AI and Incidental Findings: A Retrospective Duty?

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INTRODUCTION

Delayed and missed follow-up on incidental findings threatens patient health and is a major financial risk for healthcare systems. The healthcare industry spends $43 million annually settling lawsuits for missed follow-ups on lung findings alone.[1] Radiology reports document incidental findings, but they often go unnoticed. The practitioner who ordered the radiology may fail to inform the patient and recommend the follow-up, allowing the patient's disease to develop unchecked. Natural language processing (NLP) makes it possible to review documents for missed incidental findings. By saving time, NLP changes an important ethical calculus. Radiologists now can more easily detect incidental findings that were in the report but not conveyed specifically and find and disclose actionable incidental findings noted in recent past radiology reports. We argue that the duty of a practitioner or radiologist to rescue a patient by informing them of recent actionable incidental findings exists due to this technological ease. This paper argues that NLP used on existing radiology reports can catch overlooked incidental findings and ensure that the practitioners who ordered the reports note the incidental finding, inform the patient, and oversee the scheduling of follow-up.

I. Background and Definitions

Incidental findings are masses or lesions detected on imaging performed for a reason unrelated to the reason for the imaging.[2] For example, radiologists may see a lung nodule on the first slices of an abdominal CT performed for abdominal pain. Radiology guidelines define the incidental finding characteristics for which disclosure and follow-up would provide a potential medical benefit. For example, decades of

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research demonstrate that incidentally discovered simple pancreatic cysts should be initially re-imaged in six months, while incidentally discovered renal masses less than one centimeter should be initially re-imaged in three to six months.[3]

Fortunately, the radiology community developed advancements in artificial intelligence (AI) to streamline the screening, reporting, and tracking of follow-up on incidental findings based on best practice advisories.[4] A recent study at Northwestern University established the usefulness of prospectively applying AI to screen, report, and track certain incidental findings warranting follow-up.[5] AI can easily be applied to look back at recent imaging studies lying dormant in hospital databases to ensure that all significant incidental findings warranting follow-up care have been reported and tracked to completion. However, retrospective applications of AI have not been widely implemented.

Natural language processing (NLP) is a subfield of AI in which computers are programmed to analyze a text's contents and context.[6] NLP can be programmed into electronic health records to identify radiology reports containing incidental findings requiring follow-up based on best practice advisories. Additionally, NLP can automatically guide reporting of these findings to referrers, patients, and tracking to confirm if patients have received follow-up care.[7] A recent study from Northwestern University found that after one year of prospective implementation, the AI NLP software flagged 5.15 percent of all images (68 per day) as containing lung follow-up recommendations.[8] Results demonstrated 77.1 percent sensitivity, 99.5 percent specificity, and 90.3 percent accuracy for follow-up on lung findings.[9] NLP has the potential to significantly improve reliable follow-ups of incidental findings.[10]

II. The Duty to Report Actionable Incidental Findings

When radiologists discover significant incidental findings, they have a duty to disclose them and recommend follow-up and further screening.[11] Radiologists have this ethical duty due to beneficence and non-maleficence: a duty to do good and prevent harm. There is also a duty as part of the physician-patient relationship. The physician-patient relationship in radiology is unique as radiologists often do not have direct contact with patients and therefore do not report abnormal imaging findings directly to them. Rather, radiologists read and interpret imaging studies in a non-patient area of the hospital or even remotely and then dictate their findings. The radiology report should include any incidental findings and recommendations for follow-up care. It used to be that the radiologist uploaded this document to the patient's medical record for the ordering provider to read and relay to the patient. Alternatively, the radiologist could directly contact the ordering provider regarding his or her findings depending on the urgency of the finding or the nature of the radiologist's professional relationship with the ordering provider. Recently, due to both patient advocacy and the 21st Century Cures Act, the reports are generally uploaded to a patient portal. The availability of the report to the patient does not mean the patient would notice or understand an incidental finding in the report. Physicians must protect the interests of patients whose health depends on their decisions. The simple act of a radiologist dictating the significant incidental finding on his or her report and attempting to communicate the finding with referring physicians can have massive benefits for protecting patient health.

However, radiologists are not tasked with closing the loop to ensure their recommendations for follow-up are pointed out directly to patients or seeing that the patient completes the recommended follow-up care. Some centers have used NLP technology on newly dictated studies to pick up actionable incidental findings that the referring physician could overlook. The technology also can track the follow-up care to completion. There is a positive impact on patient health if the findings are more consistently communicated and follow-

up care is obtained.[12] Thus, NLP technology can help radiologists fulfill their duties to report actionable incidental findings.

However, radiologists do not usually look back in their imaging study databases to check that the ordering provider closed the communication loop to patients for incidental findings on previous imaging studies that warrant follow-up or to ensure that the patient completed previous recommendations for follow-up care.

III. The Duty to Easy Rescue

While the duty to easy rescue is not the basis for reporting incidental findings normally, it may provide an ethical basis for the retrospective use of NLP to find actionable incidental findings that were not properly communicated or that did not lead to follow-up care. Philosopher Peter Singer described the duty to easy rescue through this famous thought experiment:

"If I am walking past a shallow pond and see a child drowning in it, I ought to wade in and pull the child out. This will mean getting my clothes muddy, but this is insignificant, while the death of a child would presumably be a very bad thing."[13]

The duty to easy rescue, a refinement of the rule of rescue which is an imperative people feel to rescue individuals facing avoidable death,[14] specifically asserts that when the benefits of performing an act for someone are significant and the cost to the person performing the act is minimal, then the person should perform the act.[15] We can apply the duty to easy rescue to situations where we see a child drowning in a shallow pond or broadly to any situation where we can offer others a significant benefit at a nominal cost to ourselves. Like the drowning child example, using NLP to review documents does not take much employee time or financial resources. Retrospectively applying AI to screen past patient imaging studies can be an easily automated task, and its application may improve patient access to their healthcare information and protect patient health.

IV. The Duty to Retrospectively Screen, Report, and Track

This paper argues that the duty to easy rescue compels radiologists to apply NLP to screen, report, and track the follow-up on recent studies in their databases. Using NLP to address incidental findings could add another degree of transparency, ensuring patients have all the information they should. The extra effort could close the loop on dropped communications and may help guide follow-up care and therapies for past care that patients didn't receive. If initial experiences reveal that retrospectively applying AI helps improve patient autonomy and health outcomes while bolstering the beneficent and non-maleficent goals of radiologists, then continuing to do so may be ethically justified. Based on how well the technology works for current radiology reports, we expect that some retrospective applications will be useful, and even lifesaving.

Before the NLP developments, reviewing past radiology reports was prohibitively burdensome, and would subvert the radiologist's duties to current patients. A technologist or other employee might run the NLP technology. The ethical justifications arise from the ease with which the NLP performs these tasks. Therefore, the duty to easy rescue calls for radiologists to go beyond their normal responsibilities and retrospectively apply NLP.

How far back radiologists apply AI to screen past reports for actionable incidental findings should be considered in the context of the physician-patient duties and the duty to easy rescue. Reporting actionable incidental findings they missed on studies interpreted years ago, for example, may preclude the

radiologist's duty to beneficence as the incidental finding may have developed into a malignancy that already caused them grave harm. At that point, the rescue may not be that easy. Similarly, incidental findings on studies interpreted years ago may preclude the radiologist's duty to non-maleficence, as many of these findings may have ended up being benign and reporting them now may cause the patient great angst. However, there may be real benefit to screen more recent studies radiologists can ensure patients get the care they need.

V. Limitations on the Duty

Additionally, if the "catch-up" follow-up care and communications are too time-consuming and would distract radiologists from their current patients' needs, arguably, the retrospective look would no longer fall within a duty of easy rescue. At smaller or less-resourced centers, radiologists may be inundated with patient follow-up care requests and referring physicians regarding those abnormalities, which may subvert their duties to current patients. Further, an inundation of follow-up care requests has the potential to overwhelm referring physicians and the healthcare system. We would expect to find few missed incidental findings compared to the current number of total incidental findings found by NLP, assuming most past incidental findings were reported and followed-up. Our duty to easy rescue ethically justifies consideration of previous imaging only if the measures we take neither impose unreasonable costs nor cause greater harm than good. In all, radiologists and institutions do not have a duty to screen previous imaging studies if the resource cost is disproportionately high and subverts our duties to current patients.

CONCLUSION

The duty to screen, report, and follow up on significant incidental findings on the studies that come across our workstations today might be the same duty to screen, report, and follow up on incidental findings on previous studies sitting dormant in our databases. Applying NLP will make checking old radiology reports for unreported incidental findings easier and may benefit patients. Due to the ease with which radiology entities can run the AI to scan recent reports, radiologists should have a duty to do so. However, we acknowledge that the duty of radiologists to look back has limits and must not distract from our duty to current patients.

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