Powering a new level of cardiovascular care in Colombia

The progressive technology transforming an evolving echo lab

Echocardiography has long been the cornerstone for cardiology patient diagnosis and management, but in recent years, innovations in imaging technology have made it possible to provide greater diagnostic precision and critical insights in less time. These advancements are shaping today's echo labs—expanding reach and advancing cardiovascular care across the globe.

One of the best examples is the evolving cardiovascular unit at Los Cobos Medical Center, a level 3 complexity care private institution in Bogotá, Colombia. Dr. José Julián Carvajal, who specializes in echocardiography, has been leading the charge to build and expand the cardiology program. In 2018, it was a fledgling cardiac clinic that relied on two ultrasound systems and manual exam transcriptions, but under Carvajal's guidance it has progressed into a high-volume unit with a multidisciplinary team in Echocardiography, Electrophysiology, and Hemodynamics.

In just six years, the unit has incorporated advanced technology to drastically change and streamline workflow—reducing exam times by an average of 40 percent. Physicians have refined the process to ensure a constant flow of patients with almost no machine downtime. The innovations have also allowed the unit to eliminate some unnecessary tasks and expenses. Most importantly, Dr. Carvajal says his unit is able to reach more patients and consistently deliver optimal care.

We recently spoke with Dr. Carvajal about his efforts to build and grow the Los Cobos Medical Center's cardiovascular program. He also talked about the transformative technology that has improved efficiencies at the Bogotá institution.

What were the main objectives in creating the cardiovascular program in 2018?

Dr. Carvajal: *We wanted to establish an organized cardiac clinic that offers high-complexity cardiology services. Our goal was to grow the institution, going beyond occasional patient services, recognizing that cancer and cardiovascular diseases are the most prevalent diseases we face. From the outset, it was evident that we needed to be a multidisciplinary, comprehensive, and high-complexity group.*

Can you describe your patient population?

Dr. Carvajal: *We have a network of institutions or outpatient units referring complex patients, some for general cardiology and others for specific units like heart failure. We typically see around 600 patients a month between cardiologists and clinicians in the area. There is a notable demand for advanced imaging, not only for interventional procedures but also for diagnostics.*

In level 3 institutions like Los Cobos MC, a key challenge is educating primary institutions on identifying patients who truly benefit from accessing such facilities. We guide primary institutions in determining patient approach, necessary exams, and referral criteria. It's crucial for hypertensive, diabetic, or certain age group patients to undergo an electrocardiogram, and if needed, an echocardiogram, to ascertain if referral to a level 3 institution is warranted. Misdirected referrals, especially underdiagnosed patients, can burden both patients and institutions.

What pathologies do you treat and what is the role of echocardiography?

Dr. Carvajal: *In the past, cardiologists primarily focused on ischemic heart disease rather than cardiomyopathies. However, the landscape has changed. About a year ago, the European Society of Cardiology (ESC) introduced a dedicated chapter for managing cardiomyopathies. Previously, while we could diagnose cardiomyopathies, treatment options were limited. Now, with advancements in this area, accurate diagnosis has become more critical. Cardiac imaging plays a crucial role in achieving precision and accuracy in diagnosing and managing these pathologies.*

Echocardiography is essential for initial cardiology assessments and recommended alongside an electrocardiogram for all patients. Its accessibility and reliability make it invaluable for precise patient management.

What imaging technology did you rely on when you creating the unit?

Dr. Carvajal: *From the beginning, Los Cobos MC chose GE HealthCare and invested in many technologies, including echocardiographs, MRI, and CT scans. Our unit performed exams with two Vivid T8 machines. Personally, I think other brands are too complex and don't have the same quality and resolution.*

What were some of your initial challenges in echocardiography when you began your cardiovascular unit?

Dr. Carvajal: *In 2018, we created reports using manual transcription because we had low patient volume. Manual transcription often led to errors and necessitated frequent training, primarily due to staff rotation, disrupting what should be a straightforward process. It was also time-consuming for the assistant transcribing the information and the echocardiographer, who had to wait to review and sign exams.*

As the unit grew, there were other challenges. As a large cardiology group with a high volume of exams, it was necessary to optimize resources. In addition to supporting echocardiography, we needed the assistants to transfer patients to different parts of the hospital and assist other patients. Everything became so complex, and the process was becoming very expensive. That highlighted the need for a new workflow.

What technology did you introduce to meet those challenges?

Dr. Carvajal: *GE HealthCare's EchoPAC™ software offered a solution, integrating multiple tasks and saving valuable time. It really optimized the echocardiographer's time. EchoPAC allowed for more studies and increased focus on complex exams that demanded more attention. It also freed up our assistants.*

With guidance from a GE HealthCare's clinical specialist on EchoPAC's streamlined report automation and analysis, we were able to complete a standard exam in 2 or 3 clicks. For complex cases, I was able to take measurements and analyze in the EchoPAC station, just like working directly on the console. This completely changed my workflow, allowing me to better redistribute resources, reduce expenses and staff time, without compromising the ability to deliver optimal patient care.

We later invested in more EchoPAC's to support our three echocardiologists performing transthoracic exams and treating hospitalized patients at the same time. Even covering exams from previous days, EchoPAC enables us to calmly review these studies, focused on processing and results. We can focus on the present—examining exams from the same day. We can consider the past by refining delayed exams, and we are also thinking about the future by considering the patient's prognosis.

How did these advancements help you create an entirely new workflow?

Dr. Carvajal: *As the unit grew, we decided to acquire the Vivid E95. At this point, we had greater visibility and planning capacity, and we also had an outpatient population. With better resource management and excellent technology, we needed to be more productive. This led us (by the institution's policy) to begin implementing the 'mirror workflow'.*

Every morning, we have two rooms available for the echocardiologist. While one room is being used for the echo, another patient is being prepped in the second room. This allows for a constant flow of exams with the reassurance that post-processing and analysis will be done in more detail with EchoPAC in the afternoon.

The Vivid E95 and EchoPAC complement my work very well. I can take all the necessary 4D images and then analyze and report from EchoPAC with tools like the mitral and tricuspid package features. It gives me the flexibility to invest the time I consider necessary, without thinking that I have a patient waiting.

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How much time are you saving with the new mirror workflow?

Dr. Carvajal: *Previously, a transthoracic exam in a non-complex patient could take us 45 minutes. That was start to finish, including measurement generation, report with an assistant, signing and uploading to the system. Today, thanks to the configuration of my workflow with the Vivid consoles and EchoPAC, I can do up to 10 patients in 3 hours. Then in the afternoon, I sit down to do absolutely all the measurements and analysis in the EchoPAC, ensuring zero downtime with the ultrasound machines. So, when my colleague arrives to do exams on outpatient patients, the equipment is already available.*

We conducted an exercise with EchoPAC at the institution before deciding to invest. We simulated two exams with non-complex patients. One was done with an assistant typing the report and the other was done with post-processing in EchoPAC. The examination that included the transcription, review and signature was 40 minutes. The exam and report with EchoPAC was performed in 25 minutes.

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It means we’re talking about a reduction of approximately 40% of time. When considered individually per exam, 10 to 20 minutes may not seem like a major impact, but in a workday of 6 to 8 hours, it allows for more patients and has an impact on patient care.†

Can you elaborate on the impact of the new workflow and why it’s so important?

Dr. Carvajal: *The ability to process raw data and optimize exam time is fundamental because most of our patients are complex patients with heart failure or vascular conditions. First, to reduce risk to the patient who is under sedation. It’s also important for resource management because anesthesiologists are present for all transesophageal exams. Lastly, productivity is essential. Why should I spend an hour doing one exam when I could do three? (Except for reasons inherent to the patient.)*

So, during the exams, our focus is on obtaining the best images and then utilizing EchoPAC for post-processing. This is important for our workflow and also for the patient’s safety.

In post-processing, what are the most beneficial tools to increase efficiencies?

Dr. Carvajal: *The automation and artificial intelligence tools are very helpful, especially for less complex patients, because these features provide excellent image quality and streamline reporting in just a few clicks. This efficiency allows me to focus more time on refining exams for complex patients.*

In routine echocardiograms, automated flow assessment in Cardiac Auto Doppler is pivotal. With a single click, the equipment can produce gradient measurements for mitral and aortic flows, saving time and ensuring precision. I can customize the tool to provide the necessary measurements effortlessly.

When dealing with complex cases, especially for mitral valve assessment, 3D echocardiography has become essential. It’s not only valuable for evaluating valves but also for strain measurement and assessing 3D volumes. For oncology patients, pre-chemotherapy ventricular function measurement using 3D echocardiography has become the gold standard.

Additionally, the importance of assessing the right ventricle, once overlooked, has been underscored with the adoption of 3D echocardiography. Overall, the Vivid E95 enables me to make complex decisions, particularly in valvular heart diseases, as it facilitates comprehensive 3D assessments.

You mentioned MRI as the gold standard. How do you decide which patients or pathologies need to be referred for an MRI?

Dr. Carvajal: *It all depends on the patient. MRI is fundamental in cardiomyopathy studies because it helps with complex decisions like adjusting costly therapies such as cardio defibrillators or pacemakers. It’s also important when treatment responses are unclear so I can improve differential diagnoses. While not all patients require MRI, it’s essential for those showing limited improvement despite treatment or unclear diagnoses. It helps confirm or rule out the need for device implantation.*

And even though echocardiography offers real-time functional insights, it can be limited by poor anatomy. As a result, approximately 10% to 20% of patients with ventricular dysfunction are referred for MRI to determine the etiology of a cardiomyopathy.†

As you look towards the future, what types of technology will drive your progress?

Dr. Carvajal: *The pandemic taught us that it is possible to work remotely. For the past few years, we have also seen the power of artificial intelligence. It can streamline routine exams, allowing us to dedicate more time to complex cases. That is where our doctors make the most difference.*

In an ideal world, we have highly trained cardiologists and sonographers, supported by artificial intelligence, to handle the large volume of exams. Tools like EchoPAC plug-in play an important role, especially with the possibility of connecting remotely.

Remote support would allow cardiologists to guide sonographers who may have questions during echo exams. It would enable us to give measurements or imaging instructions in real-time for quick decisions.

What is the impact of AI and other technologies on cardiovascular care in Colombia?

Dr. Carvajal: *I believe that in recent years there has been a significant change in the healthcare sector in Colombia. Previously, it was more static, but now we see a trend towards the adoption of advanced technologies and process optimization. Medical institutions, both large and small, are incorporating high-quality equipment and understanding the importance of post-processing practices. In addition, the international training of medical professionals has contributed to improving care systems.*

However, we still face challenges, especially in conducting exams and interpreting results. This is where artificial intelligence and connectivity can play a key role. It is necessary to carry out an economic analysis and determine the return on investment to then understand the needs of the institution and offer comprehensive solutions. For example, it’s great help to the institution if artificial intelligence can help evacuate a number of exams because they are considered normal.

In summary, I think we are at a moment of change and growth in the healthcare sector, but there are still areas that require attention and improvement.

Dr. José Julián Carvajal is a cardiologist at Los Cobos Medical Center in Bogotá, Colombia. His background includes advanced studies in cardiovascular imaging, with extensive pathophysiological, clinical, and epidemiological knowledge in different areas of cardiology. Dr. Carvajal uses a bio-psycho-social approach to treating pathologies, placing great value on integrity and ethics. Dr. Carvajal’s top areas of interest are 3D echocardiography and cardiac magnetic resonance imaging, and he has co-authored more than a dozen articles.

† The statements described here are based on their own opinions and on results that were achieved in their unique setting. Since there is no “typical” hospital and many variables exist, i.e. hospital size, case mix, etc., there can be no guarantee that other customers will achieve the same results.