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Clinical Benefits Associated With Medicaid Coverage Before Diagnosis of Gynecologic Cancers

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QUESTION ASKED: For the population of women with gynecologic (uterine, cervical, ovarian, and vulvar) cancers who were covered by Medicaid during their treatment (in North Carolina from 2003-2008), what is the benefit of enrollment in Medicaid before versus after cancer diagnosis?

SUMMARY ANSWER: Lack of enrollment in Medicaid before diagnosis was statistically associated with advanced stage at diagnosis in women with gynecologic cancers, and this effect was greatest in uterine cancers.

WHAT WE DID: Using the North Carolina Central Cancer Registry linked with Medicare, Medicaid, and private insurance billing claims, we identified a cohort of 782 women diagnosed with gynecologic cancers, from 2003 to 2008, who had exclusive Medicaid coverage during the study window. They were grouped by timing of enrollment: those with and without pre-diagnosis enrollment within 6 months before diagnosis. Due to baseline differences between these groups, we used propensity matching to balance on age, race, geography, cancer site, stage at diagnosis, and presence of any other cancer diagnosis. Stage at diagnosis was evaluated using logistic regression, and all-cause mortality was assessed with Cox proportional hazard models.

WHAT WE FOUND: Lack of enrollment in Medicaid before diagnosis was statistically associated with advanced stage at diagnosis in women with gynecologic cancers (OR, 1.46; 95% CI, 1.03 to 2.05) in a propensity-matched cohort (Fig). When stratified by cancer site, this difference was greatest in uterine cancers (OR, 1.74; 95% CI, 0.87 to 3.47). In assessing survival, lack of pre-diagnosis Medicaid coverage had a mortality hazard ratio of 1.19 (95% CI, 0.92 to 1.53), $P = 0.06$.

BIAS, CONFOUNDING FACTOR(S), DRAWBACKS: It is important to note that the limitations of our data set do not allow us to be certain that women who lacked Medicaid before enrollment were also ineligible. It is likely that some women in this group were financially eligible, but simply not enrolled due to barriers of knowledge, literacy, or the willingness to engage with the health care system. Therefore, efforts to not only expand Medicaid, but also promote ease of enrollment, through public health outreach, are also important to address disparities in gynecologic cancer detection and ultimate outcomes. Also, we did not control for comorbidities because this information cannot be elicited for patients with non-continuous or interrupted insurance enrollment, as was the case in this data set. Finally, due to our propensity matching, including matching of stage, we likely under-report survival differences between the two groups. Stage is the primary driver of survival, and before matching, stage at diagnosis differed substantially between the enrollment groups.

REAL-LIFE IMPLICATIONS: Given the existence of a cervical cancer screening program in North Carolina and lack of Medicaid expansion, these data suggest that screening programs alone are not sufficient to counteract the delay in diagnosis that is common for the uninsured. JOP

See the figure on the following page.

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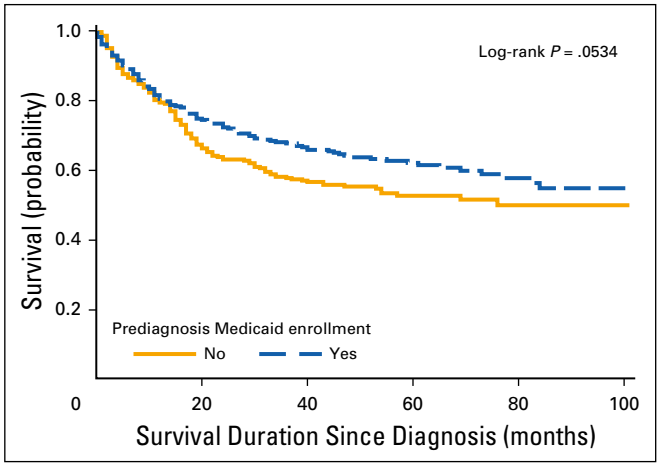

FIG. Mortality after gynecologic cancer diagnosis in women younger than 65 years by timing of Medicaid enrollment in North Carolina (2003 to 2008): overall study cohort. Kaplan-Meier survival curves stratified by prediagnosis Medicaid enrollment during the study period. Mortality is measured since month of diagnosis until death or censoring.

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Abstract

Purpose

Many low-income patients enroll in Medicaid at the time of cancer diagnosis, which improves survival outcomes. Medicaid enrollment before cancer diagnosis may confer additional benefits. Our objective was to compare stage at diagnosis and overall mortality between women with and without Medicaid enrollment before gynecologic cancer diagnosis.

Methods and Materials

Women younger than 65 years with a gynecologic cancer (2003 to 2008) were identified through the North Carolina Central Cancer Registry and linked to state Medicaid enrollment files. Those with and without Medicaid enrollment within 6 months before diagnosis were identified. Propensity matching was used to balance the exposure groups. Stage at diagnosis was evaluated by using logistic regression, and all-cause mortality was assessed with Cox proportional hazard models.

Results

Of 564 women, one half (n = 282) had prediagnosis Medicaid enrollment. Disease sites included the cervix (44%), uterus (25%), ovary (26%), and vulva/vagina (5%). More than one half (51%) of cancers were advanced stage. Women without prediagnosis Medicaid had an increased odds of advanced-stage disease (hazard ratio, 1.46; 95% CI, 1.03 to 2.05). Crude survival outcomes differed significantly between the groups; however, when adjusted for stage at diagnosis, lack of prediagnosis Medicaid coverage had a hazard ratio of 1.19 (95% CI, 0.92 to 1.53).

Conclusion

Medicaid enrollment before gynecologic cancer diagnosis is associated with an earlier stage at presentation. Given the existence of a cervical cancer screening program in North Carolina and lack of Medicaid expansion, these data suggest that screening programs alone are not sufficient to counteract the delay in diagnosis that is common for uninsured individuals.

ASSOCIATED CONTENT

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INTRODUCTION

Health insurance coverage, including Medicaid, is associated with increased access to care and improved health outcomes.[1] Medicaid is a social welfare program in the United States that offers health and medical services to low-income families and individuals, providing coverage to patients who cannot afford private insurance.[2] The expansion of Medicaid has been shown to increase use of preventive services, improve access to primary care, and decrease mortality among

new enrollees.[3,4] Research has found that having health insurance after a cancer diagnosis improves outcomes,[5] but currently unknown is whether prediagnosis coverage yields additional benefits.

Gynecologic cancers encompass screen-detectable (cervical), early-detectable (uterine, vulvar/vaginal), and poorly detectable (ovarian) disease. Cervical cancer is readily diagnosable in early microscopic disease stage screening with Pap or human papillomavirus testing. Uterine and vulvar cancer detection is based on evaluation after patients disclose symptoms, such as postmenopausal bleeding or vulvar pain, to medical providers. Ovarian cancer is poorly detected, with the majority of patients not experiencing symptoms that would lead to diagnosis until the disease has reached advanced stages. Gynecologic cancers have heterogeneous disease presentations as well as the common treatment point of the gynecologic oncologist; thus, this provides a unique opportunity to study the impact of the timing of obtaining Medicaid coverage on patient outcomes across a spectrum of cancer contexts.

In North Carolina, income limits for Medicaid eligibility rank in the bottom quartile of all US states, and adults younger than 65 years without children or disabilities are currently ineligible for coverage.[6] For those who do not initially meet income requirements for Medicaid, the acute financial burden of a cancer diagnosis may decrease their income sufficiently to qualify for Medicaid enrollment. Among patients who have Medicaid coverage after a diagnosis of cancer, it is unknown whether their clinical outcomes would be different according to their prediagnosis Medicaid enrollment status. To investigate the impact of timing of Medicaid enrollment on cancer outcomes, we conducted a population-based retrospective cohort study that identified women younger than 65 years with gynecologic cancer enrolled in Medicaid in North Carolina (between 2003 and 2008) and compared outcomes (to the end of 2010) among those with and without prediagnosis Medicaid enrollment.

METHODS AND MATERIALS

Data Source and Study Population

This study was approved by the University of North Carolina Institutional Review Board (Study # 13-2863). The North Carolina Central Cancer Registry (NCCCR) was used to identify all women with a gynecologic cancer from 2003 to 2008. Women with benign or in situ histology (including low-malignant-potential tumors) diagnosed at death or postmortem were excluded by using NCCCR flags and International Classification of Diseases for Oncology, Third Edition, codes (Appendix Table A1, online only). The North Carolina Integrated Cancer Information and Surveillance System links identified cancer cases from the NCCCR with administrative data from Medicare, Medicaid, and beneficiaries in privately insured health plans across the entire state.[7] The current study population was derived by using these Integrated Cancer Information and Surveillance System linkages and was restricted to women younger than 65 years who received a diagnosis between July 1, 2003, and December 31, 2008, and with linked enrollment in state Medicaid files during the study period. We restricted the cohort to those younger than 65 years because of near-universal Medicare enrollment starting at age 65 years.

For the purposes of this study, we defined prediagnosis Medicaid enrollment as at least 1 month of Medicaid coverage during the 6 months before cancer diagnosis. Patients who did not fulfill this criterion were considered not to have been covered prediagnosis. All patients with any enrollment in privately insured health plans or in Medicare before diagnosis were excluded from further analysis. Within the Medicaid cohort, women enrolled due to primary disability, as categorized in the state enrollment files, were excluded because they represent an unhealthy subgroup with excess mortality risk compared with the general population. Women who were not enrolled for at least 1 month before death were also excluded. Given the small number in the other (nonwhite, nonblack) race category, these patients were excluded as well.

Outcome Variables and Covariates

The two outcomes assessed were cancer stage at diagnosis and all-cause mortality, both reported by the NCCCR. Stage at diagnosis is reported in the summary staging variable, which is consistently reported by all state and national cancer registries. For our study, stage as an outcome was defined in a binary fashion: early stage (local) and advanced stage (regional and distant). Mortality was updated annually by the registry and at the time of study analysis, was available through December 31, 2010.

Age, race, population density of patient's county of residence (metropolitan, nonmetropolitan), cancer site (cervix, uterus, ovary, vulva/vagina), and multiple cancer diagnoses (yes or no for any other cancer), were included as covariates for propensity matching. Multiple cancer diagnosis refers to

whether the gynecologic cancer diagnosis of interest was the patient's first and only cancer diagnosis. Age at diagnosis, race, and multiple cancer diagnoses (yes, no) were obtained from NCCCR data.[7] Rural/urban classification was derived from US Department of Agriculture data and was dichotomized at the county level into metropolitan versus nonmetropolitan on the basis of the US Office of Management and Budget rural-urban continuum codes.[8] Cancer site was defined according to the International Classification of Diseases for Oncology, Third Edition, cancer site codes (Appendix Table A1).

Statistical Analysis

After the aforementioned exclusions were applied, propensity matching was performed to balance the cohort on demographic and clinical covariates. Logistic regression was used to estimate the probability of no Medicaid enrollment before diagnosis. Standardized differences were calculated and were all under 0.1, which indicates appropriate matching. Stage was not included in this matching because we considered stage as a mediator in the relationship between Medicaid enrollment timing and outcomes. Groupings of < 10 in covariate categories were suppressed as required in the data use agreement with the payer data sources.

Univariable and bivariable analyses of enrollment groups (prediagnosis Medicaid enrollment versus no enrollment), covariates, and the outcomes of stage at diagnosis and mortality were performed before and after propensity matching. Student t test and the χ^2 statistic were used to assess the relationship between independent variables and outcome variables. Binary logistic regression was used to generate odds ratios of the likelihood of early versus advanced stage at the time of diagnosis. Unadjusted Kaplan-Meier survival plots were generated, with stratification for cancer site. We constructed Cox proportional hazard models, both with and without cancer stage, to generate hazard ratios (HRs) for time to death. Statistical significance was set at $P < .05$. All analyses were performed with SAS 9.3 software (SAS Institute, Cary, NC).

RESULTS

Descriptive

A total of 13,845 unique cases of gynecologic cancer during 2003 to 2008 were identified from the NCCCR (Appendix Fig A1). After applying tumor-level and demographic exclusions, 12,791 cases of uterine, ovarian, cervical, and vulvar/vaginal cancer remained. Patients who did not have Medicaid (n = 5,571) or those whose primary eligibility was based on disability (n = 141) were excluded. After additional payer-level exclusions, the cohort comprised 782 women with gynecologic cancer who were enrolled exclusively in Medicaid. Before matching, the group with prediagnosis Medicaid enrollment had a larger proportion of black women than the group without prediagnosis enrollment (44% *v* 32%, respectively, $P < .001$). Disease site distribution also varied significantly between groups: uterine cancer represented a greater proportion of cancer in women with prediagnosis coverage (34% *v* 23%, respectively, $P < .001$), whereas ovarian cancer was less common (17% *v* 28%, respectively, $P < .001$; Table 1). Age, population density of county of residence, and multiple cancer diagnoses did not differ between study groups.

After propensity matching, the cohorts were balanced on race, cancer site, age, population density, and multiple cancer diagnoses (Table 1). There was a total of 564 women with a median follow-up time of 22 months. The mean age of the final study cohort was 46 years, with a racial breakdown of 65% (n = 369) white and 35% (n = 195) black. One half (51%) of the cohort had advanced-stage disease (regional or distant) at presentation, and 177 (31%) died by the end of the follow-up period. The largest cancer group was cervical (44%), followed by uterine (26%), ovarian (25%), and vulvar/vaginal (6%).

Medicaid Enrollment Timing and Stage at Diagnosis

Logistic regression models revealed a significantly increased probability of advanced stage at diagnosis in women without prediagnosis Medicaid enrollment (OR, 1.46; 95% CI, 1.03 to 2.05; Table 2). When stratified by cancer site, this difference was greatest in uterine cancer (OR, 1.74; 95% CI, 0.87 to 3.47). However, there was considerable loss in power and imprecision in estimates as a result of small sample sizes once stratified (Table 2).

Medicaid Enrollment Timing and Mortality

Women without prediagnosis Medicaid coverage had a higher mortality rate after diagnosis than those with prediagnosis coverage (Fig 1). This was driven primarily by the disparate survival outcomes in patients with cervical and uterine cancer (Fig 2). Table A2 shows the step-wise Cox proportional hazard models of mortality. In model 1, which compared the propensity-matched cohorts, lack of prediagnosis Medicaid coverage had a mortality HR of 1.28 (95% CI, 0.99 to 1.65; $P = .06$). When stage, which we consider a mediator, was

Table 1. Study Population: Medicaid Enrollees With Gynecologic Cancer in North Carolina, 2003 to 2008

	Prediagnosis Medicaid Enrollment: Original, No. (%)				Prediagnosis Medicaid Enrollment: Propensity Matched, No. (%)			
Characteristic	Total (n = 782)	No (n = 302)	Yes (n = 480)	*P*	Total (n = 564)	No (n = 282)	Yes (n = 282)	*P*
Mean age (SD), years	46.1 (11.5)	46.2 (10.8)	46.1 (11.9)	.90	45.9 (11.3)	45.8 (10.9)	46.0 (11.8)	.83
Race								
White	471 (60)	204 (68)	267 (56)		369 (65)	185 (66)	184 (65)	
Black	311 (40)	98 (32)	213 (44)	< .001	195 (35)	97 (34)	98 (35)	.93
Population density of county of residence*								
Metropolitan	483 (62)	183 (61)	300 (63)		344 (61)	175 (62)	169 (6)	
Nonmetropolitan	≤ 300 (≤ 40)	118 (39)	180 (38)	.63	220 (39)	107 (38)	113 (40)	
Stage								
Missing	*				0 (0)			.60
Local	364 (47)	110 (36%)	254 (53)		238 (42)	107 (38)	131 (46)	
Regional	208 (27)	94 (31%)	114 (24)		158 (28)	80 (28)	69 (24)	
Distant	186 (24)	≥ 90 (≥ 30)	≥ 90 (≥ 20)		153 (27)	≥ 70 (≥ 25)	≥ 65 (≥ 23)	
Unknown	24 (3)	*	*	< .001	15 (3)	*	*	.12
Cancer site								
Cervix	329 (42)	131 (43)	198 (41)		246 (44)	122 (43)	124 (44)	
Uterus	234 (30)	69 (23)	165 (34)		140 (25)	69 (24)	71 (25)	
Ovary	167 (21)	84 (28)	83 (17)		147 (26)	73 (26)	74 (26)	
Vulva/vagina	52 (7)	18 (6)	34 (7)	< .001	31 (5)	18 (6)	13 (5)	.84
Multiple cancer diagnoses								
No	700 (90)	269 (89)	431 (90)		505 (90)	253 (90)	252 (89)	
Yes	82 (10)	33 (11)	49 (10)	.75	59 (10)	29 (10)	30 (11)	.89

*Cell size < 10 suppressed in compliance with data use agreements.

included in model 2, the mortality relationship was attenuated (HR, 1.19; 95% CI, 0.92 to 1.53). Advanced stage of disease was the primary driver of mortality risk (regional stage HR, 3.45; distant stage HR, 10.02) versus local cancer.

DISCUSSION

For low-income women with gynecologic cancer in North Carolina between 2003 and 2008, Medicaid coverage before diagnosis was significantly associated with earlier stage at diagnosis. Many gynecologic cancers are curable with standard treatment when diagnosed at early stages.[9] The current results suggest that lack of prediagnosis Medicaid coverage can be an important driver of disparities in low-income populations. We used propensity matching to balance the study groups; however, before matching, stage at diagnosis was significantly higher in the women without prediagnosis coverage. Because stage is such a strong driver of mortality, we likely underreported the survival benefits of prediagnosis Medicaid coverage.

Cervical, uterine, and vulvar/vaginal cancers can be readily detected early through either screening (cervical) or reports of early symptoms to health care providers (uterine, vulvar/vaginal). Immediate access to primary care services may trigger the appropriate medical investigations that lead to timely diagnosis and treatment at early stages and, thus, improved survival. Conversely, lack of access to screening and detection services may delay diagnosis. The current findings are consistent with contemporary sociobehavioral theory, which holds that the relative impact of socioeconomic status on disease mortality depends on overall treatability of a given disease.[10-12] Thus, in this scenario, women with cervical, uterine, and vulvar/vaginal cancers will be most affected by the lack of prediagnosis Medicaid coverage.

In North Carolina, a stand-alone cervical cancer screening program is available to women regardless of insurance coverage.[13] Cancer-specific screening programs that are independent of broader health care coverage programs can

Table 2. Prediagnosis Medicaid Enrollment and the Odds of Advanced-Stage Disease at Presentation of Gynecologic Cancer Overall and by Specific Cancer Site From 2003 to 2008

Cancer Site	Prediagnosis Medicaid Enrollment	Odds Ratio	95% CI
All gynecologic cancer sites (n = 564)*	No	1.46	1.03 to 2.05
Individual cancer site*			
Cervix	No	1.50	0.91 to 2.49
Uterus	No	1.74	0.87 to 3.47
Ovary	No	1.41	0.63 to 3.11
Vulva/vagina	No	1.00	0.23 to 4.31

*Number of deaths in each group: all sites (n = 177), cervix (n = 76), uterus (n = 41), ovary (n = 55), vulva/vagina (n = 5).

potentially mitigate income-based disparities in cancer survival. Although these programs are helpful, the current results demonstrate that they are not sufficient in providing early access to care for the spectrum of gynecologic cancers amenable to early diagnosis and cure, which explains the findings with regard to cervical and uterine cancer.

Uterine cancer, which is more than four times more common than cervical cancer,[14] can also be detected early,[15] but this detection depends on physical examination and evaluation rather than on screening. Therefore, one would expect Medicaid enrollment to have a greater impact on uterine cancer outcomes than cervical cancer outcomes, where screening availability outside Medicaid enrollment exists and which was the case in the current study. Uterine cancer disproportionately affects minority populations, with an increased incidence among black women,[16,17] and in low-income populations, it is commonly associated with advanced-stage disease at presentation.[18] These populations are especially vulnerable to adverse outcomes from this disease and may benefit from insurance coverage that allows for comprehensive examinations.

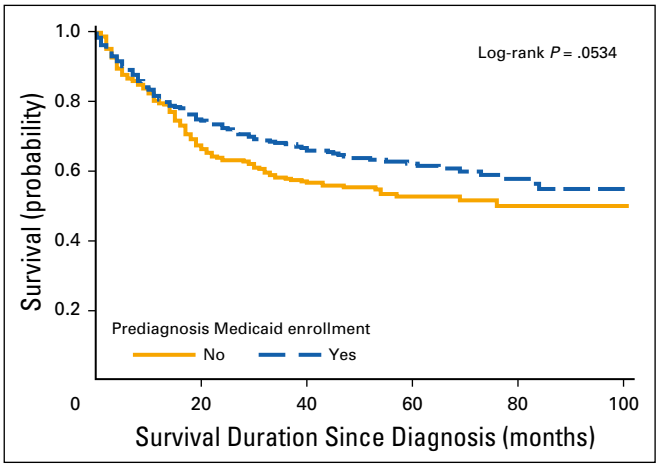

FIG 1. Mortality after gynecologic cancer diagnosis in women younger than 65 years by timing of Medicaid enrollment in North Carolina (2003 to 2008): overall study cohort. Kaplan-Meier survival curves stratified by prediagnosis Medicaid enrollment during the study period. Mortality is measured since month of diagnosis until death or censoring.

Prior research has found that Medicaid coverage at the time of cancer diagnosis confers survival benefits.[5] The implication of this work is that access to care before diagnosis is the driver of these benefits. The current results support this assumption by demonstrating that enrollment in Medicaid before diagnosis is associated with early-stage cancer diagnosis. This was recently reinforced by an analysis of patients with cervical cancer in the National Cancer Database.[19] By comparing years before and after the implementation of the Affordable Care Act, the study authors found an increase of 9 percentage points in women who presented with early-stage disease. The Affordable Care Act aims to increase the number of patients covered by Medicaid by expanding enrollment eligibility to all citizens whose annual income is up to 138% of the federal poverty level. In states without Medicaid expansion, however, those with incomes < 138% of the federal poverty level will not qualify for discounted insurance plans and are not eligible for Medicaid without coexisting disabling conditions. North Carolina has opted out of Medicaid expansion and thus has left approximately 357,000 uninsured people per year who do not qualify for Medicaid and discounted insurance; of these, 47% are women and 62% are from working families.[20,21] As a safety net, Medicaid enrollment could become available to patients who find themselves in this coverage gap only after a cancer diagnosis causes financial hardship and their lower (family) income subsequently makes them eligible to enroll in Medicaid. The current data suggest, however, that this approach is inadequate and continues to perpetuate disparities in gynecologic cancer outcomes.

Limitations of our data set do not allow for certainty that women who lacked Medicaid before enrollment were also ineligible. Some women in this group were likely financially eligible but simply not enrolled due to barriers of knowledge, literacy, or willingness to engage with the health care system. Therefore, efforts not only to expand Medicaid but also to

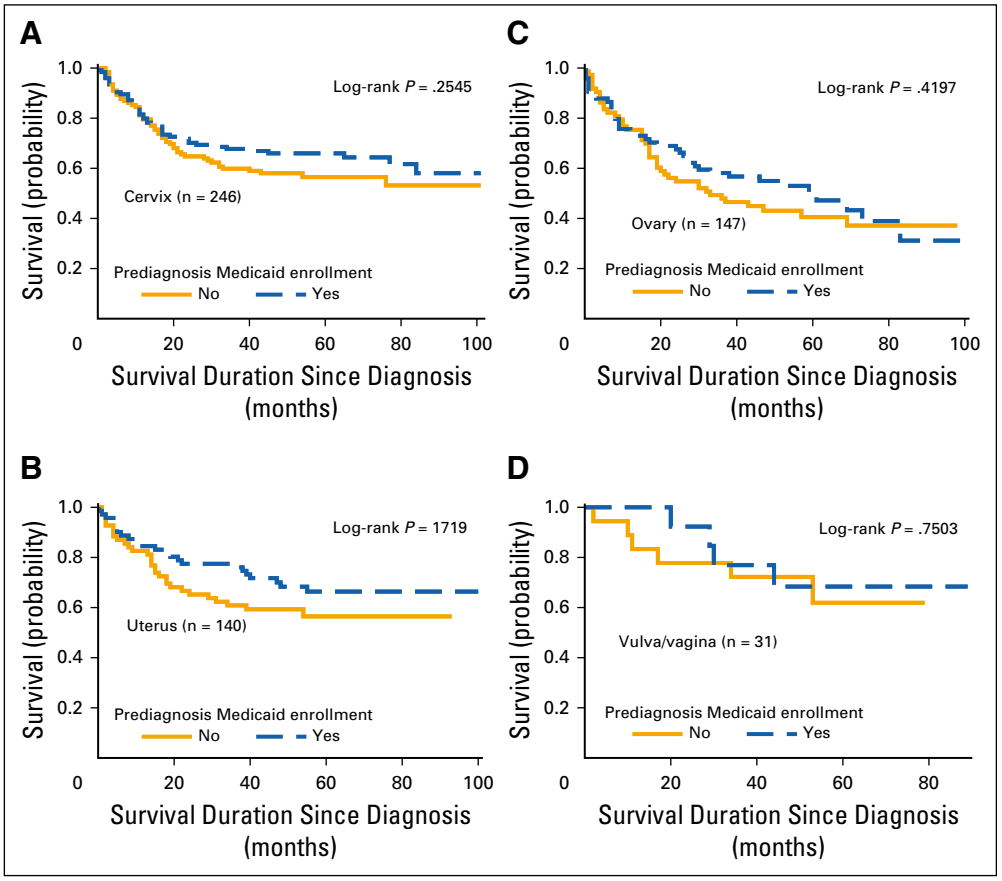

FIG 2. (A-D) Mortality after gynecologic cancer diagnosis in women younger than 65 years by timing of Medicaid enrollment in North Carolina (2003 to 2008) according to specific cancer site. Kaplan-Meier survival curves stratified by prediagnosis Medicaid enrollment during the study period grouped by International Classification of Diseases for Oncology, Third Edition, cancer site codes in the North Carolina Central Cancer Registry.

promote ease of enrollment through public health outreach are important to addressing disparities in gynecologic cancer detection and ultimately outcomes.

The current study has several other limitations, many of which are consistent with registry-linked claims data.[22] First, we were unable to measure person-level indicators of socioeconomic status as a covariate; however, all patients included in the analysis were poor based on Medicaid eligibility income requirements at $\leq$ 250% of the federal poverty level. Second, we did not control for comorbidities because this information cannot be elicited for patients with noncontinuous or interrupted insurance enrollment, as was the case in this data set. Third, we were limited to a single US state, so the results may not be generalizable nationwide, although rates of gynecologic cancer in North Carolina are similar to that in SEER reports.[2] Fourth, we were limited to all-cause mortality; therefore, the observed disparate survival outcomes could possibly be due to noncancer-related deaths, but this seems unlikely because of the association between stage of cancer and mortality observed in this population. Moreover, even a noncancer-related mortality disparity would suggest benefits of more comprehensive insurance coverage. Fifth, because the data were derived on the basis of insurance enrollment, we were unable to include data from patients who never had any insurance coverage during the study period, which is a research question that was beyond the scope of this study. Finally, because of our propensity matching, including matching of stage, we likely underreport survival differences between the two enrollment groups. Stage is the primary driver of survival, and before matching, stage at diagnosis differed substantially between enrollment groups.

The state of North Carolina currently is considering expansion of its Medicaid program. Evidence suggests that such an expansion is associated with mortality benefits across

populations regardless of diagnosis.[4] This study adds to that evidence by finding that in vulnerable populations, provision of insurance coverage at the time of cancer diagnosis is not sufficient to counteract the adverse impact of lack of prior insurance coverage. Although stand-alone cancer-specific screening programs likely improve outcomes, they cannot replace the benefits of more comprehensive medical evaluations that can detect curable cancers at an early stage. JOP

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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The following represents disclosure information provided by authors of this manuscript. All relationships are considered compensated. Relationships are self-held unless noted. I = Immediate Family Member, Inst = My Institution. Relationships may not relate to the subject matter of this manuscript. For more information about ASCO's conflict of interest policy, please refer to www.asco.org/rwc or jop.ascopubs.org/site/misc/ifc.xhtml.

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No relationship to disclose

Appendix

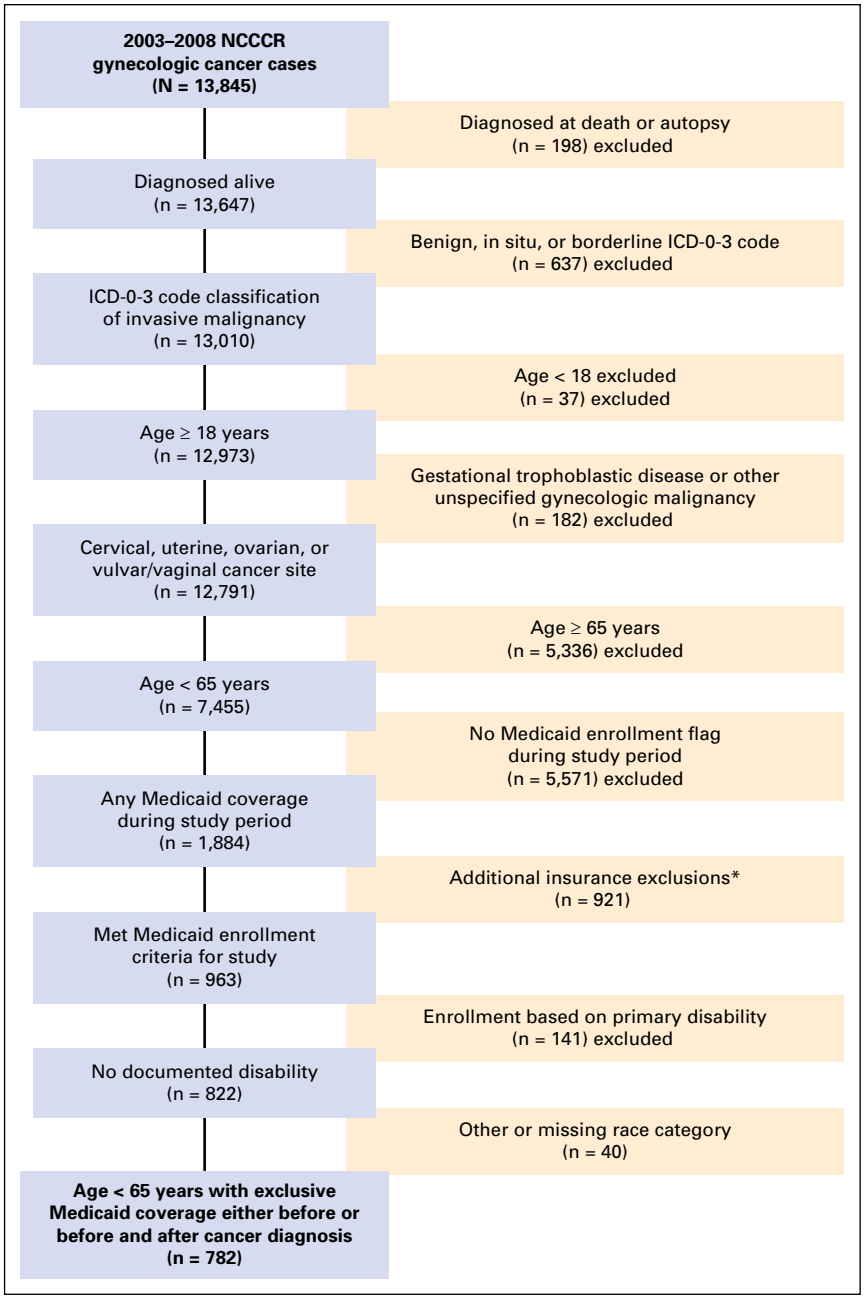

FIG A1. Study population. ICD-O-3, International Classification of Diseases for Oncology, Third Edition; NCCCR, North Carolina Central Cancer Registry. (*) Exclusions: < 6 months of pre-diagnosis assessment time for enrollment (n = 146), lack of any Medicaid enrollment prior to either study outcome (n = 655), and additional enrollment in Medicare and/or private payer health insurance during the study period (n = 120).

Table A1. ICD-O-3 Cancer Site Codes

Disease Site	ICD-O-3 Code	Description
Cervix	C53.0	Endocervix
	C53.1	Exocervix
	C53.8	Overlapping lesion of cervix uteri
	C53.9	Cervix uteri
Uterus	C54.0	Isthmus uteri
	C54.1	Endometrium
	C54.3	Myometrium
	C54.8	Fundus uteri
	C54.9	Overlapping lesion of corpus uteri
	C54.9	Corpus uteri
	C55.9	Uterus, NOS
Ovary	C56.9	Ovary
	C57.0	Fallopian tubes/adnexa
	C57.1	Broad ligament
	C57.2	Round ligament
	C57.3	Parametrium
	C57.4	Uterine adnexa
	C57.5	Other female genital organs
	C57.8	Overlapping female genital organs
	C57.9	Female genital tract, NOS
Vulva	C51.0	Labium majus
	C51.2	Labium minus
	C51.8	Overlapping lesion of vulva
	C51.9	Vulva, NOS
Vagina	C52.9	Vagina, NOS

Abbreviations: ICD-O-3, International Classification of Diseases for Oncology, Third Edition; NOS, not otherwise specified.

Table A2. Mortality After Gynecologic Cancer Diagnosis by Timing of Medicaid Enrollment, 2003 to 2008

Cancer Site*	Prediagnosis Medicaid Coverage	Model 1 (without stage), HR (95% CI)	*P*	Model 2 (with stage), HR (95% CI)
All sites	No	1.28 (0.99 to 1.65)	.06	1.19 (0.92 to 1.53)
Cervix	No	1.26 (0.85 to 1.87)	.26	1.32 (0.88 to 1.99)
Uterus	No	1.46 (0.84 to 2.52)	.17	1.20 (0.69 to 2.09)
Ovary	No	1.19 (0.77 to 1.84)	.42	1.13 (0.73 to 1.74)
Vulva/vagina	No	1.23 (0.35 to 4.36)	.75	1.46 (0.35 to 6.19)

Abbreviation: HR, hazard ratio.
*Number of deaths in each group: all sites (n = 177), cervix (n = 98), uterus (n = 52), ovary (n = 82), vulva/vagina (n = 10).