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COMMENTARY

System-driven longitudinal follow-up of incidental imaging findings

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ABSTRACT

Increasing utilization of cross-sectional imaging has resulted in more clinically significant incidental findings being discovered. However, the current approach for handling these findings is commonly inconsistent and relies greatly on the efforts of individual clinicians. Making sure every actionable incidental finding is handled in a consistent and reliable manner can be difficult, especially for a large health system. We propose an approach to handling incidental findings aimed at improving patient follow-up rates, which involves implementing system-level processes that standardize the reporting of incidental findings, notification of clinicians and the patient, and centralized monitoring of longitudinal patient follow-up. We will lay out a general framework for standardized reporting of incidental findings by the radiologist using software integrated into the daily workflow. This should enable simultaneous notification of the ordering clinician, the patient's primary-care provider, and an incidental findings navigator. The navigator will "close the loop" by working with clinicians to notify the patient of the finding, coordinate patient follow-up, and document the finding and long-term follow-up. We hope this can serve as a basic framework to help large health systems design an incidental findings workflow to improve follow-up rates and reduce patient harm.

BACKGROUND

Actionable incidental findings (AIFs) are "common imaging findings unrelated to the clinical indication for the imaging test for which follow-up is recommended".[1] As the use of imaging has increased, so has patient harm from the failure to follow-up on AIFs.[2] One single-center review of CTs in trauma activation found 43% of patients had incidental findings, and serious lesions such as suspected malignancies and vascular aneurysms accounted for 15% of findings. However, less than half had appropriate follow-up in the form of discharge summary mention, in hospital workup, or referral.[3] These results are not surprising. Like with most medical errors, health care has largely relied on the efforts of individual clinicians rather than the design of safe systems to reduce patient harm from AIFs. In many health systems, there is ambiguity regarding who is responsible for following up on AIFs, and how follow-up should occur and be documented.[4] In this piece, we explore the ambiguity in the current approach to AIFs and present a system-based alternative.

COMMON SCENARIO

Consider this scenario. A patient presents to the emergency department (ED) with chest pain. A CT angiogram of the chest is negative for pulmonary embolism; however, it finds a pulmonary nodule. When the patient is deemed ready to discharge, will the patient leave knowing they have a pulmonary nodule and the appropriate follow-up recommendations? Who is responsible for sharing the AIF and providing recommendations? Most importantly, how will the involved clinicians and the health system know whether the patient received the recommended follow up, in the form of additional imaging or a subspecialist referral? The idea that one healthcare worker is responsible for tracking the follow-up for AIFs is common practice. In most cases, this responsibility is felt to fall to the ordering physician or a primary-care physician (PCP),[4] yet this lack of standardized workflow for managing AIFs puts patients at risk.

THE CURRENT APPROACH

There are a multitude of factors which make it difficult to handle AIFs timely and consistently, and these are difficult to address because they touch on different peoples, processes, and locations. Radiologists usually identify an AIF and document it in the radiology report with follow-up recommendations. Sometimes, the radiologist directly communicates the AIF to the referring clinician, but this may not always be the case. This presents a potential gap in communication, as not all radiologists will communicate every AIF, unless it is a critical finding which will immediately impact patient outcome. In some instances, clinicians are not

aware of AIFs until a radiology report is finalized, which may be several hours to even days after an exam is ordered. The ordering clinician is then expected to inform the patient of the finding with follow-up instructions, and also document it in the electronic health record (EHR). It is assumed that either the ordering clinician or the patient's PCP will be responsible for ensuring that the appropriate follow-up occurs, although there is a difference in opinion on who bears the ultimate responsibility. In a recent survey of radiologists and emergency physicians (EP) by the American College of Radiology, both groups agreed that the responsibility for communicating AIFs and ensuring follow-up is shared, but radiologists assigned more responsibility to the ordering physician while EP assigned more responsibility to a PCP.[4] It is also up to each individual radiologist to provide follow-up recommendations for AIFs, which should be evidence-based. Studies have shown that there is significant heterogeneity in radiologist classification of AIFs and characterization of the risk associated with each, and almost a third of recommendations were discordant with societal guidelines.[5] In addition, some patients may not have a PCP, or have a PCP outside of the health system, making it difficult to notify a PCP of the finding. Furthermore, for patients who are in the ED or in the hospital as an inpatient, they may have much more pressing health issues which overshadow an AIF detected on imaging during their stay.

A POSSIBLE SOLUTION

The current ambiguous approach to managing AIFs often results in patient harm. We recommend that health systems create a centralized system approach in which roles, responsibilities, and workflows for follow-up are clearly defined; the enabling infrastructure to support and monitor these workflows and ensure closed-loop communication among interdependent-care givers are provided, and a shared accountability system is used to monitor and improve performance. Given the complex nature and wide range of AIFs, such a centralized system will emerge over time, likely starting in one clinical area or one type of imaging, and expand over time as the health system learns.

For instance, such an approach may start with AIFs identified on CT scans in the ED. A standardized reporting process should be implemented in which radiologists systematically document and submit AIFs to a centralized database. AIFs should be reported in a standardized format, for example according to the new measures from the ACR Novel Quality Measure Set, which would include the location of the lesion, at least one specific recommended follow-up modality, the time interval for follow-up imaging, and if applicable a reference to an evidence-based recommendation.[1] There should be a streamlined notification system which enables the radiologist to notify the ordering provider and the patient's PCP, if available. A dedicated navigator, who is funded by the health system, then manually reviews each incidental finding in the database and takes steps to ensure both the ordering clinician and the patient are aware of the finding and follow-up instructions. The navigator also contacts the patient to ensure they are aware of the finding, confirm plans for follow-up, and help answer any questions the patient may have. The navigator documents whether the patient, the referring provider, and the patient's PCP have been notified, and whether each step of the follow-up process has taken place. If the patient needs a PCP or a subspecialist service, the navigator can utilize hospital resources to connect the patient with the appropriate provider. At each step through this journey, the navigator serves as a guide for the patient and can monitor the incidental finding until the longitudinal follow-up process is complete.

One major benefit of centralized management is that it keeps information needed to manage AIFs in one easily accessible location, including the type of incidental finding, follow-up recommendations, patient and clinician notifications, referrals to PCP or specialist, subsequent imaging studies and procedures, and completion of follow-up. System-driven and centralized approaches to managing AIFs have been successful. For instance, Schwartz et. al. implemented a workflow in an academic center which is integrated into the electronic health record and facilitated by dedicated navigators, and ensured follow-up on nearly every incidental finding. Around 11% of those were clinically significant findings such as neoplasms or vascular aneurysms.[6] Another system-wide initiative by Irani et. al. at an academic health center aimed to track AIFs in radiology reports. Clinically significant incidental findings were identified through keyword tags as well as natural language processing of reports. Nurse navigators reached out to PCPs or specialists to coordinate follow-up care for patients with possible missed imaging follow-ups. The program helped 70 patients avoid missed cancer diagnoses over three years.[7]

Emerging technologies can improve the efficiency and effectiveness of AIFs management. Natural language processing demonstrates significant potential to automatically review radiology reports and tag AIFs.[8,9] This will save radiologists time and effort from manually tagging reports and submitting each AIF to a central database. Machine-learning tools can be used to automate notifications from radiologists to the ordering physician, PCP, and the patient.

We recognize some key requirements to consider when creating a centralized program. Senior leadership support is essential to help align multiple departments around a common vision; to ensure sufficient resources for the navigator, for project management, and for analytic support, and to create a shared accountability system to ensure the program improves safety and reduces patient harm. Although the costs for such a program may appear prohibitive, especially in a fee for service health system, the revenue from follow-up imaging studies, specialist referrals, and procedures could far exceed the cost. In addition, missed AIFs are a common source of malpractice which this intervention should improve. Most importantly, it reduces patient harm by addressing important treatable diagnoses at an earlier time, including incidentally identified cancers.

CONCLUSIONS

Patient harm from failure to follow-up on AIFs is common and costly. The current approach to managing AIFs is rickety, riddled with ambiguous roles and processes, and relies on the efforts of individual clinicians. A system approach would be standardized, safer, less costly, and less burdensome on clinicians.

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