INNOVATIVE RADIOLOGY COMMUNICATION TOOL HELPS TO REDUCE DOOR-TO-NEEDLE TIME IN PATIENTS WITH ACUTE ISCHEMIC STROKE

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Imaging plays a key role in the current algorithm for administration of thrombolytic therapy.

The goal of nonenhanced CT is to detect: an intracranial hemorrhage, ischemic stroke or other possible mimic of stroke (e.g., neoplasm, arteriovenous malformation) that could be the cause of the neurologic deficit.
Introduction

- Earlier administration of intravenous rtPA after the onset of stroke symptoms is associated with greater functional recovery.
- Reducing time-to-interpretation of the head CTs speeds up the process of clinical decision making, reduces time to intravenous rtPA, or door-to-needle times and therefore improves patient outcome.
To eliminate the delay between completion of the head CT and the preliminary report given to the stroke team.

To decrease the time to rtPA administration.
We were able to reduce the maximum acceptable 20 minute gap between the CT scan performance and interpretation to essentially zero.

We created a communication tool to facilitate a focused assessment of the head CT examinations and to answer the clinical question that would allow the clinician to administer or withhold rtPA, therefore reducing door-to-needle time and improving patient outcomes.
We composed a resident PRELIMINARY REPORT FORM that contains the most common radiographic contraindications for thrombolytic therapy.

Contraindications for rtPA

1. Intracranial hemorrhage
2. Large territorial infarct affecting more than one-third of the MCA territory
3. An intracranial mass
4. Vascular malformations, that can be associated with a high risk of intracranial hemorrhage
5. “Other”: recent intracranial surgery, head trauma, or recent stroke
Materials and Methods

- The purpose of the form was to focus the attention of the resident on the identification of contraindications to rtPA administration at the time of completion of the scan and communication of the findings to the stroke team immediately verbally and in a written form.
Every time a CT that was ordered as a “crisis stroke” is completed, a radiology resident (covering the ED service or the Neurology service) gets an overhead page.
Materials and Methods

- The resident checks the images on the monitor in the CT scan control area before the patient leaves the CT scanner.
- The resident communicates the preliminary findings to the team and fills out the form.
Materials and Methods

- Presence or absence of contraindications for rt-PA are communicated to the stroke team without delay.
- A copy of the form is also scanned into the Radiology Information System (RIS) system as a part of a permanent medical record.
A total of 609 patients with a suspected stroke were analyzed. A two sample t-test was used to analyze the median and mean door-to-CT-read time and door-to-needle time (DNT) 17 months before and 17 months after the implementation of the form (February 2010-July 2011 and August 2011-January 2013).

The number of CT scans interpreted within 45 minutes of arrival 17 months before and 17 months after the implementation of the form was also analyzed using a two-sample t-test.

All statistical analysis was performed using SAS v.9.0 (SAS Institute, Cary, North Carolina) and all significance testing was done at the 5% level.
Results

Average decrease in mean and median DTR times.

Door-to-CT-Read (DTR) Times Decreased

Mean DTR Time

- BEFORE: 59.7 min
- AFTER: 37.4 min

Median DTR Time

- BEFORE: 43.5 min
- AFTER: 30.3 min

Door-to-CT-read time 18 months before stroke form implementation

Door-to-CT-read time 18 months after stroke form implementation
Results

Within the 17 months after the implementation of the form there was significant decrease in:
Mean and median door-to-CT-read times (p=0.0001 and p=0.0005 respectively).
Results

Door-to-Needle Times (DTN) Decreased.

Average decrease in mean and median DTN

Before implementing the stroke form, the mean DTN time was 74.1 minutes, and the median DTN time was 72.5 minutes. After implementing the stroke form, the mean DTN time decreased to 64.1 minutes, and the median DTN time decreased to 59.5 minutes.
Results

Within the 17 months after the implementation of the form there was significant decrease in:
Mean and Median door-to-needle times (DNT) (p=0.01 and p=0.0057 respectively).
Results

There has also been a significant increase in the number of head CT studies interpreted within 45 minutes of arrival with the 17 months after the implementation of the form (p=0.0001) (Fig.6).
Results

There has also been a significant increase in the number of head CT studies interpreted within 45 minutes of arrival with the 17 months after the implementation of the form (p=0.0001) (Fig. 6).

The number of Head CTs interpreted within 45 minutes upon arrival increased significantly after the implementation of the form.

![Graph showing the increase in % CT read within 45 minutes upon arrival before and after the form implementation over 17 months.](image-url)
As a result of the implementation of the form, we were awarded the Stroke Gold Plus Achievement Award/Target Stroke Honor Roll (American Heart Association and American Stroke Association, 2011-2013).

This award recognized Rochester General's commitment and success in implementing excellent stroke care for patients in accordance with evidence-based guidelines.
Conclusions

- Imaging plays a key role in the management of acute stroke.
- Rapid analysis of a non-enhanced head CT in a patient with suspected stroke and immediate communication of the results to the stroke team is key.
- The implementation of the preliminary read form reduced the door-to-CT-read mean and median times by 63% and 70%, door-to-needle times by 87% and 82% respectively.
- It increased the number of CTs interpreted within 45 minutes of arrival to the emergency department by 65%.
- This new practice improved compliance with the AHA/ASA guidelines and therefore improved and will continue to improve patient outcomes.

On the basis of the success that we have achieved via the implementation of this innovative communication tool, we recommend that other institutions adopt this practice. For more information and with any questions please feel free to contact the author at kaplanlist@gmail.com


3. AHA/ASA Guideline. Guidelines for the Early Management of Adults With Ischemic Stroke. Harold P. Adams Jr, MD, FAHA, Chair; Gregory del Zoppo, MD, FAHA, Vice Chair; Mark J. Alberts, MD, FAHA; Deepak L. Bhatt, MD; Lawrence Brass, MD, FAHA; Anthony Furlan, MD, FAHA; Robert L. Grubb, MD, FAHA; Randall T. Higashida, MD, FAHA; Edward C. Jauch, MD, FAHA; Chelsea Kidwell, MD, FAHA; Patrick D. Lyden, MD; Lewis B. Morgenstern, MD, FAHA; Adnan I. Qureshi, MD, FAHA; Robert H. Rosenwasser, MD, FAHA; Phillip A. Scott, MD, FAHA; Eelco F.M. Wijdicks, MD, FAHA.