Comparison of Screening Colonoscopy Rates After Positive Noninvasive Testing for Colorectal Cancer in States With and Without Cost-Sharing

Douglas Barthold, PhD; Kai Yeung, PharmD, PhD; David Lieberman, MD; A. Mark Fendrick, MD

Introduction

The Affordable Care Act requires that several colorectal cancer (CRC) screening modalities be covered with no cost-sharing for eligible individuals with average risk. However, cost barriers remain for some individuals with a positive test that requires a follow-up colonoscopy. In response, state-level policies have been enacted in Kentucky (2016), Oregon (2017), and California (2021) to eliminate financial disincentives that may deter follow-up colonoscopy for these individuals. In January 2022, federal guidance was issued to remove cost-sharing for colonoscopies following noninvasive CRC screening tests for commercial insurers, and a similar policy is under consideration for Medicare. We examined the CRC screening rates in Oregon and Kentucky and compared them with the rates of neighboring states without similar policies.

Methods

This cohort study was deemed exempt from Institutional Review Board approval and informed consent owing to deidentified data. The study followed the STROBE reporting guideline.

We used repeated cross sections of the MarketScan Commercial Claims and Encounters Database from January 1, 2012, to December 31, 2019, to compare use of any CRC screening and receipt of a colonoscopy among individuals who received a CRC screening other than colonoscopy in Oregon vs Idaho and Washington and in Kentucky vs Indiana, Tennessee, and West Virginia using adjusted logistic regression. Analyses were adjusted for state fixed effects, year fixed effects, age, age squared, sex, and health care plan. The samples were restricted to person-years for individuals aged 45 to 64 years with 12 months of continuous enrollment in self-funded plans. Oregon and comparator states were further restricted to ages 50 to 64 years and excluded enrollees with high-deductible plans.

Statistical analyses were conducted using Stata, version 17.0 (StataCorp LLC); 2-sided $P = .05$ was considered significant. Data were analyzed between July 1, 2021, and January 31, 2022.

Results

The sample constituted 2,327,935 person-years among 1,215,580 individuals (51.5% women; mean [SD] age, 54.5 [5.1] years). Details regarding CRC screening use are provided in Table 1. Individuals in Oregon had 6% higher odds of receiving any CRC screening after policy implementation (odds ratio [OR], 1.06 [95% CI, 1.00-1.06]; $P = .03$) compared with neighboring states that did not implement a similar policy (Table 2). Individuals receiving CRC screening in Oregon after policy implementation had 35% higher odds of undergoing an initial noninvasive test (OR, 0.65 [95% CI, 0.58-0.73]; $P < .001$) (Table 2). There were no significant differences in total CRC screening use in Kentucky after policy implementation compared with neighboring states (Table 2). Similarly, compared with neighboring states, the odds of receiving a colonoscopy conditional on undergoing noninvasive CRC screening were not statistically different in Oregon or Kentucky (Table 2).
The Affordable Care Act eliminated cost-sharing for several CRC screening modalities. Because many individuals in the US undergo noninvasive CRC screening as an initial test, clinical guidelines state that a positive test requires a follow-up colonoscopy. However, several individuals who test positive on such tests incur out-of-pocket costs that may impede completion of the screening process or create financial hardship. Consequently, state-specific policies and recent federal guidance have eliminated cost-sharing for follow-up colonoscopy.

After comparing outcomes in 2 states that eliminated consumer cost-sharing for follow-up colonoscopy with those of neighboring states without such regulations, we found that access to full coverage significantly increased overall CRC screening and use of noninvasive testing in Oregon but not Kentucky. However, there was no significant increase in colonoscopies among individuals who received an initial noninvasive screening test in either state. Future studies should examine whether the use of noninvasive testing improves cost-effectiveness and reduces risk for patients.

Study limitations include an inability to observe screening test results in claims data and possible unmeasured confounding. Regardless, our results are consistent with previous research demonstrating an association between policies that eliminate out-of-pocket costs and use of cancer screening. These findings suggest that the enactment of policies that remove financial barriers is merely one of many elements (eg, health literacy, outreach, transportation, access to care) that may help to achieve desired cancer screening outcomes.

### Table 1. Use of CRC Screening in States With Policy Changes and Comparator States

<table>
<thead>
<tr>
<th>Screening type</th>
<th>Total (Oregon)</th>
<th>Oregon comparator statesa</th>
<th>Kentucky (Kentucky comparator states)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of person-years</td>
<td>2,327,935</td>
<td>112,672</td>
<td>497,606</td>
</tr>
<tr>
<td>Any CRC screening</td>
<td>342,554</td>
<td>15,659 (13.9)</td>
<td>68,880 (13.8)</td>
</tr>
<tr>
<td>Colonoscopy</td>
<td>190,063</td>
<td>11,096 (9.8)</td>
<td>46,102 (9.3)</td>
</tr>
<tr>
<td>NCS</td>
<td>181,443</td>
<td>5319 (4.7)</td>
<td>27,000 (5.4)</td>
</tr>
<tr>
<td>Colonoscopy (conditional on NCS)</td>
<td>28,952 (1.2)</td>
<td>756 (0.7)</td>
<td>4222 (0.8)</td>
</tr>
</tbody>
</table>

Abbreviations: CRC, colorectal cancer; NCS, noncolonoscopy CRC screening.

### Table 2. Adjusted Odds Ratios for CRC Screening in Oregon and Kentucky After Policy Implementation

<table>
<thead>
<tr>
<th>Screening type</th>
<th>Oregon (OR (95% CI))</th>
<th>P value</th>
<th>Kentucky (OR (95% CI))</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any CRC screening</td>
<td>1.06 (1.00-1.06)</td>
<td>.03</td>
<td>1.00 (0.96-1.05)</td>
<td>&gt;.99</td>
</tr>
<tr>
<td>Colonoscopy (among CRC screenings)</td>
<td>0.65 (0.58-0.73)</td>
<td>&lt;.001</td>
<td>0.97 (0.89-1.07)</td>
<td>.57</td>
</tr>
<tr>
<td>Colonoscopy (conditional on NCS)</td>
<td>0.99 (0.78-1.27)</td>
<td>.96</td>
<td>1.01 (0.86-1.18)</td>
<td>.91</td>
</tr>
</tbody>
</table>

Abbreviations: CRC, colorectal cancer; NCS, noncolonoscopy colorectal cancer screening; OR, odds ratio.

* Adjusted analyses compared Oregon (after 2017) with Idaho and Washington and compared Kentucky (after 2016) with Indiana, Tennessee, and West Virginia. Difference-in-differences logistic regression adjusted for state fixed effects, year fixed effects, age, age squared, sex, and health care plan (basic, comprehensive, exclusive provider organization; health maintenance organization; point of service; preferred provider organization; and point of service with capitation).

### Discussion

The Affordable Care Act eliminated cost-sharing for several CRC screening modalities. Because many individuals in the US undergo noninvasive CRC screening as an initial test, clinical guidelines state that a positive test requires a follow-up colonoscopy. However, several individuals who test positive on such tests incur out-of-pocket costs that may impede completion of the screening process or create financial hardship. Consequently, state-specific policies and recent federal guidance have eliminated cost-sharing for follow-up colonoscopy.

After comparing outcomes in 2 states that eliminated consumer cost-sharing for follow-up colonoscopy with those of neighboring states without such regulations, we found that access to full coverage significantly increased overall CRC screening and use of noninvasive testing in Oregon but not Kentucky. However, there was no significant increase in colonoscopies among individuals who received an initial noninvasive screening test in either state. Future studies should examine whether the use of noninvasive testing improves cost-effectiveness and reduces risk for patients.

Study limitations include an inability to observe screening test results in claims data and possible unmeasured confounding. Regardless, our results are consistent with previous research demonstrating an association between policies that eliminate out-of-pocket costs and use of cancer screening. These findings suggest that the enactment of policies that remove financial barriers is merely one of many elements (eg, health literacy, outreach, transportation, access to care) that may help to achieve desired cancer screening outcomes.

### ARTICLE INFORMATION

Accepted for Publication: April 24, 2022.

Published: June 14, 2022. doi:10.1001/jamanetworkopen.2022.16910

Open Access: This is an open access article distributed under the terms of the CC-BY License. © 2022 Barthold D et al. JAMA Network Open.

Corresponding Author: Douglas Barthold, PhD, 1959 Pacific St NE, Box 357630, Seattle, WA 98195 (barthold@uw.edu).

Author Affiliations: The Comparative Health Outcomes, Policy, and Economics (CHOICE) Institute, Department of Economics, University of Washington, Seattle, Washington.
of Pharmacy, School of Pharmacy, University of Washington, Seattle (Barthold, Yeung); Kaiser Permanente Washington Health Research Institute, Seattle (Yeung); Division of Gastroenterology and Hepatology, School of Medicine, Oregon Health Sciences University, Portland (Lieberman); Center for Value-Based Insurance Design, University of Michigan, Ann Arbor, Michigan (Fendrick).

Author Contributions: Dr Barthold had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: Barthold, Lieberman, Fendrick.

Acquisition, analysis, or interpretation of data: Barthold, Yeung.

Drafting of the manuscript: Barthold.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Barthold, Yeung.

Administrative, technical, or material support: Barthold.

Supervision: Fendrick.

Conflict of Interest Disclosures: Dr Lieberman reported participating in scientific advisory boards for ColoWrap, Freenome, and Genescopy. Dr Fendrick reported providing consulting services to AbbVie, Amgen, Bayer, California Health Care Foundation, CareFirst Blue Cross Blue Shield, Centivo, Community Oncology Association, Covered California, EmblemHealth, Exact Sciences, Freedman Health, GRAIL, Harvard University, Health & Wellness Innovations Inc, Health[at]Scale Technologies, HealthCorum, Hygieia, Livongo, MedZed Inc, Merck & Co, Mercer, Montana Health Co-op, Mother Goose Health LLC, Pair Team, Penguin Pay, Phathom Pharmaceuticals, Risalto, Risk International, Sempre Health, Silver Fern Healthcare, the State of Minnesota, US Department of Defense, Virginia Center for Health Innovation, Welth Inc, Wildflower Health Inc, Yale-New Haven Health System, Zansors; has equity interest in Health & Wellness Innovations, Health[at]Scale Technologies, Pair Team, Sempre Health, Welth Inc, Zansors; receiving research support from the Agency for Healthcare Research and Quality, Boehringer Ingelheim, West Health Policy Center, Arnold Ventures LLC, National Pharmaceutical Council, Patient-Centered Outcomes Research Institute, Pharmaceutical Research and Manufacturers of America, the Robert Wood Johnson Foundation, the State of Michigan, and the Centers for Medicare & Medicaid Services; serving as co-editor for the American Journal of Managed Care and a member of the Medicare Evidence Development & Coverage Advisory Committee; and maintaining a partnership at VBID Health LLC. No other disclosures were reported.

Funding/Support: Support for data access and analyses was provided by the University of Washington (UW) Population Health Initiative, the UW Student Technology Fee program, the UW Provost's office, and Eunice Kennedy Shriver National Institute of Child Health and Human Development research infrastructure grant P2C HD042828 to the UW Center for Studies in Demography and Ecology.

Role of the Funder/Sponsor: The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

REFERENCES


