



New pediatric hybrid environment

Philips Allura Xper FD10/10 plays key role

Who/where

Established in 1883, Cincinnati Children's Hospital Medical Center in Cincinnati, Ohio, is a leading medical research and teaching hospital with 475 licensed beds.

Challenge

Develop a new pediatric hybrid cardiac cath environment to support a wide variety of complex pediatric cardiac catheterization, electrophysiology, and surgical/hybrid procedures.

Solution

Cincinnati Children's Hospital selected the Philips Allura Xper FD 10/10 bi-plane imaging system to meet the requirements for this demanding and specialized hybrid lab.

The Heart Center at Cincinnati Children's Hospital Medical Center in Cincinnati, Ohio features two state-of-the-art, fully digital, multi-functional cardiac catheterization labs. Each lab has a Philips Allura Xper FD10/10 bi-plane system. Located within the inpatient cardiology ward, the catheterization suite is designed to handle the full range of diagnostic and therapeutic cases. Since the catheterization suite is the setting for a unique new "hybrid" approach to comprehensive care for pediatrics with congenital heart disease, it was also designed to accommodate simultaneous catheterization and surgical procedures when necessary. This includes the use of cardio-pulmonary bypass (CPB). The current caseload is approximately 650 procedures annually.

In existence for more than 120 years, Cincinnati Children's Hospital Medical Center (CCHMC) and its staff have played a key role in many significant breakthroughs, such as developing an oral vaccine for polio, the first heart and lung machine, and a technique for preserving whole blood. Ranked eighth nationally among pediatric hospitals by *U.S. News & World Report*, CCHMC has the only pediatric cardiac intensive care unit in the region.

When Russel Hirsch, M.D., Director, Cardiac Catheterization Laboratory at Cincinnati Children's Hospital Medical Center, discusses his vision for creating a hybrid pediatric cardiac catheterization laboratory, one thing comes through loud and clear—a genuine passion for his patients and their families. His commitment to developing an environment that offers the absolute highest degree of patient care and clinical efficiency is obvious. "We strive every day to make the procedures as safe as we can for our patients," says Dr. Hirsch.

Dr. Hirsch and his team have spent several challenging years translating his vision into a reality. With two rooms recently opened, the team at Cincinnati Children's is successfully advancing an innovative new configuration that combines a state-of-the-art, digital bi-plane catheterization laboratory and a world-class open surgical suite. As Dr. Hirsch explains, "It is an operating room and a catheterization laboratory. It has the full functionality of a standard cardio-thoracic surgery operating room, with the ability to use cardio-pulmonary bypass if we need to, with the obvious space prerequisites and everything else that is required. At the same time, we have excellent angiographic visualization so we can, on a day-to-day basis, perform cardiac catheterizations like we ordinarily would." As a result, the interventional cardiologists and cardiothoracic surgeons at Cincinnati Children's Hospital are redefining how they can address the full range of procedures associated with congenital heart disease.

PHILIPS

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At the center of this new hybrid environment, Dr. Hirsch needed a cath lab that could best reduce X-ray dose levels to patients and staff. Having an extremely reliable system with outstanding imaging quality was of the utmost importance. There were also some very specific mobility and geometry specifications that needed to be met, so Dr. Hirsch and the decision makers at Cincinnati Children's Hospital were looking for an innovative company that would work closely with them, even to the point of developing some unique modifications to the equipment and the way it was installed.

A hybrid lab from the ground up— patient care for neonates to young adults

Cincinnati Children's Hospital selected the Philips Allura Xper FD 10/10 bi-plane imaging system to meet the requirements for this demanding and specialized hybrid lab. With safety always at the forefront of his thinking, Dr. Hirsch notes that the right X-ray system was key to helping him reduce the overall dose to his staff and his pediatric patients. "The system is still relatively new to us, but in the literature I've read, the radiation dose to the patient is less for the same angiography," says Dr. Hirsch. The Allura's X-ray Personalized (Xper) pediatric settings and DoseWise system with Spectra Beam filtering reduces dose significantly. In fact, a recent KCARE/MHRA study (October 2006) found Philips Allura Xper FD10 to emit 30% to 60% less patient entrance dose than competitive systems, while at the same time providing superb image quality.

Other features also help minimize X-ray dose. For example, Allura's Xper Beam Shaping also offers collimation on last image hold, and with Xper Fluoro Store, the last

20 seconds of fluoroscopy is always stored and available for reference or archiving. This eliminates the team having to make an acquisition to document something that has been correctly visualized using fluoroscopy.

Dr. Hirsch continues, "Some of the modifications that are being brought into the new version that is just becoming available, will allow us to further refine measurements and minimize dose. These are very important, incredibly useful innovations, because really it's all about dose. It's all about reducing the risk of radiation."

Another major safety concern is limiting contrast usage. Dr. Hirsch emphasizes the link between image quality and contrast. "If you get a better image you can use less contrast," he says. While acknowledging that the amount of contrast used is a multifaceted issue, Dr. Hirsch says, "The image quality is key. If you have poor image quality, it doesn't matter how much contrast you give, you are going to get a poor image." In describing his experience with the Allura Xper FD 10/10, Dr. Hirsch says, "The image quality is as good as I've seen anywhere; it is very, very good."

Ease of use for a wide variety of pediatric cases also figured into the hospital's decision. Dr. Hirsch explains, "The Philips user interface has always been very intuitive, and they continue to refine it with the Xper system. And we can use this for every type of patient, both cath and EP." For example, the Allura Xper FD10/10 has an anti-scatter grid and when the system is used for procedures on neonates or babies, clinicians have the option to remove the grid and significantly reduce dose further. Grid selection is simple and

does not require a service call, so a single lab can be used on a wider variety of patients without any major disruption.

Finally, reliability and robustness are needed to improve the lab's efficiency. At the heart of the Philips imaging system is the MRC X-ray tube with its high reliability and frictionless spiral groove bearing design. This tube design not only makes the system quieter, it also has higher heat dissipation capacity. Because it cools faster, the system allows physicians to generate X-ray continuously for long periods of time without interruption even on large patients and complex congenital cases. The Xper FD10/10 system is designed to keep SpectraBeam filtration irrespective of patient size, compared with systems that automatically remove filtration on larger patients. These Xper features are designed to improve productivity while increasing protection to patients and staff.

Enhanced access to the patient for wide variety of cases

Dr. Hirsch describes equipment mobility and flexibility as being a fundamental requirement in the hybrid environment. Insuring maximum access to the patient is critical, both for the cath staff, as well as for the specialized surgical staff that might have to be brought in, and that access has to be achievable in a minimum amount of time. The ability to get to the patient easily and quickly is designed into the Allura Xper FD10/10's geometry. The detector and gantry can be easily moved out of the traditional imaging position. Staff have the option of either applying direct pressure and pushing the equipment or automatically repositioning it using the Xper tableside control module.

Dr. Hirsch says, "The mobility of the Allura system is very good. The lateral camera and detector park far out of the way. The AP camera can also swing 90 degrees easily in either direction, on a pivot point that puts the entire structure well away from the table. That way we can move other equipment around in there. It allows the surgeons to have excellent access to the patient"

Advantages of the Allura's gantry design also appealed to Dr. Hirsch. "The ability of the anterior-posterior (AP) gantry to rotate into a completely lateral position is very helpful. Once the lateral camera is parked out of the way we can use the AP camera in any position, should the need arise during any particular hybrid procedure.

The lateral gantry of the Philips Allura Xper biplane system is also designed to enhance visualization and flexibility. With a unique double-C design, the Xper FD 10/10 lateral camera allows completely independent control of rotation and angulation. As with the AP camera, the lateral can also be used as a full-range monoplane system leaving the head of the table clear.

"We do have room at the table for the surgeons plus the biplane cameras; however, in hybrid procedures we generally only need one good view—so we appreciate the unique geometry because it helps us get any view we need with either camera freeing up a lot of space around the table."

Dr. Hirsch also credits the Philips team with paying special attention to the needs for space and clinical efficiency in the hybrid environment. "Some of the custom modifications they've made may not be appreciated by the casual observer. For example, the gantry, which supports the bank of six monitors, is offset. We can move the tower of monitors all the way back from the

table, and as close to the wall as we possibly can. We can then accommodate a number of people around the table if we need to." He also points out that the Philips monitor suspension has the ability to move up and down. "That is also particularly useful in this facility," he says. "It's that kind of flexible design where Philips is particularly good at helping us come up with a good solution."

The motivation for a hybrid environment

There's no doubt in Dr. Hirsch's mind about the rationale for pursuing this new approach to pediatric cardiac care. He points to a number of different scenarios where the traditional distinctions between the Cath lab and open surgical suite may contribute to potential risk for the patient, and inefficiency for the staff. "All too frequently," he explains, "we were called down to the operating room to do procedures that are catheter related on patients who were on bypass, or who had their chests open. We would attempt to balloon dilate, or place stents or devices, but with very poor angiographic assistance. On the other hand, not infrequently, we would call the surgeons to the cath lab to help us get vascular access, or to do other surgical procedures during cardiac catheterizations in an environment that really wasn't an operating room."

There is an acute awareness of the added strain placed on families when a procedure has to be rescheduled because something didn't go as planned. According to Dr. Hirsch,

"There are situations where we think we are going to be able to complete a procedure percutaneously with catheters, but we aren't able to." As an example, Dr. Hirsch describes a patient with a very large atrial septal defect (ASD). "Most of the time, we are able to close these with devices, but if we were unsuccessful, those patients would need to be awakened, rescheduled and brought back at a different time. Then they would again undergo general anesthesia for surgery to complete the ASD closure."

Now, in the case of an ASD closure procedure that fails, Dr. Hirsch explains, "We have the facility to simply keep the patient in the room under general anesthesia and create the operating room directly around him by bringing in the perfusion staff, OR staff, and five surgeons." He is confident that his team can offer the families convenience and piece of mind that they will have the surgery taken care of in one setting.

Many of the patients Dr. Hirsch cares for have substantial multi-organ disease and frequently undergo various procedures at one setting. So for example, a patient who is having a cardiac catheterization may also need to be transferred down to the operating room to have a bronchoscopy while under general anesthesia. "Now what we can do is offer that family the option to get the cardiac catheterization and all other necessary procedures completed without having to transport the



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patient to different areas in the hospital,” says Dr. Hirsch. Without a doubt, Dr. Hirsch believes the new environment offers his patients a better setting for a range of care. “The environment meets all current standards of care,” he explains.

Hoping for the best, preparing for the worst

Not surprisingly, Dr. Hirsch’s focus never strays far from the patient. He explains, “The bottom line is there are times when we have a critically ill patient on the table. I don’t want to be too dramatic, but with the right room design and protocols more children can be saved, and that’s why we do what we do. These are incredibly complex procedures, and we need to be very organized.” In assessing how things went in his first actual hybrid procedure, Dr. Hirsch says, “I was extremely proud of our people. The systems worked very, very well. The equipment performed beyond expectation. Everybody had exactly what he or she needed. The patient was cared for with a favorable outcome. We expect the best and prepare for the worst.”

Reliable equipment from a committed partner

One of the reasons Dr. Hirsch can focus on the patient and enhancing the environment to optimize safety is his confidence in the equipment he has selected. Referring to the Philips Allura bi-plane, he says, “Frankly, this equipment gets hammered every single day. We do between 550 and 650 cases a year. They are long cases, and the demands on the angiography equipment are great.” When he says long cases he means sometimes 4+ hours long, or even longer. “We’re working on very small babies, and often in high acuity situations. We have to have confidence in the machinery, and



in the support behind it—and we do.” In fact, Dr. Hirsch describes the service support he gets from Philips as virtually inhouse. “It’s available 24 hours a day. We have them here very quickly if we need them. We fortunately very, very seldom need them. I don’t go into the cath lab every morning wondering if the machine is going to work. It just doesn’t happen that way. I can tell you that since I’ve been here, we’ve never had a problem that required us to move a patient out of the Philips lab. That’s just not an issue. We speak very highly of Philips equipment. We’ve had a very good experience.”

The support from Philips for Cincinnati Children’s Hospital goes well beyond traditional service according to Dr. Hirsch. “In terms of interventional radiology and cardiology, we have now a fairly long standing relationship with Philips, which I think is mutually beneficial. They have been very attentive. They too are very aware that this is a new system. And they’ve shown the commitment that they want to get it right,” says Dr. Hirsch. He points out that Philips specialists from the Netherlands and the US have worked with him on enhancing image quality and adding additional functionality to his system. “We also have

some beta software for testing for ventricular dimensions and ventricular volumes which also looks like it will be very useful in evaluating volumes of children who have dilated right ventricles. Those things are going to be of great use to us. So I think that support has really been there. I can easily tell people that the service and support we get from Philips is very, very good.”

More hope for patients and their families

When Dr. Hirsch considers the impact the new hybrid environment will have on delivering better care to his patients, he believes things are definitely changing for the better. “We’ve reached the realization that surgeons can’t do everything in the operating room, and interventionalists can’t do everything in the cath lab. I think the ability to offer the patient the convenience of treatment of their congenital heart disease in a setting where we can provide simultaneous first class imaging and superb surgery is just incredible. This is going to bring about huge, enormous benefits for the patient and their families. I think the future looks very good.”



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