Postpartum Depression Screening in the Neonatal Intensive Care Unit

Angela Zavala and Tara Whitmire

Nebraska Methodist College
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Abstract

**Background and Review of Literature**: Postpartum depression (PPD) is recognized as a maternal mental health condition that can occur during pregnancy or in the postpartum period. Mothers of infants hospitalized in the neonatal intensive care unit (NICU) are at a particularly increased risk for developing PPD. Risk factors are multifactorial and if undiagnosed can lead to serious consequences for mother, infant and the family unit.

**Purpose**: The purpose of this project was: 1) to assess the incidence of PPD with interval screening compared to one-time screening in NICU mothers using the Edinburgh Postnatal Depression Scale (EPDS), and 2) to determine if maternal and infant related factors correlate with PPD in this population.

**Methods/Results**: This project was a retrospective study reviewing data from a recently implemented monthly PPD screening protocol in the NICU. The sample included 39 women who were screened with a total of 53 PPD screenings over a period of five months. During this time there were 36 30-day screenings, 10 60-day screenings, and 2 90-day screenings with an overall PPD incidence of 33%. Small sample sizes of the 60 and 90 day screenings limited the ability to make a determination on the best time to screen mothers in this setting. Preexisting history of depression and/or anxiety and the presence of maternal complications were both identified as factors that place a mother at a higher risk for PPD.

**Conclusion**: This study validated that NICU mothers are at a higher risk for PPD. Early identification through screening procedures and implementing appropriate intervention can lead to earlier detection and intervention improving outcomes for mother and infant.

**Key Words**: postpartum depression, PPD, postpartum depression in the NICU, postpartum depression screening, mothers, neonatal intensive care unit, NICU, and maternal mental health
Postpartum Depression Screening in the Neonatal Intensive Care Unit

Postpartum depression (PPD) is a common complication of pregnancy that can have a negative impact on the mother, infant and family unit. Mothers of infants hospitalized in the neonatal intensive care unit (NICU) are at a particularly increased risk for developing PPD. A need for increased education, recognition, and management strategies have been identified in this population. Introduction of screening processes for PPD in mothers with infants in the NICU helps to meet these needs to increase awareness, understanding, early detection and intervention for affected mothers.

Background

PPD is recognized as a maternal mental health condition with mood changes that can occur during pregnancy or up to one year after childbirth (Stewart & Vigod, 2016). The very label of PPD is limiting as many times the condition presents not as a typical major depressive disorder but as a mixed condition with the development of anxiety, PTSD, insomnia, obsessive compulsive behavior or psychosis (Vasa et al., 2014). PPD symptoms and severity are variable and can include any combination of the following: sadness, irritability, guilt, disinterest, fear of losing control, feeling overwhelmed, sleep disturbances, hypervigilance, flashbacks or nightmares of traumatic delivery experiences, and in extreme situations suicidal ideation and thoughts of harming the baby (Stewart & Vigod, 2016). To date, the most highly associated risk factors are preexisting depression or anxiety, poor social support and stressful life events (Katon, Russo & Gavin, 2014).

In the United States, the incidence of PPD in the general population is approximately 15%, with mothers of infants in the NICU more than 40% likely to develop a maternal mental health issue (Cherry et al., 2016). On a state level, it is
estimated that one in seven (14%) new mothers in Nebraska are at risk for PPD based on survey results from the Preganancy Risk Assessment Monitoring System (PRAMS) (Nebraska Department of Health and Human Services, 2008). With around 136 million women giving birth around the world annually, this condition can clearly be established as a major women’s health issue (Ayers, Bond, Bertullies, & Wijma, 2016).

Despite its prevalence, PPD has long been misunderstood and underdetected. It has been reported that as many as half of the women with postpartum depressive symptoms are not diagnosed or treated (McCabe et al., 2012). As a mental health issue, PPD brings with it a level of stigma that may keep some women from reporting their symptoms. In a perceivably joyful time women may be ashamed to admit their feelings or may relate the change in their mood and mental integrity to a lack of sleep, hormone alterations, or adjustment to their newly acquired parental role or modified family unit. NICU mothers, in particular, are subject to increased levels of emotional, financial, and family related stress compared to mothers of healthy, full term infants (Cherry et al., 2016).

Evidence supports recommendations for PPD screening and increasing awareness, but buy-in due to mental health stigma and implementation challenges limit progress. The importance of maternal mental health is recognized nationally as a Healthy People 2020 objective MICH-34, Decrease the proportion of women delivering a live birth who experience postpartum depressive symptoms (Office of Disease Prevention and Health Promotion [ODPHP], 2017). The American Congress of Obstetricians and Gynecologists (ACOG) and the American Academy of Pediatrics (AAP) have recommendations for PPD screening, but procedures are inconsistent. ACOG recommends screening women
at least one time during the perinatal period using a validated tool (ACOG, 2015). Often screening is administered at the 6 week postpartum checkup, but it is reported that as many as 40% of women do not attend this recommended visit (ACOG, 2016). The AAP suggests screening to be done around the one, two and four month well-child visits (Cherry et al., 2016). Mothers of infants with long term hospitalizations in the NICU often miss out on well-child PPD screening opportunities making the NICU an appropriate setting for substituted screening procedures.

The potential consequences of PPD are well documented. Maternal decreased quality of life, challenges with daily living activities, risk for relationship strain and negative impact on the infant are possible in varying degrees (Stewart & Vigod, 2016). The AAP reports that maternal depression can have a significant impact on the mother-child dyad influencing attachment and bonding, neurobehavioral development of the infant, and breastfeeding duration (Earls, 2010). The AAP also recognizes that PPD can lead to inappropriate medical care, family dysfunction, and impaired social-emotional development of the child (Earls, 2010). Furthermore, ACOG (2015) reported that maternal suicide surpasses postpartum hemorrhage and hypertensive crises as causes for mortality of women in the perinatal period.

The target population of this project was mothers with infants in the NICU and evaluating a recently implemented PPD screening protocol that uses the Edinburgh Postnatal Depression Scale (EPDS). Stakeholders necessary for the implementation and evaluation of the PPD screening program included NICU nursing staff, neonatologists, neonatal nurse practitioners (NNP), NICU staff development nurses, hospital social workers, and high risk and general obstetricians. These stakeholders had an important
role in increasing awareness of PPD through maternal education, being compliant with screening procedures, and collaborating with referral services and appropriate providers. The PPD screening protocol in the NICU provides an opportunity for early identification of PPD which potentiates better outcomes for mother, infant, the family and community.

**Problem Statement**

Mothers of infants in the NICU have an increased risk for postpartum depressive symptoms over the general population of new mothers. Appropriate tool selection and timing of screening may have a potential impact on the identification and diagnosis of PPD. Current recommendations for PPD screening do not provide guidance on the most appropriate time to screen mothers in the NICU setting. The clinical question guiding this project was, “for mothers with infants in the neonatal intensive care unit (NICU), is interval screening for postpartum depression more effective than one time screening for detecting postpartum depressive symptoms during their infant’s hospitalization”.

**Purpose Statement**

The purpose of this project was two-fold: 1) to assess the incidence of PPD with interval screening compared to one-time screening in NICU mothers using the Edinburgh Postnatal Depression Scale (EPDS), and 2) to determine if maternal and infant related factors correlate with PPD in this population.

**Outcomes**

There are several outcomes associated with this capstone project. The first outcome was gaining an understanding of the incidence of PPD in NICU mothers at a Women’s Hospital in the midwest. This analysis was conducted by evaluating EPDS scores suggestive of depression in NICU mothers. Evaluation of the incidence of PPD
was beneficial to support the need for continued screening in this setting. Prevalence of a condition is one of the key elements that support the necessity of screening as a secondary preventive measure (Maxim, Niebo, & Utell, 2014).

A second outcome of this project was to determine if one time or interval PPD screening is most appropriate in the identification of PPD in NICU mothers. Currently, there is no specific guidance on the recommendation for screening for PPD in the NICU. The EPDS screening tool is delivered to mothers every 30 days while the infant is hospitalized. Analyzing the data from this screening tool provided information regarding when most cases of PPD were identified at the designated screening times: 30 days, 60 days or 90 days after childbirth. This provided guidance regarding the most appropriate time to conduct screening for PPD in this setting to minimize unnecessary screening.

A third outcome was an assessment of descriptive data that provided correlations between PPD and certain maternal demographic and infant related factors. Demographic data was analyzed to assess for comparisons in gestational age at birth, infant age at time of screening, age of mother, maternal complications, and preexisting history of depression or anxiety. This information was utilized to identify those at highest risk for PPD to direct increased awareness and education interventions.

**Review of the Literature**

Literature was reviewed to analyze current research on PPD, specifically in the NICU setting. Themes examined included associated risk factors for PPD, PPD tools studied in the NICU setting and methods for PPD screening in the NICU. Previous findings support the implementation of PPD screening in the NICU. Factors surrounding screening processes in this setting were examined.
Detailed Search Strategy

Search efforts were completed by reviewing the online databases CINAHL (Cumulative Index to Nursing and Allied Health Literature) Plus with Full Text and PubMed to pursue literature on the subject of PPD (Appendix A). Key words utilized in these searches included: “postpartum depression”, “PPD”, “postpartum depression in the NICU”, “postpartum depression screening”, “mothers”, “neonatal intensive care unit”, “NICU”, and “maternal mental health”. Search criteria were refined by publish dates between 2011 through 2017. Additional searches were conducted in the Cochrane Database of Systematic Reviews under the subheadings of Pregnancy & Childbirth and Common Mental Disorders Group using the key words NICU and PPD screening. Current literature was also explored on the ACOG and AAP websites for recent recommendations and committee opinions regarding PPD. Search efforts were completed between July, 2016, and July, 2017.

Inclusion/Exclusion Criteria

A total of twelve research articles were appraised in the review of literature (Appendix B). Inclusion criteria were human studies, English language, and research designs with a high level of evidence. Maternal specific or NICU related studies regarding mothers with PPD were sought. Studies excluded from review were those that were not related to maternal depression and anxiety, not conducted in the NICU setting and research done before 2011.

Study designs varied from qualitative, descriptive, cohort studies, a randomized controlled trial (RTC) and systematic review. A majority of the studies were level IV in the hierarchy of evidence. Most of the studies reviewed data collected from self-report
tools and some retrieved data from chart reviews. A few of the studies were considered fair as they were quasi-experimental and lacked a control group for comparison. Articles were assessed for sample size and demographic specifications in the populations being studied. A number of studies had smaller sample sizes but research was enriched by specifically looking at groups in certain demographic categories for assessment of variabilities from current knowledge on PPD. Statistical methods were reviewed for appropriateness with most involving correlative or regression analyses.

**Synthesis of Evidence**

**Associated risk factors.** The benefit to understanding risk factors for PPD is to find associations that can target mothers who may need more frequent or thorough assessment. This has the potential to develop a proactive rather than reactive process that will promote better psychological and social outcomes for mother and child. Of the twelve studies reviewed, six included a focus on risk factors for PPD. Findings from the reviewed studies are congruent with previous research that has shown major risk factors for PPD include poor social support, stressful life events, and preexisting anxiety, PTSD, or depression. Other identified PPD risk associations studied in the evaluated studies include: demographic identifiers, emergency delivery, infant complications, NICU admission, low birth weight infants, and perinatal death.

Maternal complications were studied and not shown to be an associated risk factor, however, the consequences of maternal conditions including NICU admission and infant health complications were shown to be significant (Hoedjes et al., 2011). Greene et al. (2015) found primaparas to be at a particularly high risk especially in the week after NICU admission and prior to discharge. Rogers, Kidokoro, Wallendorf and Inder (2012)
as well as Shaw et al. (2014) both found inconsistencies in predictors of PPD but noted its prevalence to be increased in NICU mothers. Furthermore, Vasa et al. (2014) found a correlation between NICU length of stay and incidence of PPD. Findings in a systematic review suggested that risk factors for PPD are multifactorial and that prevalence in mothers with infants in the NICU is significantly increased over mothers with healthy, term infants (Tahirkheli, Cherry, Tackett, McCaffree, & Gillaspy, 2014). This literature supports universal PPD screening in women in high risk obstetric care and those with infants in the NICU.

**Screening tools for PPD in the NICU.** Current recommendations for the assessment of postpartum depressive symptoms endorse the use of a validated screening tool for measurement of the presence and severity of PPD. Numerous tools have been studied for clinical validity, but few have been thoroughly assessed in the NICU setting. Specificity, sensitivity and characteristics among validated PPD screening tools were reviewed in current literature.

As confirmed in previous research, the EDPS tool continues to be a highly sensitive tool that has been most extensively studied in the NICU setting (Tahirkheli et al., 2014). The State-Trait Anxiety Inventory (STAI) tool primarily focuses on anxiety, but was recognized as a sensitive detector of postpartum depressive symptoms within the NICU setting (Rogers et al., 2012). The Patient Health Questionnaire-9 (PHQ-9) proved to be a validated tool in most studies, but has not been studied within the NICU maternal population (Tahirkheli et al., 2014). Inconsistent findings regarding the Postpartum Depression Screening Scale (PDSS) tool are worth noting. In the study conducted by McCabe et al. (2012) it was demonstrated that the PDSS is highly correlated with the
EPDS (r=.79) and Beck Depression Inventory (BDI-II) (r=.81) suggesting this is a validated tool for clinical use. Blucker et al. (2014) recognized the supportive validity of the PDSS tool but final analysis determined that results may be different between NICU and non-NICU mothers.

As demonstrated in Table 1, there are numerous tools available for the screening of PPD with varying degrees of specificity, appropriately detecting a negative finding, and sensitivity, the accuracy of correctly identifying a positive finding. However, some are more precise in indicating certain manifestations such as anxiety, PTSD, insomnia and attachment issues related to the questions asked on the tool. Also, as many studies used one screening tool, it would be beneficial for future studies to evaluate the accuracy of all screening tools on NICU mothers for a comparative study. At this time, the EPDS remains the gold standard for assessment of PPD as a validated tool in the NICU setting.

Table 1
Differentiating PPD Screening Tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Questions</th>
<th># Prevalence score</th>
<th>Sensitivity %</th>
<th>Specificity %</th>
<th>Strong Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPDS</td>
<td>10</td>
<td>≥13¹</td>
<td>70</td>
<td>82</td>
<td>Depression</td>
</tr>
<tr>
<td>EPDS-3A</td>
<td>10</td>
<td>&gt;4</td>
<td>88</td>
<td>49</td>
<td>Depression/Anxiety</td>
</tr>
<tr>
<td>STAI</td>
<td>40</td>
<td>≥40²</td>
<td>81</td>
<td>80</td>
<td>Anxiety</td>
</tr>
<tr>
<td>PDSS</td>
<td>35</td>
<td>≥60</td>
<td>-</td>
<td>-</td>
<td>Depression</td>
</tr>
<tr>
<td>PHQ-9</td>
<td>9</td>
<td>≥10</td>
<td>73</td>
<td>93</td>
<td>Depression</td>
</tr>
</tbody>
</table>

¹-Scoring 10-13 indicates the mother is at high risk for depression.
²-Two-20 question scales; 40-59=moderate anxiety and 60-80=severe anxiety.
³-The PDSS tool did not have sensitivity and specificity documented in reviewed literature.

**Interval and one-time screening for PPD.** Processes for implementing a protocol for screening for PPD in the NICU have not been well established. Although many facilities practice family centered care, the infant is the focus of care and the
mother is not treated as a patient while her infant is hospitalized. Staff in the NICU often build a positive rapport with mothers making this an appropriate setting to start an open dialogue about maternal anxiety or depressive symptoms.

Of the six studies reviewed that reported on both timing of screening and prevalence of PPD, two conducted interval screening and the remaining four studies completed a one-time screening on study participants (Table 2). Among the two studies using interval screening both used the EDPS screening tool. The PDSS, EDPS and STAI tools were utilized in the studies utilizing one time screening. Overall, in the studies with one time screening there was an increase in the amount of participants with reported symptoms of PPD from baseline to follow-up screening. However, due to the variability in screening tools utilized it was difficult to conclude if the timing of screening contributed to a change in prevalence among participants. It would be beneficial in future studies to further analyze interval screening for PPD in NICU mothers to have the evidence to back protocols in the clinical setting.

Table 2

Postpartum Screening Tools, Interval Assessment and Incidence of PPD

<table>
<thead>
<tr>
<th>Source</th>
<th>Tool</th>
<th>N</th>
<th>NICU</th>
<th>Testing</th>
<th>% PPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoedjes et al., 2011</td>
<td>EPDS</td>
<td>161</td>
<td>Yes</td>
<td>6, 12, &amp; 26 wks PP</td>
<td>23%/44%¹</td>
</tr>
<tr>
<td>McCabe et al., 2012</td>
<td>PDSS</td>
<td>111</td>
<td>Yes</td>
<td>&gt;14 days PP x1</td>
<td>52%²</td>
</tr>
<tr>
<td>Rogers et al., 2013</td>
<td>EPDS/STAI</td>
<td>73</td>
<td>Yes</td>
<td>at NICU discharge</td>
<td>20%/43%</td>
</tr>
<tr>
<td>Blucker et al., 2014</td>
<td>PDSS</td>
<td>495</td>
<td>Yes</td>
<td>2 weeks PP x1</td>
<td>36%/52%³</td>
</tr>
</tbody>
</table>
POSTPARTUM DEPRESSION SCREENING IN THE NICU

<table>
<thead>
<tr>
<th>Study</th>
<th>Screening Tool</th>
<th>Score</th>
<th>Positive</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vasa et al., 2014</td>
<td>EPDS</td>
<td>131</td>
<td>Yes</td>
<td>Every 2w   in NICU</td>
<td>19%</td>
</tr>
<tr>
<td>Cherry et al., 2016</td>
<td>PDSS</td>
<td>385</td>
<td>Yes</td>
<td>2 weeks PP x1</td>
<td>36%²</td>
</tr>
</tbody>
</table>

1- Sample 1: Mild preeclampsia (≥140/90 + proteinuria)/ Sample 2: Severe Preeclampsia (SBP≥ 160 OR DBP ≥100, +proteinuria, elevated liver enzymes, low platelets, or fetal growth restriction)
2- An additional 30% were identified as at high risk for PPD.
3- Both samples all NICU mothers
   - Sample 1: Group had equal high school and college graduates, more single women, same race and preexisting symptoms.
   - Sample 2: Group had higher level of education, more married or partnered women.

Summary of Evidence

Literature supports the implementation of universal screening procedures in the NICU setting as these mothers have been identified as having an increased prevalence of this condition. Risk factors identified for PPD in mothers with infants in the NICU is multifactoral supporting screening all mothers as predictors can be variable. Multiple screening tools have been tested in NICU setting, with the EPDS tool being the current standard of care. Appropriate timing for when PPD screening should be administered to mothers in the NICU has yet to be determined.

Theoretical Framework

Postpartum depression (PPD) is a maternal health condition that can result partly from maladaptive coping methods. Preceding circumstances such as parental role change, family dynamic changes, hormonal variations, financial implications and an increase in responsibility and stress can all be contributors to this condition. For this reason, the Roy Adaptation Model was the theoretical framework that was closely aligned with this project regarding PPD affecting mothers with infants in the NICU.
Background & Description of Framework

Sister Callista Roy was the theorist who developed the Roy Adaptation Model (RAM) in the 1970’s (Wetsell, Gonzalez, & Moreno-Fergusson, 2015). In Roy’s model she acknowledges that there are barriers to adaption when a person misinterprets or inappropriately reacts to stimulus from others or their environment (Wetsell et al., 2015). The RAM suggests that coping is influenced by several adaptive modes: physiological/physical mode, self-concept/group identity mode, role function mode and the interdependence mode (Wetsell et al., 2015). The physiological mode contains the integrity of the physical necessities and balance within bodily systems (Wetsell et al., 2015). The self-concept mode involves the beliefs, spirituality, and self-esteem of a person and the role function mode encompasses how a person fits within society, their family and developmental stage (Wetsell et al., 2015). Lastly, the interdependence mode is the capacity and integrity of a person’s interpersonal relationships (Wetsell et al., 2015). Stimulus that a person experiences may be influential on one or all of these modes and the extent of this impact can affect how one may cope with a particular situation (Figure 1).
Application to Project

A number of circumstances can play a factor in how one transitions into a new role. With the birth a baby, comes an evolution into a new parental role which can be influenced by challenging dynamics including: stress, hormonal changes, financial implications and change related to the modified family unit. Mothers with infants in the NICU may experience these challenges as well as additional stressors such as: how to care for their preterm or sick infant in the NICU, altered expectations of parental role, uncertainty, guilt, stress from the NICU environment and potentially, their own maternal complications (Blucker et al., 2014).

In the RAM, a number of adaptive modes are identified that are influenced by stimulus. Helping to positively support areas in these different modes may have an impact on how a mother responds to perceivably negative stimuli. For example, providing tips to mothers to support their physical self by encouraging eating three healthy meals daily, being exposed to light during the day and getting adequate sleep can have a powerful influence on mood. Educating mothers of NICU babies on how they can
care for their baby in this setting and encouraging skin-to-skin time can impact parental confidence and therefore, the self-concept and role function mode. Making sure mothers have the personal, social and financial support and they need through a challenging time will fulfill areas within the interdependence mode. These efforts may ultimately help a mother more adequately adapt and cope in the stressful NICU setting.

Early delivery of mental health promotive tips, social support, resources, and education may help mothers to cope when faced with stressful stimuli such as in situations for mothers with infants in the NICU. The implementation of a screening program in the NICU not only acts as a method for early detection but expands the knowledge of NICU staff and providers to make maternal mental health a priority in the quest for family centered care. Increased awareness, knowledge and giving parents the tools to adequately adapt to their parental role in the NICU has the potential to decrease the incidence of PPD in NICU mothers.

**Organizational Assessment**

The facility and unit where this project was implemented demonstrated readiness for a project involving the implementation and evaluation of a PPD screening protocol for NICU mothers. This women’s hospital outlined support for a hospital wide initiative to support maternal mental health to increase awareness, education and screening opportunities for depression in mothers during pregnancy and after childbirth. The NICU Parent Advisory Committee voiced an interest and need for enhanced family and maternal psychosocial support while infants are hospitalized in the NICU. Discussions on how a process to promote maternal mental health were communicated at the NICU Practice Council and the neonatology physician group meetings. Furthermore, a
hospitalwide PPD committee was formed involving staff and management from the units of Labor and Delivery, Mother/Baby, NICU and High Risk Obstetrics (HROB).

A potential barrier that was considered with the implementation of this project was inaccurate data from PPD screening due to challenges with staff compliance with a maternal based program in a unit that focuses on the care of infants. There was a concern that staff may not understand why a maternal assessment of depression is applicable in a NICU setting. Education was crucial for staff buy-in on the importance of the mother-child dyad and infant consequences of PPD. Facilitators involved with the support and implementation of PPD screening in the NICU included: NICU management, neonatologists, neonatal nurse practitioners (NNP), NICU nursing staff, social work, NICU staff development nurses, IT support, and the legal team. There were no anticipated risks or unintended consequences of this project.

**Methodology**

This quality improvement capstone project was a retrospective study reviewing data from a recently implemented PPD screening protocol in the NICU setting that was developed as a part of the organization’s initiative to promote maternal mental health. This population is known to be at an increased risk for PPD and a coordinated effort to enhance the detection of this prevalent condition in this high risk population is anticipated to improve outcomes for mother and infant. A standard for PPD screening in the NICU has yet to be established. Evaluating the efficacy of one time or interval screening in NICU mothers was a focus of this project.

**Setting**
This project was conducted at a Level III, 51 bed NICU at a Midwestern women’s hospital. This 127 bed hospital is the only facility in the region with a primary focus on women’s health serving an urban Midwestern city. The facility offers a variety of services including obstetrical, reproductive, gynecological, imaging, neonatal and emergency care. Over 5,200 babies were born in 2016 with approximately 450 babies born monthly at this facility (D. Becker, personal communication, September 5, 2017). In 2016, there were 711 infants admitted to the NICU including low birth weight, late preterm, and full term infants with complications (C. Strong, personal communication, July 11, 2017) (Figure 2).

Figure 2. NICU Admissions per Gestational Age in 2016

Sampling

Participants of this project were selected using a convenience sample of all mothers meeting inclusion criteria at the facility where the project was implemented. Screening for PPD in NICU mothers at this facility is completed at 30 days after childbirth and every month following until the infant is discharged from the NICU. All mothers with infants in the NICU are offered the EPDS screening tool at those designated times for assessment of PPD. The mother has the right to decline the assessment. This
project involved a chart review based upon the following criteria. Inclusion criteria for the records reviewed included every biologic mother 19 years of age or older with an infant hospitalized over 30 days in the NICU who agreed to complete an EPDS screening tool. Exclusion criteria included mothers whose infants were discharged from the NICU prior to 30 days of life, mothers under the age of 19, and mothers who declined to complete the EPDS. A letter of support was obtained from the facility site where the project was implemented.

**Implementation Procedures**

The implementation of a program for PPD screening in the NICU was recently implemented at this setting based on the facility’s initiative. Establishing this program encompassing PPD screening in the NICU took a collaborative effort involving a number of stakeholders at the unit and organizational level. Initial steps involved gaining support, approval and setting goals for the development of the protocol. Policy development necessitated coordination with NICU management, the clinical nurse specialist, neonatology physicians, social work, IT, and legal team. Education and policy implementation were disseminated to the NICU staff prior to the PPD screening protocol GoLive date of October, 1, 2017.

The development of the protocol for PPD screening started with approval from NICU management and neonatology providers. Although family centered care is a mainstay in many NICUs, developing a process in the NICU that focuses on maternal mental health is relatively unconventional. Evidence on prevalence and support for PPD screening in the NICU from recent literature were discussed at PPD committee meetings.
A representative of the NICU management team, neonatology physician group and NNP group were invited to attend these monthly meetings. Interest and endorsement from the Parent Advisory Committee on heightened maternal and family support was obtained.

Policy development required collaboration with the clinical nurse specialist, social worker, IT, legal team and neonatologists. Decisions on how the policy should integrate with workflow, identifying who will do the screening, processes for mothers who screen high, and where to document the information were considered. Identifying accessible and appropriate resources for mothers who screen high on the EPDS tool was a necessity in policy development. A detailed process for neonatologist notification, referral procedures, and resource allocation were coordinated. Once developed, policy approval for PPD screening in the NICU was obtained from the PPD committee, NICU Practice Council, the neonatology group, and unit management.

Consultation with the organization’s IT and legal team were a necessary component of PPD screening in the NICU setting. Legal counsel was required to examine documentation procedures for a tool performed on the mother as she is not technically a patient at the time of screening when her infant is hospitalized in the NICU. Consideration of the most appropriate location to document the tool (in the mother’s or infant’s chart), as well as maintaining compliance with Health Insurance Portability and Accountability Act (HIPAA) privacy laws were scrutinized. IT was involved to build PPD screening as a physician order into the house rule order set, and subsequent alert on the nursing ‘task list’ was built to fire every 30 days during an infant’s hospitalization. The EPDS screening tool was also built into the information system for documentation in the medical record.
Education for staff and mothers were integral to the success of initiating PPD screening in the NICU. Standardized education sheets on PPD were created to ensure mothers are receiving the same information at the various points of potential contact for maternal care: HROB, L&D, Mother/Baby and NICU. Comprehensive education was delivered to NICU nursing staff in a self-guided PowerPoint and quiz one month prior to the GoLive date. The education involved the relevance of maternal mental health screening in the NICU, PPD prevalence, consequences of untreated PPD for mother and infant, current recommendations by ACOG and the AAP, as well as the PPD screening policy for this NICU setting.

**Intervention**

This project was a retrospective study reviewing data from a recently implemented PPD screening protocol in the NICU setting that began October, 2017, thereby impacting only mothers who delivered on or after September 1, 2017. The PPD policy at this Midwestern women’s hospital is to screen mothers with infants hospitalized in the NICU at 30 days following delivery and every 30 days after until discharge. The order for PPD screening was built into the order set to be active on every infant admitted to the NICU. At the designated time (30, 60, 90 days etc.) the order set triggers an alert to the nursing ‘task list’ as an indicator it is time to perform PPD screening. At this time the nurse obtains a paper EPDS tool, explains the tool to the mother and encourages her to complete the tool. The mother does have the right to refuse PPD screening. If the mother agrees to complete the EPDS screening tool it is encouraged to be completed at the point of care or within 24 to 48 hours. If there is concern outside of the designated
screening times that a mother is struggling with PPD the EPDS tool may be offered any
time on an as needed basis.

Once the EPDS tool is completed the nurse follows the documentation protocol to
obtain a score on the EPDS tool. If the score is 9 or below, no further intervention is
necessary. If the score is 10 or above the nurse then notifies the neonatologist and social
worker for referral and proposed resources. If the mother answers the question regarding
suicidal ideation as anything other than ‘Never’ she is to be immediately escorted to the
emergency department for evaluation for her safety and the neonatologist and social
worker notified. Documentation of interventions are completed per protocol within the
mother’s electronic medical record and the completed EPDS tools are filed in a locked,
secure area. This process is followed per the outlined policy for every infant at 30 days
of life and every 30 days while hospitalized in the NICU.

Measurement Instrument

The data collection tool utilized for this project was the Edinburgh Postnatal
Depression Scale, otherwise known as the EPDS. This is a validated 10 question self-
report scale that has been studied within the general population as well as in the NICU
setting. The EPDS is readily available in multiple languages and questions on the tool
involve inquiry about the extent of fear, sadness, anxiety, feeling overwhelmed and
suicidal ideation (Cox, Holden & Sagovsky, 1987) (Appendix C). There is a maximum
score of 30 on the EPDS with a score of 10 or greater indicating possible depression and
a cutoff score of 12 or greater suggestive of probable depression (Vasa et al., 2014). The
EPDS is intended to be a self-assessment completed by the mother to answer the
questions with responses that come closest to how she has felt in the last seven days. The
reliability and validity of the tool has been analyzed in a number of studies. According to Simpson, Glazer, Michalski, Steiner and Frey (2014) the EPDS has a sensitivity of 70% and a specificity of 82% in the perinatal population. This tool has been universally used as a measurement of PPD since the 1980’s. This tool is publically available to anyone for reproduction without permission as long as the tool is appropriately cited when in use (Cox et al., 1987).

**Data Collection Procedures**

Following Institutional Review Board (IRB) approval, a retrospective review of data from EPDS tools and audit of the electronic medical record on mothers screened was completed to analyze the incidence of PPD at each screening interval. This was done comparing the data from mothers who have a single 30 day screening completed with those who have interval screening every 30 days. Completed EPDS forms were utilized to identify which records to review within the electronic medical record for maternal and infant data. Associated maternal and infant factors analyzed included: infant gestational age at delivery, gestational age at the time of screening, maternal complications, age, and history of preexisting depression and/or anxiety. Data was collected on women meeting inclusion criteria who delivered between September 1, 2017, through January 31, 2018. Data collection was completed by March 31, 2018. No patient identifiers were utilized in the data collection and data organization for this project. The researcher, an employee of the organization, received permission from the Compliance Officer following IRB approval for access into the organization’s information system for the data collection involved with this quality improvement project.
Ethical Considerations/Protection of Human Subjects

PPD screening has been established as a new NICU protocol for all mothers meeting eligibility related to infant length of stay. NICU nursing staff deliver the EPDS tools to the mothers and the researcher performed a retrospective review of the tools and electronic medical record of those who were screened since implementation. An informed consent was not applicable for this project as it was impractical being a retrospective study. There were no conflicts of interest associated with this quality improvement project.

Risks and benefits were evaluated for this project. There were no known direct benefits of this study. However, it was anticipated that the evaluation the recently implemented screening protocol for PPD in the NICU would provide validation of the pertinence of providing this intervention to mothers within this setting. The protocol was developed with a goal for earlier detection and intervention for a known maternal mental health problem of increased incidence in this population. The ultimate goal of PPD screening in the NICU, is to play a part in identification of a prevalent maternal health complication and make a positive impact on outcomes for mother and baby.

A risk of this project would be a breach in confidentiality of maternal or infant data through the data collection process. Privacy was maintained by keeping the paper EPDS forms in a secure location to uphold HIPAA standards with protected health information. Data input into Excel was coded anonymously and kept separate from any data that could be identifiable to maintain patient confidentiality.
Integrity of the Data

The intervention evaluated in this project was a recently implemented PPD screening protocol in this NICU setting. Ongoing screening and documentation will continue beyond this project per the outlined process designated by the facility. Comparison of completed EPDS forms with what is documented in the electronic medical record on NICU mothers who were screened for PPD was analyzed. Accurate record keeping was accomplished by documenting the data collected in an Excel document.

Data Analysis

Statistical analysis was completed utilizing data collected from the EPDS screening tools, and data from maternal and infant electronic medical records. Data was organized without patient identification in an Excel document for analysis. Collaboration with a statistician was utilized for assistance with the planning and analysis of the data for this project. Excel was the software utilized used for statistical analysis.

Descriptive statistics was the primary method of synthesizing the data for quantitative analysis of this project. EPDS scores were evaluated using ratio and ordinal levels of measurement. When evaluating incidence, ordinal measurement was utilized with EPDS scores under 10 indicating no depressive symptoms, and scores 10 through 30 indicating possible to probable depression. A bar chart was used to display PPD incidence at each interval of screening: 30, 60, 90 days and as needed (PRN) screens. Distribution and central tendency for the EPDS scores were evaluated using a ratio measurement of the scores. The assessment of overall incidence of PPD was
determined to meet the first outcome of this project. Further breakdown of incidence at the 30, 60, 90 day screenings supported the second outcome in determining the most appropriate timing for screening in this setting.

Analysis of demographic data was completed to support the third outcome of this project in assessing for correlations between PPD and certain maternal and infant factors. Demographic variables analyzed on a ratio level of measurement were included on: maternal age, infant gestational age at birth, and infant gestational age at screening. Comparison of the measures of central tendency were completed for maternal age, and infant gestational age at birth and at gestational age at screening. Presence of maternal complications prior to delivery and preexisting history of depression or anxiety were analyzed using a nominal level of measurement, yes or no. Consideration for what constituted a maternal complication for this study included: preeclampsia, HELLP syndrome, prolonged HROB stay prior to delivery, and emergent delivery due to compromise of maternal or infant wellbeing. Completing a logistic regression model for assessment of the relationship between maternal/infant factors and PPD was considered but not completed as an insufficient sample size was attained for 60 and 90 day screenings.

**Results**

This evidenced based practice study reviewed PPD screening data from EPDS screening tools and electronic medical record from women who delivered September, 1, 2017 through January 31, 2018. There were 39 women screened with a total of 53 PPD screenings over a period of five months from PPD screening implementation, October 1, 2017 through the end of February 2018. During this time there were 36 30 day
screenings, 10 60 day screenings, 2 90 day screenings, and 5 PRN screenings. There was an overall PPD incidence in this sample of 33%. Incidence was also determined for each screening interval and found to be 22% for the 30 day screenings, 10% for the 60 day screenings, 0% for the 90 day screenings, and 80% with PRN screenings (Figure 3). Central tendency measures were also determined for each screening interval (Table 3).

Establishing the overall incidence of PPD for this setting during the designated period for this study met the first outcome of this project. The second outcome was partially met as incidence was determined for all screening intervals, however, significantly smaller sample sizes for the 60 and 90 day screenings limited capability to adequately determine comparatively when the most appropriate screening time should be in this setting.

Figure 3. PPD Incidence per Screening Interval
Table 3

Central Tendency of EPDS Scores (0-30) Per Screening Interval

<table>
<thead>
<tr>
<th>Measure</th>
<th>30 Day</th>
<th>60 Day</th>
<th>90 Day</th>
<th>PRN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>6.6</td>
<td>4.4</td>
<td>1</td>
<td>14.4</td>
</tr>
<tr>
<td>Median</td>
<td>7</td>
<td>4</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Mode</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Maximum</td>
<td>16</td>
<td>12</td>
<td>2</td>
<td>27</td>
</tr>
</tbody>
</table>

Maternal and infant factors reviewed in this study included: gestational age at birth, gestational age at time of screening, maternal age, maternal complications and maternal history of depression or anxiety. The range of gestational ages at birth for infants in this sample were from 24.6 weeks through 39.4 weeks. The mean age for infant gestational age at birth was 33 weeks and for gestational age at time of screening was approximately 37 weeks. The infant gestational age at time of PPD screening across all intervals ranged from 29.2 weeks through 43.3 weeks. Gestational age at birth and gestational age at time of screening are displayed on the scatter plot below to show distribution (See Figure 4). Central tendency measures were determined for gestational age at birth and gestational age for each interval of screening (See Table 4).

Maternal age was analyzed for this sample and was noted to have an age range of 21 to 42 years of the mothers screened. The mean age for mothers in this sample was 30.7 years. Of note, there were no mothers that were less than 19 years of age which would have met exclusion criteria for this study.
Figure 4. Gestational Age and EPDS Scores

![Gestational Age and EPDS Scores](image)

Table 4

Central Tendency of Gestational Age (GA) at Birth and per Screening Interval

<table>
<thead>
<tr>
<th>Measure</th>
<th>GA- Birth</th>
<th>GA-30 Day</th>
<th>GA-60 Day</th>
<th>GA-90 Day</th>
<th>GA-PRN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>32.7</td>
<td>36.3</td>
<td>36.9</td>
<td>40</td>
<td>38</td>
</tr>
<tr>
<td>Median</td>
<td>33</td>
<td>36.6</td>
<td>36.8</td>
<td></td>
<td>38.5</td>
</tr>
<tr>
<td>Mode</td>
<td>32</td>
<td>36.3</td>
<td>40.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>24.6</td>
<td>29.2</td>
<td>33.3</td>
<td>38.4</td>
<td>33.3</td>
</tr>
<tr>
<td>Maximum</td>
<td>39.4</td>
<td>43.3</td>
<td>40.5</td>
<td>41.1</td>
<td>41.2</td>
</tr>
</tbody>
</table>

Also analyzed in this study was maternal preexisting history of depression and/or anxiety as well as for the presence of maternal complications including: preeclampsia, HELLP syndrome, extended HROB stay prior to delivery, and emergent delivery due to infant or maternal wellbeing. Of the 39 mothers who were screened in this sample 22 (56%) met criteria to be categorized as having a maternal complication, and of these 22 mothers, 6 (27%), ended up having elevated scores on their EPDS screening tool (Figure
5). There were 9 (23%) of the 39 women in this sample who had a history of depression and/or anxiety (Figure 6). What is most concerning is that of the 9 women with a preexisting mental health history, 5 (56%) went on to score high when screened for PPD.

Maternal complications and preexisting history of depression and/or anxiety produced significant results suggesting a higher risk for PPD in women with these factors. Of the 13 women who screened high on their PPD screening, 6 (46%) had a maternal complication. Five of the 13 (38%) women in this sample had a history of preexisting depression and/or anxiety.

Figure 5. Maternal Complications
Data was also extracted specific to the mothers who screened high on the EPDS screening tools to analyze factors specifically pertaining to those affected by PPD. In mothers whose EPDS score was 10 or greater it was noted that infant gestational age at birth ranged from 28.2 weeks to 37.2 weeks with a mean of 33 weeks. In these mothers it was also determined that at the time they screened high the gestational age of their infant ranged from 32.5 to 41.2 weeks with a mean gestational age of 37 weeks. Both gestational age at birth and age at time of screening are similar when comparing the entire sample with mothers who screen high for PPD. The ages of mothers with high screens were also similar to the entire sample with a range of 22 to 41 and a mean age of 29 years.

**Discussion**

This study on PPD screening in the NICU identified consistent findings with previous research in several areas including an increased incidence of PPD in this setting.
and the influence of multifactorial risk factors particularly with preexisting mental health history and maternal complications. Previous research identified PPD impacting approximately 15% of the general population with mothers of infants in the NICU more than 40% likely to develop a maternal mental health issue (Cherry et al., 2016). Findings of this study support previous incidence data on NICU mothers as this sample had an overall PPD incidence of 33%. This information is supportive in suggesting that mothers with infants in the NICU are a high risk group for developing PPD, and further validates the importance of continuing the intervention of screening for PPD in this population. Furthermore, it is recommended to initiate a notification process upon NICU admission of mothers who have a preexisting history of mental health conditions and perinatal complications as these are the highest predictive risk factors identified. This may aid in processes to identify even earlier detection through enhanced surveillance of warning signs.

Demographic factors explored such as infant and maternal age did not seem to correlate with an increased risk for PPD. The age of mothers in the entire sample compared to the group of mothers with high screens were comparable. Of note, no mothers in this sample met exclusion criteria due to their age being 19 or less. Infant gestational age at birth and at time of screening were also comparable when reviewing mothers who screened high with the entire sample. Further studies and a larger sample size of extremely premature infants may provide further insight if gestational age is a correlating risk factor for PPD in NICU mothers.

This project intended to outline data to support the most appropriate time to screen mothers for PPD in the NICU. Unfortunately, small sample sizes in the 60 and 90
day screenings limited the ability to make this determination. Further studies are recommended to identify best practice related to timing of screening. Several concepts not anticipated as outcomes of this study included: the necessity of as needed (PRN) screenings, consideration for consistent care nurses offering the PPD screening tool and process needs for mothers with language barriers. Of the PRN screens completed during the screening period 80% resulted in a high score warranting intervention. This validates the necessity of supporting nurses to offer the EPDS screening tool to mothers as needed any time warning signs of PPD are suspected. Only offering the screening tool at rigid times may omit some mothers from having their condition recognized and treated timely.

Consistent care nursing is a model employed by this unit which allows for a nurse to consistently provide care on the shifts she/he works to a particular infant and their family while hospitalized. This model allows for consistency, building trust, and a team approach to care. It was discovered that a 60 day PPD screen was given to a mother per protocol by a nurse that was not a consistent care nurse for her infant and she scored significantly below the threshold for PPD. A PRN screen was then noted as completed several days later as offered by the mother’s consistent care nurse and the mother screened a 14, well over the threshold of 10 for PPD. Future research is warranted on the consistency of EPDS scores when offered by a known consistent care nurse over a nurse that the mother has not yet formed a trusting relationship. In a vulnerable setting such as the NICU, it is possible that having a nurse who the mother trusts, such as the consistent care nurse, offer the screening tool as she may be more apt to accurately answer the questions truest to her current feelings.
An unexpected finding in this study was that non-English speaking mothers had an increase in incidence of PPD over the entire sample at 40%. In this study there were 5 total non-English speaking mothers (4-Spanish and 1-Chuukese Pacific Island) out of a total of 39 mothers (13%). Refined processes on how to present the screening tool to non-English speaking mothers needs to be explored: interpreted by family, through the My Real-Time Trusted Interpreter (MARTTI) or if the document is accurately understood. Further studies could be developed on further data analysis of non-English speaking mothers and PPD screening in the NICU.

Limitations

The analysis of interval screening for PPD in the NICU was limited by smaller sample sizes on the 60 and 90 day screenings. Census was unusually low following PPD screening implementation from October through January which influenced the smaller sample size. If this study were repeated, it is likely a larger sample overall would be obtained for all intervals due to the increased census. Also, continuing to collect data over a longer period than five months would be beneficial since analyzing interval screening must occur over several months. Collectively, an increased sample over a longer period of time may provide better data for analysis of most the most appropriate timing for PPD screening in the NICU setting.

Plan for Sustainability

The intervention evaluated has been implemented as a part of the organization’s initiative to promote maternal mental health at this women’s hospital. Support for ongoing commitment to continue to screen mothers for PPD in the NICU has been established through approval by the neonatology group and management of this unit.
Processes for sustainability have been confirmed by the establishment of formal policy development, staff education, processes for maternal education, and IT integration of PPD screening and documentation.

The results of this study do not endorse changing the timing of PPD screening at this time. Data collection and analysis on PPD in this NICU is requested by management to continue and an extension or revision of this project’s IRB application is planned to be completed and submitted by a neonatal nurse practitioner who will continue this work. The interval for delivery of PPD screening could be easily modified on this unit if determined through future data collection and analysis. This could be changed by making a policy revision and educating staff on the proposed alterations to screening timing.

Implications for Practice

Overcoming the stigma attached to maternal mental health conditions was one goal of this project. Mental health stigma can be perceived by the mother which may impact her willingness to come forward with her true feelings, as well as the stigma of healthcare providers in the form of decreased comfort level in starting conversations with mothers to assess for warning signs. Stewart and Vigod (2016) suggest adopting programs that have staff and provider education as well as collaborative care with obstetricians or primary care providers to minimize barriers such as shame and mental health stigma. Consequences related to PPD can impact the mother, infant, family unit and community. Establishing a comprehensive program for early detection and intervention can have lasting benefits for all impacted by this condition.
Maternal mental health issues should not be the sole responsibility of the obstetrician or primary care provider. Mothers with infants in the NICU are known to be at an increased risk for PPD. With extended length of stays in NICUs, this makes for a prime encounter for preventative efforts, education, identification of problems and early intervention efforts if warranted.

Conclusion

Postpartum depression is a major maternal health issue that can have a lasting impact on mother and infant. Mothers with infants in the NICU are at a particularly higher risk for developing symptoms of depression and or anxiety in the postpartum period. The incidence of PPD in NICU mothers warrants action in the form of screening processes and intervention plans for resources and referral. It has yet to be determined the most appropriate time to screen in this setting, however, the lack thereof may lead to serious consequences. The ultimate goal of PPD screening in the NICU, is to play a part in identification of a prevalent maternal health complication and make a positive impact on outcomes for mother and baby.
References


http://doi.org/10.3109/08958378.2014.955932

doi:10.1097/NNR.0b013e318268d06c


http://dx.doi.org/10.2147/IJWH.S54666


Appendix A

Search Trail for Literature Review

**PICOT QUESTION:**
For mothers with infants in the Neonatal Intensive Care Unit (NICU), is interval screening for postpartum depression more effective than one time screening for detecting postpartum depressive symptoms during their infant’s hospitalization?

---

**Population/Problem**
- NICU (C) 873 (P) 2,251
- Mothers (C) 1,676 (P) 15,014

**Intervention**
- Postpartum Depression (C) 313 (P) 1,030
- Postpartum Depression Screening (C) 235 (P) 352

**Search completed in CINAHL Plus with Full Text database (C) and PubMed database (P)**

**Search completed in Cochrane database of systematic reviews**

- NICU (30) PPD Screening (7)

**All combined using “AND” (1)**

---

**Final Keepers**
12

**Practical screens considered:**
- Human study, Research article, Last 6 years (2011-2017), English-language

**Inclusion Criteria:**
- High level evidence, NICU setting, PPD screening, maternal/neonatal outcomes r/t PPD

**Exclusion Criteria:**
- Not related to PICOT, outpatient setting, general depression, editorials or opinion papers
### PICOT Question:
For mothers with infants in the Neonatal Intensive Care Unit (NICU), is interval screening for postpartum depression more effective than one time screening for detecting postpartum depressive symptoms during their infant’s hospitalization?

<table>
<thead>
<tr>
<th>Citation/Level of Evidence</th>
<th>Participants Setting Sample</th>
<th>Purpose</th>
<th>Methods/Design &amp; Limitations</th>
<th>Findings</th>
<th>Applicability to Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blucker, R. T., Gillaspy Jr, J. A., Jackson, D., Hetherington, C., Kyler, K., Cherry, A. …&amp; Gillaspy, S. R. (2014). Postpartum depression in the NICU: An examination of the factor structure of the postpartum depression screening scale. Advances in Neonatal Care, 14(6), 424-432. doi:10.1097/ANC.000000000000135</td>
<td>The sample for study 1 is n= 385. Sample for study 2 is n=110. The setting was a NICU in the south-central area of the U.S. This sample was a convenience sample and data collection took place from July 2009-December 2010.</td>
<td>The purpose of this study was to investigate the validity of the PDSS among women with infants in the NICU setting.</td>
<td>Study 1 was retrospective and descriptive. Study 2 was prospective and descriptive. PPD screening was done on participants using the PDSS at 2 weeks postpartum. Confirmatory factor analysis was the statistical method used to analyze the PDSS in this sample for both study 1 and 2. A goodness of fit model was also used in study 2.</td>
<td>Study 1-Inadequate fit with the 7-factor model of PDSS. 5-factor model reasonable. Study 2- Inadequate fit with the 7-factor and 5-factor models. PDSS was not found to be a tool with high validity in this sample of NICU mothers.</td>
<td>Although, the PDSS tool wasn’t supported as a tool with high validity in this sample of NICU mothers, this sample still had a large percentage of mothers experiencing depressive symptoms. This supports evaluation for PPD in the NICU setting.</td>
</tr>
</tbody>
</table>
POSTPARTUM DEPRESSION SCREENING IN THE NICU

Limitations of this study include smaller sample size and that PDSS tool designed for general population and doesn’t address challenges NICU moms face.


| Setting is a NICU in the south central area in the U.S. Sample is a convenience sample of 111 mothers with infants in the NICU who met inclusion criteria. Recruitment and data collection occurred from Feb. 2008-Feb. 2009. The purpose of this study is to assess PPD and contributing variables of mothers with infants in the NICU as well as how these factors influence infant length of stay. | Cohort study design PDSS used to measure depressive symptoms, STAI used to measure anxiety, Parental Stressor Scale an assessment of environmental stress from NICU setting, Postpartum Support Questionnaire assessment of support, and CRIB is a measure of severity of infant condition. | 52% of sample had a positive screen for PPD. Higher than expected anxiety scores on STAI tool. NICU LOS was significantly correlated with stress related to NICU environment, infant appearance and parental role change. No social support subscales correlated with LOS. In moms with history of mental illness, substance abuse history and severity of infant condition best predictors of LOS. | Findings showed an elevated incidence of PPD over what is expected in the general population. Anxiety and stress in the NICU environment also consistent findings in this population. No specific associations made between PPD and LOS, but anxiety was significant in being correlated with LOS. This supports screening and processes to support maternal mental health in the NICU setting which has positive implications for mothers, babies and organizations. |

Level of evidence: IV Cohort study
### POSTPARTUM DEPRESSION SCREENING IN THE NICU

<p>| Chuffo Siewert, R., Cline, M., &amp; Segre, L. (2015) | Implementation of an innovative nurse-delivered depression intervention for mothers of NICU infants. <em>Advances in Neonatal</em> Setting was Level IV NICU in the Midwest. Participants of open trial were subject to the following inclusion criteria: have an infant. The purpose of this study is to examine listening visits (LV) as a nurse-delivered Qualitative case study Narrative analysis completed on each of the 6 sessions of the LV for one of the participants in the open trial. Findings suggest that LV works as a valuable adjunct to other maternal mental health interventions. LV are at a value because the reflective listening and flexible nature of the LV show much promise in the way of helping with early detection of maternal social and mental health problems. This intervention can be done right at the bedside. Intervening early with education or intervention may help. | Zero order correlations used to analyze demographic variables with LOS. Multivariate models completed for those with and without mental health history and LOS. Limitations include small sample size. Also, correlation between the PPDS and STAI scores could indicate these tools are measuring the same occurrence, being PPD. Using both these tools could limit the significance of the overall analysis. | moms without history of mental illness, vaginal delivery, infant appearance, and severity of infant condition best predictors of LOS. |</p>
<table>
<thead>
<tr>
<th>Source</th>
<th>Participants</th>
<th>Intervention</th>
<th>Limitations</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earls, M.F. (2010). Clinical Report-Incorporating recognition and management of perinatal and postpartum depression into pediatric practice. *Pediatrics.*126(5), 1032-1039, doi:10.1542/peds.2010-2348</td>
<td>born &lt;32 weeks gestational age admitted to the NICU requiring 6 weeks hospitalization, English speaking, over 18 years of age, and had a EPDS score 12 or greater. For this case study the sample size was 1 account of the LV intervention.</td>
<td>depression intervention for mothers in the neonatal intensive care unit (NICU) screening 12 and over on the Edinburgh Postnatal Depression Scale. Limitations were not listed but could include small sample size as only one account was used in the case study.</td>
<td>intervention support mothers to share their concerns and feelings. This approach helps to decrease anxiety and depression in this population. Due to the ability for the program to be administered at the infant’s bedside or within the hospital, this cuts down on barriers related to social stigma, cost and inaccessibility to support services.</td>
<td>improve outcomes for mothers with infants in the NICU.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>Participants</th>
<th>Intervention</th>
<th>Limitations</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Care, 15(2), 104-111. doi: 10.1097/ANC.0000000000000146</td>
<td>Level of evidence: VI Qualitative Case Study</td>
<td></td>
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<td></td>
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</table>


The purpose of this report is to increase awareness to the importance of PPD assessment and referral in the pediatric setting to improve maternal-baby dyad interactions. PPD incidence can vary among socioeconomic groups but on average in general population is around 13%. PPD can have a significant impact in neurobehavioral development of the infant, attachment and bonding as well as breastfeeding cessation. The mother-baby dyad has to be a consideration when caring for an infant. What effects mother can in some way can impact the infant. This supports process improvements in education, screening and intervention for PPD in the NICU setting.

Level of evidence: IV

Exploratory descriptive study

The sample for this study included 150 consecutive referrals of NICU mothers to the unit psychiatrist over a 2 year period. The setting was a 82 bed NICU that had an on-site psychiatrist for referrals. The purpose of this study was to describe the characteristics of NICU mothers who were referred for mental health evaluation.

The design was a prospective longitudinal study. Measurement tools used for depression assessment was

**Postpartum Depression Screening in the NICU**


The sample size for this study was 69 mother-infant couplets in a level IV NICU. The participants were

The purpose of this study is to identify predictive factors for

The design was a prospective longitudinal study. Measurement tools used for depression assessment was

Looking at the time across the entire study 65% of mothers met criterial for at least one of the psychological

This study confirms a high incidence of psychological distress in NICU mothers plus an emphasis that only a small percent were enrolled in therapeutic services by discharge could indicate the

Level of evidence: IV
Prospective longitudinal study

<table>
<thead>
<tr>
<th>Study Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>already a part of a larger NIH study. Participants recruited from August 2011 - December 2012. depression, anxiety and PTSD in NICU mothers with very low birth weight infants during hospitalization.</td>
</tr>
<tr>
<td>Center of Epidemiological Studies-Depression Scale, STAI for anxiety and the Modified Perinatal Posttraumatic Stress Disorder Questionnaires for postpartum traumatic stress. A Parental Stressor Scale-NICU was used as a tool to measure parental stress and Life Events Checklist assessed lifetime exposure to traumatic stress. Questionnaires were administered to participants at two points at approximately 28 days after birth and 14 days prior to NICU discharge. Multiple regression models were used to analyze different variables for conditions being studied. Depression and anxiety decreased overtime during hospitalization. Only 9% of mothers from the NICU were enrolled in therapeutic services by discharge despite the high incidence of depression, anxiety and PTSD.</td>
</tr>
<tr>
<td>need for more resources in the NICU setting to direct mothers to who are affected by PPD symptoms. Focus on these resources may need to be NICU based to overcome barriers related to limited access, financial concerns and stigma.</td>
</tr>
</tbody>
</table>
predictors of maternal mental health issues.

Descriptive statistics, paired-sample t-tests, and McNemar tests were performed to analyze maternal psychological distress changed over time.

Pearson and chi-square analyses were performed to highlight associations among variables.

Limitations of this study included self-reported maternal psychological distress, small sample size and that the study design does not allow for cause and effect.

Hoedjes, M., Berks, D., Vogel, I., Franx, A., Bangma, M., Darlington, Sample in this study is n=161. Sample of this study also
The purpose of this study was to
Prospective cohort study
With mild preeclampsia 23% of women reported depressive symptoms
Women with severe preeclampsia are more likely to develop PPD. The increase in prevalence in

**Level of evidence: IV**

**Prospective cohort study**

- Recruited as a part of a larger Pro-Active study assessing preeclampsia and postpartum health.
- Setting took place in 4 hospitals in the Netherlands.
- EPDS used to measure indication of postpartum depressive symptoms after mild and severe preeclampsia and potential contributing factors.
- Multiple logistic regression analyses examined the association between severity of preeclampsia, contributing factors, and PPD assessed at three different points postpartum: 6, 12, and 26 weeks after childbirth.

At any point in the assessed postpartum period. This was less than the 44% of those who had severe preeclampsia.

- The prevalence of PPD occurred at differing times in the mild and severe preeclampsia groups but this was not found to be significant.

This study determined that it was not the severity of preeclampsia that causes PPD symptoms but complications that were caused as a result of the pre-e: NICU admission, gestational age at delivery, perinatal death, obstetric complications, and delivery type.

- Limitation: No control group with mothers of uncomplicated pregnancies and small sample size.

- Both mild and severe preeclampsia compared to the general population indicates the need for screening in these high risk mothers.

- Also, as it was found that gestational age at birth and NICU admission were contributing factors for PPD screening processes should also be implemented in this high risk setting.
<table>
<thead>
<tr>
<th>Reference</th>
<th>Sample size</th>
<th>Study Type</th>
<th>Purpose of Study</th>
<th>Methodology</th>
<th>Findings</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>McCabe, K., Blucker, R., Gillaspy Jr, J. A., Cherry, A., Mignogna, M., Roddenberry, A,… &amp; Gillaspy, S. R. (2012). Reliability of the Postpartum Depression Screening Scale in the Neonatal Intensive Care Unit. <em>Nursing Research, 61</em>(6), 441-445. doi:10.1097/NNR.0b013e318268d06c</td>
<td>Sample size is n=111 in a convenience sample of mothers with infants in the NICU. Participants included were also a part of a larger study examining psychosocial factors of NICU mothers in a NICU in south central area of U.S.</td>
<td>Descriptive study</td>
<td>The purpose of this study was to evaluate the reliability and validity of the PDSS in a sample of NICU mothers.</td>
<td>Descriptive study</td>
<td>The PDSS was found to have excellent reliability for total scores and were adequate for the subscales in this sample of NICU mothers.</td>
<td>PDSS found to be a reliable tool, but validity requires more research. This tool has more qualitative aspects to the questions on the scale involving sleep, anxiety, guilt, etc. which may be a better tool for the NICU population compared to similar tools. This makes it a potentially useful tool relating to feelings NICU mothers may feel. The best tool for PPD screening in this setting has yet to be determined although the EPDS at this time is the gold standard.</td>
</tr>
<tr>
<td>Rogers, C. E., Kidokoro, H., Wallendorf, M., &amp; Inder, T. E. (2013).</td>
<td>Sample size is n=73 cohort of mother-infant</td>
<td>The purpose of this study</td>
<td>Prospective cohort design</td>
<td>Findings of this study found a prevalence rate of PPD of 20%, similar to other</td>
<td>Working to break down barriers in the NICU to increase parental confidence and ways to decrease</td>
<td></td>
</tr>
</tbody>
</table>

Level of evidence: IV

Cohort study

| groups at a level III NICU. Infants had to be <30 weeks gestation and recruited within the first 72 hours of life. | is to identify the risk factors that may be predictive indicators for postpartum depression (PPD) in mothers with very preterm infants. | Individual demographics, maternal psychosocial and infant risk factors were entered into hierarchical linear regression models and EPDS and STAI-S scores were used as outcome variables. MRI results (extent of brain injury, LOS, and days ventilated were infant data collected. P value <0.1. Differences between Caucasian and African-American mothers were evaluated with *t*-tests for continuous variables and *χ*2 analyses for categorical variables. Factors proven significant from the regression models literature. Moderate to severe anxiety was discovered in 43% of mothers in the sample prior to NICU discharge. There was no difference found in PPD between ethnicity groups. The risk factors associated with an increased risk for PPD in this study were: being married, parental role alteration, and increased length of ventilation. Unlike previous findings in literature this study did not find a correlation between a history of depression and anxiety and risk for PPD. No significant predictors were found for anxiety in these mothers. Ventilation days may influence overall infant length of stay. Since minimal factors were identified as predictors of depression and anxiety, universal PPD screening in the NICU is recommended. |
and those prevalent in more than one race were evaluated by analysis of covariance.

| Sample of n=135 mothers of NICU infants born at 26-34 weeks gestation. Setting was several northern California NICUs. Participants completed self-assessment tools—Stanford Acute Stress Reaction Questionnaire, Beck Depression Inventory, Beck Anxiety Inventory to aid in determining inclusion into treatment vs. control group. | The purpose of the study is to identify if potential factors (demographic, maternal factors, pregnancy history, infant condition/factors) were associated with depression, anxiety and PTSD in mothers of premature infants in the NICU who screen positive for ASD. Randomized controlled trial. Mothers positive for depression, anxiety, or acute stress disorder (ASD) were included in treatment intervention group. Control group were those who screened negative. Bivariate statistics including two-sample t-test, Wilcoxon rank-sum test, Chi-square test, and Fisher’s exact test used to compare maternal factors between treatment and control group. Three-level variable created to analyze whether mothers screened positive for depression. | 77.8% of mothers in the sample screened positive for at least one of the 3 measures of depression, anxiety or ASD. Half of the sample (51.1%) screened positive for 2 or 3 of the measurement tools. Almost 75% of sample met criteria for ASD. 47.4% of mothers screened positive for anxiety symptoms. 35.6% of mothers screened positive for depression. Maternal factors, demographics, pregnancy history and severity of infant condition do not have differing association between treatment and control groups. Findings of this study suggest that it is difficult to identify mothers at risk for PPD symptoms based upon demographic, maternal or infant factors. This suggests the recommendation for universal screening for all mothers in the NICU setting. This is further supported by the high incidence of emotional distress found in a majority of the sample. |

| Level of evidence: Level I- Systematic Review of | There were 100 articles reviewed as candidates for this systematic review. 39 articles were excluded based on inclusion/exclusion criteria. 23 articles did not meet inclusion criteria, however were used for general information regarding PPD. | The purpose of this systematic review is to evaluate the known increased prevalence of postpartum depression, risk factors, screening tools, and interventions specific to mothers. Descriptive evaluation of the studies provided in this review. Five authors completed the review from medical centers and universities in Oklahoma. Articles were searched by electronic sources using PubMed, MedLine, PsycINFO, and... | Studies involved in the review had varying designs with some inconsistencies in results. Studies analyzed for prevalence of PPD had some variance in findings ranging from 16-52.3%. Some discrepancies were noted in varying findings of risk factors, may be attributed to sample size. However, overall similar etiology related to NICU... |
randomized controlled trials, correlational, cross-sectional prospective, case-control, and factor analysis studies.

| Articles | Google Scholar databases. The search took place from 2/2013 to 8/2013. Keywords for the search included: “neonatal intensive care”, “NICU infants”, “mothers of preterm infants”, premature infants in the NICU”, “low birth weight infants in the NICU”, “mothers with PPD”, mothers with PPD in the NICU”, “PPD in the NICU”, “depression in the NICU”, “emotional distress in the NICU”, “parents in the NICU”, and “stress in the NICU”. Articles were found from September 1972-August 2013.

Data was analyzed separately in the following categories: prevalence, etiology, specific factors were found to influence PPD. Varying screening tools assessed in different articles and table easily itemized the different screening tools for type/length, availability, administration and if previously used in NICU setting. Intervention and prevention of PPD should be a family centered coordinated effort in the NICU setting.

Screening procedures for PPD in the NICU is supported with a coordinated plan for follow-up in women who screen with positive results. Interventions should include a multidisciplinary and family centered approach.
diagnosis and screening, and interventions. Three different tables were used to break down data from applicable reviewed articles: prevalence in NICU setting, screening tools and intervention methods.

A limitation of this review was the small sample size of a number of the articles as well as the lack of a control group in some of the studies. It is also noted in the analysis of different screening tools reviewed that a potential limitation is a response bias related to social desirability which could cause the possibility of a high false positive rate.

<table>
<thead>
<tr>
<th>Vasa, R., Eldeirawi, K.,</th>
<th>Sample was n=131 mothers of</th>
<th>The purpose of EPDS used to measure maternal</th>
<th>Predictors of PPD found to be:</th>
<th>Findings suggest increasing risk for PPD with increasing</th>
</tr>
</thead>
</table>

| NICU infants hospitalized longer than 2 weeks at a Midwestern hospital. | this study was to assess the incidence of mothers whose newborns are in the NICU, relationship of LOS with PPD, and if early detection impacts maternal PPD over time. | PPD every 2 weeks while infants hospitalized. Assessment of infant LOS done by analyzing PPD across ordinal levels of LOS using chi-square and bivariate logistic regression analysis. | Preexisting history of depressive symptoms, longer length of stay, history of substance abuse. Limitation is that there was no control group and not random blinded study design. | Length of stay. This supports PPD screening in the NICU related to common occurrence of long term hospitaliations. Furthermore, baseline assessment of preexisting history may be warranted to help identify higher risk NICU mothers. | Level of evidence: Level IV- Prospective cohort |