Oncology Capture of ED Patients with Incidental Radiologic Findings

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Radiologic imaging (i.e., CT and MRI scans) is often used in emergency departments (EDs) to diagnose patients presenting to the hospital. Use of these imaging tools can lead to the discovery of incidental findings, defined as findings that are nonemergent and unrelated to the main concern for which patients sought care. According to one study, 27 percent of all CT scans performed in an ED show an incidental finding that is unrelated to the reason patients originally sought care.[1] Examples of incidental findings discovered through imaging include adrenal masses[2] and pulmonary lung nodules.[3] Some incidental findings are malignant and left unaddressed, often resulting in more extensive and expensive care. Most concerning, patients with unaddressed incidental findings have the potential to experience more adverse outcomes.

After being notified of an incidental finding by an ED provider and discharged, patients are generally left to seek follow-up care on their own. This care model (often called a "push" model of care) is not ideal, as patients may not understand the nature of their finding or know the medical specialty to contact for follow-up care. One study reported that incidental findings in the ED are common, yet only about 18 percent of patients who were notified of an incidental finding had evidence of follow-up care.[4] It is no secret that patients find it hard to navigate the U.S. healthcare system, especially as it relates to oncology care. Patients who are informed about an adrenal nodule may not know where their adrenal gland is located or that they should follow up with an endocrinologist. These patients require a provider to help them navigate the healthcare system at large and to ensure they receive appropriate follow-up care.

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Moving from a 'Push' to a 'Pull' Model of Care

Vanderbilt University Medical Center and Vanderbilt-Ingram Cancer Center in Nashville, Tenn., recognized that their current push model of care and referral processes for ED patients with incidental findings had significant opportunities for improvement.

Prior to 2020, Vanderbilt University Medical Center ED providers would receive an alert of a patient's incidental finding in the electronic health record (EHR). ED providers would then discuss the findings with the patient prior to his or her discharge, placing the burden of follow-up care on the patient. From there, oncology providers would receive messages about certain incidental findings via the EHR or by phone. However, these processes were undefined, and non-clinical oncology staff (e.g., schedulers) were unsure about which subspecialty patients should follow up with. These factors had the potential to delay follow-up care and result in inappropriate routing of patient cases.

With the opportunity to redesign our processes, we assembled a project team to evaluate the current and ideal state for assisting ED patients with incidental findings. This team included Vanderbilt-Ingram Cancer Center's associate nursing officer, chief surgical officer, nurse navigators, a project manager, and a business analyst, as well as ED stakeholders, such as the executive medical director, case managers, and a social worker. Bringing this interdisciplinary team together helped ensure representation of all perspectives and support of key stakeholders, who played a role in the development of the new processes. The ideal workflow depended on four essential cornerstones:

- Dedicating staff to follow up with ED patients after discharge and provide ongoing support
- Replacing the existing "push" model with a "pull" model
- Leveraging a technology solution in the EHR to ensure complete and consistent data capture
- Educating ED providers and staff on any process changes.

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Implementing a New Workflow

The project team determined that radiology would continue to alert ED providers of incidental findings via the EHR, and ED providers would continue to notify patients of their findings prior to discharge. However, after notifying patients of their incidental findings, ED providers would now complete a follow-up form in the EHR to initiate the appropriate follow-up care. Depending on patients' insurance status, the EHR routes the message to one of two baskets—an in-network basket or an out-of-network and uninsured basket—that are monitored by dedicated staff. These staff then contact patients directly to facilitate the appropriate follow-up care.

With the new workflow, the project team understood that additional staff would be needed to ensure program success. Today, two ED case managers focus on patients who present to the ED and are considered out-of-network or uninsured. From an in-network perspective, two disease-specific nurses navigate patients with pancreatic- and pulmonary-related incidental findings, a dedicated physician sees all patients with liver findings, and a nurse manager (who also oversees the program) is responsible for all other incidental findings.

These dedicated staff not only are alleviating burdens from Vanderbilt's nurse navigators but are also establishing "high-touch" relationships with patients by providing a tailored experience, as patients are now interacting with staff who are dedicated to their disease site. Moreover, these staff have expertise in both the nature of the incidental finding and navigation of the health system's follow-up processes.

Upon receipt of an incidental finding EHR message, nurse navigators, ED case managers, or dedicated physicians review the medical chart and contact the patient to discuss the finding and to formulate a follow-up plan, whether it be through their primary care provider or a specialist. Because ED providers may see patients who are not local, not every patient referred to the program receives follow-up care within the Vanderbilt healthcare system. If a patient receives a call from our providers and already has a specialist in mind, staff are happy to forward the patient's medical records to an appropriate provider. This is an important aspect of our program, as patients can complete necessary follow-up with an appropriate healthcare professional even if they live outside of the state.

During the final step of our new workflow, the program's nurse navigators, ED case managers, and physician document their outreach and communication with patients in the EHR via the title "ED incidental finding." Providers use a patient list within the EHR, so all work can be located and tracked.

For this new workflow and for the program to succeed, it was imperative that ED providers were educated about the new processes and supportive of our changes. The project team developed and presented a standard operating procedure to ED providers at their regular meetings. Additionally, because Vanderbilt University Medical Center is a teaching hospital, residents were also informed of this process change during their weekly conferences. After ensuring physician buy-in, the new workflow and processes were presented via weekly emergency room update communications to make all ED staff aware of the program.

Celebrating Patient 'Wins'

Below are a couple of patient "wins" that illustrate our success with this new workflow.

Patient A, a 64-year-old male, presented to the ED with abdominal pain. After completing the necessary imaging, the ED provider found that the patient had a pancreatic mass with liver metastases. Once referred to our new program, the pancreatic-dedicated nurse navigator contacted the patient on the same day the incidental findings were discovered, scheduled an oncology appointment for the following day, and the patient began chemotherapy just six days later.

Patient B, a female traveling through Nashville on her way back to her home in Colorado, presented to the ED, and imaging found an incidental lytic lesion on her spine. When the nurse navigator contacted the patient, the patient said that she had a history of breast cancer and had a medical oncologist she saw regularly. The nurse navigator sent the ED reports to the patient's oncologist and made sure the patient had an appointment scheduled. The nurse navigator also called the oncologist's office prior to the patient's appointment to make sure they had the patient's reports and everything else they needed.

Patient C, a male patient, presented to the ED with a migraine. Imaging subsequently showed a mass on his spine. The nurse navigator made several phone calls and requests through the EHR and, within a week, was able to secure a neurosurgical appointment for the patient for evaluation.

Proving Program Efficacy

When evaluating the efficacy of any program, it is important to remember your goal(s). In our case, we had a two-part goal: 1) routing ED patients with incidental findings through the appro-

priate referral pathway and 2) improving patient engagement through dedicated nurse navigators and staff to initiate follow-up care. Since our program went live in May 2020 and through the end of June 2021, providers identified 1,663 unique ED patients with incidental radiologic findings, approximately 120 patients a month (Figure 1, below). More importantly, 100 percent of those patients were successfully routed via our newly established referral pathways, indicating that the first part of the program's goal is being accomplished.

Looking at the two-part goal, a total of 3,741 outpatient appointments were completed between May 2020 and June 2021, an average of 267 outpatient appointments per month (Figure 2, below). Less than half of those appointments occurred within the cancer center, meaning that most of our program follow-up occurs in non-oncology departments. Lab, radiology, and medicine patient care centers have all experienced a significant number of visits. This finding is important because it demonstrates a significant benefit beyond the cancer center, which helps inform future growth and resourcing for the program.

The data showed some delays in realized visits due to the nature of an incidental finding, which may warrant follow-up immediately or within three months, six months, or longer. Figure 2 shows the number of outpatient appointments completed per month. When comparing this with Figure 1, there were very few visits in May 2020, even though more than 100 unique ED patients were identified with incidental findings. These data suggest that appointments were scheduled out months later, resulting in higher visit totals during later months (e.g., September or October) and beyond. It is also possible that appointments were scheduled out months later due to appointment availability at the time of patients' ED visit, clinical need for follow-up, and provider recommendations.

Another key indicator demonstrating program efficacy is the number of surgeries and procedures that have resulted from these incidental findings. As outlined in Figure 3, page 24, from May 2020 to June 2021, almost 150 surgical procedures were completed, amounting to about 10 procedures per month. From a fiscal responsibility perspective, this is a critical metric, as surgical

Figure 1. Unique Incidental Findings Patients by Month
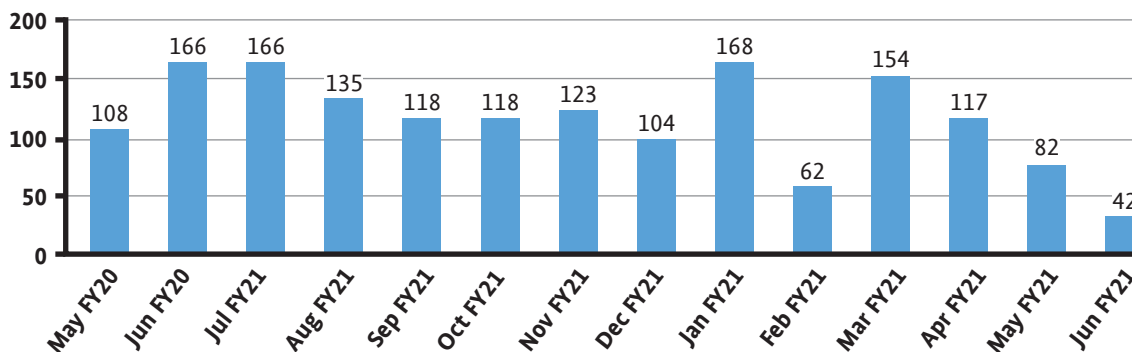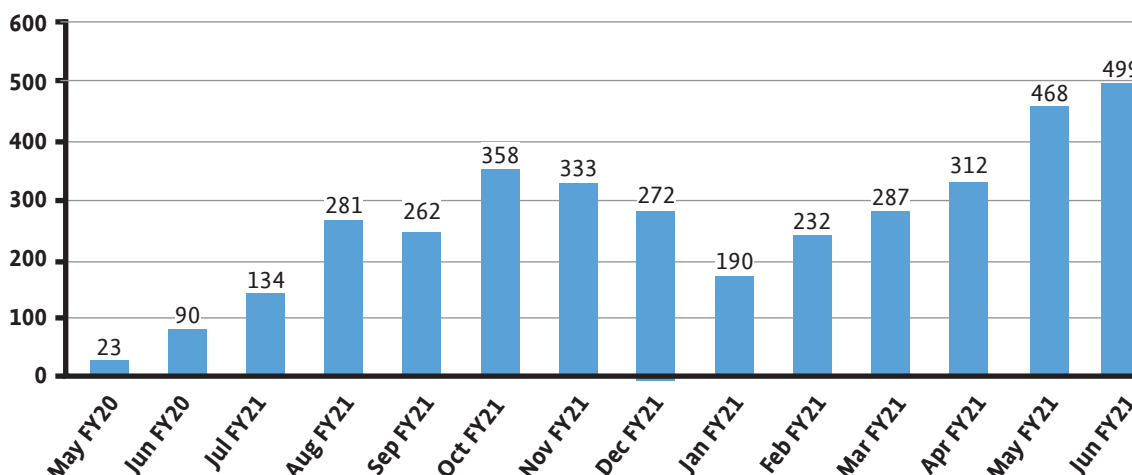

Figure 2. Total Completed Outpatient Appointments by Month

procedures are high revenue generators. Looking at organizational investment in terms of resources, return on investment (ROI) is essential to ensure the ongoing success of the program and future growth.

Learning from Successes and Challenges

Many factors were critical to the success of the program, including involving the appropriate stakeholders (e.g., leadership, nurse navigation, ED case management, and analytics) from the onset. Also, it was imperative to have providers with expertise in incidental findings and the skill to navigate our complex healthcare system—in our case, nurse navigators—who follow up with patients. The ability of staff to deliver these services was critical. Dedicated staff, like our nurse navigators, and resources (e.g., data analytics, program management, and information technology) were key to swift implementation and program success. Finally, engagement by physician leadership was essential to ensure necessary provider education and program advocacy that is carried out across the institution.

Ongoing program success can be credited to the consistent communication and collaboration between all team members, including nurse navigators, ED case managers, physicians, and other organizational leaders. Under the new workflow, all communication is done via the EHR; without this seamless and trackable platform, patients would undoubtedly fall through the cracks.

Even with our successes, we experienced and continue to work through several barriers. In particular, data validation was a significant barrier to demonstrating the efficacy of the program. It was not always apparent whether follow-up visits, labs, procedures, and surgeries were directly associated with a specific patient's incidental finding. Overcoming this barrier involved frequent and close collaboration between nursing, physician leadership, and data analytics to ensure data were attributed to the appropriate incidental findings and tracked to demonstrate ROI.

Other barriers included patient response rates to staff and appointment no-shows. Even though patients are contacted directly about their incidental findings through our "pull" model, they still bear responsibility and must reciprocate that engagement to obtain the follow-up care they need. This includes responding to and working with staff, as well as physically presenting for their scheduled appointments.

Finally, we are faced with a large number of patients with incidental findings and a limited number of navigational resources. Our nurse navigators and other staff can only do so much to engage with patients, including phone calls, online messages, and letters. Demonstrating the program's efficacy should allow us to grow and invest in additional navigational resources.

Exploring Growth Opportunities and Future Direction

Growth within the incidental findings program has been intentional. The program was first staffed by a single nurse navigator and two case managers. Two additional disease-specific nurse navigators (e.g., pancreatic and pulmonary) were later added. With the addition of this dedicated staff, our program's growth was able to align with Vanderbilt University Medical Center's growth. For example, the medical center recently established a lung institute and pancreatic cancer program, and the implementation of our lung-dedicated physician and pancreatic-dedicated nurse navigator helped support the growth of these new programs.

Work is actively taking place to expand the program to the inpatient setting, as our current structure is focused solely on patients who present to the ED and receive follow-up care in the outpatient setting. Opening these services to the inpatient setting will allow us to capture patients who present to the ED, have an incidental finding, and are admitted to the hospital for an unrelated need. Considering this opportunity, we established a work group to focus on this expansion, developing the appropriate processes and ensuring adequate resource allocations to follow-up with
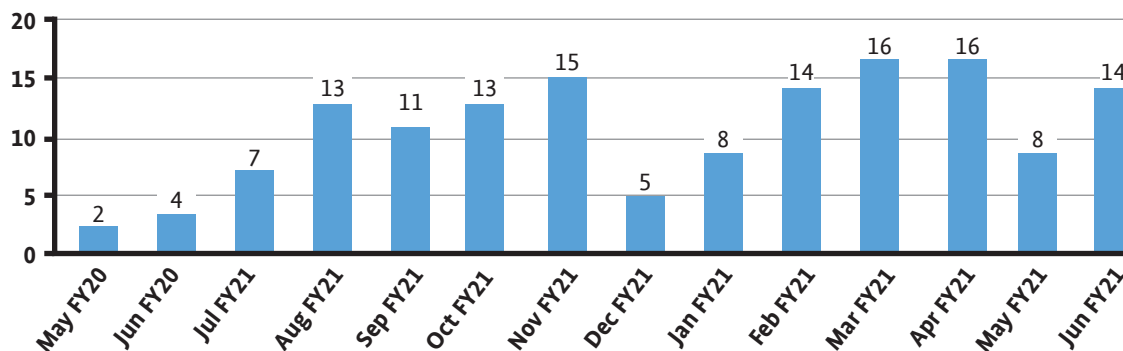
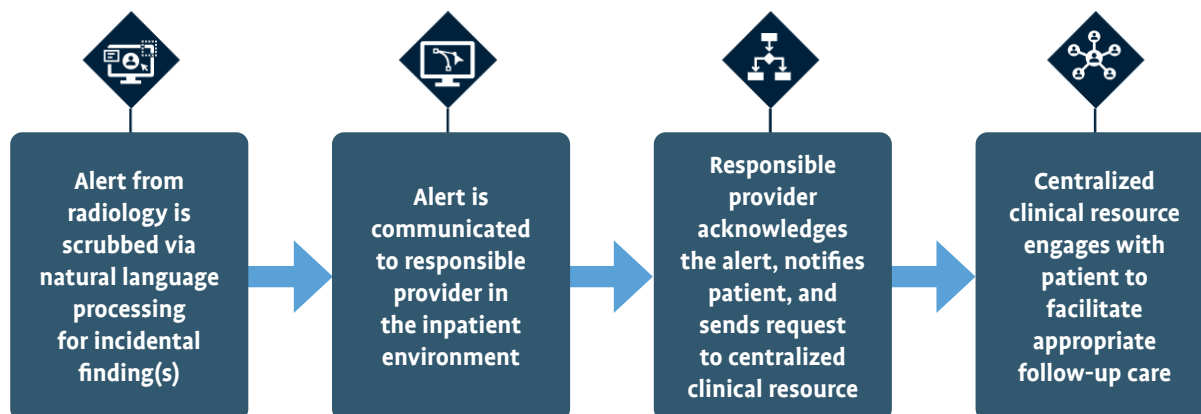Figure 3. Total Completed Surgical Procedures by Month

Figure 4. Vanderbilt University Medical Center Inpatient Process

| Alert from radiology is scrubbed via natural language processing for incidental finding(s) | → | Alert is communicated to responsible provider in the inpatient environment | → | Responsible provider acknowledges the alert, notifies patient, and sends request to centralized clinical resource | → | Centralized clinical resource engages with patient to facilitate appropriate follow-up care |

those admitted to the hospital. The goal is to cross-coordinate follow-up care for admitted patients with incidental findings with the inpatient care team(s) prior to discharge.

As a direct result, the work group established the process outlined in Figure 4, above. This process hinges on natural language processing as the catalyst for initiating follow-up. Therefore, an alert initiated through the EHR from radiology is scrubbed via a natural language processor, which was developed in-house at Vanderbilt University Medical Center. The processor looks for any coded language that relates to incidental findings. Once an incidental finding is identified, the alert is automatically communicated to the inpatient care team and responsible provider. The inpatient care team acknowledges the alert within the EHR, notifies the patient appropriately, and forwards the request to a new, centralized clinical resource to activate the follow-up process. This resource then engages directly with the patient—similar to our ED-based process—and facilitates next steps. A pilot of this program expansion is underway in a few of Vanderbilt's larger units, and we hope to expand this program into our entire inpatient operation in the future.

Finally, there are numerous opportunities to expand this program and share findings beyond the Vanderbilt University Medical Center and Vanderbilt-Ingram Cancer Center. These opportunities include expanding to other community hospitals within the Vanderbilt University Medical Center system that offer emergency or inpatient services, as well as to other service lines

with a high frequency of radiologic imaging. Moreover, there is opportunity to share these processes with other hospitals and health systems within the Vanderbilt Health Affiliated Network.

Finally, because this opportunity is not unique to the Vanderbilt University Medical Center and its patients, an important next step is to share these findings with the broader, national oncology community through publication in peer-reviewed journals like *Oncology Issues*. ◼

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