

MANAGEMENT OF CRITICAL IMAGING RESULT COMMUNICATION IN AN ACADEMIC SETTING: ASSURING TIMELY AND ACCURATE COMMUNICATION USING A PACS/DICTATION- INTEGRATED NOTIFICATION SYSTEM.

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BACKGROUND

- Inability to quickly communicate critical results to the appropriate clinician is a significant potential source of medical error.
- Other potential errors observed in our institution:
 - Failure of the radiologist to appropriately document communication.
 - Failure of the clinician to act on reported critical or incidental imaging findings.
- In an effort to improve patient safety and reduce miscommunication, a commercially available imaging result notification system was integrated into our PACS/dictation software.
- The result notification software was under-utilized prior to the implementation of a communication policy in the Radiology Department.



PURPOSE

- To assess the best implementation strategy of a closed-loop communication process utilizing the dictation system in Radiology.
- To demonstrate the importance of a departmental policy regarding critical and incidental imaging finding communication.
- To automate the process of tracking and monitoring critical and incidental findings in Radiology.



METHODS

- UMC radiology department purchased a commercially available results notification software in 2013. Data collection indicated underwhelming utilization of the software.
- In January 2014, changes were made to ease the utilization of the communication system, and a departmental policy was implemented with the goal of improving the speed and accuracy of critical result notification.
- Two Clinical Outcome Coordinator positions were created to oversee all messages in the system and follow-up documentation in the patient's electronic medical record.
- The policy was used to standardize the communication and documentation of critical results in our institution through the use of the notification software.
- A mandatory training module on the critical result communication software was created in order to educate all ordering providers at our institution.



METHODS

- The notification software was integrated into the dictation software to ensure accurate documentation into the imaging report and PACS.
- With only one click or voice command, the radiologist creates a voice message that is sent to the ordering provider. After message is sent, the name of the notified provider, date, and time are automatically placed into the imaging report.
- If the user spoke to physician/provider directly, an option exists to document the communication without requiring a voice message to be sent.
- The physician/provider is contacted via his or her preferred contact method (usually paged with a phone number which allows them to listen to the voice message and confirm receipt or create a reply).



METHODS

- If a provider is not in the communication system, there is an option to send a voice message to the critical result coordinator (from radiology), who is responsible for relaying the message to the appropriate provider and adding the provider contact information to the communication system.
- In areas of the hospital with shift workers or high turnover of providers/residents (ED, NICU, etc.), critical and incidental messages are sent to a designated Clinical Outcome Coordinator representing that group of providers. The coordinator is responsible for relaying the message to the appropriate team caring for the patient and confirming receipt.



METHODS

- Critical and incidental results were categorized into three main categories:
 - **Yellow** results include incidental or unexpected findings that frequently need follow-up imaging and require clinician notification within 24 hours.
 - **Orange** results are more urgent and require notification within 12 hours.
 - **Red** results are reserved for critical results that require urgent notification within 60 minutes and are usually accompanied by a phone call to the ordering clinician.
- Separate notification categories were created for pulmonary nodules that required follow up or were deemed suspicious for malignancy, which are sent to a dedicated pulmonary nodule clinic nurse.



CATEGORY EXAMPLES

RED Results Compliance Goal = 60 min	ORANGE Results Compliance Goal = 12 hrs	YELLOW Results Compliance Goal = 24 hrs
Tension pneumothorax	Massive pleural effusion	Incidental findings needing follow up
Acute aortic dissection	Pericardial effusion	Pulmonary nodule Needs Follow-up
Acute/massive pulmonary embolism	ARDS/opportunistic infection	New or recurrent malignancy
Ruptured AAA	Unexpected pancreatitis	Incidental AAA
Acute GI bleed	Unexpected diverticulitis/appendicitis	Incidental intracranial aneurysm
Unexpected pneumoperitoneum	Unexpected biliary obstruction	Chemotherapy toxicity
Bowel obstruction/volvulus	Pseudoaneurysm	
Colonic intussusception	Unexpected acute fracture	
Retained operative foreign body	Acute septic joint/osteomyelitis	
Ovarian/testicular torsion	Occluded vascular graft/endoleak	
Ectopic pregnancy	Intracranial infection	
New intracranial hemorrhage	Obstructive hydrocephalus	
New spinal cord compression		
Dural venous sinus thrombosis		
Non-accidental injury		

Escalation Process

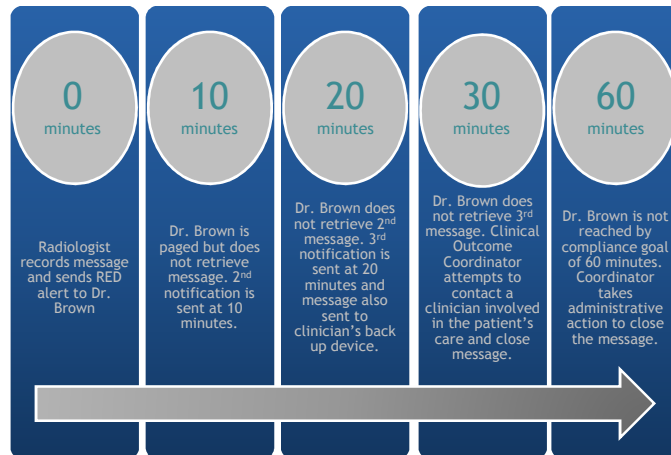
An automated escalation process within the notification software exists for each alert category.

Specific time limits were established for notification increments, use of provider back up device, and initiation of fail safe (coordinator gets involved).

	Red	Orange	Yellow
First Alert	0 min	0 min	0 min
Incremental Notification	10 min	1 hr	3 hrs
Start Backup Device at	20 min	3 hrs	6 hrs
Fail Safe (coordinator)	30 mins	6 hrs	12 hrs
Compliance Goal	60 min	12 hrs	24 hrs

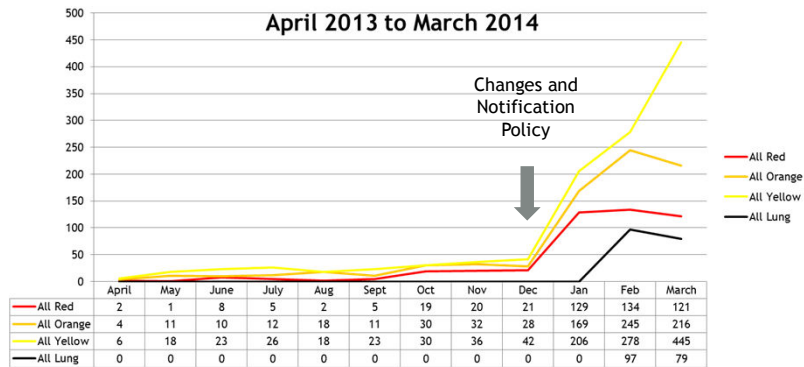


EXAMPLE ESCALATION PROCESS FOR AN ALERT



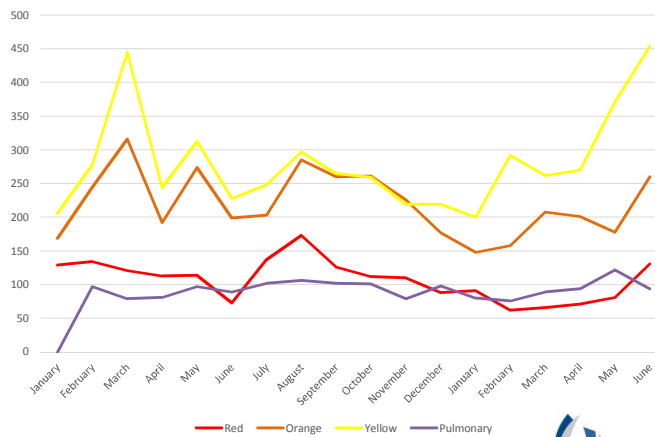
RESULTS

- Dramatic increase in utilization of the notification system since the changes were made to the software and a policy was created in January 2014, including all result categories.
- In the 9 months previous to implementation of the departmental policy, the average number of critical results entered into the system was only 51 per month.



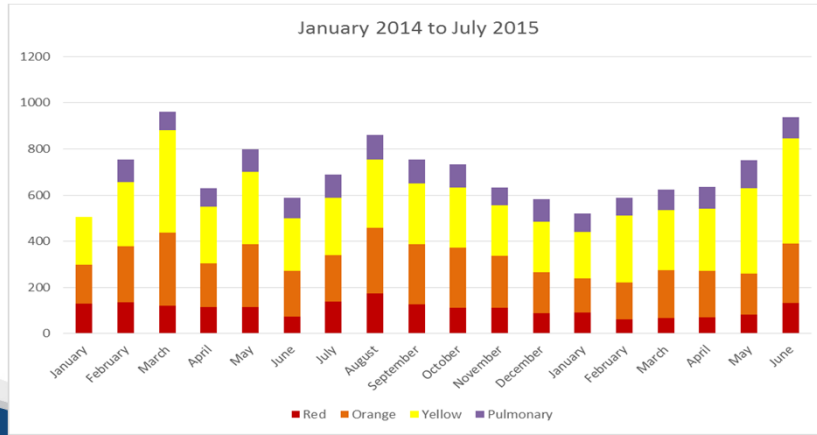
RESULTS

Trends in Usage of Notification Software Since changes in the software and Implementation of Departmental Policy - 2014/2015



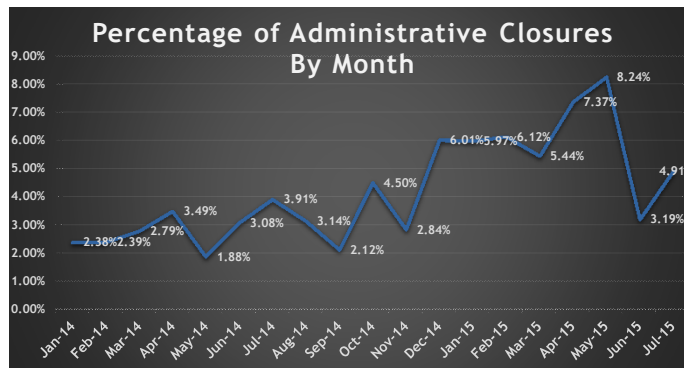
RESULTS

Currently, we are averaging 700 closed total messages per month with increased compliance by the radiologist, satisfaction by the referring provider, and improving overall patient care.



RESULTS

Majority of critical results messages are closed by the ordering providers in our institution. The percentage of messages closed by an administrator is consistently less than 10%, averaging 4%.



RESULTS

- The Clinical Outcome Coordinators in radiology oversee the messages created and check for appropriate documentation and follow-up in the patient's electronic medical record.
- An escalation policy is also in place regarding the lack of documentation and follow-up in the EMR, with recurrent reminders for the clinicians and also directly to the patient.
- From January 2014 to July 2015:
 - **296** letters were sent informing patients with incidental findings requiring follow-up.
 - **225** letters were sent informing patients with incidental lung nodules requiring follow-up imaging.



CONCLUSION

- An integrated PACS/Dictation physician notification system was readily adopted by radiologists at the University of Mississippi and has demonstrated effective closed-loop communication of critical and incidental imaging results to ordering providers/clinicians.
- Critical findings are relayed with increased speed and accuracy in our institution as a result of a departmental communication policy. Communication also improved significantly by simple observation, i.e. the "Hawthorne effect."
- The implementation of Clinical Outcome Coordinators in radiology was crucial for monitoring the communication and documentation process as well as ensuring appropriate follow-up for our patients.



FUTURE DIRECTIONS

The next step in this process will be to integrate the communication software directly into our electronic medical record in order to automate the process of notification, documentation, and follow-up.

