



A systematic review of interventions for healthcare professionals to improve screening and referral for perinatal mood and anxiety disorders

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Abstract

Postpartum depression affects approximately 11% of women. However, screening for perinatal mood and anxiety disorders (PMAD) is rare and inconsistent among healthcare professionals. When healthcare professionals screen, they often rely on clinical judgment, rather than validated screening tools. The objective of the current study is to review the types and effectiveness of interventions for healthcare professionals that have been used to increase the number of women screened and referred for PMAD. Preferred Reporting Items for Systematic Reviews and Meta-Analyses was utilized to guide search and reporting strategies. PubMed/Medline, PsychInfo/PsychArticles, Cumulative Index to Nursing, Allied Health Literature (CINAHL), and Health Source: Nursing/Academic Edition databases were used to find studies that implemented an intervention for healthcare professionals to increase screening and referral for PMAD. Twenty-five studies were included in the review. Based on prior quality assessment tools, the quality of each article was assessed using an assessment tool created by the authors. The four main outcome variables were the following: percentage of women screened, percentage of women referred for services, percentage of women screened positive for PMAD, and provider knowledge, attitudes, and/or skills concerning PMAD. The most common intervention type was educational, with others including changes in electronic medical records and standardized patients for training. Study quality and target audience varied among the studies. Interventions demonstrated moderate positive impacts on screening completion rates, referral rates for PMAD, and patient-provider communication. Studies suggested positive receptivity to screening protocols by mothers and providers. Given the prevalence and negative impacts of PMAD on mothers and children, further interventions to improve screening and referral are needed.

Keywords Postpartum depression · PMAD · Intervention · Screening · Referral

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Introduction

Perinatal mood and anxiety disorders (PMAD) is an overarching term for any mood or anxiety disorder diagnosed (Thiam and Weis 2017) while pregnant or up to 1 year postpartum (Gaynes et al. 2005). PMAD is a broad category that includes, but is not limited to, postpartum depression (PPD), perinatal depression, and postpartum anxiety. PMAD encompasses diagnosed psychopathology (e.g., major depressive disorder) and other dimensions of psychological distress. Symptoms include crying more often than usual, feelings of anger, withdrawing from loved ones, feeling numb or disconnected from the baby, feeling guilt about not being a good mom, loss of energy, irritability, and hopelessness (Centers for Disease Control and

Prevention 2017). While the terminology PPD has historically been used to discuss maternal mental health concerns, the current review uses the term PMAD to reflect contemporary literature. However, PPD is still used if there is an obvious distinction between PPD and PMAD in the context of a study. Within a diagnostic framework, PPD is diagnosed as a major depressive disorder with peripartum onset, which is the most recent episode occurring during pregnancy or in the 4 weeks following delivery (American Psychiatric Association 2013). PPD affects approximately 11% of women (Centers for Disease Control and Prevention 2017). Moreover, some reports have estimated the prevalence of PPD to be as high as 40–60% among low-income and teenage mothers (Earls and Committee on Psychosocial Aspects of Child and Family Health 2010).

What do we know about PMAD?

PMAD has been shown to have negative effects on the mother, child, and the mother-child relationship. For instance, Lovejoy et al. (2000) reported that mothers with PPD exhibited more negative and disengaged behavior towards their children compared to their non-depressed counterparts. Also, mothers with PPD touch their infants less and in a less affectionate manner than non-depressed mothers (Ferber et al. 2008). Infants of depressed mothers are less likely to be securely attached (Martins and Gaffan 2000). Depressed mothers are less likely to put their infant to sleep in the back position, have a lower likelihood of ever breastfeeding, and are more likely to put the child to bed with a bottle (Paulson et al. 2006). A meta-analysis by Goodman et al. (2011) indicated that maternal depression was related to children's higher levels of internalizing, externalizing, and general psychopathology in small magnitude. Likewise, maternal depression was related to negative affect and behavior and lower levels of positive affect and behavior in children (Goodman et al. 2011).

There are several known risk factors exacerbating susceptibility to PMAD. Risk factors for developing PMAD include a history of depression or anxiety (Gaillard et al. 2014), low marital satisfaction (Escribà-Agüir and Artazcoz 2011), domestic violence (Ahmed et al. 2012), lack of social support (Eastwood et al. 2012), and isolation (Eastwood et al. 2012). In addition, positive depression screens have been associated with later increased rates of suicidal ideation (Bodnar-Deren et al. 2016), indicating a need to screen and refer perinatal women for further evaluation and treatment.

Screening and referral for treatment for those with PMAD

The American College of Obstetricians and Gynecologists (ACOG) recommends screening for depression and anxiety symptoms at least once during the perinatal period using a standardized, validated tool (American College of

Obstetricians and Gynecologists 2015). The American Academy of Pediatrics (AAP) recommends incorporating the Edinburgh Postnatal Scale into the 1, 2, 4, and 6 month visits (Earls and Committee on Psychosocial Aspects of Child and Family Health 2010). The AAP also endorses using a cut score of 10 on the EPDS as an indicator of risk that depression is present (Earls and Committee on Psychosocial Aspects of Child and Family Health 2010). These guidelines by leading professional organizations indicate the importance of screening by a variety of healthcare professionals.

Screening rates for PMAD are inconsistent and low among healthcare professionals in the USA (Evans et al. 2015). A systematic review by Evans et al. (2015) demonstrated that among seven studies, an average of only 55% of healthcare professionals ever, sometimes, often, or always assess for PPD. When healthcare professionals do assess women for PMAD, the most common method of assessment is clinical judgment. Pediatricians are most likely to use clinical assessment (80%), as opposed to a validated screening tool (Connelly et al. 2007; Heneghan et al. 2007; Wiley et al. 2004). However, Heneghan and colleagues (2000) have shown pediatricians demonstrate poor accuracy in recognizing elevated levels of depressive symptoms without a validated screening tool during the postpartum period (e.g., sensitivity = 29%, specificity = 81%). Moreover, 60% of OB/GYNs rely on clinical assessment (Chadha-Hooks et al. 2010; Leddy et al. 2011). This finding echoes a larger general trend in documented limitations in the accuracy of health professionals' clinical judgment when assessing mental health concerns (e.g., Lopez et al. 2017; Neal and Brodsky 2016). Screening for PMAD is generally recognized as a way to improve depression outcomes (Georgiopoulos et al. 2001). When obstetricians recognize a woman's PMAD, referral and treatment rates are fairly high during the prenatal period (80%) and postpartum period (93.7%) (Goodman and Tyer-Viola 2010). However, when women screen positive for PMAD but the obstetrician is unaware of the positive screen, referral and treatment rates are low during the prenatal period (33%) and postpartum period (27.5%). The noted results indicate a need for systematic approach to screening for PMAD and use of results to increase treatment and referral rates for women suffering from PMAD. A review of the sensitivity and specificity of the Edinburgh Postnatal Depression Scale (EPDS), a commonly used perinatal depression screening tool, demonstrated that sensitivity of the scales ranges from 65–100% while specificity ranges from 49 to 100% during the postpartum period (Eberhard-Gran et al. 2001). The EPDS has adequate reliability with a Cronbach's alpha of 0.87 (Cox et al. 1987). Due to providers' inconsistency in clinical judgment, as well as strong psychometric properties of the EPDS, screening tools should be used to adequately assess PMAD.

The present review

A lack of screening and referral for treatment of PMAD demonstrates a need to assess interventions for healthcare professionals to increase screening and, therefore, referral rates for behavioral health treatment for women with PMAD. Likewise, The Centers for Disease Control and Prevention considers PMAD a common and serious illness in the USA (Centers for Disease Control and Prevention 2017). The current review aims to (1) summarize and describe the literature concerning implementation of an intervention for healthcare professionals (e.g., pediatricians, obstetricians, nurses) to increase PMAD screening rates and, in instances of positive screens, behavioral health referrals and (2) review the effectiveness of the noted interventions. To our knowledge, there have been no systematic reviews investigating such interventions for healthcare professionals.

Methods

Search strategy

Articles included in the current review were identified through searches of the following databases: PubMed, Medline, PsychInfo, PsychArticles, CINAHL, and Health Source: Nursing/Academic Edition. Additional relevant articles were found through article introduction or reference sections. Each database was searched from 1994 to 2017 because the postpartum specifier was introduced in 1994 in the DSM-IV (Segre and Davis 2013).

Selection criteria

Articles were included if they were performed in the USA, in English, peer-reviewed, used human subjects, and described original data. Intervention search terms were not included as to capture the broad scope of interventions. Search terms are shown in Table 1. Articles were included if they screened or referred women for PMAD during pregnancy or up to 1 year postpartum. Studies were also included with any medical

provider as the target audience of the intervention (e.g., nurse, nurse practitioner, obstetrician, family physician). See Table 3 for a full list of target audiences of the interventions. Case studies and non-peer-reviewed articles were excluded to ensure rigor. Studies performed outside of the USA were excluded.

Study selection

PRISMA was utilized to guide search and reporting strategies of the current review (Moher et al. 2009). The flow chart of study selection resulting in the 25 articles is shown in Fig. 1.

Assessment of perinatal mood and anxiety disorders

PMAD was defined as any form of depression or anxiety during pregnancy or up to 1 year postpartum (Gaynes et al. 2005). Others have defined the onset of postpartum timeframe as short as 4 weeks postpartum (American Psychiatric Association 2013), but the current review takes a more conventional approach to the onset timeframe in order to provide a more comprehensive review. PMAD ranged from symptom report instruments to clinical diagnosis. Any diagnostic version of perinatal mood and anxiety disorders was included (e.g., PPD, postpartum anxiety, peripartum depression).

Assessment of intervention

An intervention was defined as any tool or method aimed at increasing provider screening rates, treatment and referral rates, knowledge of PMAD, or confidence in assessing and referring for PMAD. Interventions included, but were not limited to, educational interventions (e.g., presentation, conference), systematic changes in electronic medical records, and use of a standardized patient training exercise.

Assessment of outcome

Outcomes included any variable addressing screening rates, treatment and referral rates, rates of positive PMAD screeners, and provider PMAD assessment-related knowledge, attitudes, and skills.

Quality assessment

Based on prior assessment tools of quality (Downs and Black 1998; Effective Public Health Practice Project 1998), the quality of each article was assessed using a 26-question assessment tool created by the authors. The assessment tool is shown in Online Supplement A. Items are separated into three sections: introduction, methods, and results. A point system was used to assess the quality of each article. High scores indicate a higher quality study and

Table 1 List of search terms

Topic	Keyword
Perinatal disorder	postpartum depression* OR postpartum anxiety* OR perinatal mood anxiety disorder* OR peripartum depression* OR peripartum anxiety*
Healthcare provider	physician* OR nurse* OR obstetrician* OR gynecologist* OR pediatrician* OR medical* OR healthcare professional*

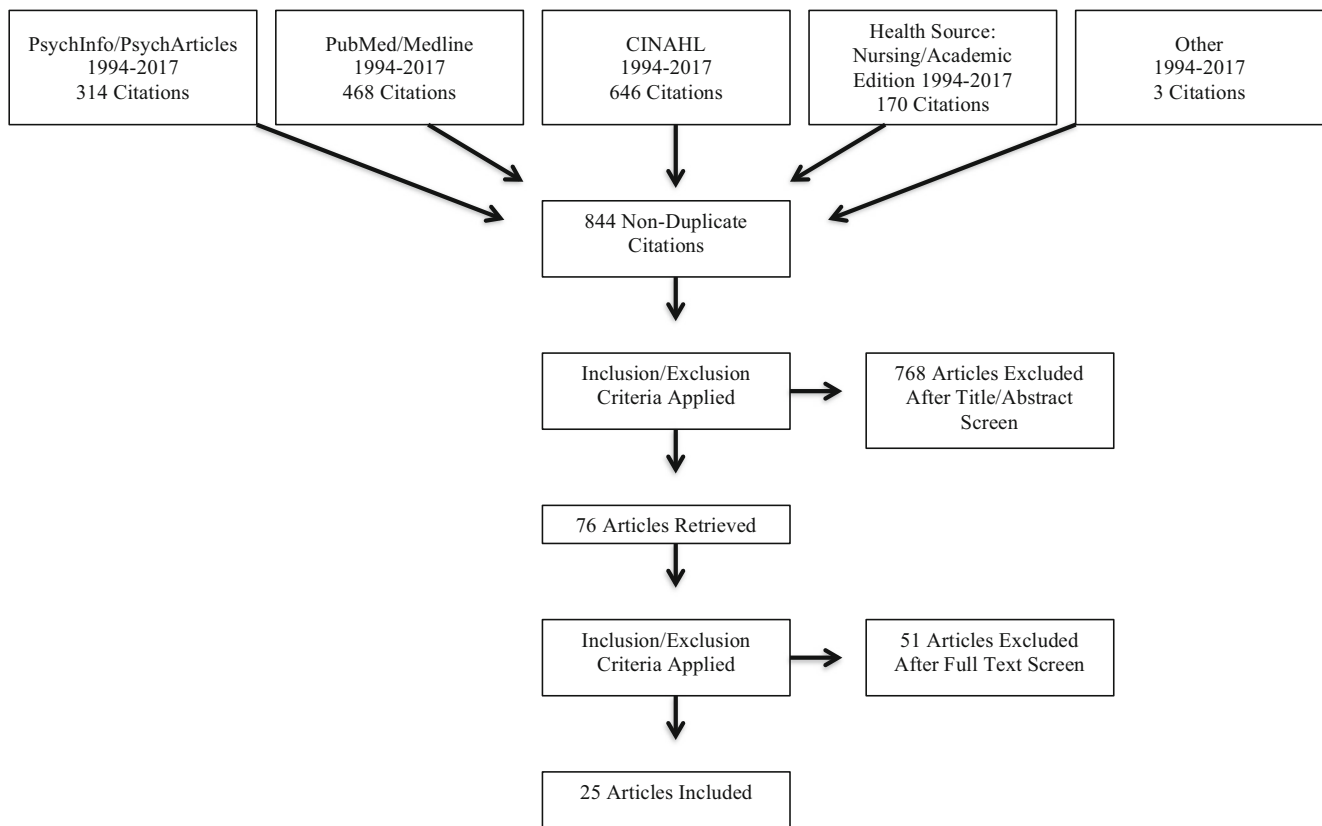


Fig. 1 Flowchart of the study selection

possible scores range from 1 to 32. To ensure the reliability of ratings, the quality assessment tool was used by two authors (Jenkins and Long) to assess each of the final 25 selected articles. The two coders began by assessing five articles independently. Intraclass correlations were then conducted and any items with coefficients under .70 were revised for clarity in definition. Jenkins and Long then completed the same process in three successive iterations to ensure the intraclass coefficients were above .70 (i.e., above acceptable inter-rater agreement values; Bakeman and Gottman 1997, Koo and Li 2016). After each iteration of coding, the coders communicated regarding differences in results and clarified any discrepancies. By the last iteration of coding, all intraclass coefficients achieved .70 or above.

Results

Quality assessment summary

The results of the quality assessment tool are shown in Table 2. Most studies provided comprehensive and clear information regarding the intervention for healthcare providers to improve PMAD screening and referral.

Study characteristics

Characteristics of the 25 selected studies are shown in Table 3. Quality assessment total scores ranged from 6 to 23 among the 25 selected studies, indicating a broad scope of article quality in the literature regarding interventions for healthcare professionals to improve screening, treatment, and referral practices for PMAD.

PMAD measurement tool The majority of studies ($N=14$, 56%) used the EPDS (Cox et al. 1987), to measure PMAD symptoms. Other PMAD measurement tools include the PHQ-2 ($N=2$, 8%) (Kroenke et al. 2003), PHQ-9 ($N=3$, 12%) (Kroenke et al. 2001), and the Structured Clinical Interview for the DSM (SCID; $N=1$, 4%) (First 1997). One study used a two-question screen endorsed by the US Preventive Services Task Force (Olson et al. 2005). One study used the National Institute for Health and Clinical Excellence (NICE) two-question screen. One study used the PPDS.

Intervention type All studies implemented an intervention to improve screening, treatment, or referral rates for PMAD. The majority of the studies ($N=21$, 84%) implemented an educational intervention. Two (8%) studies implemented a change in electronic medical records (EMRs) as the intervention. Two

Table 2 Quality assessment summary

		Yes (%)	No (%)		
Introduction					
1. Is the hypothesis/aim/objective clearly stated?		24 (96%)	1 (4%)		
2. Did the authors give appropriate rationale for the study?		24 (96%)	1 (4%)		
Methods					
	Mixed methods	Quantitative	Qualitative	Cannot tell, N/A	
3. Is this study qualitative, quantitative, or mixed methods design?		10 (40%)	13 (52%)	1 (4%)	
	Controlled clinical trial (placebo vs. intervention)	Cohort analytic (two groups pre and post)	Cohort (1 group pre and post)	Cohort (1 group post-test only)	Other/cannot tell
4. Indicate the study design:		1 (4%)	8 (32%)	14 (56%)	1 (4%)
5. Were data collection tools shown to be valid?		Yes (w/ numbers and alphas)	Yes, text only	No/not applicable	
6. Were data collection tools shown to be reliable?		0 (0%)	9 (36%)	16 (64%)	
7. Did they address sample size/statistical power concerns?		4 (16%)	1 (4%)	20 (80%)	
8. Is the intervention clearly stated?			Yes (%)	No (%)	
9. Is the intervention education based?			5 (20%)	20 (80%)	
10. Is the intervention electronic medical records (EMR) based?			24 (96%)	1 (4%)	
11. Is the intervention a combination of education and EMR?			21 (84%)	4 (16%)	
12. Did authors examine a standardized patient?			2 (8%)	23 (92%)	
13. Is the target population clearly described?			2 (8%)	23 (92%)	
14. Did the authors target a singular population?			21 (84%)	4 (16%)	
15. Did the authors target multiple populations?			12 (48%)	13 (52%)	
16. Did the authors clearly state cutoff points for measure of referral for PMAD?			13 (52%)	12 (48%)	
			16 (64%)	9 (36%)	
Results					
17. Is the outcome variable percentage screened?			14 (56%)	11 (44%)	
18. Is the outcome variable percentage referred?			10 (40%)	15 (60%)	
19. Is the outcome variable percentage screened positive?			17 (68%)	8 (32%)	
20. Is the outcome variable knowledge/attitudes/skills?			10 (40%)	15 (60%)	
21. Is the outcome variable something other than listed above?			19 (76%)	6 (24%)	
22. Are the demographics clearly described?			11 (44%)	14 (56%)	
23. Did authors directly address hypotheses/aims?			23 (92%)	2 (8%)	
Discussion					
24. Do the authors make appropriate conclusions based on results?			24 (96%)	1 (4%)	
25. Do the authors discuss study limitations or potential bias?			17 (68%)	8 (32%)	
26. Do the authors discuss interpretation or application of results?			21 (84%)	4 (16%)	

EMR electronic medical records

(8%) studies implemented a training program involving a standardized patient exercise. Two (8%) studies began using an established screening protocol with research nurses. One (4%) study sent out reminders of screening protocol to providers via email, meetings, and in-services as the intervention.

Intervention target audience The target audience for the intervention was heterogeneous across studies. Seven (28%)

interventions targeted providers in the obstetric field. Five (20%) interventions targeted providers in the pediatric field. Two studies (8%) were aimed at healthcare providers in both the obstetric and pediatric fields. Three (12%) interventions were aimed at primary care or family practice healthcare professionals. Two (8%) were aimed at intervening with medical students while 1 (4%) was developed for research nurses. Two (8%) were targeted at all levels of professionals in the

Table 3 General characteristics of selected studies

Study	Quality assessment score	PMAD measurement tool	Design	Intervention type	Intervention target audience	Outcome variable(s)
Baker-Ericzen et al. (2008)	23	EPDS	1 group, pre- and post-test	Education	OB/GYN healthcare providers; pediatric healthcare providers	Percentage of women screened Percentage of women referred for services Percentage of women screened positive for PMAD KAS Mental health service use Satisfaction with program assistance and mental health advisor Staff and provider familiarity and feedback of screening program KAS Percentage of women screened at 6 week visit Percentage of women screened Percentage of women referred for services Percentage of women screened positive for PMAD Detection of PMAD Percentage of women screened Percentage of women referred for services Percentage of women screened positive for PMAD Percentage of women referred for services Percentage of women screened positive for PMAD Percentage of women referred for services Percentage of women screened positive for PMAD Type of treatment Accuracy of EPDS scoring Percentage of women referred for services
Bauer et al. (2009)	17	EPDS	1 group, pre- and post-test	Education, case-based didactic lectures, 11 h	Pediatric residents	
Chaudron et al. (2004)	23	EPDS	2 groups, pre- and post-test	Education	Pediatricians; pediatric nurse practitioners	
Gordon et al. (2006)	20	EPDS	1 group, post-test only	Education	Obstetric healthcare providers	
Lind et al. (2017)	17	EPDS	1 group, post-test only	Education	Obstetric providers Pediatric providers	
Rowan et al. (2012)	15	EPDS	1 group, post-test only		Obstetric staff	

Table 3 (continued)

Study	Quality assessment score	PMAD measurement tool	Design	Intervention type	Intervention target audience	Outcome variable(s)
Schaar and Hall (2013)	17	EPDS	1 group, pre- and post-test	Reminders of protocol via email, meetings, in-services Education, standardized patient Education	Obstetrics/gynecology providers and staff Maternity unit nurses	Percentage of women screened positive for PMAD KAS
Segre et al. (2014)	21	EPDS	1 group, post-test only	Education		Percentage of women screened Percentage of women screened positive for PMAD
Sheeder et al. (2009)	21	EPDS	1 group, post-test only	EMR	Providers in an adolescent-oriented maternity program; nurses	KAS Percentage of women screened Percentage of women referred for services Percentage of women screened positive for PMAD
Smith and Kipnis (2012)	19	EPDS	1 group, pre- and post-test	Education	Healthcare providers of all levels	Percentage of women screened Percentage of women screened positive for PMAD
Talmi et al. (2009)	14	EPDS	1 group, post-test only	Education	Pediatric primary care providers, pediatric residents	KAS Average EPDS scores Percentage of women screened positive for PMAD
Venkatash et al. (2016)	18	EPDS	1 group, post-test only	Implementation of a screening protocol	Obstetric providers	Percentage of women screened Percentage of women screened positive for PMAD Diagnoses after further evaluation
Yawn et al. (2012)	21	EPDS, PHQ-9	Controlled clinical trial, placebo vs. intervention	Education	Physicians and nurses at family medicine practices	Type of treatment Percentage of women screened Percentage of women referred for services Percentage of women screened positive for PMAD
Avalos et al. (2016)	19	PHQ-9	1 group, pre- and post-test	Education, distribution of regional materials	Obstetricians, nurse practitioners,	Percentage of women screened

Table 3 (continued)

Study	Quality assessment score	PMAD measurement tool	Design	Intervention type	Intervention target audience	Outcome variable(s)
Yonkers et al. (2009)	19	BHQ	1 group, pre- and post-test	about screening and treatment Education	certified nurse-midwives Obstetric provider	Percentage of women screened positive for PMAD Identification of depression Percentage of women screened Percentage of women referred for services Percentage of women screened positive for PMAD
Horowitz et al. (2011)	16	EPDS, SCID for DSM-IV	1 group, post-test only	Implementation of established screening framework	Research nurses	Percentage of women screened positive for PMAD Risk factors for PPD Percentage of women screened
Olson et al. (2005)	21	PHQ-2, 2 question screen endorsed by the US Preventive Services Task Force	1 group, pre- and post-test	Education	Pediatricians	Percentage of women referred for services Percentage of women screened positive for PMAD
Feinberg et al. (2006)	14	PHQ-2, PHQ-9	1 group, post-test only	Education, EMR	Pediatricians; nurses	Pediatric feedback on process of screening KAS Acceptability of the screening approach KAS
Osborn et al. (2012)	15	National Institute for Health and Clinical Excellence (NICE) 2 question screen PDSS	1 group, post-test only	Education, 1-day training then mentoring program	Community health nurses, health visitors	Percentage of women screened positive for PMAD Predictors of depressive symptoms KAS
Mancini et al. (2007)	20	PDSS	1 group, post-test only	Education	Obstetricians, certified nurse-midwives, medical assistants	Percentage of women screened positive for PMAD Predictors of depressive symptoms KAS
Baker et al. (2009)	6		Other/cannot tell	Education	Primary care providers	KAS
Tucker et al. (2004)	15		1 group, post-test only	Education, standardized patient	Medical students; faculty facilitators	KAS
Thomason et al. (2010)	17		1 group, post-test only	Education	Nurses and paraprofessionals; social workers;	KAS

Table 3 (continued)

Study	Quality assessment score	PMAD measurement tool	Design	Intervention type	Intervention target audience	Outcome variable(s)
Schillerstrom et al. (2013)	22		1 group, pre- and post-test	Education	early childhood teachers/teachers assistants Medical students	Comfort level with PPD and postpartum self-care discussions Web-based education tool statistics Registered users of the education tool Education tool user rating of modules
Wisner et al. (2008)	13		1 group, post-test only	Education	Healthcare providers of all levels	

Articles are sorted by PMAD measurement tool

KAS knowledge, attitude, skills, EPDS Edinburgh Postnatal Depression Scale, PHQ Patient Health Questionnaire, BHQ Brief Health Questionnaire, PDSS Postpartum Depression Screening Scale

healthcare field while 1 (4%) was aimed at maternity unit health professionals. One (4%) intervention was aimed at nurses and healthcare providers in an adolescent maternity program and 1 (4%) was aimed at paraprofessionals and nurses.

Outcome variable(s) Four key outcome variables, and a total of 63, were present among the 25 selected studies along with other study-specific outcomes. The four main outcome variables were the following: percentage of women screened for PMAD ($N = 13$, 20.63%), percentage of women referred for services ($N = 9$, 14.29%), percentage of women screened positive for PMAD ($N = 16$, 25.40%), and provider knowledge, attitudes, and/or skills (e.g., PMAD screening priority, PMAD screening burden level, knowledge of PMAD support groups and resources) ($N = 10$, 15.87%). Other outcome variables presented were the following: staff and provider feedback of screening program ($N = 2$, 3.17%), participant mental health service use ($N = 1$, 1.59%), mother and healthcare provider satisfaction with program assistance and mental health advisors ($N = 1$, 1.59%), staff and provider familiarity of screening program ($N = 1$, 1.59%), detection of PMAD ($N = 2$, 3.17%), qualitative data regarding acceptability of the screening approach to mothers and healthcare providers ($N = 1$, 1.59%), risk factors for developing PMAD ($N = 2$, 3.17%), comfort level with PPD and postpartum self-care ($N = 1$, 1.59%), frequency of use of a web-based education tool for PMAD statistics ($N = 1$, 1.59%), registered users of the education for PMAD tool ($N = 1$, 1.59%), education tool user rating of modules ($N = 1$, 1.59%), average EPDS score ($N = 1$, 1.59%), depression diagnosis after a positive screen ($N = 1$, 1.59%), type of treatment ($N = 2$, 3.17%), and accuracy of EPDS scoring ($N = 1$, 1.59%).

Overview of intervention impact

The three main intervention types (i.e., education, EMR, standardized patient exercises) were reviewed for their impact on outcome variables. Twenty of the 25 articles included in the current review evaluated relative impact on some type of outcome. Studies that implemented an educational intervention reported screening completion rates ranging from 39 to 100% (Avalos et al. 2016; Chaudron et al. 2004; Gordon et al. 2006; Lind et al. 2017; Olson et al. 2005; Schaar and Hall 2013; Segre et al. 2014; Yawn et al. 2012). Similarly, studies that implemented an educational intervention reported positive screening rates, indicating a potential depressive disorder range from 4.4 to 29.5% (Avalos et al. 2016; Baker-Ericzen et al. 2008; Chaudron et al. 2004; Gordon et al. 2006; Lind et al. 2017; Mancini et al. 2007; Olson et al. 2005; Schaar and Hall 2013; Segre et al. 2014; Smith and Kipnis 2012). Women who received referral or treatment from their healthcare provider ranged from 62 to 100% (Baker-Ericzen et al. 2008;

Gordon et al. 2006; Olson et al. 2005). Of the nine pre-post design studies (Avalos et al. 2016; Baker-Ericzen et al. 2008; Bauer et al. 2009; Chaudron et al. 2004; Olson et al. 2005; Schaar and Hall 2013; Schillerstrom et al. 2013; Smith and Kipnis 2012; Yonkers et al. 2009), detection of depression and referral for treatment increased from pre- to post-educational program. Thirteen studies used post-intervention examination only (Feinberg et al. 2006; Gordon et al. 2006; Horowitz et al. 2011; Mancini et al. 2007; Osborn 2012; Rowan et al. 2012; Segre et al. 2014; Sheeder et al. 2009; Talmi et al. 2009; Thomason et al. 2010; Tucker et al. 2004; Venkatesh et al. 2016; Wisner et al. 2008). There was positive receptivity to the screening protocol by both mothers (Olson et al. 2005) and providers (Baker-Ericzen et al. 2008; Feinberg et al. 2006; Schaar and Hall 2013).

Of the two studies that implemented a change in EMR as the intervention, results indicated that providers administered the EPDS 98% of the time and referred mothers with positive screens 100% of the time (Sheeder et al. 2009). Results also indicated that screening for PMAD was not burdensome and opened up new opportunities for discussion between patient and provider (Feinberg et al. 2006). Overall, of the two studies that implemented changes in EMR as the intervention, results indicate positive changes in patient-provider communication. Of the two studies that implemented a standardized patient exercise, the percent of women screened for PMAD ranged from 39 to 100% (Baker-Ericzen et al. 2008). Also, students found the standardized patient session to be useful, it held their interest, and rated it as excellent or near excellent (Tucker et al. 2004). Overall, studies that implemented a standardized patient exercise as the intervention, results indicated positive receptivity to the exercise. Intervention findings need to be viewed with caution in light of the majority (e.g., Feinberg et al. 2006; Gordon et al. 2006; Segre et al. 2014; Tucker et al. 2004) only conducting post-intervention assessment (i.e., limited rigor) and that some outcomes still varied widely in terms of positive outcomes (e.g., rate of screening completion post-educational intervention).

Discussion

The aim of the current study was to summarize and describe studies that implemented an intervention for healthcare professionals to increase screening and referral rates for PMAD. The 25 selected studies demonstrated heterogeneous interventions to improve screening and referral for PMADs. While most interventions included an education piece, other interventions focused on changes in EMRs, standardized patients, established protocol with a research nurse, or healthcare provider reminders of the screening protocol. Educational intervention type also varied widely, including conferences, 45-min meetings, educational website development, and

seminars, among others. Educational material in the interventions included symptoms of PMAD, detection tools, treatment options, crisis situations, and impact of PMAD on mothers and children. There were also a variety of target audiences of the intervention including obstetrician and pediatric healthcare professionals, primary care healthcare professionals, medical students, research nurses, maternity unit healthcare professionals, and paraprofessionals.

The PMAD measurement tool most often used was the EPDS. The four main outcome variables utilized in the 25 selected studies were percentage of women screened, percentage of women referred for services, percentage of women screened positive for PMAD, and knowledge, attitudes, and/or skills. The quality of the articles varied widely from very high quality (e.g., Baker-Ericzen et al. 2008; Chaudron et al. 2004) to lower quality (e.g., Baker et al. 2009) based on our quality assessment tool. Several studies did not address the validity of the PMAD measurement tools used. It is important to address validity of measurement tools to reduce bias (Marshall et al. 2000).

One key methodological weakness of the current literature is the lack of pre-post intervention assessments. Fourteen of the 25 reviewed articles implemented no assessment or post-intervention assessment only. Intervention findings need to be viewed with caution in light of the methodological weaknesses. The three main intervention types (i.e., education, change in EMR, standardized patient exercise) were evaluated for the intervention impact. Results from studies that implemented an educational intervention indicated modest positive effects on screening completion rates, referral rates, and receptivity to screening protocol by mothers and healthcare providers. Results from studies that implemented a change in EMRs indicated improvement in patient-provider communication. Results from studies that implemented a standardized patient indicate positive receptivity to the training tool. Overall, results suggest that screening is feasible and may have positive effects on screening completion rates, referral for treatment for PMAD, and improved patient-provider communication. Of course, such positive gains are tempered by the very small total number of studies (e.g., only two addressing EMR) and limited pre-post or randomized designs.

Current studies suggest PMAD is a substantial issue for expecting and new mothers. However, literature also suggests screening and referral rates are low for PMAD (Evans et al. 2015; Goodman and Tyer-Viola 2010; Horowitz and Cousins 2006) and the current review demonstrates a need for an effective and widely used intervention to improve PMAD screening and referral rates, as well as subsequent patient-oriented health outcomes. With only 25 articles aimed at interventions for healthcare professionals to increase screening and referral rates for PMAD, more studies are needed to assess the usefulness and feasibility of these types of interventions and others.

Limitations

There are three main limitations to the current review. First, PMAD definitions and assessment varied across studies. Some studies measured PMAD with self-report questionnaires (e.g., Baker-Ericzen et al. 2008; Rowan et al. 2012) while others did not measure PMAD at all (e.g., Thomason et al. 2010; Tucker et al. 2004). Others used the PHQ-2 or PHQ-9 (e.g., Olson et al. 2005; Yawn et al. 2012) or clinical interview assessments (Horowitz et al. 2011). The variability between studies limits comparison of study results. Second, outcome variables were heterogeneous between studies. Sixty-three different indicators of outcome variables were presented in the 25 studies. Third, we were not able to assess the effectiveness of interventions due to the heterogeneity of PMAD definitions and lack of sufficient number of pre-post assessment designs.

Implications

There are several implications for future research that are informed by the current study. First, future studies should assess PMAD using validated and reliable screening tools designed for the perinatal population, such as the EPDS. Such psychometrically supported tools would enhance both the rigor and convergence of future PMAD research. Second, studies should be inclusive of many healthcare professionals when implementing an intervention, potentially examining differences in PMAD-related competency and behaviors by type of professional. Third, studies should be inclusive and clear about the outcome variables. Given the prevalence and negative impact of PMAD on mother and child, further interventions to improve screening and referral are needed among all disciplines of healthcare. Fourth, given the methodological limitations of current literature, future studies should utilize pre- and post-intervention assessments to enhance the rigorous testing of available types of interventions. Future research should consider the use of education, change in EMR, and standardized patient exercises as potential interventions to improve screening and referral for PMAD. Finally, studies performed in the USA should be compared to results found outside of the USA to evaluate our effectiveness and improve our current PMAD screening, referral, and treatment practices.

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