Executive Summary

In recent years, the responsibilities of radiologists have greatly increased to not only making the proper radiologic diagnosis, but to deliver prompt, safe, efficient and friendly service. The timely reporting of radiologic results to referring clinicians has become an important topic in recent years, specifically recognized by the American College of Radiology, which has been continually updating guidelines to be adhered to by radiologists.

Our institution, Maimonides Medical Center, recognized the potential dire consequences of delayed communication of radiology test results and the resulting failure of clinicians to review radiologic reports, and implemented a Critical Test Result Management (CTRM) software system four years ago in order to minimize the occurrence of potential negative patient safety and care outcomes.

The implementation of the CTRM system has dramatically improved radiologist’s and clinician’s workflow. It provides a safe and reliable method in which radiologists are able to convey important radiologic findings and a quick way for clinicians to obtain radiologic reports, which ultimately improves patient safety and care.
SUBMISSION

Title: Closing the Communication Gap Between Diagnostic Radiology and Clinicians

Background Knowledge:

Maimonides Medical Center is a busy, 730-bed community hospital, with more than 1,200 admitting physicians and two satellite facilities in the heart of Brooklyn and two in Staten Island, New York. Our hospital performs a large number of radiologic studies daily, and has the fifth highest volume of Emergency Department visits in the country. Therefore, we are certainly not spared from the radiologic communication dilemma that has become a major contributor in medical malpractice.

During the past decade, the field of radiology has grown exponentially and clinicians have ordered significantly more diagnostic exams across all modalities. In today’s fast paced and “consumer-driven” medical environment, there are more demands imposed on clinicians to deliver quick and accurate care. These increasing demands have made it difficult for them to review imaging results in a timely fashion, resulting in potential dire consequences for their patients and medical-legal implications for their organizations.

Aside from making the proper diagnosis, the radiologists’ responsibilities have also increased with a focus on prompt delivery of diagnoses to facilitate patient care, and to satisfy the referring clinicians. Because of this dramatic increase in the number of exams performed, malpractice surrounding radiologist-related errors in diagnosis has also increased approximately 40 percent between 1996 and 2003. Moreover, claims payouts due to communication breakdowns in conveying test results rose by $70 million from 1991 to 2010 across all specialties. Therefore, quick and accurate communication between radiologists and clinicians has become more critical than ever in today’s time-sensitive medical delivery system.

Although the most common cause of medical malpractice litigation in the U.S. is “failure to diagnose,” the second most common cause is failure to communicate results of radiologic exams. The communication breakdown between hospital clinicians and private clinicians has also been under evaluation, albeit not to the extent of radiologic result communications. Thus, the healthcare industry and advocacy organizations are increasing attention to critical test results notification.

The American College of Radiology (ACR) has also recognized the increasing responsibility of radiologists to communicate urgent and/or critical findings. The ACR’s “Practice Guideline for Communication of Diagnostic Imaging Findings” which was originally published in 1995 has gone through multiple revisions up to the most recent 2010 edition. The ACR guideline recognizes that effective communication is a critical component of diagnostic imaging. According to the ACR, an effective method of communication should: A) Be tailored to satisfy the need for timeliness; B) Support the role of the interpreting physician as a consultant by encouraging physician communication; and C) Minimize the risk of communication errors. Ultimately, timely receipt of the report is more important than the method of delivery.

Local Problem:
The current environment in both hospitals and physicians’ offices is rife for communication breakdown. Typical primary care physicians receive more than 40 radiologic reports weekly. Eighty-three percent of these physicians report delays in receipt of test results, and only 41 percent expressed that they are satisfied with how tests results are managed.

A recent study conducted by Gale et al. tried to define the magnitude of malpractice costs related to communication failure. Using linear regression analysis of the National Practitioner Data Bank from 1991-2009, they found that claims payments in radiology malpractice cases have increased by an average of $4.7
million annually. While the majority of malpractice cases continued to involve failure of clinical diagnosis, communication failures accounted for four percent of cases by volume and seven percent of the total cost.

Among 8,400 claims recorded from 2004-2008, 306 of them were related to failure of communication of results.\(^4\) Radiologists were named as the primary defendants in 7.8 percent of cases. Medicine was the primary responsible specialty in 40.1 percent. The most common contributing factor was failure to notify the patient of the result or an incorrect result, followed by failure to notify the referring clinician.

**Intended Improvement:**
In a strategic attempt to bridge the communication gap between the radiology department and our referring clinicians, we employed a CTRM software system four years ago. The radiology department administration foresaw communication as being a major issue, and approached the hospital administration, along with all the departmental chairpersons, regarding implementation of this automated CTRM system. The overarching goal of this endeavor was to minimize the occurrence of potential negative patient safety and care outcomes through the implementation of a CTRM solution. Communication turnaround time (TAT) goals for CTRM were 60 minutes for critical findings and 24 hours for unexpected findings. Pre-CTRM, TAT for critical and unexpected findings were not defined in terms of a time frame but rather to reach the referring clinician immediately for a critical finding and as soon as possible for an unexpected finding. The challenge pre-CTRM was being able to reach physicians directly and quickly so a patient was not lost in the system.

**Planning and Implementing the Intervention:**
We presented a practical and systematic approach in implementing CTRM technology across our enterprise to address radiology results communication. The Radiologists and Radiology Administrator investigated various CTRM options through vendors that we have had business relationships with and at the RSNA. The Nuance solution implemented was found to be the most flexible, customizable and user friendly for our enterprise.

Many multi-departmental meetings were conducted, where potential benefits to patients and clinicians were presented, as well as the cost-savings (reduction in potential malpractice suits and claims) that this CTRM system might potentiate. Meetings were initially at a very high level between senior radiologists/administrators and the chief medical officer, legal department, risk management and performance improvement staff to discuss the impact and added value of such technology. Once consensus and approval were obtained, the radiology department presented this to the departmental chairpersons and executive medical committee. This concept was initially met with some skepticism at the medical staff level, along with concern for loss of direct contact with radiology and unnecessary interruption in clinician workflow. However, with strong evidence (both medical and legal) supporting the dire consequences of communication break-down and taking into consideration the large volume of studies performed at our institution – as well as communication failures at our facility in the past (some with negative outcomes- two cases of incidental lung nodules on CT imaging that were mentioned in the final radiology report but not directly communicated to the referring clinician verbally. In both cases, the ordering physician did not review the final radiology report. Two years later, both patients’ lung nodules developed into lung cancers with resultant litigation.) – the CTRM system was implemented. This entire process took approximately eight months.

The next step of our implementation process was to decide how we should use this CTRM system given its flexibility. Consensus was achieved among all departments and radiology divisions to compile the diagnoses constituting “Critical” and “Unexpected.” Only these findings would warrant the use of this automated contact system, to reduce unnecessary disturbance to workflow. (See Table 1 and 2). In total, this process took one month.

After establishing the criteria for critical and unexpected findings by consensus, the time to respond was also decided among all departments to be: (A) Critical – up to 60-minutes after initial contact, or (B) Unexpected and Abnormal – up to 24-hours after initial contact.
The Emergency Department (ED) also participates in this automated system known as “ER Callback,” for radiologists to convey unexpected results for patients directly discharged from the ED in order to reduce the risk of loss to follow up. Their compliance time was set to be 36-hours, and the criteria encompasses anything considered to be an unexpected finding that requires further workup or follow up. For a patient discharged directly from the ED with a critical finding, there is direct communication between the radiologist and the lead physician in the ED. For any patient that has been admitted to the hospital through the ED, the previously stated critical and unexpected criteria apply and the CTRM system is activated.

Additional situations for which this CTRM system may also be used for rapid communication occur in cases of discrepancy in radiologic results: (A) If a resident radiologists’ preliminary report was inadequate or inaccurate, attending radiologists may employ this system, or (B) If attending radiologists find discrepant results for radiologic exams on the same patient.

Next, with approximately 1,200 clinicians associated with our enterprise, including outpatient clinics, contact information was compiled. Each attending physician was given the choice of how they would prefer to be contacted. The paging system using their existing pager was the modality of choice selected by the administration and head of the clinical departments. This was one of the most time consuming processes as it involved a concerted effort by the department of radiology and the chairpersons of the other departments to ensure that all physicians in the enterprise responded so the data base could be accurately built. This process lasted six months, but is ongoing as new physicians are added to staff, other staff leaves and individuals change their preferred method of contact.

The clinicians also had the choice of selecting the frequency of contact within the allotted response time – for example, paging every 15 minutes vs. every 30 minutes within the 60 minutes of compliance time. In order to avoid unnecessary interruption in clinician workflow and their personal lives, embargo periods were also established with respect to reporting unexpected findings. For all unexpected findings made after 8 p.m. (seven days a week), the automated message/paging is not initiated until the following morning at 8 a.m. in order to adhere to normal working hours. Weekends and holidays are also embargoed for unexpected findings.

Once these above parameters were agreed upon, the implementation of this system began in phases: (A) Initial introduction to the Intensive Care Units (MICU, SICU, PICU); (B) Followed by medical and surgical floors; (C) And finally, outpatient clinics and offsite medical facilities associated with our institution. Each phase in was a two month process. As one implementation became successful and any kinks were identified and corrected, the next implementation began.

Since CTRM was a hospital mandated program, success was measured based on physician compliance and responsiveness to the radiologists calls within the designated call back times. Data is gathered for every activation of the system to monitor compliance of the receiver physician. Data is analyzed and presented monthly at the Radiology Performance Improvement meeting (PI) and quarterly at hospital wide PI. Outliers are reported to their appropriate chairperson when there is consistent lack of compliance. Radiology physician usage is monitored based on compiling monthly individual user statistics.

**HIT Dimensions Utilized:**

CTRM is a hosted communication system that merges voice and data technology to ensure fail-safe, verifiable, direct communication between diagnostic departments and ordering clinicians. CTRM enables healthcare organization’s diagnostic departments to automate the communication, receipt, and verification of critical test results (CTRs). Previously, hospitals used time intensive and unreliable manual systems, processes, and tools. Simply put, CTRM streamlines critical communications between diagnostic departments and referring physicians, and then verifies the receipt of CTRs. CTRM can significantly reduce turnaround time, decrease a patient’s length of stay, and improve the timeliness of patient care decisions.
Here’s a step-by-step process as to how CTRM actually works: (See Figure 1)

1) The radiologist enters the patient’s last name, first name, and medical record number.
2) The radiologist selects the ordering clinician from a drop down menu compiled of all the clinicians and medical teams. The radiologist can also type in the attending’s name to activate the auto-fill function to expedite the process. More than one MD can be contacted by cc’ing them in situations where there are multiple consultants involved in the patient’s care thus keeping everyone in the loop.
3) The radiologist defines the finding as unexpected or critical.
4) The radiologist records the pertinent findings and recommendations (short audio file which is archived and admissible in court) using the same dictation system that is utilized for reporting results.
5) The radiologist sends the message.

Once a radiology report is recorded, time of creation, unexpected vs. critical nature of the report, and contact information of the recipient are all documented for the radiology CTRM administrator to view. This system is automated and requires essentially no administrator input. (See Figure 2)

The clinician will receive a text page with a phone number to call, along with a unique six digit access code (never the same or unique to a physician) that pertains to that particular report. They simply have to call that number and enter the access code to retrieve the message. When the finding has been received by the clinician, the time and date of receipt is recorded and stamped. (See Figure 3)

When the clinicians receive the page, they can retrieve the recorded message at their earliest convenience within the allotted compliance time. The “transaction” is completed once the clinician retrieves the recorded message, and the radiologists will have the assurance of the clinician’s acknowledgment of such critical/unexpected findings. The clinician also has the opportunity to contact the reporting radiologists using the provided pager number with each report should they wish further clarification or want to discuss the case in more detail.

This entire transaction is documented and archived in a remote database by the vendor, which may be utilized in a court of law. The response time for each clinician is documented every time they return a page, allowing collection of compliance data.

Compliance data may be generated in several categories: the type of study (critical vs. unexpected), ED call-back system, and the individual clinicians. Each month, the CTRM administrator generates compliance data to assess the areas that require improvement, and also the clinicians that may not have adhered to the aforementioned response time. (See Figure 4-7)

Outcomes:
Since the implementation of the CTRM system to date (four years), there has been no documented malpractice litigation regarding radiologist communication in our institution. Radiologists in our department are more efficient in that they spend less time finding doctors to convey results and have more time to interpret imaging studies and teach.

Additionally, the department of radiology gauged the influence on clinician workflow and satisfaction since employing the CTRM system. Surveys of radiologists and clinicians were conducted to assess their likes and dislikes about this system. A total of 85 clinicians were assessed with our anonymous survey, and a total of 16 radiologists were surveyed to assess their opinion about using the CTRM system.

Survey Results:
- General surgery and surgical subspecialties constitute 19/85 surveys
- Subspecialties include: Urology, plastic surgery, orthopedics, and obstetrics/gynecology
• Internal Medicine and Medicine subspecialties constitute 66/85
• Subspecialties include: Cardiology, hematology/oncology, gastroenterology, radiation oncology, and infectious disease

Out of the 85 clinicians who completed the survey, 74 (87 percent) have received messages from the CTRM, 11 (13 percent) have never utilized this system.

**Frequency of contact by CTRM:**
- 1-3 times/week: 57/74 (77%)
- Less than 1 time/week: 15/74 (20%)
- 4-6 times/week: 3/74 (4%)

**Overall satisfaction:**
- 52/74 (70%) Like the current CTRM reporting system, while 22/74 (30%) dislike the system
- 41/74 (55%) Physicians responded that they prefer the CTRM system to the conventional way of radiology reporting
- 32/74 (43%) Responded that direct telephone contact by radiologists is always preferred

**Impact on workflow:**
- 35/74 (47%) Clinicians responded the CTRM has significantly expedited patient management
- 4/74 (8%) Clinicians responded that patient satisfaction has increased because of this system
- 28/74 (37%) Clinicians responded that there has been no impact since such implementation
- 0 (0%) Reported that there was negative impact

See Addendum 1 for further survey results

**Barriers/Challenges Faced:**
There were several limitations in the implementation of the CTRM in our institution. First, the introduction of this CTRM system was initially met with some skepticism by clinicians as they were concerned about disruption to their workflow. We understand that clinicians have an immense amount of obligations, and sometimes simply will not be able to return the page to obtain the critical report since patient care is always a priority. It would be optimal to tailor the CTRM delivery regimen to the individual subspecialty. For example, for a surgeon who tends to perform procedures in the morning, it would be prudent for the CTRM system to deliver all messages in the afternoon, so the surgeon will have greater probability to return the page in a timely manner. Moving forward, we can take into account the physician’s preference to better serve their needs.

Second, decreased direct communication with radiologists was an initial barrier. Some clinicians prefer a direct one on one conversation with the radiologist to discuss results and their implications as this is what they are traditionally accustomed to. We make every effort to contact these particular physicians directly by phone first. If they are not reachable for any reason, CTRM is utilized. In addition, if a doctor has a question about a report sent via CTRM, they can respond to the radiologist via CTRM and a direct conversation can take place.

Lastly, making the CTRM more seamless was a challenge with our electronic medical record system in terms of delays in updating the correct attending physician for a patient. Often times a consultant physician would serve as the ordering physician for a radiologic exam, and the critical/unexpected recorded results would then be reported to the consultant instead of the primary attending physician. This issue, although problematic, can be overcome by the CTRM system “carbon copy” option, when a radiologist is able to report the findings to more than one attending physician.
Financial Considerations:

This project was funded entirely by the institution due to their recognition of the importance and benefit that CTRM technology has from a timely patient communication and care standpoint. It is premature to measure cost savings at this point. However, the real added value cannot be measured in dollars but rather in practicing sound medicine, ensuring that results of imaging study results are delivered in a timely, efficient fashion. Our malpractice carrier has fully supported this initiative from the beginning and as of very recently, has reimbursed the cost for this system.

Summary:
Radiologist-clinician communication breakdown has been a major concern in today’s malpractice litigation, and has become a major focus for improvement and regulation by the ACR. The process of reaching clinicians in today’s hospital environment is often time-consuming and reduces radiologists’ productivity. Radiologists can no longer rely on indirect communication methods such as facsimile, secretarial staff, or depend on clinicians to search for reports on the PACS/RIS/HIS systems. Rather, they need to deliver quick and direct communication with clinicians.

The CTRM system that we have implemented has improved radiologist productivity by making it easier to convey findings to clinicians and allowing clinicians to expedite patient care as a result of receiving imaging results expeditiously. The majority of the responses in the clinician surveys impart a positive attitude towards this CTRM system, with the most major influence placed on a more efficient patient care process. Most importantly, it ensures that positive findings, albeit critical or unexpected, are delivered quickly and efficiently and not lost in our busy enterprise. The system insures that the referring doctor will receive the radiological report. Equally important, it allows radiologists to know that they received and read the information. If they are out of compliance, an escalation process is activated until they acknowledge receipt. To date, there has not been one malpractice case at our institution with regard to communication of results. The patient is the ultimate beneficiary and can be managed more efficiently, safely and quickly. This is the true value-add of implementing this powerful technology.