Original Article

Using Online Error Reporting To ManageRadiology Quality Control

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Abstract

Picture archiving and communication systems (PACS) in radiology are an example of information technology systems used in healthcare that can improve productivity without sacrificing quality. The previous feedback loop between technologists and radiologists has been eliminated by the widespread use of PACS. Upon discovering quality discrepancies during an examination, the radiologist submitted a paper-based quality-control report rather than communicating the information directly. A web-based tool for reporting issues can facilitate the restoration of some of the feedback loop and offer opportunities for a more thorough examination of errors that users have submitted. This study set out to test the hypothesis that our department's efforts could be more concentrated if data from an online error reporting software used for quality control were utilized. 930 errors (390 exam protocol, 390 exam validation, and 150 exam technique) were submitted for the372,258 radiologic examinations performed over the course of the 6- month study, translating to an error rate of 0.25%. Technologist documentation had the most submitted errors in the category exam protocol, with 77 errors [44%] in ultrasonography, and the highestsubtype error for the computed tomography modality, with 35 errors [18%] in imaging protocol. For almost all of the modalities, positioningand incorrect accession had the highest errors in the exam technique and exam validation error categories, respectively. A system with a veryhigh quality could be indicated by an error rate of less than 1%; however,it is more likely that some errors were missed or not reported. The reporting rate may also be impacted by how the error reporting system is received by the staff.

Keywords: Quality assurance, Web technology, Radiology.

Introduction:

There is a constant chance for quality review in many areas of healthcare, and regular measurement and continuous improvement canbe beneficial. Although primary clinical medicine receives most of the attention in discussions about quality, there is growing body of researchthat examines the quality of radiology services as well (Johnson,2007)."The degree to which the appropriate procedure is performed in the appropriate manner at the appropriate time, and the correct interpretation is precisely and promptly communicated to the patient and referring physician" is the definition of quality. According to this assertion, appropriateness of the examination and procedure protocol, accuracy of interpretation, results communication, and measuring and tracking performance improvement in quality, safety, and efficiency maybe some of the essential elements of quality. Hospitals are currently addressing many of these quality aspects through a range of targeted programs for improving quality, wherein common issues with care processes or work flow are systematically identified and modified to enhance practice. However, some aspects of quality are too information-intensive and may even be beyond the scope of normal human capability to be addressed by merely operational or administrative measures (Swensen, 2005). Integrating the quality- control procedures that were employed in the film environment is the first challenge that many radiology practices encounter when they "go digital." Something is missing from the relationship between the technologist and the radiologist when the technologist stops visiting thereading room to hang films. A component of the relationship is also lostwhen referring physicians stop having in-person consultations with theradiologist. These modifications could lead to a drop in quality. Radiologists used to be able to see on the film whether an image was inadequately collimated or lacking in some other way. However, in an electronic setting, radiologists and technologists have fewer opportunities for direct feedback, which could lead to a decline in quality. Furthermore, radiologists might be using the same paper-based

forms from years ago when they do submit quality-control reports. PeerVue Qualitative Intelligence Communication System (QICS) is an automated tool that University Hospitals Cleveland's RadiologyDepartment used in 2013 to track quality assurance issues related to imaging procedures. The department's informatics committee radiologists trained with the software and conducted pilot testing duringthe first month of its launch. QICS was implemented in the academic sections of the department after minor modifications, and subsequentlyit was extended to the community hospitals. One year after the new online system was put into place, we are now assessing it with the hopethat the data it provides will help us concentrate our efforts on overseeing quality control in our radiology department (Hillman , 2004).

Materials and Methods:

The QA Reporting System:

Using web-based PeerVue QICS software, which is integrated into the PACS, radiologists can continue to view images and dictate reports while reporting problems or errors encountered during the patient study.PeerVue QICS is a web application that runs on the hospital intranet. Managers and support staff for healthcare providers can access the web application directly from a web browser, or radiologists can conveniently access it from their department's PACS. The software offers managersand supervisors an automated follow-up section where they can reply and ensure feedback. Formatted reports, generated monthly from PeerVue QICS, are sent to supervisors and modality directors, and contain information relevant to their areas to provide analysis andsupport response to any trends (Rubin , 2011).

Data:

The program is set up to accept submitted errors and classify them intoany number of categories and subcategories. Three main categories and numerous subcategories within each major category were theconfiguration utilized by our department. The chief medical information officer, PACS administrator, chairman, and vice-chairman of the department came to an agreement on the categories and subcategoriesthat our department has been using (Nagy , 2008). The survey was administered to radiologists and PACS specialists. The following were the three main categories:

1- Exam protocol: errors pertaining to noncompliance with the imaging protocol. For every modality, we have system-wide protocols that include the right sequences on MRI, types and counts of views on computed radiographs, etc.
2- Exam technique: mistakes pertaining to inappropriate methods of acquisition, such as incorrect patient centering, inappropriate field ofview, inappropriate administration of the contrast bolus, excessive dosage, etc.
3- Exam validation errors are those that relate to problems with distribution attributes like exam completion, PACS transfer, and administrative labels.

Analytical Statistics:

Data are presented as frequencies and percentages for descriptiveanalysis. Using Pearson's chi-squared test, differences in reportederror subtypes for various subgroups were examined. As $p < 0.05$, statistical significance was defined.

Quality in radiology:

There are numerous ways to define quality in radiology. One of these could be "a prompt delivery of accurately interpreted reports by capablepersonnel in an efficient, effective, and sustainable manner as well as timely access to and delivery of integrated and appropriate radiologicalstudies and interventions in a safe and responsive facility (Kohli MD, 2014). The ultimate goal of quality assessment programs is to assess performance and to introduce feedback mechanisms that will allow the introduction of change, which in turn should lead to an improvement in the quality of care (Rybkin , 2011).

The quantity of submissions :

Earlier research examining the effectiveness of quality control in radiology departments has revealed a variety of problem rates.revealeda 0.2% adjusted error rate (605 problems in almost 300,000 proceduresover 9 months). (Meenan , 2012) who employed the web-based RadTracker system recorded an issue rate of 0.85% of the annual volume (2472 issues in 292,360 procedures). Based on our data, 930 errors were reported over the course of six months, yielding an issue rate of 0.25%, placing us towards the lower end of this range. A systemwith a very high quality could be indicated by an error rate of less than 1%, but only if almost all errors are found and reported.

Radiologists also stated that they only ever submitted formal issues through the system when they were urgent or had

limited time, but they still made an effort to personally offer feedback on QA issues when they could.Therefore, encouraging staff education, outlining the advantages of using online reporting systems thoroughly, and providing reassurancethat quality standards are met will help boost system usage (Dunnick , 2006).

Recommendations:

- An underestimation of errors may have resulted from staff resistance toparticipation or from inadequately reinforced education, as was covered in more detail earlier. Possible reasons for underreporting could include worries about privacy, data security, risks of external review, or self- implication. Fitzgerald points out that the health care industry's legacy ofblame culture prevents mistakes and near-misses from being reported.
At the system risk level, we have created a blameless culture, which weare still promoting within the department.

- Another limitation could have been that different system users' perceptions of the error subtypes varied, leading to interobserver variability in reported errors. Reproducibility may also be hampered by intra-observer variability. Further, Meenan's study concluded that the department's online QC Management tool usage had atrophied over time, providing an inaccurate picture of ongoing quality issues, suggesting thata decrease in radiologist utilization may have occurred over time. It is anticipated that, when appropriately classified, various QC issues may become more common in response to various external factors, such as workflow modifications and system updates. Variability can be reduced by offering staff brief educational courses to coordinate their perceptionsof the error subtypes. Additionally, supplying workstations with an instructional reference on error subtype definitions and including definitions and information about various error categories and subtypes in the software may also be helpful.

Conclusion:

In conclusion, we have integrated an online imaging quality assurance reporting system into our PACS as part of our ongoing digitalization efforts in the radiology department. The most common errors that users reported were exam validation error subtypes like incorrect accession and exam protocol error subtypes like technologist documentation and imaging protocol. These will be taken into account when carrying out tasks aimed at improving performance, and their effectiveness will be assessed as part of our continuous plans for process improvement. Thisvalidates our hypothesis that we can concentrate our efforts on quality management within our large radiology department using data from this error-reporting system.

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