovascular Service Line (CVSL) is a collection of cardiovascular programs occurring in both the ambulatory and hospital settings at all locations under one governance and management system. It may be lost here, so let's call it out: this means that the physician practice falls under the same leadership as services offered in the hospital. This is a significant aspect of the transformative power of this model to truly integrate care.

At the top of the CVSL chain of command is a shared physician and administrative leadership team. This body will be charged with directing the overarching vision, strategy, programmatic offerings, quality, service, and financial performance – including budget – for all cardiovascular services. An ingredient to success for this leadership unit is to bring in multiple perspectives, with representatives from perhaps executive level positions, both from the practice(s) and hospital, to operations and nursing. To sum it up, this leadership team will consider the CVSL its own business unit within the hospital or health system, with top-line to bottom-line authority and accountability. This is a critical aspect of the service line model, bringing robust financial data into the equation with clinical decisions around quality and service. To be effective leaders, physicians need to understand the financial ramifications of decisions which have largely been absent in historical medical directorships and other prior leadership models. **FIGURE 2** shows a larger program CVSL governance structure.

// Dyad Leadership

At the top of the CVSL and at each of the committee levels – including the Clinical Councils, which will be discussed below – sits both a physician and administrative chair. This pairing of

physician and administrative talent at each level – known as the dyad leadership model – is another critical success component of the service line model. In a recent survey by MedAxiom, nearly 60 percent of respondents described their governance structure as one that incorporates the Dyad Model.

Drawing on the strengths of each dyad member, physicians will lead the determination of clinical vision and standards, whereas administrators will lead execution of this course. It only makes sense to have physicians set standards around accreditation, performance, quality, peer review, and patient experience. Further, physicians should take the lead in program development, including determining what clinical services are offered, where they are offered, and by whom. This is becoming a major decision point around the country as resources tighten and centers of excellence continue to emerge, threatening low-volume programs.

By contrast, administrators can navigate the organizational infrastructure to execute on these visions and standards. This too has been a missing ingredient from past structures, such as medical directorships, where physicians went back to busy clinical schedules and no one was left to implement decisions. Administrators, as part of their experience, can manage the necessary staffing, HR, information technology, and regulatory issues that might otherwise halt progress.

// Clinical Councils: The CVSL Foundation

The bedrock on which the CVSL is built is the Clinical Council. It is at these councils where the rubber meets the road in terms of clinical operations. Unlike traditional departmental breakdowns in hospitals and health systems, clinical councils are organized around subspecialties and/or disease types. Some examples might be arrhythmia, coronary artery disease or interventional, CV surgery, heart failure, structural heart or vascular diseases. Each of these councils is populated by physician participants who are either specially trained, have a keen interest, or heavily influence the subject area. It is wise to seek broad participation at the

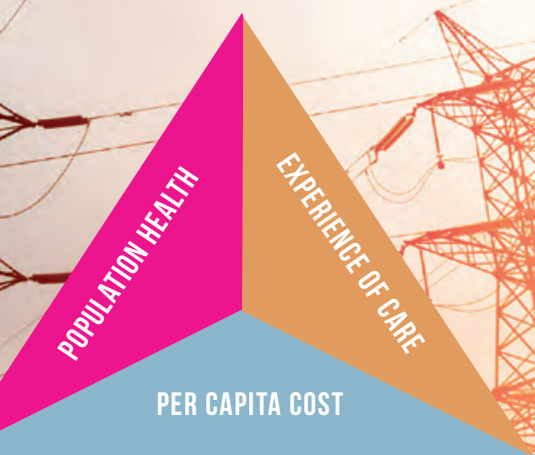
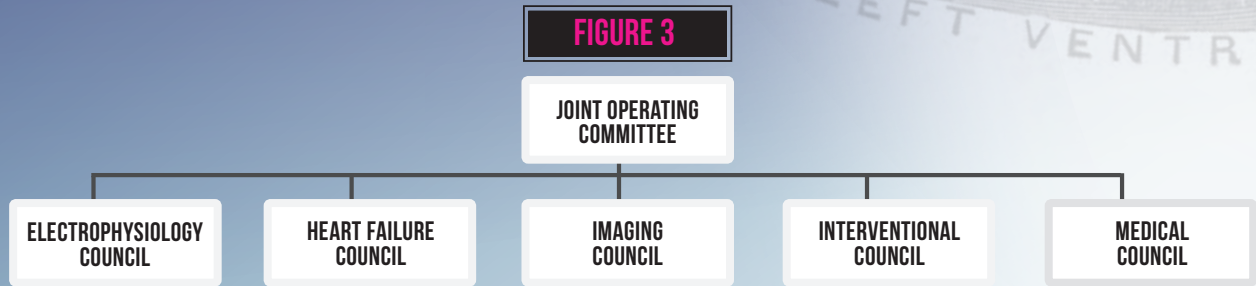


FIGURE 1: IHI TRIPLE AIM



FIGURE 2



council level such that a significant portion, if not all, of your CVSL medical staff is involved at some level. Further, these councils will often be multidisciplinary in their membership, where a cardiologist may sit on the surgical council or an electrophysiologist on the arrhythmia council. **FIGURE 3** shows a smaller program's clinical council structure.

At the top of each council sits a physician/administrator dyad team. The physician member is sometimes elected by his or her peers or sometimes appointed, depending on the organizational culture. The administrative member is someone steeped in the content area and with at least some reasonable influence over the organizational elements. For instance, a cath lab manager may co-lead the interventional council or the Heart Failure Clinic director the heart failure council.

As mentioned above, the clinical councils are where the heavy lifting takes place in terms of clinical and operational management. Each council will have a very clearly defined scope of authority and accountability to avoid duplication with other councils. Within their specialty content area, each will have jurisdiction over clinical program development, quality and performance improvement, emerging technology and therapies, full spectrum operations including budget, capital needs, physician succession and recruitment, and physician credentialing and skill development. All decisions of the clinical councils will filter through the overarching leadership body (Joint Operating Committee in Figure 3 above) to ensure that system level priorities and needs are being met.

TABLE 1 provides a more detailed example of a clinical council.

// Co-Management: The First Step of the Journey

Developing a full cardiovascular service line can often take 12-18 months, depending on the organization. This is not surprising given that a vision and strategy needs to be identified, governance and leadership structures created, old structures assimilated or dismantled, and sometimes bylaws changed. Given this and that organizations are feeling an imperative to get results quickly, deploying a co-management program is often a first step on the service line journey.

Co-Management is defined as a formal (legal) relationship where physicians share in the management of all or parts of the cardiovascular service line. This relationship must have a very clearly defined scope and authority, with predefined success metrics for accountability. Compensation for co-management activities comes from two distinct buckets: **1)** time for meeting attendance and other administrative functions; and **2)** incentives for achieving results. The structure co-management takes is often aligned around the clinical councils described above. This is yet another way that such a program becomes a gateway to the full CVSL model.

These two components are critical to align economic incentives and make co-management successful. All too often, already very busy physicians are asked to volunteer time for administrative tasks. As can be predicted, the inclination is to give sparingly to these activities in order to concentrate on clinical activities that drive compensation. This tension exists with private physicians as well as hospital employed physicians, particularly when the latter group's compensation model is largely or entirely based on production measures like work RVUs.

The most common co-management model is a simple agreement between a hospital (or health system) and either individual physicians, physician groups, or both. Scope and authority are clearly defined but does not typically include management of the overall service line (see **FIGURE 4**). Likewise incentive metrics are also clearly defined with specific trigger points for payments. The incentive compensation will usually carry a greater weight than time when looking at the overall pool.

TABLE 1	
SCOPE	<ul style="list-style-type: none">• Coordination of all non-invasive image services, including echocardiography, nuclear cardiology, CT, MR• Ensure appropriate accreditation of each• Oversee credentialing and peer review for all non-invasive services
MEMBERS	<ul style="list-style-type: none">• All Non-Invasive Physicians (across all modalities)• One Interventional Cardiologist• One Radiologist• Director of Radiology
ROLE	<ul style="list-style-type: none">• Oversee Appropriate Use Criteria (AUC) adherence• Monitor and manage report turnaround time• Determines EMR consistent patient annotation• Evaluates and determines expansion of clinical scope• Develops patient recruitment strategies• Develops care coordination strategies with primary care and hospitalists• Determine appropriate physician recruitment & succession planning

A recent survey by MedAxiom found facilities creating metrics around the indicators in **TABLE 2** below. Each facility will need to tailor its incentives around specific opportunities unique to the organization. More and more programs are seeking metrics that provide real financial return opportunities, which also provides the business case for entering into such an arrangement (important for legal and fair market considerations).

TABLE 2

INCENTIVE METRICS

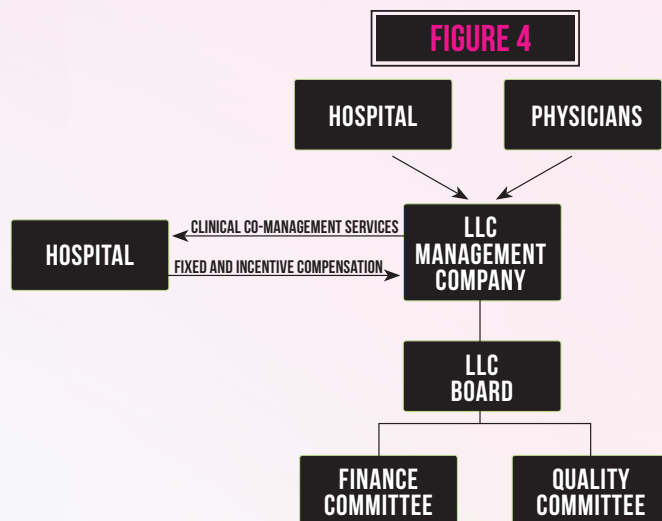
Outcomes	Coding & Documentation
Readmission Rates	Patient Satisfaction
Patient Safety	Referring Physician Satisfaction
National Quality Standards (registries)	Program Development
Efficiency/Process Improvements	Outreach Development
Standardization	Appropriate Use Criteria
Length of Stay	Quality Assurance Programs
Cost per Case	Supply Cost

Additionally, only that which can be accurately measured can be used as a metric, given that proving performance improvement is a must. This is often a monumental challenge as our current systems are simply not designed around answering the questions we're now asking of them. It can often take considerable time to retool our information systems to provide the accurate data needed as part of a co-management program. Last, all incentives will need to pass legal approval which is very different from facility to facility.

A more complicated arrangement when co-management covers the entire service line is the joint venture model (see **FIGURE 4**). In this model physicians and the hospital jointly own a management services company which then holds a contract with the hospital for management services. Compensation for the management services would be based on the fair market value of these service and might include both fixed and incentive (for achieving certain management performance goals) payments. Additionally, physicians may have incentives for achieving pre-defined clinical, operational or programmatic goals. These incentives may be incorporated as part of the joint venture, or handled separately, particularly if participation in the joint venture is not inclusive of the entire CVSL medical staff.

Physician participation in co-management – and the CVSL for that matter – is typically limited to aligned physicians. At some locations this may mean employed physicians or physicians contracted through a PSA, or those who are committed to the host hospital. Limiting participation is in part due to the fact that co-management agreements often include a restrictive covenant, which may preclude some from participation.

It should be noted that care should be taken to clearly define and adhere to specific criteria for participation and seek legal counsel and approval on the definitions. Further all compensation between physicians and hospitals or health systems should seek fair market guidance.



// Summary

The United States simply cannot afford the current health system, particularly given its current expense trajectory. At many facilities, efforts are underway to cut as much as 20-30 percent from current cost structures, expecting reimbursement to continue to tighten. Given the dynamic state of our industry and the ever-increasing demands to improve the product while at the same time lowering cost, it will no longer be acceptable to simply tinker at the edges. Something much bigger will need to be employed.

With all the pieces in place, the cardiovascular service line model has the transformative power to fundamentally change the way health care is delivered. It accomplishes this by: augmenting existing administrative structures with physician leaders in real and accountable governance roles; re-orienting services around subspecialty or patient types from the traditional vertical departmental organization; empowering action-oriented dyad leadership that can navigate both the clinical and infrastructure requirements; and aligning both clinical and economic incentives around solid organizational improvement goals through co-management.

The journey to the service line model is certainly not quick or easy, but the opportunities – to patients and to health care systems – are worth the efforts.

For over 14 years, Joel was CEO of a large, Midwestern, multi-specialty group that included 23 cardiologists. In 2009, he led the integration of his group into their primary hospital system and assumed leadership of all its employed physicians. He joined MedAxiom Consulting in March, 2012. MedAxiom Consulting partners with organizations, offering expansive knowledge of healthcare delivery systems and performance improvement to help implement customized, yet scientifically sound initiatives. Engagements and projects have specific and unique attributes but primarily fall into nine main areas including Physician Compensation, Cardiovascular Service Line Management, Integration and Alignment Strategies, Hospital-Physician Alignment, Strategy and Program Development, Operations and Performance Management, Financial Performance and Coding Accuracy, Clinical Quality, and Market and Business Development.

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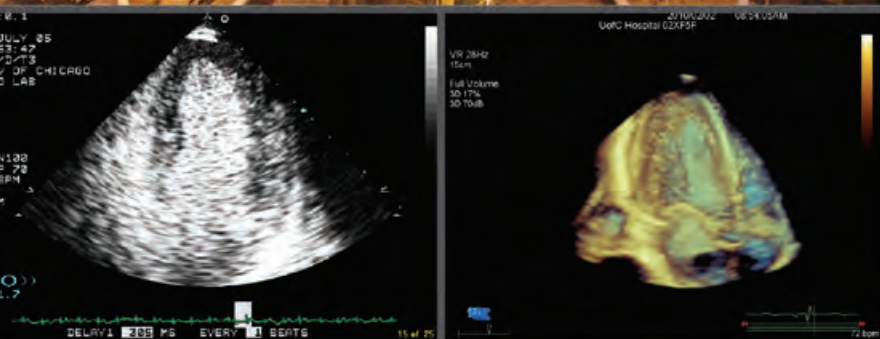
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Learning Lab Co-Director:
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ECHO IN CANCER: *Are we answering the need?*

Contributed by Marielle Scherrer-Crosbie
MD, PhD, FASE, Massachusetts General Hospital,
Boston, Massachusetts



In the last five to ten years, there has been a growing attention to the interaction of cardiology and oncology, illustrated by the newly defined cardio-oncology subspecialty and the tremendous increase in lectures and publications on the topic.

One of the very first echocardiographic procedures was in the diagnosis of a cardiac tumor, and echocardiography is still a tool of choice in the diagnosis and monitoring of the rare primary and secondary cardiac tumors and the monitoring of the impact of neighboring cancers on the pericardium.

The frequency of these tumors, however, has not markedly changed over the last decades and does not explain the growth of the field. In contrast, the survival of most cancers has been transformed by improvements in the diagnosis and treatment of these diseases. The population of cancer survivors in the United States alone counts more than 14.5 million individuals and is estimated to reach 19 million in the next ten years.

This rapid increase in survival is, however, paralleled by a simultaneous augmentation in cardiovascular pathologies for many reasons. As survivors are aging, the cardiovascular risk profile and pathologies increase. The survivors also have more time to develop long term cardiovascular side effects of cancer therapies. The field of cancer drugs is rapidly growing and includes many potentially cardiotoxic treatments. Finally, the aging of the population means that more patients with a new diagnosis of cancer will have existing known cardiovascular pathologies.

As echocardiography is the first-line tool for the diagnosis of myocardial, valvular, and pericardial function, the questions of what to look for, when, and how frequently to prescribe an echocardiogram to cancer patients are

posed. The main indications for echocardiography in the cardio-oncology laboratory are by decreasing frequency:

1. Baseline evaluation and monitoring of cardiac (and valvular) function in patients treated with cardiotoxic treatment **2.** Pericardial effusion in patients with neighboring or metastatic tumors, and **3.** Diagnosis and surveillance of cardiac tumors.

The baseline evaluation and monitoring of cardiac function in patients treated with cardiotoxic treatment is most controversial, and we will focus on that topic. Many of the aspects of this indication are still in discussion and recommendations have been issued from the ASE and the EACVI regarding the role of echocardiography in patients treated with chemotherapy or radiotherapy. (See “Expert Consensus for Multimodality Imaging Evaluation of Adult Patients During and After Cancer Therapy: A Report from the American Society of Echocardiography and the European Association of Cardiovascular Imaging” [J Am Soc Echocardiogr, September 2014;27(9):911-39] and “Expert Consensus for Multimodality Imaging Evaluation of Cardiovascular Complications of Radiotherapy in Adults: A Report from the European Association of Cardiovascular Imaging and the American Society of Echocardiography” [J Am Soc Echocardiogr, Sept 2013;26(9):1013-32].)

What are we looking for?

Chemotherapy: many chemotherapeutic agents are mildly cardiotoxic, but anthracyclines, which are used in breast cancers, hematological malignancies, and sarcomas, can induce irreversible and severe heart failure. Trastuzumab (Herceptin), which is prescribed in the HER2+ aggressive breast cancer, potentiates this effect.



Radiotherapy: radiotherapy in breast cancer and in hematological malignancies can irradiate the left anterior descending territory with subsequent ischemia and myocardial dysfunction. Valvular abnormalities (regurgitation and stenosis) are seen mostly in patients with hematological malignancies.

The effect of cancer treatments on LV function has routinely been followed using LV ejection fraction (LVEF). It is clear however that when LVEF is decreased, a substantial proportion of patients do not recover after cardioprotective therapy. Although 3-dimensional echocardiography appears to be less variable in the follow-up of cancer patients than 2-dimensional LVEF and is recommended if feasible, it still remains less sensitive than myocardial strain. Global longitudinal strain in particular appears more sensitive than LVEF in detecting early myocardial damage and in predicting subsequent LVEF decrease. The new consensus guidelines clarify the use of LVEF and strain in the evaluation and follow-up of patients treated for their cancers.

When and how frequently?

The timing and frequency of the cardiac monitoring remains a topic of discussion – some recommendations are given by the ASE/EACVI. A baseline evaluation of the cardiac and valvular function appears justified in patients treated by chemotherapy or radiotherapy. Although late cardiomyopathy has been described, the effect of chemotherapy on cardiac function and cardiac events is often noted within a few years of the treatment. In contrast, the effects of radiotherapy are often late and manifest after at least five to ten years.

Key Points:

- The population of cancer patients at risk of cardiovascular disease has markedly increased and is large
- Echocardiography is a first line tool for the diagnosis and monitoring of treatment-induced cardiac effects
- Global longitudinal strain is a sensitive marker of treatment-induced cardiac dysfunction
- The timing and frequency of monitoring are discussed in new ASE recommendations

Dr. Marielle Scherrer-Crosbie is an associate physician at Boston's Massachusetts General Hospital in the Cardiac Ultrasound Laboratory and co-director of the hospital's Cardio-oncology Program. She is also an Associate Professor in Medicine at Harvard Medical School. She was a team leader of ASE's Echo and Cancer Therapy Writing Group, which produced the "Expert Consensus for Multimodality Imaging Evaluation of Adult Patients During and After Cancer Therapy: A Report from the American Society of Echocardiography and the European Association of Cardiovascular Imaging," that appeared in the September 2014 issue of the Journal of the American Society of Echocardiography. Dr. Scherrer-Crosbie has served on ASE's Research, International, and Scientific Sessions Committees and its Board of Directors.

"Once patients have survived cancer, they don't die from cancer, they die from heart disease. Cardio-oncology is about making sure that doesn't happen."

—Dr. Juan Carlos Plana, Chair of ASE's Echo and Cancer Therapy Writing Group.

Contributed by Deborah R. Meyer, JASE Managing Editor

There are approximately 11.7 million people in the U.S. living with active cancer or with a history of it, and this number is projected to grow as screening tests become more widely available, cancer treatment improves, and the population ages. Cardiovascular disease often co-exists with cancer due to the high prevalence of both diseases and the cardiotoxic effects of some of the therapies used to treat the cancer patient.

In September 2014, the Journal of the American Society of Echocardiography published **"Expert Consensus for Multimodality Imaging Evaluation of Adult Patients During and After Cancer Therapy: A Report from the American Society of Echocardiography and the European Association of Cardiovascular Imaging."** This report provides recommendations as to the echocardiographic and other imaging techniques to be used (2D vs. 3D echo, contrast, strain imaging, CT, MRI), the recommended time intervals for follow-up, and the thresholds to be used in the adjudication of cardio-toxicity. Its release fills a huge hole in the limited literature previously available to guide the clinician on how to care for this emerging cohort of new cardiovascular patients. Echocardiography is, and should be, the most widely used imaging modality in the evaluation of these patients.

The perceived need to create this guideline grew out of emerging data which describes the magnitude of risk of cardiovascular adverse events in the population of patients that received treatment for cancer as a child or as an adult. The Childhood Cancer Survival Study showed that adult survivors of childhood cancer were 15 times as likely to have congestive heart failure and 10 times as likely to have coronary artery disease as their siblings. Also, analysis from the SEER Medicare database demonstrated a 2.5 fold increased risk for cardiomyopathy and a 1.4 fold increased risk for congestive heart failure in older breast cancer women receiving anthracyclines.

Dr. Scherrer-Crosbie, who was a team leader of ASE's Echo and Cancer Therapy Writing Group, which produced the expert consensus, has written the accompanying article, "Echo in Cancer: Are We Answering the Need?" to provide some insight for our members as to this relationship between cardiology and oncology.

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Figure 14.

Sri Sathya Sai Institute of
Higher Medical Sciences.



72 HOURS IN BANGALORE, INDIA

Contributed by Jayne Cleve, BS, RDCS, Duke University Medical Center, Durham, North Carolina; Melissa Daubert, MD, Duke University Medical Center, Durham, North Carolina; Bharat Patel, RDCS, RVS, RDMS, FASE, Hoboken University Medical Center, Hoboken, New Jersey; and Georgeanne Lammertin, MBA, RCS, RDCS, FASE, University of Utah, Salt Lake City, Utah on behalf of the ASEF VALUES Program (Valvular Assessment Leading to Unexplored Echocardiographic Strategies)

What do you get when you combine 16 dedicated ASE members with a hospital that looks like a palace built to serve the poor and staffed by amazing physicians, nurses, and sonographers? (**Figure 1**) Well, for three days you get an incredible experience: the ASEF VALUES Program! Sponsored by the ASE Foundation (ASEF), the August mission was led by Dr. Partho Sengupta and sonographer Mr. David Adams. This event was in collaboration with Sri Sathya Sai Institute of Higher Medical Science (SSSIHMS) and supported by GE Healthcare and Core Sound Imaging (Raleigh, NC).

The following is a recounting of our adventures, in an effort to give some insight to ASE members on what it is like to participate in an international mission that combines patient care, research, and teaching. The event was held in Southern India, so most of us traveled from the United States through several plane changes to arrive at the mission.



Figure 2. Dr. Partho Sengupta and David Adams by the welcome sign.

Tuesday, August 12, 2014 8:00am

The ASEF VALUES Program kicked off with opening remarks by Dr. Thomas Ryan, former ASE President and current ASE Foundation Task Force Chairperson, via live webcast on Google Hangout **(Figure 4)**. Dr. Ryan described ASEF's long history of providing charitable care through collaborative healthcare efforts across the globe. This was the third ASEF program to take place in India, further demonstrating the Foundation's ongoing commitment to providing high-quality cardiovascular care throughout the world. Following Dr. Ryan was a warm welcome from Dr. Partho Sengupta, ASE's liaison to India, and a candle lighting ceremony in tribute to the founder of SSSIHMS. Then, a live telecast by Dr. Jagut Narula discussed the history and challenges of treating rheumatic heart disease (RHD). This was followed by a talk by David Adams and Dr. Sanjeev Bhavnani regarding the use of point of care echo and smart phone based technology for the evaluation of RHD. Then it was time to get to work!



Figure 4. Practicing for the Google Hangouts.

Monday, August 11, 2014 6:00pm

We were welcomed into the Sai Family at SSSIHMS with open arms and large inviting banners **(Figure 2)**. After a heartfelt and touching short film showing the history of SSSIHMS and its founder Sathya Sai Baba, there was an opening ceremony and introductions of the ASEF Team. The podium was shared by Dr. PK Dash, Chief Cardiologist at SSSIHMS, Dr. Partho Sangupta, Dr. Sanjeev Bhavnani, Dr. Srikanth Sola, and David Adams in the welcoming as well as the program overview, schedule, and expectations for the next three days. This all took place in the high tech conference room which doubled as the echo reading room **(Figure 3)**.

After the presentations, the ASEF Team was hosted by SSSIHMS for dinner. The dinner was hosted in the lobby of the hospital, where the team was able to interact with all of the individuals who had gathered for this mission. We met with the doctors, our assistants, echo students from SSSIHMS, and teaching staff.

Figure 3. The main conference room at SSSIHMS.



Tuesday, August 12, 2014 10:30am

Patients came to SSSIHMS from all parts of Bangalore and the surrounding area, some taking several hours to reach the clinic by way of public transportation. The patients were divided into two groups; one group underwent a typical history and physical while the other group was evaluated using mobile devices to

Figure 1. The entire ASEF VALUES Team in front of the SSSIHMS.



record ECG (**Figure 5**), blood pressure, oxygen levels, and finally, a screening echocardiogram using the GE handheld V-Scan (**Figure 6**). These procedures were recorded after a six minute walk test, a protocol set-up by Dr. Bhavnani, who spearheaded the mobile clinic.

After the initial work up in the mobile clinic, all patients received comprehensive echocardiograms in the main hospital, performed by ASEF volunteer sonographers. Sonographer students from SSSIHMS were assigned to each ASEF sonographer to assist, act as interpreters, and learn. Local physicians that were interested in learning from the ASEF volunteers joined the observing SSSIHMS student sonographers (**Figure 7**). The sonographer and nursing students from SSSIHMS were extremely eager to learn from the ASEF volunteers, and bonds quickly formed between the two groups. As the day progressed, student nurses quickly learned how to operate the mobile echo equipment, after which they taught the local physicians how to use the devices and enter all the data into the electronic medical records.



Figure 5



Figure 6



Figure 7

Figure 5. Smartphone ECG in the Mobile Health Clinic.

Figure 6. Bharat Patel training a physician to use handheld echo in the Mobile Health Clinic.

Figure 7. David Tomberlin teaching (note the ASE posters on the walls).

Tuesday, August 12, 2014 5:30pm

Individuals from India and the U.S. offered both expertise and innovations for this event. From Kathi Browne utilizing Google glasses to Dr. Sanjeev Bhavnani demonstrating how ECGs are possible with the use of a smartphone, examples of how to bring healthcare to underserved areas abounded. Laurie Smith with Core Sound Imaging was instrumental in getting all the images uploaded and ready for interpretation.

Wednesday, August 13, 2014 8:00am

On the second day of the ASEF VALUES Program, both international and local experts gathered via Google Hangout to review and discuss interesting case presentations by ASEF physician volunteers: Dr. Rob Mathews, Dr. Lucy Safi, and Dr. Melissa Daubert. The expert panel included SSSIHMS physicians Drs. Dash, Sola, Barooah, and Bharadwaj, and ASE Past President Dr. Jim Thomas from Northwestern, who provided thoughtful insight on the treatment of RHD patients with severe mitral stenosis/regurgitation, multivalvular involvement, and the indications and utility of exercise stress testing in moderate mitral stenosis.

Following this interactive session, it was time to see more patients in the clinic and read echocardiograms. Selected patients received stress echocardiograms for further assessment of their valvular heart disease. A number of patients then went to the cath lab to receive a balloon valvuloplasty (**Figure 8**). Dr. Reeta Varyani, a Consultant Cardiologist at SSSIHMS, even wore Google Glass during one of the procedures and recorded it all! (**Figure 9**) The breadth of rheumatic and congenital heart disease that was encountered was truly remarkable. All scans were collectively interpreted by ASEF physicians and physician delegates who converged upon SSSIHMS from across India. Thus, echocardiography not only provided a window into our patients' hearts, but into all those who participated in the ASEF VALUES Program.

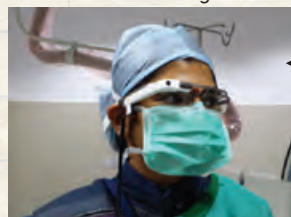


Figure 9. Dr. Reeta Varyani using Google Glass to record a cath procedure.



Figure 8. In the cath lab performing a balloon valvuloplasty under echo guidance.

Wednesday, August 13, 2014 5:30pm

This evening the medical staff from SSSIHMS gave a brief overview, via Google Hangouts, of how RHD affects individuals all over the world. RHD is a disease of the poor and young (<25 years) caused by untreated infections from Group A Streptococcus (GAS). What commonly starts as a sore throat can cause severe valvular damage leading to congestive heart failure and death. Medication and treatment in underprivileged countries are limited, thus overlooking the impact of minor symptoms is normal. Drs. Barooah, Lingam, and Kini presented staggering statistics regarding the estimated 15.6 million people affected by

RHD and some of the treatments currently ongoing at SSSIHMS. David Adams gave an overview on the use of strain imaging to diagnose patients. David's presentation gave everyone a better understanding of strain and the use of strain especially with RHD and heart failure patients.

Wednesday, August 13, 2014 8:30pm

Even though we were tired after having had another full day of scanning/learning/teaching and being immersed so welcomingly in another culture's hospital, we decided to meet for one last meal together (**Figure 10**). A few of us would be leaving throughout the day on Thursday, and others on Friday and Saturday, so we were making use of the time we had left.

It was an eventful night full of laughter and stories being told from across different ends of the table. There were pictures taken, phone numbers exchanged, and promises to stay in touch and meet again. There was even a six-foot dosa (Indian meal staple) delivered to the table by the chef himself!



Figure 10. The ASEF Team in front of SSSIHMS.

Thursday, August 14, 2014 8:00am

Three days have flown by! Once again we started the day reviewing cases with ASE Past Presidents Dr. Patty Pellikka and Dr. Roberto Lang via Google Hangout. We were just starting our day but it was 10:00 pm as they sat in their offices linking up with us! By now, the ASE sonographers along with their SSSIHMS students were totally in sync and operating very efficiently. As the studies were being performed, the physicians sat in the conference room reading with the delegate physicians from across India. (**Figures 11 & 12**) In the end, almost 300 patients underwent clinical evaluations in the mobile clinic and 237 echocardiograms were performed over 3 days!



Figure 11. Dr. Melissa Daubert (middle) reading echocardiograms with Indian physicians.

Thursday, August 14, 2014 4:00pm

At the end of the day we took the opportunity to talk to sonographers and students of SSSIHMS about our experiences. They expressed their thoughts; the common denominator was how much they learned from the ASEF volunteers and the lifelong friendships that were formed. As a goodwill gesture, the student sonographers honored our female sonographers with hair garlands and wore traditional saris on the last day (**Figure 13**). Many hugs were exchanged with a few tears at the end of a very fulfilling experience.

We cannot express enough gratitude to Drs. Sola and Ashwin as well as the SSSIHMS team for giving us this opportunity to help the people in India. Our sincere thanks to Dr. Sengupta and David Adams for being the leaders they are, representing ASE and of course all the U.S. volunteers on this humanitarian mission. It ended too soon with the final ARTI (Indian prayer)! It's amazing what was achieved in these short 72 hours by ASEF volunteers and the SSSIHMS team; a group that came together for one cause "LOVE ALL, SERVE ALL" (**Figure 14**). We encourage all fellow ASE members to volunteer in the future to represent the ASE in remote parts of the globe. You will receive so much more than you give.

*"AUF -
WIEDERSEHEN"
(Until we meet again)*

Jayne Cleve is a Cardiac Sonographer at Duke University Medical Center; Dr. Melissa Daubert is an Assistant Professor of Medicine at Duke University Medical Center; Bharat Patel is a Lead Cardiac Sonographer at Hoboken University Medical Center; and Georgeanne Lammertin is the Manager of Non-Invasive Imaging Services at the University of Utah.



Figure 12.
Dr. Partho Sengupta reading
with the Indian physicians.



Figure 13. Student
sonographers wearing
traditional saris.

ASEF TEAM MEMBERS

David Adams, FASE
Dr. Sanjeev Bhavnani
Kathi Browne
Egle Burdulis, FASE
Jayne Cleve
Dr. Melissa Daubert
Natalie Fauss
Georgianne Lammertin,
FASE
Dr. Robin Mathews
Bharat Patel, FASE
Evelina Petrovets
Dr. Lucy Safi
Dr. Partho Sengupta,
FASE
Dipti Shah
Laurie Smith
Kara Thurmond
David Tomberlin
Hemavathi Umamaheswar

INDIA NATIONAL TEAM MEMBERS

Dr. Manish Bansal, FASE
Dr. Shantanu Sengupta, FASE

SSSIHMS TEAM MEMBERS

Dr. Banajit Barooah
Sivakumar Chandrasekaran
Dr. Voleti Choudhary
Subbarao Gadicherla
Dr. PK Dash
Dr. Prayaag Kini
Dr. Anand Lingam
Subramaniam Mani
Dr. Venkatesh Murugan
Srinivas Naredla
Dr. V. Ramnathlyer
Dr. Srikanth Sola
Dr. Reeta Varyani
Ashwin Venkateshvaran

EXPERT PANEL MEMBERS

Dr. Roberto Lang, FASE
Dr. Jagut Narula
Dr. Patricia Pellikka, FASE
Dr. Tom Ryan, FASE
Dr. Jim Thomas, FASE

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Photos from 2014
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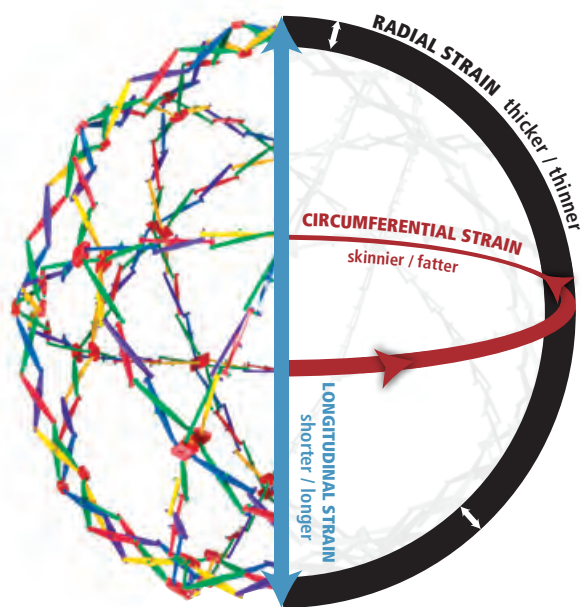
To patients, strain is something to be avoided. To echocardiographers and cardiologists, strain is something to be embraced.

From measuring the impact of coronary artery disease to evaluating cardiotoxicity due to chemotherapy, strain is an excellent tool to assess myocardial mechanics and is rapidly becoming a part of a standard echocardiographic workup.

To help sonographers and cardiologists more intuitively understand strain concepts and incorporate the technique into daily practice, Esaote created a FUNdamentals of Strain educational program and integrated identical comprehensive strain packages into both console and laptop echo systems.

FUNdamentals of Strain

Jay Washecheck's FUNdamentals of Strain presentation has been well received at recent scientific meetings and uses examples from everyday life to help clearly define and illustrate strain concepts. For example, "Since taking this job, my waist size has increased from 30 to 33 inches" becomes "+10% circumferential strain."



To see how a Hoberman Sphere demonstrates types of strain, go to www.EsaoteStrain.com

A Hoberman Sphere is a popular toy with a unique structure that allows it to fold down to a fraction of its fully expanded size, and Jay inventively uses a Hoberman Sphere to illustrate and reinforce longitudinal, circumferential, and radial strain concepts.

Twist, torsion, and the basic interpretation of strain curves are also memorably demonstrated. To see Jay's presentation of the Hoberman Sphere, go to www.EsaoteStrain.com.

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MyLab alpha laptop with comprehensive integrated strain package

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STRAIN:

is it really so hard?

Contributed by James D. Thomas, MD, FASE, Director, Center for Heart Valve Disease, Bluhm Cardiovascular Institute and Division of Cardiology, Northwestern Memorial Hospital, Chicago, Illinois

Of all the many advances in echocardiography over the past 60 years, among the most remarkable has been the development of myocardial deformation imaging or “strain imaging” as it is generally termed. But while there has been an enormous amount of research done on strain imaging and a great deal of “buzz” in the echo world, it has still not penetrated into daily clinical practice. In this article, I would like to outline some of the principles of strain imaging, why it has sometimes seemed so difficult for general users to apply, and also ways that the American Society of Echocardiography (ASE) is helping to bring strain imaging into the main stream.

The first thing we need to get clear is just what this word “strain” really means. The basic definition of strain is the degree of deformation observed in some object. To choose the simplest possible example, imagine a rubber band that is 10 cm long. If that rubber band is then stretched to 12 cm, then we say that rubber band has undergone a 20% strain. If we relax the rubber band back to 8 cm, then, relative to the original 10 cm length, we say the rubber band has experienced -20% strain. In reality, of course, we live in a three-dimensional world, so we have to consider deformation in all 3 dimensions. In the heart, for example, the myocardium basically has 3 fundamental types of deformation. During systole, it typically shortens along its long axis and circumferentially while thickening in the radial dimension. Thus we anticipate that from end diastole to systole we will have negative longitudinal and circumferential strain and positive radial strain. Normal values for longitudinal and circumferential strain are typically around -20%, while radial strain is around +40%. Strain is closely related to ejection fraction, but if it were a mere surrogate for EF, it wouldn't be that interesting. Instead, it gives independent information about early changes in myocardial contractility. For example, when patients begin to develop cardiac dysfunction from chemotherapy drugs, longitudinal strain may become depressed before any changes are observed in the ejection fraction. Thus, strain imaging may be a way of identifying cardiomyopathies in their earliest stage.

So how can we measure strain in the heart? In the experimental laboratory, small metallic beads can be surgically implanted, and their motion relative to each other can be observed by x-ray, but this is not a particularly patient friendly approach! Fortunately echocardiography provides much safer ways to do this. One approach is to use tissue Doppler. By analyzing how the velocity of tissue motion changes throughout the myocardium, it is possible to determine the rate at which the tissue is shortening

or lengthening. While this tissue Doppler approach to strain imaging is certainly well validated, it has proven quite challenging to use in clinical practice. A much easier approach to this is Speckle Tracking Imaging (STI), which can be applied to virtually any 2D echo study of the heart. What speckle tracking does is to track the motion of the tiny speckles that occur in the myocardium due to interference patterns between tissue structures smaller than a wavelength of sound. These speckles are relatively persistent throughout the cardiac cycle and so can serve as markers to track the deformation of the myocardium.

Despite the thousands of research papers validating the use of speckle tracking imaging, it has still not achieved much use in daily clinical practice. There are several reasons for this. First, there is a sense that it is a very challenging technique, and certainly in the early days it required a great deal of expertise to get meaningful data. Now, however, virtually all of the major manufacturers have robust strain packages that can be easily applied to patients going through a busy clinical laboratory. All that is really required is high quality apical images of the heart at a sufficiently high frame rate to capture the motion of myocardial speckles, typically between 40 and 80 frames per second. One further barrier to use, however, is evidence that emerged in earlier clinical trials demonstrating that different values of strain may be obtained on the same patient using equipment from two different vendors. These vendor differences have threatened to cripple the field by requiring patients to always be studied on the same machine when they come back for repeat examinations, a very impractical approach.

Fortunately, the ASE and the European Society of Cardiovascular Imaging (EACVI) have partnered with all of the major vendors to improve intervendor reliability in strain imaging. Beginning almost four years ago, clinicians and engineers have been meeting as a committee (Initiative to Standardize Deformation Imaging) at our Society conferences every six months to analyze the reasons for differences in strain values between vendors and to develop strategies for narrowing these differences. One approach was to simulate echo images by computer modeling and deliver these to the vendors for their analysis. In this way, we knew that every company was analyzing the exact same dataset. A more realistic test occurred in the spring of 2013 in Leuven, Belgium, where 62 patients were scanned on seven different echo machines and analyzed on a further two software only packages. What we have learned from these exercises is that some of the differences between vendors were simply because they were reporting

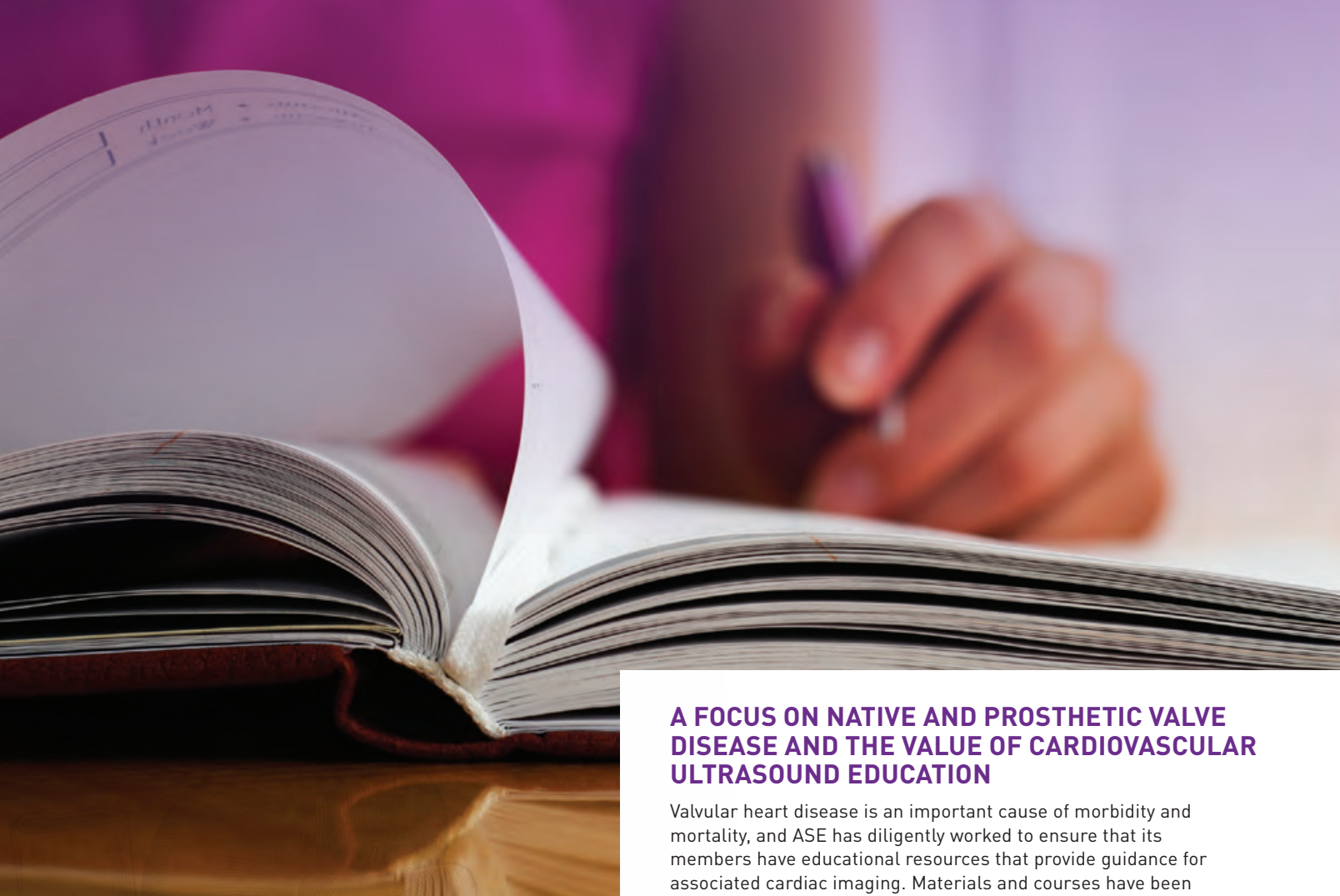
different types of strain from each other. For example, some vendors average strain across the myocardium, whereas others report strain only in the subendocardium, where there typically is higher values of strain. By simply requiring the vendors to be consistent in what they report out, we have achieved much narrower confidence intervals between the vendors than has previously been reported in earlier trials.

“I think we now have data available that should make every major echo lab develop a serious program for strain imaging of their patients.”

While there is still much work to be done in this area, our committee is pleased to publish, in early 2015, a consensus document outlining some of the technical aspects of our deliberations. This consensus document has been reviewed by the Guidelines and Standards committees of both ASE and EACVI and will be published in both Society journals. It will provide technical guidance into the nomenclature of strain, consistent symbols for representing it, and defining where it should be measured. Companies are still allowed to report different parameters, but these must be explicitly defined. Our hope is that by operating from common definitions, we will find much less variation between vendors in the strain measurements of our patients.

The final barrier to widespread use of strain imaging has perhaps been the lack of a “killer application” that has so often driven development in our field, in the way that mitral valve planimetry drove 2D echo and regurgitant quantification drove color Doppler. However, I think we now have data available that should make every major echo lab develop a serious program for strain imaging of their patients. I have already mentioned the cardio-oncology application, and a recent guideline in JASE (**“Expert Consensus for Multimodality Imaging Evaluation of Adult Patients during and after Cancer Therapy: A Report from the American Society of Echocardiography and the European Association of Cardiovascular Imaging,”** published in September 2014) describes in detail how strain can be used to manage these patients. Similarly, there have been major publications demonstrating the value of strain in assessing patients with valvular heart disease, myocardial infarction, and amyloidosis. With the progress seen in the quality of myocardial imaging and the gratifying progress that we are seeing towards eliminating intervendor differences, I hope we will see a major upsurge in the use of strain imaging by echocardiographers around the world.

Dr. Thomas is the Director of the Center for Heart Valve Disease at the Bluhm Cardiovascular Institute and Division of Cardiology at Northwestern Memorial Hospital in Chicago, Illinois. He is ASE’s co-chair of the Initiative to Standardize Deformation Imaging, which has produced “Definitions for a common standard for 2D speckle tracking echocardiography: Consensus document of the EACVI/ASE/Industry Task Force to Standardize Deformation Imaging,” that is appearing in an upcoming issue of JASE. He is a Past President of ASE and has served on numerous committees including the Industry Relations Taskforce, the Finance Committee, the Management/Executive Committee, International Relations Committee (currently its Co-Chair) and the Education Committee.



A FOCUS ON NATIVE AND PROSTHETIC VALVE DISEASE AND THE VALUE OF CARDIOVASCULAR ULTRASOUND EDUCATION

Valvular heart disease is an important cause of morbidity and mortality, and ASE has diligently worked to ensure that its members have educational resources that provide guidance for associated cardiac imaging. Materials and courses have been developed that provide direction in the assessment of valvular function, identification of patients requiring intervention, as well as guidance of interventional procedures.

As part of ASE's mission to provide education to our members and the public, a number of Guidelines and Standards documents have been written to delineate and standardize the care of patients with valvular heart disease.

RECOMMENDATIONS FOR EVALUATION OF THE SEVERITY OF NATIVE VALVULAR REGURGITATION WITH TWO-DIMENSIONAL AND DOPPLER ECHOCARDIOGRAPHY – JASE 2003:

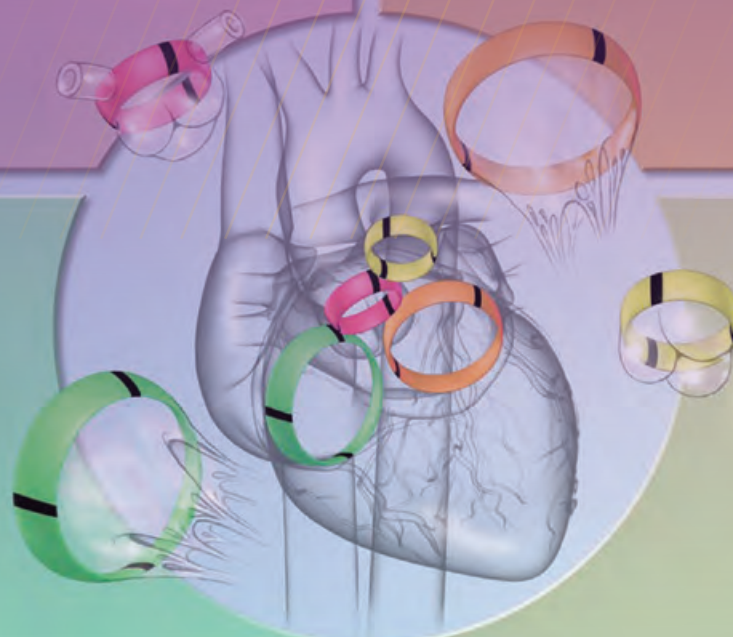
Developed in conjunction with the ACC, AHA, and ESC, this document offers a critical review of echocardiographic and Doppler techniques used in the evaluation of valvular regurgitation in the adult patient and provides recommendations for the assessment of severity of valvular regurgitation.

ECHOCARDIOGRAPHIC ASSESSMENT OF VALVE STENOSIS: EAE/ASE RECOMMENDATIONS FOR CLINICAL PRACTICE – JASE 2009:

Prepared by experts from Europe and the U.S., the aim of this paper was to detail the recommended approach to the echocardiographic evaluation of valve stenosis, including recommendations for specific measures of stenosis severity, details of data acquisition and measurement, and grading of severity.

education corner

Contributed by Cheryl Williams, ASE's Education Manager



From the ASE "Guidelines for the Evaluation of Valvular Regurgitation" Poster

RECOMMENDATIONS FOR EVALUATION OF PROSTHETIC VALVES WITH ECHOCARDIOGRAPHY AND DOPPLER ULTRASOUND – JASE 2009:

Lead authored by William Zoghbi, MD, FASE, this document offers a review of echocardiography and Doppler techniques used in the assessment of prosthetic valves and provides recommendations and general guidelines for the evaluation of prosthetic valve function.

clinical applications of 3D Echocardiography along with their strengths and weaknesses.

To help take the wealth of information provided in these guidelines and present it in a readily available format, Rebecca Hahn, MD, FASE – a renowned echocardiographer and 2015 Chair of ASE's Scientific Sessions – created a two-hour lecture that provides a case-based review of these ASE guidelines. Available as part of ASE's membership benefits package, this lecture is described by users as "very organized, step-by-step fashion that was easy to follow." During this session, Dr. Hahn explains the guidelines, with a specific focus on the mitral and aortic valve, defines the proper measurement techniques for accurate quantitative assessment of valvular heart disease, describes the imaging requirements for comprehensive assessment of prosthetic valves, and explains how echo can be used to identify patients requiring valvular interventions.

Guideline-based sessions reviewing assessment of valvular function were also woven into ASE's 25th Scientific Sessions, the recordings of which are accessible online at www.ASEUniversity.org. Content includes dedicated lectures on the "Systematic Approach to the Evaluation of Prosthetic Valves," "Mitral Valve Procedures, Intersection of the Surgeon and the Echocardiographer" (including a viewing of a taped mitral valve surgery), "Advanced Evaluation of Aortic Valve Stenosis," among dozens of others. In addition, experts discussed the use of "3D Echocardiographer in the Assessment of Valvular Function," for which more information can be found in:

EAE/ASE RECOMMENDATIONS FOR IMAGE ACQUISITION AND DISPLAY USING THREE-DIMENSIONAL ECHOCARDIOGRAPHY – JASE 2012:

With Chairs Roberto Lang, MD, FASE and Luigi Badano, MD, this document provides a practical guide on how to acquire, analyze, and display the various cardiac structures using 3D echocardiography, as well as limitations of the technique. In addition, this document describes the current and potential

With the rapid pace at which technological development is occurring, ASE has also provided dedicated resources to guide new transcatheter interventions. On www.ASEUniversity.org, you will find a lecture by Stephen Little, MD, FASE, from Houston Methodist Hospital, describing the echo guidance for TAVR, including the importance of accurate annular measurement and device sizing, the structural pathologies within the transcatheter heart valve landing zone that may compromise valve function, and a review of TEE checklists to access acute procedural success. This lecture is included with your membership, in addition to access to this full guideline:

EAE/ASE RECOMMENDATIONS FOR THE USE OF ECHOCARDIOGRAPHY IN NEW TRANSCATHETER INTERVENTIONS FOR VALVULAR HEART DISEASE – JASE 2011:

Co-Chaired by Jose Zamorano, MD, FASE, and Past ASE President, Linda Gillam, MD, FASE, this document serves as a reference for echocardiographers participating in any or all states of new transcatheter treatments for patients with valvular heart disease.

With recognition to the importance of valvular function and new percutaneous interventions for structural and valvular heart disease, course chair Michael Picard, MD, FASE, has dedicated a special, full-day session at the 3rd Annual Echo Florida event to providing case-based lectures to demonstrate how 2D and real-time 3D/4D echocardiography can be used to select, guide, and follow these interventions.

Education does not end in the classroom, real or virtual. Education continues daily. Interactions in clinical practice, whether with colleagues or patients, research studies, and more, can all challenge our knowledge and perceptions. To help, ASE has created guideline posters, pocket-guides, guideline resource books, and more that can be kept easily accessible for referencing during patient studies and image interpretations. Visit www.ASEMarketPlace.com for more purchase options.

A SURVIVOR:

THE EXTRAORDINARY LIFE OF DR. CANESSA

Contributed by Rhonda Price, ASE's Chief Standards Officer and International Relations Specialist

AN INTRODUCTION FROM DR. ITZHAK KRONZON

Roberto Canessa is a gifted physician, internationally recognized pediatric echocardiographer, eloquent speaker, lecturer, and raconteur. He is also the charismatic, admired hero of the Andes, a superb athlete, former presidential candidate, farmer, mechanic, dedicated family man, and wonderful, special friend.

Itzhak Kronzon, MD, FASE | Lenox Hill Hospital | New York, New York

Dr. Roberto J. Canessa's patients can't tell him how they feel or where they hurt. They can't speak, some haven't yet been born, and many are struggling to survive. He doesn't underestimate their ability and will to survive the seemingly insurmountable odds against them. That is a struggle which Dr. Canessa, a pediatric cardiologist from Montevideo, Uruguay and survivor of the famous 1972 Andes plane crash, has also endured.

Much has been written about the 1972 Andes plane crash, also called the 1972 flight disaster and, in South America, Miracle of the Andes. Excellent and reliable sources of information include the New York Times #1 bestseller *Alive* by Piers Paul Reed and the award-winning 2008 documentary "Stranded: I've Come from a Plane That Crashed on the Mountains," directed by Gonzalo Arijón.

On October 12, 1972, 45 passengers departed Montevideo, Uruguay en route to Santiago, Chile aboard a Uruguayan Air Force plane. The passengers were members of the "Old Christians" rugby team, along with many of their friends and family, traveling to the team's rugby match in Chile. Chartering the plane was an inexpensive way for the young members of the team, most of whom had never traveled outside Uruguay, to travel to another country. They sold all the available seats.

Because of weather conditions over the Andes, the pilots were forced to land the plane in Mendoza, Argentina to wait out the storm. When weather conditions improved late the next day, Friday the 13th of October, the pilots made a decision not to travel directly over the Andes from Mendoza to Santiago because clearing the height of the mountains in such a short distance would have been risky and a strain on the Fairchild plane. Instead, they opted to fly south along the Argentinian side of the mountain range, cut across the mountains at the low pass, and then travel north on the Chilean side of the mountain range to Santiago. Because of a pilot error in calculating the time required to clear the mountain range at the pass (strong headwinds weren't considered and visibility was poor), the plane flew into the mountain range instead of around it, clipping the mountains.

Twelve people immediately died in the crash. Others died later as a result of injuries or the cold, and still others perished days later when an avalanche covered the plane's fuselage, where the survivors were seeking shelter at night. In the end, there were 16 survivors, enduring nighttime temperatures of 30 degrees below zero, altitudes of 10,000 feet, and little food in an environment that had no vegetation or wildlife. Rescue planes flew overhead in the early days, but couldn't see the white fuselage in the vast and deep snowy range. The survivors were able to hook up a radio signal after 11 days, only to hear reports that the search for them had been called off. "When the search had been called off, I realized our only chance of living depended on us," said Dr. Canessa. He still uses that lesson in his daily life: "Don't wait for the helicopters to rescue you ... go and fetch them."

Displaying incredible maturity and solidarity for such a young group, they developed a system for keeping each other warm at night and sharing limited supplies. Dr. Canessa, then a 19-year old second-year medical student, was called upon, with his limited medical training, to help set broken bones and other injuries. The group made difficult choices in order to survive. Being from Montevideo, on the coast of Uruguay, they had no experience with snow or mountains, and made mistakes. Their clothing was suitable for a rugby match, not an expedition in the most isolated area of the Andes Mountains. Some lost half of their body weight while on the mountain.

After 60 days on the mountain enduring unbearable conditions, Roberto Canessa and Nando Parrado – the healthiest members of the group – hiked away from the crash site to seek help. Spring had arrived and snow was beginning to melt, finally making the onward trek a possibility. Even in their weakened condition and without proper equipment, they hiked 44 miles over extreme mountain ranges in ten days. Dr. Canessa refers to that first night on their journey away from the crash site, in the extreme cold with only a makeshift sleeping bag and without the protection of the fuselage, "the worst night of my life." On their



“MY DESTINY WAS TO WALK OR TO DIE
... AND GOD WAS IN BOTH OF THEM.”

tenth day of hiking, after finally descending the mountain ranges, Dr. Canessa saw a man on a horse – a Chilean shepherd – across the river. They couldn’t communicate across the width of the river, expanded from the now-melting snow, but Canessa and Parrado heard the word “mañana” and relaxed for the first time in 70 days, knowing that help would soon arrive. True to his word, the Chilean shepherd, Sergio Catalan, rode hours on horseback to the nearest town to alert rescuers, while sending help across the river to provide food and shelter for the two. It was said that they “smelled of the grave.” The world was stunned with the news that there were still survivors after 70 days on the mountain.

"EVERY DAY WHEN I LOOK AT MYSELF IN THE MIRROR, I FEEL VERY RELIEVED TO SEE THE SILLY GOAT THAT I ALWAYS WAS. IT WAS A SIMPLE SHEPHERD WHO RESCUED US, WHO WAS GENEROUS ENOUGH TO LEAVE ASIDE HIS THINGS TO GET HELP. SINCE THEN, I RESPECT PEOPLE IN A DIFFERENT WAY."

—R. CANESSA

This is a story of hope and inspiration, solidarity and ingenuity, loss and survival. “Youthful arrogance might have been a factor in survival” of the young group, acknowledges Dr. Canessa. In any event, those experiences on the mountain have guided the way Dr. Roberto Canessa, an ASE member and long-time attendee of ASE’s Scientific Sessions, deliberately lives his life and conducts his clinical practice. ***Life can be short. Miracles happen. Enjoy the life you have. Make time for the people and things you cherish.***

In a book he is writing with Simon & Schuster (release date of March 2016), Dr. Canessa describes how seeing the ultrasound images of his unborn patients, who are struggling to survive, reminds him of himself looking out the window of the fuselage where he sought protection from the cold nights. He was also looking for a way to survive. It is a powerful connection he has with his patients.

At age 61, Dr. Canessa has earned the respect of the medical and academic community. Director of the Cardiac Ultrasound Department and Prenatal Diagnosis of Congenital Heart Disease, he is working in the non-invasive evaluation of Heart Transplant Program and is investigator of Fetal Cardiology at the Italian Hospital in Montevideo. He was awarded his country’s National Prize in Medicine in 1986 and twice has been awarded the Great National Prize in Medicine, in 1991 and 1999. He is recognized worldwide for his role in the 1972 Andes event, and is in demand as a motivational speaker, having spoken at M.I.T., Harvard, Wharton School at the University of Pennsylvania, Royal College of Surgeons in England, and the American Heart Association. In 1994 he was a candidate for the office of President in Uruguay.

Dr. Canessa’s daily schedule is not typical, but it reflects the lessons he has learned from life. He has arranged his day to allow time in the morning for the things that give him pleasure – tennis, restoring old cars, friends, and farming. He enjoys a leisurely lunch at home with his family most days of the week, before turning his attention to his medical practice. Typical hours for his practice are 3-10 pm, seeing his private patients 3-6 pm and then working with his medical team as on-call consultants at hospitals throughout Montevideo, a role for which he is in great demand most days of the week. This often places him in emergency departments in some of the poorest hospitals in the city. Many of his patients appear to have been abandoned or neglected. On a recent Friday evening, a young patient was born dead and with HIV but was resuscitated. With the encouragement and support of Dr. Roberto Canessa, the child has a fighting chance.



TOP LEFT: Dr. Canessa gives a new patient with special needs a fighting chance.

TOP RIGHT: Remnants of the wreckage of the Uruguayan Air Force plane.

BOTTOM LEFT: Dr. Canessa makes it a practice to take time to enjoy the company of friends. Here the two are sharing mate, a bitter tea. Unlike the tea we drink, which is mostly liquid that has been steeped in some tea leaves, a mate is mostly tea leaves. The thermos his friend is holding contains the hot water that is poured over the tea. Then a metal straw (bombilla) is pushed into the tea to drink the steeped liquid at the bottom of the mate container. The ritual is a social event.

BOTTOM MIDDLE: Dr. Canessa (left) leads a staff discussion on a recent patient case with the assistance of Dr. Santiago Millan.

BOTTOM RIGHT: Antenna from the wreckage of the Fairchild plane on display at the Museo Andes 1972.

A LIFE WORTH EXPLORING

I first met Dr. Canessa in Portland during ASE 2014. Sitting on a bench outside the convention center while waiting for the next train into town, I was joined by a gentleman with striking white hair, a lovely accent, and – I was to discover – an amazing story. Seated beside me was Dr. Roberto Canessa, a pediatric cardiologist from Uruguay, motivational speaker, and survivor of the famous 1972 Andes plane crash. Dr. Canessa's story unfolded as we rode the train into town and walked across Pioneer Square. He was writing a book with Simon & Schuster which discusses, among other things, how his experience as a survivor has shaped his connection with his young and unborn patients, also struggling to call themselves survivors. "Survivor" is a label Dr. Canessa earned and wears with pride. We parted ways at 6th Avenue toward our respective hotels, but made plans for me to visit Dr. Canessa and his family later in the summer while I was on a planned trip to South America. It was clear to me that Dr. Canessa had lived a life worth exploring.

That visit to Montevideo took place this past August 7 and 8, at which time Dr. Canessa warmly welcomed me into his close circle of family, friends, and colleagues. During my two days in Uruguay, I joined him on patient visits, accompanied him to the selection of the Dean for the Faculty of Medicine, observed a staff meeting to discuss a patient case, and shared meals with his family and close friends. I met the director of "Stranded," the award winning documentary about the 1972 crash, shared my first Yerba mate, and had a private tour of the museum dedicated to the victims and survivors of the crash, Museo Andes 1972. In his neighborhood of Carrasco, Dr. Canessa is surrounded by constant reminders of a very difficult time in his life, but he uses them as the impetus to live life deliberately and to fully appreciate his good fortune.

It's a lesson for us all.

—Rhonda Price

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