

INCIDENTAL FINDINGS

Ensuring appropriate, timely action for optimal care



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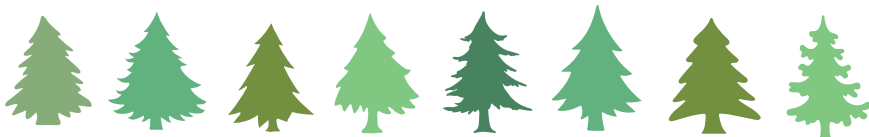
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IMAGING 3.0 IN PRACTICE

Incidental Findings Ensuring appropriate, timely action for optimal patient care

The comprehensiveness of imaging continues to expand at a dizzying pace. While these sophisticated tools have dramatically improved disease detection, they have also increased the number of findings unrelated to the ordering physician's clinical question – what we call incidental findings.

The radiology community has developed guidelines and appropriateness criteria to assist radiologists in making follow-up recommendations for incidental findings without subjecting patients to unnecessary care. But in many cases, those recommendations languish without appropriate action, potentially leaving patients at risk for untreated malignancies. In other cases, clinicians struggle to explain the implications of incidental findings, which can cause patients anxiety.

As we consider ways to address these issues and better handle incidental findings, we can learn from radiologists who have implemented successful incidental-findings programs. Some of these efforts are highlighted in this issue. They include sending letters directly to patients to encourage appropriate follow-up of incidental findings, consulting with patients and their referring providers to explain primary and incidental findings, and leveraging artificial intelligence to detect relevant incidental findings in CT exams that radiologists might otherwise miss.

But the brilliance of these individuals is less in their specific solutions and more in the methods they used to arrive at those solutions: clarifying the problem they are trying to solve, understanding root causes before jumping to solutions, testing and revising their solutions as they are developed, and making adjustments when and after the solutions are implemented.

Every healthcare environment is unique. We hope that these examples will give you ideas about how to overcome the challenges of managing incidental findings at your institution. But more important than the specific solutions, I encourage you to adopt the problem-solving mindset that each of these cases exemplifies.

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SHARE YOUR STORY

Have a case study idea you'd like to share with the radiology community? To submit your idea, please visit acr.org/Suggest-a-Case-Study.

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Standardizing Findings Management

Radiologists and referring physicians collaborate to standardize the management of incidental findings uncovered through lung cancer screening.

KEY TAKEAWAYS

- Radiologists in a lung cancer screening program used a standardized system to report pulmonary nodules, but they didn't have a clear framework to report incidental findings.
- In collaboration with referring physicians and other specialists, radiologists developed standardized guidelines for managing recommendations related to incidental findings.
- By using standardized guidelines to report incidental findings, radiologists can consistently provide clear follow-up care recommendations to patients and referring physicians.

The main goal of LungHealth®, the low-dose CT (LDCT) lung cancer screening program that Beth Israel Deaconess Medical Center (BIDMC) launched in 2016, is to detect lung cancer early and improve survival rates among high-risk patients. But radiologists are uncovering more than lung nodules through the program; they are also detecting a lot of incidental findings. Now, program leaders are standardizing how they handle these findings, expanding LungHealth beyond lung cancer detection for more holistic patient care.

"In the past, radiologists weren't always sure what to do about incidental findings," says Lauren M. Taylor, RN, BSN, LungHealth program manager. "We really didn't have any framework around what exactly makes up an incidental finding in the context of lung cancer screening or how to determine what

type of follow-up care to recommend." (Read "A Proactive Role for Radiology" at [acr.org/A-Proactive-Role-for-Radiology](https://www.acr.org/A-Proactive-Role-for-Radiology) to learn more about BIDMC's LungHealth program.)

As an ACR-designated lung cancer screening center, LungHealth uses ACR's Lung-RADS™ guidelines to consistently assess and report lung nodules using a standardized reporting template. But to create a standardized protocol for incidental findings found through LDCT screening, program leaders had to work closely with referring physicians and other specialists.

To that end, Taylor and LungHealth's medical director, Alexander A. Bankier, MD, PhD, met with specialty departments throughout the hospital and asked for their input. Specifically, they asked the specialists what findings within the framework of lung cancer screening and in light of a



Alexander A. Bankier, MD, PhD, professor of radiology at Harvard Medical School and chief of the cardiothoracic imaging section and director of functional respiratory imaging at Beth Israel Deaconess Medical Center, and Lauren M. Taylor, RN, BSN, LungHealth program manager, led development of standardized guidelines related to incidental findings.



Top: LungHealth is a low-dose CT lung cancer screening program at Beth Israel Deaconess Medical Center.

Bottom: The radiologists review each patient's specific risk profile when considering follow-up care.

about using the guidelines to manage incidental findings more consistently.

"Now, when our radiologists read a lung cancer screening exam and see a renal cyst of a certain size, for example, they can look it up and find a direct recommendation based on what they're seeing," Taylor says. "The recommendation is then directly inserted into the report. This way, all incidental findings and their potential management recommendations are reported in a standardized manner across the board."

Just a couple weeks after implementing the new guidelines, Taylor says the benefits are already obvious. "We've received positive feedback from referring physicians who like receiving direct recommendations for incidental findings. Having guidelines in place to determine the next steps after a scan is very helpful to them and valuable for patient care," she says. "For our radiologists, it removes the gray area around incidental findings. Now, their recommendations are very clear, reproducible, and consistent."

By Brooke Bilyj, freelance writer

Now It's Your Turn >>>

Follow these steps to deploy an incidental findings management program at your institution and tell us about it through email at imaging3@acr.org or on Twitter at the hashtag [#Imaging3](https://twitter.com/Imaging3).

- » Communicate with specialists outside of your area of focus to identify their follow-up recommendations for potential findings related to their section of the body.
- » Organize each specialist's recommendations into a master document that other physicians can review before implementing new imaging follow-up guidelines.
- » Empower radiologists to manage incidental findings more consistently by incorporating multidisciplinary recommendations into your standardized reporting template.

patient's specific risk profile should require follow-up or additional testing. They also asked what the recommended next steps should be for each potential finding.

From there, Taylor and Bankier created a list of all of the possible findings and correlated them to each specialty's recommended next steps. Then, they asked an independent group of referring physicians across the hospital to audit the list until everyone agreed with how the recommendations were presented. "It was a

strenuous process," Taylor says. "It has to be fairly extensive because it touches on every possible incidental finding you could see for each section of the body."

Once the radiologists and other physicians reached a consensus, Taylor and Bankier began rolling out the guidelines around mid-October of 2018. They uploaded the list of recommendations into the reporting template that the radiologists use for lung cancer screening, and Bankier talked with the radiology team



Case Study Published July 2016

Ensuring Quality

A focused team is resolving quality and safety issues within the radiology department at the University of Mississippi Medical Center.

KEY TAKEAWAYS

- Radiologists at the University of Mississippi Medical Center formed a team dedicated to addressing quality and safety issues within the department.
- The team implemented programs to track follow-up care, improve communication, reduce reading room interruptions, and render consults on outside imaging.
- As a result of these initiatives, about 15 more patients a month receive appropriate follow-up exams for incidental findings and report turnaround times have improved.

The University of Mississippi Medical Center (UMMC) is a tertiary care hospital, receiving some of the most complex cases in the state. Many UMMC patients, especially those in the emergency department (ED), undergo imaging studies that frequently reveal potentially clinically relevant incidental findings, such as pulmonary nodules. But as ED physicians focus on treating patients' acute conditions, pulmonary nodules and other relevant incidental findings can easily be overlooked, often delaying follow-up care.

To prevent this from happening, the UMMC radiology department recently created two complementary programs: The critical and incidental findings communication system directly informs ordering clinicians about critical findings, pulmonary nodules, and other clinically relevant incidental findings; the clinical outcomes coordinator program tracks lung nodules and other incidental findings alerts to ensure patients receive timely and appropriate follow-up care.

"Since launching these programs, more patients have received proper diagnoses as a result of appropriate follow-up care and better communication with the patient," says Cyrillo R. Araujo, MD, associate professor of radiology at the University of Mississippi and director of ultrasound at UMMC.

The critical and incidental findings communication system and clinical outcomes coordinator programs are just two of several projects UMMC's radiology department has initiated since forming a dedicated quality and safety team two years ago. As the department's quality and safety officer, Araujo leads the team, which comprises radiology leaders, nurses, radiology technicians, a referring physician representative, medical physicists, residents, and, soon, a patient advocate.

"Before 2014, the radiology department did not have a committed quality and safety team," Araujo explains. "Now the team meets for an hour every month to address quality and safety issues in radiology and is part of



Cyrillo R. Araujo, MD, associate professor of radiology at the University of Mississippi and director of ultrasound at UMMC, leads the department's quality and safety team.

the hospital's larger efforts to improve quality and safety throughout the institution."

Communicating Findings

To start, the team conducted a strengths, weaknesses, opportunities, and threats (SWOT) analysis to identify the department's quality and safety successes and shortcomings (Read "Analyze the Situation" at acr.org/Analyze-the-Situation to learn more). In response to this analysis, one of the team's first projects addressed challenges associated with communicating critical and incidental findings in imaging studies.

Even before the team formed, the department had a results communication solution embedded within its dictation system to expeditiously deliver imaging findings to referring clinicians. But the program was underutilized and didn't work with referring clinicians outside of the health system, Araujo says. Instead, the radiologists used a manual process to communicate and document critical and incidental findings. The approach was

time consuming and prone to substantial variation, which could delay and negatively impact patient care.

To address the issue, Araujo and his team implemented a department-wide policy requiring all radiologists to use the critical and incidental findings communication system and upgraded the program to send communication alerts to referring physicians outside of UMMC. The team also added alerts specifically for pulmonary nodules, which frequently require follow-up care.

Now when the radiologists find a lung nodule in an imaging study, they enter a pulmonary nodule alert into the results communication system, which automatically sends a notification to the ordering provider and documents that the automated communication system has been initiated. Once the ordering provider receives the recorded voice message, they have the option to close the message, verifying that the system was used and the communication loop was closed, or reply with a recorded message back to radiology.

Wendy Howell, BSN, RN, CCRN, clinical outcomes coordinator in the UMMC radiology department, says the alerts ensure patients receive timely follow-up care. “For example, we had a patient who came through the ED for trauma and whose full-body scan revealed a pulmonary nodule,” she explains. “A suspicious alert was created, and the patient had his first oncology appointment within 19 days, whereas before the nodule probably would not have been followed up on as quickly, leading to a less favorable outcome.”

James C. Kolb, medical director in UMMC’s ED, says the alerts are more than convenient — they help save lives. “I used to lie awake at night and wonder how many nodules the radiologists mentioned while the patient was in the ED for trauma that nobody followed up on,” Kolb explains. “With these alerts, patients are receiving the care they need, when they need it.”

Tracking Follow-Up Care

While the digital alerts help the radiologists communicate imaging findings more effectively, they do not track follow-up care. To close this gap, the quality and safety team

developed the clinical outcomes coordinator program. “We have two coordinators within the department who make sure the findings are appropriately documented within each patient’s electronic medical record (EMR) and that the patients show up for their follow-up imaging or clinical appointments, as recommended,” Araujo says.

Each week, the coordinators run a report of all the results communication system alerts, paying particular attention to incidental findings and pulmonary nodules that require follow-up care. “When we see an incidental finding or a pulmonary nodule, we pull the medical record to see whether the finding has been documented in the patient’s chart,” explains Melissa L. Stevens, CEN, clinical outcomes coordinator in UMMC’s radiology department. “If the documentation is not there, per policy, we email the ordering physician and ask them to add the finding to the EMR to ensure the patient doesn’t fall through the cracks as a result of uncoordinated care.”

The coordinators also set reminders in their digital calendar to check on patients with incidental findings and pulmonary nodules and see whether their follow-up exams were actually done within the timeframe the radiologists recommended. If the follow-up exam is not in the patient’s chart at that time,

the coordinators send a letter to the patient about the finding.

“Two months after we send the initial letter, we’ll go back into the patient’s chart,” Howell says. “If the follow-up exam still has not been completed, we’ll send a second, certified letter to the patient to remind them to get the finding checked.” As a result, Araujo says, roughly 15 more patients per month now receive follow-up exams for incidental findings than they did before the program began. To streamline the follow-up care tracking process, the team is working to integrate the alerts and follow-up reminders directly into the patient EMR.

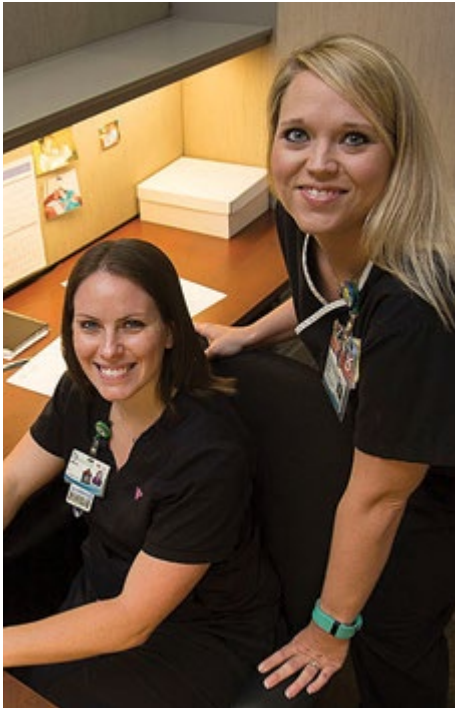
Reducing Interruptions

After implementing the clinical outcomes coordinator program, the quality and safety team focused on reducing reading room interruptions. Its goal was to decrease imaging interpretation errors due to frequent distractions, improve report turnaround times, and streamline communication with referring clinicians. To that end, the team developed a program that puts radiology navigators in the reading room during weekdays to answer the phone and call referring clinicians on the radiologists’ behalf.



PHOTO COURTESY OF THE UNIVERSITY OF MISSISSIPPI MEDICAL CENTER

The University of Mississippi Medical Center is a tertiary care hospital and the only academic medical center in the state.



Melissa L. Stevens, CEN, and Wendy Howell, BSN, RN, CCRN, are clinical outcomes coordinators in UMMC's radiology department. They track follow-up care of incidental findings, including pulmonary nodules.

"Our main ED/body reading room phone rings every 10 minutes," Araujo says. "The navigators' primary job is to triage the calls and connect the callers with the appropriate radiologists, as needed." The navigators also perform administrative duties, such as tracking each radiologist's non-clinical activities, including radiation planning consultations, tumor board cases and attendance, and hospital committee participation, on a spreadsheet. The department can share this log with hospital administrators, demonstrating the added value the radiologists bring to the health system.

Once the navigator program was underway, the quality and safety team built on that effort by adding radiology facilitators to the department. The facilitators are senior radiology residents who perform the same duties as the navigators on nights and weekends, when fewer staff radiologists and residents are available to read all of the ED and inpatient exams. In addition to answering the phone, the facilitators protocol imaging studies performed at UMMC during nights

and weekends and assist with consultations on outside imaging from referring hospitals.

"We receive a lot of requests for outside imaging consults after hours, when the department is shorter of staff," Araujo explains. "The facilitators help expedite the consultation process by talking to the referring physician or care team about the request, opening the images in the picture archiving and communications system (PACS), reviewing the clinical information, and presenting the case to the staff radiologist. This makes the interpretation more efficient and provides a quicker answer to the clinical question."

Since the navigators and facilitators joined the department, reading room interruptions have decreased sharply, Araujo says. "Before, the radiologists would get halfway through these huge studies and have to start over whenever the phone rang," notes departmental business administrator Cheryl Williams. "Now the radiologists say they don't know how they ever managed without the navigators and facilitators in the reading room."

In fact, a survey of radiology residents and staff indicates that having the navigators and facilitators in the reading room has improved everything from the accuracy of the radiologists' reads to their relationships with referring providers. "We don't have any interruptions or disturbances while reading complex cases, which reduces the error rate and increases efficiency," says Manohar S. Roda, MD, assistant professor of radiology and a body and MRI imaging radiologist at UMMC.

Araujo and his team are in the process of data mining to determine how much turnaround times have improved since the navigators and facilitators joined the department. While he doesn't have these statistics yet, Araujo says anecdotal evidence indicates that turnaround times have improved notably. Bethany Sabins, MSN, FNP-C, nurse practitioner in UMMC's department of obstetrics and gynecology, says her department has noticed a significant improvement in turnaround times as a result of the program.

"The radiology navigators and facilitators help the radiologists communicate important findings in a much more efficient and

quick manner," Sabins says. "This allows us, as referring providers, to discuss the imaging results with our patients face-to-face during their office visit, rather than having to bring them back for another visit or discuss the findings by phone. It's a huge plus, especially since some of our patients travel up to three and a half hours to be seen."

Forming Partnerships

With the success of these programs, the quality and safety team is working to expand some of its existing projects where needed and launch new initiatives to further enhance patient care. The team's latest program involves improving the process for consultations of outside imaging studies. Through these multifaceted quality and safety projects, Araujo and his team have elevated the UMMC radiology department from a place where imaging exams are simply interpreted to a critical junction along the path to coordinated care.

"Ultimately, our quality and safety program demonstrates the radiology department's commitment to partnering with other departments throughout the hospital to provide better and coordinated care for patients," Araujo says. "These partnerships are critical in the new value-based model of care and have proven to enhance patient care and improve outcomes."

By Jenny Jones, Imaging 3.0 manager

Now It's Your Turn >>>

Follow these steps to improve incidental findings follow up and report turnaround times at your institution and tell us how you did through email at imaging3@acr.org or on Twitter at the hashtag [#Imaging3](https://twitter.com/Imaging3).

- » Assemble a multidisciplinary group of radiologists, technologists, referring clinicians, physicists, and other stakeholders to uncover and address your group's challenge areas.
- » Upgrade or install results communication software to timely deliver critical and clinically relevant incidental and pulmonary nodule findings directly to referring clinicians.
- » Create a reading room call center to reduce interruptions and improve communication between radiologists and referring physicians.



Reinventing Curbside Consults

A hospital uses radiology eConsults to make it faster and easier for primary care providers to get answers about imaging and improve patient care.

KEY TAKEAWAYS

- Five academic medical centers working with the Association of American Medical Colleges participated in a CMMI Health Care Innovation Award to formalize the curbside consult into a new eConsult program. One of the hospitals, Dartmouth-Hitchcock Medical Center, uniquely extended the program to radiologists.
- The eConsults occur directly through the hospital's electronic medical record, saving primary care physicians (PCPs) time and providing answers from participating specialists with clinical expertise.
- PCPs and patients have embraced eConsults at Dartmouth-Hitchcock — 95% of PCPs are very satisfied, and 81% of patients are satisfied or very satisfied with the program.

Physicians often use the phrase “curbside consult” to reference getting informal advice from colleagues. In a curbside consult, a primary care physician (PCP) might call, email, or page a specialist for input on an image or finding. As experts in appropriate imaging, radiologists are often part of these informal consultative conversations, fielding such questions as, “Does this patient need a chest CT?” and “Does this brain MRI finding require further imaging?”

Although curbside consults are widely used in medicine, they are often inefficient and time consuming. What if the specialist isn't available when the PCP calls? What if the PCP's email gets buried in the specialist's inbox? In the past, the result was often delayed decision-making, which can directly impact patient care. All that is changing, however, through the power of technology.

At Dartmouth-Hitchcock Medical Center in Lebanon, New Hampshire, the curbside approach to consulting with specialists has been augmented by an automated process that allows PCPs to ask questions through a system embedded in the hospital's electronic medical record (EMR). The electronic consult (eConsult) program, which leverages new technology developed by the University of California, San Francisco (UCSF), enables PCPs to more efficiently and directly communicate with specialists, expediting patient-care decisions while ensuring appropriate image ordering for higher-quality patient care.

Here's how it works, according to David A. Pastel, MD, a neuroradiologist at Dartmouth-Hitchcock: The PCP places an “order” for an eConsult in the patient's chart in the EMR. This eConsult order lands in the in-basket pool for the specialty. In the radiology department, an administrative person monitors this pool and directs the eConsult request to the appropriate radiologist via the EMR.

Recipients of the eConsult request have 72 business hours to respond to questions within the EMR. After the 72 hours have elapsed,



David A. Pastel, MD, a neuroradiologist at Dartmouth-Hitchcock, advocated for adding radiology to the medical center's eConsult program.

they receive a reminder alert. This ensures that PCPs don't have to open another program on their computers to send an email or to pick up the phone, both of which can be unreliable methods for getting a quick answer.

The results of the eConsult pilot program are already proving impressive at Dartmouth-Hitchcock. Today, 86% of the hospital's PCPs are using eConsults, with nearly all of them reporting that they are “very satisfied” with the program.

Origin Story

In 2014, Dartmouth-Hitchcock was one of five academic medical centers working with the Association of American Medical Colleges (AAMC) that received a three-year Centers for Medicare & Medicaid Services (CMS) innovation grant to integrate an eConsult program into its EMR. The goal was to improve communication and coordination between primary and specialty care, contain costs, and avoid unnecessary testing.

Implementing the eConsult program at the hospital involved using the templates developed at UCSF to serve as a basis for Dartmouth-Hitchcock's template formation. With input from specialists and PCPs, the eConsult team developed streamlined templates that allow PCPs to ask specialists low-acuity clinical questions, with the appropriate data available to enable specialists to give a timely and thoughtful response.

While the original CMS grant provided funds to support implementation of eConsults in up to 15 specialties (12 medical and three surgical) at each center, one specialty was left out: radiology. It wasn't until Lisa Pastel, MD, MPH, a PCP and member of the eConsult primary care template review committee at Dartmouth-Hitchcock, began reviewing the neurology eConsults that she recognized this major oversight.

"I was surprised to see a choice in the neurology eConsults for 'review of imaging,'" she says. "I wondered why neurology was being asked to review imaging instead of radiology." Lisa Pastel, who is also an assistant professor of medicine at Dartmouth-Hitchcock, mentioned this to her husband, David Pastel.

David Pastel's reaction was the same as his wife's: "It's in everybody's interest for

radiologists to answer questions pertaining to imaging. If there is an abnormal imaging finding, a radiologist has the proper training and experience to determine the correct next step."

After David Pastel raised his concern with Michelle M. L'Heureux, MD, primary care lead for eConsults at Dartmouth-Hitchcock, the group decided to add radiology as a specialty to its eConsult program. Now Dartmouth-Hitchcock is the only system of the original five hospitals that includes radiology as a consulting specialty in its program.

Since radiology was not part of the original CMS innovation award, Dartmouth-Hitchcock had to figure out how to pay for the service. David Pastel says the hospital recognized radiology eConsults as an important service to enhance patient care and keep down costs associated with unnecessary imaging orders.

"All imaging eConsults receive reimbursement from a Population Health Innovation Fund through Dartmouth-Hitchcock's Population Health Management Council," says David Pastel. According to L'Heureux, the process of getting support from the fund was simply a very informal request between David Pastel, the eConsult team, and the council.

All in the Details

Under the eConsult program, PCPs use standard templates built directly into the EMR to consult with radiologists about what tests to order and ask typical imaging-related questions — for example, how to handle a thyroid nodule finding. "The eConsult platform brings PCPs closer to the radiologist," says David Pastel. "And it helps ensure our patients receive the appropriate imaging test as well as better management of abnormal imaging findings."

For radiology eConsults, all of the templates include the same basic questions with slight variations for subspecialties. This organization makes it simple for PCPs to find the correct eConsult template and submit their questions to the appropriate specialist through the EMR. At the end of each consult, the specialist is asked whether or not the consult is appropriate.



Lisa Pastel, MD, MPH, a primary care provider and member of Dartmouth-Hitchcock's primary care template review committee, noticed that radiology was initially left out of the eConsult program and considered it a major oversight.

A high-acuity consult would be flagged as inappropriate, and the referring PCP would be notified.

"It is always the prerogative of the specialist, no matter the specialty, to decide if an eConsult question is clinically appropriate and best handled in this format, or whether it would be better addressed via a face-to-face referral due to the complexity of the issue," L'Heureux says.

In the program's first year, radiologists have received nearly 60 consultation requests. David Pastel says that while six core subspecialty radiologists handle most of the eConsults at Dartmouth-Hitchcock, another four imagers have been occasionally called on to answer specific eConsults, for a total of 10 participating radiologists.

For radiologists, responding to eConsult requests has proven to be a quick process. A recent survey indicated that of all eConsults at Dartmouth-Hitchcock, 35% take between 5–10 minutes, 35% take 11–20 minutes, and 30% take more than 20 minutes to answer. The volume of radiology eConsults is also manageable, typically about six per month — mostly regarding neuroradiology and body imaging.



Michelle M. L'Heureux, MD, primary care lead for eConsults at Dartmouth-Hitchcock, worked with the group to add radiology to the program.



“Just the other day, I received an eConsult where a patient had an emergent head CT scan after a fall, and a possible small meningioma was incidentally found.”

—David A. Pastel, MD

Added Value

In light of the move toward quality-based care, the eConsult program has provided great value to both PCPs and patients. David Pastel gives an example to illuminate the program's worth: “Just the other day, I received an eConsult where a patient had an emergent head CT scan after a fall, and a possible small meningioma was incidentally found,” he says. “Usually, a finding like this gets punted back to the PCP. They read it and often don't know what to do next. I received an eConsult from the PCP that said, ‘What should I do with this? Should I order an MRI?’ I saw that the patient was 68 years old, so I recommended an MRI to evaluate further.”

He adds that while for this patient the MRI only verified a need to follow up over time, it also saved the PCP from referring the patient to neurosurgery, and it calmed the patient's anxiety. “The patient was concerned about the meningioma finding. His mind was put at ease when the MRI showed that he should just have another scan in six months to a year to ensure stability.”

This anecdote shows the value of eConsults in radiology, both to PCPs and patients. A recent survey indicated that 86% of Dartmouth-Hitchcock PCPs are now using eConsults. Of those PCPs surveyed, 95% at the hospital said they are “very satisfied” with the eConsult program.

Lisa Pastel says that eConsults are less time consuming and commonly more effective than a phone call. Plus, eConsults allow better documentation of queries in the patient chart for all providers to see in the future.

“I often learn about appropriate imaging from the eConsult and share that with

other clinicians in my practice,” Lisa Pastel says. “These eConsults are spreading knowledge of how to handle questions that often went unanswered or were fielded by the wrong clinician.”

L'Heureux agrees, saying that “an additional benefit radiology eConsults bring to the table is the assistance they provide with choosing the right imaging test the first time. This in turn avoids unnecessary or redundant testing for the patient, which is a win-win situation for all involved.”

Although patients are not fully aware of the eConsult program, some were surveyed about whether their PCP had asked for input from a specialist, with logic built in to help identify if the referral was from an eConsult. Forty-nine percent of those patients surveyed were very satisfied with their eConsults, and another 32% were satisfied.

David Pastel says PCPs often thank him after an eConsult. “They're really busy, and they're managing complicated patients with multiple medical problems. If we can quickly answer their questions without requiring a phone call or looking up answers, then it's a huge deal,” he states. “It's important for us as radiologists to demonstrate our value beyond interpreting studies. We really do more than interpret studies all day”.

eConsults for All

If you're interested in establishing an eConsult program at your hospital, check with your department chair to gauge interest or ask them to bring the idea to your hospital administration. In addition, consider convening a group of PCPs and specialists to form an eConsult committee

to discuss how you might formalize your curbside consults in the absence of a technological solution. Once this initial plan of action is settled, explore funding options to automate the process.

Certain vendors integrate eConsults and templates directly into their EMRs. If the eConsult functionality and templates aren't already built into your EMR, check with your vendor about creating an eConsult program.

Since this case study was originally published in 2017, CMS has made eConsults reimbursable in some states, with stipulations.

In 2017, David Pastel was hopeful that eConsults would become reimburseable soon. “I think the payers may be eager to start paying for eConsults if they see it saves them money down the line — especially if it can help them avoid having to pay for a patient to visit a specialist.”

Until then, David Pastel emphasizes that the program is more about enhancing radiologists' value as imagers, not earning relative-value units. “As accountable care organizations become more widespread, it's very important for radiologists to be as accessible and helpful as possible to PCPs,” he says.

By Alyssa Martino, freelance writer

Now It's Your Turn >>>

Follow these steps to deploy an eConsult program at your institution and tell us how you did through email at imaging3@acr.org or on Twitter at the hashtag #Imaging3.

- » Check with your department chair and PCPs to gauge potential interest in an eConsult program.
- » If there is interest in the program, check if your EMR vendor has included eConsult functionality and eConsult templates into your EMR. If the functionality isn't already a fixed feature, check with your vendor about creating an eConsult program.
- » Don't get bogged down by whether or not eConsults are a billable service right now; with the rise of accountable care organizations, it will become key for radiologists to enhance their value beyond reading images.



Actionable Findings Tracking Program

Radiologists develop a process to ensure incidental findings are appropriately addressed.

Radiologists play an important role in identifying actionable incidental findings. Up to 15% of radiology reports include recommendations for follow-up, yet recommended follow-up radiology exams are not completed 23-71% of the time.^{1,2} Given the considerable rate of cancer diagnoses among incidental findings, this poses a grave risk to patients,³ says Nadja Kadom, MD, chair of the Metrics Committee of the ACR Commission on Quality and Safety.

To mitigate the risk related to uncompleted radiology follow-up recommendations, Neville Irani, MD, associate professor of radiology at the University of Kansas Medical Center, implemented a tracking program in his department, which conducts 415,000 exams annually.

"Inaction on incidental findings is a common and well-known problem identified in the 2015 Institute of Medicine report on diagnostic error,"⁴ Irani says. "In talking with our primary care physicians, they recounted many cases where follow-up had not occurred. The tipping point came in 2018, when tracking abnormal radiology results became a requirement for primary care value-based program participation, and we, as radiologists, saw an opportunity to help our primary care partners and add value to patient care by tracking incidental findings."

The tracking program that Irani implemented relies on dedicated staff using digital tools to identify actionable recommendations in reports,

transfer them into a tracking database, calculate a due date, and then check for completion after the due date. Over three years, the team tracked 18,267 recommendations. A third of these recommendations were not followed when the team reviewed the cases.⁵ Of these, the team was able to coordinate follow-up care with nearly 2,500 patients and their providers. As a result of this program, 2.8% of these patients were able to avoid a missed diagnosis of malignancy. Here's how the program works:

- The project leaders encourage radiologists to tag reports that contained an actionable recommendation with "#follow" at the end of the report.
- An algorithm that the radiology team developed in-house searches the radiology report text, including the date the radiologist signed the report, and populates the due date for completion of the follow-up recommendation. For example, if the radiologist recommended follow-up in three months and the report was signed on May 15, the tool populates the spreadsheet *due date* column as Aug. 15.
- The tracking team will also retrospectively search for terms like "recommend" or "follow-up" to pick up additional reports that may not have been tagged. Initially, the team conducted these searches on a monthly basis, but with increased staffing, they now perform them weekly.

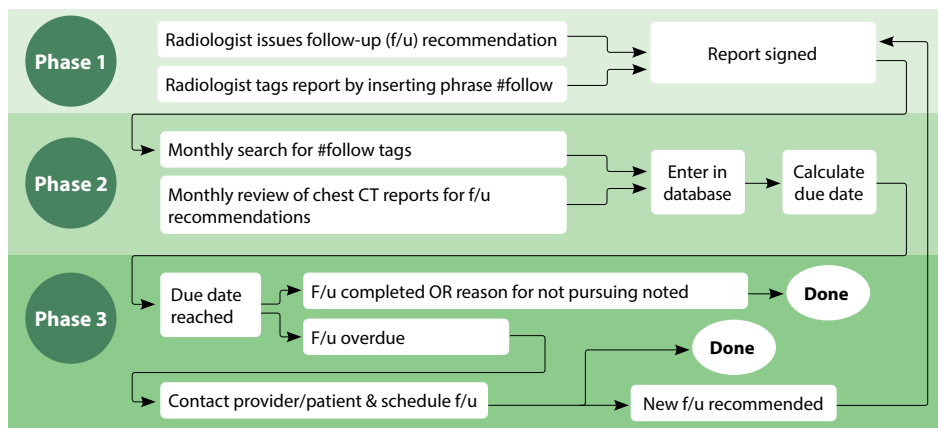
- The team and rotating quality and safety residents review the cases to see whether follow-up recommendations have been completed within the recommended timeframe.
- The team marks each case without documentation of completed follow-up in a spreadsheet and contacts providers and patients to determine the status, in case the follow-up had been completed elsewhere or had become clinically unnecessary. Throughout the tracking process, the team places notes in the patient's chart, detailing attempts to coordinate or communicate with the care teams and patients.
- In cases in which follow-up has yet to be completed and remains necessary, the team helps order the necessary follow-up and schedule patients. In addition to scheduling follow-up imaging, the radiology tracking team schedules surgical consultations, biopsies, or subspecialty referrals.
- They continue to track these cases until the follow-up examination has been completed.
- Upon completion of the follow-up examination, the team checks the results for any new follow-up recommendations. If there is no further follow-up recommendation, the case is considered closed.
- If a new follow-up recommendation is present, the program team resets the due date and modality, and the tracking process restarts.

ENDNOTES

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By Neville Irani, MD; Nadja Kadom, MD; Ben Wandtke, MD, MS; and Jenny Jones, Imaging 3.0 manager

Figure 1: Tracking Program Workflow



UNDERSTANDING INCIDENTAL FINDINGS

Research study provides insights into frequency and malignancy rates



Radiologists often detect findings that are secondary, or incidental, to the reason a particular study is ordered. For instance, a referring provider might order a chest CT for suspected pulmonary embolism, and the imaging study might reveal an incidental pulmonary nodule.

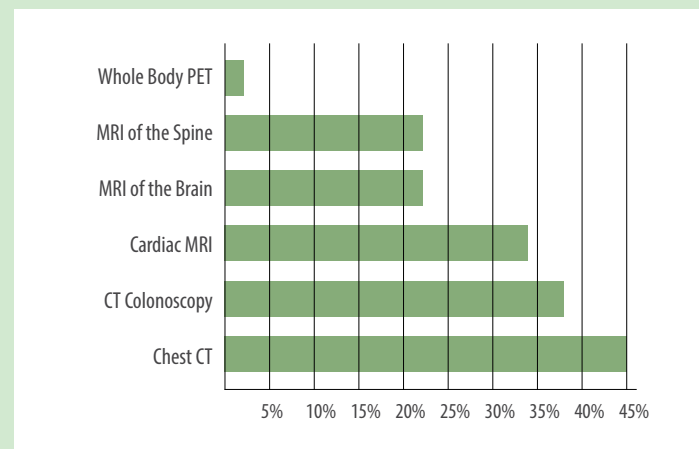
The management of many common incidental findings is informed by scientific evidence and available as guidance documents and appropriateness criteria issued by corresponding medical societies.¹ The role of radiologists in the management of actionable incidental findings is expanding but starts with issuing appropriate follow-up recommendations to catch potential malignancies while not subjecting patients to unnecessary exams and/or surgeries.

Often, however, follow-up recommendations are not executed. Some radiology practices have implemented tracking programs to increase the number of completed follow-ups.^{2,3,4} As a result, more malignancies are being diagnosed,⁵ which should incentivize others to invest in tracking programs as well, says Nadja Kadom, MD, director for quality in the department of radiology at Children's Healthcare of Atlanta,

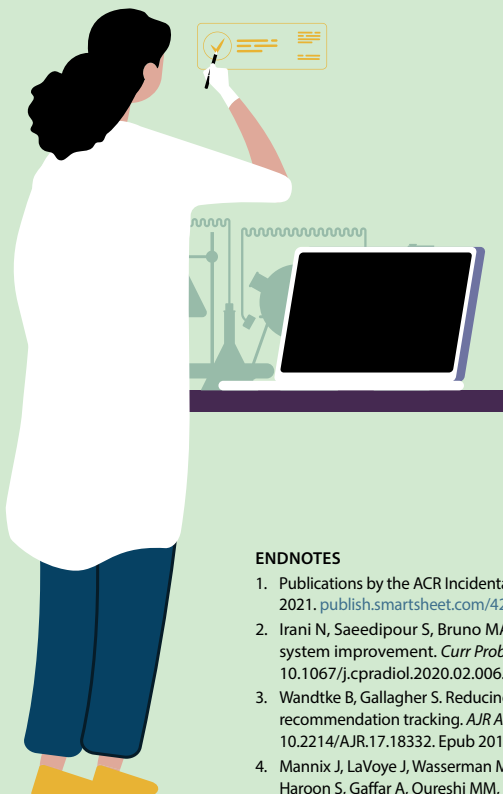
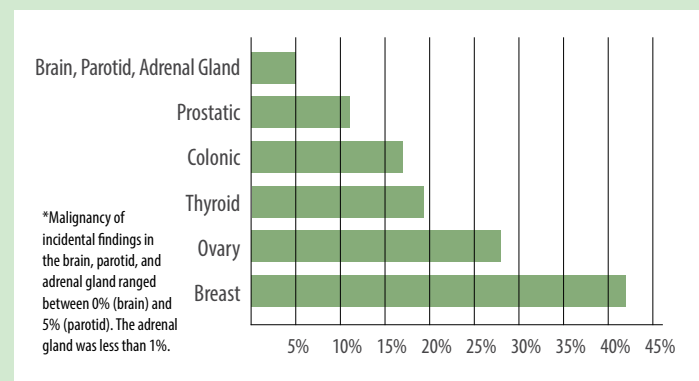
professor of radiology and imaging sciences at Emory University School of Medicine, and chair of the Metrics Committee of the ACR Commission on Quality and Safety.

This data from a paper published in *The British Medical Journal* provides some insight into the frequency of incidental findings for various exam types and the prevalence of malignancies in incidental findings by body part.⁶

Prevalence of Incidental Findings by Modality



Prevalence of Malignancy in Incidentalomas



ENDNOTES

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Case Study Published October 2018

Virtually Connected

Radiologists at Massachusetts General Hospital use virtual consults to review findings with patients and primary care providers.

KEY TAKEAWAYS

- Building off of Massachusetts General Hospital's existing patient consultation clinic, radiologists develop a virtual consults program that allows them to remotely review their findings with patients and primary care physicians (PCPs).
- Virtual consults give patients a better understanding of their diagnoses and how their bodies are responding to treatment while keeping their PCPs in the loop.
- Approximately 90% of patients who had virtual consults say the encounters significantly improved their healthcare experience.

A primary care physician (PCP) at Massachusetts General Hospital (MGH), Susan E. Bennett, MD, dreaded those moments: She would sit to review an imaging study with a patient and point out some type of abnormality — a lung nodule, perhaps, or a small amount of emphysema on an older smoker's lungs. Then she would do her best to explain the results and reassure the patient that an abnormality was not always as bad as it might seem.

But the imagination runs wild. And in those instances, Bennett would often see an all-too-familiar look in the patient's eyes. "I'd see a look that conveyed fear and confusion," Bennett says. "I struggled to find the language to explain what an incidental finding means. Patients were hearing about findings that seemed scary, and I was unable to reassure them. PCPs don't have the training to point out subtle abnormalities on imaging studies or explain the differential diagnoses of incidental findings."

The solution: In early 2016, MGH embarked on a virtual radiology consultation pilot program that would allow patients to discuss their results directly with the doctor who knows imaging best — the radiologist. By early 2017, the pilot — which involved two radiologists, three PCPs, and 10 patients — was expanded to include five radiologists and more than 50 patients.



Dania Daye, MD, PhD, a radiology resident at Massachusetts General Hospital, co-led implementation of a virtual consults program that allows patients to discuss their images directly with a radiologist through videoconferencing.







So far, the program has had a positive impact, with 90% of patients saying that the consultations markedly improved their healthcare experience. And the radiologists are benefiting, too.

"Radiologists have an image problem — few avenues exist for radiologists to talk to patients, and very few patients know their radiologist.

INCIDENTAL FINDINGS WHITE PAPERS



The ACR Incidental Findings Committee has published a series of white papers in the *JACR* to guide the management of incidental findings. These valuable resources cover everything from incidental findings on abdominal CT to incidental adrenal masses.

-  Managing Incidental Findings on Thoracic CT: Lung Findings bit.ly/IncidentalThoracicCT
-  Managing Incidental Adnexal Findings on CT and MRI bit.ly/IncidentalAdnexal
-  Managing Incidental Findings on Thoracic CT: Mediastinal and Cardiovascular Findings bit.ly/IncidentalThoracicCTCardio
-  Management of Incidental Pituitary Findings on CT, MRI, and 18F-Fluorodeoxyglucose PET bit.ly/IncidentalPituitary
-  Management of Incidental Pancreatic Cysts bit.ly/IncidentalPancreaticCysts
-  Management of Incidental Adrenal Masses bit.ly/IncidentalAdrenalMasses

An image is worth a thousand words, but that doesn't matter if we don't explain the findings," says Dania Daye, MD, PhD, a radiology resident at MGH. "Programs like this change how patients and other physicians perceive us. This is a great opportunity for radiologists to contribute more directly to patient health and to increase our own value by becoming more involved with patients."

Expanding Results Delivery

The virtual consults program has roots in a 2012 initiative that started when a woman with cancer asked her radiologist to see her imaging so that she could better understand how her treatment was working. That encounter led a team of MGH radiologists to establish a clinic in which they conducted in-person consultations with patients during limited hours. (Learn more in the Direct to Patients case study at acr.org/Direct-to-Patients.)

Patients responded favorably to the in-person consultations — they started following their doctors' advice more regularly and sticking to care regimens more often. But the in-person consults were held at MGH only once a week, so in early 2016, Daye and a colleague brainstormed ideas to give more patients direct access to their radiologists.

They came up with the concept of virtual consultations and pitched it to radiology department leaders, who saw the potential benefits and greenlighted a pilot program. "As we thought about scaling our results delivery program, we decided that the virtual consults would provide an efficient way

to broaden our reach without disrupting our workflow," says Daye, noting that the in-person clinic also remains in operation.

Engaging Radiologists

To start, Daye and her team selected a couple of radiologists who already embraced the idea of direct communication with patients to take part in the pilot. Daye notes that no radiologists had to be convinced of the concept's merits. Indeed, she says, "During the initial pilot, we were approached by many other radiologists who had heard about it and were interested in participating."

While MGH's radiologists were eager to join the project, some worried about the amount of time the virtual consults would take. These concerns were quickly dispelled, however, when they realized that the average virtual consultation lasts fewer than seven minutes.

"I was particularly sensitive about making sure this program would not interfere with our other duties, so we kept it simple, and we're instituting it incrementally," says Dushyant V. Sahani, MD, FACR, director of computed tomography at MGH and associate professor of radiology at Harvard University. "As we do more of these consults, we expect them to just blend into our normal workflow."

Empowering Patients

The radiologists then partnered with three PCPs, who began recruiting patients for the project. The PCPs asked patients during their regularly scheduled appointments if they












Susan E. Bennett, MD, primary care physician at Massachusetts General Hospital, appreciates that the radiologists are available to talk with patients about their image findings.

would be interested in the virtual consults, providing them with an informational brochure that MGH developed. Ten patients participated in the initial pilot.

Each consult unfolds the same way: When a patient opts for a consult, the PCP calls a radiologist in the same specialty and says that the patient would like to speak with them. The radiologist then uses videoconferencing in the reading room or any other place with an accessible computer and a camera to appear virtually in the patient's exam room.

On the patient's end, the consults are conducted on an iPad, the first of which was

-  Management of Incidental Renal Mass on CT bit.ly/IncidentalRenalMassesCT
-  Management of Incidental Livers Lesions on CT bit.ly/IncidentalLiverLesionsCT
-  Managing Incidental Thyroid Nodules Detected on Imaging bit.ly/IncidentalThyroidNodules
-  Overview of White Papers of the ACR Incidental Findings Committee II on Adnexal, Vascular, Splenic, Nodal, Gallbladder, and Biliary Findings bit.ly/IncidentalFindingsWhitePapers
-  Managing Incidental Findings on Abdominal and Pelvic CT and MRI: Part 1 bit.ly/IncidentalAbdominalandPelvicCT1

-  Managing Incidental Findings on Abdominal and Pelvic CT and MRI: Part 2 bit.ly/IncidentalAbdominalandPelvicCT2
-  Managing Incidental Findings on Abdominal and Pelvic CT and MRI: Part 3 bit.ly/IncidentalAbdominalandPelvicCT3
-  Managing Incidental Findings on Abdominal and Pelvic CT and MRI: Part 4 bit.ly/IncidentalAbdominalandPelvicCT4
-  Managing Incidental Findings on Abdominal CT bit.ly/IncidentalAbdominalCT

View the entire series at bit.ly/IncidentalFindingsCommitteePapers.

purchased with money from a small grant that Daye secured from MGH's Center of Expertise in Healthcare Quality and Patient Safety. The rest were purchased with a grant the team secured from the ACR. The iPads feature split screens that show the images on one half and the radiologist on the other, or the radiologist in a smaller window on the bottom left and the patient's images on the rest of the screen. The setup allows the radiologists to review the images and findings directly with patients and their PCPs.

The goal is to educate patients about their findings, motivating them to make healthy lifestyle changes and to follow their doctors' orders. The thinking, Bennett says, is that when patients see their clogged arteries, they will get more serious about losing weight, and when they see their damaged lungs, they will be more inclined to quit smoking.

"As radiologists, we don't always factor in how much we need to share information with patients and how interested they are in their care," Sahani says. "It is remarkable how engaged patients become when you actually discuss their bodies with them. Empowering them with this knowledge is in their best interest. It's their data, after all."

Gauging the Impact

Survey results show that patients in the initial pilot found value in the virtual consults, which they said helped them better understand their care. Based on this positive response, the hospital secured an ACR Innovation Fund Grant in January of 2017 to expand the pilot program to five radiologists and more than 50 patients.

Daye wrote the grant proposal with input from Bennett and Sahani. "The objective was to assess the value of virtual consultations with primary care providers and patients as a new means of optimizing patient-centered care in radiology," Daye says.

During this expanded pilot, the PCPs found that patients were following doctors' orders better than patients who were not involved in the virtual consults. "Patients told us that they understood their medical conditions a lot better after interacting with the radiologists, asking questions, and seeing firsthand what the insides of their bodies look like," Daye says. "As a result, they



Dushyant V. Sahani, MD, FACR, director of computed tomography at Massachusetts General Hospital and associate professor of radiology at Harvard University, says the virtual consults program empowers patients as active participants in their care.

were more apt to take actions, such as losing weight, to improve their health."

According to surveys, 90% of patients in the expanded pilot were "very satisfied" with the virtual consult experience. They found listening to the PCP and radiologist discussing their care particularly beneficial. "The consults give patients insight into how we think and how we make decisions, which is important because things are not black and white in medicine," Bennett explains. "The more information patients have about what's going on with their health, the better."

The radiologists intend to track these patients to study the program's lasting impact. "In the expanded pilot, we are demonstrating the overall value of the framework," Daye says. "Next, we intend to conduct long-term patient follow-up to look at patient outcomes in specific diseases."

Looking to the Future

For Bennett and other PCPs, the program helps drive higher quality care. "Now, when a patient has a finding on an imaging exam, I no longer have to stumble through, trying to explain what the finding means," Bennett says. "I know I can loop in the radiologist to provide a detailed explanation of the finding, and then the patient and I can work together to determine the next steps in their care."

MGH's radiologists have also responded favorably to the program. By interacting with patients, even in this virtual way, the radiologists are no longer regarded as ambiguous figures who sit in dark rooms all day examining images. Instead, they are viewed as they should be: as key members of the care team focused on improving patient health.

The results of the pilot have been so positive that MGH's radiologists have adopted the virtual consultations as a permanent initiative, adding more PCPs and extending the program to include surgical specialties, such as urology.

They also envision developing a template that other radiologists could follow to implement similar virtual consults at their own institutions, and they hope to eventually collaborate with other radiologists to test the program at institutions nationwide. Daye says that such consults could be particularly beneficial in rural areas where patients and their radiologists are often separated by hundreds of miles.

Sahani says that efforts like this are critical to advancing high-quality care. "When we talk to patients, radiologists can make a tremendous contribution to their care by giving them a better understanding of their conditions, diagnoses, and treatments," he says. "And the bonus is that we can see the difference we are making directly with the patient and the PCP. We don't always get that kind of feedback. This is a fantastic model for the future."

By Chris Togneri, freelance writer

Now It's Your Turn >>>>

Follow these next steps to begin implementing a virtual consults program at your institution. Tell us about it through email at imaging3@acr.org or on Twitter with the hashtag [#Imaging3](https://twitter.com/Imaging3).

- » Secure technology that will allow radiologists to meet with patients and primary care physicians virtually to review images and findings.
- » Start with a pilot project that includes physicians who understand the benefits of radiologists delivering results directly to patients.
- » Show patients their images and describe the findings to help them better understand their diagnoses and treatment options.



Failsafe

Radiologists develop a program that encourages emergency department patients to follow up on incidental findings.

KEY TAKEAWAYS

- Radiologists at Penn State Milton S. Hershey Medical Center led a team in the development of a program that closes the gaps in follow-up of incidental findings for emergency department patients.
- Participants in the program receive a letter and phone call about their incidental findings and are encouraged to follow up with a primary care provider.
- Patients have been receptive to the program, responding particularly well to the follow-up phone call.

A patient visited the emergency department (ED) for a rib injury. A CT scan showed no broken bones, but the radiologist noted a pulmonary nodule in the patient's left lung and recommended follow-up imaging. At discharge, the emergency physician suggested that the patient follow up on the nodule with his primary care physician (PCP) — but that didn't happen.

Now, a year later, the patient is having another CT, and this time the radiologist suspects and a biopsy confirms the presence of lung cancer. The patient finally begins treatment, but the chances of a positive outcome have significantly diminished.

Scenarios like this one occur every day in hospitals nationwide.¹ At Penn State Milton S. Hershey Medical Center, radiologists have taken the lead to address the issue with Failsafe, a program that uses letters and phone calls to inform patients about incidental findings discovered in the ED and encourages them to follow up with their PCPs. And it's having a positive impact.

In the past six months alone, 70% of the patients that the Failsafe team has spoken with indicated that they didn't know about their incidental findings and follow-up recommendations until they received either the letter or the phone call. "The program goes beyond the standard of care to ensure patients can address incidental findings in a timely manner," says Michael A. Bruno, MD, FACR, professor of radiology and medicine and vice chair for quality and safety at Hershey Medical Center.

Uncovering the Cause

Bruno and his team developed Failsafe after they learned about ED patients at Hershey who didn't receive the recommended follow-up care for their incidental findings and, as above, presented later with advanced cancers. They found three gaps in the communication process for handling incidental findings in the ED:



Michael A. Bruno, MD, FACR, professor of radiology and medicine and vice chair for quality and safety at Hershey Medical Center, led the creation of Failsafe.

1) the preliminary radiology report sometimes excluded incidental findings, which were later added at the stage of the final report but might not have been noticed by the emergency physician, 2) some ED patients didn't have a regular PCP, and if they did, the PCP generally was never alerted to the incidental findings and was often completely unaware of the patient's ED visit, and 3) the emergency physician occasionally failed to communicate the findings to the patient and/or PCP.

"As a result of these communication gaps, the majority of ED patients with incidental findings that required follow-up and their PCPs were never told about the findings," Bruno says.

Even when patients were informed of their incidental findings in the ED and told to follow up with their PCPs, most didn't do it. "Patients have the sort of mistaken impression that when they go to the ED, they've been thoroughly evaluated by a

doctor, so they generally don't visit their primary care physician right after an emergency room visit," Bruno explains. "Patients don't realize that emergency physicians provide only acute management assessment and treatment of presenting conditions. And despite being instructed to do so, patients don't always understand the need to follow up with their primary care physicians."



[Date]

Dear [Patient name, e.g., "Mr. Smith"],

I am writing to you today because you recently had an imaging study in the Dept. of Radiology here at Penn State Hershey Medical Center (PSHMC) as part of your visit to our Emergency Department. Your study was interpreted by a PSHMC radiology doctor, who felt there were findings that may require follow up.

The PSHMC radiologist who reviewed your study does not know the details of your health history, and therefore can only give general recommendations; it is up to your primary care doctor to customize those recommendations and make a follow-up plan that is right for you. Therefore, we are writing to ask you to please contact your primary doctor directly and inform them that they need to evaluate the findings related to your recent radiology test for follow-up.

If your primary care doctor is here at PSHMC, he or she can obtain the full Radiology report and decide what, if any, follow-up is right for you. If your doctor is not affiliated with PSHMC, you can obtain a copy of our report yourself by contacting our Health Information Services Department, at 717-531-8055. If you plan to make an appointment with your doctor to discuss the findings of the radiology study, you should request a copy of the report at least seven (7) days prior to your appointment, so that you will be sure to have it with you when you see your doctor.

If you do not have a primary care physician at this time, you may obtain a referral to a provider from our Department of Family and Community Medicine by calling the PSHMC Care Line at 717-531-6955 or if you are outside of our local calling area, you can use our toll-free Care Line number, which is 1-800-243-1455. The Care Line is available 24 hours a day, seven days a week.

Thank you for allowing us to participate in your care.

Sincerely,

[Committee Member], M.D.

[Academic title]

Department of Radiology, Hershey Medical Center

A sample of the letter that patients receive through the Failsafe program.

Developing a Solution

To close these gaps, Bruno and his team initially thought about sending their reports to ED patients' PCPs. But most of the patients that the radiologists talked to couldn't provide their PCP's name because they either couldn't remember it or they didn't have a family physician.

So instead, Bruno and his team opted to communicate their findings directly to patients. "We would use the patient to carry our message to their PCP, who could then discuss our findings and recommendations with the patient," Bruno explains. "Our thinking was that patients have the most amount invested in the information, so they would be the most likely to convey the message and help us communicate better with the clinicians we serve."

With Failsafe, the radiologists send patients letters informing them that they have incidental findings that require follow-up with their PCPs. To protect patient privacy, the letters exclude specific findings or follow-up recommendations.

"The letters have minimal customization," says Bruno, whose signature appears on each one. "We have one for adults and another for children, both available in English or Spanish, but other than that, all of the letters are the same." Eventually, though, the team discovered that the letters alone were not enough.

Getting Team Input

After developing the Failsafe model, Bruno called several emergency physicians, PCPs, and other stakeholders to pitch the program. William M. Bird, DO, vice chair for clinical care in Hershey's Department of Family and Community Medicine, says he was relieved to learn about the program. "Most primary care docs are concerned about a small irregularity getting overlooked and then having it come back to hurt the patient months or years later, when it could have been addressed earlier," Bird says. "We agreed with the radiologists that this was an important quality issue."

Glenn K. Geeting, MD, medical director for hospital quality and vice chair for quality in emergency medicine, also saw the program's

benefits. "As emergency physicians, sometimes we receive the final radiology report after the patient leaves the ED, and we aren't sure what to do with the incidental findings," Geeting says. "The findings may not be significant enough to call the patient back, but at the same time, we worry they could be a potential risk to the patient down the line. This program solves that issue and gives us peace of mind."

With stakeholder support, Bruno and his team assembled a workgroup that included emergency physicians and PCPs, an attorney from the hospital's legal team, the chief quality and chief medical officers, and both the emergency department and radiology department chairs. The group hashed out the program's details, such as how to handle patients who didn't have a PCP.

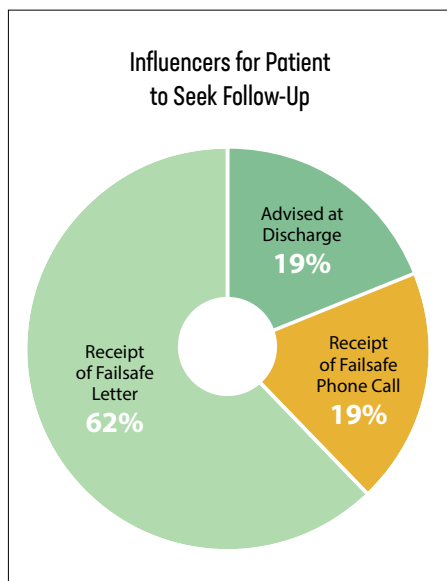
"We agreed to take all of those patients as new patients," Bird explains. "The letter provides a number that patients without a PCP can call, and we make it a priority to address their findings as soon as possible."

Gauging the Impact

When Failsafe launched in 2012, Bruno sent a memo to care providers to ensure everyone knew about the program. The radiology department's administrative team then began sending the letters to patients without any additional follow-up. But Bruno knew he needed to actually speak with the patients to gauge the program's impact.

After the team had sent 100 letters, Bruno called about a dozen patients to hear their thoughts on the letter. "Some of the patients said the letter upset them a little, but mostly they were happy to get the information," Bruno says. "Of the patients I talked with, eight had already arranged their follow-up appointments, one said he wasn't going to follow up, and another said she wasn't going to follow up, but since I called, she would."

From those initial calls, Bruno felt good about the program's impact. But after the team sent 500 letters, Bruno called another sampling of about 24 patients, and the response wasn't as positive. Most of the patients didn't bother returning Bruno's phone calls, and a majority of the patients he spoke with said they weren't concerned



Preliminary data shows that patients are more likely to follow up on incidental findings discovered in the emergency department with Failsafe.

about the letter. “Some said that they didn’t read the letter because they assumed it was about their bill, or they thought they already knew what it was about and just threw it away,” Bruno recalls. “Others said they didn’t think they needed to follow up.”

Expanding the Program

Realizing the program had an engagement problem, Bruno began advocating to hire a nurse to not only send the letters but also call the patients to ensure they received the letters and encourage them to schedule their follow-up appointments. Convincing hospital administrators to hire a nurse to manage the program wasn’t easy, but Bruno made the case with help from the chief medical and chief quality officers.

Specifically, the trio argued that if the program prevented just one lawsuit, it could potentially save the hospital millions of dollars. They also argued that revenue from the follow-up appointments performed at Hershey could offset the program’s cost, and that the nurse could also perform quality analysis. “These three arguments helped sway the more cost-conscious administrators, and so the hospital administration

ultimately decided to cover the nurse’s salary,” Bruno says.

Nicole Seger, MSN, RN, CPN, patient safety analyst, joined the team and began managing Failsafe in the first quarter of 2016. Around the same time, Bruno sent out another memo via the medical staff office to remind everyone in the Hershey care community about the program.

“It’s important that when you implement a program like this, your whole system knows about it because patients are going to ask questions and schedule appointments, and everybody needs to know what they’re referring to and what’s happening,” Seger says.

Informing ED Patients

In addition to hiring Seger, Bruno and his team worked with an IT expert to automate the Failsafe process and provide tracking capabilities. Now, when an ED patient has a non-critical incidental finding that requires follow-up, the reading radiologist enters the case into a program embedded within the department’s PACS, which puts the case on a list for an oversight committee member to review each week.

Once the committee member approves the cases, Seger enters them into a tracking system that automatically pulls the patients’ contact information and generates a letter for each case. Seger mails the letters and creates a flag in the system that reminds her to call the patients in 10 days to confirm that they have received the letters.

During the calls, Seger also collects and documents other information, like what the patients thought of the letter and whether they have scheduled their follow-up appointments. “Most of the patients I’ve called have been glad to receive the letter and have indicated that they intended to follow up with a PCP,” Seger says. “They also say the phone call, me reaching out to them directly, increased their motivation to follow up.”

Planning the Next Phase

In the past six months, Seger has sent 106 letters to ED patients with incidental findings and reached 48 of them by phone. Of the

patients she’s spoken with, 21% said that they planned to follow up with their PCPs.

“With this preliminary data, we’re already learning a lot about patient engagement and how to reach patients more effectively,” says Bruno, adding that the program will also help radiologists and other providers better understand the long-term impact of incidental findings follow-up.

While the team is just beginning to collect data about the program’s results, the anecdotes from patients and support from emergency physicians and PCPs has convinced Bruno to expand the program again in 2018. This time he’ll take it beyond the ED to include all of Hershey’s radiology patients.

“We knew the ED would provide a solid proof of concept to start, but we have other patients who have incidental findings that aren’t followed up as reliably as we would like,” Bruno says. “We think we could do more good if we included all imaging patients to ensure they have the information they need to follow up with their PCPs about our evidence-based recommendations. By doing so, we could save even more patients from enduring the potential harms associated with delayed care.”

ENDNOTE

1. Blagev DP, Lloyd JF, Conner K, et. al. Follow-up of incidental pulmonary nodules and the radiology report. *J Am Coll Radiol* 2014;11:378-383. Available at bit.ly/IncidentalFollowUp.

By Jenny Jones, Imaging 3.0 manager

Now It’s Your Turn >>>

Follow these steps to begin developing your own program for incidental findings follow-up and tell us how you did at imaging3@acr.org or on Twitter with the hashtag #Imaging3:

- » Identify the gaps in incidental findings follow-up at your institution.
- » Develop a program to close the gaps that includes sending letters and making phone calls to patients.
- » Bring stakeholders together to solicit their input and ensure everyone is on board with the program.



Case Study Published July 2017

An Extra Set of Eyes

Radiologists in Virginia are trialing a beta version of an application that uses artificial intelligence to detect relevant incidental findings on CT exams.

KEY TAKEAWAYS

- Radiologists at the University of Virginia Health System have implemented an application that uses computer algorithms to aid in imaging interpretation.
- The technology currently detects coronary calcium scores, pulmonary emphysema, liver steatosis, spine compression fractures, and bone mineral density in chest, abdomen, and pelvis CT scans.
- The app helps the radiologists identify findings that they might not have been able to detect otherwise, potentially leading to enhanced patient care.

It is widely believed that artificial intelligence (AI) and machine learning programs will eventually proliferate throughout radiology. Still, some radiologists are reluctant to adopt these technologies for fear the tools could one day supplant them — although, many experts agree, that won't happen any time soon.¹

Other radiologists, like those at the University of Virginia (UVA) Health System, recognize the value of AI and its related technologies to streamline their workflow and detect findings that they may be unable to see on their own. They understand that these intelligent tools and algorithms, which can learn to identify findings on imaging studies, will empower radiologists to deliver more effective and efficient care, much like new modalities and quality standards have in the past. So when UVA's radiologists got an opportunity to test a beta version of a

software application that leverages AI to detect findings on certain imaging studies, they eagerly embraced it.

Now, the app is allowing UVA's radiologists to focus on acute findings while helping them identify pertinent incidental findings that they might not have seen in the past and provide additional information to referring physicians for improved patient care. "We believe that computer algorithms have the long-term potential to help radiologists perform their daily clinical work by enhancing their abilities to interpret large numbers of complex medical images," says Cree M. Gaskin, MD, professor and chief of musculoskeletal imaging and intervention, associate chief medical informatics officer, and vice chair of informatics and operations at UVA. "We became interested in this particular application because it already offers several clinically relevant algorithms in a system that integrates well with our picture archiving and communications system (PACS)."



Cree M. Gaskin, MD, professor and chief of musculoskeletal imaging and intervention, associate chief medical informatics officer, and vice chair of informatics and operations at UVA, led the integration of a beta version of an application that uses artificial intelligence to help radiologists identify findings.

The App

The app UVA's radiologists are trialing for research and evaluation purposes is called the Radiology Assistant from Israeli-based medical technology company Zebra Medical Vision, which draws on an extensive library of anonymized imaging cases to inform its algorithms. In beta testing, the app includes algorithms that identify five findings on chest, abdomen, and pelvis CT scans: coronary calcium scores, pulmonary emphysema, liver steatosis, spine compression fractures, and bone mineral density. Soon, the app will also include algorithms that detect additional findings on body imaging as well as findings on breast and brain imaging.

UVA's radiologists began using the app this spring and are already reporting benefits from its integration. Specifically, the app is reminding the radiologists to

“The app aids in the detection of specific findings, but the radiologist remains the clinical expert.”

—Cree M. Gaskin, MD

include these relevant incidental findings in their reports, which is helpful given the large volume of cases they read each day and is particularly useful for residents who are learning to read exams and report findings. What’s even more impactful is that, in the case of bone mineral density, the app is helping the radiologists identify findings that they couldn’t see before.

“We’re familiar with noting coronary calcium, pulmonary emphysema, spine compression fractures, and steatosis of the liver, but we were previously unable to comment on bone density unless osteopenia or fractures were visible, meaning the disease was already advanced,” explains Arun Krishnaraj, MD, MPH, associate professor and chief of the body imaging division and vice chair of quality and safety at UVA. “Now we’re including low bone density because the app is prompting us even before we can visually identify findings of the disease. It’s like having an extra set of eyes to help us provide additional information to referring physicians for optimal patient care.”

A Measured Approach

While UVA’s radiologists are regularly using the app now, Gaskin and his team took a measured approach to implementing it. Initially, they installed the app on a workstation that only Gaskin could access in the musculoskeletal division. From there, he loaded chest, abdomen, and pelvis CTs to see how the app would respond and how it would impact the radiologists’ workflow. “We didn’t want to put something on all of the workstations that would be distracting or cumbersome,” Gaskin explains. “Isolating the initial implementation allowed us to resolve any problems before pulling in anyone else.”

Once it was clear the app would be easy to use, Gaskin began showing it to the

department’s body imaging radiologists. He emphasized that the tool would integrate seamlessly into their workflow while enhancing their quality and contribution to patient care. “Showing tools like this in the flesh allows the radiologists to see how unobtrusive they are and how they can add value by helping to identify findings that radiologists couldn’t see otherwise,” Gaskin says.

After observing the app in action, the radiologists understood its potential to improve care and agreed to install it on their workstations. “I’ve been talking with my colleagues and residents a lot about AI and machine learning because I want everyone to be aware of this emerging technology and understand that it’s just like any new modality or tools that we use,” Krishnaraj says. “So when the radiologists in my division saw the app, they generally already had this mindset that this technology is going to make us better, more efficient, and more accurate.”

How It Works

To the radiologists, the app appears as a simple icon on their workstations while the identification of these specific findings happens automatically in the background. It starts when imaging acquisition is completed and the CT scanner sends the images to the PACS. The PACS then forwards copies of the images to an on-site server dedicated to the app, which uses algorithms to read the images and then stores its findings for each relevant study on the server.

When a radiologist opens one of these studies in PACS, the app recalls the stored results and uses a color-coded system to relay the findings to the radiologist. If all of the findings are normal, the icon turns



Arun Krishnaraj, MD, MPH, associate professor and chief of the body imaging division and vice chair of quality and safety at UVA, believes AI tools, like the app, will make radiologists more accurate and efficient.

green, and the radiologist takes no further action with the app. If any of the findings are abnormal, the icon turns red, prompting the radiologist to click on the icon to review the results. “With the color-coding, you can look out of the corner of your eye and see whether any abnormalities are detected,” Gaskin explains. “No time is lost to observe the color, and only a single click is necessary to review abnormal results.”

After reviewing the app’s findings, the radiologist can decide whether to include them in the report. For example, if the app indicates that a patient’s bone density is abnormal and the patient has no history of osteoporosis or other bone-density issues, the radiologist might recommend a dedicated dual-energy X-ray absorptiometry (DEXA) scan for further evaluation. But if the medical record shows that the patient has already been diagnosed with osteoporosis, the radiologist would not include the recommendation in the report because the referrer and patient are likely already aware of the condition and treatment is likely already underway. “The app aids in detection of specific findings, but the radiologist remains the clinical expert,” Gaskin says.



Industry Partner

In testing the app, the radiologists are providing feedback to the vendor about its functionality and interface. They also intend to track cases in which they've recommended DEXA scans to see whether patients get the scans and whether the results match the app's findings. "If the app incidentally detects low bone density and a DEXA scan confirms its existence, the patient can start treatment to prevent fractures and other symptoms that could lead to a diminished quality of life downstream," Krishnaraj explains. "Now, suddenly, we've impacted that patient's life, and we've helped lower the costs to the healthcare system as a whole by addressing the issue much earlier than we would have in the past."

UVA's radiologists are hopeful about the app's capabilities and look forward to implementing additional algorithms as they become available. They view their work in assisting with the development of this

and other advanced technologies (UVA's radiologists are also part of the IBM Watson Health Imaging cooperative) as part of their responsibility to ensure patients receive the best possible care. "We're interested in advancing technology and improving care, so it makes sense for us to partner with industry to achieve that," Gaskin says. "We understand what tools are needed to improve care and our industry partners have the expertise to develop these tools. Both sides need each other."

While some radiologists may be apprehensive about integrating such advanced technologies into their workflow, UVA's radiologists are enthusiastic about adopting them and encourage others to do the same. "AI, machine learning, and computational assessment algorithms aren't something to be avoided but rather embraced," Gaskin says. "These tools have a real potential to enhance, but not replace, what radiologists do, allowing us to expand our expertise beyond traditional image interpretation to

deliver better and more affordable care to our patients."

By Jenny Jones, Imaging 3.0 manager

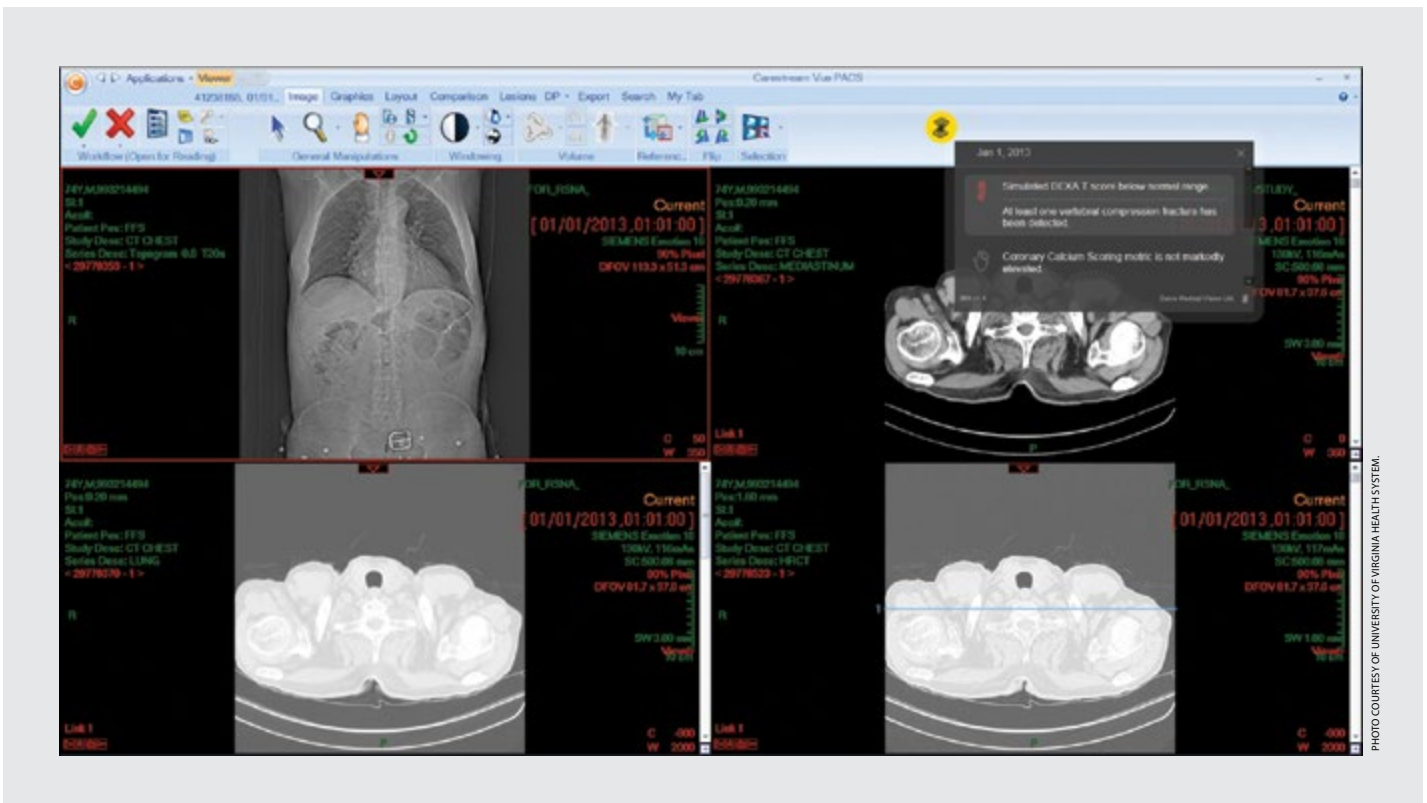
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1. Arndt RZ. Artificial intelligence takes on medical imaging. *Modern Healthcare*. www.modernhealthcare.com/article/20170708/TRANSFORMATION03/170709944 Accessed June 13, 2017.

Now It's Your Turn >>>

Follow these steps to begin integrating AI into your own practice and tell us how you did at [imaging3@acr.org](https://www.imaging3@acr.org) or on Twitter with the hashtag #Imaging3.

- » Educate your team about AI, machine learning, computational assessment algorithms, and other advanced technologies, emphasizing their potential to enhance the radiologist's role in patient care.
- » Cultivate partnerships with industry leaders who are developing advanced AI technologies, and consider becoming a testing site.
- » Introduce the technologies in a thoughtful way to ensure radiologists' workflow is not disrupted in the process.



When the radiologist clicks on the icon, the app displays its findings, as shown here in these screen captures from 2017. The radiologist can then decide whether to include the results in their reports.

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