

Using a Clinical Dashboard to Track Colorectal Cancer Screening Rates and Modalities in a Large Integrated Health System

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Introduction: The measurement of colorectal cancer (CRC) screening rates is imperative for quality reporting and population health management. Tracking screening rates is difficult in real-time and complicated by changes in clinical guidelines, clinical practice, and other regional and national events. We developed and validated a clinical dashboard that tracks real-time population health CRC screening data in a large health system.

Methods: The setting is a U.S. academic health center in California with over 50 primary care (PC) clinics and 420,000 PC enrollees. The health system uses the data visualization software Tableau to develop population health clinical dashboards for several disease and performance measures. The underlying data is aggregated from lab results, claims data, professional billing, and health maintenance history from the electronic health record. The CRC dashboard includes age-eligible PC patients at average-risk for CRC and captures utilization of several screening modalities: colonoscopy, fecal immunochemical test (FIT), Cologuard, flexible sigmoidoscopy and CT Colonography. The dashboard reports the real-time screening rate for the health system as well as screening rates by age, sex, race, ethnicity, PC clinic, and PC provider. The dashboard also tracks colonoscopy completion after abnormal FIT by the same strata. After dashboard development, we performed a validation study by conducting a manual chart abstraction of data for 500 randomly selected PC patients eligible for screening.

Results: The CRC screening dashboard included 179,768 screening eligible individuals in 10/2022 (Figure). The screening rate ranged from 50.3% (in 1/2022) to 61.4% (in 11/2020). There was a noticeable decline in the screening rate (61.4% to 57.5%) at the height of the COVID-19 pandemic (11/2020 to 2/2021; Figure). There was also a decline in the screening rate (60.5% to 50.8%) in 10/2021, when the health system implemented the 2021 USPSTF CRC screening recommendations and approximately 37,000 individuals age 45-49 were added to the dashboard. Compared to chart review, the dashboard was highly specific for screening participation and capturing screening modalities, including colonoscopy (97.3% sensitive, 99.2% specific), FIT (96.3% sensitive, 99.8% specific) and flexible sigmoidoscopy (88.9% sensitive, 100% specific).

Conclusion: Use of CRC screening dashboards is an effective way for health systems to evaluate real-time screening data and the impact of events or interventions on screening participation over time. Measuring and reporting CRC screening rates is essential to achieve the national screening rate goal of 80%. Our CRC screening dashboard was highly sensitive and specific and offers a useful means to use real-time data to identify clinical gaps and design new system-wide quality improvement interventions to increase CRC screening rates.

Table: a) Patient demographic characteristics and screening modalities and b) performance metrics for dashboard validation cohort; n=500

| Patient Characteristics | | n (%) or mean (SD) | | | | |
|----------------------------------|-----------------------------|--------------------|--------|--------|----------|----------|
| Age, years [mean, (SD)] | | 58.9 (8.6) | | | | |
| Sex [n, (%)] | | | | | | |
| Male | | 221 (44.2) | | | | |
| Female | | 279 (56) | | | | |
| Race [n, (%)] | | | | | | |
| White | | 281 (56.2) | | | | |
| Black | | 31 (6.2) | | | | |
| Asian/Pacific Islander | | 58 (11.6) | | | | |
| American Indian/Alaska Native | | 3 (0.6) | | | | |
| Middle Eastern | | 8 (1.6) | | | | |
| Other | | 53 (10.6) | | | | |
| Unknown/Declined to State | | 66 (13.2) | | | | |
| Ethnicity [n, (%)] | | | | | | |
| Non-Hispanic | | 361 (72.2) | | | | |
| Hispanic | | 63 (12.6) | | | | |
| Unknown/Declined | | 76 (15.2) | | | | |
| Screening Modality* [n, (%)] | | | | | | |
| Colonoscopy | | 251 (92.6) | | | | |
| FIT | | 27 (9.9) | | | | |
| Sigmoidoscopy | | 8 (2.9) | | | | |
| Cologuard | | 7 (2.6) | | | | |
| CT Colonography | | 1 (0.4) | | | | |
| Completed CRC Screening [n, (%)] | | 274 (54.8) | | | | |
| Overall Performance Metrics | Sensitivity | Specificity | PPV | NPV | F1-Score | Accuracy |
| Colonoscopy | 97.3% | 99.2% | 99.2% | 97.2% | 0.982 | 98.2% |
| FIT | 96.3% | 99.8% | 96.3% | 99.8% | 0.966 | 99.6% |
| Sigmoidoscopy | 88.9% | 100.0% | 100.0% | 99.8% | 0.941 | 99.8% |
| Cologuard | 77.8% | 100.0% | 100.0% | 99.6% | 0.875 | 99.6% |
| CT Colonography | 100.0% | 100.0% | 100.0% | 100.0% | 1.0 | 100.0% |
| Overall Screening | 88.3% | 99.1% | 99.2% | 86.7% | 0.934 | 93% |
| Individual Performance Metrics | % Reported correctly (n, %) | | | | | |
| Sex | 500, 100% | | | | | |
| DOB | 500, 100% | | | | | |
| Race | 489, 97.8% | | | | | |
| Ethnicity | 489, 97.8% | | | | | |
| PCP | 496, 99.2% | | | | | |
| PCP Department | 476, 95.2% | | | | | |

*Percentages add to >100% due to some patients having >1 screening modality

Figure: Snapshot of Colorectal Cancer Screening Dashboard on 11/17/2022; n= 179,768 patients
(Attached separately)