



Philips Allura Xper FD20

Interventional labs Changing opinions on multi-purpose rooms

Who/where

Linda and Jack Gill Heart Institute
University of Kentucky Medical Center
Lexington, KY

Challenge

The Linda and Jack Gill Heart Institute looked to harness new technology to help transform the cath lab from a room primarily used for coronary arteriograms into a comprehensive cardiovascular imaging and intervention center appropriate for the full range of cases and volume associated with modern cardiology.

Solution

With the Philips Allura Xper FD20 system, Linda and Jack Gill Heart Institute installed a true multi-purpose room that maintained outstanding image quality for a wide range of clinical applications.

The Linda and Jack Gill Heart Institute is a part of the University of Kentucky (UK) Medical Center located on the campus in Lexington, KY. It provides a central focus for cardiovascular disease care, including: clinics, non-invasive cardiac diagnostics, invasive cardiac techniques such as cardiac catheterization, angioplasty and electrophysiology, a base for the physicians providing this care, and a special focus on counseling cardiac patients and their families. The Linda and Jack Gill Heart Institute Building opened in 2004, and currently includes four cath lab suites: a Philips Allura Xper FD20 lab, two Philips Allura Xper FD10 labs, and a Philips Integris Allura 9/9 bi-plane lab.

A cardiologist's perspective

Dr. John Gurley, Director of Interventional Cardiology and Professor of Medicine, has his sights clearly focused on cardiology's future, particularly the evolving role of the cath lab. Dr. Gurley sees diagnostic and interventional cardiology in the midst of a significant transformation and a long way from where it was when he arrived at UK 20 years ago.

"In years past, the cath lab was a place where you came to take pictures of coronary arteries — it had a very limited role. Even interventional cardiology was limited to balloon angioplasty."

Noting recent trends in cath lab usage and drawing on his vast experience, Dr. Gurley points out how things have changed.

"That is not the way we practice cardiovascular medicine today," he says. "We do much more."

Much of that change is being driven by advances in technology. Improvements in imaging modalities such as X-ray, Ultrasound, MR, and CT are contributing to cardiologists' ability to successfully perform an expanded range of procedures. These advances, coupled with ever smaller and efficiently designed devices that can be deployed via catheter, are shattering old notions of what types of cases can be performed in the cath lab. With dramatic growth in non-coronary cardiac procedures, and the potential for even more advances, many interventions that formerly required open-heart surgery no longer do.

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Standing inside Gill Heart Institute's Room 4, Dr. Gurley describes just how much more he and his colleagues are capable of doing these days with the latest cath lab technology.

"This room is designed to be an all-purpose acute care room because that is the role of cardiovascular cath labs in this decade, and the decade to come," says Dr. Gurley.

He checks off a list of procedures including ICD implantation, arrhythmia mapping and repair, ablation, atrial septal defect repair, and percutaneous valvuloplasty that he and other cardiologists are performing on an almost routine basis.

"Whatever cardiovascular issue is at hand, we are going to fix it without having to make a major incision," he explains. "That's our objective and we're getting very close. So now these rooms have to handle a wider range of procedures, including a lot of non-coronary vascular work."

The solution

Certainly one key factor contributing to this expanding range of procedures in the cath lab is a new generation of cardiovascular imaging systems, like the Philips Allura Xper FD20 system that is housed in Room 4. This multi-purpose cardiovascular lab features a 20" (measured diagonally) Philips Flat Panel Detector.

"Today we need a room with the capability for large field-of-view work," says Dr. Gurley.

With its 2k x 2k imaging chain resolution, 14 bit depth, and edge-to-edge distortion free image presentation, the Allura Xper FD20 system provides Dr. Gurley with the right combination of outstanding image quality and flexibility. He can perform traditional coronary studies as well as many other types of cases that he sees on a regular basis.

"The equipment allows us to produce a wide range of diagnostic images, from large scale thoracic and abdominal aortagrams, to highly detailed carotid and cerebral studies, and coronary cine angiograms. The Philips Allura Xper FD20 is our first piece of equipment that allows us to do all this while maintaining very high quality coronary imaging."

"We can take care of practically anything in this room. The equipment allows us to produce a wide range of diagnostic images, from large scale thoracic and abdominal aortagrams, to highly detailed carotid and cerebral studies, and coronary cine angiograms. The Allura Xper FD20 is our first piece of X-ray imaging equipment that allows us to do all this while maintaining very high quality coronary imaging."

Changing opinions about large field-of-view

Dr. Gurley acknowledges that the new Philips Flat Detector technology on the Allura Xper FD20 system helped change his opinion regarding the viability of a single large field-of-view multi-purpose room for the cath lab. His concern was that a single larger field-of-view system would mean compromising image quality in his coronary studies. Traditionally, smaller hospitals that might not have the budget or volume to support a dedicated cath and vascular lab selected a bigger image intensifier (II) system for use on both cardiac and vascular studies.



Dr. John Gurley, Director of Interventional Cardiology and Professor of Medicine

“When the lab staff ask me to select a room for coronary cases, I always prefer the FD20 room over the image intensifier-based 'cardiac' room.”

“I always advised against that approach,” says Dr. Gurley.

He felt a system designed to do coronary work was not well suited for doing large field vascular work. He also believed image quality deteriorated when using a bigger II on smaller field coronary studies.

After working with the Allura Xper FD20 system for almost a year, Dr. Gurley is a firm believer in the advantages of this multi-purpose room. He is extremely enthusiastic about the image quality, especially on coronary studies. And he is quite willing to share his experience with others.

“I do see people,” says Dr. Gurley, “who come here and are concerned they won't be able to perform high quality coronary angiography with the FD20. They perceive this as a room designed for peripheral vascular angiography. They've been told for years, and rightfully so, to be careful with combination rooms. They've encountered colleagues who have struggled with image quality when attempting coronary angiography and intervention in large-field II rooms. But when I show them the images from this Philips FD20 system, they are pleasantly surprised.”

Maintaining outstanding image quality

Dr. Gurley reports that while the Allura Xper FD20 system can handle the full range of vascular imaging work including extremities, abdominal, pelvic, renal, carotids and neuro

studies, it can also support the full range of cardiac cases without any compromise in image quality. Across the entire range of cases now being handled in his cath lab, the image quality on the Allura Xper FD20 system is excellent.

“When the lab staff ask me to select a room for coronary cases, I always prefer the FD 20 room over the II based 'cardiac' room.”

Dr. Gurley is quick to compare the coronary image quality on the Allura Xper FD20 system with the image quality on the Philips FD10 (a dedicated cardiac system with a 10" flat detector). Pointing to a coronary arteriogram case performed on the Allura Xper FD20 system, Dr. Gurley says, “Look at the clarity of the image, the ability to visualize small vessels, and the sense of depth.”

He compares it to a similar coronary case on the Allura FD10 system in the next room.

“As far as I'm concerned, when we are looking and coronary image quality, these two rooms are virtually interchangeable. I wouldn't have believed this a couple of years ago, but we're now able to attain very high quality coronary angiograms with the FD20. This room does not compromise coronary image quality in the least.”

For cardiologists who still have doubts, Dr. Gurley recommends that they observe the system in operation in a range of these studies.

For anyone visiting Dr. Gurley, seeing is believing, as he selects random images from recent cases to showcase the image quality and the flexibility of the Allura Xper FD20 system. He points to one case after another with outstanding image quality.



“We're seeing vessels that we previously might not have seen. The flat detector gives us very nice contrast detail on small diameter objects.”

On one image he counts the bifurcations out loud: “These are 7th and 8th order branching vessels that we can clearly visualize. This is a beautiful image, very high resolution. Look at the fine detail all the way out to the edge.”

In another case Dr. Gurley demonstrates how easily he's able to switch from imaging in the pelvis to coronary imaging and in doing so, reports no degradation in image quality.

“I can also collimate down to this small coronary view. I have not seen a higher quality diagnostic image,” he says.

In evaluations using a NEMA phantom to measure image quality, Dr. Gurley compared the performance of the Gill Heart Institute's Allura Xper FD20, the Allura FD10, and the Integris Allura 9/9 biplane systems. Using a composite image quality score, which incorporates high contrast spatial resolution, plus low contrast detection, and the ability to resolve moving objects, he found: “The cine image quality of the FD20 is nearly equal to that in the dedicated cardiac FD10 machine, and exceeds the image quality of the II based cardiac biplane lab.”

There's no loss of diagnostic data in coronary mode and image quality curves are virtually identical across the range of patient sizes — and this is for coronary angiography.”

In addition to maintaining outstanding image quality, the Allura Xper FD20 system allows cardiologists to achieve the full range of cardiac projections angles — even the steepest angles. While in the past there may have been some trade-offs with the larger field-of-view biplane system, there's no appreciable disadvantage with the Allura Xper FD20 system. Dr. Gurley performs a simple measurement to demonstrate that the profile on this compact 20" flat detector, which can rotate and pivot, is only an inch or two larger in each direction than the 10" dedicated coronary detector on the Allura FD10 system.

“As far as the operator is concerned,” he says, “the system feels just like an FD10. I have no problems doing all my coronary cases in here.”

Expanding the range of cases

Dr. Gurley says the Allura Xper FD20 system offers cardiologists the flexibility to complete an expanded range of cases without restriction.

“If you are just doing coronary work, the FD10 lab is an excellent choice. However, if you want to do anything else, such as ventricularography, atrial procedures, septal procedures, vascular, or cerebral, you had better do them in a large field room with a system like the Allura Xper FD20. With the wide field, I can watch the device coming up the inferior vena cava and not worry about getting stuck in renal veins or the pelvis. We're using this machine for almost everything we do in the cath lab. It really is a comprehensive cardiovascular imaging and intervention center.”



David J. Moliterno, M.D. Professor of Medicine, Chief, Division of Cardiovascular Medicine, Vice-Chair of Medicine Co-Director, Gill Heart Institute. Dr. Moliterno has been instrumental in encouraging Dr. Gurley and the rest of the staff to harness technology that will help keep Gill Heart Institute on the leading edge of cardiology.

Dr. Gurley points to a case involving a repair to an atrial septal defect and describes it as a fairly standard procedure for the cath lab now.

“If you want to do ventricularography, atrial procedures, septal procedures, vascular, or cerebral, you had better do them in a large field room with a system like the Allura Xper FD20. We're using this machine for almost everything. It really is a comprehensive cardiovascular imaging and intervention center.”

“In most of these cases we have a 98 or 99 percent chance of fixing this,” says Dr. Gurley.

“We used an intra cardiac echo probe to determine the size of the atrial septal defect, and we placed the patch to repair it. At the same time, as part of our plan, we scheduled

renal angiography. We were able to determine that the patient had a severe blockage of her renal arteries. This was a true combination procedure, and very beneficial for the patient. This system just happens to do both very well. So it gives us a great deal of flexibility. It really doesn't matter whether we are performing an EP procedure, a device implant, an aortogram, or a coronary intervention; the equipment delivers the imaging support that we need. We can do just about anything in this room."

The list of various procedures being performed in Room 4 is a long one. Dr. Gurley is pleased with the Allura Xper FD20's versatility in EP and device implant work.

"This is an excellent system for cardiac re-synchronization cases (bi-ventricular pace makers and ICD implants). We have more than enough capacity to visualize everything, including subcutaneous electrodes, if we need to install them."

He includes carotid arteries and vertebral images to the case mix on the Allura Xper FD20 system. "We're able to manage carotid and vertebral artery disease with this equipment, and we have beautiful intracranial images. The cerebral angiography here is absolutely first rate. I have not seen anything better."

He calls up a kidney transplant patient with complications and goes through a series of images: "Here we switched over to a coronary technique, which is very helpful for this kind of anatomy. We see the narrowing, which explains why the transplant didn't work. We first used 'coronary' balloons and wires for the renal artery, then we switched to a vascular technique to place a stent. This is a problem ideally suited to a percutaneous repair.

No one wants to re-operate on a kidney transplant. It's technically difficult and risky."

Dr. Gurley reviews a coronary angiogram performed on the same patient: "If anybody can find a better quality coronary angiogram I would like to see it. Because there's just no drop off in quality here. We can change the field-of-view without changing image quality."

A cath lab built for ease of use and low dose

"Operator comfort and safety, along with patient comfort and safety, those are significant issues for any cath lab," says Dr. Gurley. This is especially important as procedures become more complex and in some cases longer. With the Philips Xper (X-ray, Personalized) module on the Allura Xper FD20, the system offers operators complete tableside control, making it extremely easy to use.

"Operational simplicity has been a Philips strength for decades and this system is very easy to use," says Dr. Gurley. All the Philips Flat Detector systems share the same user interface, so clinicians and technicians have no trouble adjusting from the Allura FD10 to the Allura Xper FD20 room. With Xper, there's also a wide range of operational settings which can be pre-set to match a variety of different clinicians' individual preferences. When a clinician keys in his or her name, the system automatically configures itself to their pre-defined parameters.

Radiation safety and minimizing exposure is another important issue. Dr. Gurley believes that the Philips Flat Detector helps cardiologists optimize exposure parameters. At the same time he points out that tube design and beam filtration should also be considered when purchasing a cath lab.

Again, the Allura Xper FD20 system offers some significant advantages. Philips MRC X-ray tube, with its frictionless spiral groove bearing design, makes the system much quieter and more efficient. The unique Spectra Beam filtering helps reduce the dose amounts by up to 50 percent. Xper Beam shaping offers collimation on last image hold, and with Xper Fluoro Store the last 20 seconds of fluoro is always stored and available for reference or archiving. And the Xper module includes enhanced dose reporting with easily visible in-room displays for skin dose and Dose-Area Product (DAP). Dr. Gurley also comments that with the outstanding image quality, he can often use less contrast, which also benefits the patient.

Making sense for workflow

Dr. Gurley says that along with the clinical advantages, there are compelling business reasons to consider multi-purpose rooms like the Allura Xper FD20.

“With hospitals demanding a strong return on their investment, we simply can’t afford downtime, to have staff sitting around, or equipment going unused,” he says. “We might have a day when all of the scheduled cases are coronary arteriograms or interventions. We don’t want to try and run all those cases through the two coronary rooms we have in the middle and let the pediatric and the vascular rooms sit idle on the ends. If we have an emergency, such as an acute MI, that comes in from the Emergency Room, we need to be able to respond. Or if we need to fix a

coronary, it’s important to have the flexibility to utilize all of these rooms, so our patients aren’t waiting for a room to open up.”

As far as patients and their families are concerned, Dr. Gurley says, “When they come to our lab, they want a high quality procedure but they don’t want to wait for one particular piece of equipment. I think during the next decade we must have the ability to provide service on demand. Satisfaction is going to be linked very closely to timeliness of service.”

A lab for today and the future

Dr. Gurley credits Philips with playing an active role in developing a multi-purpose cath lab that offers cardiologists the functionality they need today, along with the flexibility for expanded capabilities in the future.

“Philips has been very proactive,” he says. “They’re not content to just sit back and dwell on where the need is today. They are looking ahead three, five, even 20 years down the road.”

“Today and in the foreseeable future, the cath lab will represent the final stop for integrating clinical and imaging data. It will be the place where images, treatment decisions, and intervention intersect.”

Already there is great interest in replacing some of the work done in the cath lab now with less invasive imaging techniques, including MR and CT. While looking forward to that development, Dr. Gurley remains confident that the role of the cath lab will continue to expand.

“There is no question that we are going to continue to need catheterization and interventional labs like this for a long time to come,” he says. “We will need the ability to escalate from non-invasive to invasive imaging modalities. And we will need a place to integrate the imaging data with other clinical information. Today and in the foreseeable future, the cath lab will represent the final stop for integrating clinical and imaging data. It will be the place where images, treatment decisions, and intervention intersect.”

Summarizing how the Allura Xper FD20 system fits in with his vision for the future of cardiology, Dr. Gurley says, “This is really the first true multi-functional room that doesn’t limit us. It’s a good example of a system that supports the expanding role of the cath lab, and we’re just getting started.”

It comes as no surprise that when people ask for his thoughts on choosing between a dedicated coronary system and a multi-purpose system, Dr. Gurley doesn’t hesitate: “I tell them if I had to select only one room for myself, there’s no question the Philips Allura FD20 is what I would have.”

The opinions expressed herein are those of Dr. John Gurley, only, and do not represent an endorsement by the University of Kentucky.



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