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Maternal Depression Scale: Do "Drop-In" Laborist Patients Have Increased Postpartum Screening Risks Compared to Patients with Adequate Prenatal Care?

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Abstract
Objectives The Edinburgh Postnatal Depression Scale (EPDS) identifies women with depressive symptoms in pregnancy. Our primary objective was to determine the prevalence of EPDS screen-positive women delivering on our no prenatal care (laborist) service and to compare these patients to private patients delivering with prenatal care. *Methods* Retrospective cohort analysis of EPDS scores during January 1, 2015 to June 18, 2015 was conducted. Scores ≥ 10 were considered at-risk. Results were analyzed as an aggregate and then as no prenatal care versus prenatal care. Characteristics for patients with at-risk scores (EPDS ≥ 10) versus low-risk scores (EPDS < 10) were quantified. *Results* Analysis occurred on 970 women. EPDS ≥ 10 occurred in 12.4% (n = 120/970). Positive EPDS score was 21.1% without prenatal care versus 10.9% with adequate prenatal care (P = 0.003). Maternal demographics and delivery characteristics were clinically similar in patients with prenatal care compared to no prenatal care. Private insurance was more common in patients with prenatal care compared to no prenatal care (23.5 versus 8.1%, P = 0.0001). However, analysis of patients with EPDS > 10 showed non-significant distributions of ethnicity, private insurance, Medicaid, or no insurance compared to patients with EPDS < 10. *Conclusion for Practice* Patients without prenatal care who arrive solely for urgent "drop-in" delivery have a measurable increased risk factor for postpartum depressive symptoms. Ethnicity and payor status were related to adequacy of prenatal care but were not significant variables when analyzing patients with EPDS > 10. Laborist services providing care to "drop-in" patients should recognize this increased risk and develop policies for screening, referral and follow-up of at-risk patients.

Keywords Prenatal care · Postpartum depression · Edinburgh postnatal depression scale · EPDS · Maternal health · Laborist service

Significance

One in ten women are at risk for development of postpartum depression. This frequency doubles to 1 in 5 for patients who arrive at the hospital only for delivery and are cared for within our laborist service. This finding highlights the need for universal screening for depression and close surveillance in the postpartum period, especially for the at-risk population without prenatal care.

Introduction

Depressive symptoms are recognized as the most common emotional complication of pregnancy, affecting approximately 10% of deliveries (Werner et al. 2014; Venkatesh et al. 2016; Reeves et al. 2011). Traditional prenatal care allows perinatal providers the opportunity for the detection and treatment of depression and other mental health concerns in pregnant and postpartum women (Massachusetts Child Psychiatry Access Program [MCPAP] For Moms 2017). However, not every woman participates in prenatal care. Previous research suggests various barriers to adequate prenatal care include younger age of the woman, fewer years

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of education, current illicit drug use, transportation barriers, poverty, and lack of social support (Baer et al. 2018; Nothnagle et al. 2000; Sunil et al. 2008). Furthermore, incentives such as cash, baby carrier, and taxi voucher do not increase initiation of prenatal care, but instead increase the frequency of visits for women who have already attended prenatal care appointments (Haas et al. 2012). Over the past decade, a growing trend towards obstetric hospitalist programs in the United States has developed primarily to improve patient safety for "drop-in" patients without an established prenatal care provider (Olson et al. 2012). Contracted duties of a laborist service include delivery management and initial postpartum care for unassigned patients arriving at the hospital (Veltman 2015).

The United States Preventive Services Task Force (USPSTF) recommends screening for depression in postpartum women (USPSTF 2016); decreasing the proportion of women who experience postpartum depression is a United States Department of Health and Human Services goal (Centers for Disease Control and Prevention 2017; HealthyPeople 2017). However, postpartum depression questionnaires are not yet routinely administered in all hospitals in the U.S. Our institution is unique due to the fact that every woman is instructed to complete the Edinburgh Postnatal Depression Scale (EPDS) questionnaire before discharge. Our hospital determined that universal screening with the EPDS would be a nursing-initiated process on postpartum day 1–3. This report evaluates the routine use of the EPDS in a population of patients delivering without prenatal care compared to women delivering with prenatal care. We theorized that these "drop-in" patients may be especially vulnerable to an increased risk for postpartum depression and may represent a sub-population that can benefit from targeted postpartum preventative therapy. To our knowledge, little to no data exists that examines the possible connection between postpartum depression and prenatal care. The findings of our study would have relevant practice implications for laborist services and postpartum nursing care and follow-up.

Methods

The EPDS is a ten-question, self-administered tool previously validated to identify women at risk for developing perinatal depression (El-Hachem et al. 2014; Cheraghi et al. 2015). Research has demonstrated that the EPDS can be considered a reliable screening tool for postpartum depression as early as the second day after delivery (El-Hachem et al. 2014). Responses are scored between 0 and 3 according to the severity of various symptoms. The total score is obtained using answers from each of the ten items.

The EPDS questionnaire is administered universally to postpartum women at Sunrise Hospital and Medical Center in Las Vegas, NV. The tool serves as a 10-item questionnaire with internal and external validation to identify women at risk for depression during pregnancy and the postpartum period. The questionnaire is simple enough for patient self-administration and requires minimal time commitment to complete and assess. Instructions for completing the EPDS tool are given by nursing staff on day 1–3 following delivery. A total score between 0 and 9 indicates a low or limited risk for postpartum depression. A score between 10 and 13 indicates a mild risk of postpartum depression, between 14 and 18 indicates moderate risk for postpartum depression, and 19 or above indicates severe risk of postpartum depression. A score of 10 or higher warrants follow-up for support services, counseling, and potentially medication or hospitalization if patient or neonatal safety is a concern by our institution's guidelines and the Alabama Perinatal Excellence Collaborative (APEC) guidelines (APEC 2017).

In our hospital, patients without prenatal care were automatically assigned to the laborist service. After obtaining approval from the University of Nevada Institutional Review Board, we retrospectively analyzed the electronic charts of women who delivered in our institution between January 1, 2015 and June 18, 2015. Laborists delivering patients with prenatal care (private physician missing delivery) were assigned in the prenatal care groups. A total of 1736 patient charts were reviewed. Exclusion criteria included any woman whose EPDS score was not available in the patient chart (n = 760). Six additional patient charts were excluded because either the patient refused to take the questionnaire (n = 2), the questionnaire was not found in the nurse's note (n = 1), or the patient did not complete the questionnaire (n = 3). The remaining 970 patients were included in the analysis.

Adequacy of prenatal care (PNC) was a standard component of our pregnancy intake interview. A woman was considered to have no PNC if she had zero visits with an antenatal service (ob/gyn physician, midwife, or other provider). Women with 1–3 antenatal visits were categorized as having limited PNC, and women with four or more antenatal visits were considered as having adequate PNC. Variables of maternal age, race/ethnicity, insurance status, method of delivery, pregnancy complications, gestational age at delivery, and neonatal outcomes were reviewed in patients with no PNC compared to adequate PNC. An additional analysis examined patients with EPDS scores less than 10 compared to patients with EPDS scores of 10 or greater. Multivariate analysis was performed to determine significant associations leading to at-risk postpartum depression score. Data was analyzed using Graph Pad software. A p-value of less than 0.05 was considered statistically significant.

Results

For the 970 patients analyzed, 12.7% had no PNC (n = 123), 6.3% had limited PNC (n = 61), and 81.0% had adequate PNC (n = 786). The mean EPDS score was 4.89 ± 5.4 (range 0–25) in the no PNC group, 3.97 ± 5.2 (range 0–23) in the limited PNC group, and 3.52 ± 4.1 (range 0 to 23) in the adequate PNC group (Table 1). The mean EPDS scores were significantly different between the adequate PNC group versus no PNC group (p = 0.0001), but not significantly different between the limited PNC group versus no PNC group (p = 0.27).

Demographic data for the three groups are summarized in Table 1. No significant difference in the mean maternal age and in the gestational age at delivery was found between the adequate PNC group or limited PNC group compared to the no PNC group. Furthermore, no statistically significant difference was found when comparing preterm deliveries in women with adequate prenatal care versus no prenatal care (11.7 versus 12.2%, p = 0.88) and limited prenatal care versus no prenatal care (13.1 versus 11.7%, p = 1.00). The percentage of primigravid patients (para 0) was higher in the adequate PNC group (34.2%) compared to the no PNC group (13.8%, p = 0.0001). The percentage of patients with depression or a history of depression was higher in the no PNC group (4.9%) compared to the adequate PNC group (1.7%, p = 0.033). Similarly, the percentage of patients with substance abuse was higher in the no PNC group (14.6%) compared to the adequate PNC group (2.4%, p = 0.0001).

Our study included a higher percentage of Latino/Hispanic women with no PNC compared to adequate PNC (65.8 versus 51.9%, p = 0.005) and limited PNC (65.8 versus 29.5%, p = 0.0001). Conversely, a higher percentage of Caucasian women had adequate PNC compared to no PNC (22.5 versus 13.8%, p = 0.03), and a higher percentage of African American women belonged to the limited PNC group compared to no PNC group (44.3 versus 17.1%, p = 0.0001). In terms of mode of delivery, significantly more patients in the no PNC group had a vaginal delivery (N = 92/123, 74.8%) compared to patients with adequate PNC (N = 448, 57.0%, p = 0.0002) and patients with limited PNC (N = 35, 57.4%, p = 0.019). The rate of cesarean delivery was higher in patients with adequate or limited PNC compared to patients without PNC (Table 1).

In terms of insurance, significantly fewer patients without PNC had private insurance (7.3%) compared to women with adequate PNC (32.4%, p = 0.0001) or limited PNC (19.7%, p = 0.024). In parallel, significantly more patients with no PNC were self-pay (38.2%) compared to women with adequate PNC (5.6%, p = 0.0001) or limited PNC (14.7%, p = 0.001). Medicaid insured comprised 61.8% of patients with adequate PNC compared to 54.5% of patients with no PNC (p = 0.136) (Table 1).

Table 1 Demographic characteristics for patients with adequate and limited prenatal care versus no prenatal care

	No PNC (N = 123)	Adequate PNC (N = 786)	p-value	Limited PNC (N = 61)	p-value
EPDS score					
Mean EPDS score	4.89 ± 5.4	3.52 ± 4.1	0.0001	3.97 ± 5.2	0.27
EPDS score > 10	26 (21.1%)	86 (10.9%)	0.0003	8 (13.1%)	0.53
Obstetric factors					
Maternal age at delivery (years)	26.9 ± 6.19	26.9 ± 6.12	1.00	26.5 ± 6.08	0.679
Gestational age at delivery (weeks)	38.8 ± 2.1 (30.4–42.0)	38.5 ± 2.2 (25.0–42.0)	0.158	38.3 ± 2.9 (24.1–41.6)	0.184
First delivery (para 0)	17 (13.8%)	269 (34.2%)	0.0001	7 (11.5%)	0.817
Current or history of depression	6 (4.9%)	13 (1.7%)	0.033	1 (1.6%)	0.428
Substance abuse	18 (14.6%)	19 (2.4%)	0.0001	5 (8.2%)	0.246
Race					
Latino/Hispanic	81 (65.8%)	408 (51.9%)	0.005	18 (29.5%)	0.0001
African American	21 (17.1%)	147 (18.7%)	0.71	27 (44.3%)	0.0001
Caucasian	17 (13.8%)	177 (22.5%)	0.03	13 (21.3%)	0.209
Mode of delivery					
Vaginal delivery	92 (74.8%)	448 (57.0%)	0.0002	35 (57.4%)	0.019
Cesarean delivery	31 (25.2%)	338 (43.0%)	0.0002	26 (42.6%)	0.019
Insurance					
Medicaid	67 (54.5%)	486 (61.8%)	0.136	40 (65.6%)	0.158
Private	9 (7.3%)	255 (32.4%)	0.0001	12 (19.7%)	0.024
No insurance	47 (38.2%)	44 (5.6%)	0.0001	9 (14.7%)	0.001

Table 2 The relationship between prenatal care and EPDS cut-off scores

	Total	No PNC	Adequate PNC	p-value	Limited PNC	p-value
N (%)	970 (100%)	123 (12.7%)	786 (81%)	–	61	–
EPDS 10+	120 (12.3%)	26 (21.1%)	86 (10.9%)	0.003	8 (13.1%)	0.530
EPDS 11+	97 (10.0%)	21 (17.1%)	68 (8.6%)	0.008	8 (13.1%)	0.243
EPDS 12+	72 (7.4%)	19 (15.4%)	48 (6.1%)	0.001	5 (8.2%)	0.578

Table 3 Percentage of patients according to severity of EPDS scores

	No PNC (N = 123)	Adequate PNC (N = 786)	Limited PNC (N = 61)
Low/limited risk (EPDS 0–9)	97 (78.9%)	700 (89.1%)	53 (86.9%)
Mild risk (EPDS 10–13)	14 (11.4%)	65 (8.3%)	5 (8.2%)
Moderate risk (EPDS 14–18)	10 (8.1%)	15 (1.9%)	0 (0.0%)
Severe risk (EPDS 19 or above)	2 (1.6%)	6 (0.8%)	3 (4.9%)

A total of 120 patients (12.4%) were found to have EPDS scores of 10 or greater. A significantly higher incidence was seen for scores of 10 or greater in patients with no PNC (21.1%; n = 26/123) compared to patients with adequate PNC (10.9%; n = 86/786; p = 0.0003) or limited PNC (13.1%; n = 8/61; p = 0.53) (Table 1). This relationship between the no PNC group and adequate PNC group persisted as the at-risk EPDS score was increased to 11, 12, or greater (Table 2). In addition, a higher proportion of patients with moderate or severe symptoms (i.e. EPDS > 13) had no PNC (46.2%, n = 12/26) compared to the limited PNC group (37.5%, n = 3/8, p = 1.00) or the adequate PNC group (24.4%, n = 21/86, p = 0.049). A breakdown of the number of patients based on severity of EPDS score is shown in Table 3.

Additional analysis found small clinical differences in the demographics of women with EPDS scores 10 or greater. The mean maternal age at delivery was 28.0 years for women with EPDS scores 10 or greater compared to 26.7 years in women with EPDS scores of less than 10 (p = 0.036) (Table 4). Women who scored 10 or higher had a mean gestational age at delivery of 37.8 weeks compared to 38.6 weeks for patients who scored less than 10 (p = 0.0002).

Ethnicity was a significant feature of patients with prenatal care compared to no prenatal care. Within patients with no prenatal care, 16.0% (N = 13/81) of Hispanic/Latino women had a positive EPDS screen, 33.3% (N = 7/21) of African American women had a positive screen, and 35.3% (N = 6/17) of Caucasian women had a positive screen. No statistically significant difference was found between Hispanic/Latino and African American (p = 0.119), Hispanic/Latino and Caucasian (p = 0.091), or African American and Caucasian (p = 1.00) in relation to frequency of at-risk EPDS score, ethnicity, and no prenatal care.

Surprisingly, although payor status was associated with having adequate, limited or no prenatal care, having private insurance, Medicaid insurance, or no insurance was not found to be statistically significant when comparing EPDS score of 10 or greater to patients with EPDS score less than 10 (Table 4). Likewise, mode of delivery was associated with having adequate or inadequate prenatal care; however, no significant difference was seen in the rates of vaginal versus cesarean delivery among women with EPDS score of 10 or greater compared to women with EPDS score less than 10 (Table 4).

Table 4 Clinical characteristics for patients with a positive postpartum depression screen (EPDS 10+) versus patients with EPDS score of < 10

	EPDS 10+ (n = 120)	EPDS < 10 (n = 850)	p-value
Maternal age at delivery (years)	28.0 ± 6.4	26.7 ± 6.06	0.036
Gestational age at delivery (weeks)	37.8 ± 2.87	38.6 ± 2.09	0.0002
Latino/Hispanic	52 (43.3%)	455 (53.5%)	0.040
African American	28 (23.3%)	167 (19.6%)	0.333
Caucasian	30 (25.0%)	177 (20.8%)	0.287
No prenatal care	26 (21.7%)	94 (11.1%)	0.003
Vaginal delivery	64 (53.3%)	511 (60.1%)	0.165
Cesarean delivery	56 (46.7%)	339 (39.9%)	0.165
Medicaid	81 (67.5%)	507 (59.6%)	0.11
Private insurance	25 (20.8%)	251 (29.5%)	0.051
No insurance	14 (11.7%)	92 (10.8%)	0.75

Discussion

To date, little data exists that examines the possible connection between postpartum depression symptoms and adequacy of prenatal care. Our data indicates that the absence of prenatal care leading to delivery in a laborist service doubles the frequency for at-risk postpartum depression screen (21.1% of women who did not receive prenatal care compared to 10.9% of women with adequate prenatal care). In addition, women with no prenatal care were more likely to have moderate or severe symptoms compared to women with adequate prenatal care, as evidenced by higher percentage of EPDS scores greater than 13 in the no PNC group than in the adequate PNC group (46.2 versus 24.4%, $p = 0.049$).

In our population, patients with no prenatal care were more likely to identify as Hispanic/Latino. However, our research found no statistically significant difference among the different races when looking at patients with EPDS ≥ 10 in the no PNC group. This finding suggests that absence of prenatal care and the reasons for its absence is an independent risk factor for having a positive postpartum depression screen. Understanding the reasons for the absence of prenatal care may lead to evidence-based identification of women with persistent perinatal mood disorders in the future.

Postpartum depression has potential consequences beyond maternal emotional risks, making it imperative to screen for this potentially severe and prevalent syndrome (MCPAP for Moms 2017). Increased risks exist for poor infant bonding, disruptive parenting, poor infant growth and poor infant development in postpartum depressive families (Werner et al. 2014; Conway and Kennedy 2004; Brummelte and Galea 2016; Sidebottom et al. 2014; Heberlein et al. 2016). Previous research suggests that various comorbidities such as previous history of depression, age of the woman, pregnancy complications, unplanned/unwanted pregnancy, and social support lead to an increased risk of postpartum depression (Silverman et al. 2017; Beck 2001). Social support can include the relationship established with a prenatal care provider (Ruyak et al. 2017). Our study suggests that women unable or unwilling to obtain obstetrical care prior to delivery are a vulnerable population for elevated EPDS score. In order to fulfill the USPSTF postpartum recommendation, a universal screening tool such as the EPDS must be implemented. Laborist services may be the appropriate providers to screen for increased risk. However, policies for screening will be ineffective without policies for referral and follow-up. One concern is whether patients who do not seek prenatal care are also at risk for not seeking postpartum care. As a result, the importance of utilizing these findings to better understand the underlying causes leading women not to attend prenatal care appointments and engaging in future research to determine the best methods to reach these women during pregnancy cannot be understated.

Recognizing risk factors for postpartum depression allows for potential early detection and intervention for affected women (Tachibana et al. 2015). Postpartum depression questionnaires are not routinely administered in hospitals in the U.S. Our institution is unique because every woman is instructed to complete the EPDS questionnaire before discharge. We are now aware that having a screening program may have no impact upon future risk without an effective postpartum follow-up program. The findings of our study highlight the need for conducting future preventive studies for at-risk patients with no prenatal care delivering on laborist services. Future studies should evaluate the impact and effectiveness of implementing targeted follow-up for patients with elevated postpartum depression score in order to gain better insight regarding the obstacles these women face that prevent them from obtaining prenatal care. With this concept in mind, the next step in our program is to determine the number of screen positive patients who have outpatient follow-up when discharged from a laborist service. One basic unanswered question is if the universal, hospital based depression score is identified and managed during postpartum follow-up visits. As recommended by American College of Obstetricians and Gynecologists (ACOG), practices must be prepared to initiate medical therapy, refer to behavioral health resources, and ensure follow-up for at-risk patients (2015). This next step will allow us to better determine how providers can recognize women at increased risk in a manner that attempts to overcome social, economic, and other environmental barriers to attending prenatal care appointments.

The strengths of our study include the large sample size and potential applicability to other centers. The rate of no PNC in our study is 12.7%, which is similar to other studies (United States Department of Health and Human Services 2013). Our institution not only provides delivery services specifically for women with no prenatal care through a 24 h obstetrical hospitalist service, but also delivers patients with private care. These patients with adequate prenatal care are reaffirmed as having a 10.9% risk for postpartum depression. This high frequency validates the national recommendations for universal depression screening at least once during the perinatal period for depression and anxiety symptoms using a standardized, validated tool (ACOG 2015). Similarly, we recommend that laborist programs should confirm our findings and consider prospective, interventional studies for further management.

Our study is limited by the retrospective nature of data collection and the inherent biases of voluntary self-reporting on the EPDS scale. Data collection was limited to intake variables pertinent in the delivery process. As a result, complete

past medical and social histories, including past history of and treatment for depression and substance abuse, were not equally available for all patients. Therefore, causation as to why absent prenatal care is associated with double the rate of positive score has yet to be determined. Including the screen of all patients in the electronic record and ensuring all at-risk women receive consultation with a social worker that tracks specific postpartum follow-up are some of the quality improvement realizations of this study.

In conclusion, this study is the first publication to objectively identify patients with no prenatal care arriving only for delivery on a hospital-based laborist service as having increased frequency for screen-positive EPDS score. The rate of positive EPDS was doubled in women with no prenatal care compared to prenatal care (21.1 versus 10.9%), suggesting that the absence of prenatal care is a measurable variable when considering positive score frequency. Hospitals with laborist services must consider themselves the modern gatekeepers for this population and must adapt postpartum services to identify and provide adequate referral and follow-up for this high-risk population. Previous research suggests that incentives in the form of cash, baby carrier, and taxi cab voucher did not increase postpartum follow-up appointments after delivery, suggesting that unidentified factors exist as barriers to follow-up (Haas et al. 2012). As a first step towards increasing the quality of care for this population, we recommend universal screening for postpartum depression on laborist services, which are mainly responsible for delivering patients with no prenatal care, followed by prospective studies of efficacious intervention for all postpartum women with a risk score greater than 10.

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