Original Article

Enhancing turn-around-time (TAT) on stroke protocol head CT reports via continuous quality improvement (CQI) methodology in a busy teleradiology practice

Eigles SB*, Panughpath SG, Kalyanpur A
Teleradiology Solutions, Inc., Bangalore, India

Abstract. Through strict adherence to continuous quality improvement (CQI) methodology, over a 3 year period our teleradiology practice was able to achieve ongoing 100% compliance with our turn-around-time (TAT) goal for interpretation of stroke protocol head CTs. During the 3 years prior to implementing CQI, our efforts to reduce TAT through traditional less systematic methods had been ineffective, while through the iterative CQI method of defining metrics, measuring, planning, implementation, and re-evaluation, we progressively achieved our goal of interpreting all stroke head CTs in less than 15 minutes.

Keywords: Head CT, stroke protocol, TAT, CQI, teleradiology

Introduction

In recent years, there has been increasing recognition of the importance of rapid triage and treatment of non-hemorrhagic stroke, with thrombolysis predicated on first excluding intracranial hemorrhage [1, 2]. To this end, beginning in 2006, our teleradiology company began to prioritize reports for non-contrast head CTs obtained to rule out stroke (stroke protocol). We internally set a goal of 15 minute TAT, a requirement subsequently adopted by one client hospital in 2009, and later by all of our clients. In 2010, the American Heart Association publicized a 1-hour door-to-needle goal, including up to 20 minutes for radiology reporting (AHA/ASA 2010 Stroke Campaign Manual) [3]. After three years of monitoring stroke protocol TAT, as of late 2009, administrative efforts to reduce TAT had been relatively ineffective. Between 2006 and 2009, average stroke head CT TAT was only 16.0 minutes, but 40% of cases exceeded 15 minutes (Fig. 1).

We then began a long-term systematic CQI initiative, which we continue to the present time. This project has resulted in a dramatic sustained decrease in the number of delayed cases, achieving our goal 15 minute TAT goal as well as reducing average TAT.

Materials and Methods

We first selected our metric and in stages more accurately defined it. We replaced our focus on average TAT in favor of percentage of cases <15 minutes, a metric which more accurately reflected client concerns. We defined TAT as starting when all images and the order are received by our company, and ending at the commencement of a phone call communicating the results.

We required all parties handling each delayed case to comment on reasons for delay (RFD), which previously had been largely unknown to our administration. The most common RFD were: complex protocol (brain CTA, perfusion, etc.), complex report, order changed to stroke, TAT not adjusted per metric, and long hold time. In addition to the self-reported RFD, we examined the correlation between TAT and a spectrum of potentially unreported factors, including individual radiologist, hospital, report type (positive versus negative), radiologist location, weekday versus weekend, time of day, patient age and gender, multiple simultaneous exams, number of images, availability of prior exams, completeness of images, and whether the report was called by the radiologist or a clerk. We found particularly positive correlations between the number of delayed cases and (a) individual radiologists, (b) specific hospitals, (c) positive reports, (d) the transmission of multiple simultaneous exams on the same patient, and (e) calls made by the radiologists (see example, Table 1). With regard to the radiologists, there was no correlation between delayed cases and specialty training or years of experience.

On a monthly basis, we implemented specific workflow changes to address the most significant issues. Examples of such changes include:

1. Coordinator immediately notifies radiologists of

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 * Corresponding author: Stephen B Eigles, MD
    (stephen.eigles@gmail.com).
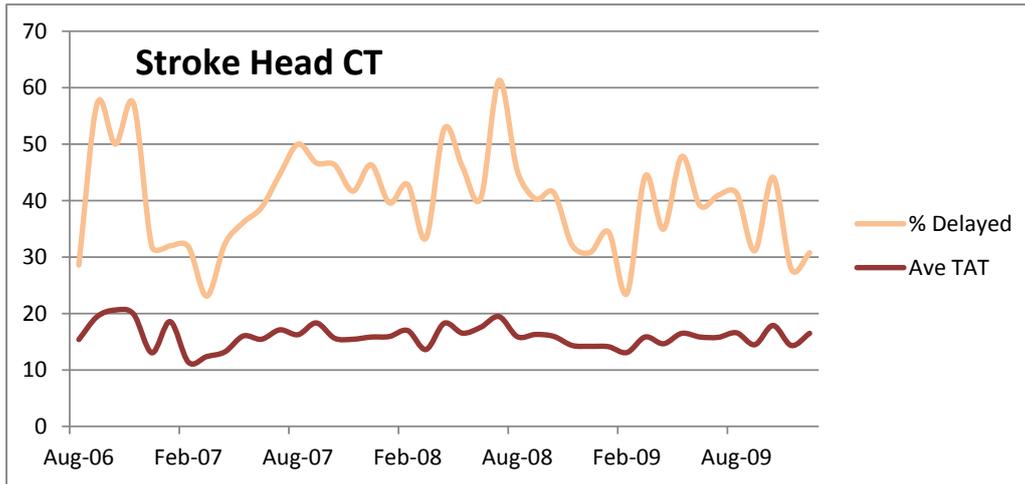
Figure 1 Average stroke head CT TAT between 2006 and 2009 was only 16.0 minutes but 40% of cases exceeded 15 minutes.
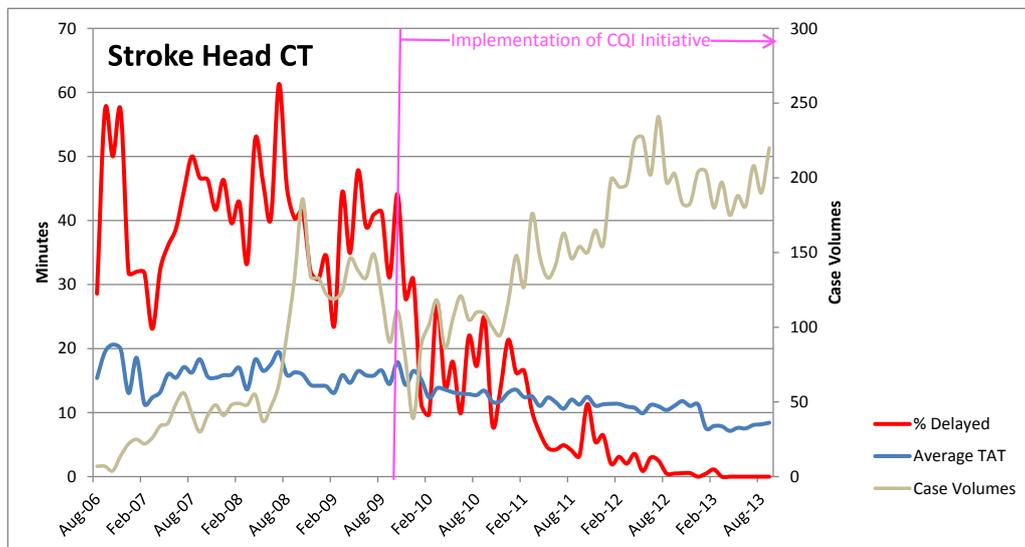
Figure 2 CQI Step 6: Goal achieved.

stroke exams.

2. Cases are assigned to the fastest radiologist.

3. Radiologist informs if busy, and the stroke case is reassigned.

4. If a probable stroke exam is ordered incorrectly, it is treated as a stroke while confirming.

5. TAT times are calculated as per metric definition.

6. Radiologist calls results before entering the report or receiving prior images/report.

7. All teams (order entry, radiologist, proofer, call center) are trained re importance of stroke exams and protocols.

8. Mandatory RFD on delayed cases

9. Stroke TATs are discussed in every monthly radiologist conference.

10. Work with hospitals to:
   a. Unbundle multiple exams
   b. Specify stroke exams
   c. Facilitate radiologist calls to providers

We subsequently evaluated whether the changes were having the desired effect. Summarized data was shared with staff and radiologists, and we determined which RFD had resolved, and which still needed action. Through group discussion of the findings, brainstorming led to suggested workflow changes that achieved the desired outcome. We used control charts to assess our performance on an ongoing basis, such as in this sample (Table 2).

Results

Over a period of several years, by iteratively performing the CQI process on a monthly basis, we gradually reduced the number of delayed cases, to the extent that in the ensuing years, despite increasing case volumes, we have had no more than 1 delayed case each month. In 2006, we labeled just 54 cases as Stroke Protocol, but only 57% had a TAT<15 minutes. By 2012, we labeled 2,454 cases as Stroke Protocol and yet achieved

TABLE 1
CALLS MADE BY RADIOLOGISTS

	All Rads	Rad A
Mean TAT (min)	10.6	16.2
No. of observations	113	8

TABLE 2
SAMPLE MONTH RFD ANALYSIS

2010	Aug & Sept	Oct
Reason For Delay	# cases	# cases
Unknown	4	2
Order needs corrections	1	
Images arrived late	1	
Delated order entry	1	6
Prior exam	1	
On hold with hospital	3	3
Busy	1	
Report not noticed, resent	1	
Additional history needed	1	
2nd opinion needed	1	
Doc would only speak ww rad	1	
Complex		2
Radiologist busy		4
RIS/PACS problem		2

Delayed cases covered by prior policies
Delayed cases covered by new policies

>99% TAT<15 minutes, as well as cut the average TAT in half (Fig. 2).

Conclusion

CQI has been a highly effective method of treating the complex problem of report delays, allowing us to achieve our TAT goals through incremental workflow changes.

Acknowledgement

Conflict of Interest

The authors declare no conflicts of interest.

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