



The hybrid room in Leipzig promotes the development of minimally invasive procedures.

Hybrid Rooms – Worthwhile Investments

What was previously the exclusive area of large-scale university hospitals is now starting to become interesting for smaller hospitals as well. Hybrid rooms for treatment of cardiovascular disease offer an ideal setting for the use of modern techniques that put less strain on patients. Examples from the German cities of Immenstadt and Leipzig show the benefits this approach can yield.

By Ingrid Horn, PhD



Dr. Wulf Ito works comfortably and under optimum control – without having to move the patient.



Andreas Ruland and Dr. Wulf Ito took great care when preparing for the installation of the hybrid room in Immenstadt.

Mountains, forests, and lakes – the Oberallgäu region in Southwest Germany is an excellent vacation destination – which is what led Peter Schmitt there. The Cologne resident intended to spend two weeks hiking this summer, but now he is lying in the nearby Immenstadt Hospital. He suffered a heart attack at his hotel. And yet, the 68-year-old was lucky things did not turn out worse, because the Immenstadt Hospital installed a cutting-edge cardiovascular center in the fall of 2008 with a hybrid room as its centerpiece. Equipped with high-performance technology from Siemens, the room functions as a catheter lab and operating room in one.

“Hybrid” Means “Interdisciplinary”

Whether it be vascular diagnostics or therapeutic measures such as insertion of stents, dilation of vessels in the legs, or endarterectomy of blockages – all of it is possible in just this one room. In extreme cases, four different medical experts attend the operation in Immenstadt: a cardiologist, an interventional angiologist, a vascular surgeon, and an anesthesiologist. All of them have free access to the patient and a free view to the monitors. Thanks to high-resolution imaging procedures, the monitors dis-

play the current vascular situation during the intervention, comparative images, and hemodynamics. “We decided in favor of the floor-mounted version of Artis zee®,” explains Wulf Ito, MD, one of the two head physicians at the center, “and we also chose an operating table with Trendelenburg and lateral tilt.” Artis zee is a C-arm that is equipped with corresponding fluoroscopy technology and has a 220-degree range of motion. Together with the variable positioning of the operating table, it allows the physician to work comfortably and without strain under optimum control before, during, and after the intervention – without moving the patient. At the same time, the hybrid room is equipped with everything a surgeon normally needs to operate. This eliminates time-consuming changes of location for the patient and the operating team.

Careful Analysis is Crucial

The Immenstadt Hospital took great care when preparing for the installation of its

hybrid room. “We’re talking about a total investment of about a million euros for technology and modifications,” says Andreas Ruland, Managing Director of Oberallgäu Hospitals (Kliniken Oberallgäu), of which the Immenstadt Hospital also is a part of. “That being the case, we have to be sure that the measures we take will pay off in the long term.” The basis for the decision was an expert report on the hospital’s economic development prospects. According to the report, the local population was undersupplied with options for treating cardiovascular disease, which caused patients to shift to hospitals in the surrounding area. In addition, some of the many tourists visiting this popular vacation destination require emergency care. The demographic development of the population and the age structure of the tourists also serve as an indicator that the number of cardiovascular diseases will continue to grow in the future. Accordingly, the experts’ report sets expectations of about 1,200 patients to be treated annually, on both an out-

“Our investment will have paid for itself within three to five years.”

Andreas Ruland, Managing Director, Oberallgäu Hospitals, Immenstadt, Germany

Immenstadt

The Oberallgäu Cardiovascular Center (Herz- und Gefäßzentrum Oberallgäu) is a facility at the Immenstadt Hospital. It offers round-the-clock care for all cardiovascular diseases. Detecting these diseases early and treating them in line with the latest in medical science are the stated quality aims of the center, which was founded in 2008.

The center's three departments, cardiology, angiology, and vascular surgery, offer a full spectrum of services. Alongside conventional procedures such as ultrasound diagnostics and electrocardiography, the center has the full range of tools and equipment of a cardiac catheter lab at its disposal. This is the key factor defining a hybrid room. Applications for catheter technology range from vascular imaging, biopsy of the heart muscle, and implantation of cardiac pacemakers and defibril-

lators, to dilation of blocked vessels and placement of stents. Vascular reconstruction surgery is one of the tasks of vascular surgery, which can also be used in combination with catheter technology.

The Immenstadt Hospital is part of Oberallgäu Hospitals, which also includes hospitals in the towns of Sonthofen and Oberstdorf. This hospital association receives 100 percent of its funding from the rural district of Oberallgäu and ensures that the population of the southern Oberallgäu region, with about 80,000 people in all, has access to medical care. To this end, it provides 270 beds and employs a staff of 500 employees and 50 physicians. Each year, the association treats about 18,000 patients, most of them at the Immenstadt Hospital.

patient and an inpatient basis, with the break-even point falling at 600 patients. Hospital management had five bids developed and analyzed before deciding in favor of Siemens. "We are very pleased with this choice, not only because Siemens made the lowest bid, but also because the service is great," Ruland attests. And that level of service starts right from the outset, with spatial planning. The C-arms in the Artis family, with their integrated imaging system technology, are designed for rooms with dimensions of 45 square meters (ca. 484 square feet) or more. For Siemens, it is very important to work out a customized room and technology solution together with the customer and the users involved.

More Patients – More Income

To Ruland's satisfaction, the initial expectations have been exceeded thus far. "Having treated 600 patients already in the first six months, we will reach 1200 patients in the first year of operation." According to the report, the hospital was not supposed to reach that figure until the third year, because a two-year start-up period to grow the patient stream had been figured into the calculations. "If we include the other interventions, for example, those involving the leg and

pelvic arteries as well as implantation of cardiac pacemakers, our investment will have paid for itself within three to five years," the managing director says with confidence. The Immenstadt Hospital is evidently – thanks to the cutting-edge technology that Siemens has been offering for hybrid rooms for a decade now – on track to win back patients on a large scale. With the first hybrid catheter lab in Southwestern Germany, the Immenstadt Hospital offers gentle, university-level care close to patients' homes – and that means more patients and, ultimately, more income.

Attracting Top Talent

Modern technology alone is not enough to attract the qualified staff that enhance a hospital's reputation, but it is an essential prerequisite. The existence of a hybrid catheter lab was also a major requirement for Ito in deciding to move to Immenstadt and, together with his colleague, Professor Jan Torzewski, MD, to take over as the head physicians of the new cardiovascular center. Both men are cardiologists and complement each other perfectly. Torzewski is additionally trained in intensive medicine and Ito in angiology. "In the medium term, we intend to use our hybrid room for heart valve replacement as well," says Ito,

Summary

Challenge:

- Incidences of cardiovascular diseases are expected to continue to rise
- New treatment techniques require new rooms and cutting-edge technology

Solution:

- Analyses of target vs. actual status are a prerequisite for sensible investment decisions
- Customized room and technology solutions from a single source
- C-arms of the Artis family, with integrated imaging system technology, can be used flexibly and optimize workflows

Result:

- Hybrid rooms can be used across disciplines
- Cutting-edge technology helps attract highly qualified staff
- Gentle procedures reduce operating and recovery times
- Modern technology opens up new patient flows
- More patients mean more income



Imaging methods such as *syngo* DynaCT for CT-like 3D soft-tissue imaging contribute to the achievement of technological progress.

explaining future prospects. In this field, the center is currently working with the University Hospital of Ulm (Universitätsklinikum Ulm), where Torzewski was part of a team of physicians that uses a catheter to transport the new valve to the heart, passing through an incision in the iliac region and through the femoral artery. This method, which reduces strain on patients to a considerable degree, is characteristic of current developments in cardiac surgery, a field that will come to depend on hybrid rooms in the future.

Hybrid Rooms Promote Minimally Invasive Interventions

What is still a vision in Immenstadt is already routine at the Leipzig Heart Center (Herzzentrum Leipzig). At the center, Professor Thomas Walther, MD, works as the Assistant Medical Director of the Cardiac Surgery Clinic. He ranks among the pioneers of catheter-based heart valve implantation. The existence of a hybrid room was a crucial factor in the development of this minimally invasive procedure. "Minimally invasive" means that no open-heart surgery is involved, and con-

sequently that no heart-lung machine is required. A small incision is sufficient to gain access to the defective heart valve – either via the femoral artery or via the apex of the heart.

Hospital management had established a hybrid room some years ago, choosing Siemens as its partner. The room is equipped with an AXIOM® Artis ceiling-mounted C-arm. The monitors can display not only conventional images, but also images produced using the *syngo*® DynaCT method developed by Siemens. This method yields computed tomography-like images that depict the vascular conditions of the heart in three dimensions and with outstanding precision. For Walther, this method was a precondition for being able to develop the procedure for heart valve implantation via the apex of the heart using catheter technology, a procedure he was the first to use. Walther can now look back on 250 successful interventions of this kind. "This progress became possible through direct cooperation with the cardiologist at the operating table," the heart surgeon says with certainty. And working directly with the car-

diologist saves time, too. "What we used to need three hours for, now takes us just two hours to accomplish," Walther says, outlining the potential savings.

Hybrid Rooms Broaden the Patient Clientele

Another crucial factor in determining return on investment is the hybrid room's level of capacity utilization. Shorter operating times per intervention mean that more patients per day can undergo operations. In Leipzig, about 50 percent of interventions involving the heart valves are now performed using minimally invasive techniques, and that figure is expected to grow. In patients with severe aortic stenosis, 19 percent of replacement valves are placed using a catheter. These figures make the Leipzig Heart Center a leader in Germany and internationally.

This gentler way to operate broadens the patient clientele in any case. In particular, older or frail patients with other diseases often benefit from the reduced operating times and lower physical strain. An 80-year-old diabetic patient with a

Leipzig

The Leipzig Heart Center is a wholly owned subsidiary of RHÖN-KLINIKUM AG, based in the town of Bad Neustadt, Germany. It is affiliated with the University of Leipzig as a specialized hospital and provides maximum care for cardiac patients. The center has 380 beds and ten full-day spaces. It offers high-performance medicine for all aspects concerning the heart in order to ensure that its patients enjoy optimum quality of life. This goal is also served by the center's own research work, which develops new methods of treatment.

The Cardiac Surgery Clinic, based at the Leipzig Heart Center, enjoys an outstanding international reputation. It is among the centers pioneering the introduction of catheter-based techniques of heart valve implantation. The clinic focuses on mitral valve surgery, aortic valve implantation, coronary surgery, treatment of heart failure and arrhythmias, as well as treatment following organ transplantation. Each year, about 3,500 cardiac interventions are performed there. The majority of them are combination interventions involving both the blood vessels and the valves of the heart. Long accustomed to working with cutting-edge technology, the clinic has had a hybrid room for some time now and with it, has amassed a large body of experience in the use of minimally invasive methods.



One of the pioneers of catheter-based heart valve implantation: Thomas Walther, MD

mitral valve defect, whom a cardiologist would not have considered a candidate for an operation as little as two years ago, now falls into the hands of Walther's operating team. And the statistics for the heart clinic tell an even clearer story: In 2007, four times as many interventions for mitral valve defects were performed using minimally invasive methods as were performed using conventional procedures. At the same time, the number of those conventional operations has remained the same for ten years. This is a clear indication of an increase in the number of patients who are now traveling to Leipzig for cardiac surgery from all over Germany.

Dedicated to Progress

Constant fluoroscopy requires three to four minutes for an aortic valve implantation. The team can follow the course of the guide wires, precisely place the implant, and monitor the success of the procedure. This is possible only because the system's technology keeps the level of radiation exposure for the patient and operating team very low. Imaging meth-

ods such as *syngo* DynaCT contribute to this. Improving them is important when it comes to achieving technological progress. Professor Walther therefore intends to work together with Siemens on the further development of *syngo* DynaCT. A line concept that starts with a three-dimensional computed tomography (CT) image should help further increase the precision of the operating technology. For a university hospital like the cardiac surgery unit in Leipzig, being at the forefront of technology is mandatory. "That's why we have already decided in favor of the next generation of the C-arm," says Walther, meaning the latest addition to the Artis family – Artis zeego®. This C-arm moves via a multi-axis robotic arm. This means that the latest Siemens angiography system offers physicians practically unlimited freedom of motion. The system's flat detector rotates around the patient at higher speed and with extreme precision, producing soft tissue tomograms of unprecedented precision. "Artis zeego will further improve the workflows in our team and will also make it easier to handle obese patients, for instance,"

the experienced cardiac surgeon says with conviction. Identifying potential room for development, applying new techniques, and sharing experience with colleagues are all integral parts of Walther's work ethic. The fact that this yields benefits for everyone involved – industry, hospitals, and the patient – goes without saying.

Ingrid Horn, PhD, studied biology and biochemistry. She is an expert in science communications and an experienced writer with a focus on biomedical topics.

Further Information

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