Ectopic pregnancy morbidity and mortality in low-income women, 2004–2008

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STUDY QUESTION: Does the risk of adverse outcomes at the time of ectopic pregnancy vary by race/ethnicity among women receiving Medicaid, the public health insurance program for low-income people in the USA?

SUMMARY ANSWER: Among Medicaid beneficiaries with ectopic pregnancy, 11% experienced at least one complication, and women from all racial/ethnic minority groups were significantly more likely than whites to experience complications.

WHAT IS KNOWN ALREADY: In this population of Medicaid recipients, African American women are significantly more likely than whites to experience ectopic pregnancy, but the risk of adverse outcomes has not previously been assessed.

STUDY DESIGN, SIZE, AND DURATION: We conducted a cross-sectional observational study of all women (n = 19 135 106) ages 15–44 enrolled in Medicaid for any amount of time during 2004–2008 who lived in one of the following 14 US states: Arizona; California; Colorado; Florida; Illinois; Indiana; Iowa; Louisiana; Massachusetts; Michigan; Minnesota; Mississippi; New York; and Texas.

PARTICIPANTS/MATERIALS, SETTINGS, METHODS: We analyzed Medicaid claims records for inpatient and outpatient encounters and identified ectopic pregnancies with a principal diagnosis code for ectopic pregnancy from 2004–2008. We calculated the ectopic pregnancy complication rate as the number of ectopic pregnancies with at least one complication (blood transfusion, hysterectomy, any sterilization, or length-of-stay [LOS] > 2 days) divided by the total number of ectopic pregnancies. We used Poisson regression to assess the risk of ectopic pregnancy complication by race/ethnicity. Secondary outcomes were each individual complication, and ectopic pregnancy-related death. We calculated the ectopic pregnancy mortality ratio as the number of deaths divided by live births.

MAIN RESULTS AND THE ROLE OF CHANCE: Ectopic pregnancy-associated complications occurred in 11% of cases. Controlling for age and state, the risk of any complication was significantly higher among women who were black (incidence risk ratio [IRR] 1.47, 95% CI 1.43–1.53, P < 0.0001), Hispanic (IRR 1.16, 95% CI 1.12–1.21, P < 0.0001), Asian (IRR 1.34, 95% CI 1.24–1.45, P < 0.0001), American Indian/Alaskan Native (IRR 1.34 95% CI 1.16–1.55, P < 0.0001), and Native Hawaiian/Pacific Islander (IRR 1.61, 95% CI 1.39–1.87, P < 0.0001) compared with white women. The ectopic pregnancy mortality ratio was 0.48 per 100 000 live births, similar to that reported in previous US surveillance.

LIMITATIONS, REASONS FOR CAUTION: This is a secondary analysis of insurance claims.

WIDER IMPLICATIONS OF THE FINDINGS: Among women at higher baseline risk of pregnancy complications due to their economic status, women from racial/ethnic minority groups face an additional risk of ectopic pregnancy adverse outcomes compared with whites. Systematic changes to reduce racial disparities are an essential part of improving maternal health in the USA.

STUDY FUNDING/COMPETING INTEREST(S): The Eunice Kennedy Shriver National Institute of Child Health and Human Development (1 K08 HD060663 to D.B.S.). The authors report no conflict of interest.

TRIAL REGISTRATION NUMBER: Not applicable.

Key words: ectopic pregnancy / healthcare disparities / Medicaid / pregnancy complication / female sterilization / African Americans / Hispanic Americans / Asian Americans / Native Americans / Pacific Island Americans
Introduction

Ectopic pregnancy mortality in the USA has declined in recent decades, but both the incidence (Stulberg et al., 2014) and mortality ratio (Creanga et al., 2011) of ectopic pregnancy have been consistently higher among black women compared with whites. The decline in ectopic pregnancy mortality has also been slower among black women compared with whites. In 1980–1984, there were 0.65 ectopic pregnancy deaths per 100 000 live births among white women in the USA, compared with 3.57 among blacks. In 2003–2007, there were 0.26 ectopic pregnancy deaths per 100 000 live births among white women, a decrease of 60.4%; in comparison, the mortality ratio fell by 50.8% among black women, to 1.75 ectopic pregnancy deaths per 100 000 live births (Creanga et al., 2011). Among all pregnancy-related deaths in the USA (2006–2010), 1.9% of deaths among white women were from ectopic pregnancies compared with 4.8% among black women (P < 0.05) (Creanga et al., 2015). Ectopic pregnancy mortality reporting to date has not included insurance status or other socioeconomic markers.

Medicaid is the US public health insurance program that has served as the safety net for many low-income women and children. In 2008–2010, 48% of US births were covered by Medicaid (Markus et al., 2013). Black women are disproportionately represented among Medicaid enrollees (Salganicoff et al., 2012). It is unknown whether the previously observed racial disparity in ectopic pregnancy mortality is a proxy for socioeconomic factors or whether race and socioeconomics have independent effects on ectopic pregnancy outcome.

In order to prevent pregnancy-related deaths, medical and public health experts recommend tracking severe maternal morbidity events and non-fatal ‘near-miss’ outcomes (Berg et al., 2002). Prevalence of non-fatal complications at the time of ectopic pregnancy are not well studied. Among Illinois hospitalizations for ectopic pregnancy in 2000–2006 (n = 13 007), 7.4% included a procedure indicating that a complication occurred, and 23% had lengths-of-stay greater than 2 days (Stulberg et al., 2011). There was a significantly lower odds of complications at private hospitals compared with public (OR 0.39, 95% CI 0.25–0.61), and a higher odds of >2-day hospitalizations among Medicaid-insured (OR 1.46, 95% CI 1.32–1.62) and self-pay patients (OR 1.25, 95% CI 1.22–1.36) compared with others. There was an unexpected disparity in the rate of sterilizing surgery on the basis of insurance status (Medicare versus privately insured, OR 4.7, 95% CI 1.4–15.5), which motivated us to further investigate sterilization as a potential complication of ectopic pregnancy.

Looking more generally at severe morbidity at the time of delivery, a recent study of multiple states found that minority race/ethnicity, Medicaid or no insurance, and lower household income by zip code were all significantly associated with higher risk of adverse maternal outcomes (Creanga et al., 2014). That study did not include ectopic pregnancies.

We conducted this study to assess the rate of morbidity and mortality at the time of ectopic pregnancy among women enrolled in Medicaid in 14 states, and to see if in this low-income population there was outcome variation by race.

Materials and Methods

Medicaid claims data

We received Medicaid Analytic Extract data files from the Centers for Medicare and Medicaid Services (CMS) under an approved Data Use Agreement. We analyzed Medicaid records for all female beneficiaries 15–44 years of age, for the years 2004–2008, from Arizona, California, Colorado, Florida, Illinois, Indiana, Iowa, Louisiana, Massachusetts, Michigan, Mississippi, New York, and Texas. Our data constituted a complete census of this population. We did not have the ability to review data from all US states so we selected these states to maximize the number of enrollees, geographic spread, and racial diversity. Enrollment data files provided person-level information on Medicaid enrollees, including whether or not they were enrolled in the Medicaid program for each month of the included years. Unlike Medicare, which covers elderly and disabled individuals based on criteria set by the US federal government, Medicaid eligibility criteria are set by each state. However, the federal government requires states to offer Medicaid coverage to pregnant women if their income is under 133% of the federal poverty line, and allows coverage up to higher incomes (Salganicoff et al., 2012). Thus, it is not uncommon for women to enroll in Medicaid at the start of pregnancy and then lose Medicaid coverage after delivery (if they are not poor enough to meet criteria for non-pregnant women). Month-by-month enrollment data allowed us to identify women enrolled prior to pregnancy and those whose enrollment began at the time of their pregnancy diagnosis.

Claims files provided encounter-level information from all sources of acute medical care, including inpatient, outpatient, physician services, radiology, and clinic visits. We did not examine long-term care files or pharmacy prescription claims for this study since our previous research found these did not contribute information about ectopic pregnancy (Stulberg et al., 2014).

Outcome measures

We identified ectopic pregnancy cases and associated complications from claims containing the International Classification of Diseases, 9th revision, Clinical Modification (ICD9) and Current Procedural Terminology (CPT) codes outlined in Table I. Ectopic pregnancies treated in all settings (inpatient, ambulatory, emergency, or any combination thereof) were included. We calculated the incidence of ectopic pregnancy as the number of ectopic pregnancies divided by the number of person-years of Medicaid enrollment among female Medicaid beneficiaries ages 15–44 in our study population.

Among identified ectopic pregnancies, the primary outcome was a composite of any of the following complications: blood transfusion, hysterectomy, other sterilizing surgery (including bilateral oophorectomy, salpingectomy, or salpingo-oophorectomy), or hospitalization with length-of-stay (LOS) greater than 2 days. We counted these as complications only if they occurred in the same claim as an ectopic pregnancy. Secondary outcomes were each of these complications reported individually, and ectopic pregnancy mortality. Sterilization procedures commonly used for a desired end to a woman’s fertility (e.g. tubal ligation and occlusion) were excluded from the complications list in an effort to minimize the risk of misclassifying desired sterilizations as complications. Hospital LOS was calculated by subtracting admission dates from discharge dates. Ectopic pregnancies were not sub-classified by implantation site (tubal versus other) because this was not reliably coded in claims records.

We calculated the ectopic pregnancy complication rate as the number of ectopic pregnancies associated with at least 1 complication, divided by the number of total ectopic pregnancies. For both the numerator and denominator counts, repeat ectopic pregnancy encounters within 9 months (270 days) were considered part of the same episode of care. Repeat ectopic pregnancy encounters for the same beneficiary after 9 months were treated as a new ectopic pregnancy episode. This case ascertainment method and time frame were developed and subjected to sensitivity analyses in our previous work (Stulberg et al., 2013). In analyzing the relative risk of ectopic pregnancy complication by race/ethnicity and other factors here, we excluded women who experienced more than 1 ectopic pregnancy episode during the study period in order to examine the effects of pre-ectopic pregnancy care.
Ectopic pregnancy-related deaths were identified using 2 variables in the Medicaid files: Date of death reported in enrollment (Personal Summary) files, and patient discharge status from inpatient admissions. We reviewed claim histories around the time of death of all Medicaid enrollees with a date of death that occurred within 3 months of an ectopic pregnancy, and of ectopic pregnancy hospitalizations with a deceased patient status. Cases with competing or intervening cause of death (such as gunshot wound, asthma attack, etc.) were excluded. The ectopic pregnancy mortality ratio was calculated as ectopic pregnancy deaths divided by live births, which were identified using ICD9 codes V270, V272, V273, V275 and V276. This ratio was derived from complete counts of both events (ectopic pregnancy deaths and live births) in this 14-state Medicaid census.

### Independent variables

We examined ectopic pregnancy complication rates by race/ethnicity using the race/ethnicity variable in Medicaid files, which is coded as white, black, Hispanic, Asian, American Indian/Alaskan native, native Hawaiian/Pacific Islander, or multiracial. We also controlled for age and state of residence (model 1).

We conducted a post hoc analysis to assess whether the effects would change if we also controlled for receipt of preconception care and prenatal care (model 2). Preconception care was defined as any visit with a diagnosis or procedure code indicating family planning, contraception, or other women’s preventive services (ICD9 codes: V25, V26, V700, V703, V705, V709, V723, V762, V7240 and V7241) within 1 year prior to the ectopic pregnancy. Prenatal care was defined as any prenatal visit (ICD9 codes: V22, V23, V7242) within 3 months prior to the ectopic pregnancy.

### Statistical analyses

Because the outcome variable was a ratio of counts, we used Poisson multi-regression models to estimate the incidence rate ratios (IRR) and 95% confidence intervals (95% CI) for ectopic pregnancy complication by race/ethnicity, adjusting for age and state.

### Ethics approval

The University of Chicago’s Institutional Review Board acknowledged the study as exempt from review since it constituted a secondary analysis of de-identified data. The authors had no conflicts of interest.

### Results

#### Study population

There were 45 201 325 person-years of enrollment in Medicaid among women ages 15–44 in Arizona, California, Colorado, Florida, Illinois, Indiana, Iowa, Louisiana, Massachusetts, Michigan, Minnesota, Mississippi, New York, and Texas combined during the 2004–2008 period, representing 19 135 106 unique individuals. Overall, there were 101 892 cases of ectopic pregnancy in this population, with 99 267 individuals having at least 1 ectopic pregnancy and 98 513 having exactly 1.

#### Complications

The overall ectopic pregnancy complication rate was 11.07%. Blood transfusion (at least once during the episode of care) was documented in almost 4% of all ectopic pregnancies. Nearly 3 out of every 1000 ectopic pregnancies (0.27%) resulted in the patient being sterilized, either by hysterectomy (0.13%) or by removal of bilateral ovaries and/or fallopian tubes. There was marked variation in ectopic pregnancy incidence (Table II) and complication rates (Table III) by race/ethnicity. Table IV presents the risk of complications by race/ethnicity from both multivariable models: model 1 controlling for age and state, and model 2 additionally controlling for preconception and prenatal care. All racial/ethnic minority groups had a statistically significantly higher risk of the composite outcome (any ectopic pregnancy complication) compared with whites. Blood transfusions and LOS > 2 days were also significantly more common among each racial/ethnic minority group than among whites. Black, Asian, and Hispanic women also had a significantly greater risk of hysterectomy and any sterilization compared with white women.

#### Mortality

In this 14-state population census of women receiving Medicaid, there were a total of 17 ectopic pregnancy-related deaths and 3 530 780 live births in the study population, for an ectopic pregnancy mortality ratio of 0.48 per 100 000 live births. Of the women who died, 52.9% were black (n = 9), 23.5% Hispanic (n = 4) and 23.5% white (n = 4).

### Discussion

Just over 11% of ectopic pregnancies resulted in a complication requiring a blood transfusion, a hysterectomy or other sterilization, or a hospitalization longer than 2 days. Women from all racial/ethnic minority groups were significantly more likely than white women to experience the composite outcome (at least 1 complication), as well as the individual outcomes blood transfusion and hospitalization longer than 2 days. Black, Asian, and Hispanic women had increased risk of all reported

### Table I Diagnosis and procedure codes for ectopic pregnancy and associated complications.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>ICD-9 code</th>
<th>CPT code</th>
<th>Diagnosis/procedure field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ectopic pregnancy</td>
<td>633.xx</td>
<td>--</td>
<td>Principal diagnosis</td>
</tr>
<tr>
<td>Sterilizations</td>
<td></td>
<td></td>
<td>Principal, secondary or other procedure</td>
</tr>
<tr>
<td>Hysterectomy</td>
<td>68.3–68.9</td>
<td>51925 58150-58294 59135 59525</td>
<td></td>
</tr>
<tr>
<td>Bilateral oophorectomy</td>
<td>65.5</td>
<td>--</td>
<td>Principal, secondary or other procedure</td>
</tr>
<tr>
<td>Bilateral salpingo-oophorectomy</td>
<td>65.6</td>
<td>--</td>
<td>Principal, secondary or other procedure</td>
</tr>
<tr>
<td>Bilateral salpingectomy</td>
<td>66.5</td>
<td>--</td>
<td>Principal, secondary or other procedure</td>
</tr>
<tr>
<td>Blood transfusion</td>
<td>99.0x</td>
<td>36430 36455 86077-86079 p9010 s9538</td>
<td>Principal, secondary or other procedure</td>
</tr>
</tbody>
</table>

*aInternational Classification of Diseases, 9th Revision, Clinical Modification.

*bCurrent procedural terminology.
complications, including hysterectomy and any sterilization. The ectopic pregnancy mortality ratio in our study population was 0.48 deaths per 100,000 live births, nearly the same as the 0.50 ectopic pregnancy deaths per 100,000 live births reported from US vital statistics for 2003–2007 (Creanga et al., 2011).

This study’s main strength is the use of Medicaid claims data to describe ectopic pregnancy short-term outcomes among the complete population of women ages 15–44 years enrolled in Medicaid in 14 states. We calculate that these states include nearly 60% of the US population of women of reproductive age enrolled in Medicaid (Sonfield, 2007). The number of ectopic pregnancies identified allowed us to report complication rates that have not previously been described at the population level.

Our findings add to the literature on racial disparities in severe maternal morbidity in the USA. While racial and socioeconomic disparities in maternal outcomes have been reported previously (Creanga et al., 2013), no prior research has focused on ectopic pregnancy outcomes among women enrolled in Medicaid. The higher risk of complications we found for all racial/ethnic minority groups, compared with whites, suggests that factors associated with race and ethnicity negatively affect women’s reproductive health beyond being associated with lower income.

The causes of the racial disparities we observed are probably complex. They may include factors that have been described in the literature in relation to ectopic pregnancy: worse access to care (Asplin et al., 2005), greater loss-to-follow-up (Butts et al., 2010, Jaspan et al., 2010, Nelson et al., 2003), and differences in quality of care received (Van Mello et al., 2012). It is noteworthy that racial/ethnic disparities exist even controlling for prenatal and preconception care. It would be reasonable to hypothesize that women who receive prenatal or preconception care prior to an ectopic pregnancy may have better access to care, better health education or literacy, and a routine source of care, and thus when problems develop during pregnancy they may be more likely to present for care early. The finding that racial/ethnic disparities were present when controlling for these factors suggests that additional

### Table II  Person-years of Medicaid enrollment by race/ethnicity, 2004–2008, women ages 15–44a.

<table>
<thead>
<tr>
<th>Race/ethnicity</th>
<th>Person-years</th>
<th>Ectopic pregnancies</th>
<th>Incidence of ectopic pregnancyb</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>14 091 875</td>
<td>27 777</td>
<td>0.20%</td>
</tr>
<tr>
<td>Black</td>
<td>8 684 810</td>
<td>27 443</td>
<td>0.32%</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td>438 730</td>
<td>668</td>
<td>0.7</td>
</tr>
<tr>
<td>Asian</td>
<td>1 558 775</td>
<td>2414</td>
<td>2.4</td>
</tr>
<tr>
<td>Hispanic</td>
<td>17 843 210</td>
<td>39 055</td>
<td>3.8</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td>539 280</td>
<td>680</td>
<td>0.7</td>
</tr>
<tr>
<td>Unknown</td>
<td>2 044 645</td>
<td>3855</td>
<td>3.8</td>
</tr>
<tr>
<td>Total</td>
<td>45 201 325</td>
<td>101 892</td>
<td>0.23%</td>
</tr>
</tbody>
</table>

*a*Includes all women enrolled in Medicaid in Arizona, California, Colorado, Florida, Illinois, Indiana, Iowa, Louisiana, Massachusetts, Michigan, Minnesota, Mississippi, New York, Texas.  
*b*Ectopic pregnancies/person-years of enrollment.

### Table III  Ectopic pregnancies associated with at least one complication.

<table>
<thead>
<tr>
<th>Ectopic pregnancies</th>
<th>Any complication (blood transfusion, sterilization or LOSa &gt; 2 days)</th>
<th>Transfusion</th>
<th>Sterilization (hysterectomy or other)</th>
<th>Hysterectomy</th>
<th>LOS &gt; 2 days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>White</td>
<td></td>
<td>27 777</td>
<td>2.378</td>
<td>957</td>
<td>3.45%</td>
</tr>
<tr>
<td>Black</td>
<td></td>
<td>27 443</td>
<td>3.710</td>
<td>1218</td>
<td>4.44%</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td></td>
<td>668</td>
<td>87</td>
<td>37</td>
<td>5.54%</td>
</tr>
<tr>
<td>Asian</td>
<td></td>
<td>2414</td>
<td>329</td>
<td>155</td>
<td>6.42%</td>
</tr>
<tr>
<td>Hispanic</td>
<td></td>
<td>39 055</td>
<td>4343</td>
<td>1501</td>
<td>3.84%</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td></td>
<td>680</td>
<td>86</td>
<td>22</td>
<td>3.24%</td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
<td>3855</td>
<td>342</td>
<td>124</td>
<td>3.22%</td>
</tr>
<tr>
<td>All</td>
<td></td>
<td>101 892</td>
<td>11275</td>
<td>4014</td>
<td>3.94%</td>
</tr>
</tbody>
</table>

*a*Length of stay.
mechanisms for the disparities exist. It is possible that unmeasured confounding contributed to the observed racial disparities, for example if white women were over-represented among the subset of beneficiaries who became Medicaid-eligible due to pregnancy and thus had a higher average income than Medicaid enrollees from racial/ethnic minority groups.

We are especially concerned about the disparities in rates of hysterectomy and other sterilizing surgery. The USA has a problematic history of involuntary sterilization of poor and minority women, and reports of omen. 

**Table IV** Ectopic pregnancy complications by race/ethnicity.

<table>
<thead>
<tr>
<th>Race/ethnicity</th>
<th>Any complication (blood transfusion, sterilization or LOS* &gt; 2 days)</th>
<th>Transfusion</th>
<th>Sterilization (hysterectomy or other)</th>
<th>Hysterectomy</th>
<th>LOS &gt; 2 days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1a</td>
<td>Model 2b</td>
<td>Model 1a</td>
<td>Model 2b</td>
<td>Model 1a</td>
</tr>
<tr>
<td>Black</td>
<td>1.47 (1.43, 1.53)</td>
<td>1.49 (1.44, 1.55)</td>
<td>1.28 (1.23, 1.34)</td>
<td>1.27 (1.22, 1.33)</td>
<td>1.40 (1.32, 1.49)</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td>1.34 (1.16, 1.55)</td>
<td>1.40 (1.21, 1.62)</td>
<td>1.41 (1.20, 1.66)</td>
<td>1.44 (1.23, 1.70)</td>
<td>–</td>
</tr>
<tr>
<td>Asian</td>
<td>1.34 (1.24, 1.45)</td>
<td>1.36 (1.25, 1.47)</td>
<td>1.80 (1.66, 1.96)</td>
<td>1.80 (1.65, 1.96)</td>
<td>1.78 (1.58, 2.01)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1.16 (1.12, 1.21)</td>
<td>1.18 (1.14, 1.22)</td>
<td>1.18 (1.13, 1.23)</td>
<td>1.15 (1.10, 1.20)</td>
<td>1.41 (1.32, 1.51)</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td>1.61 (1.39, 1.87)</td>
<td>1.59 (1.37, 1.84)</td>
<td>1.91 (1.55, 2.36)</td>
<td>1.84 (1.49 – 2.27)</td>
<td>–</td>
</tr>
</tbody>
</table>

*Controlling for age and state.  
*Controlling for age, state, preconception care, and prenatal care.  
*Length of stay.

**Limitations**

We did not have access to medical charts or patient-reported outcomes to validate Medicaid claims, so we cannot rule out the possibility that our case ascertainment technique provides an over- or under-count of ectopic pregnancies or complications; however, we have previously conducted sensitivity analyses on multiple aspects of this technique including the diagnosis and procedure codes for ectopic pregnancy and the 9-month time window for an episode of care (Stulberg et al., 2013, 2014). Furthermore, claims data techniques for identifying acute complications from procedure codes have been validated by other authors (Lawthers et al., 2000; Virnig and McBean, 2001).

Additional limitations include a lack of long-term follow-up to identify more distant sequelae of ectopic pregnancy; and the possibility that the 14 states may not be representative of the other states with respect to the ectopic experience of women enrolled in Medicaid. We were also unable to assess provider factors and many other individual and contextual factors that may contribute to variation in ectopic pregnancy outcomes. We did not classify patients based on ectopic pregnancy implantation site, medical treatment with methotrexate, or outpatient-only care, because claims data lacked reliable means of identifying these aspects of care. However, we did include all ectopic pregnancies from inpatient, outpatient, and emergency room claims. We also could not observe care received by women before or after their Medicaid eligibility; it is possible that the variables we identify as receiving preconception or prenatal care are proxies for Medicaid eligibility, and that a patient who received care under other (non-Medicaid) insurance, or under a Medicaid managed care program with capitated instead of encounter-based payment, would be misclassified as having not received this care.
Conclusions

Ectopic pregnancy diagnosis and treatment has seen dramatic improvements in recent years, but not all women benefit equally. Future research should identify interventions that can continue to improve pregnancy outcomes for everyone, with a special emphasis on identifying and addressing the causes of racial and ethnic disparities.

Authors’ roles

D.B.S. conceived and supervised the study, and took lead on writing the manuscript. L.C. completed the analyses and participated in writing the manuscript. I.H.D. assisted with data acquisition, data management, and manuscript preparation. D.S.L. participated in data analysis and writing of the manuscript. All authors participated in the conception and drafting of the manuscript and all give final approval of this article.

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Conflict of interest

None declared.

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