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THE EFFECTS OF BREAST AND CERVICAL CANCER PREVENTION AND TREATMENT ACT (BCCPTA) IN GEORGIA

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Doctor of Philosophy

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Abstract

THE EFFECTS OF BREAST AND CERVICAL CANCER PREVENTION AND TREATMENT ACT IN GEORGIA

By Li-Nien Chien

The Breast and Cervical Cancer Prevention and Treatment Act (BCCPTA) of 2000 allowed states to extend Medicaid coverage to uninsured women under 65, diagnosed with breast and cervical cancers (including pre-cervical condition) through the National Breast and Cervical Cancer Early Detection Program providers, or in Georgia any provider, and found in need of cancer treatment.

The first article examined whether BCCPTA helped uninsured breast cancer patients enroll in Medicaid more quickly to start treatment at early stage. I conducted a quasi-experimental study that compared the stage of cancer of the women aged 19-64 diagnosed with breast cancer who were eligible for BCCPTA with those in the same age spectrum diagnosed with one of five other cancers when they enrolled in Medicaid. There were 8.0 more breast cancer patients enrolling in Medicaid at early stage than control cancer patients per month. The marginal effect of BCCPTA increased 9.5% breast cancer cases enrolling in Medicaid at early stage ($p<.1$).

The second article examined how BCCPTA affected the patterns of disenrollment from Medicaid for women diagnosed with breast, cervical and control cancers. The post-BCCPTA period analyzed here was one in which Georgia women could self-report that they were in active treatment and hence, still eligible. The unadjusted disenrollment rate declined 50% for breast and cervical cancer cases while it increased 30% for control cancer cases post-BCCPTA. The direction and magnitude of results held after adjusting for covariates that could affect disenrollment rates.

The third article investigated cervical cancer treatment of patients enrolled in Medicaid under BCCPTA. In terms of treatment combination, 75% of pre-invasive patients had a precancerous procedure, with about 21%, versus 34 % of invasive cases receiving surgery. Those more likely to receive surgery among pre-invasive cases were those with more advanced stage and a co-morbidity. Among invasive cases, later stage was associated with higher odds of radiation/chemo but not surgery. Non-Hispanic black were significantly less likely to have surgery than those no-Hispanic white in both pre-invasive ($p < .01$) and invasive cases ($p = .05$).

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CHAPTER 1

THE BACKGROUND AND THE IMPLEMENTATION OF BREAST AND CERVICAL CANCER PREVENTION AND TREATMENT ACT

1.1 Background

The Breast and Cervical Cancer Prevention and Treatment Act (BCCPTA) was passed by Congress and enacted as Public Law 106-354 in 2000. BCCPTA allows states to create a new optional Medicaid eligibility category to cover uninsured women under age 65 who have been screened and diagnosed and found in need of treatment of breast and cervical cancers and precancerous cervical condition through the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) providers(Centers for Medicare and Medicaid Services [CMS], 2005).

NBCCEDP is funded by the Centers for Disease Control and Prevention (CDC) and provides timely and high-quality screening and diagnostic services to low-income, uninsured, and underserved women to detect breast and cervical cancer at the earliest stages since 1991. To date, NBCCEDP has served more than 3.2 million women, provided more than 7.8 million screening examinations, and diagnosed 35,090 breast cancers, 2,161 invasive cervical cancers, and 114,390 precursor cervical lesions(CDC 2008).

NBCCEDP has been successful in providing cancer screening/ diagnostic services to low-income uninsured women across the nation. However, under the original authorizing legislation, NBCCEDP can only provide funds for cancer screening and diagnosis. These uninsured women who cannot find any charity care or pay out-of-pocket for services face significant barriers to treatment if being diagnosed with those cancers. The creation of BCCPTA is groundbreaking as an effort to use population-wide public health screening

programs (NBCCEDP) as a new pathway for Medicaid to reduce the "treatment gap" for those women with no medical insurance(Adams, Blake et al. 2007).

BCCPTA has generated significant interest as a policy approach for addressing the challenges of the uninsured facing serious illness. First, BCCPTA is one of the legislations in providing Medicaid-funded treatment to a disease-specific Medicaid expansion. In general, Medicaid is available only to certain low-income individuals and families who fit into an eligibility group that is recognized by federal and state law. Income test is the necessary for Medicaid eligibility while assets and resources are also tested against established thresholds. Conversely, there is no income eligibility test under BCCPTA provision. Instead, the specific disease test (screened/diagnosed with breast/cervical cancer) is required which represents a unique model in federal Medicaid policy.

Another distinction of BCCPTA is that women are eligible for Medicaid as long as they are "in active treatment" for their cancers while they can utilize any Medicaid covered service while eligible. The definition of "in active treatment" is not explicit and states differ in the timing and types of recertification required(Adams, Blake et al. 2007). Generally, the eligibility recertification is determined by treating providers. After BCCPTA implementing, a female breast or cervical cancer patient is disenrolled from Medicaid if she is no longer in treatment at the time of recertification or she is not eligible for Medicaid under other eligibility categories. This would help those women have a more stable insurance coverage and a better connection with their care providers.

BCCPTA also gives states the flexibility to select broader screening scenarios for defining "screened under the program". The program includes three options: option 1: women are considered screened under the program if they have received at least one federally-funded screening service through the state program; option 2: women who have

not received a federally-funded screening service can be considered as screened under the program if they received at least one screening service through the state program; and option 3: women who have not received a federally-funded screening service can be considered as screened under the program if they receive a screening services from a provider designated by a state program as a BCCPTA screening provider(Kenney, Blake et al. 2004). Option 1 is the most restrictive while option 3 is the most expansive. The variation of options would affect the number of women being covered. Currently, 17 states chose the option 1, 21 states chose option 2 and only 12 states chose option 3(CMS 2010).

In addition, BCCPTA allows states to extend presumptive eligibility procedure to facilitate the enrollment and access to services for women who are in the need of treatment for their cancer. Election of presumptive eligibility provides states the opportunity to offer immediate health care coverage to the women likely to be Medicaid eligible before a full Medicaid eligibility determination. This procedure tends to enroll Medicaid applicants for a limited period of time and hopes that they can access care after diagnosis without any delay. While all fifty states and the District of Columbia have chosen to implement the Medicaid program option enabled by the BCCPTA, only 22 states have chosen presumptive eligibility option in January 2007(CMS 2010).

1.2 Implementation

All fifty states and the District of Columbia chose to implement the BCCPTA option in their Medicaid plan quickly(Sciulli 2003) and invest $220 million over 5 years to help bring down financial barriers to cancer treatment(National Patient Advocate Foundation 2008). As mentioned, this Medicaid expansion creates a great effort to improve the accessibility of the

low-income uninsured women who need be treated; however, the current evidence of the effects of this legislation is limited.

The first research was conducted by CDC, the Centers for Medicare and Medicaid Services (CMS) and the George Washington University (GWU) Center of Health Services Research and Policy. This study adopted case-study approach in 16 selected states to analyze the effects of BCCPTA at initial implementation, included 1) the designs of states' Medicaid expansions, 2) the collaboration between state Medicaid programs and Title XV officials, 3) the development of BCCPTA Medicaid enrollment procedures, 4) the effect of BCCPTA implementation on Title XV agencies, and 6) the state's experience in implementing BCCPTA. They used structured interviews with state Medicaid officials, Title XV grantees, community/advocacy organizations and document review. The findings indicated that 1) BCCPTA was implemented relatively smoothly, with states using existing NBCCEDP provider screening networks, 2) substantial variation across states in their experience with Medicaid enrollment and expenditures, 3) variable impact on the activities of Title XV agencies, and 4) uncertainty about long-term costs associated with BCCPTA coverage due to the early stage of implementation(Maloy 2004).

1.2.1 Georgia BCCPTA

The impact of BCCPTA across states is quite significant. Georgia was one of the states chose the most expansive interpretation (option 3) to cover more women with income level less than 200% of Federal Poverty Level (FPL) regardless their screening providers. From implementation through June 2006, a total of 4,081 women have enrolled in Medicaid under this new eligibility category for needed services(Georgia Department of Community Health 2006). The state data showed that nearly 75% of Georgia BCCPTA enrollees entered

non NBCCEDP-funded providers and BCCPTA accounted for over one-third of female Medicaid enrollees with breast and/or cervical cancer covered by the state in 2003(Adams, Blake et al. 2007). Georgia's Medicaid program spent over $29 million on BCCPTA enrollees, a cost of over $12,000 per enrollee in 2003 alone. Adams et al. (2009) additionally employed difference-in-differences (DID) approach to examine the effect of BCCPTA on timing of Medicaid enrollment after cancer diagnosis. They found that Georgia BCCPTA significantly increased the enrollment by two to three women per month and also shortened time-to-enrollment of those breast and cervical cancers enrollees by seven to eight months relative those with control cancers(Adams, Chien et al. 2009).

1.2.2 Texas BCCPTA

Texas, instead, chose the most restrictive interpretation (option 1) to cover the women who were screened and diagnosed with breast and/or cervical cancer through NBCCEDP-funded sites. As of 2006, it served 1,200 women over roughly the same period that Georgia served 4,100 women. However, the population at 22.3 million in Texas is over 2.5 times the 8.7 million in Georgia which indicates the substantial variation of number of enrollees under BCCPTA due to the three options(Dunkelberg 2006). Option 1 might result in numerous uninsured women who were not qualified for BCCPTA eligibility would delay their cancer treatment in Texas. Later, those women might seek medical care in emergency rooms or state hospitals with more severe disease conditions or later stage of cancer, and need more intense care. Therefore, most recently, the 80th Texas Legislature passed Senate Bill 10 that allows any health care provider to refer eligible women in the needs of treatment for breast or cervical cancer to Medicaid. On September 1, 2007, any woman diagnosed with those cancer who qualifies all eligible requirements as determined by the Department of

State Health Services Breast and Cervical Cancer Services policy for Medicaid for Breast and Cervical Cancer, can receive services(Texas Department of State Health Services 2008).

1.2.2 California BCCPTA

California is another state which covers all women regardless their screening site. The state additionally created a "state-only" program to cover women who are not eligible for Medi-Cal but eligible for the state program(Kenney, Blake et al. 2004). California is also one of states providing state funds for uninsured women who were diagnosed with breast and/or cervical cancers prior to BCCPTA. This state program covered a total of 2,566 uninsured low-income (<200% FPL) women diagnosed with those cancers who enrolled for 12 to 18 month for treatment. There were a highest proportion (43%) of these enrollees diagnosed with Stage II of diseases through December 2000 in the state program(Lane, et al., 2001). The Breast and Cervical Cancer Treatment Program (BCCTP), followed by the state program, continuously provides the needed cancer treatment to breast or cervical cancer women who are not qualified for federal BCCTP (referred to BCCPTA) but qualified for state BCCTP after implementing BCCPTA. However, the benefit and the duration of coverage are different between these two programs. Federal BCCTP provides full-scope Medi-Cal at no cost while state-funded BCCTP provides no cost services limited to breast and/or cervical cancer treatment and related services. Women under state-funded BCCTP also need to pay the insurance premiums under certain circumstances. Moreover, federal BCCTP provides benefits for the duration of cancer treatment, as long as the individual continues to meet all other BCCTP eligibility criteria, while state BCCTP provides breast cancer treatment services for up to 18 months and cervical cancer treatment services for up to 24 months(California Department of Health Care Services 2008).

1.3 Objective

BCCPTA is an important policy approach for reducing the treatment gap through publicly funded screening programs. Although the data has been shown substantial variation among states, the current evidence of BCCPTA effects is still insufficient in terms of the stage of disease at Medicaid enrollment, the pattern of Medicaid disenrollment, and cancer treatment pattern. Such data are relevant at a time when Medicaid programs are responding to fiscal stress by cutting eligibility, services or both. It would also help state policy makers understand how this innovative program is working to improve the health of low-income uninsured women.

The effect of BCCPTA in Georgia is informative regarding to the scope of Medicaid expansion and the linkage of cancer registry to Medicaid administrative data. As the Georgia BCCPTA chose the broad interpretation, evidence will also become a potential model of other states, for example Texas, that would be likely to switch from option 1 (most restrictive) to option 3 (most expansive). Option 1 more likely creates a financial burden for uninsured women access to care and delay seeking their treatment, in turn, results in more advanced disease. Finally, they probably receive treatment in the emergency room or state hospitals which increased additional cost if they could be treated earlier. At present, some states plan to add options 2 and 3 to encourage women to have regular screenings and earlier diagnosis. Those women screen, diagnosed and found in need of cancer treatment at private funds providers would become eligible for Medicaid. States more likely treat more women possibly at a lower cost if they can get treatment at an earlier stage of diseases.

Additionally, the data from Georgia linked to cancer registry to Medicaid enrollment and claims files would improve accurate of evaluating the effects of BCCPTA. First, cancer registry has been linked to several years of complete Medicaid enrollment and claims data

pre and post the implementation of the Georgia BCCPTA program. Second, the linkage would allow the study to identify newly Medicaid enrollees with those cancers. Moreover, the data we used obtains individual demographics, cancer diagnosis, and Medicaid status. These are vital information would help researchers better identify the relationship between BCCPTA and study outcomes.

Medicaid Analytical Extract (MAX) from Research Data Assistance Center (ResDAC) contains the beneficiary-level enrollment, utilization, and expenditure data on a calendar year basis. It is also available for all fifty states; however, lack of critical information from the cancer registry, such stage at diagnosis, and monthly enrollment records would not be able to explicitly examine the research questions in the dissertation. In addition, it is difficult to examine an overall effect of BCCPTA across the nation since each state operates its BCCPTA program differently.

The objective of this dissertation uses data from Georgia to conduct a quasi-experimental study and apply pre and post test design with control group to examine the effects of BCCPTA on 1) early stage of cancer at Medicaid enrollment, 2) the pattern of Medicaid disenrollment and 3) cervical cancer treatment among Medicaid enrollees. For the third paper, I only used Medicaid enrollees diagnosed with pre-invasive and invasive cervical cancer in the post-BCCPTA period.

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CHAPTER 2

THE EFFECTS OF THE BREAST AND CERVICAL PREVENTION AND TREATMENT ACT ON EARLY STAGE AT MEDICAID ENROLLMENT: EXPERIENCE FROM GEORGIA

Abstract

Background. To examine whether the Breast and Cervical Cancer Prevention and Treatment Act (BCCPTA) helps uninsured low-income breast cancer patients enroll in Medicaid more quickly to start the treatment at early stage of cancer.

Methods. We used data from Georgia Comprehensive Cancer Registry and Medicaid enrollment/claims files to conduct a quasi-experimental study that compared the stage of cancer of the women aged 19-64 diagnosed with breast cancer who are eligible for BCCPTA with those in the same age spectrum diagnosed with any one of five other cancers (bladder, colorectal, melanomas of the skin, non-Hodgkin lymphomas and thyroid) when they enrolled in Medicaid. Difference-in-differences analysis (DID) was employed to estimate the net effect of BCCPTA on stage of cancer at Medicaid enrollment.

Results. In terms of early stage at Medicaid enrollment per women-month, there were 7.5 more women with breast cancer enrolling at early stage of cancer post-, versus pre-BCCPTA while, this applied to 0.5 less women with control cancers. Additionally compared to control cancer cases, the DID estimation showed breast cancer patients were 8.0 more likely to enroll in Medicaid at early stage post-BCCPTA without controlling other confounders. The dprobit model showed that the implementation of BCCPTA increased 9.5% patients with breast cancer enrolling in Medicaid at early stage ($p<.1$) at initial month.

Conclusion. The Georgia BCCPTA program successfully helped uninsured low-income breast cancer patients enroll in Medicaid an early stage of disease to start their treatment, which is crucial for better survival and health outcomes of these patients.

2.1 Introduction

The Breast and Cervical Cancer Prevention and Treatment Act (BCCPTA) created a new Medicaid option to allow states to provide full Medicaid benefits to uninsured women who were under age 65, screened and/or diagnosed, and found in need of treatment for breast and cervical cancers and precancerous cervical conditions through the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) providers(CMS 2005). The NBCCEDP program, funded by Centers of Disease Control and Prevention, was designed to provide timely breast and cervical cancer screening and diagnostic services for uninsured and underinsured women with income generally less than 250% of federal poverty level (FPL)(Tangka, Dalaker et al. 2006). Since NBCCEDP received no funds for treatment, uninsured women with those cancers could be easily left without adequate treatment. To fill this treatment gap, Congress passed the BCCPTA in 2000 which creates greater access for women in terms of obtaining treatment through Medicaid(Adams, Blake et al. 2007).

BCCPTA was adopted by all fifty states quickly while there is considerable variation in how each state operates its own BCCPTA program. For example, while one of the mandates under BCCPTA is that women are eligible if they are screened for breast and/or cervical cancer by another legislated program, the NBCCEDP, states also have 'Screening Options' to extend coverage for women screened under a non-NBCCEDP funded provider(CMS 2005). The Georgia BCCPTA program, Women's Health Medicaid Program (WHMP), is one of twelve states which chose the most expansion coverage which covered eligible women screened and diagnosed with both cancers by any provider in the state with income less than 200% FPL and started enrolling them in July 2001(Georgia Department of Human Resources 2002). State data showed that 75% of the Georgia BCCPTA enrollees

were screened by non-NBCCEDP sites and BCCPTA itself covered over one-third of all female Medicaid beneficiaries with breast or cervical cancer treated in 2003(Adams, Blake et al. 2007).

BCCPTA was not only a disease-specific Medicaid expansion but groundbreaking as the first effort to use a population-wide public health screening programs (NBCCEDP) as a new pathway for bringing those uninsured women into Medicaid. Moreover, the distinct characteristics of BCCPTA, such as a higher income criterion, could be significant in getting uninsured cancer patients into Medicaid more quickly and consequently, at an earlier stage of disease, which could lead to more effective treatment and better survival rates(Vernon, Tilley et al. 1985; Machiavelli, Leone et al. 1989; Afzelius, Zedeler et al. 1994; Richards, Westcombe et al. 1999).

BCCPTA made a new eligibility group of uninsured breast and cervical cancer patients who had higher income than those usually eligible under Medicaid. Prior to BCCPTA, a non-elderly woman with those (or other) cancers could be eligible for Medicaid only if she fell into certain eligibility categories (e.g. a mother, pregnant, blind or disabled) and had very-low income. While the rules for counting income and resources vary from state to state, the eligibility level for low-income working mothers in Georgia equals 52% FPL in 2009(Kaiser Commission on Medicaid and the Uninsured 2009). A female cancer patient could also wait a long period to qualify for Medicaid as a disabled person (certified by physician as disabled and unable to work for the next 12 months)(Benítez-Silva, Buchinsky et al. 1999; Benitez-Silva, Buchinsky et al. 2004) and income less than 75% FPL(Kaiser Commission on Medicaid and the Uninsured 2010). Or she could also wait for eligibility under the medically needy program if her catastrophic healthcare expenses meant she met the state income/asset

thresholds while any transfer usually takes 36 to 60 months of the Medicaid application in Georgia.

BCCPTA women could enroll in Medicaid with no direct income test and resource/asset limitations; she did need to meet the income criteria of the NBCCEDP (less than 200% FPL) even if not screened by that provider type. Other eligibility groups often deal with a long and cumbersome process that required applicants to locate different documentation necessary to verify the value of their resources. For some, the process itself discouraged completion of the application even if they were actually eligible(Hill and Lutzky 2003; Stuber and Bradley 2005).

Additionally, there are no requirements for a waiting period of prior uninsurance under BCCPTA. For very young women (teens) SCHIP programs can impose a requirement of uninsured status for six months in Georgia(Kaiser Commission on Medicaid and the Uninsured 2009).This was a strategy for preventing crowding out of private insurance coverage but found to significantly affect both take-up and crowd-out(Lo Sasso and Buchmueller 2004). Without those restrictions, newly diagnosed breast and cervical women with no insurance would likely enroll in Medicaid in a shorter period.

Each state also has the option to adopt the presumptive eligibility, usually a three-month period, under BCCPTA. This allows states to enroll women in Medicaid for a limited period of time before full Medicaid applications are filed and processed, based on a determination by a Medicaid provider. It was used primarily for pregnant women and successfully helped them seek care earlier and more frequently(Piper, Mitchel et al. 1994). Georgia and 21 states offer this procedure to facilitate the prompt enrollment and immediate access to service for women who are in need of treatment for breast or cervical cancer(CMS 2010).

This new 'pathway' of BCCPTA with its higher income eligibility limit and less strenuous application process meant more uninsured female breast and cervical patients could enroll more quickly after BCCPTA, and hence could start cancer treatment at early stage of cancer. Our earlier work has found that BCCPTA successfully reduced the time gap between cancer diagnosis to Medicaid enrollment of female Medicaid enrollees with both cancers by 7-8 months; prior levels indicated delays of approximately 14-17 months(Adams, Chien et al. 2009). Given this, we hypothesized that the implementation of BCCPTA improved breast and cervical cancer patients enrolling in Medicaid did so at an earlier stage of disease. We used data from a single state — Georgia — in which the comprehensive cancer registry has been linked to several years of complete Medicaid enrollment and claims data pre and post the implementation of the Georgia BCCPTA program to test this hypothesis for breast cancer cases.

2.2 Methods

2.2.1 Study Design

We conducted a quasi-experimental design and employed difference-in-differences (DID) analysis to adjust for any temporal changes other than BCCPTA that could affect stage of cancer at the time of Medicaid enrollment of women with both intervention and control cancers. The intervention group includes women with breast cancer and the control group includes female Medicaid beneficiaries with any one of five control cancers: colorectal, bladder, melanomas of skin, non-Hodgkin lymphomas and thyroid. The five control cancers we chose, in consultation with clinical and Georgia Comprehensive Cancer Registry (GCCR) staff, based on whether screening tests that can detect their cancers at earlier stages and hence, allow women effective treatment options, were available. We had initially chosen only

colorectal cancer cases as a control group but found the sample size is inadequate. Besides, we omitted those with cervical cancer in our analyses because the cancer registry data (GCCR) used in this study does not include newly diagnosed women with in situ cervical cancer or, moreover, those with a precancerous cervical condition during the study period.

2.2.2 Data Sources

The major data sources used in this study are the GCCR and Georgia Medicaid enrollment and claims. GCCR is a statewide population-based cancer registry of all incident cancer cases diagnosed in any Georgia county since 1999. It provides data on demographics and disease status for each case. Medicaid enrollment files provide monthly enrollment records of all linked cancer beneficiaries. Medicaid claims files provide data from diagnosis fields coded by the International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM) on claims as the patient is actually enrolled in Medicaid and received the treatment. By combining these three files together, we were able to identify not only the time gap between the cancer diagnosis and Medicaid enrollment, but also a measure of the possible cancer stage progression over this time period. We also merged county data from the Area Resource File, County Business File and Georgia Department of Community Health to control county factors that could affect individual ability to enroll in Medicaid.

2.2.3 Study sample

We included all women aged 19-64 diagnosed with breast cancer who are eligible for BCCPTA with those in the same age spectrum diagnosed with any one of five other cancers and enrolled in Medicaid in or after the month of their cancer diagnoses. We excluded those who enrolled in Medicaid over 65 since we were unable to observe their medical claims once

they were into Medicare. We also excluded those who were enrolled prior to diagnosis because they would not be affected by the new eligibility rules under BCCPTA. These exclusions resulted in 3,238 observations, among whom 2,502 were breast cancer patients and 736 were control cancer patients. Those for which stage was missing in the GCCR and/or Medicaid claims data and those who had more than one primary cancer site over their lifetime were also omitted (N=826). The latter exclusion was made since the regional and distant codes in claims data could easily represent regional or distant disease progression from a different primary cancer than the one we observed. The final sample size was 2,412 women diagnosed with breast (N=1,898) and control cancers (N=514).

2.2.4 Stage at Medicaid Enrollment

The measurement of stage at Medicaid enrollment is the key variable in our analyses. Stage at cancer diagnosis is important since it describes the severity of disease as a patient found her cancer. However, from a policy perspective stage at Medicaid enrollment is more important because this is the stage at the time which a woman enters Medicaid and can access treatment. To derive this measure, we used the stage data both from the GCCR and Medicaid claims for services received after their enrollment. This approach allowed us to account for the possible stage progression from 'early' to 'late' for women who waited a longer time period before enrolling in Medicaid after being diagnosed.

GCCR includes the Surveillance, Epidemiology, and End Results (SEER) Program summary stage which could be used for all types of cancer. It groups cancer cases into five main categories, 1) in situ, 2) local, 3) regional, 4) distant and 5) unstaged. It also can be used

in medical claims, hence, we applied the ICD-9-CM codes from Disease Staging[1] to derive a stage measure from Medicaid claims(Gonnella, Louis et al. 2007). We further worked with GCCR staff to match the staging from Disease Staging program into SEER summary stage. The full list of codes for breast and control cancers is available upon request.

For our analysis, we characterized cancer stage as 'early' if patients were diagnosed with in situ or local, and as 'late' if patients were diagnosed with regional or distant disease. In doing this, we adopted the methods and coding system from our earlier work which derived sensitivity and positive predictive value (PPV) measures using stage from Medicaid claims versus the cancer registry for breast and colorectal cancers. This work indicated a sensitivity of 91% and a PPV of 76% for breast cases but lower PPV for colorectal cancer (sensitivity=91%; PPV=52%). We additionally measured the sensitivity and PPV for all our five control cancers and these results are available upon request.

The decision of whether we kept the stage data as found in the GCCR or changed it using claims was based on whether or not the woman enrolled in Medicaid within six months after her cancer diagnosis. We hypothesized that stage of disease would likely progress after a six month waiting period. Therefore, for those diagnosed 'early' and enrolled over six months after diagnosis we measured their stage at enrollment from the claims data; our measure simply indicated whether or not there was disease progression to a stage of regional or distant from the initial GCCR stage. Otherwise, we used the stage data as measured from the GCCR; this applied to those diagnosed with late stage in the GCCR or those diagnosed early and enrolled in Medicaid within six months.

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[1] Disease Staging: Coded Criteria, v. 5.24 (The MEDSTAT Group, Inc. Ann Arbor, MI) is a classification system that uses diagnostic codes to produce clusters of patients who require similar treatment and have similar expected outcomes.

2.2.5 Econometric model

We employed a DID analysis and adopted a probit model to estimate the marginal effect of BCCTPA on early stage of cancer at the time of Medicaid enrollment by comparing the change before and after the implementation of BCCPTA for women with breast cancer versus those with a control cancer, controlling for other related factors. The model was shown:

$$probit(S) = \beta_0 + \beta_1 BCCPTA + \beta_2 Breast + \beta_3 BCCPTA * Breast + \gamma X_i + \eta C_{it} + \delta T_t + \varepsilon_{it}$$

where S = stage of cancer at Medicaid enrollment (S=1 if it is an early stage, S=0 if it is a late stage); BCCPTA = a vector of binary variables representing the time from the implementation of BCCPTA measured by months; we categorized these monthly time intervals into five categories: initial implementation month, 3, 6, 9 months and a year post-BCCPTA implementation; Breast = a binary variable where 1 = breast cancer and 0 = control cancers; BCCPTA*Breast = is a vector of interactions of the five categories of post-BCCPTA period interacted with breast cancer. We also controlled for X_i = a vector of individual covariates, including age at enrollment, race/ethnicity, marital status, and residence, C_{it}= a vector of county factors which might change over time, including county with a teaching hospital, percentage of small firms (<10 employees) and percentage of Medicaid recipients within the residency county; and T_t = year dummy to control for other time trends factors.

To interpret the DID model, β_1 was the estimate of the trend of enrollment in Medicaid for women with *all* cancers (including both breast and control cancers) before and after the implementation of BCCPTA. Because of intensive public health campaigns and mature noninvasive diagnoses techniques, breast cancer is more often found at early stage

than some other cancers, for example colorectal cancer(Anderson and May 1995; Winawer 2007). We noted that, β_2 was the estimate of the baseline difference between breast and control cancer patients in early stage of Medicaid enrollment. In turn, β_3 was the estimate of the DID effect, which was the policy influence of the BCCPTA on the change of breast cancer versus control cancer patients into Medicaid at an early stage.

Besides, we examined five policy periods since it was possible that there was a group of long-term uninsured women with cancer in the pre-BCCPTA period who, due to the new availability of coverage post-BCCPTA, would enroll in Medicaid. This potential 'back-log' of women with late stage of cancer could immediately enroll after BCCPTA implementation and if they dominate new Medicaid enrollees immediately after BCCPTA, our analyses could actually suggest that BCCPTA lead to a deterioration of women enrolling at an early stage when in fact it led to an improvement.

2.2.6 Statistical analysis

All analyses were conducted using Stata version 9.2 (Stata Corp., College Station, TX). All statistical tests were two-sides and significant level at p value less than 0.1.

2.3 Results

Table 1 presented the summary statistics of women diagnosed with breast and control cancers. Of the 3,238 patients in the sample, those with breast cancer (37.3%) were more likely to enroll in Medicaid at an early stage of disease than those with a control cancer (16.8%) across the full study period. The mean for all independent variables indicated that patients were largely aged 45 to 64, married, with one primary cancer over their lifetime, and lived in a fringe county large metropolitan area. Compared to those with a control cancer,

breast cancer patients presented a higher percentage of black and they more resided in a county with a teaching hospital, a lower percentage of small firms or a lower percentage of Medicaid recipients.

In Table 2 we showed the descriptive data on the stage at the time of cancer diagnosis, at the time of Medicaid enrollment and the 'progression' in stage from diagnosis to enrollment for breast and control cancers and pre- versus post- BCCPTA implementation. Overall, breast cancer patients were more likely diagnosed and also enrolled in Medicaid at an early stage of disease than control cancer patients, in both policy periods. When the difference pre- versus post-BCCPTA was compared, there were 6.4 more women with breast cancer but 0.6 less women with a control cancer, diagnosed at an early stage each month. In turn, there were 7.5 more breast cases while 0.5 less control cases each month, enrolled in Medicaid at an early stage after BCCPTA.

We further examined the tumor progression from early to late per month. Before BCCPTA, 1.4 women with breast cancer and 0.2 women with control cancers experienced a progression by the time they enrolled. After BCCPTA, the stage for both cancers progressed less (0.3 versus 0.1 per women-month). As comparing the change pre- and post-BCCPTA, we found that breast cancer cases were 1.1 more versus control cancer cases were 0.2 more enrolled while still in an early stage post-BCCPTA each month.

As we illustrated in Table 2, without controlling for other confounders that could possibly influence the stage of cancer at Medicaid enrollment, DID estimations showed that after we accounted for the baseline difference pre- versus post-BCCPTA for both cancers, there were 7.0 more breast cancer patients more likely to be diagnosed with early stage of disease, 8.0 more likely to enroll in Medicaid while still at an early stage but 0.9 less likely to have progressed from early to late stage relative to those with a control cancer.

The probit models (showed in Table 3) represented the marginal effect of BCCPTA on early stage at Medicaid enrollment. The five policy periods measured from the initial month of policy implementation in 3 month increments up to a year post-BCCPTA were used to test for a 'lag' in its effect. As we saw in the first bank of the data, after accounting for other confounders, the trend of enrolling in Medicaid at early stage did not change post-BCCPTA (β_1). While, the baseline difference of breast versus control cancer patients was significant; in turn, breast cancer patients had higher probability enrolling in Medicaid at early stage than those with control cancers in both periods (β_2). For the DID estimation (β_3), we found that women with breast cancer were found 9.5% more likely to enroll in Medicaid at an early stage than those with control cancers at initial BCCPTA implementation. The effect of BCCPTA was also significant at a year lag afterward. Besides,

For other covariates, black race was associated with a lower probability of enrollment at an early stage while being of unknown marital status and living in a county with a higher percentage of small firms (proxy for higher levels of uninsured(The Kaiser Commision on Medicaid and the Uninsured 2006)) were associated with a higher probability of enrollment at an early stage. The significant levels of other covariates were consistent over the five BCCPTA periods.

2.4 Limitation

While shedding new information on the effects of BCCPTA, our study has several limitations. First, the data came from a single state and cannot be generalized since each state operates its BCCPTA program differently. Georgia, WHMP, allowed more uninsured low-income women with breast cancer into Medicaid by allowing all providers to screen for eligibility(CMS 2010). This means effects found in Georgia may be stronger than in other

states with more restrictive eligibility rules. Nevertheless, the results from Georgia definitely provide a first outlook of how BCCPTA worked on improving the health of previously uninsured low-income women with breast cancer by enrolling and starting treatment at early stage of cancer.

Second, the use of medical claims is an inexpensive method to measure stage at alternative times and provides time-sensitive stage information but its ability to identify cancer stage is limited because of imperfect sensitivity and PPV(Cooper, Yuan et al. 1999). In this study, the bias occurred as we used claims to determine early stage of disease at the time a woman was actually enrolled in Medicaid for both breast and control cancers. Fortunately, the measures of effect are more likely to be biased toward the null(Jurek, Greenland et al. 2005; Jurek, Greenland et al. 2008) if the non-differential misclassification happened only on identifying early versus non early stage of cancer and no difference in pre-, versus post-BCCPTA. This might actually result in the effect of BCCPTA more likely being underestimated

Another limitation relates to our use of a six month window to determine the possible tumor progression for women diagnosed with early stage but enrolled in Medicaid over six month after diagnosis. It might be argued that using a six month window is not appropriate since the speed of stage progression changes individually. We chose six months since a systemic review article found a delay of 3-6 month was associated with more advanced stage for patients with breast cancer(Richards, Westcombe et al. 1999). In sensitivity analyses we used three, nine and twelve months as alternative 'windows' of time and this resulted in results robust to those presented here.

Finally, we are unable to measure some factors, such as education, employee status and income-level individually which are likely associated with the probability of a woman

enrolling in Medicaid at early stage. We addressed this limitation by including county factors associated with health capacity, socio-economic status, and Medicaid policy environment to control for these unobserved variations. The effects of BCCPTA only changed slightly when excluding those covariates in the regression models.

2.5 Discussion

In addition to providing better access to cancer treatment by offering a new source of coverage, BCCPTA may also result in cancer patients enrolling in Medicaid at an earlier stage of their disease. Our results indicated that the Georgia BCCPTA program, WHMP, can help breast cancer patients enroll while still at an early stage. This could be significant clinically in terms of allowing those patients to have more treatment options and, hence, lead to better outcomes. If these clinical outcomes hold true, the BCCPTA, moreover, allows state Medicaid programs to use public funding more effectively as survival rates and quality adjusted life years may increase for low-income women with breast cancer.

This study is the first to our knowledge to examine the effect of BCCPTA on early stage at Medicaid enrollment. We were able to conduct a quasi-experimental design and employ DID analysis with a group of control cancer cases to 'difference out' the baseline change before and after the policy implementation; this helps better identify the relationship between the outcome and policy effect. Additionally, we could combine stage data both from cancer registry and medical claims to measure stage of cancer at the time of a woman actually enrolled in Medicaid and started treatment which is imperative from a policy perspective.

Existing work has confirmed that Medicaid enrollees were more likely diagnosed with late stage breast cancer than those with private insurance(Ayanian, Kohler et al. 1993;

Roetzheim, Pal et al. 1999). This is likely because Medicaid often begins to serve cancer victims only after they have waited a long period to qualify for coverage due to serious illness/disability and/or catastrophic expenses for health care, thus may have reached a later stage of disease. However, the distinct characteristics of BCCPTA improved the chances that women getting into Medicaid will do so more quickly(Adams, Chien et al. 2009) and hence, enroll while still in an earlier stage of cancer.

The above studies could be affected by a confounding effect; for example, newly diagnosed cancer patients enrolling in Medicaid were more likely at a later stage than those enrolled prior to their diagnoses(Bradley, Given et al. 2003; Bradley, Gardiner et al. 2005) due in part, to the structure of Medicaid eligibility rules. We were concerned about a potential confounding as a large number of uninsured patients who were sicker, perhaps at a later stage of cancer, could have been waiting for Medicaid eligibility prior to BCCPTA and would exhibit a later stage compared to Medicaid enrollees diagnosed and enrolling post-BCCPTA immediately. We were able to test the potential policy lag as we expanded the effect of BCCPTA from the initial implementation month to up to a year. We were able to document an effect of BCCPTA at initial implementation and this was consistent across lag effects up to one year afterward.

In conclusion, the Georgia BCCPTA program successfully helped uninsured low-income breast cancer patients to enroll in Medicaid an early stage of their cancer to start their treatment, which is crucial for the survival and long-term health benefit of these patients. The study results are also valuable for state government and policy makers to further understand the potential benefit of this new legislation.

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Table 1. Summary Statistics of Women Diagnosed With Breast and Control Cancers

	Breast Cancer	Control Cancer
	%	%
Sample size	2,502	736
Stage at Medicaid enrollment		
Early (In situ + Local)	37.3	16.8
Regional	37.5	27.0
Distant	11.5	32.1
Unstaged	13.8	24.0
Age at enrollment		
19-34	4.7	14.3
35-44	19.1	17.5
45-64	76.2	68.2
Race/Ethnicity		
White	46.8	53.5
Black	48.1	42.0
Others & Unknown	5.2	4.5
Marital status		
Single	23.9	25.4
Married	41.0	37.8
Separated, divorced, widowed	29.4	29.5
Unknown	5.6	7.3
No. of cancer diagnosis over lifetime		
One primary	88.0	92.3
1st of 2 or more primaries	5.8	5.6
More than 2 primaries	6.2	2.2
Residence		
Central city large metro	30.9	30.2
Fringe county large metro	42.1	38.7
Small metropolitan area	23.3	26.1
Completely rural	3.7	5.0
County with a teaching hospital (Yes)	33.9	29.9
Percentage of small firms (<10 employees) within residency county, mean(SD)	73.2(4.2)	73.9(4.6)
Percentage of Medicaid recipients within the residency county, mean(SD)	21.4(7.7)	21.8(7.9)

SD, standard deviation

Table 2. The Early Stage (In Situ or Local) at Cancer Diagnosis and Medicaid Enrollment of Women With Breast or Control Cancers Pre- and Post-BCCPTA Implementation Per Women Month (N=2,412)

		Pre-BCCPTA (01/1999-06/2001)			Post-BCCPTA (07/2001-12/2004)			Difference (Post-Pre)		
Cancer site		Cancer diagnosis	Medicaid enrollment	Tumor progression	Cancer diagnosis	Medicaid enrollment	Tumor progression	Cancer diagnosis	Medicaid enrollment	Tumor progression
Breast	per women-month (n/N)	13.5 (243/ 640)	12.1 (218/ 640)	1.4	19.9 (596/ 1,258)	19.6 (587/1,258)	0.3	6.4	7.5	-1.1
Control	per women-month (n/N)	2.9 (53/228)	2.7 (49/228)	0.2	2.3 (69/ 286)	2.2 (67/ 286)	0.1	-0.6	-0.5	-0.2
DID	per women-month							7.0	8.0	-0.9

1. BCCPTA indicates Breast and Cervical Cancer Prevention and Treatment Act
2. Early stage was included in situ and local. This calculation omitted patients with unstaged of cancer and more than one primary cancer sites
3. n: the patients with early stage of disease, N: the patients with the diseases
4. Tumor progression denoted the distribution of early stage change from cancer diagnosis to Medicaid enrollment

Table 3. The Probit Model of The Marginal Effects of BCCPTA on Stage at Medicaid Enrollment (N=2,412)

	BCCPTA Implementation									
	Jul-01		Post 3 month		Post 6 month		Post 9 month		Post 1 year	
Variables	Coeff		Coeff		Coeff		Coeff		Coeff	
Post-BCCPTA	-0.101		-0.100		dropped		-0.052		-0.016	
Breast cancer	0.148	***	0.168	***	0.161	***	0.168	***	0.161	***
Breast interacted with BCCPTA	**0.095**	*	0.064		0.082		0.074		**0.101**	*
Age at enrollment										
35-44	-0.071		-0.071		-0.071		-0.069		-0.069	
45-64	-0.040		-0.041		-0.040		-0.039		-0.038	
Race/Ethnicity										
Black	-0.056	**	-0.057	**	-0.056	**	-0.056	**	-0.055	**
Others & Unknown	-0.001		0.000		0.001		0.002		0.003	
Marital status										
Married	-0.011		-0.011		-0.013		-0.013		-0.013	
Separated, divorced, widowed	0.019		0.018		0.018		0.018		0.018	
Unknown	0.185	***	0.186	***	0.185	***	0.184	***	0.185	***
Residence										
Fringe county large metro	-0.030		-0.030		-0.030		-0.030		-0.030	
Small metro	0.015		0.014		0.015		0.014		0.015	
Completely rural	-0.070		-0.070		-0.070		-0.069		-0.066	
County with a teaching hospital (Ref.=No)	0.038		0.037		0.037		0.037		0.037	
Percentage of small firms (< 10 employees)	-0.001		-0.001		-0.001		-0.001		-0.001	
Percentage of Medicaid recipients	0.005	*	0.005	*	0.005	*	0.005	*	0.005	*
Year of diagnosis										
2000	-0.006		-0.007		-0.007		-0.007		-0.006	
2001	0.128	***	0.128	***	0.117	***	0.117	***	0.117	***
2002	0.155	**	0.180	**	0.062		0.124	**	0.096	**
2003	0.161	**	0.186	***	0.068		0.128	**	0.069	
2004	0.219	***	0.244	***	0.126	**	0.186	***	0.126	**

BCCPTA indicates Breast and Cervical Cancer Prevention and Treatment Act; Ref., reference group; Coeff: Coefficient

Post-BCCPTA after 6 month was dropped due to collinearity

* p<.1, ** p<.05, *** p<.01

CHAPTER 3

THE EFFECTS OF THE BREAST AND CERVICAL CANCER PREVENTION AND TREATMENT ACT ON MEDICAID DISENROLLMENT[2]

Abstract

Background: The Breast and Cervical Cancer Prevention and Treatment Act (BCCPTA) of 2000 created a new Medicaid option that allowed states to expand coverage to previously uninsured low-income women screened by certain public providers and found in need of treatment for those cancers. States also had the flexibility to allow any provider to screen for this new eligibility category and BCCPTA women were made eligible for all Medicaid services for the duration of their treatment. We have assessed the effect of this new program on the disenrollment patterns of women with breast/cervical cancer versus those with control cancers pre- and post-BCCPTA in Georgia. The post-BCCPTA period analyzed here was one in which Georgia BCCPTA women could self-report that they were in active treatment and, hence, still eligible.

Methods: The Georgia Comprehensive Cancer Registry (1999–2004) was linked to Medicaid enrollment files (1998–2005) to identify female Medicaid enrollees aged under 65 and enrolled in Medicaid at or after being diagnosed with breast (n = 2,265), cervical (n = 439) or one of five control cancers (n = 700). The rate of disenrollment (per 100 person-months) was computed for each cancer group pre- versus post-BCCPTA. We employed difference-in-differences analysis to adjust for any temporal changes other than BCCPTA that could affected the disenrollment rate of women with both the treatment (breast/cervical) and control cancers. We

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used a parametric hazard model with a Weibull distribution to analyze the odds of disenrollment.

Results: The unadjusted disenrollment rate declined 50% for women with breast and cervical cancers, whereas it increased over 30% for those with control cancers, pre- versus post-BCCPTA. The direction and magnitude of these results held after adjusting for socio-demographics and area characteristics that could affect disenrollment rates.

Conclusion: Georgia BCCPTA has the potential to improve continuity of care for women with breast and cervical cancers because they experience more stable coverage and simpler recertification process under this new eligibility category.

3.1 Introduction

The Breast and Cervical Cancer Prevention and Treatment Act (BCCPTA) was passed by Congress and enacted as Public Law 106-354 in 2000. The BCCPTA allowed states to create a new optional Medicaid eligibility category to cover uninsured women under age 65 who have been screened and diagnosed with breast and/or cervical cancer or a precancerous cervical condition through the National Breast and Cervical Cancer Early Detection Program (NBCCEDP, funded by Centers for Disease Control and Prevention [CDC]) sites and found in need of treatment (CDC,2009). The NBCCEDP funded by the CDC has provided screening and diagnostic services for uninsured women with incomes generally below 250% of the federal poverty level through participating providers since 1990. Although the NBCCEDP has served more than 3.2 million women since its inception (CDC, 2009), uninsured women could be left without adequate treatment options because the NBCCEDP received no funds for treatment.

In response to concerns about this lack of coverage, the BCCPTA was passed along with enhanced federal matching rates (equal to those used in the State Children's Health Insurance Program) to encourage states to use Medicaid to fill this coverage "gap." Although BCCPTA follows a previous diagnosis-based Medicaid expansion (tuberculosis in 1993), it is the first to link a national public screening program (NBCCEDP) to Medicaid eligibility. The overarching goal of BCCPTA was to increase access to timely health care for women with these cancers and it was quickly adopted by all states. There is, however, considerable variation in how each state's BCCPTA program operates. Georgia's BCCPTA program, the Women's Health Medicaid Program and the focus of our analysis, chose the most expansive coverage option by including all women regardless of their screening sites starting in July 2001 (Adams, Blake, Raskind-Hood, Chien, & Zhou, et al., 2007).

The BCCPTA establishes a potentially quicker pathway for states to enroll uninsured low-income women with breast and cervical cancers into Medicaid. Before BCCPTA, women could qualify based on first being in certain categories (a mother, pregnant, disabled, or elderly) and then, poor or near-poor based on state-established income (and asset) thresholds (Centers for Medicare and Medicaid Services [CMS], 2009). In some states, women could qualify if they had catastrophic health care expenses and became medically "needy." Hence, if a woman with cancer did not qualify under the nondisabled categories, she would have to be determined as disabled owing to her cancer, or if in a state with a medically needy program, incur high out-of-pocket health care expenses before qualifying for Medicaid. However, BCCPTA made women eligible after being diagnosed through NBCCEDP providers, or in Georgia and 11 other states (AR, CA, IA, MI, MS, NE, OK, RI, TN, UT, WV) any provider (CMS, 2010), although women and their providers still needed to take appropriate actions to complete enrollment for BCCPTA to have an effect. In earlier work, the BCCPTA was shown to increase the number of women enrolling in Medicaid each month by 2 to 3 and to decrease the time gap between diagnoses to eventual Medicaid enrollment by 7 to 8 months (Adams, Chien, Florence, & Raskind-Hood, 2009).

Another distinction of BCCPTA is that women are eligible for coverage of all Medicaid services as long as they are in active treatment for their cancer, although states differ in the timing and types of recertification required. During much of our study period, Georgia BCCPTA women could simply respond to the Medicaid program by letter every 6 months indicating active treatment (Adams et al., 2007). This meant their redetermination process was more often than some eligibility groups (e.g., disabled recertified annually) but simpler, because it was self-report and did not require income verification. As BCCPTA matured, Georgia moved to an annual recertification and required a doctor's statement that

the woman was still in treatment. This may have kept BCCPTA women more "connected" to the provider system and providers more aware of their compliance with treatment. Otherwise, patients with cancer who lose eligibility and involuntarily leave the Medicaid program may not be able to complete their planned therapies or manage their disease symptoms because those leaving Medicaid usually have fewer insurance options and personal resources to pay for ongoing care (Weissman, Witzburg, & Campbell, 1999; Harman, Manning, Lurie, & Christianson, 2003; Carlson, DeVoe, &Wright, 2006). Thus, if the BCCPTA implementation and recertification processes reduced the rate at which women with breast/cervical cancer disenrolled from Medicaid, it may also have improved their ability to complete treatment.

It is important then, to ascertain whether BCCPTA allowed the Georgia state Medicaid program to provide, on average, more stable insurance coverage to women with the cancers affected by this legislation. We employed a difference-in-differences (DID) analysis with a treatment group (women with breast/cervical cancer affected by BCCPTA), and a control group (women with cancers not affected by BCCPTA) to address this question. This method allows us to control for factors changing over time other than BCCPTA that could affect disenrollment rates and that differ between treatment and control cancers. We were able to address this question by using linked cancer registry and enrollment data on all incident cases of breast/cervical or one of five control cancers (bladder, colorectal, melanomas of the skin, non-Hodgkin lymphomas, and thyroid) who were enrolled in Georgia Medicaid in or after their month of diagnosis. Our specific research questions were as follows:

_ Did the implementation of BCCPTA in Georgia change the rate at which women with breast/cervical cancer disenroll from Medicaid?

_ Did the change in disenrollment rate for breast/cervical cancer cases differ from that of women with other types of cancer for which eligibility was not altered by BCCPTA?

We hypothesized that women diagnosed with breast/cervical cancer were less likely to disenroll from Medicaid compared to those with one of the control cancers after the BCCPTA implementation. Our data allowed us to test whether this rate differed after controlling for other socio demographic and area characteristics that could affect this rate.

3.2 Methods

3.2.1 Data Sources

The Georgia Comprehensive Cancer Registry (GCCR) incident cases from January 1, 1999, to December 31, 2004, linked to Medicaid enrollment files with patients' encrypted social security numbers were used to identify female Medicaid enrollees diagnosed with breast, cervical, or one of the five control cancers. The GCCR has been a state-wide population-based cancer registry in Georgia since 1999. Georgia's Medicaid program provided monthly enrollment records back as far as January 1998 and through December 2005. This allowed us to document the timing of both Medicaid enrollment and disenrollment in relation to a woman's cancer diagnosis. The Federal Information Processing Standard (a 5-digit identifier represented a unique county in United States) code from GCCR was used to link data from the Area Resource File, County Business File, and other sources to obtain county data on health system provider capacity, socioeconomic status, and the other environmental factors that could affect the probability of a woman disenrolling from Medicaid.

3.2.2 Sample Population

We included all women newly diagnosed with breast, cervical, or one of the five control cancers between the ages of 19 and64 and enrolled in Medicaid in or after their month of cancer diagnoses as reported in the GCCR. We chose the five control cancers, in consultation with clinical and GCCR staff, based on whether they were cancers for which screening tests that can detect them at earlier stages and, hence, allow women effective treatment options, were available. We had initially chosen only colorectal cancer cases as a control group, but found the number of women in Medicaid with this cancer to be inadequate in terms of sample size.

From our initial sample, we excluded those aged 65 and over who were not made newly eligible for Medicaid under the BCCPTA. Those who enrolled in Medicaid before the month of their cancer diagnosis were less likely to have entered Medicaid due to the new eligibility rules of BCCPTA and, therefore, were excluded (n = 2,180).We further excluded those with more than one primary cancer diagnosis because they could enroll in Medicaid before the detection of the treatment or control cancers (n = 401). The final sample was 3,404 women with a first primary diagnosis of breast (n = 2,265), cervical (n = 439), or one of the five control cancers (n = 700). Patients who died after enrolling in Medicaid (n = 564), or who did not disenroll from Medicaid before the end of our observation period (n = 1,533), or who turned age 65 (n = 70) were treated as right censored observations. We also omitted those with missing GCCR data on stage at diagnosis (7%) from our regression analysis.

3.2.3 Study Variables

The incidence rate of disenrollment (per 100 person-months) was defined as the total

number of disenrollees divided by the sum of the months that individuals were enrolled and, hence, exposed to the risk of disenrolling. The denominator was the length of enrollment measured in months from the first month of enrollment in Medicaid to the first month of disenrollment from Medicaid, death, turned 65, or end of the study period. The numerator was the number of new disenrollees that occurred during a period of Medicaid enrollment experienced by the population at risk. This numerator and denominator was calculated for women in each of the three cancer groups as an unadjusted rate. Then, the adjusted (for covariates) rate was measured from DID estimation.

As noted, we used DID analysis to estimate the net effect of BCCPTA. To do this we created three dummy variables for the estimation: 1) treatment versus control cancers, 2) pre- versus post-BCCPTA period, and 3) the interaction of dummy variables 1 and 2. This interaction dummy measures the difference in the change pre- versus post-BCCPTA for the treatment versus the control group and hence, is the DID estimator. The DID methodology has been used for policy analysis by a number of researchers (Adams, Florence, Thorpe, Becker, & Joski, 2003; Adams et al., 2009; Dubay & Kenney, 2003; Gavin, Adams, Manning, Raskind- Hood, & Urato, 2007; Tai-Seale, Freund, & LoSasso, 2001).

We also included a set of covariates that could affect our outcome but that were considered independent of BCCPTA. Individual covariates were: 1) age at diagnosis, 2) race/ethnicity, 3) marital status, and 4) stage at diagnosis. County covariates were: 1) geographic area of residence, 2) presence of a teaching hospital, 3) percentage small firms (<10 employees), 4) percentage of service employers, and 5) percentage of Medicaid recipients within the county. These factors were hypothesized to be area characteristics that reflected alternative insurance options and community norms or preferences regarding those in need of Medicaid coverage. Finally, dummy variables for year at diagnosis were included

to control for secular changes.

3.2.4 Statistical Analysis

We first looked at the characteristics of women diagnosed with breast, cervical and control cancers pre- versus post-BCCPTA and compared the differences using chi-square test or Student t-test. The Kaplan-Meier estimates of time enrolled in Medicaid with the corresponding survival curves were shown for breast/cervical cancers versus control cancers pre- and post-BCCPTA adjusted for the censoring of observations. A bivariate comparison based on the log-rank test was conducted to compare the proportional assumption before and after BCCPTA. The disenrollment rates of breast, cervical, and the control cancers pre- and post-BCCPTA were then computed. We additionally predicted the adjusted disenrollment rate from the DID estimation based on the parametric hazard model with a Weibull distribution. The percentage change in the rate of disenrollment pre- versus post-BCCPTA was shown to compare the effect of the BCCPTA. All analyses were performed using STATA 9.2 (Stata Corp LP, College Station, TX).

3.3 Results

The characteristics of women with breast, cervical and the five control cancers enrolled in Medicaid in or after their diagnosis pre- and post-BCCPTA were shown in Table 4. There were far more breast cancer cases (67%) than cervical (13%) owing to the omission of in situ cervical cases from the GCCR. The remainder of the sample (20%) was women with one of the five control cancers. For those with breast cancer, we found the difference of age distribution, race/ethnicity, and stage of diagnosis pre- versus post-BCCPTA period. For those with cervical cancer, there were more single women post-BCCPTA. We also

found the difference in percentage of service employers and percentage of Medicaid recipients before and after BCCPTA for all three cancer groups.

Figure 1 presented the Kaplan-Meier estimates of Medicaid disenrollment for breast/cervical cancer versus control cancers accounting for censoring owing to death, or turning 65, or remaining enrolled at the end of the study period before the end of the study period. As Figure 1 showed, there was an increase in the survival curve of remaining enrolled in Medicaid post-BCCPTA for women with breast and cervical cancers but not for those with one of the control cancers. Whereas for women diagnosed with breast cancer, 20% had disenrolled by the end of 6 months and 40% by 12 months in the pre-BCCPTA period, only 10% had disenrolled by 6 months and 20% by 12 months in the post-BCCPTA period. In contrast, for women with one of the control cancers, approximately 40% had disenrolled by 6 months and 60% by 12 months in both periods. We found similar patterns when comparing the difference between cervical and control cancers pre- versus post-BCCPTA. The log-rank test indicated that the likelihood of disenrollment significantly decreased ($p < .001$) after BCCPTA for patients with both breast and cervical cancers, whereas there was no significant difference pre- versus post-BCCPTA for those with a control cancer.

In Table 5, we provided unadjusted and adjusted disenrollment rates for each cancer and the percent change in this rate pre- versus post-BCCPTA. The unadjusted rate of disenrollment for breast (2.8), cervical (5.3), and the control cancers (5.1) of every 100 person-months enrolled in the pre-BCCPTA period changed to 1.4 for breast, 2.4 for cervical, and 6.7 for the control cancers in the post-BCCPTA period. Hence, these unadjusted disenrollment rates declined 50% for breast (from 2.8 to 1.4) and cervical (from 5.3 to 2.4) cancer cases while they increased over 30% for the control cancers (from5.1 to 6.7) post-BCCPTA. In the second bank of data in Table 2, the disenrollment rates after

adjusting for covariates included in the hazard rate model (see Appendix 1) were shown. These results indicated the decline in the adjusted disenrollment rate for breast cancer cases was from 3.6 to 1.6 and for cervical cases was from 6.1 to 2.7. The decline was more than 50% for both treatment cancers after BCCPTA implementation.

3.4 Limitation

Although this study adds to our understanding of the potential benefits of the BCCPTA expansions of Medicaid we note several limitations. First, the data came from a single state (GA) that chose the more generous option for screening eligibility; hence, results cannot be readily generalized. The other 11 states (AR, CA, IA, MI, MS, NE, OK, RI, TN, UT, WV) that also chose this option may indeed have experienced changes in the same direction as seen in Georgia, decreased time from diagnosis to enrollment (Adams et al., 2009) and decreased disenrollment rates but the magnitude of such effects will likely differ. Effects in the other states would be influenced by details of BCCPTA implementation as well as other state-specific eligibility criteria. We do note that these twelve states account for 30% of all Medicaid enrollments nationally and, hence, Georgia's experience is quite informative for the nation (The Urban Institute & Kaiser Commission on Medicaid and the Uninsured, 2009). We also note that the magnitude of the effect may be stronger in Georgia because it informally allows women to recertify themselves at least in the beginning years. It is hard to compare to other states because there is not yet, to our knowledge, a state-by-state summary of methods used by each state to recertify women under BCCPTA.

As with any hazard model, we have data censoring. We treated women who died before disenrolling from Medicaid, turned age 65, or were not observed disenrolling before the end of our study period as censored observations. We did not estimate a competitive risk

model because disenrollment and death can be viewed as independent events (Cutler, 1995; Honore' & Lleras-Muney, 2006). The probability of death could also have changed pre- and post-BCCPTA owing to its effects on enrollment and, potentially, treatment timing and completion. We repeated our analyses excluding those who died in our sample and the results were robust (data not shown).

Another limitation could be seen in our omission of the "treatment" group as those women screened and diagnosed with breast/cervical cancers before, their Medicaid enrollment. Those who were enrolled in Medicaid before their cancer diagnosis could also be affected by BCCPTA even though they, by and large, were eligible initially due to meeting very low-income or disability criteria. We found that those enrolled in Medicaid before their diagnosis, although less likely to disenroll compared with those enrolled in or after their diagnosis as found in an earlier study (Ramsey, Zeliandt, Richardson, Pollack & Linden, et al., 2008), did not change our overall findings when included in our sample and analysis (data not shown).

It might be argued that a 6-month redetermination process (for BCCPTA and welfare-related eligible women) affects only those who were enrolled for at least 6 months and their inclusion in the sample is a limitation. We did a sensitivity analysis using only those enrolled 6 months or longer and the results were consistent and of similar magnitude as those presented (data not shown). Finally, there were unobserved determinants associated with whether an individual and or the community in which they reside, exhibits very different tastes and preferences regarding the Medicaid program and, therefore, their willingness to stay enrolled. We assumed that the DID analysis would difference out those omissions and result in unbiased estimations.

3.5 Discussion

The BCCPTA has generated great interest as a potentially broader policy approach to addressing the needs of low-income women facing serious illness and having no insurance coverage. Earlier, we found that the creation of this unique eligibility category helped more women get into Medicaid and sooner after their cancer diagnosis (Adams et al., 2009). Here, we found that the simpler recertification process and perhaps stronger connection to a treating provider found in this disease-specific program significantly lowered the rate of disenrollment (~50%) from that usually seen among women with breast and cervical cancers in Georgia's Medicaid program.

This legislation seems to have established a more stable source of insurance coverage and perhaps improved continuity of care for those women diagnosed with breast and cervical cancer who would otherwise likely be uninsured. Georgia's experience should be of interest to other states. Recent research in the Washington Medicaid program found that cancer patients diagnosed between 1997 and 2002 experienced a high rate of disenrollment within 1 year of their diagnosis (Ramsey et al., 2008). Overall, they found that 33.5% of patients who were diagnosed with breast or cervical cancer had disenrolled by 1 year. Surprisingly, they found that women screened by NBCCEDP providers were more likely to remain enrolled beyond one year although they did not complete a pre- and post-BCCPTA analysis nor use a formal control group as done here.

A national study examined the BCCPTA's effect on timing of abnormal screening to definitive diagnosis and, in turn, timing to initial treatment among women screened under the NBCCEDP. They found both positive and negative impacts. For example, BCCPTA decreased the mean time to definitive cervical diagnosis by 12.8% for White women, whereas it increased the mean time between a diagnosis and the initiation treatment for

Black and Hispanic women with cervical cancer (Lantz & Soliman, 2009). These results are disturbing because the findings on racial differences indicate BCCPTA may not be working to close existing disparities in stage at diagnosis and mortality. We note that women screened by NBCCEDP providers, while the main group targeted by the legislation, comprised only an estimated one fourth of Georgia's BCCPTA enrollees (Adams et al., 2007). Although it is possible that increased cancer cases in Georgia's or other states' Medicaid programs could overburden participating providers, the types of racial differences seen in this national study may or may not hold in any specific state. Medicaid directors should use state specific data to discern what these patterns look like.

An important aspect of the BCCPTA recertification process is that it depends on whether the woman is continuing treatment. This, and the lack of income recertification (in Georgia), seems to guarantee more stable insurance coverage for women with breast and cervical cancers than occurs under other eligibility categories. This is important as studies have indicated potentially harmful impacts on health of losing Medicaid coverage (Carlson et al., 2006; Harman et al., 2003; Weissman et al., 1999). For example, even after accounting for potentially confounding factors, loss in Medicaid coverage was associated with discontinuity of care (Weissman et al., 1999). State-specific research should further consider whether the longer enrollment periods associated with the BCCPTA results in more women completing care, and in turn, improves survival rates.

Despite the positive effects seen in Georgia, we still found that 20% to 25% of breast/cervical cancer patients disenrolled after 1 year and approximately half of those patients had reenrolled within 1 year. Among those reenrolling, over 70% reenrolled within 3 months. This "turnover" may not be efficient either administratively or clinically as monthly medical expenditures for adults enrolled in Medicaid for 12 months are lower than for those

enrolled for just 6 months (Ku, MacTaggart, Pervez & Rosenbaum, 2009). From a policy prospective, if the easier recertification under BCCPTA prevents involuntary disenrollment among those still in need of treatment, it may lead to lower administrative as well as clinical costs in the longer run.

In conclusion, the treatment-related and easier recertification process that is part of the BCCPTA, found here to be associated with reduced disenrollment rates, should be maintained. Keeping this aspect of BCCPTA intact, and in turn, minimizing the number of women who disenroll, only to reenroll within 3 months, will help the BCCPTA expansion reach its full potential and enhance the ability of Medicaid to remain a strong safety net for low-income cancer patients.

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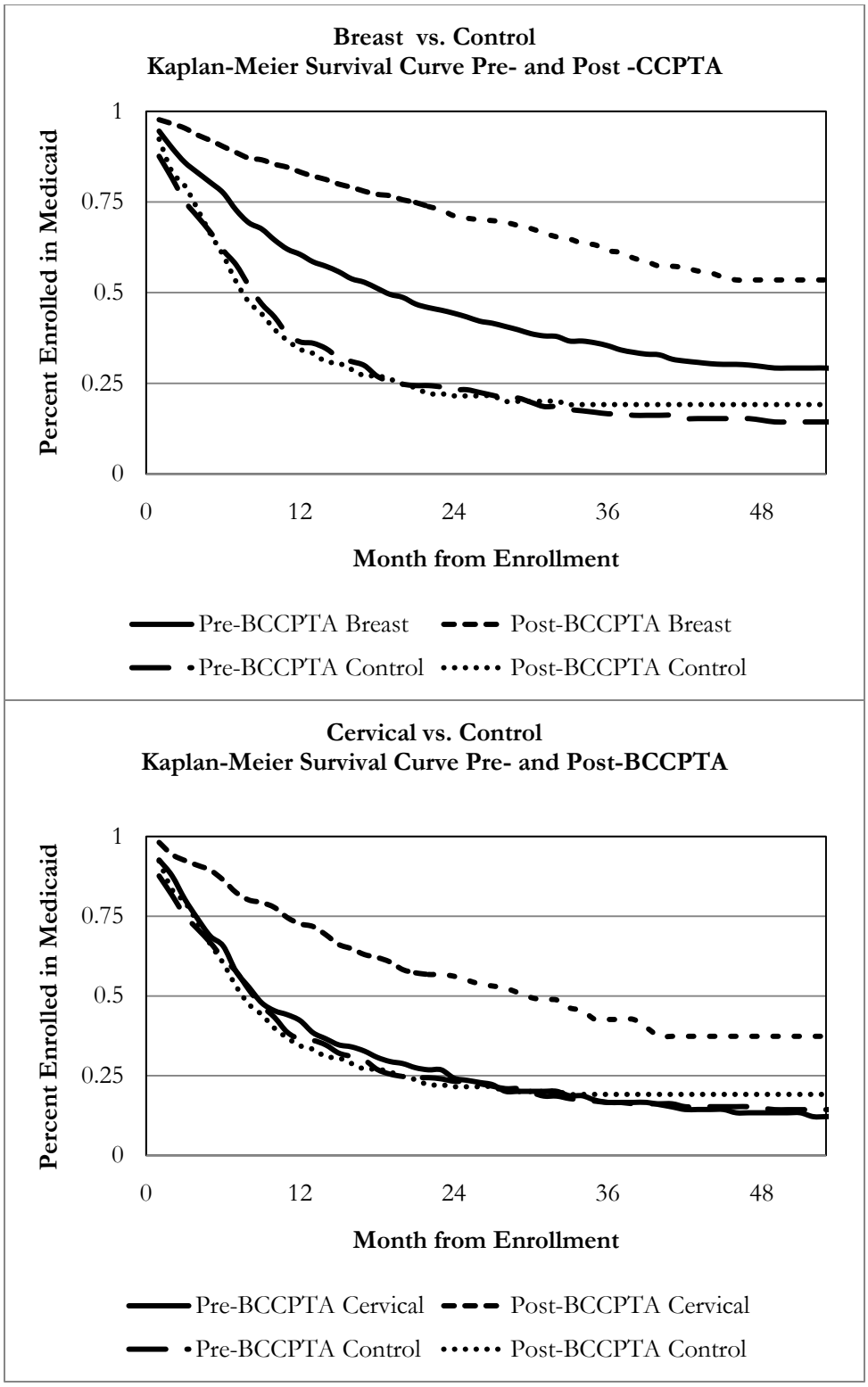

Figure 1. Proportion of Cancer Enrollees Who Continue To Be Enrolled In Medicaid Accounting For Censoring Pre- and Post-BCCPTA

Table 4. Characteristics of Women with Breast, Cervical, and Control Cancers Pre- and Post-BCCPTA

	Breast			Cervical			Control		
	Pre	Post		Pre	Post		Pre	Post	
	%	%		%	%		%	%	
Sample size	842	1,423		166	273		305	395	
Age at diagnosis			<.01*						
19-34	29.8	25.2		60.8	53.1		38.7	31.6	
35-44	34.6	41.0		27.1	28.6		23.9	28.9	
45-64	35.6	33.9		12.0	18.3		37.4	39.5	
Race/Ethnicity									
White	46.4	46.9		57.2	55.7		54.1	51.1	
Black	49.5	47.0		38.0	38.8		41.3	44.1	
Others & Unknown	4.0	6.1		4.8	5.5		4.6	4.8	
Marital status						<.01*			
Single	21.9	24.7		21.7	35.9		22.6	27.1	
Married	39.4	41.5		37.3	35.2		39.3	37.0	
Separated, divorced, widowed	31.9	28.5		34.9	23.8		30.8	28.9	
Unknown	6.8	5.3		6.0	5.1		7.2	7.1	
Stage at diagnosis			<.01*						<.01*
In Situ	9.7	8.9		-	-		5.6	3.0	
Local	37.8	37.0		46.4	36.6		28.9	26.6	
Regional	39.9	39.7		38.0	42.9		29.8	24.8	
Distant	9.0	7.1		10.2	12.8		29.2	31.4	
Unstaged	3.6	7.3		5.4	7.7		6.6	14.2	
Residence									
Central city large metro	31.2	30.7		24.7	27.8		31.5	30.1	
Fringe county large metro	40.9	42.9		39.2	43.2		38.7	40.0	
Small metro	23.9	22.8		31.9	23.4		23.0	26.3	
Completely rural	4.0	3.6		4.2	5.5		6.9	3.5	
County with a teaching hospital (yes)	34.6	33.8		21.1	30.0	<.05*	27.9	31.6	
Percentage of service employers, mean	12.6	13.7		12.4	13.9		12.5	13.8	
(SD)	(1.6)	(2.2)	<.001†	(1.7)	(2.3)	<.001†	(1.8)	(2.2)	<.001†
Percentage small firms (< 10	73.3	73.2		73.8	73.6		73.9	73.8	
employees), mean (SD)	(4.3)	(4.1)		(4.3)	(4.2)		(4.7)	(4.3)	
Percentage of Medicaid recipients, mean	19.4	22.5		19.8	22.3		19.4	23.3	
(SD)	(6.9)	(7.8)	<.001†	(7.4)	(7.2)	<.001†	(7.7)	(7.7)	<.001†

BCCPTA indicates Breast and Cervical Cancer Prevention and Treatment Act, SD: standard deviation

Pre-BCCPTA: 01/1999-06/2001; Post-BCCPTA: 07/2001-12/2004

* Chi-Square test (the proportion of Medicaid enrollees pre- and post-BCCPTA among the groups)

† Student t test (the mean of difference of Medicaid enrollees pre- and post-BCCPTA among each group)

Table 5. The Unadjusted and Adjusted Disenrollment Rate (Per 100 Person-Month) of Each Cancer Pre- and Post-BCCPTA

	Pre-BCCPTA		Post-BCCPTA		Percent change (Post-Pre)/Pre	
	Unadjusted	Adjusted*	Unadjusted	Adjusted*	Unadjusted	Adjusted*
	Mean (95%CI)	Mean (95%CI)	Mean (95%CI)	Mean (95%CI)	%	%
Breast	2.8 (2.6, 3.1)	3.6 (3.5-3.7)	1.4 (1.2, 1.5)	1.6 (1.5-1.6)	-50.0	-55.6
Cervical	5.3 (4.3, 6.0)	6.1 (5.9-6.2)	2.4 (2.0, 3.8)	2.7 (2.6-2.7)	-54.7	-55.7
Control	5.1 (4.5, 5.8)		6.7 (6.0, 7.7)		31.4	

BCCPTA indicates Breast and Cervical Cancer Prevention and Treatment Act, CI: confidence interval

Pre-BCCPTA: 01/1999-06/2001; Post-BCCPTA: 07/2001-12/2004

*Adjusted disenrollment rate is predicted from the parametric hazard model with a Weibull distribution

Appendix 1. Full Specification of Parametric Hazard Model of the Odds of Women Disenrolling from Medicaid with a Weibull Distribution

	Breast vs. Control (N=2,605)		Cervical vs. Control (N= 938)	
Variables	adj-HR	(95% CI)	adj-HR	95% CI
BCCPTA implementation				
Pre-BCCPTA	Ref.		Ref.	
Post-BCCPTA	1.33	(0.99-1.77)	1.02	(0.72-1.46)
Cancer site				
Breast	0.69	(0.59-0.82)	—	
Cervical	—		0.98	(0.78-1.24)
Control	Ref.		Ref.	
Interaction term				
Breast interacted with BCCPTA	0.45	(0.36-0.57)	—	
Cervical interacted with BCCPTA	—		0.44	(0.30-0.60)
Age at diagnosis				
19-34	Ref.		Ref.	
35-44	0.71	(0.62-0.81)	0.79	(0.65-0.96)
45-64	0.71	(0.62-0.82)	0.68	(0.55-0.83)
Race/Ethnicity				
White	Ref.		Ref.	
Black	1.02	(0.90-1.15)	0.85	(0.71-1.03)
Others	0.96	(0.73-1.25)	1.29	(0.90-1.84)
Marital Status				
Single	Ref.		Ref.	
Married	1.06	(0.92-1.23)	1.07	(0.87-1.32)
Separated, divorced, widowed	0.95	(0.81-1.10)	0.95	(0.77-1.17)
Unknown	0.87	(0.68-1.11)	1.12	(0.98-1.61)
Stage at diagnosis				
In situ	Ref.		—	
Local	1.79	(1.37-2.35)	Ref.	
Regional	1.96	(1.50-2.56)	1.15	(0.96-1.39)
Distant	4.31	(3.24-5.73)	2.10	(1.70-2.58)
Residence				
Central city large metro	Ref.		Ref.	
Fringe county large metro	0.99	(0.85-1.16)	1.04	(0.84-1.30)
Small metro	1.05	(0.87-1.26)	1.08	(0.84-1.38)
Completely rural	0.87	(0.63-1.20)	0.93	(0.62-1.41)
County with a teaching hospital (Ref.=No)	0.97	(0.83-1.13)	1.03	(0.82-1.29)
Percentage of service employers	1.03	(0.99-1.07)	1.03	(0.98-1.09)
Percentage small firms (< 10 employees)	0.98	(0.97-1.00)	0.99	(0.97-1.01)
Percentage of Medicaid recipients	0.99	(0.98-1.00)	1.00	(0.98-1.01)
Year of Diagnosis				
1999	Ref.		Ref.	
2000	1.01	(0.85-1.19)	1.06	(0.82-1.36)
2001	0.95	(0.78-1.16)	1.39	(1.04-1.86)
2002	0.86	(0.64-1.16)	0.94	(0.61-1.46)
2003	0.71	(0.52-0.97)	1.21	(0.78-1.88)
2004	0.48	(0.33-0.71)	0.96	(0.57-1.61)

BCCPTA: Breast and Cervical Cancer Prevention and Treatment Act, Adj-HR: Adjusted hazard ratio, CI: Confidence Interval, Ref. : Reference group

CHAPTER 4

CERVICAL CANCER TREATMENT OF PATIENTS ENROLLED UNDER THE BREAST AND CERVICAL CANCER PREVENTION AND TREATMENT ACT IN GEORGIA

Abstract

Background: The goal of the Breast and Cervical Cancer Prevention and Treatment Act (BCCPTA) of 2000 is to provide cancer treatment to uninsured low-income women diagnosed with breast and cervical cancers as well as pre-cervical conditions, through a special Medicaid option that assures treatment following diagnosis. The objective of this study was to investigate cervical cancer treatment patterns of patients enrolled under BCCPTA in Georgia.

Methods: We used data from the Georgia Comprehensive Cancer Registry and Medicaid enrollment/claims files to identify Medicaid enrollees diagnosed with pre-invasive (N=1,149) and invasive cervical cancer (N=444). Virtually all of the pre-invasive cases were eligible through BCCPTA versus only 55% of the invasive cases. We used patients' Medicaid medical claims for the first two years after Medicaid enrollment to examine the receipt of cancer treatment. Logistic regressions were used to estimate the odds ratios of independent factors associated with receipt of: 1) cancer 'work-up'; 2) precancerous procedure; 3) surgery; 4) radiation and 5) chemotherapy.

Results: Of patients diagnosed with pre-invasive cervical cancer, 56% received a cancer 'work-up' to determine their cancer diagnosis while this applied to 85% of those diagnosed with an invasive condition. In terms of treatment, a full 75% of pre-invasive patients had a precancerous procedure (e.g. loop electrosurgical excision procedure (LEEP), Cone/Cold-

knife), with about 21%, versus 34 % of invasive cases, receiving surgery. Those more likely to receive surgery among pre-invasive cases were those with more advanced stage of disease or with a co-morbidity. Among invasive cases, later stage was associated with higher odds of radiation or chemotherapy but not surgery. Non-Hispanic black women were significantly less likely to have surgery than non-Hispanic white women after controlling for other covariates among both pre-invasive ($p < .01$) and invasive cases ($p = .05$).

C**onclusions:** Treatment patterns among Georgia Medicaid cases appear appropriate to stage but almost 18% with invasive cervical cancer received no cancer treatment through Medicaid, within two years of enrollment. As treatment is available, affordable, and generally accessible under BCCPTA the state could further improve health outcomes of these women by reviewing and monitoring their receipt of appropriate cancer care and follow-up.

4.1 Introduction

Cervical cancer is one of the most common female cancers in the United States. The American Cancer Society (ACS) estimates approximately 11,270 new cases will be diagnosed with invasive cervical cancer and that there will be 4,070 deaths from this disease in 2009(ACS 2009). The incidence and mortality of invasive cervical cancer had declined dramatically since the mid 1940s due to wide use Papanicolaou (Pap) smear and early detection and treatment of cervical intraepithelial neoplasia (CIN)(Devesa, Silverman et al. 1987; Casper and Clarke 1998; Schoell, Janicek et al. 1999). However, the rate is not evenly distributed across all segments of the U.S. population. Women who were low incomes(Bradley, Given et al. 2004), low education and uninsured(Akers, Newmann et al. 2007) were more likely to have a higher incidence and mortality of cervical cancer mainly because of failure to detect and treat the cancer early(Roetzheim, Pal et al. 1999; Breen, Wagener et al. 2001; Sung, Alema-Mensah et al. 2002; Thorpe and Howard 2003; Hewitt, Devesa et al. 2004; Harlan, Greene et al. 2005; Rodriguez, Ward et al. 2005). Unlike the patterns for invasive cervical condition, the number of cases of CIN has continuously increased, especially in young women(Miller, Ries et al. 1993; Weiss, Kau et al. 1994; Mangan, Legano et al. 1997). Although sexually transmitted diseases and in particular the human papillomavirus (HPV) have been associated with cervical cancer and are on the rise, there is no conclusive evidence regarding the reason for this continued upward trend(Wolfendale, King et al. 1983; Cuzick, Sasieni et al. 1996; Noller 1996; Herbert 1997).

Two important pieces of legislation were implemented to create greater accessibility for cancer screening, diagnosis and treatment of this preventable, treatable and curable disease. The National Breast and Cervical Cancer Early Detection Program (NBCCEDP) funded by the Centers for Diseases Control and Prevention, has provided screening and diagnostic

follow-up for uninsured women with income generally less than 250% of the Federal Poverty Level since 1990(CDC 2009). In program year 2008, NBCCEDP screened 301,209 women for breast cancer with mammography and found 3,782 cases of this disease while also screening 321,296 women for cervical cancer and detecting 5,201 cancers and high-grade precancerous lesions(CDC 2009). Research has indicated that the aging of NBCCEDP significantly improved the screening rates of mammography, breast clinic examination and Pap smear in late 1990s(Adams, Florence et al. 2003) and yet, the funding for this program allows it to reach only an estimated 12-15% of those eligible(Chattopadhyay, Hall et al. 1999)

Moreover, the NBCCEDP does not cover all the diagnostic services that clients may need, and covers no treatment costs at all(Paula, Lisa et al. 1999). Partly in response to this gap, Congress passed the Breast and Cervical Cancer Prevention and Treatment Act (BCCPTA) in 2000 to give states the option of offering women in the NBCCEDP access to treatment through a special Medicaid eligibility category(CMS 2009). BCCPTA was adopted quickly by all 50 states and Georgia began enrolling their patients into the Women's Health Medicaid Program (WHMP) on July 1, 2001. Women will be qualified for BCCPTA if they are uninsured and diagnosed with those cancers through the NBCCEDP providers, or in Georgia, through any provider(CDC 2010). Moreover, women will be continuously eligible for BCCPTA as long as they are considered 'under cancer treatment' by their physicians although states might differ in the timing and type of recertification process used. In Georgia, BCCPTA women could simply respond to WHMP by a self-report letter every six months indicating they were in active treatment at least through 2003(Adams, Blake et al. 2007).

The Georgia BCCPTA, in response to the national legislation, has created greater access to previously uninsured low-income women diagnosed with breast and cervical cancer into Medicaid. Our earlier work found that BCCPTA led to 2-3 more women with those

cancers enrolling in Medicaid in a given month. It also helped those patients to enroll in Medicaid more quickly by shortening time to enrollment up to 7-8 months(Adams, Chien et al. 2009). Hence, breast cancer patients can enroll and potentially, start treatment while still at an early stage of disease (Chien and Adams, 2010). This could, in turn, result in better outcomes and survival rates. Moreover, the simpler recertification process under this new legislation created a more stable insurance coverage for those patients. The rates of disenrollment from Medicaid declined over 50% for both cancers post-BCCPTA(Chien and Adams 2010).

The ultimate goal of BCCPTA is to provide Medicaid coverage of those uninsured patients that assures treatment following diagnosis. In Georgia, breast cancer patients under BCCPTA were more likely than those under other Medicaid eligibility groups to receive any treatment, any drug regimen, any radiation, and any surgery within two years of Medicaid enrollment (Adams, Chien and Gabram, 2010). This analysis also showed that there was no difference across eligibility groups between lumpectomy and mastectomy but BCCPTA women with mastectomy were more likely to receive adjuvant therapy after controlling for all other covariates. Given these findings for BCCPTA breast cancer patients, it is important to understand the pattern of cancer treatment for those diagnosed with pre-invasive and invasive cervical cancer. In particular, we examined the receipt of treatment according to the National Cancer Institute (NCI)'s guidelines and the factors associated with the treatment patterns seen.

4.2 Methods

4.2.1 Data Sources

The major datasets we used were the Georgia Cancer Comprehensive Registry (GCCR), Georgia Medicaid enrollment and claims files. The GCCR is a state wide population-based cancer registry that collects all cancer cases diagnosed in Georgia since 1999. It includes information on cancer patients' demographics and disease condition at the time of their cancer diagnosis. Medicaid enrollment files offer monthly eligibility records for all beneficiaries. Medicaid claims files contain diagnostic and procedure information coded by the International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM) and Current Procedural Terminology (CPT) schema for medical billing.

We also merged in county characteristics from Area Resource File (ARF), Commission on Cancer (CoC), and Consolidated Analysis Center, Incorporated (CACI). The ARF, assembled by the Health Resources and Services Administration (HRSA), provides a variety of county-level data for the 159 counties in Georgia as well as across the nation. The CoC, established by the American College of Surgeons in 1922, provides data on hospitals which deliver the best cancer care and which are able to comply with established CoC standards(Commission of Cancer 2008). The CACI U.S. Marketing Systems Group provides data on household's income level at the county level(CACI International Inc. 2001). These county covariates allow us to better analyze the variation in treatment patterns as they are affected by the capacity of local area health care resources.

4.2.2 Study sample

Cervical cancer cases from GCCR between July 1st, 2001 and December 31th, 2004 who also linked to the Medicaid enrollment file using the patients' encrypted social security number and who were identified with a primary site of cancer as invasive (local stage and beyond) cervical (N=470). We excluded those who enrolled in Medicaid more than six

months after being diagnosed since we would be unable to track their cancer treatment before enrolling in Medicaid (N=25). We note that GCCR does not include pre-invasive (precancerous or in situ) cervical cancer cases; therefore, we identified those cases as women who were ever enrolled under the BCCPTA eligibility category and who were not found as having breast cancer as their primary site in the GCCR (N=1,539).

Of the remaining sample of precancerous/local and later stage cases (N=1,984), we excluded those who had more than one primary cancer site because their cancer treatment can be easily affected by the other cancers (N=25). To ensure that all women can be followed for at least for two years, we excluded those aged over 63 since we wouldn't observe their medical claims from Medicare once they turned 65 (N=11). Those who were not enrolled in Medicaid continuously in the first two months were also excluded since those women might not actually be eligible for Medicaid under BCCPTA but rather, were given presumptive eligibility (N=11).The final sample from these linked data, then was 1,937 patients covered by Medicaid, 1,149 of whom were diagnosed with pre-invasive cervical cancer, 444 of whom were diagnosed with invasive cervical cancer and 344 of whom we were unable to stage either from GCCR or Medicaid claims and which were omitted in later analyses.

4.2.3 Cervical Cancer Treatment

In conjunction with NCI's treatment guideline(National Cancer Institute 2010), we examined cervical cancer treatment as the receipt of any: 1) cancer work-up, 2) precancerous procedure, 3) surgery, 4) radiation, and 5) chemotherapy among patients with pre-invasive and invasive cervical condition.

The choice of cervical cancer treatment is largely based on the patient's stage(National Cancer Institute 2010) but all women with suspected cancer should receive a cancer 'work-up'. This was defined as a series of tests and procedures which are needed to establish the diagnosis in order to prepare treatment plans (available upon request). Precancerous procedures, for example, loop electrosurgical excision procedure (LEEP) and cone/cold-knife, are appropriate for patients with only abnormal cell changes (pre-invasive condition). Simple hysterectomy is a surgical removal of the uterus and can be used in cases with pre-invasive or early stage of invasive cancer. Invasive surgery, radiation and/or chemotherapy are the standard treatment for invasive cases. The invasive surgical treatment contains several possible surgeries: simple/radical hysterectomy, pelvic/paraaortic lymph node dissection/ sampling, radical trachelectomy, removal of cervical stump or pelvic exenteration/evisceration. The treatment procedures were identified from ICD-9-CM Code or CPT codes contained in the Medicaid claims files and a full listing is shown in the appendix 2.

4.2.4 Study variables

We included patient's demographics, disease conditions, Medicaid enrollment status and resident county characteristics from our databases to examine their association with the receipt of cervical cancer treatment. Patient's covariates included: 1) age at Medicaid enrollment, 2) race/ethnicity, 3) stage at diagnosis, 4) Charlson comorbidity index, 5) pre-enrolled in Medicaid, 6) Medicaid eligibility category and 7) length of Medicaid enrollment.

The stage data were from either GCCR or based on Medicaid claims for services received in or after their month of diagnosis and enrollment. The stage system we used here is the Surveillance, Epidemiology, and End Results (SEER) Program summary stage which

can group cases into five main categories: 1) in situ, 2) local, 3) regional, 4) distant and 5) unstaged. It can also be derived from the ICD-9-CM codes in medical claims which would help us to identify stage for those not from GCCR. The full list of codes for identifying cervical cancer stage from the claims is available upon request.

To adjust the severity of a non-cancer medical illness which might affect the treatment options, we adopted Romano's(Romano, Roost et al. 1993) modification of the comorbidity index originally developed by Charlson(Klabunde, Potosky et al. 2000; Klabunde, Warren et al. 2002). All available medical claims up to one year after the first month of Medicaid enrollment were used to compute the Charlson comorbidity index and patients were assigned the maximal score observed.

Because reasons for enrollment in Medicaid vary, we hypothesized that persons who enrolled in Medicaid *before* cancer diagnosis would be a distinct group compared with persons who enrolled in Medicaid *after t*heir cancer diagnosis. Thus, we created a dichotomous variable "pre-enrolled" to indicate whether subjects were previously enrolled in Medicaid four or more months before the month of their cancer diagnosis as recorded in the GCCR.

Medicaid eligibility category was defined based on the most frequent eligibility category during the initial six months of enrollment and classified into three categories: 1) BCCPTA, 2) disabled and 3) other eligibility groups. We also created a hierarchy to break the tie (e.g. BCCPTA before disabled and disabled before the 'other Medicaid'). Finally, length of enrollment was defined as a dichotomous variable which denoted whether a patient was continuously enrolled in Medicaid for 24 months or longer.

County covariates included: 1) urban/rural status of resident county, 2) percentage of household's income <$15K, 3) whether county has at least one hospital with CoC certification and 4) percentage of Ob/Gyns per 1000 women.

4.2.5 Statistical analysis

We used logistic regression to estimate the odd ratios (ORs) of independent variables associated with the receipt of cervical cancer treatment. All analyses were conducted using Stata version 9.2 (Stata Corp., College Station, TX). All statistical tests were two-sided.

4.3 Results

4.3.1 Basic characteristics.

Table 6 showed that there were far more patients with pre-invasive cervical conditions (59%) than those with invasive (23%) or unstaged cervical cancer (18%). A large proportion of patients with precancerous conditions were aged between 19 and 24 (41.7%), non-Hispanic white (66.8%), with CIN II stage (64.8%) and no co-morbidity (85.4%). For their Medicaid status, 98.5% enrolled under BCCPTA eligibility category, 15.8% enrolled prior to their cancer diagnosis (pre-enrolled) and 49.2% enrolled for over 24 months. The mean duration of enrollment for this group was 20 months within the two years follow-up in our study period.

Compared to pre-invasive cases, we found that invasive cancer patients were older, more likely to be non-Hispanic black, with higher co-morbidities and more likely to be pre-enrolled but less likely to enroll under BCCPTA and to be enrolled over 24 months. With respect to county variations, they tended to reside in a county with a higher income

population and Ob/Gyns per 1000 women but with fewer hospitals with CoC approval, relative to their counterparts.

4.3.2 Descriptive Analysis.

Table 7 showed the receipt of cervical cancer treatment patients received within two years of Medicaid enrollment. For patients with pre-invasive cervical cancer, 56.0% had any cancer work-up, 75.4% had any precancerous procedures, and 20.8% had a simple hysterectomy. For patients with invasive cervical cancer, 84.7% had any cancer work-up, 34.2% had any invasive surgery, 61.9% had any radiation and 53.8% had any chemotherapy.

As we further explored the treatment combinations among the pre-invasive cervical patients, 75.3% had precancerous procedures, 7.7% had simple hysterectomy, and 13.1% had both treatments (Table 8). Less than 1% of these patients received only radiation and/or chemotherapy and only 3.6% received no cancer treatment for their disease. For invasive cases, overall, 15.3% had invasive surgery, 50.5% had radiation and/or chemotherapy, 16.7% had both, and 17.6% received no cancer treatment. As we additionally examined treatment according to stage of cancer, we found that surgery was a major procedure for treating patients with local stage(29.3%) while radiation and/or chemotherapy was mainly used for treating those with regional or distant (69.3% and 78.3%). We also found that patients with local stage of cervical cancer had the highest rate (24.3%) of no invasive treatment even though only 31.5% of them received conization.

4.3.3 Multivariate Analysis.

Table 9 showed the multiple regression models of the receipt of cancer work-up, precancerous treatment and simple hysterectomy among patients with pre-invasive cervical

condition. We found that patients with older age, a co-morbidity and enrolled over 24 months were all significantly more likely to receive any cancer work-up. Those more like to receive precancerous treatment were those of younger age, non-Hispanic black, CIN II stage, with no co-morbidity and residing in a county with a CoC approval hospital. In contrast, those more likely to receive surgery (simple hysterectomy) were those with older age, more advanced stage and a co-morbidity.

Table 10 showed the multiple regression models of the receipt of cancer treatment among patients with an invasive cervical cancer. Patients with later stage, a co-morbidity, pre-enrolled, enrolled under BCCPTA and enrolled over 24 months were more likely to receive any cancer work-up. Non-Hispanic black women were significantly less likely to have invasive surgery after controlling for the other covariates ($p = .05$). Later stage was associated with higher odds of radiation or chemotherapy but not surgery. Among Medicaid eligibility groups, BCCPTA women were no different in terms of receiving invasive surgery, radiation or chemotherapy than other eligibility groups while patients who were disabled were less like to undergo surgery compared to those under other Medicaid categories.

3.4 Limitation

While this is one of the few studies to examine BCCPTA women we note there are several limitations. First, the data is from a single state and cannot be ready generalized since each state operates its BCCPTA program differently. Moreover, Georgia is one of twelve states that chose the most expansive coverage(CDC 2010) and potentially, enrolled more uninsured who were in need of cancer treatment. The greater access afforded by a BCCPTA program which covers low-income uninsured women screened and diagnosed at any

provider might result in larger variation in cervical cancer treatment patterns compared to states with more restrictive coverage.

Although the optimal treatment is largely based on stage of disease, the woman's age and her childbearing plans, present medical conditions, and physician's and patient's preferences are part of the decision process(NCI 2010). In this study, we controlled for some of the visible factors for receiving alternative treatment options but we were not able to control for unseen variation (e.g. individual preferences) which likely affect treatment decisions.

We were unable to track patients' cervical cancer treatment if their treatment was out of Medicaid claims, out of study period, or out of cancer treatment as we defined it. Additionally, we wouldn't know the treatment patterns of those who enrolled in Medicaid more than six month after diagnosis. Those patients might enroll in Medicaid under BCCPTA but they might receive treatment before they enrolled in Medicaid; this cannot be observed in the study.

Finally, it is possible that women in our sample have other cancers not readily detected through claims data and note noted in the GCCR; this could lead to confounding in the patterns seen. For example, we found that 4.4% of pre-invasive cervical cases received chemotherapy which might not be clinically appropriate. As noted, these women may have other types of cancer which we were unable to detect.

4.5 Discussion

BCCPTA is a policy approach for addressing the challenges of the uninsured facing serious illness by providing cancer treatment through a special Medicaid eligibility option. Our study found that the majority of patients diagnosed with pre-invasive and invasive

cervical cancer received the cervical cancer treatment through the Georgia Medicaid, WHMP, after enrollment in BCCPTA or other eligibility categories.

We also found that virtually all of the patients with pre-invasive cervical conditions received some form of cervical cancer treatment. This is extremely important from a policy perspective because early detection and appropriate treatment of precancerous cells can prevent them from becoming cancerous. For all the cancers, starting treatment at an early stage of cancer is the key for a better outcome. Moreover, if treatment can start when abnormal cells affect only the surface of a small part of the cervix and not a large portion due to spreading to other tissues, it is much more likely to be successful. Therefore, as BCCPTA extends Medicaid to cover those diagnosed with precancerous cervical condition, we might expect that the incidence and mortality rate of invasive cervical cancer among those low-income women might decrease as treatment starts at precancerous stage of disease. It could additionally result in utilizing Medicaid funding more successfully since the costs of managing precancerous conditions are significantly lower than the costs of invasive cervical cancer(Wolstenholme and Whynes 1998).

Unfortunately, there were still nearly 20% of patients diagnosed with local invasive cervical cancer who did not receive invasive surgery, radiation or chemotherapy based on our analysis of Medicaid claims data. We further found that 31.5% of them received conization which is a typically therapeutic purpose to remove pre-cancerous cells. It is possible that they could receive other types of cancer treatment which we did not identify in this study, especially the treatment in the clinical trials. Future work is necessary for those with no cancer treatment since their stage of disease was still early and they should have higher survival rates than those diagnosed at a regional and/or distant stage (Jemal, Siegel et al. 2006).

The advantage of this study is that we are able to identify cancer treatment through Medicaid claims that extend beyond the period covered by cancer registries. These registries can capture comprehensive information about incident cancers and the use of initial surgery and radiation but Medicaid covers chemotherapy and prescription drug treatments for its enrollees and also allows for tracking patients longitudinally for information other than vital status. Therefore, linking of registry data with Medicaid claims has the potential to identify utilization of appropriate cancer treatments and within appropriate time periods. It can thereby serve as a source of information to gauge quality of care among these low-income patients. This is very important since the intervening years before health reform can be used to further address the unnecessary morbidity and mortality associated with cervical cancer and reduces the costs of Medicaid.

Several covariates affect the pattern of cervical cancer treatment. Age is a significant factor associated with the receipt of cervical cancer treatment. Younger women were less likely to undergo surgery while older women were more likely to receive radiation therapy. This is most likely due to the fact that women in the childbearing ages would typically keep the uteri while older patients would consider the risk of surgery and individual preferences(Jason, Randall et al. 2005; Goodheart, Jacobson et al. 2008; van der Aa, Siesling et al. 2009). Both results are consistent with the finding from previous studies and indicate in general, that treatments received under the BCCPTA Medicaid program are in line with standards of care.

Race disparity has been documented as existing in cancer treatment. Similar to previous work(del Carmen, Montz et al. 1999; Shavers and Brown 2002), we found that black patients were less likely to receive surgical treatment for both pre-invasive and invasive cervical cases. A meta-analysis study additionally found that African Americans are less frequently treated

for cervical cancer, or are treated inappropriately because of co-morbidity conditions, poorer health, patients' refusal of treatment, and lack of physician recommendation for treatment(Shavers and Brown 2002). The potential impact of BCCPTA on the care of these patients is needed as the lower hysterectomy rate may be associated with higher mortality if this is the necessary treatment for the stage of disease found among these minority populations.

While our earlier work found that BCCPTA women with breast cancer were more likely to receive any cancer care relative to other Medicaid eligibility groups (Adams, Chien, and Gabram, 2010), here, we only found that BCCPTA invasive cases were more likely to receive cancer work-up but not surgery, radiation and chemotherapy. A previous study indicated that the average cost of BCCPTA women with cervical cancer was lower than those under the disabled category while higher than those under other Medicaid categories(Adams, Blake et al. 2007). Our results might reflect that the Georgia BCCPTA program utilized the Medicaid funding effectively to treat more women with cervical cancer with a relative lower cost.

It is important to note that the receipt of cervical cancer treatment was influenced by women being in a county with a CoC approved hospital. CoC Accreditation is granted only to those facilities that have voluntarily committed to provide the best in cancer care and which are able to comply with established CoC standards. Our data showed that pre-invasive cervical patients who lived in a county which has at least one CoC approval hospital more likely received nonsurgical treatment and were less likely to have a hysterectomy. This might reflect that CoC approval hospitals more likely to consider possible alternative treatment options since they have more specialists and training in oncology.

Although BCCPTA provides treatment for those per-cervical cancer patients, the most important is whether those patients can continuously receive Pap smear screening annually and more intensive follow-up to prevent the risk of invasive cervical cancer. Given that the risk of invasive cervical cancer among these women is much higher than that among the general population of women(Melnikow, McGahan et al. 2009), future work should focus on what happens to these women as they exit the Medicaid program.

In summary, cervical cancer is highly preventable and curable when it is detected early and treated effectively. The creation of the BCCPTA provides a pathway for those uninsured women diagnosed with pre-cervical and invasive cervical cancer into Medicaid to get early/appropriate cancer treatment. Our data showed that the Georgia Medicaid might improve the health of previously uninsured women diagnosed with this disease by providing early and appropriate treatment under both traditional Medicaid eligibility and the expansion through BCCPTA. Moreover, extension of treatment to patients with pre-invasive conditions is a highly effective use of public program funds since it can prevent the disease from becoming invasive.

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Table 6. Summary of Characteristics of Patients Enrolled in Medicaid With Pre-invasive and Invasive Cervical Cancer

	Classification			Total (N= 1,937)
	Pre-invasive (N= 1,149)	Invasive (N=444)	Unstaged (N= 344)	
	%	%	%	%
Demographic characteristics				
Age at Medicaid enrollment, mean (SD)	29.1(9.6)	42.6(10.5)	34.3(12.1)	33.1(11.7)
19-24	41.7	4.5	27.6	30.7
25-34	34.3	19.1	29.7	30.0
35-44	15.8	33.6	20.1	20.6
45-63	8.3	42.8	22.7	18.7
Race/Ethnicity				
Non-Hispanic White	66.8	54.7	62.8	63.3
Non-Hispanic Black	27.0	39.4	30.2	30.4
Others	6.2	5.9	7.0	6.2
Disease characteristics				
Stage at diagnosis				
CIN II	64.8			38.5
CIN III & In situ	35.2			20.9
Local		50.0		11.5
Regional		39.6		9.1
Distant		10.4		2.4
Unstaged			100.0	17.8
Comorbidity index				
0	85.4	58.8	81.7	78.6
1	11.3	22.1	10.5	13.6
2+	3.1	16.4	7.0	6.9
Missing	0.2	2.7	0.9	0.9
Medicaid characteristics				
Pre-enrolled	15.8	23.0	15.1	17.3
Medicaid eligible groups				
BCCPTA	98.5	55.2	94.2	87.8
Disable	0.2	23.6	2.0	5.9
Others	1.3	21.2	3.8	6.3
24 month enrollment status				
Duration, mean (SD)	20.2(5.1)	17.9(7.0)	19.8(5.6)	19.6(5.7)
Over 24 months (Yes)	49.2	41.0	46.5	46.8
County characteristics				
Residency				
Central city large metro	33.9	30.0	35.8	33.4
Fringe county large metro	24.3	40.5	28.5	28.8
Small metropolitan area	35.4	25.7	31.1	32.4
Completely rural	6.2	3.8	4.7	5.4
Missing	0.2	0.0	0.0	0.1
% Household's income <$15K, mean (SD)	26.3(9.2)	23.7(9.8)	25.4(9.2)	25.5(9.4)
With a Commission on Cancer approval hospital (yes)	58.1	65.3	55.2	59.3
Ob/Gyns per 1000 women, mean (SD)	0.21(0.18)	0.26(0.20)	0.24(0.20)	0.22(0.19)

*Sample included BCCPTA and Other Medicaid eligibility categories who enrolled in Medicaid within 6 months after diagnosed with pre-invasive and invasive cervical cancer

Table 7. Summary of Receipt Treatment of Patients Enrolled in Medicaid With Pre-invasive and Invasive Cervical Cancer (N=1,593)

	Classification	
	Pre-invasive (N= 1,149)	Invasive (N= 444)
	%	%
Any cancer work-up	56.0	84.7
Any pre-cancerous treatment	75.4	
Any simply hysterectomy	20.8	
Any invasive surgical treatment		34.2
Any radiation	0.3	61.9
Any chemotherapy	4.4	53.8

Invasive surgical treatment including simply hysterectomy

Table 8. Receipt of Treatment of Patients Enrolled In MedicaidWith Pre-cervical and Invasive Cervical Cancer (N=1,593)

	Pre-invasive	Invasive cervical cancer			
		Local	Regional	Distant	Overall
Sample size	1,149	222	176	46	444
Precancerous Treatment combination					
Precancerous treatment	75.3				
Simple hysterectomy	7.7				
Precancerous treatment + simply hysterectomy	13.1				
Radiation and/or chemo ONLY	0.3				
None	3.6				
Invasive treatment combination					
Invasive surgical treatment		29.3	1.7	0.0	15.3
Radiation and/or chemo		29.7	69.3	78.3	50.5
Invasive surgical treatment + radiation and/or chemo		16.7	19.3	6.5	16.7
None		24.3	9.7	15.2	17.6

* 31.5% (17/54) of women who diagnosed with local stage invasive cervical cancer and did not receive invasive treatment were received conization

Table 9. Multiple Regression Models of Receipt Treatment of Patients Enrolled in Medicaid With Pre-Invasive Cervical Cancer (N=1,147)

	Any cancer work-up			Any precancerous treatment			Any simple hysterectomy		
Independent variables	OR	95%CI	p_value	OR	95%CI	p_value	OR	95%CI	p_value
Demographics characteristics									
Age at Medicaid enrollment									
19-24	0.42	0.24 - 0.71	**	15.73	8.91 - 27.77	***	0.03	0.02 - 0.06	***
25-34	0.41	0.24 - 0.71	**	4.51	2.70 - 7.55	***	0.20	0.12 - 0.34	***
35-44	0.38	0.21 - 0.68	**	1.42	0.83 - 2.43		0.73	0.42 - 1.27	
45-63	Ref.			Ref.			Ref.		
Race/Ethnicity									
Non-Hispanic White	Ref.			Ref.			Ref.		
Non-Hispanic Black	0.82	0.61 - 1.09		1.92	1.29 - 2.86	**	0.48	0.31 - 0.76	**
Others	0.65	0.39 - 1.08		1.92	1.01 - 3.64	*	0.52	0.27 - 1.03	
Disease characteristics									
Stage at diagnosis									
CINII	Ref.			Ref.			Ref.		
CINIII & In_situ	1.20	0.92 - 1.55		0.37	0.27 - 0.51	***	3.87	2.73 - 5.48	***
Comorbidity index									
0	Ref.			Ref.			Ref.		
1	1.81	1.20 - 2.72	**	0.66	0.43 - 1.04		1.62	1.01 - 2.60	*
2+	3.39	1.42 - 8.09	**	1.14	0.51 - 2.54		0.75	0.31 - 1.79	
Medicaid characteristics									
Pre-enrolled	0.76	0.55 1.06		0.72	0.47 1.12		0.90	0.53 1.53	
Enrolled over 24 months (yes)	1.54	1.20 - 1.98	**	0.99	0.72 - 1.36		1.05	0.73 - 1.50	
County characteristics									
Residency									
Central city large metro	Ref.			Ref.			Ref.		
Fringe county large metro	0.82	0.57 - 1.19		1.36	0.84 - 2.19		0.69	0.41 - 1.18	
Small metropolitan area	1.06	0.76 - 1.49		0.77	0.50 - 1.20		1.32	0.81 - 2.17	
Completely Rural	1.17	0.66 - 2.07		0.75	0.36 - 1.57		1.13	0.49 - 2.60	
% Household's income <$15K	0.99	0.97 - 1.00		1.01	0.99 - 1.04		0.99	0.97 - 1.01	
With a Commission on Cancer approval hospital (yes)	0.76	0.52 - 1.12		1.89	1.14 - 3.13	*	0.53	0.30 - 0.94	*
Ob/Gyns per 1000 women	1.56	0.60 - 4.04		0.38	0.12 - 1.28		1.46	0.37 - 5.72	

*, p<.05, **, p<.01; ***, p<.001

Table 10. Multiple Regression Models of Receipt Treatment of Patients Enrolled in Medicaid With Invasive Cervical Cancer (N=444)

	Any cancer work-up			Any invasive surgery			Any radiation therapy			Any chemotherapy		
Independent variables	OR	95%CI	p_value	OR	95%CI	p_value	OR	95%CI	p_value	OR	95%CI	p_value
Demographic Characteristics												
Age at Medicaid enrollment												
19-24	2.24	0.51 9.82		0.40	0.12 1.33		0.43	0.14 1.37		1.20	0.42 3.45	
25-34	1.90	0.79 - 4.59		1.21	0.63 - 2.29		0.57	0.29 - 1.10		0.80	0.43 - 1.49	
35-44	1.48	0.70 - 3.11		1.14	0.67 - 1.96		0.92	0.52 - 1.64		1.30	0.78 - 2.18	
45-63	Ref.			Ref.			Ref.			Ref.		
Race/Ethnicity												
Non-Hispanic White	Ref.			Ref.			Ref.			Ref.		
Non-Hispanic Black	1.07	0.57 - 2.02		0.61	0.37 - 1.00	0.05	1.59	0.94 - 2.66		1.03	0.65 - 1.64	
Others	1.43	0.35 - 5.81		0.74	0.30 - 1.85		0.67	0.25 - 1.77		0.97	0.39 - 2.39	
Disease characteristics												
Stage at diagnosis												
Local	Ref.			Ref.			Ref.			Ref.		
Regional	3.03	1.54 - 5.98	**	0.32	0.20 - 0.52	***	10.25	5.82 - 18.06	***	5.57	3.43 - 9.03	***
Distant	6.55	1.65 - 26.05	**	0.10	0.03 - 0.32	***	6.36	2.70 - 14.95	***	3.98	1.90 - 8.32	***
Comorbidity index												
0	Ref.			Ref.			Ref.			Ref.		
1	3.27	1.38 - 7.75	**	1.52	0.87 - 2.66		1.47	0.82 - 2.63		1.63	0.96 - 2.79	
2+	5.68	1.76 - 18.28	**	1.61	0.84 - 3.11		2.39	1.15 - 4.99	*	2.22	1.18 - 4.20	*
Medicaid characteristics												
Pre-enrolled	2.85	1.31 6.23	**	2.08	1.13 3.85	*	1.37	0.74 2.55		1.55	0.87 2.75	
Medicaid eligible group												
BCCPTA	4.09	1.87 - 8.94	***	0.78	0.42 - 1.46		1.83	0.94 - 3.57		1.55	0.84 - 2.89	
Disable	0.63	0.26 - 1.51		0.29	0.14 - 0.64	**	0.84	0.39 - 1.82		0.75	0.37 - 1.51	
Others	Ref.			Ref.			Ref.			Ref.		
Enrolled over 24 months (yes)	2.40	1.21 - 4.76	*	1.15	0.72 - 1.85		2.01	1.19 - 3.39	**	1.44	0.90 - 2.29	
County characteristics												
Residency												
Control city large metro	Ref.			Ref.			Ref.			Ref.		
Fringe county large metro	1.54	0.70 - 3.37		1.02	0.56 - 1.83		1.09	0.58 - 2.06		0.81	0.45 - 1.44	
Small metropolitan area	1.65	0.66 - 4.12		0.71	0.35 - 1.44		1.06	0.50 - 2.22		0.63	0.32 - 1.25	

Completely Rural	1.83	0.31 - 10.82	0.77	0.22 - 2.70	0.67	0.18 - 2.45	1.00	0.28 - 3.63
% Household's income <$15K	1.00	0.95 - 1.04	1.01	0.98 - 1.05	1.01	0.97 - 1.04	1.00	0.97 - 1.04
With a Commission on Cancer approval hospital (yes)	1.07	0.43 - 2.69	0.78	0.40 - 1.52	0.96	0.47 - 1.94	0.70	0.37 - 1.36
Ob/Gyns per 1000 women	1.37	0.18 - 10.34	0.60	0.13 - 2.74	3.07	0.64 - 14.80	1.00	0.24 - 4.17

*, p<.05, **, p<.01; ***, p<.001

Appendix 2. Cancer Work-up, Diagnostic And Treatment Procedures For Women With Pre-Invasive Cervical Cancer And Invasive Cervical Cancer

Cervical cancer treatment	Procedures
Cancer work-up	Exam (Pelvic EUA, cystoscopy)
	Pap Smear
	Cervical biopsy
	HPV cytology
	Endocervical curettage
	Endometrial sample
	Imaging (CT, MRI)
Precancerous treatment	Diagnostic excisional procedure: LEEP, Cone, Cold-kinfe
	Therapeutic Cervical Conization: LEEP, Cone, Cold-kinfe
	Excision/Ablation of therapeutic zone
Surgery	Simple hysterectomy
	Rradical hysterectomy
	Pelvic lymph node dissection
	Radical trachelectomy
	Rremoval of cervical stump
	Pelvic exenteration/evisceration
Radiation	Any radiation therapy procedure
Chemotherapy	Any chemotherapy procedure

CHAPTER 5

CONCLUSION AND FURTHER RESEARCH

5.1 Conclusion

The Georgia BCCPTA program, WHMP, successfully helped uninsured low-income breast cancer patients to enroll in Medicaid an early stage of their cancer to start their treatment, which is crucial for the survival and long-term health benefit of these patients.

The Georgia BCCPTA which maintains the treatment-related, easier recertification process associated with reduced disenrollment and in turn, minimizing those who disenroll only to re-enroll within 3 months, will help the BCCPTA expansion to increase the ability of Medicaid to remain a strong safety net for low-income cancer patients.

The Georgia BCCPTA might improve the health of previously uninsured women diagnosed with pre-invasive and invasive cervical cancers by providing early and appropriate treatment under both traditional Medicaid eligibility and the expansion through BCCPTA of women diagnosed with pre-invasive and invasive cervical cancer. Additionally, extension of treatment to those with pre-invasive conditions can prevent the disease from becoming invasive and is a highly effective use of public program funds.

Our results support that BCCPTA is a strong safety net for low-income uninsured women diagnosed with breast and cervical cancer. Although the data we used is from a single state which cannot be readily generalized to other state since each state operates its own BCCOPA program differently. However, the results from Georgia are informative. First, the experience from Georgia BCCPTA can be an outlook for states which would adopt the most expansive coverage. The findings are also valuable for state government and policy makers to further understand the potential benefit of this new legislation. In addition,

the results from BCCPTA would be a potential model for Health Reform in 2014. For example, BCCPTA is a federal legislation while each state operates its BCCPTA program differently.

5.2 Further research

BCCPTA provides Medicaid coverage for uninsured women diagnosed with breast and/or cervical cancer to access cancer treatment which might improve their health outcomes. In this dissertation, I used the data from a single state, Georgia to provide newly evidence of effects of BCCPTA. As I mentioned, each state operates its BCCPTA program differently. Further research can investigate the evidence from other states. Moreover, researcher can combine the findings from multiple states and provide an overall impact of BCCPTA on this subgroup of populations.

Besides, this dissertation examines the three intermediate outcomes of BCCPTA, early stage at Medicaid enrollment, the pattern of disenrollment and the cervical cancer treatment. Unfortunately, due to the limitation of the data, I would not be able to examine the effects of BCCPTA on survival rate, quality of life and cancer recurrent which are the important issues of this new legislation. The future work can focus those long-term outcomes which would help policy makers further understand the benefits and the potential impact of this disease-specific Medicaid expansion.

Race disparity is an important issue as we study Medicaid population since Medicaid covers more minority groups. This disparity found that non-Hispanic black women were less likely to enroll in Medicaid at early stage of cancer and received less invasive surgical treatment among those diagnosed with invasive cervical cancer. However, this dissertation

would not be able to investigate the factors attributed this disparity. Further research can focus on race disparity of BCCPTA.

Finally, this dissertation examined the effects of BCCPTA on health outcome and health utilization. It is possible the BCCPTA has potential effect on improving the rate of employee among cancer survivors since they can access care under Medicaid.