

ORIGINAL RESEARCH

Obstetrics and Gynecology

Early pregnancy loss in the emergency department, 2006–2016

Lyndsey S. Benson MDMS¹ | Sara L. Magnusson MPH² | Kristen E. Gray PhD^{2,3} |
Kelly Quinley MD⁴ | Larry Kessler ScD² | Lisa S. Callegari MDMPH^{1,2,3}

¹ Department of Obstetrics and Gynecology, University of Washington School of Medicine, Seattle, Washington, USA

² Department of Health Services, University of Washington School of Public Health, Seattle, Washington, USA

³ Department of Veterans Affairs (VA) Puget Sound Health Care System, Health Services Research and Development, Seattle, Washington, USA

⁴ Department of Emergency Medicine, The Permanente Medical Group, Richmond, Virginia, USA

Correspondence

Lyndsey S. Benson, MDMS, Department of Obstetrics and Gynecology, University of Washington, Seattle, Washington, USA.
Email: lsbenson@uw.edu

Funding information

Department of Maternal and Child Health within the School of Public Health at the University of Washington

Abstract

Objectives: Women experiencing early pregnancy loss (EPL) frequently present to the emergency department (ED), but little is known about who receives EPL care in these settings. We aimed to estimate the proportion of ED visits for EPL-related care and determine characteristics associated with seeking care for EPL in the ED in a national sample.

Methods: We conducted a secondary analysis of the 2006–2016 National Hospital Ambulatory Medical Care Survey (NHAMCS), a nationally representative survey of US ED visits. We identified women ages 15–44 years who presented to the ED for threatened or confirmed EPL based on diagnosis code or chief complaint. We estimated the proportion of ED visits attributable to EPL-related care among all ED visits and among women 15–44 years old. Using multivariable logistic regression, we evaluated patient and visit characteristics associated with receiving EPL-related care versus all other care.

Results: The 2006–2016 NHAMCS dataset included 325,037 visits (weighted $n = 1,447,144,423$), including 82,871 visits among women ages 15–44 years (weighted $n = 371,016,125$). Of all ED visits for women ages 15–44 years, 2.7% (95% confidence interval, 2.5–2.9) were for EPL-related care. This equates to $\approx 900,000$ visits annually. Compared with women ages 15–44 years presenting to the ED for other reasons, those presenting for EPL-related care were younger and more likely to be Black or Hispanic.

Conclusions: EPL-related care accounts for over 900,000 ED visits in the United States each year. These findings highlight the current burden of EPL visits upon EDs nationally.

KEYWORDS

bleeding in pregnancy, early pregnancy loss, emergency department, miscarriage, pregnancy

1 | INTRODUCTION**1.1 | Background**

Approximately 20% of pregnancies end in early pregnancy loss (EPL), or miscarriage, which is defined as a nonviable, intrauterine pregnancy

within the first 12 weeks of gestation.^{1–4} Individuals experiencing EPL may report bleeding, cramping, or no symptoms at all, and many who do experience symptoms of EPL will go on to have a normal pregnancy.² Although some individuals present to their primary obstetric providers for evaluation of EPL, many seek care in the emergency department owing to lack of an established provider, delays in accessing outpatient care and timing or urgency of symptoms.^{5,6}

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Options for management of EPL include expectant management (“watch and wait” approach), medication management (with mifepristone and misoprostol or misoprostol alone), and surgical management (uterine aspiration).^{2,7} All 3 management options are considered safe and effective, and all 3 can be initiated in the ED setting.^{2,8} Clinical practice guidelines recommend that patients are informed about effectiveness of options and that patient preference should guide treatment choice in the absence of contraindications.^{2,9}

ED use has been consistently increasing in the United States, with use by low-income populations and populations of color rising at higher rates over time, and these vulnerable populations are more likely to face barriers in accessing routine health care services.¹⁰ Individuals seeking care in the ED are more likely to be Medicare and Medicaid beneficiaries, Black, and female.¹⁰ A growing number of maternity wards have closed in the United States in recent years, further increasing barriers to routine outpatient care for these populations, including access to primary care and obstetrics care.¹¹

1.2 | Importance

Based on data from 1993–2003, bleeding during early pregnancy comprised 1.6% of all ED visits among women ages 13–54 years.⁶ Knowledge gaps remain regarding the prevalence of ED visits for EPL in more recent years and the characteristics of patients who seek care for EPL in the ED. Despite the prevalence of visits to the ED for early bleeding, significant barriers to providing evidence-based EPL care in this setting remain, and patients overwhelmingly report negative experiences because of lack of emotional support, logistical follow-up, and provider knowledge and communication.^{12–17} Understanding the current prevalence of EPL will help inform resource allocation and training priorities for EDs.

1.3 | Goals of this investigation

The objective of our study was to characterize EPL-related ED visits in the United States.

2 | METHODS

2.1 | Study design and data source

We conducted a cross-sectional observational study using data from the National Hospital Ambulatory Medical Care Survey (NHAMCS) from years 2006–2016.¹⁸ NHAMCS is a nationally representative sample of US ED visits, administered annually by the National Center for Health Statistics, Centers for Disease Control and Prevention.¹⁸ Survey eligibility includes non-federal general and short-stay hospitals located in the 50 states and the District of Columbia that have a 24-hour ED, an outpatient department with physician clinics, or hospital-based ambulatory surgery locations. NHAMCS uses a 4-stage probability sampling design, and sampling weights are provided to pro-

The Bottom Line

Although a common condition presenting to the emergency department (ED), little is known about the national burden of ED visits for early pregnancy loss (EPL). In this analysis of data from the National Hospital Ambulatory Medical Care Survey, the authors found that over 900,000 ED visits annually are associated with EPL. These results highlight the importance of EPL diagnosis, care, and disposition in the ED.

duce unbiased population estimates. Each ED is randomly assigned to a 4-week reporting period, during which data for a random sample of visits are recorded by trained census interviewers. All data from the NHAMCS are publicly available and de-identified, so this study was deemed exempt from review by the University of Washington Institutional Review Board.

2.2 | Study population

We first identified the total number of ED visits in NHAMCS between 2006 and 2016 for women and men of all ages. We then identified visits for women of reproductive age, defined as ages 15–44 years. We note that individuals identifying as women are not the only population who experience pregnancy and EPL; however, because of the limitations of this dataset, we were able to identify EPL-related care only among individuals coded as women.

2.3 | Outcomes

Our primary outcome was visits for EPL-related care, which we identified using a combination of *International Classification of Diseases, Ninth Revision and Tenth Revision, Clinical Modification* (ICD-9 and ICD-10) diagnosis codes and ED Reason for Visit (RFV) codes. RFV codes include the chief complaint, as well as other symptoms or medical problems relevant to the ED visit. We classified EPL-related care as visits for clinical presentations across the spectrum of miscarriage, from either a threatened EPL (bleeding in early pregnancy without a clear diagnosis of pregnancy loss) to having already experienced a completed EPL. We used RFV and ICD-9/ICD-10 codes to define a broader category of threatened EPL and then defined a subgroup of diagnosis-confirmed EPL, which included only visits with ICD-9/ICD-10 codes for missed or spontaneous abortion (see Table 1).

2.4 | Characteristics of ED visits

We included demographic, visit-level, and hospital-level characteristics of ED visits related to EPL. We chose all characteristics

TABLE 1 Reason for visit (RFV) and *International Classification of Diseases, Ninth and Tenth Revisions, Clinical Modification (ICD-9/ICD-10)* diagnosis codes and definitions consistent with early pregnancy loss (EPL)-related care

	Code type	Code	Definition
Diagnosis-confirmed EPL	ICD-9	632*	Missed abortion
		634*	Spontaneous abortion
	ICD-10	O02.1	Missed abortion
		O03.*	Spontaneous abortion
Threatened EPL	RFV	17902	Spotting or bleeding during pregnancy
	ICD-9	640*	Threatened abortion
	ICD-10	O02.0	Threatened abortion

Abbreviations: EPL, early pregnancy loss, ICD, international classification of disease, RFV, reason for visit.

a priori based on review of the literature regarding EPL presentation in general and in the ED specifically.^{2,19,20} Demographic characteristics included patient age (as a continuous variable and as a categorical variable); race/ethnicity (categorized as Non-Hispanic Black, Non-Hispanic white, Hispanic, and Other); payment/insurance status (categorized as private insurance, public insurance [Medicare, Medicaid, or other state-based program], self-pay, and other or unknown insurance); and residence (private residence, unhoused, or other). In addition to categorizing age into 4 groups (ages 15–19, 20–29, 30–39, and 40–44 years old), we also categorized age as a dichotomous variable (age 35 years and older vs age <35 years), as advanced maternal age (defined as age 35 years or older) is an established risk factor for EPL.²

Visit characteristics included the day of the week the visit took place (weekend or weekday), season (Fall, Winter, Spring, and Summer), and year of visit. Visit characteristics also included use of ultrasound, hospital admission, type of provider seen, consultation by another service, length of visit, wait time to see a provider, and return visit within 72 hours. Ultrasound use, hospital admission, consultation of another service, return visit within 72 hours were dichotomous variables, and return visit referred to whether the patient had been seen in the same ED in the past 72 hours for any reason. Categories for type of provider seen were physician (including attending or resident physician), nurse or advanced practice provider (nurse practitioner or physician assistant), and other or no provider specified. Wait time was calculated as the time from arrival to first provider contact, and length of visit was calculated as the time from arrival to discharge; both wait time and length of visit were analyzed as categorical variables. Hospital-level characteristics included geographic region (Midwest, Northeast, South, and West) and metropolitan statistical area (MSA) designation (as defined by the US Office of Management and Budget), reflecting an urban versus rural classification.

2.5 | Data analysis

We performed a descriptive analysis of ED visits for EPL-related care. We estimated the proportion of ED visits attributable to EPL-related care among all ED visits (for women and men) and among women 15–44 years old. Similarly, we estimated the proportion of diagnosis-

confirmed EPL visits (a subset of EPL-related visits) among all ED visits and among those of women ages 15–44 years. We descriptively examined the demographic, visit, and hospital characteristics, including proportions and 95% confidence intervals (CIs), of visits for EPL-related care, visits for diagnosis-confirmed EPL, and visits unrelated to EPL among women of reproductive age.

Using multivariable logistic regression, we compared characteristics of reproductive aged women presenting for EPL-related care to those presenting for any other reason. We first examined unadjusted associations and then estimated multivariable logistic regression models to examine the factors independently associated with receiving EPL-related care in the ED. Models produced odds ratios (ORs) and corresponding 95% CIs. We included the previously selected demographic and hospital-level characteristics. Statistical significance was set at $P < 0.05$ for all ORs. We evaluated model fit with the Hosmer-Lemeshow goodness-of-fit test.

For all analyses, weighted results are reported unless otherwise stated. The highest proportion of missing data was seen for race/ethnicity (10.6%); all remaining variables had <10% missing data. There were no significant differences in proportion of missing data for any variables between women presenting for EPL-related care compared with women presenting for other reasons. For our primary logistic regression analysis, we performed complete case analysis. We performed a sensitivity analysis using multiple imputation by chained equations to assess the impact of any missing data; all variables with missing data were imputed. We used Stata 16.1 (StataCorp, College Station, TX) and accounted for the NHAMCS multistage sampling design for all analyses.

3 | RESULTS

The 2006–2016 NHAMCS dataset included 325,037 visits (weighted $n = 1,447,144,423$, 95% CI 1,339,853,608–1,554,435,237), including 82,871 visits among women ages 15–44 (weighted $n = 371,016,125$, 95% CI 340,534,073–401,498,177). There were 2342 visits for EPL-related care (weighted $n = 9,981,767$, 95% CI 8,901,906–11,061,627) and 612 diagnosis-confirmed EPL visits (weighted $n = 2,569,861$, 95% CI 2,173,318–2,966,405). Weighting to national estimates,

EPL-related care, accounted for 0.69% (95% CI 0.64–0.75) of all visits. This is equivalent to 907,433 visits for EPL-related care annually. When restricting the population to women ages 15–44 years old, visits for EPL-related care accounted for 2.7% (95% CI, 2.5–2.9) of all ED visits. Among all visits for EPL-related care, 25.6% had diagnosis-confirmed EPL. Visits with diagnosis-confirmed EPL accounted for 0.68% (95% CI 0.60–0.78) of all ED visits for women ages 15–44 years old.

The median age of women presenting for EPL-related visits was 26 years (interquartile range 21–31), with over half (54.4%) between the ages of 20 and 29 years (Table 2). Women seeking care related to EPL were disproportionately Black (26.4% vs 23.7% for non-EPL-related visits) and Hispanic (20.2% vs 11.2%), and Hispanic women were also disproportionately represented among women with diagnosis-confirmed EPL (19.4%). Women presenting for EPL-related care were more likely to use public insurance compared with women presenting for reasons unrelated to EPL. Very few women in any group reported experiencing homelessness.

Visits for EPL-related care and for diagnosis-confirmed EPL were evenly distributed between weekdays and weekends and across seasons, and there were no differences compared to the distributions for non-EPL-related care. There were no significant changes over time from 2006 to 2016. Distribution of visits varied by geography similarly among EPL-related and non-EPL-related visits, with the largest proportion in hospitals in the South (42.5% of EPL-related visits vs 40.7% of non-EPL-related visits). The majority of hospitals were located in urban (MSA) areas, and this proportion was higher for the group seeking EPL-related care (80.6% vs 76.1%).

More than half (57.4%) of visits for EPL-related care included an ultrasound. Visits for diagnosis-confirmed EPL or threatened EPL were not more likely to result in hospital admissions compared to visits for non-EPL related care. ED visits for EPL-related care were more likely to be preceded by a prior ED visit within the past 72 hours compared visits for non-EPL-related care (OR 1.79, 1.14–2.81).

Wait times and length of visit were longer for EPL-related care and diagnosis-confirmed EPL compared with visits unrelated to EPL. Almost half (43.8%) of diagnosis-confirmed EPL visits lasted longer than 4 hours, as did 36.7% of threatened EPL visits, compared with 21.9% of non-EPL-related visits. ED visits for threatened EPL and diagnosis-confirmed EPL were more likely to include seeing a physician versus other provider type (91.5% and 93.3%, respectively, vs 87.2% of visits for non-EPL-related care). Another service (eg, gynecology) was consulted for 11.3% of EPL-related visits and 17.3% of diagnosis-confirmed EPL visits, compared with 5.0% of non-EPL-related ED visits for women ages 15–44 years.

Unadjusted and adjusted ORs for associations of patient and hospital characteristics with presentation to the ED for EPL-related care versus presentation for other reasons among women of reproductive age are shown in Table 3. In the multivariable logistic regression model for all EPL-related care, younger age, non-white race, and urban location were significantly associated with presentation to the ED for EPL-related care versus other reasons. In the multivariable regression model for the subset of diagnosis-confirmed EPL, diagnosis-confirmed EPL diagnosis versus presentation for reasons unrelated to EPL was

associated with younger age (adjusted OR 2.1, 1.5–2.9), Hispanic race (adjusted OR 1.7, 1.2–2.3), and urban location (adjusted OR 1.7, 1.1–2.5) (data not shown). We evaluated our models using the Hosmer-Lemeshow goodness-of-fit test, which showed insufficient evidence for rejecting the models due to poor fit (P -values 0.73 and 0.77 for logistic regression models for threatened EPL and diagnosis-confirmed EPL, respectively). The same characteristics that had a significant association with EPL-related care and confirmed EPL diagnoses in the primary logistic regression models also had significant associations in the secondary sensitivity analyses using multiple imputation (data not shown).

4 | LIMITATIONS

This study is limited by potential misclassification of EPL-related care for both diagnosis and RFV codes. ICD-9/ICD-10 coding is often incomplete or imprecise, and coding for EPL in the ED has low sensitivity for identification of confirmed EPL specifically.^{21,22} Similarly, the RFV variable may lead to misclassification, as the chief complaint may be documented by triage nurses before full evaluation and final visit diagnosis determination by a medical provider. To maximize sensitivity for identifying patients receiving EPL-related care in the ED, we used both RFV and ICD-9/ICD-10 codes. This was also the reason we presented data on the subgroup of visits for diagnosis-confirmed EPL. However, it is possible that there are visits in this dataset that are related to ectopic pregnancy or induced abortion that are miscoded as EPL, and similarly we could have missed EPL visits that are miscoded as induced abortions.

NHAMCS sampling also excludes federal and long-term hospitals, which means the results from any analysis may be generalizable to only $\approx 85\%$ of US hospitals. We were unable to assess the treatment modality (expectant, medication, or aspiration management) or other outcomes for diagnosis-confirmed EPL visits.²³ We do not know how many patients had established care with an obstetrician before their ED visit, had previously received an ultrasound, or had previous complications in this or a prior pregnancy. There is no longitudinal follow-up in NHAMCS, so we are not able to link return visits for the same patient or ensure that patients are not counted more than once in the sample. We also do not know the primary reasons patients decided to seek care in the ED; patients may present to the ED rather than an outpatient clinic for a number of reasons, including timing or acuity of symptoms, lack of an established care provider, or difficulty in scheduling or accessing care.

5 | DISCUSSION

In this study using national data from NHAMCS, we estimated that there are $\approx 900,000$ ED visits for EPL-related care each year in the United States. Women visiting the ED for EPL-related care were younger and more likely to be Black or Hispanic than reproductive age women who presented to the ED for other reasons.

TABLE 2 Characteristics of women ages 15–44 years old presenting to the emergency department for early pregnancy loss (EPL)-related care, diagnosis-confirmed EPL, and reasons unrelated to EPL; 2006–2016, weighted

	Non-EPL-related visits	Visits for EPL-related care (threatened or diagnosis-confirmed)		Subset of visits with diagnosis confirmed EPL	
Patient characteristics	N (% [†])	N (% [†])	P value [‡]	N (% [†])	P value [‡]
	371,016,125	9,893,059 (2.7)		2,535,662 (0.69)	
Age (median [interquartile range])	28 (22–36)	26 (21–31)	<0.001	27 (22–32)	<0.001
Age (years)			<0.001		<0.001
15–19	54,089,396 (15.0)	1,349,499 (13.6)		334,540 (13.2)	
20–29	146,263,112 (40.5)	5,387,666 (54.4)		1,270,887 (50.1)	
30–39	110,433,146 (30.6)	2,706,698 (27.4)		788,821 (31.1)	
40–44	50,337,412 (13.9)	449,195 (4.5)		141,416 (5.6)	
Age <35	259,199,483 (71.8)	8,566,402 (86.6)	<0.001	2,117,825 (83.5)	<0.001
Age ≥35	101,923,583 (28.2)	1,326,656 (13.4)		417,838 (16.5)	
Race/ethnicity			<0.001		0.0002
Non-Hispanic white	187,033,910 (51.8)	3,930,420 (39.7)		1,037,786 (40.9)	
Non-Hispanic Black	85,599,756 (23.7)	2,607,081 (26.4)		593,628 (23.4)	
Hispanic	40,398,156 (11.2)	1,996,323 (20.2)		493,161 (19.4)	
Other	9,951,242 (2.8)	342,646 (3.5)		91,611 (3.6)	
Payment source			0.029		0.48
Self-pay	63,821,881 (17.7)	1,802,963 (18.2)		456,349 (18.0)	
Private insurance	122,519,009 (33.9)	3,148,087 (31.8)		803,903 (31.7)	
Public insurance	128,474,789 (35.6)	3,902,442 (39.4)		1,020,213 (40.2)	
Other/unknown	41,495,828 (11.5)	912,805 (9.2)		246,852 (9.7)	
Residence			0.16		0.27
Private residence	344,049,572 (95.3)	9,468,896 (95.7)		2,440,439 (96.2)	
Homeless	1,594,995 (0.4)	40,483 (0.)		7498 (0.3)	
Other/unknown	9,960,214 (2.8)	195,434 (2.0)		32,398 (1.3)	
Visit characteristics					
ED visit day			0.51		0.11
Weekend	98,226,147 (27.2)	2,778,310 (28.1)		599,803 (23.7)	
Weekday	262,896,919 (72.8)	7,114,749 (71.9)		1,935,860 (76.3)	
ED visit season			0.98		0.89
Fall	91,309,571 (25.3)	2,469,032 (25.0)		646,609 (25.5)	
Winter	84,715,722 (23.5)	2,300,036 (23.2)		588,769 (23.2)	
Spring	93,034,847 (25.8)	2,602,738 (26.3)		612,389 (24.2)	
Summer	92,062,927 (25.5)	2,521,253 (25.5)		687,896 (27.1)	
Year			0.30		0.54
2006	30,350,809 (8.4)	837,273 (8.5)		243,159 (9.6)	
2007	28,820,200 (8.0)	970,058 (9.8)		236,703 (9.3)	
2008	30,959,474 (8.6)	799,163 (8.1)		193,277 (7.6)	
2009	33,358,259 (9.2)	865,854 (8.8)		217,320 (8.6)	
2010	33,004,740 (9.1)	905,958 (9.2)		321,992 (12.7)	
2011	34,765,961 (9.6)	1,056,741 (10.7)		258,108 (10.2)	
2012	33,019,197 (9.1)	830,072 (8.4)		184,099 (7.3)	
2013	32,848,723 (9.1)	737,636 (7.5)		163,307 (6.4)	

(Continues)

TABLE 2 (Continued)

	Non-EPL-related visits	Visits for EPL-related care (threatened or diagnosis-confirmed)	Subset of visits with diagnosis confirmed EPL	
2014	34,973,033 (9.7)	873,977 (8.8)	266,128 (10.5)	
2015	34,354,260 (9.5)	1,121,852 (11.3)	239,298 (9.4)	
2016	34,668,411 (9.6)	894,475 (9.0)	212,272 (8.4)	
Hospital admittance	18,315,934 (5.1)	348,761 (3.5)	148,508 (5.9)	0.41
Ultrasound	21,557,288 (6.0)	5,675,877 (57.4)	1,362,769 (53.7)	<0.001
72-Hour revisit	14,935,505 (4.1)	476,429 (4.8)	180,156 (7.1)	0.038
Seen by consult service	13,631,730 (5.0)	823,863 (11.3)	321,498 (17.3)	<0.001
Provider				0.0002
Physician	314,966,109 (87.2)	9,050,411 (91.5)	2,364,970 (93.3)	
Nurse or advanced practice provider	41,776,571 (11.6)	779,149 (7.9)	156,187 (6.2)	
Other/none	4,332,423 (1.2)	60,614 (0.6)	14,505 (0.6)	
Length of visit				<0.001
<1 h	53,024,908 (14.7)	553,633 (5.6)	115,645 (4.5)	
1–2 h	79,670,319 (22.1)	793,294 (8.0)	162,473 (6.4)	
2–4 h	110,905,312 (30.7)	3,968,253 (40.1)	918,070 (36.2)	
>4 h	79,256,653 (21.9)	3,630,368 (36.7)	1,109,371 (43.8)	
Wait time				<0.001
<30 min	209,475,341 (58.0)	5,322,565 (53.8)	1,299,087 (51.2)	
30 min–1 h	64,735,411 (17.9)	1,626,307 (16.4)	378,907 (14.9)	
1–2 h	49,106,140 (13.6)	1,602,950 (16.2)	497,994 (19.6)	
>2 h	30,921,428 (8.6)	1,221,889 (12.4)	324,888 (12.8)	
Hospital characteristics				
Geographic region				0.031
Midwest	82,811,837 (22.9)	1,987,754 (20.1)	541,786 (21.4)	
Northeast	60,360,035 (16.7)	1,419,228 (14.3)	397,000 (15.7)	
South	146,847,459 (40.7)	4,208,570 (42.5)	954,279 (37.6)	
West	71,103,735 (19.7)	2,277,507 (23.0)	642,598 (25.3)	
Metropolitan statistical area (MSA)				0.0031
MSA	274,696,059 (76.1)	7,971,398 (80.6)	2,076,277 (81.9)	
Non-MSA	53,407,811 (14.8)	1,091,589 (11.0)	275,286 (10.9)	

† Column percentages may not add up to 100% because of missing data.

‡ P values refer to comparisons with non-EPL-related visits.

Of these EPL-related visits, approximately one-fourth had a confirmed EPL diagnosis in the ED.

The overall prevalence of EPL in the ED has not been recently reported. Wittels et al published results from a study using 1993–2003 NHAMCS data, finding that 1.6% of ED visits among women ages 13–54 years were because of vaginal bleeding in early pregnancy. Although bleeding in early pregnancy is a common predictor of EPL, it does not capture all EPL-related visits, so we included a broader definition of EPL-related care, as well as a subgroup specifically for diagnosis-confirmed EPL. We also used updated data from 2006–2016 and nar-

rowed the focus to a more commonly used reproductive age range of 15–44 years old.²⁴ We found similar correlates of ED visits for EPL-related care to the prior Wittels et al publication, including younger age and identifying as Hispanic or Black.

Our data showed that Black and Hispanic women are overrepresented among women seeking EPL-related care in the ED compared with women presenting to the ED for other reasons. Black and Hispanic women are less likely to receive prenatal care in the first trimester of pregnancy and more likely to experience pregnancy-related morbidity and mortality.²⁵ Women of color are also more likely to

TABLE 3 Bivariate and multivariate model: Predictors and characteristics of visits of women who present to the emergency department for early pregnancy loss (EPL)-related care (threatened and diagnosis-confirmed) versus care unrelated to EPL

	Unadjusted		Adjusted	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Age (years)				
<35	1.0	Reference	1.0	Reference
≥ 35	0.39	0.33	0.47	0.38
Race/Ethnicity				
Non-Hispanic white	1.0	Reference	1.0	Reference
Non-Hispanic Black	1.45	1.23	1.71	1.34
Hispanic	2.35	1.96	2.82	2.14
Other	1.64	1.20	2.23	1.55
Payment source/insurance				
Self-pay	1.10	0.91	1.33	0.98
Private insurance	1.0	Reference	1.0	Reference
Public insurance	1.18	0.99	1.41	1.08
Other	0.86	0.69	1.06	0.68
Residence				
Private residence	1.0	Reference	1.0	Reference
Homeless	0.92	0.35	2.43	0.82
Other	0.71	0.50	1.01	0.83
ED visit day				
Weekday	1.0	Reference	1.0	Reference
Weekend	1.05	0.92	1.19	1.04
ED visit season				
Fall	1.0	Reference	1.0	Reference
Winter	1.00	0.84	1.20	1.01
Spring	1.03	0.86	1.24	1.03
Summer	1.01	0.86	1.20	1.00
Geographic region				
Midwest	1.0	Reference	1.0	Reference
Northeast	0.98	0.76	1.27	0.85
South	1.19	0.96	1.49	1.11
West	1.33	1.08	1.65	1.17
Metropolitan statistical area (MSA)				
Non-MSA	1.0	Reference	1.0	Reference
MSA	1.42	1.12	1.79	1.36

experience EPL compared with white women, likely resulting from cumulative stressors of racism, social determinants of health, and increased environmental and occupational exposures.^{26,27} Overall, the United States has seen a steady increased use of EDs, underscoring the vital role they play in caring for those who are socioeconomically vulnerable.¹⁰

Among the 4 regions in the United States, the highest proportion of visits for EPL-related care took place in hospitals in the South; this proportion was higher than the proportion of visits for non-EPL-related care that took place in the South. Obstetric unit closures have disproportionately affected the South, which may contribute to these findings.^{11,28,29} Women in the South also face greater barriers

to seeking family planning care, because of state-level restrictions on abortion-related care.^{30,31} This points to a lack of access to reproductive health and to obstetrics and gynecology services for women, who may then turn to the ED for pregnancy and EPL-related care.

Our data demonstrate that patients who present to the ED and have a confirmed EPL diagnosis are also more likely to have had a prior ED visit within 72 hours (7.1% had been seen in the past 72 hours, compared with 4.1% of patients presenting for care unrelated to EPL). Although some of these patients may have been directed to return to the ED or may have barriers to accessing outpatient care, this finding may also indicate an opportunity for improved counseling and referral to ambulatory clinics to decrease burden on ED resources. Understanding the burden of EPL and the characteristics of patients seeking care for EPL in the ED will help inform education, policies, and resource allocation to best serve these patients. In response to the unique physical, emotional, and cognitive needs of patients experiencing EPL, and concerns regarding the quality of care they receive in the ED, there are ongoing interdisciplinary efforts to train health care teams in the ED and outpatient setting to provide patient-centered, evidence-based care for EPL.³² One example of this is the Training, Education, and Advocacy in Miscarriage Management (TEAMM) project, based at the University of Washington.³³

In summary, EPL-related care accounts for >900,000 ED visits in the United States each year. Given the ongoing closures of obstetric units and reproductive health clinics around the United States, limiting access to women's health services for the most disadvantaged, EDs will increasingly need to fill gaps in care.^{11,28,29,34} Provision of comprehensive and high-quality EPL care in the ED setting will therefore be one critical component to ensuring healthy outcomes and equitable care for women in the United States.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

LB and SM conceived the study. LB, SM, KG, KQ, and LC designed the study. LB and SM conducted the data analysis. KG, LK, and LC provided statistical advice and oversaw the data analysis. LB and SM drafted the manuscript and all authors contributed substantially to its revision.

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AUTHOR BIOGRAPHY



Lyndsey S Benson, MD, MS is an Assistant Professor in the Complex Family Planning Division in the University of Washington Medicine Department of Obstetrics and Gynecology in Seattle, Washington.

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