

Tailored Radiologist Reports Regarding Clinician Notification of Cerebral Infarct or Hemorrhage Exacerbations or Complications Improve Overall Compliance Rates

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Purpose

Timely reporting of Critical Values enhances health care delivery.

We recognize that it is important not only to report new/acute findings in those patients characterized prospectively as suspicious for undergoing "acute stroke", but also to notify clinicians about new or expanded infarcts, or consequences thereof including mass effect or hydrocephalus, even for patients not specifically introduced as undergoing stroke alert studies.

The aim of this quality initiative was to determine if a tailored notification regimen could improve notification rates by radiologists in this patient population.



Methods

At the end of each month (Feb 2013-Sep 2014) we mined all CT Head and MRI Brain reports from our practice.

Using key phrases and excluding negating language, we developed a technique in Microsoft Excel to automatically refine the candidate exam list to about 6% of studies with highest probability for acute findings.

Cases designated as discrete Stroke Alert CT's were excluded from consideration, since those exams have a discrete workflow and notification regimen.

The reports for these remaining studies were then reviewed individually for signs of new or increased infarction or hemorrhage, as well as increased mass effect, hydrocephalus, and other consequences meriting notification.



Methods

Radiologists were provided with monthly customized reports summarizing their notification performance.

We undertook several PDSA cycles. The first provided gross reporting success percentages for these critical values, follow by successive waves of increasing information:



specific language from reports that warranted notification for each individual, then



examples of (anonymized) reporting failures to the entire group, then



report verbiage which indicated specifically why each case should have been reported, then



section-wide imaging examples and associated reports



PDSA Methods



Cycle 1:
Email advising radiologists (fellows and attendings) of this new monitoring project with presentation of baseline data



Neuroradiologists-

We have begun to monitor compliance for notifying clinicians of: **NEW OR EXPANDED INFARCTS OR HEMORRHAGES, OR SECONDARY COMPLICATIONS THEREOF** (including developing hydrocephalus or herniation), regardless of whether these findings may be expected in any given percentage of cases.

For notification of new or expanded infarcts and hemorrhages, we documented clinician notification in **80.0%** (8/10). Note that both missed opportunities came in cases where the findings were made, but communication of findings directly with clinician were not documented.

We will continue to follow performance of notification in these cases. Please do not hesitate to contact me with questions about the goals of this project or the mechanisms of data collection.

Thanks,



PDSA Methods



Cycle 2:
More detailed report with individualized emails to radiologists identifying specific cases the did not meet our goal

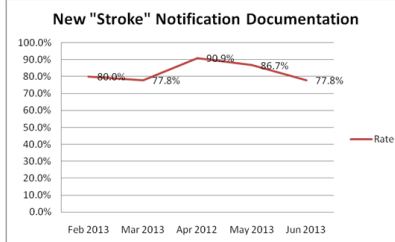
Neuroradiologists-

Below is the June performance for documentation of notification in positive "stroke" cases. It is imperative that we document timely notification for all new or expanding infarcts or hemorrhages, along with significant changes in mass effect or hydrocephalus.

Obviously June data will include performance by the graduated fellowship class; new fellow performance will be presented in the July report.

Cases which were not documented will be presented to involved radiologists in separate email(s).

Summary Data			
Acute Infarct/Hemorrhage Notifications (Stroke Alerts CT's counted separately, not included)			
Month	Newly diagnosed acute hemorrhage or infarcts	Notification documented	Rate
Feb 2013	10	8	80.0%
Mar 2013	9	7	77.8%
Apr 2012	11	10	90.9%
May 2013	15	13	86.7%
Jun 2013	9	7	77.8%



I appreciate your continued vigilance.

PDSA Methods



Cycle 2:
More detailed report with individualized emails to radiologists identifying specific cases the did not meet our goal

Personalized e-mail example:

Dr. [REDACTED]

This case was dictated by a resident, but it falls on the attendings to ensure that there is adequate documentation of communication for new or expanded strokes or hemorrhages. Please let me know if there is anything I can do to increase compliance.

Date	Acc	Newly diagnosed acute infarct/hemorrhage	Notification
2013	67	New right lacunar infarct	--

Thank you,



Cycle 3:
Even more detailed report with verbatim reports and Q&A-style teaching points for all radiologists to internalize



There may be some lingering confusion regarding when notification is necessary regarding acute or expanded infarcts or hematomas, or expanding consequences of these entities.

It is imperative that we document notification to a clinician about these findings if

- 1) the clinician is not yet not aware; or
- 2) the clinician had suspected the process but lacked proof.

Please review these illustrative examples which I hope clarify when notification is necessary:

CASE 1.
Consider the following from a head CT report:
IMPRESSION:
 AGE-INDETERMINATE LEFT PONTINE INFARCT.
 WHITE MATTER CHANGES MAY REFLECT CHRONIC MICROVASCULAR ISCHEMIC DISEASE.
 NO LARGE HEMORRHAGE OR MIDLINE SHIFT.

Notification to clinician of alert:
 Dr. White from the ER was notified about the age indeterminate pontine infarct at 1200 on 9/10/2013 with readback confirmation. The opportunity for questions was provided and all questions asked were answered."

and the brain MRI report from a study 24 hours later:
IMPRESSION: MRI shows acute infarct in the left pons which extends from the midline to the left side of pons."

Q: Do the MRI findings warrant notification?
 A: **YES**, because even though there was notification in the first Head CT, the determination of age was inconclusive. It was only upon interpreting the brain MRI that we could establish the acute nature of the infarct.

CASE 2.
Consider this head CT report:
 "There is further evolution of the previously noted left frontal zone of ischemia. It is now seen to involve the left frontal operculum at the lateral aspect of the superior frontal gyrus, the middle frontal gyrus and the lower portion of precentral gyrus extending into some central gyrus. Medially there is involvement of superior frontal gyrus extending to the interhemispheric fissure. There is mild mass effect."

Q: Do these CT findings warrant notification?
 A: **YES**, because even though an infarct had been described previously, this study shows extension of the infarction bed.

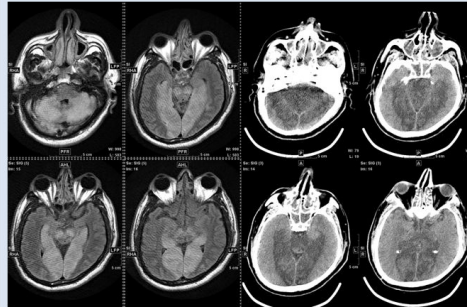


Cycle 4:
Most detailed report images and verbatim report examples to illustrate why target was not achieved

This past month for notification of **new or expanded infarcts and hemorrhages**, we documented clinician notification in **85.7% (6/7)**. As was the case with the missed notification opportunity in January, this month's instance came despite documentation of **increased mass effect** in the report. Please take a moment to review this:

Illustrative Case:

This 58 y/o male patient presented to Mount Sinai Queens with mental status changes and was ultimately found to have distal basilar thrombosis. A CT, MR, and subsequent CT were performed here over the following week (images from the MR and the second CT are shown below).



Reports for the MR and CT both described the infarct distribution correctly, and the CT further includes:

"Edema results in effacement of the cisterns about the brainstem, fourth ventricle, and sulci about the **cerebellar** hemispheres, more severe than was present on the prior MR."

This case was flagged because **is no documentation of communication** of these changes with a clinician.

We have enjoyed much success in notification of critical values, but please remember that changes in mass effect are a definite criterion for clinician notification.

Thank you for your continued vigilance.

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Results

The reporting compliance increased from 83.3% to 94.0% (three month rolling averages), including six individual months at 100%.

Notification Rates (3m Average)



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Results

Subjectively, there is greater awareness of the need to notify when imaging findings grew more conspicuous.

Success is now documented and monitored by the Performance Improvement Committees of both Radiology and the Stroke Service.



Conclusion

Customized monthly reports informing radiologists of their specific success in documenting clinician notification of new or expanded infarcts and hemorrhages, and consequences thereof, enhances performance.

Progressive PDSA cycles, with more illustrative presentation in each wave, led to even better performance overall.

This method serves as a model that can be extended to other sections in the Department to enhance overall communication with clinicians.

