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MORNING REPORT

Not to be Missed…

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A patient presents to the pain clinic for management of chronic back pain. During the visit she reports progressive neck enlargement and intermittent hoarseness lasting for months. Concerned about the possibility of an underlying structural lesion, the physician orders an MRI of her neck. The pain specialist is unaware that a CT of the thorax, ordered by the patient's primary care physician (PCP) nearly two years ago, identified a right goiter with substernal extension. The patient is unaware of the CT findings, although she was advised by the PCP to schedule an appointment after the CT. The results of the CT are not documented in the PCP's notes, and there is no record of any attempts to reach the patient about the CT findings.

The pain specialist advises the patient to follow up with her PCP for further evaluation of hoarseness. The patient schedules an appointment in the resident teaching clinic. The resident orders pulmonary function tests that are consistent with extrathoracic obstruction. A CT of the neck is ordered and performed two weeks after the MRI. Both reveal a retrosternal goiter. Per the CT report, the goiter has enlarged significantly compared with the previous study and is now encroaching on the trachea.

During a follow-up visit with her resident physician, it is learned that the patient has been exposed to unnecessary repetitive imaging and that previous imaging was missed for review, resulting in a delay in appropriate diagnosis and treatment. After recognition of this event, a root cause analysis is performed in order to prevent missed testing in the fu-

ture and to prevent potential patient safety adverse events.

A root cause analysis (RCA) is a method in risk analysis that helps identify contributing factors associated with an adverse event. The result of a specific unsafe act (active error) that produces an adverse event often has multiple contributory factors (latent errors) that create an unsafe environment. By placing blame on an individual, weaknesses in the operating structure of the system remain unchanged, creating a vulnerability for a repeat adverse event. In an effort to prevent adverse events from reoccurring, it is necessary to identify and either mitigate or eliminate the contributory factors associated with an adverse event. As a result, a new standardized system process is created, altering the previous environment that allowed for an active error to occur.

In an RCA, a series of steps are taken. First, a team is formed and led by an individual with expertise in RCA who was not directly involved in the adverse event. Information is gathered through flowcharts regarding the adverse event in order to identify what happened. Next, the causes or contributing factors are determined by utilizing fishbone diagrams and the "Ask Why Five Times" technique. Finally, recommended actions are summarized and shared with leadership to propose changes in the standardization of the system processes.

The World Health Alliance for Patient Safety has identified poor test follow-up as one of the major processes contributing to unsafe patient care.[1] This problem has been well described during transitions of

care.[2] In one study, 41% of patients were discharged with laboratory and radiological test results still pending.[3] Between 20% and 62% of tests pending at the time of discharge were not followed up post-hospitalization; for patients discharged from the emergency department, the range is estimated to be 1% to 75%.[2] In a recent study of radiology follow-up using an e-mail alert system for important imaging findings, 20% of electronic reports were not viewed by the referring physicians.[4] Recent studies focus on lack of follow-up of tests ordered in the ambulatory setting.[5] Between 7% to 62% of alerts displayed through a computerized provider order entry system were not reviewed within 30 days.[5] The consequences of missing results can be significant, resulting in delayed diagnoses, adverse drug events, and increased visits to the hospital.[5]

The factors that contribute to missed test results are the type of system or practice used (i.e. electronic health record (EHR), paper system, or hybrid), procedures for communicating critical test results, and the test result practices for patients moving across care settings.[2]

In this case, an interdisciplinary team was formed comprised of residents, academic faculty, and EHR information technology professionals. Two main root causes associated with the adverse event of unnecessary imaging and missed imaging results were identified: 1) Each care setting used a different EHR system, and 2) there was no standard system for test result reporting of important or urgent imaging for the

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outpatient resident PCP clinic. The first root cause identified was that the inpatient hospital, pain clinic, and outpatient resident clinic all used different EHR systems at our medical center, creating a lack of transparency in health care management between different providers. As a result, the pain specialist was unable to access the PCP's health care management plan and acknowledge a work-up for the patient's symptoms that was already in process. The second root cause recognized was that residents are not present in the clinic every week. Consequently, the covering resident may be oblivious to an urgent test result if he/she did not order the test, despite the result waiting in the ordering resident's EHR inbox.

The greatest limitation to a productive RCA is the inability to create feasible recommended actions. Unfortunately for our health care system, due to budget and contract constraints within each hospital care setting, it is not feasible for the inpatient, outpatient, and pain clinic to all have the same EHR system to facilitate data flow between health care management locations. However, in order to facilitate follow-up of prioritized studies and to decrease missed results, our outpatient resident clinic implemented a centralized e-mail inbox that receives all incoming prioritized test results. Additionally, a physician—in our case, a resident on his continuity clinic week—is now specifically assigned to be responsible for reviewing and managing

these on any given day. By implementing this standardized system, our outpatient resident clinic has utilized the RCA to find a feasible solution to decrease missed test results and subsequently decrease delays in appropriate diagnosis and treatment.

References

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Table 1. Root Cause Analysis to Decrease Missed Tests and Imaging	
Contributing Factors	**Action Plan**
Multiple EHR systems utilized across the health care system **No standard for urgent test result reporting**	Standardize the EHR across all health care settings in the hospital network. Critical lab value reports are e-mailed to a centralized e-mail inbox of the outpatient clinic EHR. One senior resident rotating in the outpatient clinic is responsible for following up on critical lab value reports in the centralized e-mail inbox throughout the clinic day.