Convincing evidence exists to validate the use of coronary CT angiography (CTA) to triage patients presenting with chest pain to the Emergency Department (ED). Yet, creating a successful chest pain triage program requires more than just implementing technology. It should involve developing new protocols and fostering collaboration between clinical specialties to successfully change patient management and outcomes.

At Baptist Hospital of Miami, Ricardo C. Cury, MD, FSCCT, Chairman and CEO of Radiology Associates of South Florida and Director of Cardiac Imaging at Baptist Hospital, and his colleagues have implemented ED chest pain protocols, including the use of CTA. These protocols have helped to decrease length of stay and the cost of care and improve clinical outcomes. The target for the ED, he says, is to quickly assess patients with a low probability of acute coronary syndrome.

This was no easy task. Baptist Hospital has a 100-bed ED and sees an average of 25 patients each day presenting with chest pain. In the ED, 10 CTAs are performed daily on a LightSpeed VCT.

In addition to having the right technology, Dr. Cury explains, it is important to implement and integrate the CTA protocol—developed in conjunction with ED clinicians, hospitalists, radiology, cardiology and administration—into the patient care process.

“Collaboration across specialties and gaining administrative support are the major drivers for success,” he says. “We held several meetings with these groups to define the protocols—and this is very important so everyone supports and follows them.”
CTA drives successful patient management

Baptist Hospital’s chest pain protocol for the use of CTA defines five levels of care based on clinical presentation, ECG, and cardiac enzymes (Table 1). Patient management is determined by the degree of coronary stenosis detected by CTA.1 Patients without stenosis are discharged to follow up with their primary care physician. Those with mild, non-obstructive stenosis of less than 50% are discharged from the ED and referred for consultation with a cardiologist or primary care physician within one week to ensure proper treatment. In patients with moderate stenosis (50% to 70%), a stress MPI or cardiac catheterization with fractional flow reserve is conducted to determine hemodynamic significance of the lesion. Patients with severe stenosis, graded at 70% or greater are sent to the cardiac cath lab for further diagnosis and possible intervention.

The implementation of a coordinated protocol for chest pain patients using CTA at Baptist Hospital has led to several remarkable results, based on the preliminary experience of over 500 patients.

“Using this protocol, we are able to significantly decrease downstream testing after CTA because 85% of patients could be discharged right away, including those with negative and mild non-obstructive disease.”

– Dr. Ricardo Cury

CTA Chest Pain Protocol – Baptist Hospital

**Group 1.**
Patient with STEMI or new LBBB with ischemic symptoms. For these patients, door to balloon time is within 90 minutes.

**Group 2.**
Patients with non-STEMI or unstable angina, typical anginal symptoms with ST-segment depression, ischemic T-wave inversion, CHF or hemodynamic instability with chest pain. Patients are sent to the cath lab within 24 hours.

**Group 3.**
Patients with a moderate to high risk of ACS, a TIMI score greater than two, atypical chest pain or angina lasting less than 20 minutes, and negative cardiac enzymes and either negative or non-diagnostic EKG. Patients receive a SPECT MPI.

**Group 4.**
Patients with a low risk of ACS, a TIMI score of less than two, atypical chest pain or angina lasting less than 20 minutes, and negative cardiac enzymes and either negative or non-diagnostic EKG. These patients receive a coronary CTA for detection of coronary stenosis.

**Group 5.**
Patients with non-cardiac chest pain. Patients are triaged with a chest X-ray, chest CTA (PE, Aortic Dissection or TRO), ventilation/perfusion scan or GI work-up, depending upon suspected pathology.

The number of major cardiac events (MACE) is also impressive at 0.1% at 30 days, well below the national average found in the literature of 2% to 4%, notes Dr. Cury.
“Radiation dose reduction while maintaining image quality§ with ASiR is a key component in this protocol, particularly as we look at lifetime dose for patients who received multiple CTAs.”

– Dr. Ricardo Cury

The right technology

The LightSpeed VCT features GE’s ASiR® (Adaptive Statistical Iterative Reconstruction) technology which may enable dose reduction. “We routinely use SnapShot Pulse (a prospective gating feature), ASiR, mA range of 250 to 500, and 100 kV to acquire images with an average of 1 millisievert on patients under the age of 65 with a BMI of less than 25,” he adds.

Before implementing ASiR, the average dose was 5 mSv for all patients. “Radiation dose reduction while maintaining image quality§ with ASiR is a key component in this protocol,” Dr. Cury says, “particularly as we look at lifetime dose for patients who received multiple CTAs.”

Patients with heart rates over 60 bpm are given an oral beta blocker—100 mg PO—in the ED as soon as they are identified as a candidate for CTA, Dr. Cury explains. “This is very important as it improves workflow and alleviates the need for an IV beta blocker,” he says. However, if the heart rate remains high, they can still administer the IV beta blocker in the CT room.

Using the AW Workstation, vessels are delineated via an automated post-processing capability with additional processing completed by dedicated technologists. Images are available approximately 15 minutes after completing the case, and in most instances, the report is completed within one hour.

Dr. Cury understands why Baptist Hospital has been successful in implementing CTA in the ED while other facilities have struggled to improve outcomes while simultaneously reducing length of stay and the cost of care. “Coordination of care between specialties, including their buy-in to follow the protocol before patient presentation,” he says, “and having the right technology that provides good image quality and a dose reduction strategy, are all very important contributors to our success.” He recommends that as facilities look to the future, any investment in CT technology must consider both the image quality and dose performance of the system.
Baptist Health South Florida is the largest faith-based, not-for-profit healthcare organization in South Florida. Baptist Hospital of Miami Emergency Department is one of the largest in the United States. The new 67,000-square-foot ED is home to the second busiest emergency center in South Florida, treating more than 80,000 patients each year. The new Center has a total of 100 exam rooms, 20 of which are part of the new Children’s Emergency Center. Included are six state-of-the-art trauma rooms (four trauma rooms for adult patients, and two for pediatric patients) equipped with sophisticated technology to manage the most severe injuries. The new ER is designed to maximize space, visibility and flexibility while providing more comfortable, spacious treatment areas for patients and their families.

Radiology Associates of South Florida (RASF) has served residents of Miami-Dade County since 1968. The practice is the tenth largest private practice group in the US and provides diagnostic radiology and interventional radiology/vascular surgery services to patients with many types of health conditions. RASF is affiliated with five hospitals and 12 imaging centers.

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Figure 1A. A 62-year-old male presented with chest pain to the emergency department. His ECG and cardiac enzymes were negative. The low-dose coronary CT angiography demonstrates a significant stenosis in the proximal LAD (>90%) with non-calcified plaque.

Figure 1B. In same patient, invasive coronary angiography confirms the presence of a high-grade stenosis in the proximal LAD (95%). Patient underwent PCI with stent placement in the proximal LAD.