Special Report

# A Failure to Communicate?: Trends in the Radiology Requisition, 2011–2016

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**Rationale and Objectives:** Complete clinical information improves the diagnostic capacity of medical imaging, and the radiology requisition is the radiologist's primary means of receiving clinical information. This study aimed to characterize trends in the quality of clinical information in radiology requisitions at an academic medical center between 2011 and 2016.

**Materials and Methods:** This institution's requisition form includes two questions: "*Signs and Symptoms:*" and "*Clinical Question to be answered. . .:*" Requisitions for three studies (CT UPPER ABDOMEN & PELVIS W, CT HEAD WO, and XR PORT CHEST, 1 VIEW) from three selected months were individually rated in four categories of clinical information. Additionally, requisitions for 13 study types were evaluated for character count and for the proportion of requisitions with identical answers to the two questions. A total of 3250 requisitions were individually rated.

**Results:** There was a decline in the quality of clinical questions in computed tomography requisitions ($P = 0.016$) and a decline in the quality of medical history in chest x-ray requisitions ($P < .001$). Of the 13 study types, nine had more than 1000 total requisitions (total n = 260,617). Of those nine studies, six showed trends of increasing character length ($P < .001$ for each). Four showed an increasing proportion of identical answers to the two questions ($P < .001$), and one showed a decreasing proportion of identical answers ($P < .001$).

**Conclusions:** This decline in the quality of clinical information is concerning. Whether it is due to increasing time pressures, a shift in the attitudes of ordering providers, or any other cause, this study demonstrates a declining trend in the quality of communication via the radiology requisition.

**Key Words:** Imaging requisition; communication; quality of radiology service.

## INTRODUCTION

Radiologists are better able to interpret imaging examinations when they have more complete clinical information. Higher quality clinical information has regularly been shown to increase diagnostic sensitivity, and some trials have shown that it can do so without losing specificity (1). This effect has not just been demonstrated in experimental settings but has been shown in the context of a radiologist's regular workflow (2). Along with clinical information, a specific question can help guide a radiologist's focus. In patients with acute strokes, requisitions for head computed tomography (CT) scans or magnetic resonance images mentioning a suspicion for a stroke were more likely to result in a correct diagnosis than in those not mentioning a suspicion of stroke (3). Medical students given a clinical history were more likely to make a correct diagnosis from an image if they suspected the correct diagnosis before viewing that image (4), suggesting that a requisition that suggests concern for a specific condition would be helpful in diagnosing that condition. Furthermore, most radiologists report desiring more clinical information than is available in the requisitions they receive, and most are discouraged by the difficulty of accessing clinical information through other systems (5).

Given the clear benefit of clinical information and clinical questions to diagnostic radiology, there has been significant interest in documenting the level of clinical information provided in radiology requisitions, which are the primary means by which a clinician requesting a test communicates with the radiologist who is responsible for the production and interpretation of the examination. Multiple studies have examined how radiology requisitions have been affected by conversion from paper-based ordering systems to electronic ordering systems, with studies generally concluding that the implementation of computerized physician order entry (CPOE) systems improves the quality of clinical information in requisitions (6–9). Similarly, multiple studies have documented how radiology requisitions have changed in response to a training or quality improvement effort, with results showing measurable improvement after the quality improvement efforts with variable degrees of regression toward baseline levels within months after the intervention (10,11). A study attempted to characterize the completeness of radiology requisitions compared to emergency department provider notes, comparing

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different shifts, provider levels, and anatomic locations, and it found that attendings and residents tend to give better clinical information than physician extenders and that the quality of clinical information given differs by anatomic location (12). However, no previous study has examined how the quality of clinical information contained in the radiology requisition may be changing over time independent of any major stimulus.

This study was completed at an academic medical center that implemented its CPOE system in 2010. The CPOE is the means by which providers at this institution order diagnostic radiologic studies. A radiology requisition in this CPOE involves free-text responses to two prompts: "*Signs and Symptoms:*" and "*Clinical question to be answered (appropriate, detailed history MUST be included in order to assure exam appropriateness & accuracy of interpretation):*" Each of these free-text responses can include anywhere from zero to 256 characters. During the years since the implementation of this CPOE system, no major systemic change has altered how clinicians order imaging.

This study aims to examine the change in the quality of clinical information contained in radiology requisitions over the course of 2011 to 2016 in order to characterize long-term trends in the radiology requisition. This study also aims to compare trends seen in the ordering of a simpler study type (x-rays) to those seen in the ordering of a more complex study type (CTs).

## MATERIALS AND METHODS

Data were retrieved from the medical record database of a major academic institution (Epic Systems Corporation, Madison, WI). Three categories of imaging studies were reviewed: chest x-rays, abdomen/pelvis CTs, and head CTs. All adult requisitions for the study types shown in Table 1 were examined. For quantitative tests, only study types with more than 1000 orders over the study period were considered.

The primary measure of requisition quality involved rating-selected requisitions using a scale that has been published (6) and validated (8). The scale evaluates requisitions on information related to four categories: signs and symptoms; medical history; abnormal test results; and clinical question. The information in each of those categories was rated with a score of 0 ("none"), 1 ("some"), or 2 ("detailed"). This was done for the highest-volume type of chest x-ray, the highest-volume abdominal CT, and the highest-volume head CT: XR

**TABLE 1. Tests Included in Analysis**

| Name of Test Ordered | Name of Test in Analysis |
|---|---|
| CHEST PA/LATERAL—XR | XR CHEST PA/LATERAL |
| XR ADULT CHEST PA/LATERAL | |
| XR CHEST PA/LATERAL | |
| XR PORT CHEST 1V LINE PLCMNT—INITIAL ONLY | XR PORT CHEST 1V LINE PLCMNT—INITIAL ONLY |
| XR PORT CHEST 1V LINE PLCMNT—INTL ONLY | |
| XR PORT CHEST 1V LINE PLCMNT—NO CHARGE | XR PORT CHEST 1V LINE PLCMNT—NO CHARGE |
| XR PORT CHEST, 1 VIEW | XR PORT CHEST, 1 VIEW |
| XR PORTABLE CHEST, 1 VIEW | |
| XR PORTABLE CHEST, 1VIEW | |
| XR PORT CHEST 1V | |
| CT CHEST ABDOMEN PELVIS W | CT CHEST, ABDOMEN, PELVIS W |
| CT CHEST, ABDOMEN, PELVIS W | |
| CT CHEST ABDOMEN PELVIS WO | CT CHEST, ABDOMEN, PELVIS WO |
| CT CHEST, ABDOMEN, PELVIS WO | |
| CT CHEST, ABDOMEN, PELVIS WWO | CT CHEST, ABDOMEN, PELVIS WWO |
| CT CHEST ABDOMEN PELVIS WWO | |
| CT CHEST, ABDOMEN, WWO | CT CHEST, ABDOMEN, WWO |
| CT UPPER ABD & PELVIS W | CT UPPER ABDOMEN & PELVIS W |
| CT UPPER ABD AND PELVIS W | |
| CT UPPER ABDOMEN & PELVIS W | |
| UPPER ABDOMEN & PELVIS W—CT | |
| CT UPPER ABD AND PELVIS WO | CT UPPER ABDOMEN & PELVIS WO |
| CT UPPER ABDOMEN & PELVIS WO | |
| CT UPPER ABD AND PELVIS WWO | CT UPPER ABDOMEN & PELVIS WWO |
| CT UPPER ABDOMEN & PELVIS WWO | |
| UPPER ABDOMEN & PELVIS WWO—CT | |
| CT UPPER ABDOMEN & PELVIS WWO CONTRAST | |
| CT HEAD WO | CT HEAD WO |
| CT HEAD WWO | CT HEAD WWO |

1V, one view; CT, computed tomography; PA, posterior-anterior; PLCMNT, placement; W, with contrast; WO, without contrast; WWO, with and without contrast; XR, x-ray.