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# Early Impact of Medicaid Expansion and Quality of Breast Cancer Care in Kentucky



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- BACKGROUND:** In January 2014, Kentucky expanded Medicaid coverage to include all individuals and families with incomes up to 33% above the federal poverty line. This study evaluated the early impact of Medicaid expansion on some aspects of the quality of breast cancer care in Kentucky.
- STUDY DESIGN:** The Kentucky Cancer Registry was queried for all women aged 20 to 64 years diagnosed with breast cancer between 2011 and 2016. Demographic, tumor, and treatment characteristics were assessed for each year during this interval. To evaluate the association between Medicaid expansion and these parameters, these variables, along with quality metrics deriving from said variables, were compared for the years 2011 to 2013 (pre) and the years 2014 to 2016 (post).
- RESULTS:** Of 13,625 women with breast cancer, 11,915 (59.5%) were diagnosed and treated from 2011 to 2013, and 8,127 (40.5%) were diagnosed and treated from 2014 to 2016. After Medicaid expansion, fewer patients were uninsured (3.7% post vs 1.0% pre) and more were covered by Medicaid (15.9% post vs 10.9% pre) ( $p < 0.001$ ). There was increased diagnosis of early stage (I and II) breast cancer ( $p = 0.002$ ) and an increasing proportion of women undergoing breast-conservation therapy ( $p < 0.001$ ). Time from diagnosis to operation increased ( $p < 0.001$ ), time from operation to chemotherapy remained unchanged ( $p = 0.26$ ) and time from operation to radiation decreased ( $p < 0.001$ ).
- CONCLUSIONS:** The expansion of Kentucky Medicaid in 2014 has been associated with earlier diagnosis and somewhat improved quality of breast cancer care, despite a stable disease incidence. Additional improvements in treatment expediency will require improvements in patient outreach and healthcare infrastructure. (J Am Coll Surg 2018;226:498–504. © 2018 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)
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In the last 20 years in the US, the combination of an aging population with increased life expectancy and more medical comorbidities has contributed to ever-rising healthcare costs that have precluded many lower- and lower-middle-class families from affording private

insurance.<sup>1</sup> As a result, many of these individuals have lacked access to healthcare in anything other than an emergent setting. This situation has placed a large burden on healthcare infrastructure, with many patients requiring care for complex, late-stage problems that could possibly have been addressed earlier and more effectively had appropriate medical care been more readily accessible.

The passage of the Patient Protection and Affordable Care Act (ACA) by the US government in March 2010 resulted in the largest overhaul of healthcare since the creation of Medicare and Medicaid in the 1960s.<sup>2</sup> One key component of this legislation involved the option for states to expand Medicaid beginning in 2014 to include all individuals and families with incomes up to 33% above the federal poverty line. As one of the states that elected to expand Medicaid coverage, Kentucky witnessed a drop in the rate of uninsured individuals from approximately 19% to 7%, the largest such drop of any state in the union.<sup>3</sup>

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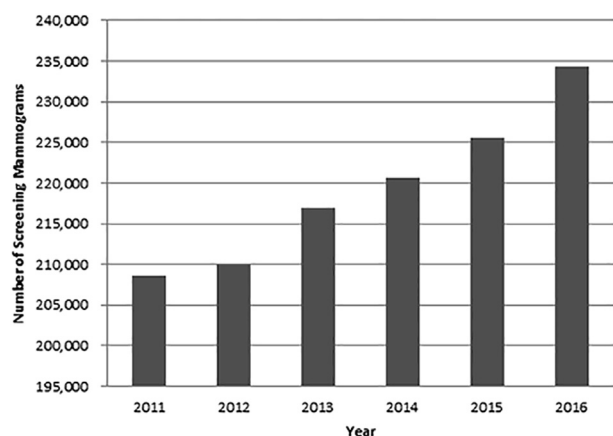
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**Figure 1.** Screening mammograms performed in Kentucky by year (2011 to 2016). The number of screening mammograms performed in women younger than age 65 years increased in a relatively linear fashion over time.

The decision to expand Medicaid in Kentucky, as in many other states, ostensibly aimed to improve access to quality healthcare for many of the commonwealth's citizens. Although defining what constitutes quality healthcare in general has proven challenging in the US, evidence-based guidelines have been developed for the purposes of quality assessment for treatment of specific diseases. Breast cancer represents one such disease with specific treatment guidelines<sup>4</sup> and published metrics for measuring quality of care in women.<sup>5</sup> This, coupled with its high incidence and the availability of high-quality population-level data, renders breast cancer in women an ideal mechanism to evaluate the efficacy of Medicaid expansion with respect to improving the quality of breast cancer care. This study aimed to evaluate the impact of Medicaid expansion on the quality of breast cancer care in Kentucky.

## METHODS

### Patient cohort and data acquisition

Screening mammography data for women younger than age 65 years was obtained from the Kentucky Cabinet for Health and Family Services, Office of Health Policy. These data are provided to the cabinet by all hospitals in Kentucky. Number of screening mammograms performed per year between 2011 and 2016 were tabulated along with insurance status of patients undergoing screening mammography.

The Kentucky Cancer Registry, the state-designated population-based central cancer registry for Kentucky, was queried for all women aged 20 to 64 years diagnosed with breast cancer between 2011 and 2016. Breast cancer incidence, demographic information (including age, race, region of residence [urban vs rural, Appalachia vs

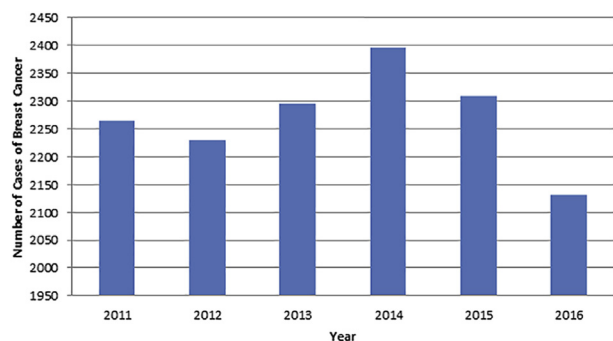
non-Appalachia]), socioeconomic information (including degree of poverty, education level, and insurance status), and stage at diagnosis were included in the data analysis. Degree of poverty was defined at the county level based on percentage of the population below the poverty line in the 2008 to 2012 American Community Survey. Quartile definitions are as follows: low = 0 to 15.83%, moderate = 15.84% to 16.45%, high = 16.46% to 20.42%, and very high  $\geq 20.42\%$ . Education level was defined by county based on the percent of the population with at least a high school education in the 2008 to 2012 American Community Survey. Quartile definitions are as follows: very low = 0% to 78.48%, low = 78.49% to 85.61%, moderate = 85.62% to 88.07%, and high  $\geq 88.07\%$ . First course treatment data, including information about receipt and timing of operation, radiation, and chemotherapy, were all assessed in the same fashion.

### Evaluation of quality of breast cancer care

Quality of breast cancer care was evaluated based on the proportion of patients undergoing breast conservation therapy who received postoperative radiation therapy, time from diagnosis to operation (among patients undergoing operations as initial therapy and not receiving preoperative chemotherapy), time from operation to radiation, and time from operation to chemotherapy. Metrics were chosen based on previously published work by AHRQ, National Quality Measures for Breast Centers, and a recent National Cancer Database analysis by Polverini and colleagues.<sup>5-7</sup> To assess for an association between Medicaid expansion and these parameters, these variables from the years 2011 to 2013 (pre) and the years 2014 to 2016 (post) were compared.

### Statistical analysis

Spearman correlation was used to assess for significance in trends in screening mammography rates over time. Descriptive analysis was performed for demographics and clinical factors. Chi-square tests and two-sample *t*-tests were used in the bivariate analysis to examine associations between the pre/post Medicaid expansion status and other variables. Multiple generalized linear regression analyses were performed to evaluate the association between continuous quality of care measures and pre/post Medicaid expansion status. For binary quality of care measures, multiple logistic regression analyses were performed to assess for the impact of pre/post Medicaid expansion status on these variables, while controlling for other demographics and clinical factors. All analyses were performed using SAS Statistical software, version 9.4 (SAS Institute). All statistical tests were 2-sided with a *p* value  $< 0.05$  used to identify statistical significance.



**Figure 2.** Breast cancer incidence in Kentucky by year (2011 to 2016). Annual incidence of breast cancer among women aged 20 to 64 years in Kentucky from 2011 to 2016 ranged from 3,858 to 4,240 cases per year during the study period.

## RESULTS

A total of 1,315,965 women younger than 65 years underwent screening mammography during the study period. Of these, 635,547 (48.3%) were performed from 2011 to 2013 and 680,418 (51.7%) were performed from 2014 to 2016. Annual number of screening mammograms performed ranged from 208,600 in 2011 to 234,315 in 2016 (Fig. 1) and increased over time ( $p = 0.001$ ). No sharp increase in the number of screening mammograms performed was noted after Medicaid expansion in January 2014. When comparing with respect to insurance type, more patients undergoing screening mammograms were covered by Medicaid (14.7% post vs 5.6% pre) and fewer were uninsured (0.05% post vs 0.53% pre) ( $p < 0.001$ ).

A total of 13,625 women with breast cancer were treated during the study period. Of these, 6,790 (49.8%) were diagnosed and treated from 2011 to 2013, and 6,835 (50.2%) were treated from 2014 to 2016. Annual breast cancer incidence ranged from 2,131 to 2,395 cases per year and did not vary significantly from 2011 to 2016 (Fig. 2).

For the entire patient cohort, most patients were between 50 and 64 years old, white, and had early stage (stage I or II) disease (Table 1). Most patients lived in urban or suburban areas, though approximately 25% lived in rural Appalachia with very limited geographic access to medical care. Although >70% had private insurance, approximately 13% were covered by Medicaid and 2.4% were uninsured. Education level and degree of poverty were approximately evenly distributed along a quartilized spectrum ranging from very low to high and low to very high, respectively.

After Medicaid expansion, fewer patients were uninsured (1.0% post vs 3.7% pre) and more were covered by Medicaid (15.9% post vs 10.9% pre) after

Medicaid expansion ( $p < 0.001$ ) (Table 2). Additionally, although the majority of patients were white both before and after Medicaid expansion (89.3% post vs 89.9% pre), a greater proportion of patients were African American (8.2% post vs 7.5% pre) and Hispanic (1.1% post vs 0.7% pre) after Medicaid expansion ( $p < 0.001$ , Table 2). Patient cohorts before and after Medicaid expansion did not differ with respect to age, location of residence (urban/suburban vs rural, Appalachia vs non-Appalachia), degree of poverty, or education level.

**Table 1.** Demographic Characteristics and Breast Cancer Stage at Diagnosis Information for Patient Cohort

Characteristic	All patients (n = 13,625)
Age group, n (%)	
20–49 y	4,265 (31.3)
50–64 y	9,360 (68.7)
Race, n	
White	12,210
African American	1071
Hispanic	119
Other	121
Unknown	104
Metropolitan area, n (%)	
Urban/suburban	8,313 (61.0)
Rural	5,312 (39.0)
Appalachia	3,423 (25.1)
Insurance status, n (%)	
Uninsured	321 (2.4)
Private	9,715 (71.6)
Medicaid	1,827 (13.4)
Early Medicare/other public	1,589 (11.7)
Unknown	137 (1.0)
Education level, n (%)	
Very low	3,507 (25.7)
Low	3,393 (24.9)
Moderate	4,469 (32.8)
High	2,256 (16.6)
Degree of poverty, n (%)	
Low	3,417 (25.1)
Moderate	3,493 (25.6)
High	3,372 (24.8)
Very high	3,343 (24.5)
Stage of breast cancer at diagnosis, n (%)	
In situ	2,563 (18.8)
I	5,098 (37.4)
II	3,845 (28.2)
III	1,291 (9.5)
IV	606 (4.5)
Unknown	222 (1.6)

**Table 2.** Demographic Characteristics before and after Medicaid Expansion

Characteristic	Pre* (n = 6,790)		Post† (n = 6,835)		p Value
	n	%	n	%	
Age					
20–49 y	2,137	31.5	2,128	31.1	0.18
50–64 y	4,653	68.5	4,707	68.9	
Race					
White	6,107	89.9	6,103	89.3	<0.001
African American	510	7.5	561	8.2	
Hispanic	47	0.7	72	1.1	
Other	55	0.8	66	1.0	
Unknown	71	1.1	33	0.5	
Metropolitan area					
Urban/suburban	4,136	60.9	4,177	61.1	0.82
Rural	2,654	39.1	2,658	38.9	
Appalachia	1,733	25.5	1,690	24.7	0.29
Insurance status					
Uninsured	252	3.7	69	1.0	<0.001
Private	4,934	72.7	4,817	70.5	
Medicaid	740	10.9	1,087	15.9	
Early Medicare/other public	790	11.6	799	11.7	
Unknown	74	1.1	63	0.9	
Education level					
Very low	1,793	26.4	1,714	25.1	0.14
Low	1,671	24.6	1,722	25.2	
Moderate	2,181	32.1	2,288	33.4	
High	1,145	16.9	1,111	16.3	
Degree of poverty					
Low	1,660	24.5	1,757	25.7	0.21
Moderate	1,739	25.6	1,754	25.7	
High	1,725	25.4	1,647	24.1	
Very high	1,666	24.5	1,677	24.5	

\*Data from the years 2011 to 2013.

†Data from the years 2014 to 2016.

With respect to tumor and treatment characteristics, there was increased diagnosis of early stage (I and II) breast cancer after Medicaid expansion (66.7% post vs 64.5% pre;  $p < 0.001$ ) (Table 3). Regarding treatment, a larger proportion of women underwent breast-conservation operation (48.8% post vs 44.0% pre;  $p < 0.001$ ) after Medicaid expansion, although the proportion of women receiving radiation after breast-conserving operation remained stable (84.5% post vs 84.7% pre;  $p < 0.001$ ). Regarding time to and intervals between treatment modalities, time from diagnosis to operation among patients not receiving preoperative chemotherapy increased ( $36.0 \pm 29.5$  days post vs  $28.6 \pm 26.6$  days pre;  $p < 0.001$ ), time from operation to chemotherapy remained unchanged ( $46.6 \pm 23.4$  days post vs  $47.5 \pm 26.6$  days pre;  $p = 0.26$ ) and time from operation to radiation decreased ( $91.5 \pm 67.5$  days post vs  $96.4 \pm 71.7$

days pre;  $p < 0.001$ ) in the period after Medicaid expansion.

Multivariable logistic regression controlling for demographic and tumor characteristics demonstrated a significant independent association between the pre-Medicaid expansion era and higher likelihood of diagnosis of late-stage breast cancer (odds ratio [OR] 1.21; 95% CI 1.10 to 1.34;  $p < 0.001$ ), a lower likelihood of receiving breast-conserving operation (OR 0.81; 95% CI 0.76 to 0.88;  $p < 0.001$ ), and no difference in likelihood of receipt of radiation after breast-conserving operation (OR 1.01; 95% CI 0.88 to 1.17;  $p = 0.85$ ) compared with the post-Medicaid expansion era. Multiple linear regression modeling of continuous outcome variables revealed a significantly increased time from diagnosis to operation (+16.2 days post vs pre;  $p < 0.001$ ), no significant difference in the time from operation to

**Table 3.** Tumor and Treatment Characteristics before and after Medicaid Expansion

Characteristic	Pre* (n = 6,790)	Post† (n = 6,835)	p Value
Stage of breast cancer at diagnosis, n (%)			
In situ	1,274 (18.8)	1,289 (18.9)	0.002
Early stage, I–II	4,381 (64.5)	4,562 (66.7)	
Late stage, III–IV	1,015 (15.0)	882 (12.9)	
Unknown	120 (1.8)	102 (1.5)	
Surgical therapy, n (%)			
Breast-conserving operation	2,987 (44.0)	3,333 (48.8)	<0.001
Other resection, including mastectomy	3,432 (50.5)	3,039 (44.5)	
No operation/unknown	371 (5.5)	463 (6.8)	
Radiation after breast-conserving operation, n (%)	2,531 (84.7)	2,816 (84.5)	0.81
Time from diagnosis to surgery, d, mean $\pm$ SD‡	28.6 $\pm$ 26.6	36.0 $\pm$ 29.5	<0.001
Time from surgery to chemotherapy, d, mean $\pm$ SD	47.5 $\pm$ 26.6	46.6 $\pm$ 23.4	0.26
Time from surgery to radiation, d, mean $\pm$ SD	96.4 $\pm$ 71.7	91.5 $\pm$ 67.5	<0.001

\*Data from the years 2011 to 2013.

†Data from the years 2014 to 2016.

‡Reflects data for patients who did not receive preoperative chemotherapy.

chemotherapy (−1.4 days post vs pre;  $p = 0.08$ ), and a decreased time from operation to radiation (−3.7 days post vs pre;  $p = 0.02$ ) after Medicaid expansion.

## DISCUSSION

The results from this study demonstrate that Medicaid expansion in Kentucky significantly decreased the number of breast cancer patients without some form of health insurance, and is associated with earlier-stage cancer diagnosis, and an increase in the rate of breast-conserving therapy complete with postoperative radiation among women with breast cancer in Kentucky. However, it translated into less-robust improvements in efficiency and timeliness of therapy through the course of treatment.

During the last 10 years, the debate about how to improve access to quality healthcare has risen to national prominence, culminating in the passage of the ACA by the federal government. Despite being a highly controversial policy, the elements it contains, particularly with respect to Medicaid expansion, have proven effective in improving access to and use of healthcare on the state level.<sup>8</sup> In 2008, Oregon expanded Medicaid in a randomized fashion to low-income adults and observed an improvement in patient access to and use of healthcare along with patient-reported health, healthcare access, and healthcare usage.<sup>8</sup> This translated into improved diagnosis of conditions such as diabetes mellitus and depression. In the time since passage of the ACA and expansion of Medicaid by many states, similar patterns have been described in other states with respect to healthcare in general.<sup>9</sup> Indeed, recent retrospective data also demonstrate an association among Medicaid expansion, access to healthcare, and decreased mortality since 2014.<sup>10</sup>

With respect to cancer care, pre-ACA Medicaid changes at the state level can also provide insight in to the potential effect of these health policies. The 2001 pre-ACA Medicaid expansion in New York State did not increase the overall use of surgical cancer care, but shifted the financial responsibility from patients or hospitals to Medicaid, and decreased racial disparities in access to high-volume centers.<sup>11,12</sup> In contrast, the 2005 Medicaid disenrollment in the state of Tennessee resulted in later stage of disease at diagnosis of breast cancer and increased delays to treatment.<sup>13</sup>

The increased rates of diagnosis of early-stage breast cancer perhaps reflect similar trends to those observed in Oregon from 2008 to 2010 and trends opposite those seen in Tennessee—namely, an improvement in access to and use of care by Kentuckians. In the absence of information about screening and diagnostic mammography, an earlier stage at diagnosis might represent a surrogate for more women taking advantage of recommended breast cancer screening. Similarly, the increase in breast-conserving therapy might reflect both treatment of earlier-stage disease and improved patient access to and willingness to undergo radiation therapy, with the idea of improved access supported by a decrease in time from operation to radiation in the current study. All of these observations point to an improvement in diagnosis and appropriateness of treatment—2 key elements of quality breast cancer care<sup>6</sup>—in women with breast cancer associated with Medicaid expansion in Kentucky.

Despite improvements in diagnosis and treatment appropriateness, simply expanding healthcare access fails to address issues with timeliness and efficiency of care. The increase in time from diagnosis to operation (ideally within 3 to 4 weeks)<sup>7,14–16</sup> suggests the presence of



additional issues extending beyond access to and availability of healthcare.<sup>17</sup> Previous work assessing barriers to quality of breast cancer care in low-income populations suggest a myriad of factors, including patient-related factors (including noncompliance and social issues) and care coordination (such as diagnosis at an outside hospital).<sup>15,17,18</sup> In light of these elements, future efforts to improve quality of care for breast cancer and other patients must include patient outreach and education, improved interdisciplinary collaboration and communication, implementation of programs to improve patient access to and evaluation by multiple specialties,<sup>19</sup> and better accessibility of patient information by physicians throughout any given state or region.

Its limitations notwithstanding, Medicaid expansion represents an effective and initially fiscally responsible option by which states can expand health insurance coverage. As part of the ACA, the federal government offered subsidies to states expanding Medicaid that would pay at least 90% of the costs of Medicaid expansion in perpetuity.<sup>20</sup> Although Medicaid expansion is projected to result in an approximate increase of 3% in state spending on healthcare for uninsured individuals, it is estimated to save states between \$26 and \$52 billion between implementation (2014) and 2019.<sup>20</sup> Furthermore, Medicaid expansion can produce cost savings in addition to increasing coverage for low-income individuals. When compared with purchasing a private insurance plan through a government-subsidized exchange (Marketplace), enrolling in Medicaid results in an approximately 50% reduction in personal expenditure on healthcare in both absolute terms and with respect to proportion of annual income.<sup>21</sup> Although the long-term cost at both the federal and state level remains unknown, Medicaid expansion can improve physical well-being, access to healthcare, and the financial burden of healthcare for individuals (particularly low-income populations) while, at least in the short term, simultaneously augmenting the financial health of participating states.

The importance of access to quality healthcare, including care for breast cancer, cannot be overstated. Using breast cancer as an example, previous studies have demonstrated an association between access to timely and appropriate diagnosis and treatment of breast cancer and improved overall survival in women with breast cancer.<sup>15-17,22</sup> By simply contributing to an increase in receipt of radiation therapy post-breast-conserving surgery, Medicaid expansion can significantly improve the health of a number of the commonwealth's citizens.

This study has several limitations. As a retrospective, population registry-based study, all data on which these analyses were based depended on hospital-based coding and data reporting. The generalizability and sustainability of the

findings reported herein also remain uncertain owing to changes in degrees of federal subsidization of Kentucky Medicaid and the availability of only 3 years of post-Medicaid expansion data for inclusion in the analysis. Additionally, certain quality assessment metrics, including details of mammographic evaluation, referral patterns after diagnosis, and appropriateness of radiation and chemotherapy regimens, were not available for evaluation. Finally, the inability to account for multiple confounders, including initiation of chemotherapy postoperatively and its influence on time from operation to radiation, limits the ability to draw strong conclusions about the direct effect of Medicaid expansion on the quality of breast cancer care in Kentucky.

## CONCLUSIONS

The expansion of Kentucky Medicaid in 2014 has been associated with more favorable disease stage at diagnosis and somewhat improved quality of breast cancer care despite a stable incidence of the disease. Additional improvements in expediency of treatment will likely require improvements in patient outreach and education, healthcare infrastructure, and cancer care coordination.

## Author Contributions

Study conception and design: Aj kay, Bhutiani, Howard  
Acquisition of data: Aj kay, Bhutiani, Huang, Chen, Howard, Tucker  
Analysis and interpretation of data: Aj kay, Bhutiani, Huang, Chen, Tucker, Scoggins, McMasters  
Drafting of manuscript: Bhutiani  
Critical revision: Aj kay, Bhutiani, Huang, Chen, Howard, Tucker, Scoggins, McMasters, Polk

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## Discussion



**DR V SUZANNE KLIMBERG** (Galveston, TX): Health care insurance is one of the few straightforward, modifiable variables related

to the use of health care. Sommers and colleagues suggest that previous health insurance expansions may have helped narrow mortality disparities by race and ethnicity. Examining how these differences have changed since the passage of the Affordable Care Act (ACA) is fundamental to assessing the potential impact of health care policy on barriers to care, incidence-to-mortality ratios, and disparities in care, whether they are social, racial, or ethnic. Increasing health care availability does not necessarily reduce health care disparities, and highlights the need for implementation strategies in conjunction with prevention strategies. A good example is mammography, which is a moderately effective prevention, but use countrywide is less than 50%.

Having said that, we estimate that 2.6 million women aged 40 to 64 years will remain uninsured in 2017. The Healthy People 2012 objectives state that 81% of women should be targeted to receive mammograms, yet the funding level with the ACA is far below that required to serve only 12% to 38% of uninsured women. In Kentucky, the roll out of the ACA only moved the needle a few percentage points.

Kentucky was one of the first, if not the first, to implement the National Breast and Cervical Cancer Early Detection Program for uninsured women. Do you think that the modest differences you saw were because of already good existing programs for breast screening in Kentucky or because breast cancer screening is recommended only every 2 to 3 years in the ACA? It may take more time for improvements to be seen. Was there a lag phase in the use of the ACA?

Nitoli and coauthors showed that, in an expansion of Medicaid coverage in several states, new Medicaid recipients were disproportionately minorities, often older and in poor health. Do you look separately at the change in metrics within these groups, especially within the newly insured? Only looking at the whole group could have diluted your seeing the change for the better in the newly insured group vs the entire group vs the uninsured.

Sommers and colleagues showed that all-cause mortality in expansion states decreased more than in nonexpansion states, especially for minorities and residents of poor counties. Did you observe such an all-cause mortality change in your database, or would you look at it, especially in the newly insured group, for example, in Appalachia?

Did the increase in insured differ in areas where the baseline was lower vs the baseline was higher in different counties, as we have seen in other states adopting Medicaid expansion?

Finally, the mortality-to-incidence ratio may give you a better estimate of what is really going on. The mortality-to-incidence ratio is preferable to traditional incidence and mortality statistics because it incorporates the underlying relationship between them.

**DR KIRBY BLAND** (Birmingham, AL): It is a pleasure to discuss this paper on the early impact for Medicaid expansion and its ultimate impact on the quality of breast cancer care in Kentucky. The paper is insightful and follows literature that was developing on quality and safety well before the contentious passage in 2010 and implementation in 2011 of the ACA. The authors' timely work confirms that Kentucky has witnessed a statistical drop in the rate of the uninsured patients, from approximately 19% to 7%. This finding, as I just reiterated, is the most significant reduction of Medicaid expansion in the US.