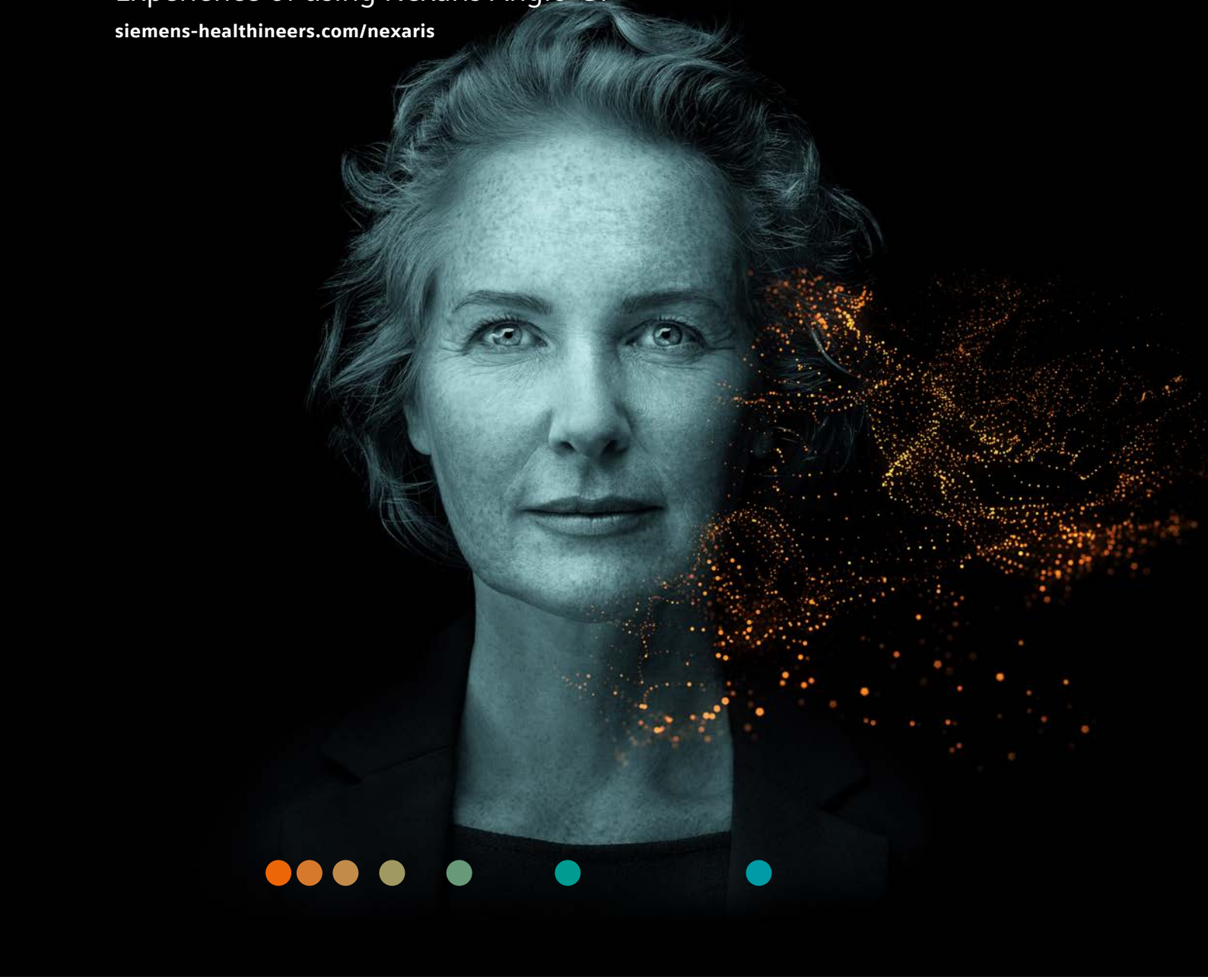
Interview

Leveraging the economic potential of a two-room solution

Experience of using Nexaris Angio-CT

siemens-healthineers.com/nexaris



SIEMENS Healthineers

Leveraging the economic potential of a two-room solution

Risk minimization, faster healing, shorter hospital stays, and a reduced burden on patients in general are just some of the key advantages of minimally invasive medicine. In the field of interventional radiology, modern imaging systems play a vital role in achieving these goals. Nexaris Angio-CT combines angiographic techniques with computed tomography (CT), as well as allowing the incorporation of other imaging modalities such as ultrasound and magnetic resonance imaging (MRI). Since November 2021, University Hospital Marburg has been one of the few hospitals in Germany to operate a hybrid system of this kind. We spoke to Professor Andreas H. Mahnken, MD, Director of the Department of Diagnostic and Interventional Radiology, about the experiences that he and his team have gained of the solution so far.

University Hospital Giessen and Marburg GmbH (UKGM) is a hospital operated by Rhön Klinikum AG. It was formed from the university hospitals of Justus Liebig University Giessen and the University of Marburg in Hesse. The University Hospital Marburg is a maximum care hospital with 1,146 beds and 9,700 members of staff. It is responsible for the care of about 500,000 people. The Department of Diagnostic and Interventional Radiology carries out over 130,000 diagnostic procedures and some 2,800 interventions each year. In addition to modern imaging using the full range of imaging techniques, the department places a particular focus on microinvasive tumor therapy ("Interventional Oncology") and the interventional treatment of vascular diseases. These can be tackled using numerous transarterial and percutaneous techniques.

Diagnostic CT scan, independent of the angiography system

Professor Mahnken, when did you begin using Nexaris Angio-CT at your department, and how did this come about?

We've had the system up and running since November 2021, and we've been using it for over half a year now. The vision to have a system like Nexaris Angio-CT in my department dates back much further than that, to 2003 or 2004, and was driven by a collaboration with Japanese colleagues. Specifically, it was in 2017 that we began making our own plans here at the hospital.

What was the rationale and thinking behind acquiring a hybrid system of this kind for your department?

The main reason was that we've developed a clear interventional focus here in Marburg over the last decade. At the same time, we also have to deliver a high standard of diagnostic care and for that we need the relevant equipment. In terms of the physical premises, a few different factors coincided and this allowed us to free up the necessary space for a solution of this kind. It was obviously a good time to talk about the purchase.

"The moment we bring these techniques together, there is obviously a huge expansion in our capabilities – thanks to combined interventions and greater confidence provided by additional image information."

Professor Andreas H. Mahnken, MD,
Director of the Department of Diagnostic and Interventional Radiology at University Hospital Marburg, Germany

What requirements had to be met, and how was the planning and implementation phase organized?

It goes without saying that the purchasing and installation of such a complex system is something that must be decided upon and implemented by the whole team – including everyone from the management board to the radiology and care teams. After all, we're talking about a substantial investment.
We were very lucky that our management board was convinced by the idea and that we enjoyed strong support developing the concept.

Installing a system like Nexaris Angio-CT requires not only space but also infrastructure. Among other things, you need an easily accessible area where you can transfer patients in and out – and there a number of other important details to bear in mind, such as the power and water supply, the network connection, and so on. You also have to consider the weight of such a system, and you need a level floor over a distance of ten to 15 meters for a rail-mounted computed tomography (CT) system. Accommodating a system of this kind within an existing building poses a considerable challenge.

Of course, implementing a project such as this also calls for good planning and continuous coordination between all parties. This process initially drew upon the knowledge of our highly committed construction department, the radiology and care teams, and of course specialist planners from the supplier and experts from the respective trades.

Professor Mahnken during a chemoembolization

Planning a CT scan for a combined Angio-CT intervention

Exploiting the economic potential thanks to the two-room solution

What has been your experience with Nexaris Angio-CT? Above all, which examinations or interventions have you performed so far using the solution?

At our department, the two systems that make up Nexaris Angio-CT – that is, the angiography and CT systems – are installed in two different rooms separated by a movable wall. Each system is operated to its full productive capacity. Once or twice a day, we also use the angiography system in a hybrid manner by bringing the CT scanner into the angiography room – thereby deriving the maximum benefit from this combined application for our patients. Both systems are highly robust tools that enable us to cover the broad spectrum of radiology – including diagnostic and interventional CT and diagnostic and interventional angiography.

The moment we bring these techniques together, there is obviously a huge expansion in our capabilities: We use the suite in hybrid mode for combined interventions – for example, bringing together percutaneous interventions with a vascular intervention. Such techniques include the combination of chemoembolization and ablation or the treatment of endoleaks in endovascular aortic therapy. Here, physicians use CT imaging to guide percutaneous puncture before switching to angiography in order to guide embolization via the vascular route. Of course, these are just two examples of a much wider range of capabilities using this system.

Do you have a goal for the future in terms of utilizing the full capacity of the Angio-CT suite?

Our aim is to operate both systems at full capacity. I can not tell you exact figures, but my experience so far is that whenever we're not currently using the device in combined mode, each system is used to its full capacity in its own right. With the two-room solution, we're able to exploit the full potential. This means we have optimum medical capabilities and we're also on solid ground from an economic perspective.

In other words, if you compare the system with a traditional, single-room solution, the benefits of a two-room solution are immediately apparent?

Absolutely. In comparison with a single-room solution, the key advantage of a two-room solution is that neither of the devices stands idle. In a traditional, single-room solution, we would often be faced with a situation whereby we were using the room for vascular interventions and would bring in the CT scanner perhaps two or three times a day, so that its daily use amounted to just half an hour. In this way, we use the CT scanner for eight hours a day or more. You could see it as a disadvantage that the two-room solution first requires you to open a door and bring the CT scanner into the angiography room, but this only takes us perhaps two or three minutes per use. Two or three times a day, that amounts to less than ten minutes. I'd say that's a very reasonable use of time compared with leaving the CT scanner unused for 7.5 hours in a single-room solution.

To what extent has the Angio-CT solution affected your everyday clinical practice?

Our clinical practice has changed significantly in two key ways as a result of Nexaris Angio-CT – not so much for me and the team of physicians but rather for our technical team and the radiology technologists. Some initial retraining was needed for the technical team, as they were suddenly working with a sliding gantry CT system. In other words, the CT gantry now moves rather than the table. We addressed this in training, and the transition was thankfully very straightforward.

On the angiography side, we also provided training to our team of radiology technologists. Those with a vascular or interventional focus in their work often have limited experience of CT imaging, but we obviously use complex CT protocols in our interventions, including vascular interventions such as perfusion CT scans. Someone who otherwise only operates standard CT scanners must first be trained again for these applications.

"Our aim is to operate both systems at full capacity. With the two-room solution, we're able to exploit the full potential."

Professor Andreas H. Mahnken, MD,
Director of the Department of Diagnostic and Interventional Radiology at University Hospital Marburg, Germany

Professor Mahnken during a chemoembolization

Another positive "side effect" is the change in how we communicate, both within and between our teams. There is no longer a dedicated angiography group or CT group, but rather a mixed team. This has led to an effective exchange of expertise and has had a very positive impact on our everyday work.

Looking at the workflow in particular, what changes have there been?

For physicians, the implementation of Nexaris Angio-CT has meant hardly any changes to their workflow. On the angiography side of things, interventional applications have actually remained the same. The key difference is that we're now able to incorporate additional, very high-quality image information during the intervention. We've always worked with relatively recent CT or MRI scans for planning purposes, and the intraprocedural use of cone beam CT is a long-established part of our methodology. Now, we're also able to reconfirm that we're doing what we intended during the intervention and with optimum image quality, for example, or to plan an intervention more precisely by adjusting the planned catheter path based on the latest data.

In my view, the key advantage of the two-room solution relates to the workflow. Not only are there medical advantages to using two modalities, thanks to combined interventions and the greater confidence provided by additional image information, but the two-room solution also has the advantage of leaving the existing workflow essentially unchanged – or indeed of improving it – by removing the need for patient transfer.

What impact does the system have on patient throughput?

Actually, Nexaris Angio-CT hasn't changed the average number of patients who pass through the interventional suite each day. Rather than performing more interventions, we carry out the interventions with greater diagnostic and therapeutic certainty and with significantly greater confidence – and we combine some interventions that would otherwise have been performed in two stages or involving patient transfer. This is certainly more convenient for patients, as they only need to come in for the intervention and don't need to have two hospital stays or two separate procedures – possibly with a day's wait between them. Although waiting times have shortened, this has not yet been reflected in a larger number of procedures.

“The two-room solution has the advantage of leaving the existing workflow essentially unchanged – or indeed of improving it by removing the need for patient transfer.”

Professor Andreas H. Mahnken, MD,
Director of the Department of Diagnostic and Interventional Radiology at University Hospital Marburg, Germany

Visualization of angio and CT images using the Artis Cockpit

In the planning phase, concerns were raised both within the team and by the management board that we might encounter problems in terms of throughput – in comparison with a dedicated CT system and a dedicated angiography system respectively. We had to ask ourselves: Are there actually patients in Marburg who will benefit from both modalities? I think we’ve now shown very clearly that our patient throughput for CT scans has remained absolutely stable, not least thanks to our highly committed team, who took a very positive approach to incorporating and implementing these changes to the workflow. At the same time, we can see that a significant number of patients benefit from combined interventions.

In any case, the Angio-CT suite has a positive impact on the patient experience. Besides the advantages I’ve already mentioned, it dispenses with the need to reposition the patient when switching between angiography and CT imaging.

Would you say that the two-room solution allows you to treat more complex cases than before?

With the two-room solution, or rather with this Angio-CT solution in general, we feel a lot more confident and are more relaxed during interventions that we would have been less comfortable about beforehand – such as those where we anticipated having to move the patient back and forth from angiography to the CT scanner. We’re now much more relaxed in these situations, as are the supporting staff. For example, the process has become much safer for intubated patients, who would previously have required an anesthesia team to accompany them during transport.

Could you perhaps tell us about a specific case in which Angio-CT was used?

Yes. If we look at the screen here, we can see an interesting case where we used a microcatheter for embolization of a pulmonary sequestration. Here, you can see the Angio-CT with the administration of an intraarterial contrast agent and visualization of the pulmonary sequestration. It’s relatively unusual to treat pulmonary sequestrations transarterially, with physicians typically opting for surgical resection instead. In particular, it was important for us to know that there were no fistulas or shunts – in other words, that we didn’t embolize in the wrong place, thereby posing a risk to the patient. This can of course be visualized much more reliably with an appropriate CT solution than if you’re working with cone beam CT.

With Nexaris Angio-CT, an ultrasound system is available in the same room. How often is this system used?

The ultrasound system is used several times a day – we often use ultrasound as a supporting tool in order to gain access to a blood vessel, for example. The evidence clearly shows that ultrasound-guided puncture is simply safer than carrying out the procedure blind, although we sometimes also use it for straightforward punctures of lymphoceles or larger abscesses, for example. As soon as things become more complex or more difficult, we bring in the CT scanner for the puncture.

Professor Mahnken is excited about the change in interventional radiology

Challenges and opportunities in interventional radiology

What developments are you currently seeing in interventional radiology? Can you identify any specific trends?

The most obvious growth in interventional radiology is currently seen in the field of interventional oncology. Minimal invasive tumor therapy is a powerful driver of innovation. This is a global trend we're seeing, independent from the fact that interventional procedures are growing significantly. At the same time, we can see that interventional radiology is becoming increasing clinical and patient centric. In other words, it's moving away from being purely about carrying out a specific task.

This trend has been accelerating over the last ten years and is turning the field into an increasingly multifaceted discipline

Do you see a link between advances in interventional radiology and the market for Angio-CT solutions?

Absolutely. Above all, hybrid modalities will facilitate the strong growth in interventional oncology by allowing us to apply percutaneous and vascular techniques. This is because they provide us with a very effective way of combining ablative methods with the strengths of tumor therapy – for example, using devascularization or localized chemotherapy. I expect there will be similar advantages in stroke therapy or aortic therapy. By contrast, I imagine there will be fewer advantages in traditional vascular recanalization, although these systems certainly help us to assess treatment outcomes in that area – as we've seen in several very impressive examples. Interventional oncology is the key driver, however. This is where we see the great benefits from this hybrid system.

Where do you personally think the challenges and opportunities lie in interventional radiology in the future?

There are endless opportunities. The interesting question is whether we can rise to the challenges – whether we can encourage the next generation of physicians to play an active role in patient care and to take responsibility for patients over the entire course of treatment. This may well include being in the department for an intervention at 3 a.m., as happened to me last night due to an emergency.

Are there specific approaches in your department that seek to tackle the challenges you've just described?

In my view, medical training doesn't devote anywhere near enough time to interventional radiology. Although it's included in the objectives catalog,[1] and corresponding statements have been issued by the German Radiological Society and the German Society of Interventional Radiology. I believe the subject is not sufficiently addressed in national curricula.

We try to counteract this by introducing our students to interventional radiology and simulation at a very early stage so they can see that it involves not only diagnostic but also manual – that is, surgical – skills that directly benefit patients. By doing so, we're trying to dispel the image of the radiologist as someone who works solely on diagnosis and is often perceived merely as an interpreter of images, even if that isn't actually the case. This is something we try to get across to our students as early as possible. And we've clearly been very successful in these efforts – for example, almost all of our students apply for a position with us after their practical year.

Lastly, a personal question: After very long planning and preparation phases in which you were personally involved, the Angio-CT suite is finally in operation. Does this give you a certain sense of pride?

It's an incredible achievement for our team, especially given that we've had this vision for over ten years and can now see the whole thing working on patients just as we'd imagined. It's very satisfying.

"Above all, hybrid modalities will facilitate strong growth in interventional oncology by allowing us to apply percutaneous and vascular techniques."

Professor Andreas H. Mahnken, MD,
Director of the Department of Diagnostic and Interventional Radiology at University Hospital Marburg, Germany

The statements by Siemens Healthineers' customers described herein are based on results that were achieved in the customer's unique setting. Because there is no "typical" hospital or laboratory and many variables exist (e.g., hospital size, samples mix, case mix, level of IT, and/or automation adoption) there can be no guarantee that other customers will achieve the same results.

The customers are employed by an institution that receives financial support from Siemens Healthineers for collaborations.

The product/feature and/or service offerings (mentioned herein) are not commercially available in all countries and/or for all modalities. Their future availability cannot be guaranteed.

The opinions expressed in this article are solely those of the featured physicians and may not reflect the views of Siemens Healthineers.

[1] The objectives catalog is the term used to describe the contents of the state examinations in human medicine and pharmacy. It is drawn up by the Institute for Medical and Pharmaceutical Examination Questions (IMPP) in Mainz, Germany.

Siemens Healthineers Headquarters
Siemens Healthineers AG
Siemensstr. 3
91301 Forchheim, Germany
Phone: +49 9191 18-0
siemens-healthineers.com

Published by Siemens Healthineers AG · digital ·