

Patient Safety Tip of the Week

September 23, 2014

Stroke Thrombolysis: Need to Focus on Imaging-to-Needle Time

Patients with acute ischemic stroke who are candidates for intravenous thrombolytic therapy benefit most when thrombolytic therapy can be accomplished in a more timely fashion. We've done a number of columns on reducing door-to-needle (DTN) times for thrombolysis in acute stroke patients (see our Patient Safety Tips of the Week for November 6, 2012 "[Using LEAN to Improve Stroke Care](#)" and March 18, 2014 "[Systems Approach Improving Stroke Care](#)").

Many organizations have achieved success in reducing the door-to-imaging (DTI) times. But a recent study from Michigan ([Sauser 2014](#)) shows that we may need to focus more on the imaging-to-needle (ITN) times. Sauser and colleagues assessed thrombolytic therapy at 30 Michigan hospitals and found that 68.4% of patients with acute ischemic stroke achieved DTI times within the guideline target of 25 minutes. Yet only 28.7% achieved DTN times within the guideline target of 60 minutes.

They found that neither annual stroke volume nor primary stroke center designation were significant predictors of shorter DTN time. And patient-level factors (including stroke severity among others) accounted for only about 15% of the variation in DTN times between hospitals. Once they adjusted data for patient-level factors, DTI times accounted for only 10% of the variation between hospitals whereas **65% of the variation was attributable to differences in the ITN (imaging-to-needle) times**. Thus, greater focus is needed on improving processes that take place on completion of imaging studies.

Many hospitals have focused their improvement efforts on shortening the door-to-imaging (DTI) time since it has been a key component of the [Get With The Guidelines®-Stroke](#) program. Sauser and colleagues point out that many of the personnel and processes involved in the DTI and ITN intervals are different. Processes after imaging include image interpretation, decision making, ordering and preparing tPA, laboratory testing, discussion and informed consent with the patient and family, and administering the tPA. This requires coordination amongst several different physicians and communication amongst numerous healthcare personnel and other individuals.

One interesting point of discussion in the Sauser study is the observation that decisions take longer when the physician has more time available. They note prior studies have demonstrated patients with shorter onset-to-arrival (OTA) times often have longer door-to-needle (DTN) times. In our March 18, 2014 Patient Safety Tip of the Week “[Systems Approach Improving Stroke Care](#)” we noted a study that mentioned times to treatment are often paradoxically increased in patients having in-hospital strokes ([Meretoja 2012](#)).

One of the key opportunities is getting those other processes underway before or while the patient having his/her imaging studies done. In our March 18, 2014 Patient Safety Tip of the Week “[Systems Approach Improving Stroke Care](#)” we discussed several studies that had demonstrated substantial improvements in door-to-needle times. One done in the US ([Binning 2014](#)) cut its door-to-needle times by over 50% and even had several cases with door-to-needle times under 20 minutes. The other, done in Finland, achieved a median door-to-needle time of 20 minutes ([Meretoja 2012](#)). In both, door-to-imaging times were reduced considerably by having the patient taken directly by EMS personnel to the CT suite rather than to the emergency department. However, a host of other processes were set in place as soon as the EMS personnel notified the hospitals they had a likely stroke patient. Expedited registration allowed for ordering the imaging studies and the blood work. Bloods were drawn for laboratory studies as soon as the patient arrived at the CT suite. In addition, the pharmacy is alerted so that the tPA can be prepared for administration. Lab studies, a bottleneck in many hospitals, were expedited by using point-of-care (POC) testing for the only two critical studies: blood glucose levels and INR’s. A physician, adept at stroke diagnosis but not necessarily a neurologist, evaluates the patient at the CT suite and administers the tPA right in the CT suite if the patient meets criteria and the CT scan and lab results do not show any contraindication.

Another key is that the process of obtaining an accurate history (often from family) begins as soon as the EMS notification comes in. The Finnish program had one additional advantage often not available in the US: an integrated electronic health record.

Another key factor is immediate interpretation of the imaging study. If a radiologist is not available for interpretation (either on-site or remotely) the “stroke” physician interprets it. The Finnish study also emphasizes the need to keep imaging simple. They just do standard non-contrast CT and reserve advanced imaging like perfusion imaging for unclear cases only.

Meretoja and colleagues concluded “the key to success in reducing the delays is to do only the basics while the patient has arrived, and to do as much as possible before, during transport.”

Reducing the overall door-to-needle times gives the stroke patient better odds of good functional outcome. Moreover, the reduced times also increase the percentage of stroke patients that are eligible for thrombolytic therapy. In the Binning study the percentage of patients receiving tPA increased to 18% from their historical rate of 5%.

We suggest that you read our prior columns, listed below, that have good links to many of the good performance improvement studies done on thrombolytic therapy and links to resources from the American Heart Association/American Stroke Association's Target: Stroke Initiative.

Some of our previous columns on improving stroke care:

November 6, 2012 “[Using LEAN to Improve Stroke Care](#)”

March 18, 2014 “[Systems Approach Improving Stroke Care](#)”

References:

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