Abnormal Uterine Bleeding, Health Status, and Usual Source of Medical Care: Analyses Using the Medical Expenditures Panel Survey

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Abstract

Background: Traditionally, research on abnormal uterine bleeding (AUB) focused on measured menstrual blood loss. However, the main burden of this symptom from the patient perspective is its impact on quality of life. Better describing the demographic characteristics, quality of life, and utilization of medical care of women with AUB could assist with health resource planning for this population.

Methods: We analyzed data from the Medical Expenditures Panel Survey from 2002 to 2010. AUB was identified by *International Classification of Diseases*, ninth edition (ICD-9) code group 626, disorders of menstruation and other abnormal bleeding from the female genital tract. Health-related quality of life was assessed by the Short-form 12 Health Survey (SF-12, QualityMetric) physical and mental component summary scores (PCS and MCS). Poorer health-related quality of life was defined as PCS or MCS <50. Odds ratios (OR) and 95% confidence intervals (CI) for the association of AUB with poorer SF-12 scores and having a usual source of care were estimated by multivariable logistic regression models.

Results: Data analyzed represented an annual average of 56.2 million nonpregnant women between ages 18 and 50 years. We estimate that 1.4 million women per year (95% CI: 1.3–1.5 million) reported AUB. Women with AUB were more likely to be younger, Caucasian, and obese than women without AUB. Compared to women without AUB, women with AUB had greater odds of a poorer PCS score (OR = 1.30, 95% CI: 1.10–1.55), a poorer MCS score (OR = 1.28, 95% CI: 1.10–1.51), and a usual source of care (OR = 1.85, 95% CI: 1.44–2.38).

Conclusions: AUB is associated with diminished physical and mental health status and having a usual source of medical care.

Introduction

Abnormal uterine bleeding (AUB) is defined as any alteration in the pattern or volume of menstrual blood flow. Two main categories of AUB are heavy menstrual bleeding and irregular menstrual bleeding, and many patients experience a combination of these symptoms.[1] Studies have shown the prevalence of AUB varies, ranging in most studies from 10%–30%, and is dependent upon the study population and definition of AUB.[2,3,4]

Research on AUB has mostly focused on objective measures of menstrual blood loss as the main study outcome. These studies defined heavy menstrual bleeding as >80 mL mean blood loss per cycle.[3] However, approximately two-thirds of women seeking medical treatment for heavy menstrual bleeding do not meet this objective criterion[5] suggesting that something other than the volume of blood lost is affecting women with AUB. In most circumstances, AUB is not life threatening, and from the patient perspective the main burden of this symptom is its impact on quality of life.[6,7] Quality of life is not measured in a standardized fashion across studies on AUB and little information is available on the impact of AUB on quality of life measures from a national population-level perspective.[6,7,8] The available population-level studies have shown that women with AUB have increased utilization of health resources compared to women without AUB.[2,9,10]

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Determining the relationship between AUB, quality of life, and having a usual source of medical care at a national level will help inform health care delivery to patients with this prevalent symptom. The objectives of this study were to compare the population of women with and without AUB by demographics, health-related quality of life status, and identification of a usual source of medical care using a large nationally representative database, the Medical Expenditures Panel Survey (MEPS). We hypothesized that women with AUB would have lower quality of life scores and greater identification of a usual source of care than women without AUB.

Materials and Methods

Data source and study design

MEPS is a series of publicly available surveys of health services utilization and health insurance coverage conducted annually since 1996 by the Agency for Healthcare Research and Quality (AHRQ). The household component of MEPS collects data on sociodemographic characteristics, health status, medical conditions, health care access and use, and medical expenditures that are representative of the United States civilian non-institutionalized population. Each year a new panel of households is assembled from a subsample of households participating in the prior year's National Health Interview Survey (NHIS), which is conducted by the National Center for Health Statistics. NHIS households are selected using a stratified multistage sample design, with oversampling of households with Hispanics or African Americans. This sampling scheme carries over into the MEPS panel of the subsequent year. In addition, NHIS households with Asian Americans or low-income families were selected with certainty into the MEPS panels. The public use data files and details of the survey methodology are available on the study website.[11]

For each MEPS panel, data are collected from household respondents through five interviews covering two full calendar years. Therefore, each calendar year includes households from two overlapping panels. Information for all eligible household members is reported by one member. Reported medical conditions are recorded verbatim and classified by professional coders according to the *International Classification of Diseases, Ninth Revision, Clinical Modifications* (ICD-9-CM). The ICD-9 codes are then truncated to the first three digits by the AHRQ in order to preserve confidentiality for individuals reporting rare conditions.

The present study used the full-year household component data from 2002 up to 2010. These data were pooled in order to provide a sufficient sample size for statistically reliable national estimates of AUB frequency. Annual MEPS response rates for this time period ranged from 64.7% in 2002 to 53.5% in 2010 (http://meps.ahrq.gov/mepsweb/survey_comp/hc_response_rate.jsp, http://meps.ahrq.gov/mepsweb/data_stats/download_data/pufs/h138/h138doc.shtml#321Response) Public-use person-level and medical conditions files were downloaded from the website (last accessed on November 5, 2012) and linked by person, household, and panel identification numbers. We defined our subpopulation of interest as nonpregnant women 18 to 50 years of age who had not had hysterectomies, in order to restrict our sample to adult women before the average age of menopause in the United States who could experience AUB. Pregnancies were identified by ICD-9 code groups V22, normal pregnancy, and V23, supervised high-risk pregnancy, in

the linked conditions files. Hysterectomy status was determined from the preventive care component of the household survey. The subpopulation was further limited to women who were in the U.S. civilian non-institutionalized population, at every interview round in a given year.

Assessment of AUB and health status

Abnormal uterine bleeding was identified from the medical conditions files by ICD-9 code group 626, disorders of menstruation and other abnormal bleeding from the female genital tract. This group includes absence of menstruation (626.0), scanty or infrequent menstruation (626.1), excessive or frequent menstruation (626.2), puberty bleeding (626.3), irregular menstrual cycle (626.4), ovulation bleeding (626.5), metrorrhagia (626.6), postcoital bleeding (626.7), other (626.8), and unspecified (626.9). Reports of AUB at multiple interviews in a given year were counted only once. Health status was assessed by the SF-12 physical and mental component summary scores (SF-12 physical component summary scores [PCS] and mental component summary scores [MCS]) from the self-assessment questionnaire (SAQ). Ninety-three percent of the subpopulation sample records included SAQ data. Scores for each SF-12 component were dichotomized at 50, the normalized mean score, with scores less than 50 indicating poorer health and functioning. We chose the score of 50 as a cut point because a score of 50 is the mean of the norms-based scores, making the results readily interpretable to consumers of the medical literature. Health care utilization was evaluated by the respondent's having a usual source of care (yes vs. no). The number of medical conditions other than AUB was obtained by counting unique conditions reported by each respondent in a given year. Number of conditions was grouped as less than or equal to 1, 2–3, and 4 or more to achieve a sufficient number of records for analyses.

Socio-demographic variables

Demographic characteristics, such as age and marital status, were based on end-of-year summary variables. When these summary variables were unavailable, values were taken from the interview round nearest the end of the year. A participant was considered employed if there was any evidence of employment for at least two rounds in a given survey year. Total personal income was converted to 2010 dollars using the Personal Consumption Expenditures index, in accordance with MEPS recommendations (http://meps.ahrq.gov/mepsweb/about_meps/Price_Index.shtml). Income categories were based on quartiles of the distribution in 2010 for the subpopulation of interest (nonpregnant women 18 to 50 years of age who had not had hysterectomies).

Statistical analysis

Sampling weights in the MEPS files were used to generate nationally representative estimates of AUB frequency, health status, and having a usual source of medical care. These weights account for the probability of selection, non-response, attrition, and the oversampling of some socio-demographic groups. Sampling weights specific to the SAQ were used for the analysis of health status. The sampling weights for each record were divided by nine resulting in average annual estimates over the nine-year time period. Strata and primary

sampling unit variables were used to obtain variance estimates by linearization of a Taylor series approximation. A subpopulation analysis was performed to limit the results to our subpopulation of interest while preserving the full sample for proper variance estimation.[12]

Categorical variables were compared by Chi-square test. Multivariable logistic regression was used to estimate adjusted odds ratios (OR) and 95% confidence intervals (CI) for the association of AUB with three outcome variables: low SF-12 PCS (<50), low SF-12 MCS (<50), and having a usual source of care. Demographic variables were selected for inclusion in the multivariable models if they were significantly associated ($p < 0.05$) with the outcome variables in the bivariate analyses. These variables were retained in the model if they remained significantly associated after mutual adjustment. To avoid over-adjustment, healthcare-related variables that may have been a consequence of reporting AUB were omitted from the models. Data analysis was performed with the statistical software package STATA version 10 (StataCorp). Two-tailed p values less than 0.05 were considered statistically significant.

Results

A total of 309,620 records were included from the MEPS household component files in the years 2002–2010. After applying the study sampling weights, these records extrapolate to an annual average of 299 million people in the United States. The subpopulation of interest, non-pregnant women aged 18–50 years ($n = 57,484$ records), corresponded to an annual average of 56.2 million women (95% CI: 54.3–58.0). Of these women, an average of 1.4 million per year (95% CI: 1.3–1.5), or 2.4%, reported AUB on an annual survey.

Compared to women without AUB, women with AUB were more likely to be younger (age 18–30 years), white, non-Hispanic, never married, and obese (Table 1). Education, employment, and income were not different between groups. Having AUB was associated with having a usual source of care and with reporting a greater number of medical conditions.

We estimated the association between demographic characteristics and SF-12 physical component (PCS) and mental component (MCS) scores to determine factors that may be independently associated with decreased quality of life. SF-12 scores were dichotomized into score ≥ 50 and <50, with <50 assumed to represent poorer quality of life (Table 2). Lower levels of education, being divorced, widowed, or separated, unemployment, lower income, and obesity were associated with PCS scores and MCS scores <50 ($p < 0.0001$ for all comparisons). Additionally, older age (41–50 years) and being black or African American were associated with reduced PCS scores ($p < 0.0001$ for both) and being White/Caucasian was associated with lower MCS scores ($p = 0.003$). Usual care differed significantly by all demographics ($p < 0.0001$): older age, white/Caucasian race, non-Hispanic ethnicity, higher levels of education, being married, higher income, and higher body mass index (BMI) were all associated with having a usual source of care. Based on the comparison of demographic characteristics by SF-12 component scores, eight covariates were selected for consideration for the logistic regression analysis of AUB status and low SF-12 component summary scores: age, race, Hispanic ethnicity, education, marital status,

TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF WOMEN WITH AND WITHOUT ABNORMAL UTERINE BLEEDING

	Weighted[a] column %		
Characteristic	No AUB	AUB	p
Total, weighted	54.8 million	1.4 million	
Age (years)			
18–30	38	43	0.03
31–40	30	26	
41–50	32	31	
Race			
White/Caucasian	78	84	0.0001
Black/African American	14	10	
Other	8	6	
Ethnicity			
Hispanic	16	12	0.003
Not Hispanic	84	88	
Years of education			
<12	16	19	0.1
12	28	24	
13–15	26	27	
≥16	29	30	
Marital status			
Married	50	43	0.005
Divorced/separated/widowed	14	14	
Never married	37	42	
Employment status	78	79	0.4
Employed	22	21	
Not employed			
Total personal income			
<$6,740	24	25	0.4
$6,740–19,999	23	20	
$20,000–39,999	26	28	
≥$40,000	27	27	
BMI			
<25 kg/m^2	50	48	0.007
25 to <30 kg/m^2	25	23	
≥30 kg/m^2	25	30	
Has usual source of health care			
Yes	75	85	<0.0001
No	25	15	
Number of medical conditions other than AUB			
≤1	36	18	<0.0001
2–3	31	32	
≥4	32	50	

Note: Percentages may not sum to 100 due to rounding.
[a]Weighted values are average annual estimates over the 2002–2010 time period, based on 57,484 records.
AUB, abnormal uterine bleeding; BMI, body mass index.

employment status, income, and BMI (Table 3). Adjusted models included covariates that remained significantly associated with the SF-12 scores. Adjusting for all eight covariates, women with AUB had 1.30 times the odds of poor physical health, defined by PCS score <50, compared to women without AUB (95% CI: 1.10–1.55) (Table 4). Adjusting for the same covariates, women with AUB were also at increased

Table 2. Demographic Characteristics and SF-12 Physical Component
and Mental Component Summary Scores, Entire Study Population

Characteristic	Weighted[a] column %			Weighted[b] column %		
	SF-12 PCS ≥ 50	SF-12 PCS < 50	p	SF-12 MCS ≥ 50	SF-12 MCS < 50	p
Total, weighted	42.1 million	13.1 million		32.3 million	23.0 million	
Age (years)						
18–30	41	27	< 0.0001	37	38	0.03
31–40	30	30		30	30	
41–50	29	43		33	31	
Race						
White/Caucasian	80	75	< 0.0001	78	79	0.003
Black/African-American	12	17		14	13	
Other	8	9		8	7	
Ethnicity						
Hispanic	15	16	0.002	15	16	< 0.0001
Not Hispanic	85	84		85	84	
Years of education						
< 12	14	21	< 0.0001	14	18	< 0.0001
12	27	34		28	29	
13–15	27	25		27	26	
≥ 16	32	20		31	26	
Marital status						
Married	50	49	< 0.0001	53	46	< 0.0001
Divorced/separated/widowed	12	19		12	17	
Never married	37	32		35	37	
Employment status						
Employed	81	69	< 0.0001	80	75	< 0.0001
Not employed	19	31		20	25	
Total income						
< $6,740	22	26	< 0.0001	23	24	< 0.0001
$6,740–19,999	21	28		21	25	
$20,000–39,999	26	26		26	26	
≥ $40,000	30	20		30	24	
BMI						
< 25 kg/m^2	54	34	< 0.0001	52	46	< 0.0001
25 to < 30 kg/m^2	26	25		25	26	
≥ 30 kg/m^2	20	40		23	28	

Note: Percentages may not sum to 100 due to rounding.
[a]Weighted values are average annual estimates over the 2002–2010 time period, based on available data (52,328 records).
[b]Weighted values are average annual estimates over the 2002–2010 time period, based on available data (51,657 records).
MCS, mental component summary score; PCS, physical component summary score; SF-12, Short form, 12 items.

odds for poor mental health (MCS <50, OR 1.28, 95% CI: 1.10–1.51) and for having a usual source of care (adjusted OR 1.85, 95% CI: 1.44–2.38) compared to women without AUB.

Discussion

Using a nationally representative sample of women, we found that AUB was reported by an average of 1.4 million women (2.4%) annually in the United States. Prior information on prevalence estimates, healthcare costs, and quality of life information for AUB has been derived from a wide spectrum of data sets including national surveys and datasets (National Health Inpatient Survey, the National Hospital Discharge Survey, and MEPS),[9,10,13,14,15,16] longitudinal cohort studies (the Oxford Family Planning Study),[17] systematic reviews,[2] and individual randomized clinical trials (RCTs).[18] The prevalence of AUB is difficult to estimate and

is dependent upon the study population and the way in which AUB is defined. Because AUB encompasses a constellation of menstrual bleeding problems ranging from scant, irregular bleeding to heavy and excessive menstrual bleeding, the dataset used and the means of defining the population of women with AUB can dramatically change prevalence estimates.

An estimate of self-reported heavy menstrual bleeding of 10%–30% is typically quoted in the literature[2,4] which is much higher than the percent that we found in this study. The collection of studies that produced the estimates of 10%–30% focused specifically on AUB and asked detailed questions about menstrual patterns.[2] In contrast the MEPS survey is a population survey on healthcare utilization and does not focus on any particular health condition. The fact that the MEPS survey is not intended to be used for estimates of prevalence and does not focus on AUB may explain the lower prevalence

TABLE 3. DEMOGRAPHIC CHARACTERISTICS AND HAVING A USUAL SOURCE OF HEALTH CARE, ENTIRE STUDY POPULATION

| | Weighted[a] column % | | |
| | Usual source of care | | |
Characteristic	No	Yes	p
Total, weighted	13.6 million	42.0 million	
Age (years)			
18–30	49	35	< 0.0001
31–40	28	30	
41–50	23	35	
Race			
White/Caucasian	76	79	< 0.0001
Black/African-American	15	13	
Other	9	8	
Ethnicity			
Hispanic	23	13	< 0.0001
Not Hispanic	77	87	
Years of education			
< 12	21	15	< 0.0001
12	29	28	
13–15	25	27	
≥ 16	24	30	
Marital status			
Married	42	52	< 0.0001
Divorced/separated/widowed	14	13	
Never married	43	35	
Employment status			
Employed	75	79	< 0.0001
Not employed	25	21	
Total personal income			
< $6,740	28	22	< 0.0001
$6,740–19,999	28	21	
$20,000–39,999	25	26	
≥ $40,000	19	30	
BMI			
< 25 kg/m^2	53	49	< 0.0001
25 to < 30 kg/m^2	25	25	
≥ 30 kg/m^2	22	26	

Note: Percentages may not sum to 100 due to rounding.
[a]Weighted values are average annual estimates over the 2002–2010 time period, based on 56,786 records.

estimate generated using these data compared to other studies that focused specifically on AUB.[2,4]

Identifying factors associated with AUB in a population-based sample can assist with the planning of health resources for this population of women. We found that younger age, white race, and markers of lower socioeconomic status were associated with AUB. This is in contrast to a study conducted 20 years ago using National Hospital Discharge Survey data that found rates of hospital discharges for menstrual disorders were greatest among women ages 40–44 years and rates of menstrual disorders for non-white women were higher than rates for White women, though this difference was not statistically significant.[16] However, the earlier study focused on hospitalization for menstrual disorders and should be interpreted cautiously within the context of current medical practices. Hospitalizations for AUB for women not undergoing hysterectomy have decreased dramatically over the past few decades,[15] and although women with AUB may be younger, they may be less likely to need hospitalization for their problem. This, again, underscores the difficulty in obtaining estimates of AUB among the general population and the importance of considering the source of the data and definition of AUB when interpreting study results.

Our study showed within a national population-based sample, women with AUB suffered a reduction in quality of life and diminished physical and mental health status as measured by the SF-12 when compared to women without AUB. This relationship was maintained when controlling for other important factors that could affect quality of life including age, BMI, education, and marital status. This was similar to findings from a previous study in which women reporting heavier menses in the previous year were less likely to report their health as very good or excellent (55%) than women with normal or lighter menses (69%).[10] Additionally, in a systematic review of RCTs on treatments of AUB, the study populations of women with AUB had lower SF-36 scores when compared with normative values for women ages 18–54 years.[2] Although women participating in RCTs may be different from a population-based sample of women with AUB, the consistency of these results suggests that the major health impact of AUB lies with its affect on quality of life. Based on these findings, a comprehensive evaluation of women with AUB should include an assessment of the impact of symptoms on health status and quality of life.

Our study showed that women with AUB were accessing health care, as evidenced by their identification of a usual source of medical care. Other studies have also shown similar associations.[2,10] When compared to women with normal or lighter menses, women with heavier menses were more likely to have seen a medical specialist, had an office visit, had surgery, or taken prescription medication in the prior year.[10] We also found that women with AUB were more likely to report more medical conditions than women without AUB. This was not surprising because AUB represents a symptom of an underlying medical problem, such as a coagulation disorder, uterine structural problems, and disorders of ovulation.[19] When women seek medical care for AUB, they should be worked up for the etiology of their bleeding and given an appropriate diagnosis.

Regardless of the etiology of the symptom of AUB, many treatment options, both surgical and non-surgical, are available. Menstrual disorders account for a substantial proportion of hysterectomies in the United States.[20] Although meta-analyses using individual patient data have shown that hysterectomy may be more cost-effective than both endometrial ablation and the levonorgestrel intrauterine system for treating AUB,[21] hysterectomy is a major surgical procedure that eliminates the option to bear children and is associated with surgical risks and significant recovery time. Choosing the "best" treatment for AUB for the individual patient involves shared decision-making and strong consideration of patient values and preferences.[22] Given women with AUB are accessing care, optimizing their medical care by developing more effective treatment strategies (better options, optimizing use of the most effective available options) could positively impact the quality of life of a substantial population of women and lead to more efficient use of health resources.

TABLE 4. LOGISTIC REGRESSION ANALYSIS OF AUB STATUS AND LOW SF-12 SUMMARY SCORES
OR HAVING A USUAL SOURCE OF CARE

Outcome	OR	(95% CI)	p
Low SF-12 physical component score (PCS < 50)			
AUB versus no AUB (unadjusted)	1.28	(1.08–1.51)	0.005
AUB versus no AUB (adjusted)[a]	1.30	(1.10–1.55)	0.003
Low SF-12 mental component scores (MCS < 50)			
AUB versus no AUB (unadjusted)	1.31	(1.12–1.54)	0.001
AUB versus no AUB (adjusted)[a]	1.28	(1.10–1.51)	0.002
Having a usual source of care			
AUB versus no AUB (unadjusted)	1.87	(1.47–2.39)	< 0.0001
AUB versus no AUB (adjusted)[a]	1.85	(1.44–2.38)	< 0.0001

Note: Both unadjusted and adjusted models are limited to records with complete data on the outcome and covariates: PCS ($n=50,723$), MCS ($n=50,085$), and usual source of care ($n=54,956$).
[a]Adjusted for age, race, Hispanic ethnicity, education, marital status, employment status, personal income, and BMI, all as categorical covariates.
CI, confidence interval; OR, odds ratio.

Our study had several limitations. Within MEPS, some diagnoses were confirmed with healthcare providers. However, some were not confirmed and the majority of household data was self-reported and subject to recall bias. Because of the cross-sectional nature of the survey, causality of diminished quality of life and increased healthcare utilization cannot be directly determined. Our study, and other studies using cross-sectional data from national datasets, showed an increase in healthcare utilization among women with AUB, but cannot pinpoint whether or not the AUB was the exact reason that women used the health resources because of the nature of the data. Additionally, although the SF-12 is a widely used and validated measure of health-related quality of life, it is not a disease-specific metric for quality of life related to AUB. Lastly, MEPS data include only 3-digit ICD-9 codes, which permitted only a broad definition of AUB (ranging from scant bleeding to excessive bleeding). We were unable to determine prevalence, quality of life, or healthcare utilization for more specific subsets of women with AUB, such as women with heavy menstrual bleeding or women with irregular menses.

The personal and financial impact heavy menstrual bleeding has on women and society make focusing on access to effective treatment of this prevalent problem an urgent priority. Findings of this study highlight the impact AUB has on quality of life and underscore the importance of assessing quality of life to determine whether or not a treatment for AUB is effective. Although women with AUB were more likely to identify a usual source of care when compared to women without AUB, 15% of women with AUB did not report having a usual source of health care. Facilitating women's access to appropriate outpatient treatment for AUB may mitigate the reduction in quality of life for this substantial population of women. Access through universal healthcare insurance coverage may help women get the care they need, which could potentially impact quality of life and improve work productivity.

Conclusions

In summary, AUB is a prevalent women's health problem that affects quality of life and utilization of health resources. Facilitating access to appropriate healthcare and effective treatment could have a dramatic impact on the lives and productivity of women with this symptom. This study emphasizes the need for additional research on the impact of individual treatment algorithms on quality of life of women and healthcare resource planning to assist with timely and appropriate treatment for AUB.

Disclosure Statement

No competing financial interests exist for any of the authors.

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