A “Perfect Duo” for Trauma Diagnostics

AXIOM Vertix MD Trauma optimizes clinical workflow in the Academic Medical Center in Amsterdam (AMC), The Netherlands

"With the digital AXIOM Vertix MD Trauma, we save considerable time compared to a CR system."

Anieke Eikelenboom, AMC Radiology/Trauma Department, Amsterdam, The Netherlands

In recent years, treatment of seriously injured patients has improved considerably. Nevertheless, accident-related traumatic injury remains the most frequent cause of death. Time is the most important factor in trauma cases, and it is especially critical after an accident. Emergency care is focused on quick diagnosis of life-threatening and serious injuries and rendering immediate and effective treatment. This is possible, however, only if processes are specifically optimized using advanced medical technology. The AXIOM Vertix MD Trauma System from Siemens Healthcare makes this possible. Proof positive can be found in the Academic Medical Center in Amsterdam. A study conducted there demonstrated that combining digital radiography and CT could substantially better clinical workflow. The AXIOM Vertix MD Trauma radiographic system was specifically designed and optimized for traumatology. The system consists of a ceiling-mounted X-ray tube equipped with a mobile detector with an associated imaging station. The tube and the detector holder are mounted on a U-arm, ensuring that the tube is always centered to the detector in all planes. This allows examinations in the trauma room to proceed swiftly and safely, without repositioning the patient. As the AXIOM Vertix MD Trauma is ceiling-mounted, it can be moved longitudinally, transversely and vertically on its telescopic arm within the room. The mobile detector can be even used for free exposures, accommodating all required exams.
Its compact construction conveniently supports easy parking and unrestricted access to the patient at every stage of the examination, which is extremely critical in emergency situations.

Optimized workflow

2002, the AXIOM Vertix MD Trauma system was installed at AMC. Before that, the center used an analog system with CR cassettes, including a table and Bucky wall unit. Detector technology is particularly advantageous in the ER: no more cassettes to process and change. Overall examination times are signifi-

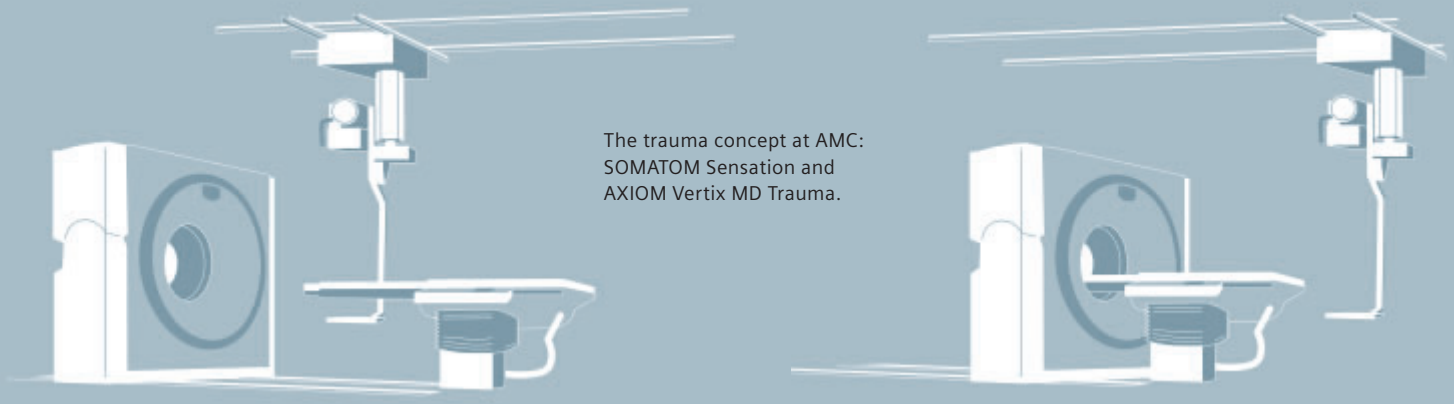
Step	Radiographic preparations in trauma room	Time in minutes (pre-DR)	Time in minutes (post-DR)
1.	Patient reception	5	5
2.	Registration of the patient in RIS – Data assignment at the system	2	1
3.	Preparing the CR cassettes for the examination	5	0
4.	Preparing the system	2	1
5.	Positioning the patient for the exposure	1	2
6.	Collimate and release exposure	2	2
7.	Check images for correct positioning	3	1
8.	Perform the second view or repeat (if necessary) and image check	5	2
9.	Preparing the images before sending to the PACS	3	1
10.	Preparation of the patient for the CT exams after X-ray exposures with AXIOM Vertix MD Trauma	10	1
Total time		**38**	**16**

The individual work steps from patient arrival to preparation of the patient for the CT exams and the times needed for each before and after installing the AXIOM Vertix Trauma digital system.

cantly reduced as a result. The following table lists the individual work steps from patient arrival to preparation of the patient for the CT exams and the times needed for each before and after installing the AXIOM Vertix MD Trauma digital system.
Thanks to the digital trauma system, overall exam times were cut by 22 minutes; that is a full 58%. The trauma patient can make it to the OR ten minutes sooner. Or to put it another way, there are 22 more minutes to take CT images. The AXIOM Vertix MD Trauma is an efficient and easy-to-operate system that supports the trauma center team in reaching a diagnosis quickly. Combined with a CT scanner, the SOMATOM Sensation from Siemens, it reaches its full potential. The AMC brought together conventional radiography and the CT scan in one of their three trauma rooms. Now patients no longer need not be transported to the various diagnostic modalities. Before the new trauma room equipment was installed, a patient might have had to be transferred up to eight times to access the different modalities in the various departments. This involved a lot of personnel and much more work, not to mention less-than-ideal care for patients in critical condition. Now all the images can be acquired using a radiography system and CT in one room immediately on the patient's arrival in trauma.

Intelligently integrated

Certain provisions need to be made to combine a CT and radiography system. Both systems do need to work independently of one another, and at the same time build an integrated solution.
The rail-mounted CT scanner and the AXIOM Vertix MD Trauma realize the concept of integrated trauma diagnostics in one of the AMC's three trauma rooms. The SOMATOM Sensation and the AXIOM Vertix MD Trauma system share a specially constructed patient table with an extra long tabletop. The table can be moved between the AXIOM Vertix MD Trauma for radiographic exams and the SOMATOM Sensation for CT exams.



The trauma concept at AMC: SOMATOM Sensation and AXIOM Vertix MD Trauma.

To illustrate a typical trauma examination: Upon arrival of a polytrauma patient, he/she is transferred onto the special patient table. The tabletop is extended towards the digital radiography system, and a series of diagnostic radiographs are performed. With the ceiling-mounted U-arm design of the AXIOM Vertix MD Trauma, standard projections such as lateral cervical spine, skull, chest, pelvis and other body regions are easily and quickly done. The extended tabletop provides free access for imaging, and re-positioning the patient for frontal and lateral projections is not necessary.
Once the diagnostic exposures are completed, the table is then extended in the opposite direction towards the CT scanner. The floor-mounted CT scanner can move as well, toward the patient to cover the region of interest for the examination. The whole process is accomplished quickly and treatment planned based on the collective results of the X-ray examination and the CT scan. During the entire diagnostic process, patient transfer has been minimized to one only, thus greatly reducing the time needed and keeping the patient under constant medical supervision. An important advantage of the integrated trauma diagnostic concept is fewer transfer steps and reduced waiting times that directly result in enhanced patient safety and treatment.

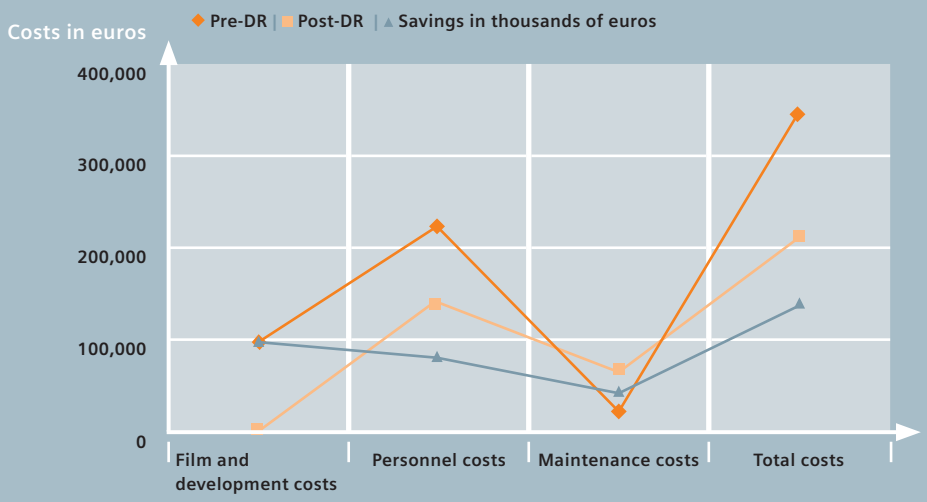
Contact
monika.boehmer@siemens.com

Academic Medical Center, Amsterdam

The Academic Medical Center (AMC) is one of the most prominent and largest medical centers in the Netherlands. It is also the first hospital to implement, in cooperation with Siemens AG, the concept of integrated trauma diagnostics in the emergency room. The hospitals of the AMC offer all medical specializations and all types of top clinical patient care. The AMC has 1,002 beds. Twenty-five thousand patients are admitted each year, along with 35,000 day admissions and over 350,000 outpatient visits.

Greater Efficiency through Digital Radiography

AXIOM Aristos FX raises cost efficiency, boosts patient throughput and improves clinical workflows at Kaiser Franz Josef Hospital in Vienna, Austria



Film/development, staff and maintenance costs (pre-DR vs. post-DR)

In today's radiology departments, efficiency and cost-effectiveness are key. But just how can X-ray facilities achieve both at the same time? The Kaiser Franz Josef Hospital SMZ-Süd in Vienna has done just that. This modern tertiary care hospital has over 745 beds and its Central Radiology Institute, under the direction of Univ. Doz. Dr. Wolfgang Kumpan, offers all the latest imaging modalities, such as X-ray diagnostics, digital FD mammography, ultrasound, interventional radiology, CT and MRI. The institute performs approx. 100,000 examinations each year.

"The reduction in the number of required work steps and associated time savings achieved with the AXIOM Aristos FX systems are a principle reason for the improvement of workflow in our radiology department."

Univ. Doz. Dr. Wolfgang Kumpan, Kaiser Franz Josef Hospital, Vienna, Austria

From analog to digital

The Central Radiology Institute was completely remodeled in 2003 and X-ray diagnostics equipped with two AXIOM Aristos FX digital radiography systems. Thus ended the era of analog radiology at the institute. From the four previously analog rooms emerged two fully digitalized X-ray rooms that could handle nearly every X-ray image: skeleton, extremities, lungs, and special images including lateral and oblique views.
The multifunctionality of the new AXIOM Aristos FX systems allows acquisition of all images in a single room without having to move the patient to another room for thoracic and skeletal images, as was required for analog systems. For non-ambulatory patients, who make up approx. 60% of all the institute's patients, that was a real chore. Not only that, but changing rooms meant the patient was not finished and ready to leave the institute for at least 65 minutes. The long waiting and exam times made both patients and personnel unhappy. This is all different now. The exam times for e.g. the cervical spine in three planes dropped from 50 to 20 minutes total examination time (door-to-door time), thus cutting waiting times from a full half hour to a mere ten minutes. This dramatic change certainly improved the mood in the waiting room, thus boosting the satisfaction and efficiency of the staff. With up to 46% fewer personnel and 50% less space, the institute is able to acquire even more images than with the analog systems.

Fewer work steps

Because of the flat detector, digital technology eliminates changing and developing cassettes, preparing preliminary images, labeling the X-ray envelope, and viewing the images on the light box. Thanks to the ceiling-mounted tube and detector stands, positioning the AXIOM Aristos FX system in the room is fast and flexible. Exam results appear on the display immediately and can be sent to the physician or other departments for diagnosis. Treating physicians can therefore produce

Step		Time in minutes (pre-DR)	Time in minutes (post-DR)
1.	Patient admission	1	1
2.	Patient registration in KIS-RIS	1	1
3.	Waiting time of the patient	30	10
4.	Cassette handling (scribor exposure)	2	0
5.	Positioning of the equipment	1	0.30
6.-7.	Placement of the patient and correct positioning for exposure	5 (for three exposures)	3 (for three exposures)
8.	Optimal collimation	1 (for three exposures)	1 (for three exposures)
9.	Program selection and initiation	1 (for three exposures)	0.30 (for three exposures)
10.	Film processing	3	0
11.-13.	Review of image quality, preparation of previous images, labeling of the film pouch	1	0.15 (only the image quality is checked)
14.	Display of the images on the X-ray film viewer, quality control by physician	1	0
10.	Period of time between the end of the patient examination and the departure of the patient from the Central Radiology Institute (ZRI)	3	3
Total Time		**50**	**20.15**

timely multi-modal reports of outstanding quality and edit them. They not only have immediate access to images, but the entire image archive, any hour of the day or night at any workstation in the institute, which not only increases efficiency of reporting but significantly optimizes the potential for specialist training.

Cost efficiency through digital technology

Using flat detector technology eliminates the cost of film, developing chemicals, processing and the personnel required. Even with the annual maintenance costs for both AXIOM Aristos FX systems totaling 66,800 Euros, the Central Radiology Institute in Vienna is still able to save 136,800 EUR, funds that can be put to other and even more beneficial uses. Digitalizing the conventional X-ray department at the Kaiser Franz Josef Hospital in Vienna markedly improved clinical workflow and efficiency and contributed to shortening the time needed for diagnostic and treatment decision-making. Improved patient comfort, lower radiation doses, higher exam throughput (multiple exams in a single appointment), and happier faces in the waiting room due to shorter exam and waiting times are all to the patient's benefit and result in higher satisfaction.
But not only the patients benefit; so does the staff. Quality of work, satisfaction and motivation rose substantially. The reasons cited included less physical labor and cassette transport, less running from department to department to accomplish tasks, less physical strain from patient repositioning, and a reduction in the daily work schedule from 33 hours (in 4 examination rooms) to 23 hours (in 2 examination rooms).

Contact
monika.boehmer@siemens.com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