The Eat Sleep Console Approach: An Evaluation of Impact, Outcomes and Continuation of Care

Stefanie DISILVIO

Follow this and additional works at: https://dsc.duq.edu/dnp

Part of the Maternal, Child Health and Neonatal Nursing Commons

Recommended Citation
https://dsc.duq.edu/dnp/26

This DNP Manuscript is brought to you for free and open access by the School of Nursing at Duquesne Scholarship Collection. It has been accepted for inclusion in Doctor of Nursing Practice (DNP) Manuscripts by an authorized administrator of Duquesne Scholarship Collection.
The Eat Sleep Console Approach: An Evaluation of Impact, Outcomes and Continuation of Care

Stefanie DiSilvio

Duquesne University School of Nursing

July 30th, 2021
Abstract

Neonatal Opioid Withdrawal Syndrome (NOWS), a subgroup of Neonatal Abstinence Syndrome (NAS), is a constellation of postnatal symptoms that occurs due to the abrupt cessation of intrauterine opioid exposure. Historically, these infants have been evaluated and treated by the Finnegan Neonatal Abstinence Scoring Tool (FNAST) (Appendix A). Recent evidence supports the use of the Eat Sleep Console Approach (ESC) (Appendix B) as an alternative to the FNAST. The ESC model focuses on the comfort and care of these infants by maximizing nonpharmacologic methods and increasing family involvement in the treatment of their infant.

The purpose of this project was to evaluate the implementation of ESC in a community hospital and to develop recommendations for subsequent steps to continue the improvement of care for this mother-infant dyad. Clinical data was collected and evaluated on opioid exposed newborns (OENs) from December 2019 through December 2020. ESC was implemented in June of 2020; therefore, we were able to compare six months of infants who were evaluated and treated using FNAST to six months of infants who were evaluated and treated using ESC. Additionally, clinical data was collected and examined to evaluate maternal outcomes that may have been impacted by this change in assessment tools. Lastly, survey data was collected from outpatient pediatric providers to assess their level of comfort in caring for these newborns, assess typical practice in caring for this patient population and evaluate handoff from the inpatient facility. The goals to decrease the average length of stay (ALOS) by one day and total morphine exposure by 20% were met. Other findings include that ESC enhances mother-infant bonding and decreases cost. Additionally, there were inconsistencies identified in outpatient follow up practices and outpatient providers desire consistent handoff from inpatient facilities.
Key Words: neonatal abstinence syndrome, neonatal opioid withdrawal, pregnancy, substance use disorder, opioid addicted newborn, Finnegan Neonatal Abstinence Scoring Tool, Eat Sleep Console Approach

Introduction

Opium, the original gangster of opioids, dates to ancient Mesopotamia (Kocherlakota, 2014). The first known documentation of opioid addiction is from the end of the 18th century (Kocherlakota, 2014). First came morphine in 1804 and then came heroin in 1874 (Kocherlakota, 2014). An increase in heroin addiction in women was observed in the 19th century (Kocherlakota, 2014). The first case of a newborn who demonstrated symptoms of opioid withdrawal at birth is documented in 1875 (Kocherlakota, 2014). Until the early 1900s, most of these infants died (Kocherlakota, 2014). Then, morphine therapy was initiated. It is astonishing to opine that 200 years later, we are treating infants in a similar manner. As the prescription opioid epidemic has flourished in the United States (US), women (and pregnant women) have not been spared (Pryor et al., 2017). Pryor et al. (2017) declares that in 2009, 14% of privately insured women within the US filled at least one opioid prescription during their pregnancy. That same study found that in the state of Tennessee, amongst Medicaid covered pregnant women, 29% filled at least one prescription for opioids during their pregnancy. Unfortunately, prescription opioids are just a portion of the problem as it relates to intrauterine opioid exposure. Pregnant women are also using heroin, fentanyl, and other synthetic opioids. Many are in a prescription medication assisted treatment (MAT) program and prescribed either methadone or buprenorphine as a means to treat their addiction. Regrettably, all opioids easily cross the placental barrier due to their liposolubility and low molecular weight (Kocherlakota, 2014). Thus, the incidence of NOWS has been steadily increasing. In the past decade, there has been a
significant increase in NOWS in the United States, England, Western Australia, and Canada (Lisonkova et al., 2019). Since 1999, the rate of opioid use disorder (OUD) amongst pregnant women has more than quadrupled, from 1.5 per 1,000 deliveries to 6.5 per 1,000 deliveries (Kroelinger, et al., 2019). A concomitant increase in the incidence of NOWS has been observed, from 2.8 to 14.4 per 1,000 live births (Kroelinger, et al., 2019). Some degree of symptoms are clinically identifiable in 60% to 80% of OENs (Kocherlakota, 2014). Symptoms typically include poor feeding, irritability, high pitched cry, gastrointestinal disturbances, poor sleep, increased muscle tone, tremors, temperature instability, tachypnea, diaphoresis, and skin breakdown. The median length of hospital stay for these infants is 19 days and this care cost the United States nearly $316 million dollars in 2012 alone (Tolia, et al., 2015; Corr & Hollenbeak, 2017). The burden is unquestionable and with that has come efforts to reduce incidence, length of stay and health-care costs. One of those endeavors is the Eat Sleep Console (ESC) Care Approach.

Prior to ESC, the commonly used NOWS assessment tool was the FNAST. The FNAST was developed in 1974 and assesses the 21 most common symptoms of neonatal opioid withdrawal using a point-based system centered on the assessor’s perceived severity. Infants with three consecutive scores of ≥ 8 are typically treated with pharmacological intervention. This score of eight was derived from Loretta Finnegan’s original article in 1975: “The infant with a score of score of seven or less was not treated with drugs for the abstinence syndrome because, in our experience, he would recover rapidly with swaddling and demand feedings. Infants whose score was eight or above were treated pharmacologically” Finnegan et al., 1975). This score was then widely adopted by hospitals around the world. Interestingly, this tool was originally designed for research and not for clinical use. Yet, it is used by 95% of institutions in
the United States (Grossman, et al., 2018). The FNAST is largely subjective, time consuming, complicated and has demonstrated poor reliability and validity (Verklan, 2019). Another drawback to this early tool is that to perform the assessment, the infant must be disturbed every two to four hours which has the potential to exacerbate the symptoms of NOWS. ESC, developed in 2017 by Grossman and colleagues (2018), seeks to remedy this by utilizing a function-based assessment tool to assess three, easy to assess, critical functions of the newborn: eating, sleeping, and consoling (Grisham, et al., 2019). ESC promotes the use of non-pharmacological interventions by the family and incorporates input from family into the scoring process. Thus far, literature is supporting the use of ESC by revealing results such as decrease length of stay, a decrease in exposure to pharmacologic agents and a decrease in cost of treatment (Grisham, et al., 2019).

**Literature Review**

Four reference databases were searched including CINAHL, Embase, PubMed and Google Scholar. This search was restricted to peer-reviewed literature in English. Key terms sought included the following: “neonatal abstinence syndrome,” “neonatal opioid withdrawal,” “pregnancy and substance use disorder,” “opioid addicted newborn,” “Finnegan Neonatal Abstinence Scoring Tool,” and “Eat Sleep Console Approach.” Several additional references were uncovered by examining the references of relevant articles found using the aforementioned method. There were 14 relevant articles from 2013-2020. Much of the existing literature concerning NOWs and ESC was found to be level IV or V non-research evidence per the John’s Hopkins Nursing Evidence Based Practice (JHNEBP) model and guidelines. This model first requests that the researcher examine if the evidence addresses the identified evidence-based question (Dang & Dearholt, 2018). If the answer is “yes,” the appraisal proceeds by using 6
steps to evaluate level IV literature (clinical consensus guidelines, consensus statements and position statements) and five steps to evaluate level V literature (summary of evidence) (Dang & Dearholt, 2018). The follow inquiries were performed on each article depending on the level.

Level IV Non-Research Evidence Appraisal (Clinical Practice Guidelines/Consensus and Position Statements)

1. Are the types of evidence included identified?
2. Were appropriate stakeholders involved in the development of the recommendations?
3. Are groups to which recommendations apply and do not apply clearly stated?
4. Have potential biases been eliminated?
5. Does each recommendation have an identified level of evidence stated?
6. Are recommendations clear?

Level V Non-Research Evidence Appraisal (Literature/Integrative Review)

1. Is the subject matter to be reviewed clearly stated?
2. Is literature relevant and up to date (most sources are within the past 5 years or classic)?
3. Of the literature reviewed, is there meaningful analysis of the conclusions across the articles that are included in the review?
4. Are gaps in the literature identified?
5. Are recommendations made for future practice or study?

Level V Non-Research Evidence Appraisal (Quality Improvement/Program or Financial Evaluation)

1. Was the aim of the project clearly stated?
2. Was the method fully described?
3. Were the process or outcome measures identified?
4. Were results fully described?
5. Was the interpretation clear and appropriate?
6. Are components of cost/benefit or cost effectiveness analysis described?

All relevant studies were found to be of high or good quality based on the responses to the above questions.

Patrick, et al. (2015) demonstrated that infants with NOWS were more likely to have complications at birth than other newborns including low birthweight (24.2% vs 7.2%), transient tachypnea of the newborn (11.7% vs 3.1%), meconium aspiration syndrome (2.8% vs 0.4%), respiratory distress syndrome (4.5% vs 2%), jaundice (32.8% vs 19.1%), feeding difficulty (17.3% vs 3%), seizures (1.4% vs 0.1%) and possible sepsis (14.8% vs 2.2%). These complications contribute to an increase in LOS for infants with NOWS compared to other newborns and an even longer LOS for those infants requiring pharmacologic treatment (Patrick, et al., 2015). In 2012, Patrick, et al. (2015) found the mean hospital charges for initial stay in for NOWS infants to be $66,700. For infants requiring pharmacological treatment, this number jumps to $93,400. These numbers are drastically higher than the mean cost of stay for an uncomplicated term infant, $3,500. Infants with NOWS are also much more likely to be insured by Medicaid (81.5% vs 46.4%) (Patrick, et al., 2015). These findings demonstrate the impact of opioid abuse on pregnant women and their children and the necessity for prevention and treatment improvements.

Thus far, there are numerous studies supporting use of nonpharmacological care in the management of these OENs. A literature review by Ryan et al. (2019) summarized the current literature on this subject and found substantial evidence that nonpharmacological treatment should be part of standard care for these infants. This review included level I-III evidence
articles published from 2000-2017. Ryan et al. (2019) noted that while nonpharmacological management of OENs is becoming more commonplace, at that time, insufficient research on its effectiveness had been performed. They describe existing research by using five categories: environmental control; feeding methods; social integration; soothing techniques; and therapeutic modalities. Environmental control included quiet, softly lit rooms and swaddling. Feeding methods exclusively focused on the benefits of breastfeeding. Breastfed infants have exhibited lower withdrawal scores, a reduction in pharmacological treatment need, a decrease in length of pharmacological treatment when needed, a decrease in overall length of stay and were less likely to end up in foster care (Ryan et al., 2019). Remarkably, there was no difference between infants fed directly from the breast to those fed expressed breast milk, suggesting that milk content may play more of a role than maternal-infant bonding (Ryan et al., 2019). Social integration encompasses rooming-in and skin-to-skin contact. Rooming-in was found to yield higher breastfeeding rates, a reduction in the need for pharmacological treatment, a decrease in some gastrointestinal disturbances in the infant, a shorter length of stay, less likelihood of admission to a level II nursery, and higher likelihood of retained child custody (Ryan et al., 2019). Skin-to-skin contact has been shown to decrease restlessness in the infant, improve breastfeeding abilities, promote maternal-infant bonding, decrease in the need for pharmacological therapy, and decrease in length of stay. Soothing techniques include non-nutritive sucking (pacifier) and positioning. Both are thought to be calming for the infant. Although, this evidence is mostly anecdotal and could benefit from evidence-based substantiation. Therapeutic modalities included innovative techniques such as massage and acupuncture. Acupuncture as a solo therapy was found to be ineffective. However, as an adjuvant therapy to pharmacological treatment it yielded a significant decrease in length of stay (Ryan et al., 2019).
While the Ryan et al. (2019) literature review supports the use on nonpharmacological care, there are also several studies to support the implementation of the ESC approach. Table 1 summarizes the findings and implications included in this evidence-based practice literature review. Grossman et al. (2018) compared 50 OENs who were assessed using both the FNASS and ESC scoring systems. All actual treatment decisions were based on ESC. The results were impressive: 6 infants were treated with morphine compared to 31 infants who would have been treated with morphine if management decisions were based on FNAST (Grossman, et al., 2018). This study was performed at Yale New Haven Children’s Hospital and included all infants with intrauterine opioid exposure who were <35 weeks gestation. The primary outcome assessed was the number of infants started on morphine therapy. Additional outcomes were the proportion of days that each approach recommended a change in pharmacologic treatment (dose adjustment), and the number of incidences when the approaches differed in their recommendations. In addition to the results of the primary outcome of the number of infants treated with pharmacologic therapy, this study also found morphine dose increases occurred on 76 patient days for the FNAST approach compared to 8 patient days for the ESC approach. There were also 30 patients on which there was a discrepancy in management based on approaches. Specifically, the FNAST would have indicated an increase in morphine while ESC would not. Another study by Blount et al. (2019) investigated a total of 389 infants (FNAST n = 203, ESC, n= 186). They appreciated a decrease in length of stay (10.3 to 4.9), a decrease in the number of infants requiring pharmacological treatment (92% to 19%), a decrease in the number of doses of morphine given, and a decrease in the total morphine dose given (Blount et al., 2019). This implementation of ESC used morphine as needed as opposed to scheduled, every three hours. A study by Dodds, et al (2019) simultaneously compared ESC and FNAST groups by first
comparing baseline and intervention groups. They achieved a 50% reduction in LOS, a 48% in cost per stay and a 79% reduction in total morphine given. In addition to the literature supporting the use of ESC, there are a substantial number of sources corroborating the role of stigma in the care of both the mother with opioid use disorder (OUD) and their OENs.

**Table 1**

*Literature Review Supporting the Use of ESC*

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Sample</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grossman, et al. 2018</td>
<td>Retrospective comparison of treatment decisions (FNAST vs ESC)</td>
<td>N = 50 infants, &gt;35 weeks gestation with intrauterine opioid exposure</td>
<td>6 infants treated using the ESC approach compared to 31 who would have been treated with FNAST</td>
</tr>
<tr>
<td>Blount, et al. 2019</td>
<td>Comparison of baseline (FNAST) and intervention (ESC)</td>
<td>N= 389 infants (FNAST n= 103, ESC n = 186), &gt;35 weeks and &gt;1800g</td>
<td>Average LOS decreased by 5.4 days, the percent of infants treated pharmacologically decreased by 73% and the average number of morphine doses/infant decreased from 38 to 0.3 , and the average total morphine dosage/infant decreased from 1.1 to 0.03 mg/kg.</td>
</tr>
<tr>
<td>Dodds, et al. 2019</td>
<td>Comparison of baseline (FNAST) and intervention (ESC)</td>
<td>N = 82 infants (baseline FNAST n = 49 and post implementation ESC n = 33)</td>
<td>Average LOS decreased from 11.77 to 5.94 (p= .0003), average variable cost per stay decreased by 48% and the total morphine exposure decreased from 2.25 mg/kg to 0.45 mg/kg (p= .001)</td>
</tr>
</tbody>
</table>

ESC was successful but more targeted interventions and increased collaboration amongst stakeholders and improved infant developmental follow-up were recommended as next steps.
Stigma is defined as “an attribute that is deeply discrediting”, reducing someone “from a whole and usual person to a tainted, discounted one” (Recto, et al., 2020 p. 354-355). Stigma implies a negative attitude towards a being. Individuals affected by stigma feel rejected and discriminated against. Stigma has been well studied, but not specifically in the population of women of childbearing age experiencing substance use disorder (SUD) which includes OUD (Recto, et al., 2020). There has been an evolution on the attitude toward pregnant and parenting women with SUD. In the United States, during the early 20th century, it was believed that SUD was a consequence of a psychological condition and not the product of moral failure (Recto et al., 2020). Through the years this changed to a perception that SUD was more a criminal or social problem, and many affected (including pregnant and parenting women) were denied healthcare (Recto et al., 2020). Women with SUD suffer a larger stigmatization than men, as this behavior contradicts what the public expects from pregnant and parenting women (Recto et al., 2020). This stigma is felt especially strong in post-partum women with OUD (Recto et al., 2020). They are judged by health care providers and perceived to be bad mothers (Cleveland, et al. 2016). In the post-partum period, these women experience a gamut of emotions. Figure 1 illustrates some of the experiences of mothers collected in a qualitative descriptive study by Cleveland, at al (2016). The experiences are categorized by themes determined via thematic analysis. These narratives are helpful to illuminate the challenges stigma creates and to serve as the groundwork for future studies in this direction. This study determined that these mothers experiencing SUD had common of early life circumstances such as sexual abuse, intimate partner violence, assault, and early onset substance abuse (Cleveland, et al 2016). This population of women lived through a higher-than-average rate or parental death, discord, divorce, desertion, substance abuse, physical abuse, emotional abuse, and sexual abuse
The authors note that when providing care for this population, it is essential that nurse “focus on providing social support to mitigate the stress”. They also state that “the judgmental attitudes and behaviors of the health care provider the women encountered during their labor and delivery and infant’s hospital stay server to further alienate the women and potentially retraumatized those who had experienced prior trauma in their lives” (Cleveland, et al 2016, p. 127). That is harsh criticism for those who chose to enter the caring profession of nursing. The American Nurses Association (ANA) calls for nurses to demonstrate “compassion, competence, and confidence” when educating mothers on non-pharmacological care of their infant’s withdrawal (Recto, et al., 2020). The ANA also recommends that all nurses take part in educational offering to expand their knowledge about mental health, SUD, interpersonal violence, and both local and state treatment opportunities for pregnant and parenting women with SUD (Recto, at al., 2020). Conversely, nurses report ethical distress, more distress and compassion fatigue when caring for infants experiencing withdrawal (Recto et al., 2020). These responses can and have led to burnout (Recto et al., 2020). A systematic review by Beokel et al. (2013) included 28 citations from Australia, the United Kingdom, the USA, Canada, and Ireland. Their review findings include that healthcare professionals had a generally negative attitude towards patients with SUD, those attitudes were stronger towards those using illicit substances, and healthcare professionals had feelings of discontent when working with this population (Boekel, et al., 2013). Several of the studies emphasized the need for and benefits of SUD training and education for health care professionals (Boekel, et al., 2013). Identified prospects for additional study in this area include interventions to addresses the challenges that pregnant and parenting women face; what types of interventions work best for dispelling stigma amongst nurses; what impact does this have on nurse’s job satisfaction; how to interventions that address
Concerning the financial impact of NOWS, a study by Ramphul et al. (2020) evaluated a large sample (n= 32,128) of patients with NOWS and found the mean cost per patient to be $79,937.75. This sample was derived from the 2016 KID database, which is the largest pediatric database in the United States. Additional demographic statistics resulted in this study are shown in figure 2. The increased incidence of NOWS amongst Medicaid payees and lower income families indicates the need for an intervention at the community level that targets families.
Consistent outcome reporting is essential in translating research into practice. A systematic review by Shan et al. (2020) reviewed 47 primary research articles and establishes a set of the most used primary and secondary outcomes measured and identified a need for a core outcome set. Kelly et al. (2020) did just that by performing a systematic review and then a 3 round Delphi survey of healthcare providers as well as parent interviews. Several of these core outcomes are used for this project and include: (1) pharmacologic treatment, (2) total dose of opioid treatment, (3) duration of treatment, (4) adjuvant therapy, (5) consolability, (6) time to adequate symptom control, (7) parent-infant bonding, (8) duration of time the neonate spent in the hospital, (9) breastfeeding; and (11) readmission to hospital (Kelly, et al., 2020).

The literature indicates that infants with NOWS and their mothers are at higher risk of complications immediately following delivery and beyond. This contributes to an increase in length of stay (LOS) and ultimately, costs. As rates of NOWS continue to rise, the need for evaluation of novel preventative and treatment therapies is mounting. Additionally, interprofessional collaboration with all key members of the health-care team is essential.
Methodology

The W. K Kellogg Foundation (WKKF) Logic Model for Program Evaluation was selected for this project. Table 2 specifies the components of the logic model for this project. This model was selected as it is practical, step wise tool that shows the association among the resources, activities, outputs, outcomes, and impact of a program. The findings are in a form readily shareable with all stakeholders. Furthermore, community and culture are central to the WKKF foundation and were also key elements of this project. The purpose of this project is to evaluate the use of the ESC approach in a community hospital setting.

Table 2

Logic Model

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Components</th>
<th>Implementation Activities</th>
<th>Outputs</th>
<th>Initial</th>
<th>Intermediate</th>
<th>Long-Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric and obstetric nurses</td>
<td>Implementation of ESC</td>
<td>Perform literature review</td>
<td>Use ESC with all eligible participants</td>
<td>Decrease length of stay for NAS</td>
<td>Improve mother infant bonding</td>
<td>Decrease health care costs related to NAS</td>
</tr>
<tr>
<td>Pediatric and obstetric providers</td>
<td>Present data to key stakeholders</td>
<td>Decrease the need for pharmacotherapy</td>
<td>Improve outcomes for mother and baby</td>
<td>Improve cognitive and behavioral outcomes for the child.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials needed for the development and production of educational tools for mothers</td>
<td>Collect data on mothers and infants with opioid exposure</td>
<td>Evaluate the data</td>
<td>Improved inpatient and outpatient satisfaction scores</td>
<td>Improve provider satisfaction and comfort</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to provide education</td>
<td>Collect data from outpatient providers</td>
<td>Summarize the data and present to key stakeholders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description of Project

The purpose of the project was to evaluate the effectiveness of ESC, assess the short-term outcomes for mother and baby, and to analyze the transition to primary care to determine if/what changes should be considered. The specific objectives were:

• Evaluate if the goal of a decrease in length of stay (LOS) by 1 day was met.
• Evaluate if the goal to decrease pharmacologic therapy (i.e., morphine) by 20% was met.
• Compare the infants who require pharmacologic therapy with ESC compared to the Finnegan Neonatal Abstinence Scoring System (FNAST).
  o Measures to include: the need for pharmacologic treatment; necessity of adjuvant pharmacologic therapy; length of treatment with pharmacologic therapy; LOS; breastfeeding; weight trend; disposition; emergency room visits; and readmission to the hospital.
• Evaluate the cost of ESC vs FNAST
  o Measures to include length of stay to calculate cost (burden).
• Evaluate the short-term outcomes of the mothers with infants who experienced NOWS (ESC vs FNAST and Core Outcome Set)
  o Measures to include: Any occurrence of maternal overdoses/deaths/relapses.
  o Measure and compare maternal depression screen scores.
  o Evaluate the discharge and follow up process of infants who experienced NOWS
  o Questions included:
    1) Regarding newborns who have had intrauterine opiate exposure: Were you informed of the infant’s history of Neonatal Opiate Withdrawal Syndrome by someone other than the infants caregiver?
2) Regarding newborns who have had intrauterine opiate exposure: Was there a hand-off (full report of birth history and newborn admission) from the inpatient facility (birth hospital and/or pediatric hospital)?

3) Regarding newborns who have had intrauterine opiate exposure: Are you able to easily access the electronic health records from their inpatient stay?

4) Regarding newborns who have had intrauterine opiate exposure: Are these infants seen more frequently than other newborns?

5) How frequently are these infants usually seen?

6) Do you feel comfortable/prepared to compare for these infants and their families?

7) Do you desire more formal education on Neonatal Opiate Withdrawal and maternal Substance Use Disorder (SUD)?

8) Do you have any suggestions to improve the care of this dyad?

**Implementation**

This activity was covered by the standard consent to treat. ESC has recently been implemented and is considered part of our usual care, but an evaluation of the program has not been undertaken. There was no burden of participation on any patients or their families. A stakeholder identification and analysis were completed, followed by a community assessment. The project was presented to key stakeholders using a multifaceted approach which included emails and face-to-face meetings. The timeline for the project was May of 2020 through July of 2021. The education for the staff began in May of 2020, followed by the official implementation of ESC in June of 2020. Data collection began in January of 2021. See Appendix C for a detailed timeline.
Community Assessment

Mercer County is a partially rural county located in western Pennsylvania (PA). This community is comprised of primarily non-Hispanic white people and ranks number 67 for overall health out of all PA counties (County Health Rankings, 2019). The demographics are representative of the rest of PA when it comes to age and gender but differ in ethnicity and location. There are notable health disparities in the historically marginalized groups of Blacks and Hispanics as indicated in table 3. Of significance is also the incidence of NAS in Mercer County and its neighboring counties (figure 4).

Table 3

<table>
<thead>
<tr>
<th>Mercer County and PA Demographics</th>
<th>Mercer County</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>111,750</td>
<td>12,805,537</td>
</tr>
<tr>
<td>% below 18 years of age</td>
<td>19.7%</td>
<td>20.8%</td>
</tr>
<tr>
<td>% 65 and older</td>
<td>21%</td>
<td>17.8%</td>
</tr>
<tr>
<td>% Non-Hispanic African American</td>
<td>5.8%</td>
<td>10.8%</td>
</tr>
<tr>
<td>% American Indian and Alaskan Native</td>
<td>0.2%</td>
<td>0.4%</td>
</tr>
<tr>
<td>% Asian</td>
<td>0.7%</td>
<td>3.6%</td>
</tr>
<tr>
<td>% Native Hawaiian/Pacific Islander</td>
<td>0.0%</td>
<td>0.1%</td>
</tr>
<tr>
<td>% Hispanic</td>
<td>1.5%</td>
<td>7.3%</td>
</tr>
<tr>
<td>% Rural</td>
<td>44.5%</td>
<td>21.3%</td>
</tr>
<tr>
<td>% Females</td>
<td>50.6%</td>
<td>51%</td>
</tr>
<tr>
<td>High School Graduation</td>
<td>93%</td>
<td>87%</td>
</tr>
<tr>
<td>Unemployment</td>
<td>5.5%</td>
<td>4.9%</td>
</tr>
<tr>
<td>Children in Poverty</td>
<td>19%</td>
<td>17%</td>
</tr>
<tr>
<td>Uninsured</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Median Household Income</td>
<td>$48,700</td>
<td>$59,200</td>
</tr>
<tr>
<td>Severe Housing Problem</td>
<td>14%</td>
<td>15%</td>
</tr>
<tr>
<td>Drug Overdose Deaths (per 100,000)</td>
<td>51</td>
<td>35</td>
</tr>
</tbody>
</table>
Data Management Plan

For this program evaluation, the data collected was predominantly demographic and clinical. Data was collected from day of life zero through 6 months of age newborns with intrauterine opioid exposure and who are ≥35 weeks gestational age and living. Data was collected on the aforementioned infants born from December 2019 through December 2020. The physical act of data collection occurred from January of 2021 through May of 2021. Most data were collected by manual chart review of the electronic health record (EHR). Data was mined in both Cerner eRecord and Epic. The demographic and clinical data was collected on all 43 patients and entered into an Excel spreadsheet and included: gender, ethnicity, gestational age, infant weights (day of life 10 weight, 2-month weight, 4-month weight, 6 month), maternal substance used, maternal urine drug screen results, infant urine drug screen results, maternal tobacco use, method of infant feeding (breast of bottle), treatment group (FNAST or ESC),
pharmacologic therapy, LOS, provider, insurance, and disposition. Patients were then divided into groups for comparison. These groups were pre implementation, post implementation, ESC, FNAST, ESC treated and FNAST treated. Statistical analysis utilized for this project included inferential and descriptive. Inferential statistics, namely a Student’s t-test, were used to compare ALOS between pre and post implementation groups and FNAST and ESC groups, ALOS amongst those patients with a history significant for maternal polysubstance abuse between FNAST and ESC groups, ALOS amongst those patients with a history significant form maternal tobacco use between FNAST and ESC groups, and weights between the FNAST and ESC groups. The evaluation of the discharge/follow up process of infants who experienced NOWS was performed via Qualtrics survey and yielded both qualitative and quantitative data. Descriptive analysis was used to describe this survey data and then also to summarize the project results.

Results

The evaluation results revealed that although there was not a statistical difference between ALOS between pre- and post-implementation (p=0.886) or between FNAST and ESC groups (p=.407), there was a decrease in the median length of stay (Figure 5) and a change in trend for ALOS (Figure 6). There was a 50% decrease in total morphine exposure seen between FNAST and ESC groups (average for FNAST was 14.6 mg per admission compared to an average of 7.3 mg per admission for ESC). Regarding the number of infants treated with pharmacologic therapy, 56% of the FNAST infants were treated and 50% of the ESC infants received treatment. None of the infants evaluated required adjuvant therapy. Among those infants requiring treatment, there was an average treatment length of 16.85 days for FNAST patients and 11.33 days for ESC patients. A total of three FNAST (42 cases) patients were exclusively breastfeed and 7 were fed a combination of breast and bottle feedings. For the ESC
population (8 cases), none were exclusively breast fed and four were fed a combination of breast and bottle feedings. Patients in both groups demonstrated sufficient growth. Figure 7 shows the growth between FNAST and ESC groups for infants from whom we were able to collect all 5 weight data points (birth, day of life 10, 2-month, 4-month, and 6-month). The t-tests for weights did not yield any statistically significant findings. There were zero readmissions, and 10 total emergency room visits within the first 6 months of life for both groups. Of these 10 emergency room visits, 90% were amongst those infants in the FNAST group. Of the infants in the FNAST group, 20.5% of were placed with someone other than the mother or father at discharge compared to 12.5% of ESC infants who were placed with someone other than the mother or father.

**Figure 5**

*Average Length of Stay*
Figure 6

*Trend in Average LOS*

![Graph showing trend in Average LOS](image)

*Notes:* Trending LOS does not include November 2020 as no cases of NOWS were observed that month

Figure 7

*Growth*

![Graph showing growth for ESC and FNAST](image)
Costs to implement ESC are minimal and are mostly related to the training of staff as shown in Table 4. An average cost per patient day of $918 was established. This $918 is considered a real cost, which is explained as the cost of providing the service including the resources used and not what is submitted for reimbursement or is reimbursed from payor. A cost benefit analysis (CBA) was performed (Appendix D) and revealed that this program will yield $43.61 per dollar spent. The return on investment is significant, and the net present value is far above zero. Though the tangible benefits are impressive, the intangible benefits are of even greater consequence (Table 5). It is important to note that savings related to LOS do not necessarily result in actual savings unless there is a change in staffing numbers, or perhaps a unit closed. This CBA encompasses the tangible benefits related to infant LOS and does not include possible financial benefits related to maternal outcomes.

There was one instance of maternal death related to a suspected overdose. Less than half of the mothers in the combined groups had one or more post-partum visits (13 out of 43). Scores from the Edinburgh Postnatal Depression Scale (EPDS) were collected from any post-partum and pediatric visit at which the tool was administered and documented. The average score for the mothers of infants in the FNAST group was 6, whereas the average score for the mothers of infants in the ESC group was three. The EPDS (Appendix E) was developed for screening postpartum women in outpatient, home visiting settings, or at the 6–8-week postpartum examination (Edinburgh Postnatal Depression Scale, n.d). The EPDS contains 10 questions. Responses are scored 0, 1, 2, or 3 according to severity of the symptom. Items marked with an asterisk are reverse scored (i.e., 3, 2, 1, and 0). The total score is determined by adding together the scores for each of the 10 items. A woman scoring 9 or more points or indicating any suicidal
ideation (a score of 1 or higher on question #10) should be referred immediately for behavioral health follow-up (Edinburgh Postnatal Depression Scale n.d).

Table 4

Costs Related to Implementation

<table>
<thead>
<tr>
<th>Category</th>
<th>$ Amount</th>
<th># Participants</th>
<th>Total Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetric Provider Training</td>
<td>Average rate = $78/hour</td>
<td>16 providers for 1 hour of training</td>
<td>$1,248</td>
</tr>
<tr>
<td></td>
<td>(mix of midwifes, physician assistants, nurse practitioners and physicians)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obstetric Nurse Training</td>
<td>Average rate $36/hr.</td>
<td>47 providers for 1 hour of training</td>
<td>$1692</td>
</tr>
<tr>
<td>Patient handouts</td>
<td>Pamphlets $1.00/each**</td>
<td>100</td>
<td>$100</td>
</tr>
<tr>
<td>Total Cost</td>
<td></td>
<td></td>
<td>$3040</td>
</tr>
</tbody>
</table>

*Average rate for these disciplines extracted from Zip Recruiter©, **Pamphlet cost provided by Staples©

Table 5

Benefits

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Value</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tangible</td>
<td>A decrease in length of stay (LOS) for the infant. Average cost per patient day = $918</td>
<td>Decrease in median LOS by 1.7 days realized</td>
</tr>
<tr>
<td>Intangible</td>
<td>Invaluable</td>
<td>Maternal mental health, maternal physical health, provider-patient relations, family dynamics, psychosocial stability, long and short-term physical and neurodevelopmental outcomes for the infant</td>
</tr>
</tbody>
</table>

The provider survey results revealed inconsistencies in handoff from inpatient to outpatient providers and in the interval/frequency of follow up care these infants received in the
newborn period. From the provider responses, we learned that 40% of providers are never informed of the infant/maternal history significant for opiate exposure by someone other than the infant’s caregiver prior to the first appointment. This 40% of providers was followed by 20% who answered “sometimes,” 20% who answered, “about half of the time,” and 20% who answered, “most of the time”. After learning the percentages, it was unsurprising that 0% of these providers said that a hand-off (full report of birth history and newborn admission) from the inpatient facility (birth hospital and/or pediatric hospital) always occurred. When asked about accessibility to the electronic health record, 80% of providers said they were able to easily access patient records. The survey responses surrounding the topic of pediatric follow up frequency were interesting. When asked if they see these infants more regularly than other newborns, 80% of the providers answered yes. When asked how frequently, 5 different providers provided 5 very different answers: (1) weekly, (2) variable depending on if they had evidence of NOWS, (3) depends on how the infant is doing at the first office visit on day three or four, (4) three to four times in their first month after discharge, (5) one to three times in the first week, and then weekly until adequate weight gain and bonding have occurred. These providers were asked about their comfort in caring for infants experiencing NOWS and their desire for more formal education on the topics of NOWS and maternal substance use disorder (SUD). The entirety (100%) of the providers said they were comfortable in caring for this population of newborns and 40% said they desired more formal education on NOWS and SUD. Lastly, when asked, in their opinion, what could be done to improve the care of this dyad, the answer was overwhelmingly better and consistent handoff.
Limitations

The primary limitation to this project was participation in ESC. Presently, it is an option and a mere 8 out of 23 families participated in the ESC approach. The reason for this lack of participation is likely multifaceted. One potential contributing factor to this lack of participation is that protocols do not allow for women using illicit substances (excluding THC) to participate in ESC. This reason disqualified two mothers. Another common reason is lack of childcare for their other children. Urban facilities have programs in place to help with such situations, but this service is missing in the rural setting. Lastly, many of these families heard about ESC for the first time during their labor or in the immediate post-partum period. This delay in awareness of ESC, did not allow families to properly prepare themselves (mentally or physically) for a 5-7 day stay in the hospital with their newborn. Due to the low number of ESC participants, data analysis and results may have been affected. A comparison group of more equal size may yield stronger results.

Another limitation was participation in the provider survey. A total of 34 surveys were sent. Of the total surveys sent to providers 5 responses were collected. All responders were physicians, despite the survey being sent to a combination of physicians, physician assistants, and nurse practitioners. It would have been beneficial to gain insight from not only more but also from diverse categories of providers. Perhaps a theme could have been identified and a thematic analysis performed.

Lastly, the worldwide COVID-19 pandemic has affected nearly every part of life over the last 18 months. This project was no exception. The virus affected hospital visitation policies, which in turn impacted families’ willingness and ability to stay with their infants. Additionally, many hospitals, including the facility at which this project occurred, halted their volunteer
services. Hospital volunteers, prior to the pandemic, were relied on to hold these infants when their caregiver or nurse were unable.

**Interpretation**

The literature overwhelmingly supports the use of ESC as an alternative to the FNAST. This project correlates with existing literature in the findings of a decrease in LOS and total morphine exposure. However, the findings also add data that supports the benefits for both initial and intermediate outcomes for mother and baby and brings to light the irregularities in provider hand off and interval/frequency of outpatient follow up. Overall awareness of maternal SUD and NOWS was fostered through this project. Through trainings, discussions, and patient care experiences, staff of all disciplines gave the impression that they were more mindful of the intricacies connected to this population of mothers and babies. This project also helped to promote the importance of newborn medicine in the study facility. The possibilities for additional efforts to help infants with NOWs and their mothers in this facility is more promising than ever before thanks to the efforts of this project.

**Summary, Conclusions and Recommendations**

In summary, not as many families participated in ESC as we had anticipated. However, the goal for a decrease in LOS was met and continues to trend in a downward direction. Total morphine exposure decreased by 50%, which exceeded our goal. From the measurements of infant disposition, we can postulate that ESC establishes enhanced mother/infant bonding. From the CBA, it is evident that ESC drastically decreases costs. The survey of outpatient providers showed that there was a deficiency in desired handoff from the inpatient facility to the outpatient provider and demonstrated inconsistencies in the outpatient follow up interval/frequency for infants with a history of NOWS.
Recommendations include enhanced support for families who desire to participate in ESC. Increased support begins by ensuring that these families are aware of ESC prior to arriving at the hospital for labor and delivery. Knowledge of the assessment and treatment plan for infants should be provided as part of the obstetric care and MAT clinic guidance. Additional support for families would include childcare and amenities (i.e., non-standard hospital room equipped with soft lighting and comfortable furnishings). Clinical practice guidelines and protocols need to be revamped to include language in relation to ESC and interval/frequency of outpatient follow-up. Handoffs from the inpatient to the outpatient provider should be standard and strategies to ensure this outcome need to be developed and evaluated. Significant consideration of prn morphine dosing should be given. The literature supports that this type of dosing for morphine, when used in conjunction with ESC, yields more significant decreases in LOS and total morphine exposure. Lastly, it is recommended that data collection and the plan-do-study-act (PDSA) cycle should continue. Incorporating what we learned from this initial evaluation and using this process in other facilities within the health system. Next steps should include surveys specific to staff and families to gain understanding of these stakeholders’ satisfaction of these tools, and data collection of staffing numbers and unit closures as they relate to patients with NOWS to ascertain a further understanding of the benefits and costs associated with ESC.
References


Staples, n.d. available at: https://www.staples.com/(retrieved on April 16th, 2020)


https://doi.org/10.1016/j.drugalcdep.2013.02.018


Zip Recruiter, n.d. available at: https://www.ziprecruiter.com/(retrieved on April 16th, 2020)
Appendix A

Finnegan Neonatal Abstinence Scoring Tool
## Finnegan Neonatal Abstinence Scoring Tool (FNAST)

<table>
<thead>
<tr>
<th>Signs &amp; Symptoms</th>
<th>Time</th>
<th>AM</th>
<th>PM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Central Nervous System Disturbances</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crying: Excessive High Pitched</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crying: Cont. High Pitched</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleeps &lt; 1 Hr After Feeding</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleeps &lt; 2 Hr After Feeding</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleeps &lt; 3 Hr After Feeding</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyperactive Moro Reflex</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Markedly Hyperactive Moro Reflex</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild Tremors: Disturbed</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mod-Severe Tremors: Disturbed</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild Tremors: Undisturbed</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mod-Severe Tremors: Undisturbed</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased Muscle Tone</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excoriations (Specific Area)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myoclonic Jerk</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generalized Convulsions</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Metabolic, Vasomotor And Respiratory Disturbance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweating</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever &lt; 101 (37.2–38.3°C)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever &gt; 101 (38.4°C)</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequent Yawning (&gt;3)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutiling</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasal Stiffness</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sneezing (&gt;3)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasal Flaring</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory Rate (&gt; 60/Min)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory Rate (&gt; 60/Min With Retractions)</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gastrointestinal Disturbances</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excessive Sucking</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor Feeding</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regurgitation</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projectile Vomiting</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loose Stools</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watery Stools</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Score</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Daily Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inter-Observer Reliability %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initials Of Scorer 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initials Of Scorer 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Appendix B

Eat Sleep Console Scoring Tool
EATING, SLEEPING, CONSOLING (ESC) CARE TOOL

- Review ESC behaviors with parents since last assessment 3-4 hours ago using Newborn Care Diary.
- If infant with Yes for any ESC item or 3 for Consoling Support Needed: Perform a Formal Parent/Caregiver Huddle to determine Non-Pharm Care Interventions to be optimized further and continue to monitor closely.
  - If not clear if infant’s difficulties eating, sleeping or consoling are due to NAS, indicate Yes and continue to monitor closely while optimizing all Non-Pharm Care Interventions.
- If infant continues with Yes for any ESC item or 3 for Consoling Support Needed (or other significant concerns are present) despite maximal non-pharm care: Perform a Full Care Team Huddle to determine if medication treatment is needed. Continue to follow infant closely, maximizing all Non-Pharm Care Interventions.

*See back of sheet for definition of items prior to performing assessment*

<table>
<thead>
<tr>
<th>TIME</th>
<th>EATING</th>
<th>SLEEPING</th>
<th>CONSOLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor eating due to NAS? Yes / No</td>
<td>Sleep &lt; 1 hr due to NAS? Yes / No</td>
<td>Unable to console within 10 min due to NAS? Yes / No</td>
<td></td>
</tr>
</tbody>
</table>

Consoling Support Needed
1. Able to console on own
2. Able to console with caregiver support within 10 min
3. Unable to console with caregiver support within 10 min

PLAN OF CARE
Recommend Formal Parent/Caregiver Huddle? Yes / No
Recommend Full Care Team Huddle? Yes / No

Management Decision
1. Continue/Optimize Non-pharm Care
2. Initiate Medication Treatment
3. Continue Medication Treatment
4. Other (please describe)

PARENTAL / CAREGIVER PRESENCE
0: No parent present
1: < 1 hour
2: 1-2 hours
3: 2-3 hours
4: ≥ 3 hours

NON-PHARM CARE INTERVENTIONS
Rooming-in: Increase / Reinforce
Parent/caregiver presence: Increase / Reinforce
Skin-to-skin contact: Increase / Reinforce
Holding by caregiver/cuddler: Increase / Reinforce
Safe swaddling: Increase / Reinforce
Optimal feeding at early hunger cues: Increase / Reinforce
Quiet, low light environment: Increase / Reinforce
Non-nutritive sucking/ pacifier: Increase / Reinforce / Not Needed
Additional help / support in room: Increase / Reinforce
Limiting # of visitors: Increase / Reinforce
Clustering care: Increase / Reinforce
Safe sleep / fall prevention: Increase / Reinforce
Parent/caregiver self-care & rest: Increase / Reinforce
Optional Comments:

Appendix C

Project Timeline
Appendix D

Cost Benefit Analysis and Calculations
<table>
<thead>
<tr>
<th>Cost Benefit Analysis</th>
<th>Values</th>
<th>Calculations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Costs</td>
<td>$3040</td>
<td>$3040</td>
<td>$3040</td>
</tr>
<tr>
<td>Benefits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tangible = The cost per patient day of $918</td>
<td></td>
<td>Decrease in LOS x cost per patient day = $1560</td>
<td>$132,600</td>
</tr>
<tr>
<td>Intangible = Unable to quantify</td>
<td></td>
<td>$1560 x 85 NOWs patients per year = $132,600</td>
<td></td>
</tr>
<tr>
<td>Discount</td>
<td>3% for 3 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1: ($132,600- $3040)/(1+.03) = $125,786</td>
<td></td>
<td>Year 1 = $125,786</td>
<td></td>
</tr>
<tr>
<td>Year 2: ($132,600- $3040)/(1+.03)^2 = $122,123</td>
<td></td>
<td>Year 2 = $122,123</td>
<td></td>
</tr>
<tr>
<td>Year 3: ($132,600- $3040)/(1+.03)^3 = $118,566</td>
<td></td>
<td>Year 3 = $118,566</td>
<td></td>
</tr>
<tr>
<td>Benefit-Cost Ratio (3% discount rate)</td>
<td></td>
<td>($132,600/1.03^3)/($3040/1.03^3) = $</td>
<td>$43.61</td>
</tr>
<tr>
<td>Return on Investment</td>
<td>ROI= ($132,600- $3040)/$3040x100=</td>
<td></td>
<td>ROI= 4262%</td>
</tr>
</tbody>
</table>

*Note: Cost calculations for benefits, discount (3 years), benefit cost ratio and ROI*
Edinburgh Postnatal Depression Screen Tool

**Edinburgh Postnatal Depression Scale**¹ (EPDS)

<table>
<thead>
<tr>
<th>Name:</th>
<th>Address:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Date of Birth:</td>
<td></td>
</tr>
<tr>
<td>Baby’s Date of Birth:</td>
<td>Phone:</td>
</tr>
</tbody>
</table>

As you are pregnant or have recently had a baby, we would like to know how you are feeling. Please check the answer that comes closest to how you have felt **IN THE PAST 7 DAYS**, not just how you feel today.

Here is an example, already completed.

I have felt happy:
- ☐ Yes, all the time
- ☐ Yes, most of the time
- ☐ No, not very often
- ☐ No, not at all

This would mean: “I have felt happy most of the time” during the past week.

Please complete the other questions in the same way.

In the past 7 days:

1. I have been able to laugh and see the funny side of things
   - ☐ As much as I ever could
   - ☐ Not quite so much now
   - ☐ Definitely not so much now
   - ☐ Not at all

2. I have looked forward with enjoyment to things
   - ☐ As much as I ever did
   - ☐ Rather less than I used to
   - ☐ Definitely less than I used to
   - ☐ Hardly at all

3. I have blamed myself unnecessarily when things went wrong
   - ☐ Yes, most of the time
   - ☐ Yes, some of the time
   - ☐ Not very often
   - ☐ No, never

4. I have been anxious or worried for no good reason
   - ☐ No, not at all
   - ☐ Hardly ever
   - ☐ Yes, sometimes
   - ☐ Yes, very often

5. I have felt scared or panicky for no very good reason
   - ☐ Yes, quite a lot
   - ☐ Yes, sometimes
   - ☐ No, not much
   - ☐ No, not at all

6. Things have been getting on top of me
   - ☐ Yes, most of the time I haven’t been able to cope at all
   - ☐ Yes, sometimes I haven’t been coping as well as usual
   - ☐ No, most of the time I have coped quite well
   - ☐ No, I have been coping as well as ever

7. I have been so unhappy that I have had difficulty sleeping
   - ☐ Yes, most of the time
   - ☐ Yes, sometimes
   - ☐ Not very often
   - ☐ No, not at all

8. I have felt sad or miserable
   - ☐ Yes, most of the time
   - ☐ Yes, quite often
   - ☐ Not very often
   - ☐ No, not at all

9. I have been so unhappy that I have been crying
   - ☐ Yes, most of the time
   - ☐ Yes, quite often
   - ☐ Only occasionally
   - ☐ No, never

10. The thought of harming myself has occurred to me
    - ☐ Yes, quite often
    - ☐ Sometimes
    - ☐ Hardly ever
    - ☐ Never

Administered/Reviewed by ___________________________ Date ____________


Users may reproduce the scale without further permission providing they respect copyright by quoting the names of the authors, the title and the source of the paper in all reproduced copies.