Evidence-Based Guidelines: Optimizing Imaging in Cancer Care

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The “Image Wisely” campaign was founded in 2010 by the Radiological Society of North America, the American College of Radiology (ACR), the American Association of Physicists in Medicine, and the American Society of Radiologic Technologists. The campaign’s objective was to reduce medically necessary radiation to the lowest amount required for best image quality (stressing the principle of “ALARA”—As Low As Reasonably Achievable) and to eliminate unnecessary studies. The marked increase in imaging use and associated dramatic increase in costs have drawn the attention of policymakers; if oncologists are unable to self-regulate and reduce the use of unnecessary examinations, new policies may stifle potential future advances in imaging.¹ This topic is discussed in the study by Dull et al in this issue, “Overuse of Chest CT in Patients With Stage I and II Breast Cancer: An Opportunity to Increase Guidelines Compliance at an NCCN Member Institution” (page 783). I commend the authors of this study for addressing the overuse of chest CT in early-stage breast cancer at their own institution.

Historically, chest radiography, liver ultrasonography, and nuclear medicine bone scanning were routinely obtained in all patients with breast cancer at initial diagnosis. Over nearly 2 decades, studies have shown the low yield for detection of metastatic disease with these imaging modalities in most patients with breast cancer, and especially those with stage I or II disease,² thus negating their utility in asymptomatic patients with early-stage disease. The introduction of chest CT and its improved detection of pulmonary nodules led to its becoming more frequently used in the initial staging of patients with breast cancer. With its increased use came the parallel rise in additional supplemental imaging, occasional unnecessary invasive procedures, and potential misdiagnoses. Kim et al,³ in their retrospective study of 1,703 asymptomatic patients with breast cancer who underwent chest CT at diagnosis, reported detection of true metastases in lung or liver in 1 (0.2%), 0 (0%), and 24 (6%) patients with stages I, II, and III disease, respectively. This study showed the lack of utility in obtaining routine chest CT at initial diagnosis in early-stage breast cancer.

Both the NCCN Imaging Appropriate Use Criteria and the ACR Appropriateness Criteria note that chest CTs are not indicated in asymptomatic patients with stage I or II breast cancer.^{4,5} However, as noted in the Dull et al study, ASCO listed the overuse of PET, CT, and radionuclide bone scans in the staging of early-stage breast cancer on their list of the top 5 practices that are widely performed, costly, and without evidence-based support, thus contributing to the high cost of cancer care.⁶ Despite the publicized potential risks of radiation exposure and the disputable value of chest CT in early-stage breast cancer, referring clinicians still order it frequently, based on anecdotal cases, concerns regarding legal ramifications, or to satisfy insistent patients. At all stages of cancer care, including at presentation, during neoadjuvant or adjuvant therapy, and in the treatment of advanced disease, evidence-based guidelines are needed to help direct physicians and their patients in selecting appropriate and indicated imaging studies.

Shinagare et al⁷ performed a retrospective study of 631 patients with gastrointestinal stromal tumor (GIST), a rare tumor that uncommonly metastasizes to the thorax, looking for specific variables associated with thoracic metastases. They noted a strong association with bulky abdominal metastases and concluded that restricting thoracic CT to patients with bulky abdominal disease would spare unnecessary thoracic imaging in 65.5% of patients, “with minimal, if any, risk of missing thoracic metastasis.” In a separate study, Shinagare et al⁸ created an evidence-based prediction rule to optimize the use of chest CT

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in patients with ovarian cancer. In this retrospective study performed at 2 academic medical centers, a radiologist blinded to outcomes and using clinical information categorized CTs into high or low risk and evaluated CTs for thoracic metastases. The authors subsequently compared outcomes with prediction rule risk categories, and concluded that use of a simple prediction rule could, with high sensitivity and negative predictive value, avoid unnecessary chest CTs in patients with ovarian cancer.

In 2014, the ACR introduced the Imaging 3.0 initiative, which stresses the role of radiologists as expert consultants who provide high-value patient care, emphasizing satisfaction, efficiency, safety, quality, and appropriateness. In this initiative, in addition to interpreting images, radiologists play a central role in educating referring providers and patients in the appropriateness of imaging studies by providing evidence-based guidelines for initial and follow-up recommendations. In addition, several institutions use clinical decision support embedded in order entry systems to guide referring clinicians in appropriate study selection and to force them to provide radiologists with adequate information to interpret studies. O'Connor et al⁹ reviewed the impact of requiring clinical justification to override repeat imaging at a 793-bed tertiary hospital. In this study, when a CT order was placed for a patient who had undergone CT scanning within the previous 90 days, the decision support program would generate an alert to the orderer and require justification (selected from a predetermined menu) to override and place the order. Adding this requirement for clinical justification led to a 1.4% drop rate increase in CT orders, which was a 23% relative change.

In this era of precision medicine, radiology is used to personalize the diagnosis and select therapy for individual patients based on specific genotypic and phenotypic variables. This directs therapeutic interventions to those who will benefit and avoids toxicities and high costs for those who will not. Although there are many examples of this use in breast cancer imaging, including MRI enhancement characteristics with specific tumor molecular subtypes or imaging with targeted monoclonal antibodies linked to PET agents to more clearly elucidate specific tumor expression,¹⁰ in the absence of targetable biomarkers, imaging indications should be evidence-based rather than anecdotal, and the study by Dull et al illustrates how institutions can use guidelines to curtail excessive use of imaging.

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