

## Defining Measures of Quality in Lung Cancer Diagnosis and Staging

To the Editor:

Staging in lung cancer has two main objectives; confirmation of stage appropriate treatment and prognostication. Accurate preoperative clinical staging (cTNM) is likely to improve survival, optimize surgical case selection, and reduce futile surgery. Faris and colleagues [1] reported the outcome of community hospital lung cancer staging, showing 22% of resections occurred without preoperative positron emission tomography (PET) and 88% without preoperative invasive staging biopsy. Although measurement of crude utilization of preoperative staging tests may have some value, the true value will only emerge when the correct denominator is used, in this case, computed tomography (CT) or CT-PET identified lymph node enlargement.

The true discriminative capacity of preoperative staging needs confirmation, and this should be ability to predict pathologic stage. Thus, cTNM and pathologic staging (pTNM) should be congruent, with minimal stage migration (upstaging). Faris and coworkers also reported low levels of chart documentation of cTNM (12%). Hence, the ability to match cTNM and the gold standard pTNM is limited, and, so too the ability to confirm cTNM staging quality and to identify the need for postsurgical adjuvant treatment.

A major confounder is the effect of systematic lymph node dissection (SND) on pathologic upstaging. Kirmani and associates [2] reported a lung resection cohort after systematic staging including 19.6% with invasive nodal staging. Systematic lymph node dissection was undertaken routinely at resection (median, 4; interquartile range, 3 to 5 nodes sampled), revealing 25.3% of patients had stage migration, with 20.8% pathologically upstaged and 4.5% downstaged. Amer and colleagues [3] reported a similar 16.6% upstaging after SND in a cohort before endobronchial ultrasound or endoscopic ultrasound, finding that SND led to a change in adjuvant chemotherapy planning in 20%.

The second confounder is time from PET to surgery. The National Comprehensive Cancer Network guidelines currently recommend CT-PET be performed within 60 days of resection. Alarming, radiotherapy planning studies using repeat CT-PET scanning have observed 17% upstaging at a median of 20 days and 51% at 120 days [4].

Both PET and invasive staging procedures have the potential to enhance postoperative outcomes at the cost of time, which may erode these benefits. The authors provide an important step in defining pathways to improving definitions of quality in lung cancer staging.

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### Reply

To the Editor:

We thank Stirling and colleagues [1] for their interest in our work [2], in which we highlighted the need for quality improvement in preoperative and operative lung cancer care delivery. We agree on the need to investigate the “true discriminative capacity” of staging tests in real-world settings. The accuracy of staging tests is heavily influenced by the thoroughness of application [3]. Evaluating this was beyond the scope of our report, but our ongoing studies will address the misuse question. However, nonapplication is, arguably, at the extreme low end of the quality spectrum. The current report simply highlights the striking severity of underuse. The correct denominator question is important. We reconstituted clinical stage by abstracting relevant details from the source preoperative radiologic and invasive staging pathology reports, which allowed matching of preoperative and postoperative stages. Illustrating the enormity of the underuse problem, we found that 86%, 65%, 67%, and 67% of patients with clinical N0, N1, N2, and N3 disease, respectively, received no attempt at preoperative invasive nodal sampling in a regional surgical resection cohort (unpublished data). The use of postresection adjuvant therapy is based solely on the pathologic stage for patients who did not receive neoadjuvant therapy. Defining the true performance characteristics of preoperative staging tests requires examination in cohorts of patients with good pathologic nodal staging, which is often lacking in population-based cohorts. Sixty-two percent of patients with pathologic N0 or N1 non-small cell lung cancer resections in the US Surveillance, Epidemiology and End Results database underwent no mediastinal nodal examination, rendering such a population unsuitable for evaluating preoperative staging tests [4]. Theoretically, delays in care (such as from positron emission tomographic / computed tomographic [PET/CT] scanning to operation) may be associated with progression of disease [5]. The median time from PET/CT to operation in our cohort was 42 days (interquartile range, 25 to 76 days) compared with the 60 days recommended by the National Comprehensive Cancer Network. Although timely care has never been associated with improved survival (the relationship is paradoxical in existing reports), delayed care is clearly a noxious experience for patients and caregivers. Ensuring routine delivery of high-quality care mandates that we quantify the gaps in the pathway to treatment, so we can work collaboratively to bridge them.

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