



Ludo F. M. Beenen, MD, (left) and  
Jan S. K. Luitse, MD, (right) behind  
the sliding gantry CT that can move  
between two rooms.

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# Bringing Healthcare to the Patient

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The Academic Medical Center (AMC) in Amsterdam, the Netherlands, is one of the highest performing and most prominent polytrauma emergency centers in the world. The emergency department is designed entirely from the patient's perspective. It is a novel approach where care is brought to the patient, not the other way around.

Text: Erika Claessens | Photos: Michel De Groot

**T**he Academic Medical Center (AMC) in the South-East quarter of Amsterdam feels like an indoor mini city. There are all kind of shops, several restaurants offering healthy food and beverages, a conference space, and comfortable lounges within reach. In the Emergency Department (ED), the colors, texture and art pieces covering entire walls are unusual as well. "This design and architecture confirms our growing belief that patient care is entirely determined by the patient's perspective," states Jan S. K. Luitse, MD, recently retired trauma surgeon and Head of the ED. "This part of the hospital building has been completely restructured and we only re-opened it half a year ago. It's the final phase in a long and breathtaking process of changes to bring healthcare to the patient."

## From trauma bay to imaging

"It all started back in 2000, when the hospital was officially designated a Level One Trauma Center," Luitse continues. "Up until then, the AMC had been functioning the same way for over twenty years: Our radiology department and CT scanner were housed on the first floor while the hospital's ED was situated in the basement of the hospital. A regular discussion point was that continually moving emergency patients from one department to another is very bad for their health. It was also time-consuming and inefficient in terms of workflow. Moving a patient from the trauma bay to the radiology department and back took about 30 minutes and involved eight employees passing from one floor to

another – often struggling with the gurney, pushing it into the elevator, and meeting all kinds of obstacles on the way."

Ludo F. M. Beenen, MD, emergency radiologist, confirms the situation: "You can see that the circumstances were not ideal. Intensive care patients were scanned with the same imaging machine as used for emergency patients. Inpatients and outpatients all went through one of the two CT scanners on the first floor. Unfortunately, we were always waiting for one of them to be free. We needed to change our process efficiency, but it was not easy to determine the needs or find the right equipment."

## Life-saving efficiency

For Luitse, the main focus was to configure an imaging situation where patients could remain on the trauma table. This would minimize transportation and maximize process efficiency, helping save as many lives as possible. But having a dedicated CT scanner in the trauma bay would also be inefficient. It would also need to be available for use on other acute and regular patients as well.

"In 2001, we heard about a Siemens CT imaging system in the operating room of a Japanese hospital that could move three meters forward. We agreed this cutting-edge invention could offer us a solution." They started brainstorming over how they could scan trauma patients better, while also integrating other emergency and intensive care unit patients.



The AMC was the first hospital in the world to possess a two-room emergency setup with sliding gantry CT.

## The Academic Medical Center

The Academic Medical Center (AMC) is one of the most prominent research institutions in the Netherlands and is one of its largest hospitals. It employs over 7,000 people, providing integrated patient care, fundamental and clinical scientific research, as well as teaching. The AMC complex houses the university hospital and the UvA faculty of medicine along with the Emma Children's Hospital, the Netherlands Institute for Neuroscience, the Spinoza Center for Neuroimaging, the medical department of the Royal Tropical Institute and the Amsterdam Institute for Global Health and Development. Numerous biotech companies and AMC spin-offs are also located on the site.

As such, the AMC is a breeding ground for fruitful scientific collaboration. But with its 45 clinical and non-clinical departments, it is equally a medical center for all the existing medical specializations, providing outstanding patient services of all kinds, including a high percentage of high-quality referral care. About 26,000 patients are admitted to AMC wards each year, whilst the outpatient clinics see around 350,000 people annually. Day care – an intermediate form of care – is becoming increasingly popular: About 30,000 patients a year receive such care. In addition, the AMC is one of the Netherlands' eleven trauma centers.

A group of dedicated people from the radiology department, trauma surgery, emergency department, and anesthesiology unit all met up and discussed their specific needs.

"To perform fully, we needed a CT that could move at least five meters backwards and forwards," explains Luitse. "Our preference was for it to be set up in the middle of two rooms, sliding on rails from one to the other. The patients would remain on the table in their room, and as such we would

bring healthcare to the patient. It was key that the functional design met the specific requirements of the polytrauma patient, not the standards of the medical staff or the hospital. The two-room emergency setup ensures that there is always one room free when an ambulance arrives. Much to our surprise, Siemens confirmed that they were ready to develop a CT-on-rails prototype for the AMC. The CT Sliding Gantry was born. From that moment on, the AMC was the first hospital in the world to possess a two-room emergency setup with sliding gantry CT."

## A pit stop for all patients

Beenen compares the evaluation and treatment of an emergency patient to a pit stop in Formula 1 racing, "One of the benefits of the sliding gantry is that speed is in the patient's favor. Because when evaluating a trauma patient, time is critical, Time = Life," Beenen states. "As in motor racing, evaluating a trauma patient is a team activity. Precise timing and perfect choreography of all the medical disciplinary teams involved is vital to saving lives. The more we work together, the faster we get, the better our chances of a good outcome. The CT-on-rails helped us develop this speed.

## Feet first

In the dual room, Beenen is eager to illustrate the setup from a patient's perspective. "In a dual-room solution you can adapt at any time to the changing circumstances.

Whenever a trauma CT is required, the gantry is slid across to the respective room. And when the trauma team is finished, the gantry is simply returned to the other room without further delay for the next patient. The patient is placed feet first towards the CT scanner, which makes it easier for the anesthesiologist to control airway, tubes, and other vital patient functions. The patient remains on the table during the scan, with the gantry moving over him or her – the flat rail system enables movement of the scanner at 120 mm/s with the same accuracy as regular CT scanners. All supporting devices, including conventional radiography, are ceiling-mounted. The first practical setup of the dual room back in 2003 had one routine CT room and one trauma room, with the CT scanner located primarily in the routine CT room. This first CT scanner was a SOMATOM Sensation 4 model, which was progressively upgraded to a 64-slice configuration in 2008. Following last year's redesign of the ED, a brand new mirrored configuration with a 128-slice SOMATOM Definition AS+ system was installed. This provides complete flexibility, as both rooms can now receive all kinds of emergency and regular patients in a completely symmetrical two-room solution. Next to the trauma rooms, we also installed a Dual Source CT, a SOMATOM Force."

## No time to waste

Luitse points to a life support trolley and explains that it stays with the patient from his or her arrival until the end of treatment, eliminating several disconnection and reconnection times. "As the volume of patients increased, the more there was the need for speed," the surgeon continues. "So we decided to connect the different tubes to the life support trolley. This reduces the overall trauma team by three people but gains us eight minutes. Our workflow is now very well developed, enabling us to provide therapy in less than 30 minutes."

Beenen continues: "For example, in acute ischemic stroke cases, every minute counts. Because of the direct availability of the sliding gantry CT the patient can be scanned within six minutes of arrival, resulting in a door-to-needle time of less than 30 minutes for most patients. This leads to significantly better patient outcomes. Now, being even more ambitious, we generally achieve times of less than 20 minutes. Once you realize that during a stroke, two million neurons are lost every minute, it becomes obvious how valuable it is to save time with the CT on rails."

## A twin emergency room

As Luitse explains, "Although of course it doesn't happen all the time, in the most urgent cases we can scan two critical patients almost simultaneously, just one minute apart from each other. Whatever side the patient enters,

the equipment is duplicated in each room with every single tool located in exactly the same place. Secondly, we made an investment in terms of electricity. It is equally important that both rooms have independent electricity networks."

This has meant that the entire trauma bay had to be restructured to meet the requirements of the new CT setup. Luitse concludes: "From a patient's perspective, the two-room solution is one of the best things we've ever had." ●



The view onto the twin emergency room and its sliding gantry CT from the control room.

## Conclusion

This CT pit stop on rails, first imagined by Jan S. K. Luitse, MD, and his team back in 2000, was built and elaborated upon over several years. It has become the ultimate example of a new patient philosophy. It has made the Academic Medical Center (AMC) in Amsterdam, the Netherlands, one of the highest performing and most prominent polytrauma emergency centers in the world. Every day, medical staff and researchers from all over the world visit the hospital to see for themselves and learn more about its novel patient concept. More importantly, the two-room sliding gantry concept provides an interdisciplinary, multifunctional, and cost-effective patient approach, allowing the simultaneous treatment of different patients at the same time. There is a bright future ahead.

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