

# TOSHIBA

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## Re-engineering the Patient Pathway

Introducing Aquilion ONE into an emergency department can shorten time to diagnosis for chest pain patients and decrease the costs of hospitalization

Computed tomography (CT) is now considered sufficiently robust and reliable to be used routinely for patients presenting with chest pain, a common symptom accounting for approximately 6 % of hospital emergencies.

While many of these cases prove to be minor, the potential for serious and life-threatening conditions means that the majority of patients need to undergo a series of costly and time-consuming diagnostic tests.

For example, a recent study<sup>1</sup> applying economic value modelling to the patient pathways at hospital trusts in the United Kingdom showed that around 70 % of all chest pain patients are referred to Acute Medical Unit (AMU) for diagnosis during a short stay estimated to cost € 657.

Around 14 % of all patients are transferred to an inpatient unit at the hospital for a definitive

diagnosis with the time to diagnosis averaging three days at a cost of € 1,166.

The introduction of the Aquilion ONE from Toshiba presents a potential to change this traditional emergency patient pathway with a wide array of detectors for whole-heart data acquisition using low radiation dose techniques that enable a definitive diagnosis of chest pain patients in one protocol in a matter of minutes.

The study by Simon-Kucher & Partners examined detailed economic value modelling of the pathways in a large National Health Service Acute Trust and concluded the potential for cost reductions range from € 375,000 to € 1.8 million per year depending on the system's usage within the emergency department and the release capacity in the acute medical unit.

A decision tree model was developed to compare the current standard diagnostic pathway with

a pathway using the Aquilion ONE to diagnose patients with acute chest pain.

The final node of each of these pathways is either the ultimate diagnosis of Acute Coronary Syndrome (ACS) or the exclusion of ACS, and for each final node the probability, associated cost and associated time spent on a ward were calculated and used to derive the overall cost of the patient-pathway

The current pathway was derived in close cooperation with one large NHS Acute Hospital Trust in the UK that sees 8,000 patients each year with acute chest pain and the study is based on discussions and analyses of patient files.

As the hospital did not use Aquilion ONE, the new pathway reflects the impact of this new CT scanner, and based on discussions with cardiologists and radiologists of four other NHS acute trusts and a review of literature the study's authors were able



Dynamic volume scanner as the state-of-the-art scanner with its wide coverage provided by 16 cm-wide detector enables scanning of most of the organs with single, non-helical rotation.

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to create a diagnostic pathway representative of other hospitals in the UK where a more usual number for an average size regional NHS Acute Trust would be 4,000 patients per annum.

Toshiba's Aquilion ONE has unique features that make it highly suitable for integration in the diagnostic pathway of patients with acute chest pain:

Aquilion ONE offers a clearly higher accuracy than currently available cardiac CT scanners even in the presence of irregular heart rates.

With 16 cm coverage in one rotation it is capable of performing whole organ scans in a sub-second, offering dynamic volume imaging with a single, non-helical rotation.

Because data are typically acquired in a fraction of a second during a single heart beat, the entire 3D dataset is temporally uniform and not constructed from multiple consecutive heart beats as with scanners with fewer detector rows, thereby reducing heart rate- and breathing-related motion artifacts and increasing image quality.

The Aquilion ONE also uses a radiation dose below those of conventional scanners and less contrast media for prospective CTA examinations.

Data was retrospectively collected for 62 patients who presented to the high-volume hospital trust and the analysis of the resource consumption focused on the main cost drivers, which are the level of emergency service, number of AMU days, number of inpatient days and the cost of an Aquilion ONE scan.

The comparison of the patient pathway using Aquilion ONE against the traditional pathway revealed that Aquilion ONE allows for an ultimate diagnosis for all patients in Emergency. This results in a release of capacities on AMU and inpatient units as well as cost savings for the hospital.

For 4,000 patients presenting each year to Emergency with acute chest pain, the hospital investigated had the potential to save around 2,400 AMU days and 1,500 inpatient days per annum if using Aquilion ONE within the Emergency chest pain pathway instead of the traditional pathway. This represents 33% of the total annual capacity of AMU beds.

On average, per patient with acute chest pain approximately 519 could be saved with Aquilion ONE compared to the standard diagnostic pathway.

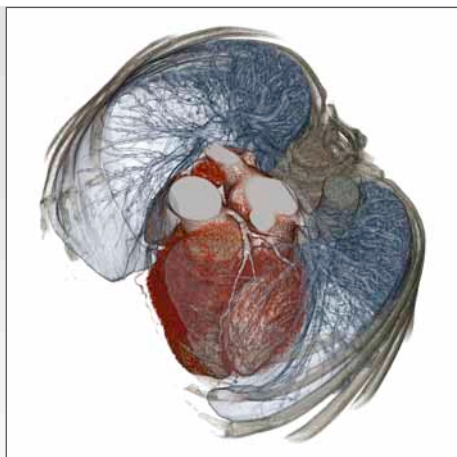
Projecting this to the annual patient population presenting with acute chest pain in A&E, i.e. for 4,000 patients in a typical hospital, annual savings of near € 1.8 million are possible.

The overall result was shown to be robust by the scenario analyses and it became clear that to achieve high cost and capacity savings it is crucial to use Aquilion ONE prior to sending the patients to AMU.

If the Aquilion ONE is used late in the pathway, there are still considerable, although smaller, savings.

The study concludes that further research is necessary to validate the new diagnostic pathway with Aquilion ONE and the cost calculation derived.

<sup>1</sup> "Economic Value Modelling of the Use of Aquilion ONE in the Diagnosis of Patients with Acute Chest Pain Presenting to A&E"; Dr. Gerald Schnell Partner, and Tina Anne Schuetz, Consultant, Simon-Kucher & Partners.



3D CTA dataset acquired by Aquilion ONE with single, non-helical rotation.

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