Colorectal cancer (CRC) is one of the most prevalent, but highly preventable, cancers in the US. Much progress has been made in reducing CRC incidence and mortality; however, gaps in CRC screening remain, arguably the most critical of which is timely follow-up after positive results of stool-based tests (SBT), such as the fecal immunochemical test (FIT) and FIT-DNA test. The yield of a positive SBT result for advanced neoplasia (the combination of CRC and advanced, precancerous polyps) is in the 20% to 35% range, representing one of the highest yields for advanced neoplasia of any indication for colonoscopy; yet rates for colonoscopy completion in this context are variable, reported as low as 18% in some centers. Delaying or foregoing this second step of screening is associated with more advanced-stage disease and doubled 10-year CRC-related mortality.

In this study, Ciemins and colleagues describe a novel CRC screening completion measure to quantify this gap in care. Ciemins and colleagues used deidentified electronic health record (EHR) data from OptumLabs Data Warehouse, which comprise demographic, clinical, and utilization and visit data for individuals from more than 50 health care organizations (HCOs). The data warehouse also contains administrative claims data for approximately 10% of individuals with EHR data. Ciemins and colleagues defined their measure as the proportion of individuals who received a colonoscopy within 180 days of a positive SBT result (numerator) out of the total number of adults aged 50 to 75 years with an abnormal CRC screening SBT result within the measurement year (denominator). Patients with a history of CRC, total colectomy, and those receiving palliative or hospice care were excluded, as were those who had underwent SBT for diagnostic purposes or in the inpatient or emergency care setting. Feasibility testing was performed by using the National Quality Forum's Feasibility Scorecard to evaluate the capability of 3 HCOs, each using a different EHR vendor, to capture data elements required to calculate this measure. Reliability testing was performed across 38 HCOs in 5 measurement years (2016-2020). While the process of measuring face validity was not explicitly described, it involved content expert advisors representing 2 HCOs and 3 national societies. Among 20,581 individuals across 38 HCOs who met inclusion criteria and had a positive SBT result in 2018, a median (IQR) of 47.9% (37.4%-53.2%) had a colonoscopy within 6 months, with a median (IQR) follow-up of 53 (28-115) days. Performance rates for this measure ranged from 13% to 70% across HCOs. Patients with Medicare or Medicaid insurance had lower colonoscopy completion rates within 6 months after a positive SBT result, at 49.2% of Medicare patients and 38.6% of Medicaid patients, compared with 50.9% of commercially insured patients. Black (371%; 95% CI, 34.6%-39.5%) and Hispanic (38.4%; 95% CI, 34.6%-42.1%) individuals had similar colonoscopy completion rates, which were lower than those of White individuals (49.0%; 95% CI, 48.2%-49.7%). Based on a subset of 2164 individuals for which both EHR and claims data were available, 2 sensitivity analyses were performed. The first of these found that 59.9% (95% CI, 57.9%-62%) of individuals with claims and EHR data had a follow-up colonoscopy, compared with 51.3% (95% CI 49.2%-53.4%) of individuals with EHR data alone, resulting in missed capture of 14% of patients who had colonoscopy within 180 days. The second sensitivity analysis included measuring performance rates at 90 days and showed that colonoscopy was completed by a median (IQR) of 39.7% (28.7%-44.0%) of individuals with positive SBT results.

Findings from this large, geographically diverse study by Ciemins and colleagues highlight the suboptimal rates of timely follow-up colonoscopy after positive SBT results and draw attention to the significant variation in care across HCOs. Also notable is the disparity in CRC screening completion related to race, ethnicity, and insurance status. As acknowledged by Ciemins and colleagues, there
are limitations to this novel measure that affect feasibility (all initially specified exclusion criteria were unable to be captured in field testing), validity (the 14% underestimate requires further development and testing), and generalizability beyond HCOs included in the data warehouse. Evaluating measure performance among individuals at average risk for CRC, for whom SBTs are intended, and for individuals aged 45 to 49 years would provide additional useful context. We commend Ciemins and colleagues\textsuperscript{5} for focusing attention on a meaningful approach to measuring high-quality CRC screening and providing guidance for standardized measurement.

Several questions arise from this study, including whether 6 months is the ideal interval for colonoscopy completion after a positive SBT result, where this measure fits in the context of existing CRC screening measures, and how to implement it in practice. To address the first question, we note a retrospective study of 70,124 patients with positive FIT results from 2 HCOs in the US in which no significant difference in CRC risk or advanced stage disease was found when colonoscopy was performed 1, 2, 3, or 4 to 6 months after the positive FIT results.\textsuperscript{6} There was no significant increase in CRCs and advanced-stage disease when colonoscopy was completed 7 to 9 months after a positive FIT result (any CRC: odds ratio [OR], 1.30; 95% CI, 0.99-1.72; advanced-stage disease: OR, 1.32; 95% CI, 0.80-2.18), but a significant increase was observed at 10 to 12 months (any CRC: OR, 1.48; 95% CI, 1.05-2.08; advanced-stage disease: OR, 1.97; 95% CI, 1.14-3.42). These data, along with others, support colonoscopy completion by 6 months, if not earlier, after a positive SBT result.

The CRC completion measure complements existing quality measures for CRC screening, including the National Committee for Quality Assurance Healthcare Effectiveness Data and Information Set measure, which quantifies the proportion of individuals aged 45 to 75 years who had appropriate screening for CRC, and the American Gastroenterological Association-steward measure for appropriate follow-up after a negative screening colonoscopy, both of which are included in national quality payment programs.\textsuperscript{7,8} The CRC screening completion measure requires further testing prior to widespread adoption or implementation into a quality payment program, but in the meantime, given existing evidence showing that sharing performance data can improve follow-up for abnormal screening test results,\textsuperscript{9} this measure could be used for local benchmarking and quality improvement initiatives with feedback given at the clinician or practice level. Performance rates for this measure could also be used to identify high-performing sites, from which broader lessons on effective and efficient processes and procedures could be adopted at sites with low rates of follow-up colonoscopy completion. Last, the disparities that may become apparent from this measure's performance rates could be used to inform equitable interventions tailored to individuals disproportionally affected by CRC.

While we continue to investigate novel approaches to increase screening uptake, the effort of Ciemins and colleagues\textsuperscript{5} reminds us that high-quality CRC screening is a process extending beyond the initial test. This measure alone does not address all the gaps in the screening process, nor does it address barriers to colonoscopy completion, but it points us in the right direction for measuring the success of screening programs. Further efforts are needed to optimize other aspects of the screening process, such as timely rescreening after negative SBT results and follow-up after screening with other noninvasive tests, such as blood-based tests (if approved) and computed tomographic colonography. Given variations in care in different points along the CRC screening pathway, it may be useful to link these process measures to improve care delivery. By thinking about screening more broadly and evaluating the overall process, we can expect meaningful progress toward closing gaps in screening with expectant decreases in CRC incidence, morbidity, and mortality.

ARTICLE INFORMATION
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