Incidental Findings and Low-Value Care

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Incidental imaging findings are common and analogous to the results of screening tests when screening is performed of unselected, low-risk patients. Approximately 15–30% of all diagnostic imaging and 20–40% of CT examinations contain at least one incidental finding. Patients with incidental findings but low risk for disease are likely to experience length bias, lead-time bias, overdiagnosis, and overtreatment that create an illusion of benefit while conferring harm. This includes incidental detection of many types of cancers that, although malignant, would have been unlikely to affect a patient's health had the cancer not been detected. Detection of some incidental findings can improve health, but most do not. Greater patient- and disease-related risk increase the likelihood an incidental finding is important. Clinical guidelines for incidental findings should more deeply integrate patient risk factors and disease aggressiveness to inform management. Lack of outcome and cost-effectiveness data has led to reflexive management strategies for incidental findings that promote low-value and sometimes harmful care.

Incidental imaging findings are common [1–3]. They can be defined as unanticipated imaging results unrelated to the patient's chief concern [1–3]. Approximately 15–30% of all diagnostic imaging and 20–40% of CT examinations contain at least one incidental finding [1]. Extensive effort has been undertaken by groups like the American College of Radiology to provide management algorithms for incidental findings, but there is a lack of outcomes or cost-effectiveness data to support most of the recommended algorithms [3–7]. In general, accurate diagnosis (e.g., did the incidental finding result in a cancer diagnosis?) and detection rate (i.e., did imaging result in discovery of an incidental finding for which additional management is recommended in a guideline?) are used to support incidental findings guidelines. However, it is increasingly clear that early-stage cancer identification is not always an ideal outcome [6, 8–15].

The intent in pursuing imaging, clinical, interventional, or surgical follow-up of incidental findings is to prevent harm through early diagnosis, but in many instances, this has been shown to cause the opposite effect—increased harm without patient benefit [6, 8–15]. This is paradoxically true for many patients who are diagnosed with incidental, early-stage cancer (e.g., grade group 1 prostate cancer, cystic kidney cancer, micropapillary thyroid cancer) [8–15]. In addition to physical harm from iatrogenic complication, pursuit of incidental findings causes emotional harm and financial toxicity from what has been termed "cascades of care," in which the index test begets a series of expensive additional tests and interventions that themselves trigger ever more tests and interventions [14–28].

It can seem unusual for early detection of cancer or provision of more information about a patient's health to be negative. Nonetheless, confusing as it may be, this has been borne out in numerous settings [6, 8–15]. Likely, it relates to multiple factors, including biases of screening, inaccurate human estimates of risk, incomplete knowledge of risk, defensive medicine, patient and provider fear, and social and economic pressure to overdiagnose. It is difficult to recalibrate human cognition (e.g., risk estimation, defensive medicine) or to resolve incomplete knowledge about risk without expensive multiyear studies (e.g., does performing biochemical testing on incidental adrenal nodules cost-effectively improve health, as currently recommended [4, 5]?). This Clinical Perspective focuses on how the known biases of screening help us predict the outcomes occurring with respect to the detection of incidental findings—preferential diagnosis of indolent, low-risk disease; in-

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creased cost and morbidity; and unchanged mortality [29, 30]. In other words, low-value care.

Incidental Findings and Relationship to Screening

Incidental findings commonly result when a sensitive imaging test such as CT or MRI is used to image organs and other body parts that have low risk for important disease. There are strong parallels in the clinical outcome of this construct to the results of intentionally screening low-risk patients with whole-body imaging, a practice that has been refuted by the American College of Radiology and challenged by the U.S. FDA owing to the low probability of identifying important disease and the high probability of downstream, low-value care [31, 32].

Incidental findings are not connected to the chief concern [1–3]. Therefore, the patient is considered low risk with respect to the incidental finding unless they happen to have a comorbid condition that coincidentally aligns with it (e.g., high-risk smoking history and incidental pulmonary nodule identified in a patient imaged for right lower quadrant pain). In most cases, an incidental finding will not be connected to a high-risk history, sign, or symptom because the imaging test is, by definition, being performed for a different indication. These factors predict the low-value care observed following the identification and management of incidental findings [1, 6, 8–15, 31, 32]. If the patient is at low risk of disease (e.g., most incidental findings, which by definition are unrelated to suspected disease) and the test is sensitive (e.g., CT or MRI), false-positive results will be common, indolent disease will be detected more often than aggressive disease, and overdiagnosis and overtreatment will dominate, all while giving the illusion of improved care through early identification. This outcome is analogous to what results from screening a low-risk population.

Although most incidental findings result from clinically indicated, diagnostic (i.e., not screening) examinations, the probability that an incidental finding is important is heavily influenced by analogous biases of screening. Consider this: an ideal screening test is inexpensive (i.e., low patient cost, low system cost), valid (i.e., few false-positives, few false-negatives), targeted (i.e., directed toward patients with highest disease prevalence), and useful (i.e., detects preclinical disease that otherwise would become clinically important, in a sufficient time to intervene with effective therapy that produces a superior outcome) [29, 30]. In the following section, the common biases of screening will be linked to incidental findings to help explain why low-value care is observed cascading from their detection [1, 6, 8–25, 28, 31–36].

Biases of Screening

Screening has several well-known, common biases [29, 30]. These biases inflate the apparent effectiveness of screening and provide insight into incidental findings management. This is because incidental findings result from inadvertently screening parts of the body at low risk for disease.

Length Bias

Length bias refers to the tendency of a screening test to identify indolent disease more often than aggressive disease [29, 30]. Indolent disease grows slowly or not at all, whereas aggressive disease grows or progresses quickly. If imaging is performed of a patient at a random interval, it is much more likely that indolent disease will be incidentally identified rather than aggressive disease. The indolence of a finding—the likelihood it will remain for many years without negative effect or symptoms—proportionally weights its prevalence against a finding that is only present for a brief period before producing symptoms (i.e., at which point it is no longer incidental).

For example, consider a patient with an indolent finding (e.g., a 1.5-cm branch duct intraductal papillary mucinous neoplasm [BD-IPMN]) who is imaged at random intervals between the ages of 50 and 69 years. During those 20 years, if at any point the patient is imaged with CT or MRI of the abdomen, the finding likely will be detectable and minimally changed. Now consider another patient who has an aggressive finding (e.g., a 1.5-cm pancreatic adenocarcinoma). If the patient is imaged at random intervals between the ages of 50 and 69 years, the window at which the finding will be identifiable and resectable is brief, likely less than 1 year. Probabilistically, irrespective of disease prevalence, indolent disease is much more likely than aggressive disease to be visible on an examination performed at a random interval. This is length bias, and it helps explain why most incidental findings are of low or negligible clinical importance, even if our intuition tells us otherwise (e.g., when an incidental finding is labeled a cancer).

Lead-Time Bias

Lead-time bias refers to detecting a cancer early, before it is clinically detectable but when nothing can be done to affect the course of the disease [29, 30]. An ideal screening test will detect a cancer not only before it is symptomatic but also in a time frame during which effective treatment will change the course of the disease. Avoiding lead-time bias requires detection of cancer before clinical symptoms, the availability of effective treatment, and a differential treatment effect if that treatment is applied before symptoms would have occurred. If treatment has the same efficacy if administered before or after symptom onset, detecting the cancer before symptom onset is not beneficial.

For example, consider a patient who develops a cancer with the following temporal characteristics: 2 years from inception to detectability by imaging, 3 years from inception to clinical symptoms, and 5 years from inception to death by cancer. If no imaging is performed, the patient will have a perceived survival of 2 years (5 – 3 = 2), defined as the time from clinical symptoms to death. However, if imaging is performed at year 2 after inception, the patient will have a perceived survival of 3 years (5 – 2 = 3), corresponding to the time from detection to death. Three years is 50% greater than the base case (2 years), even though no therapy has been given to change the course of the disease. This is lead-time bias, and it helps explain why prolongation in apparent survival following detection of an incidental finding at an early stage does not necessarily imply patient benefit.

Highlights

- *Detection of incidental findings in a low-risk population generally results in low-value and potentially harmful care, including paradoxically for many cancers.*

Overdiagnosis

Overdiagnosis bias is the detection of disease that would never harm the patient [34]. It can be thought of as a hyperbolic example of length bias [29, 30, 34]. Many incidental findings correspond to overdiagnosis. When overdiagnoses are combined with aggressive cancer diagnoses without consideration for disease aggressiveness, they can imply a beneficial effect of screening (i.e., incidental finding detection). A group enriched by overdiagnosis will appear to live longer and have less advanced disease because the disease in the screened group will be less aggressive.

For example, consider a patient with an incidental Bosniak IIF cystic renal mass. Bosniak IIF masses are common, but they are uncommonly cancer (approximately 15% of those resected, less than approximately 5% of all identified) [6, 35]. Those that are cancer are highly likely indolent and unlikely to cause morbidity or mortality unrelated to treatment effects [6, 35]. Incidental indolent cystic renal cell carcinoma arising in a Bosniak IIF cystic mass is not comparable to an aggressive, Fuhrman 3 of 4 solid clear cell renal cell carcinoma. If disease aggressiveness is not considered, including indolent Bosniak IIF cystic masses in a general population of patients with renal cell carcinoma will bias outcomes and suggest a beneficial effect of incidental detection (i.e., low risk of recurrence or metastasis, longer apparent survival). This is overdiagnosis bias, and it helps explain why binary consideration of cancer versus no cancer can be misleading and propel low-value care.

Benefits and Harms of Incidental Findings

Detection of some incidental findings can improve morbidity or mortality through early detection. This is especially so if the patient coincidentally has risk factors for the detected disease (e.g., an incidental 3.2-cm solid renal mass in a patient with von Hippel–Lindau syndrome imaged with CT for suspected diverticulitis). This is because coincidental risk factors enrich the prevalence of meaningful disease and consequently the likelihood an incidental finding is meaningful. Meaningful in this context refers to the ideal result of a screening test: preclinical detection when effective treatment would produce a superior result if administered before symptom onset. However, coincidental risk factors are uncommon because, definitionally, incidental findings are unrelated to the chief concern.

Lack of evidence and incomplete understanding of the complex interplay between diagnostic and downstream risk make it difficult to determine during routine clinical practice whether pursuit of most incidental findings will produce high-value care. This uncertainty generally results in radiologists and referring practitioners erring on the side of diagnostic sensitivity and discounting the risks of collateral harm [2, 9, 16–19]. In that common context, ascribed benefit of managing an incidental finding is instinctual or by gestalt rather than evidence based. For example, benefit might be assigned to detection of a kidney or thyroid mass that was removed and confirmed to be cancer—detection of cancer seemingly proof enough that benefit has been conferred.

However, the reality is not so straightforward [1, 6, 8–25, 28, 31–36]. Numerous studies [8, 11, 12, 14, 15, 33, 36] have shown that intervention on incidental findings, including those that are cancer, can result in low-value care and cause harm (e.g., detecting a cancer that—had it not been identified—would otherwise not have affected a patient's life or detecting a cancer for which intervention does not change disease trajectory). These factors diminish the effectiveness of managing incidental findings. In addition to questionable efficacy, there also are harms, including false-positive results, need for confirmatory testing or follow-up, cost, complications of diagnosis and therapy, and acute and chronic anxiety [1, 6, 8–25, 28, 31–33].

The challenge in incidental finding management is determining which incidental findings require management and which do not. Additionally, if management is required, it must be done in a way that maximizes patient value. This is nonintuitive, requires detailed study, and necessitates incorporation of many factors beyond imaging features: patient risk, disease risk, patient preference, available therapies, harms of confirmatory diagnosis, and harms of therapy. It is complicated. Odds favor incidental finding management causing harm. There are numerous unfortunate examples in the literature. In the following section, three specific examples are provided.

Disease-Specific Case Studies

Population-based studies have reported harm and low-value care resulting from the detection of incidental findings. These situations follow predictable, common, stepwise themes, tragically similar for many common incidental findings [1–3, 16–19, 21–32, 35]. Initially, there is enthusiasm about the potential for early diagnosis of cancer through detection of the incidental finding. The incidental finding is thus viewed as a secondary benefit of imaging. Guidelines and recommendations for management are developed to ensure patients receive the maximum benefit from early detection. Systems are instituted to ensure appropriate imaging and clinical follow-up. However, subsequent large, population-based studies have difficulty proving benefit—especially when viewed in the context of screening biases—and uncover harms that have been exerted on populations who were purported to be helped. The incidental finding is associated with a preponderance of false-positives, diagnosis of indolent or clinically unimportant disease, and no meaningful change to disease-related mortality. After a multiyear process and much collateral cost and harm, a fuller picture of the low-value care that resulted emerges. The initially aggressive approach diminishes, and the incidental finding becomes viewed as a harm of imaging.

In general, guidelines governing the management of incidental findings lack cost-effectiveness support that they result in high-value care. If incidental findings in low-risk patients are common and important—as indicated by incidental finding management guidelines—then argumentation might follow that broad-based screening should be performed in the general population (i.e., expand incidental finding management into population-level detection efforts). That has been tried and is harmful [10, 11, 31, 32]. One might argue the value proposition improves if the incidental finding is already detected (i.e., rather than trying to seek it). What follows are three prevalent examples—among many—in which that approach also has led to harm and low-value care.

Thyroid Cancer

High-resolution thyroid ultrasound identifies at least one thyroid nodule in 19–68% of randomly selected adult patients, with a higher likelihood in women and older individuals [37, 38]. Further, thyroid cancer is often detected when thyroid nodules are

sampled [39–41]. A common imaging finding that has a strong association with cancer would superficially suggest strong clinical benefit for imaging the thyroid, fastidiously reporting thyroid nodules when discovered incidentally, and aggressively sampling thyroid nodules to identify prevalent cancer. This logic is intuitive and reflects what happened over the last 50 years.

In the United States, from 1975 to 2009, the incidence of thyroid cancer approximately tripled (4.9–14.3 per 100,000 patients; relative rate: 2.9 [95% CI, 2.7–3.1]) and was associated with an estimated cost of billions of dollars [10, 42]. The increase was nearly entirely explained by increased diagnosis of asymptomatic, indolent papillary thyroid cancer (papillary cancer incidence increased from 3.4 to 12.5 per 100,000) [10]. The absolute increase was approximately fourfold higher in women despite a lower prevalence of thyroid cancer in autopsy studies [10]. Meanwhile, during the same period, mortality from thyroid cancer remained unchanged (0.5 per 100,000) [10]. Marked rise in incidence with unchanged mortality strongly implicates overdiagnosis [10, 34].

In South Korea, from 1993 to 2011, the same problem was occurring [11]. However, unlike in the United States, in which a large fraction of thyroid nodules is detected incidentally, South Korea had instituted a government-sponsored screening program [11]. The logic, as noted, was seemingly sensible—thyroid nodules are prevalent and commonly harbor cancer; therefore, screening makes intuitive sense. What occurred was a 15-fold increase in the rate of thyroid cancer diagnosis without change in mortality [11]. Thousands of additional patients were undergoing thyroidectomy with associated risk of recurrent laryngeal nerve injury and subsequent need for lifelong thyroid hormone replacement without apparent benefit [11]. Despite best intentions and intuitive logic, population harm, tremendous cost, and low-value care followed.

Fortunately, the overdiagnosis epidemic in South Korea was recognized [12]. A public messaging campaign was undertaken in 2014 to discourage citizens from undergoing screening. This bears repeating. Patients were actively warned to avoid learning about the cancer they might have because learning about it was more harmful than helpful. Following this messaging campaign, thyroidectomies decreased by approximately 35% and the incidence of thyroid cancer decreased by approximately 30% [12].

Branch-Duct Intraductal Papillary Mucinous Neoplasms

In asymptomatic adult patients over the age of 40, approximately 5–25% will have a unilocular cystic pancreatic lesion that is presumed to be a BD-IPMN [43–47]. Such lesions are 2–3 times as common on MRI versus on CT (due to superior contrast resolution) and are more common in older patients [43–47]. Most are subcentimeter. Studies have found a small increased risk of pancreatic adenocarcinoma developing in patients with larger BD-IPMNs [48].

The risk of pancreatic adenocarcinoma arising in a patient with a BD-IPMN was summarized in a 2016 meta-analysis as 0.007 per person-year of follow-up [48]. Of the 13 studies in that meta-analysis that included size [48], mean or median diameter was greater than or equal to 20 mm in seven studies and greater than or equal to 10 mm in 12 studies. In other words, the meta-analysis was biased toward larger BD-IPMNs and therefore likely inflated the risk of adenocarcinoma (even though the risk estimate was small, regardless). This is understandable because histologic series typically are enriched with larger BD-IPMNs. In a modeling study using those data, the life-expectancy benefit of surveilling larger BD-IPMNs in patients over age 60 was in general less than 6 months, with the calculated life expectancy benefit declining to just over 1 month in patients with advanced age and comorbidities [49].

Given that BD-IPMNs are prevalent and have a potential association with lethal pancreatic adenocarcinoma, there has been strong and understandable interest in surveillance and intervention to prevent harm. For a BD-IPMN secondary screening program to be effective and produce high value, each of the following four considerations must be true: the observed BD-IPMN must increase the risk of cancer; the surveillance cadence must allow accurate and reliable identification of a finding that indicates early-stage pancreatic adenocarcinoma; effective therapy must exist that permits treatment of early-stage adenocarcinoma with better results than had imaging waited until symptom onset; and the program must be affordable. Each of these components borrows on the logic of screening [29, 30].

Unfortunately, pancreatic adenocarcinoma is aggressive and fast-growing, and the surveillance cadence recommended in most BD-IPMN guidelines is annual. The odds are low that annual surveillance imaging will identify an asymptomatic adenocarcinoma in a window during which effective treatment would be different than if initiated after symptom onset. Further, imaging is expensive for BD-IPMNs because it generally involves MRI or endoscopic ultrasound. In 2019, the U.S. Preventive Services Task Force assigned a rating of "D: There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits" for pancreatic cancer screening in asymptomatic adults not known to be at high risk of pancreatic cancer (i.e., patients with inherited genetic syndrome or history of pancreatic cancer) [50]. Specific comment was made that existing guidelines for BD-IPMNs are at risk of overdiagnosis and overtreatment [50]. Those guidelines are expected to continue to evolve. In the meantime, continued aggressive surveillance of small BD-IPMNs is likely to perpetuate low-value care.

Kidney Cancer

Incidental kidney masses are present on over 50% of CT and MRI examinations [8, 14, 15, 51, 52]. A small but meaningful proportion of these masses is associated with risk of renal cell carcinoma (e.g., solid masses without macroscopic fat; Bosniak IIF, Bosniak III, and Bosniak IV cystic masses) [52, 53]. When an incidental indeterminate kidney mass is identified, algorithms are followed to determine the likelihood of cancer [3, 5, 52]. These typically include additional imaging and sometimes biopsy or extirpative therapy [52].

The high prevalence of incidental kidney masses; the potential for cancer; and the inability to reliably differentiate benign, indolent, and aggressive masses has led to an enormous increase in the number of patients undergoing renal imaging and intervention [6, 8, 14, 15, 36, 52]. SEER data from 1975 to 2019 show marked increase in incidence of kidney cancer due to increased incidental detection (6.82 per 100,000 in 1975 vs 15.85 per 100,000 in 2019) but unfortunately unchanged mortality (3.61 per 100,000 in 1975 vs 3.44 per 100,000 in 2020) [54]. The increased incidence is largely explained by detection of incidental masses less than or equal to 4 cm [15]. Increased detection without decrease in mortality strongly implicates overdiagnosis.

The effort to diagnose and treat early-stage renal masses has been associated with substantial cost and harm [6, 8, 36, 49, 55, 56]. From 2000 to 2009, there was an estimated 82% increase (from 3098 to 5624) in the number of surgically resected benign kidney masses in the United States [36]. In a study of 15 million Medicare beneficiaries 65–85 years old from 2010 to 2014, 43% underwent CT of the chest or abdomen [8]. In that population, imaging 1000 additional beneficiaries was associated with four additional nephrectomies (95% CI, three to five nephrectomies; corresponding to roughly 25,000 additional nephrectomies overall). The nephrectomy-associated mortality rate was 2.1% at 30 days and 4.3% at 90 days [8]. These data imply that more imaging leads to more detection, more surgery, and more complications [8]. Meanwhile, the mortality from renal cancer remains flat [14, 15, 54]. Recognition of overdiagnosis and overtreatment of small kidney masses has led to the emergence of active surveillance as an accepted management strategy [57].

Other Conditions

The three case studies highlighted (i.e., thyroid cancer, BD-IPMNs, kidney cancer) are but few among many examples of incidental findings causing low-value care and potential harm (e.g., normal variants at lumbar spine MRI [33]; overdiagnosis of low-risk grade group 1 prostate cancer detected at systematic biopsy [58]; incidental detection and characterization of benign adrenal nodules, with resultant recommendations for universal biochemical testing [4, 5, 59, 60]; incidental benign findings at brain MRI [61]; extrahepatic incidental findings in patients with cirrhosis [62]). In each of these cases, a similar rubric applies. Length bias, lead-time bias, and overdiagnosis in low-risk patients help us understand why the incidental findings that are observed and managed generally produce low-value care.

So, What Should We Do?

It is increasingly recognized that incidental findings are incompletely understood, expensive, and surprisingly harmful. Rather than a benefit of imaging, they are usually a harm. They are not sought, the odds of them being important is low, and they create tremendous uncertainty and low-value care. The pragmatic challenge is what to do about it in the near and medium term. Some have wondered if certain incidental findings should not be reported at all [63]. The medicolegal environment complicates matters [2, 35, 63]. Some incidental findings are cancer. Sophisticated understanding of the biases that predict low-value care—that early detection of some cancers can produce a paradoxically worse outcome than had those cancers never been detected—is not a reasonable thing to expect of patients or the legal system in 2022; it is difficult for medical practitioners to understand. However, we (radiologists) should not simply maintain the status quo. Here are several recommendations.

First, we should heed the call to action raised by some asking us to be more aware of the harms of overdiagnosis and overtreatment cascading from the detection of incidental findings [16–19]. Incidental findings are a complication of diagnostic imaging—inadvertent harm despite positive intent—like bleeding following an image-guided biopsy. The specific harms of incidental finding management are more opaque than bleeding and harder to understand, but this simply means we should take a more active role in studying and managing them. It is our complication and our challenge to solve.

Second, we should advocate for incidental findings guidelines, especially our own but others as well, to explicitly incorporate and recommend appropriate studies to confirm they are working as intended. "Working as intended" means producing high-value care. We should expect incidental findings guidelines to emphasize the creation of high-value care rather than an exclusive or overweighted focus on maximizing diagnostic sensitivity. This is not a radiology-only dilemma. Incidental findings guidelines exist in many medical and surgical specialties, and we should work collaboratively with colleagues in those fields to promote a high-value approach.

Third, we should advocate for funding organizations to prioritize the study of incidental finding management. We have a compelling argument. Incidental findings are ubiquitous and an enormous burden on the health care system [1, 3]. Randomized trials could be conducted in which deferral of aggressive diagnosis and management is a treatment arm. The emergence of active surveillance as a valid strategy for many cancer types is a precedent we can follow, apply, and expand on here.

Fourth, we should avoid being alarmist in our reporting. Yes, at present, we should follow the guidelines we support until stronger evidence arises, but we also should recognize that most incidental findings are not harmful if left alone in low-risk patients. Low prevalence of disease and the biases inherent to screening help explain why this is so. When in doubt about the significance of an incidental finding for which guidelines are unclear or give leeway, err on the side of minimizing it.

Fifth, because the clinical importance of an incidental finding is highly dependent on patient risk, we should pursue information technology solutions, in collaboration with referring practitioners, to make relevant risk factors more visible to radiologists (e.g., hypertension uncontrolled with multiple medications [adrenal nodule], unreported head and neck cancer [liver lesion]). In current practice, radiologists often rely on a brief historical snippet focused on the chief concern to interpret an examination. Incidental findings are definitionally unrelated to the chief concern and therefore not always informed by it.

Sixth, in our reporting, we should attempt to balance diagnostic sensitivity with other competing risks. We should understand the cascading harm that can result from management of an incidental finding and allow that potential for harm to influence our recommendations. We are still largely ignorant about which incidental findings are important and how best to manage (or ignore) them. In the years between now and a clear solution, we should do our best to minimize collateral harm to the patients we are trying to help.

Conclusion

Incidental findings are analogous to the results of screening tests when screening is applied to unselected, low-risk patients. They generally result in low-value and potentially harmful care. Patients with incidental findings but low risk for disease are likely to experience length bias, lead-time bias, overdiagnosis, and overtreatment that create an illusion of benefit while conferring harm. This includes incidental detection of many types of cancers that, although malignant, would have been unlikely to affect a patient's

health had the cancer not been detected. Detection of some incidental findings can create high-value care, but most do not, and differentiation is often unclear at the time of identification. Higher patient- and disease-related risk increase the likelihood an incidental finding is important. Clinical guidelines for incidental findings should more deeply integrate patient risk factors and disease aggressiveness to inform management. However, lack of outcome and cost-effectiveness data lead to reflexive management strategies that create low-value, expensive, potentially harmful care. Radiology needs outcome and cost-effectiveness data to inform its management recommendations for incidental findings.

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