

THE EFFECT OF THE CALM SCALE ON NARCOTIC USE IN LABORING WOMEN

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### **Dedication and Acknowledgment**

Many individuals dedicated their time, knowledge, and expertise to help this project come to fruition. The idea for this project came from the nurse educator on the labor and delivery unit at a southeastern U.S. urban medical center. The nurse educator had the desire to aid laboring women cope with their labor pain and offer alternative pain strategies. She educated staff on the CALM Scale and was a resource to all involved. The Clinical Nurse Specialist on the unit also played a large component in the project. The nurse educator aided in communicating with varying disciplines, networking with other experts, and was a project liaison. I would like to thank the nurses and staff on the organizational unit for their participation, time, and dedication to making a change.

Data collected and analyzed for this project was completed with the help of Tricia Crane. Her expertise is invaluable, and I am appreciative of her advice, time, and mentorship. Lastly, I would like to thank our DNP faculty for their project mentorship. They spent time helping fine-tune my project, mentoring throughout the process, and editing my work. Their positive demeanor and humor made the process more enjoyable.

### **Abstract**

**Background:** Standardized, numerical (0-10) pain scales are ineffective methodologies for assessing pain in laboring women. Pain associated with labor is a physiologically expected experience, differentiating labor pain from other pain etiologies. Labor is not a pain-free process, and pain-free labor is not a realistic outcome. Numerical pain scales lack the subjectivity needed to assess laboring women and often result in frequent narcotic administration. The CALM Scale offers a more efficient and descriptive measurement to assess and treat labor pain.

**Purpose:** The purpose of this project is to determine if the use of the CALM Scale reduces narcotic use in laboring women versus the use of a numeric pain scale.

**Methods:** A pre-test post-test design was used to examine narcotic use with the implementation of the CALM Scale. A non-parametric statistical test was utilized for the analysis of narcotic use. Multiple regressions were conducted for the analysis of patient demographics.

**Results:** The use of the CALM Scale showed no statistical significance in reducing narcotic use in laboring women ( $p=.53$ ,  $p=.82$ ). The multiple regression model significantly predicted total narcotic count ( $p<.001$ ) with BMI, age, and one-minute APGAR. No statistical significance was noted for epidural use and CALM Scale use ( $p=.73$ ).

The results suggest the need for further examination of the relationship between the numeric pain scale and the CALM Scale with APGAR scores, age, and BMI. Future research should also examine the use of the CALM Scale over longer periods with consideration for differing contexts.

**Key Words:** CALM Scale, Labor Pain, Pain Assessment, Narcotic, Opioid

### **Background and Significance**

The physiologic and psychologic processes associated with childbirth are unique for each woman. Typically, pain is the response produced by the central nervous system to signal that there is damage to the body, signaling something is wrong. Pain is a natural and expected physiologic experience in childbirth, making labor a highly individualized process that differs from other etiologies of pain. For laboring women, total elimination of pain is an unrealistic and unachievable outcome. Standardized, numerical pain assessments (0-10) are often ineffective in this patient population.

The majority of labor and delivery units in the United States use the 0-10 pain scale when assessing laboring women (Association of Women's Health, Obstetric, and Neonatal Nurses, 2012). Narcotic use in laboring women is prevalent and is perpetuated by the use of the 0-10 pain scale (Horn & D'Angelo, 2017; Jantjes et al., 2007; Roberts et al., 2010;). When using this scale per Joint Commission standards, the goal is to treat pain to achieve a pain score of zero; an unattainable outcome in childbirth. Nurses assessing labor pain are placed in a situation in which they must assess and intervene in response to the 0-10 pain score, which often results in the under or over treatment of pain (Horn and D'Angelo, 2017). The standard 0-10 pain scale lacks personalization, subjectivity, and thus applicability to the laboring mother. Nurses and patients are left confused about how to quantify and rate pain, and what pain goal is realistic (Horn and D'Angelo, 2017).

Labor is unique in its relation to pain, as the severity of pain is affected by a multitude of factors. These factors can include lighting, noise, psychosocial support, and communication (Horn and D'Angelo, 2017). Patient-centered care requires the treatment of pain to be balanced with the woman's well-being, desires, and needs (Association of Women's Health, Obstetric, and

Neonatal Nurses, 2012). Specifically, the ability to enhance the childbirth experience requires the nurse to communicate, assess, and support the laboring woman (Association of Women's Health, Obstetric, and Neonatal Nurses, 2012). Laboring mothers who are provided continuous labor support have been found to have shorter labors, increased likelihood of spontaneous vaginal deliveries, decreased analgesia needs, improved 5 minute fetal APGAR scores, and are more likely to rate the labor experience as positive (Association of Women's Health, Obstetric, and Neonatal Nurses, 2012). Labor support includes assessment of noise levels, lighting intensity, and the presence of a laboring partner.

Horn and D'Angelo (2017) suggest the CALM (Coping Assessment for Laboring Moms) scale is an appropriate alternative to the traditional 0-10 pain scale. The CALM scale involves five factors: facial expression, behavior, psychosocial support, objective vocalization, and subjective vocalization. The CALM scale assesses distress and coping concerning pain, versus only the pain's intensity (Horn and D'Angelo, 2017). When nurses assess laboring mothers using the CALM scale, they are asked "how are you dealing with labor" and the responses correspond with each of the five factors. Interventions of the CALM scale are detailed, varied, and include physical comfort, emotional comfort, informational comfort, and advocacy. Thus, utilization of the CALM scale can help nurses recognize and treat discomfort more efficiently, leading to better outcomes for mothers, their babies, and healthcare organizations.

### **Purpose Statement**

The purpose of this Doctor of Nursing Practice (DNP) project is to determine if the use of the CALM Scale when compared to the numeric pain scale, reduces narcotic use in laboring women.

### **Review of Current Evidence**

A systematic review of the literature was conducted, screening articles from 2002 to 2019 to identify the relationship between labor pain, narcotic use, and continuous labor support. The Cumulative Index of Nursing and Allied Health Literature (CINAHL) and PubMed were selected for literature searches. Key search terms were labor pain, continuous labor support, labor pain, narcotic use, CALM scale and labor, labor support, and patient satisfaction. Inclusion criteria included research articles, reports, position statements, full-text articles, and a review of the abstract. The search resulted in 44 articles from CINAHL and PubMed. Thirty studies relevant to the topic of interest resulted and were read in full. Of the 30 full-text studies reviewed, 18 had adequate content and criteria to be included in the literature review.

The final inclusion criteria consisted of literature that supported and indicated the use of continuous labor support, connections between narcotic use and traditional pain scoring methodologies, the unique quality of labor pain, and patient satisfaction with labor pain control with traditional pain scoring compared to methods incorporating alternate coping strategies. Exclusion criteria included home births and utilization of doulas or midwives. Literature older than 20 years or from non-scholarly sources were excluded. Only two true research studies examining the use and implications of the CALM scale were found. Included literature drew causations between decreased narcotic use, pain management, and poor patient satisfaction HCAPS scores (Hospital Consumer Assessment of Healthcare Providers and Systems). The rigor of the included studies was limited; including only literature analyses, descriptive perceptives, and one comparative design study.

Laboring women face unique challenges in managing pain control during birth. Pain in labor is expected, highly individualized, and often under or overestimated (AWHONN, 2012;

Barrett & Stark, 2010; Lyndon et al., 2015; Sanders & Lamb, 2014; Van Der Gucht & Lewis, 2015). Discrepancies in the reporting and perception of pain are often related to patient fatigue, exhaustion, fear, loneliness, discouragement, and/or anger (Simkin & Ancheta, 2005). Labor pain is transient and affects more than one area of the body. The contracting uterus causes vague visceral pain that can radiate to the abdominal wall, lumbosacral region, iliac crests, gluteal areas, and thighs. During the advanced phases of labor, pain transitions from visceral to somatic origins. Labor pain is now well-defined and localized to the vaginal wall, perineum, and pelvic floor (Lowe, 2002; Van Der Gucht & Lewis, 2015).

The Joint Commission (TJC) requires accredited healthcare systems to assess pain using a scale that is consistent with the patient's age, condition, and ability to understand (Lowe, 2002; Roberts et al., 2010; Sanders & Lamb, 2014). Comprehensive pain assessments can be tailored to each healthcare systems' organizational policies and procedures. However, the 0-10 pain scale is the most common scale used to assess pain in North American healthcare institutions. The 0-10 pain scale requires interventions with each documented report of pain, and the interventions are often pharmacologic. Labor pain is a normal physiologic process, that is not best assessed by the 0-10 pain scale. Additionally, alternative, non-narcotic based pain interventions exist and are under-utilized (Barrett & Stark, 2010; Horn & D'Angelo, 2017; Lowe, 2002; Lyndon et al., 2015; Roberts et al., 2010; Sanders & Lamb, 2014; Van Der Gucht & Lewis, 2015).

Misconceptions regarding labor predispose laboring women to experience anxiety, negative thinking, lack of confidence, and under preparation (AWHONN, 2012; Barrett & Stark, 2010; Bergstrom et al., 2010; Lyndon et al. 2015; Main, 2019; Sanders & Lamb, 2014; Van Otterloo et al. 2018). Uterine contractions are viewed as negative, as opposed to a natural process preparing the woman to meet her baby (Lowe, 2002; Van Der Gucht & Lewis, 2015). Labor pain



is not frequently characterized by physicians and healthcare staff as natural and manageable (AWHONN, 2012; Barrett & Stark, 2010; Bergstrom et al., 2010; Lyndon et al. 2015; Main, 2019; Sanders & Lamb, 2014; Van Otterloo et al. 2018). Women are not instilled with the desire or confidence to manage pain and assume labor pain can be significantly reduced or eliminated by pharmacologic intervention.

Researchers suggest pain management should be re-imagined as ‘coping’ (Bergstrom et al., 2010; Salomonsson et al., 2013). Women are not often afforded options for coping during labor (AWHONN, 2012; Bergstrom et al., 2010; Salomonsson et al., 2013; Van Otterloo et al., 2018). Labor can be an isolating process. Labor and delivery staff are trained to help women establish autonomy, build confidence, and individualize their labor experience. The ability for women to participate in decision-making, coupled with continuous labor support from labor and delivery staff, can increase patient confidence, autonomy, and patient satisfaction (AWHONN, 2012; Lyndon, 2015; Renner, 2008; Van Otterloo et al., 2018). In contrast, the 0-10 pain scale has been noted to decrease patient satisfaction, confidence, and autonomy (Bohren et al., 2017; Renner, 2008; Simpson et al., 2017). The CALM scale incorporates coping and is shown to increase patient satisfaction with labor pain management while reducing opioid use (AWHONN, 2012; Horn & D’Angelo, 2017; Roberts et al., 2010).

Disadvantages of opioid use in labor include hallucinations, ceiling effects, nausea, vomiting, apnea, oversedation, fetal heart rate changes, and poor fetal and maternal outcomes (Barrett & Stark, 2010; Jantjes et al., 2007; Kozhimamil et al., 2013; Simpson et al., 2017). Epidural analgesia is a common pain control method used by laboring women. Epidural analgesia is perceived as a method for a pain-free birth. However, epidural analgesia use can result in uneven/ineffective blocks, post-dural puncture headaches (PDPH), increased frequency

of instrument deliveries, increased need for invasive labor monitoring, and potentially severe hemodynamic complications (Barrett & Stark, 2010; Jantjes et al., 2007; Kozhimamil et al., 2013). The CALM scale has been noted to decrease narcotic use by laboring women and increased HCAPS scores for patient satisfaction with pain control (Horn & D'Angelo, 2017; Lyndon et al., 2015).

### **Conceptual Framework/Theoretical Model**

#### **Translational Framework**

The IOWA Model was developed at the University of Iowa Hospitals and Clinics in the 1990s to serve as a guide for nurses to use research findings to improve patient care. The model is a pathway and guide to help identify issues, research solutions, and implement changes. It is an application-oriented guide for the evidence-based practice (EBP) process (Titler et al., 2001).

This model is nursing-focused and helps bedside nursing staff explore methods to improve patient care (Titler et al., 2001). The need to explore change is often discovered via a 'trigger' from frontline staff (Titler et al., 2001). In this case, labor and delivery staff on the unit felt that the 0-10 pain scale did not accurately represent nor describe labor pain. This recognition, coupled with Joint Commission requirements to document and intervene when a patient is in pain, was thought to lead to increased narcotic use in laboring women.

#### **Theoretical Model**

The Levine-Conservation Model was utilized for the theoretical framework. The Levine-Conservation Model is based on the physical concept of conservation of energy, combined with the psychosocial aspects of the individual's needs (Levine, 1996). This model aligns with the CALM Scale, as the CALM Scale focuses on a laboring woman's psychological contributors to pain coupled with the principle of conserving energy to cope. The bedside nurse also contributes

to the Levine-Conservation Model by bringing his or her repertoire of skills, knowledge, and compassion to the laboring patient (Levine, 1996).

The model encourages nurses to focus on the influences and responses at the most basic level. The nurse accomplishes the goals of the model through the conservation of energy, structure, and personal integrity (Levine, 1996). Childbirth, and the treatment and perception of pain, are aligned with these principles. The CALM Scale assesses environmental, holistic, psychosocial, and subjective variables that contribute to labor pain. Levine's theory focuses on the individual, as does the CALM Scale.

## **Methods**

### **Design**

The CALM Scale was implemented on the labor and delivery unit. The traditional 0-10 pain scale was replaced by the CALM Scale and appeared in the medical record (Epic) for documentation. Labor and delivery nurses were provided information and instruction on the new tool by their nurse educator, clinical nurse specialist, or charge nurses before implementation. The CALM Scale was administered to all laboring women aged 18 years and older, English speaking, and who were planning a vaginal delivery. Women who labored and delivered on the high-risk unit and labor triage department were excluded from the study.

The project was implemented via a pre/post-test design. Data used for analysis included total narcotic count and varying patient demographics. Pre-test data were examined from June 1st, 2020 to July 31<sup>st</sup>, 2020. Post-test data were analyzed from June 1<sup>st</sup>, 2021 to July 31<sup>st</sup>, 2021.

The project aims to examine if the implementation of the CALM Scale decreases narcotic use during labor. Additional demographic and descriptive data were collected for correlative

purposes and included: body mass index (BMI), age, payor source, race, substance use history, epidural analgesia use, one-minute APGAR score, and five-minute APGAR score.

### **Permissions**

Permission was obtained from both the university and the project site. After review, the university and hospital IRB deemed the project 'exempt' and not in need of IRB approval. The Nursing Research Council (NRC) for organization director's permission was obtained in coordination with the IRB process. The CALM tool is available online and is copyrighted, with permission granted to Cone Health for educational and research purposes.

### **Sample and Setting**

The setting is a women's and children's hospital in the southeastern United States. hospital has 97 adult beds, 18 of which are reserved exclusively for labor and delivery. Approximately 350 registered nurses are employed in the system and approximately 150 of those are nurses trained to perform in the role of labor and delivery. On average, 300 to 400 women deliver babies at this location each month.

Laboring women, aged 18 or older, English speaking, and are a planned vaginal delivery will be involved in the project. Labor and delivery nurses implemented the CALM scale in place of the 0-10 pain scale for laboring women over the designated two-month period.

### **Instruments**

The numeric 0-10 pain scale was replaced by the CALM Scale in the post-test period (June 1st, 2021-July 31st, 2021). The CALM Scale was developed by Roberts et al. (2010) and is a comparative tool used to assess the cues of coping. Instead of placing a numeric value on pain, laboring women are assessed on five components: facial expression, behavior, psychosocial, objective vocalization, and subjective verbal expression (Roberts et al., 2010). Each of the five

components is scored from 0-10 by the labor and delivery nurse (Appendix 1) with interrater reliability for each of the five components at 81%. A score of 0 indicates no distress, or the ability to cope, whereas a score of 10 indicates high stress and not coping (Roberts, et al., 2010). Assessment of these factors allows the labor and delivery nurse to determine where supportive strategies are needed. Interventions to address non-coping can include physical comfort, emotional comfort, informational comfort, advocacy, nursing presence, and holistic nursing support (Roberts et al., 2010). Pain assessment occurs a minimum of every hour on the labor and delivery unit, when labor stages progress, as needed (PRN), and within 15 minutes after any intervention.

### **Data Collection**

A statistician was consulted to evaluate the pre and post-test data. De-identified patient demographics were analyzed for the pre and post-test time frames. No threats to privacy exist and informed consent is not indicated.

Demographic data collected included patient BMI, age, payor source, race, substance abuse history, epidural placement, one-minute APGAR scores, and five-minute APGAR scores. Narcotic administration totals were analyzed in the pre and post-test time frames.

The pretest group consisted of 797 laboring women. The average age of the women was 29.85 years with an average BMI of 34.20. Women in the pretest group received 303 Fentanyl doses, 45 Butorphanol doses, and 26 doses of an unknown narcotic. The infants born to these women had an average one-minute APGAR of 7.93 and a five-minute APGAR of 8.78.

The posttest group consisted of 977 laboring women. The average age of the women was 29.68 years with an average BMI of 34.21. Women in the posttest group had an average of 358

Fentanyl doses, 70 Butorphanol doses, and 34 doses of an unknown narcotic. The infants born to these women had an average one-minute APGAR of 7.8 and a five-minute APGAR of 8.76.

## Results

### Narcotic Use

When examining narcotic totals, 56% of patients received no narcotic during their delivery. Of that percentage, 20% received only one narcotic dose. Fentanyl was the most frequently used narcotic, followed by Butorphanol. The Mann Whitley U Test was used to examine statistical differences between the pre and post-test groups. This test was selected as data between the two groups were skewed and not normally distributed. The Mann Whitley U test showed no statistical significance in decreased narcotic use with the CALM scale versus the numeric 0-10 scale ( $p=.53$ ,  $p=.82$ ).

### Demographics

Multiple Regression was utilized to examine the effect of BMI, race, age, payor source, substance use history, epidural placement, one-minute APGAR scores, and five-minute APGAR scores with the total narcotic count. The model significantly predicted total narcotic count  $f=11.126$  (dof 8, 1633),  $p<.001$ , with BMI, age, and one-minute APGAR. This model explained 4% of the variance (adj  $r^2 .047$ ).

The pretest group negatively correlated with one-minute APGAR ( $r= -.117$ ,  $p<.001$ ) and age ( $r=-.204$ ,  $p<.001$ ). The posttest group correlated with BMI ( $r=.128$ ,  $p<.001$ ) and age ( $r= -.135$ ,  $p<.001$ ). No difference in BMI, age, and APGAR existed between groups.

When examining differences between epidural placement and narcotic count, no correlation existed ( $r=-.011$ ,  $p=.743$ ). No statistical significance was noted with epidural placement and use of the CALM Scale ( $.088$  chi sq) (dof 1,  $x^2$ , 1,  $.088$ ,  $p=.767$ ).

### **Discussion**

The purpose of the project is to determine if the use of the CALM Scale reduces narcotic use in laboring women versus the use of the numeric pain scale. Statistical analysis revealed that no significant difference was noted in narcotic usage between the pre and post-test groups. The CALM Scale did not result in reduced narcotic use in the post-test phase. Additional demographic information was collected during the pre and post-test phases and included analysis of narcotic use and the effect on BMI, age, race, payor source, epidural placement, one-minute APGAR scores, and five-minute APGAR scores.

The pretest group utilized only the numeric pain scale. Statistical analysis of the demographics mentioned with the numeric pain scale yielded interesting correlations. First, as narcotic use increased, one-minute APGAR scores decreased. Additionally, as age decreased, narcotic use increased.

The posttest group utilized the CALM Scale. Patient BMI was correlated positively with narcotic use. As the patient BMI increased, narcotic use also increased, whereas patient age was negatively correlated with age in the post-test group.

No statistical significance was found between groups. There was also no correlation or statistical significance noted between narcotic use and epidural placement, race, payor source, or five-minute APGAR scores.

### **Limitations**

Limitations exist with the study. The CALM Scale was implemented over two months and this time frame may not accurately represent the potential for change. Use of the CALM scale for longer durations of time is warranted. During the implementation of the project, the

COVID-19 pandemic caused numerous changes to the healthcare community. The impact of COVID-19 on this study is unknown but arguably has many implications.

In the post-test time frame, the CALM Scale was used, and coping-style interventions were utilized. However, the pre-existing order sets for pain and narcotic administration were still in effect and referenced the numeric pain scale. A consideration with the pre-existing order set was that if nurses chose to use narcotics as a pain intervention, the dose they administered must be correlated with a numeric pain value. For example, 50 mcg of intravenous (IV) Fentanyl was used for moderate pain, whereas 100 mcg of IV Fentanyl was indicated for severe pain. The disconnect between the verbiage in the order set and the CALM Scale ratings were not recognized preemptively and confused the nurses. The effect of this confusion on narcotic administration with the CALM Scale is unknown. If the CALM Scale is to be implemented permanently, the order sets and policy and procedures must be updated. Updating items will be time-consuming, tedious, and involve educating the physicians on placing orders.

Anesthesiologists monitored laboring patients for potential epidural analgesia. If an epidural was placed, the traditional approach was for the anesthesiologist to monitor its effectiveness by looking at the pain documentation in Epic. In the post-test phase, the CALM Scale replaced numeric pain documentation. As a result, anesthesiology was unable to assess post-epidural pain control. Collaboration and CALM Scale education were warranted and conducted between the anesthesiologists and the research team. While the anesthesia group agreed to participate in the study over the two months, they felt that the CALM Scale did not help in assessing pain from their perspective. Should the hospital choose to make the CALM Scale a permanent change, this topic will need further consideration.

### **Implications for Future Research**



Relevant correlational data discovered from the pre and post-test groups should be further investigated. Statistically significant changes in narcotic use were noted in the pretest group with relation to age and one-minute APGAR scores. This correlation would warrant investigation of the numeric scale and its potential effect on APGAR scores and age. The post-test cohort was noted for statistically significant changes with narcotic use on age and BMI. Correlational research on the CALM Scale related to narcotic use and its effect on BMI and age is indicated.

Other demographic information examined failed to show statistically significant changes. However, variances in five-minute APGAR, epidural use, payor source, and race may be noted in future research with the CALM Scale. While the patient's race was not shown to be statistically significant from a data analysis standpoint, the lack of significance lends credence to the fact that the CALM Scale is culturally sensitive. The cultural effect of the CALM Scale versus the numeric pain scale is a point of future research.

The CALM Scale has not been evaluated in research studies to determine its effect on narcotic use. Horn & D'Angelo (2017) were the only group to determine that the CALM Scale would be more beneficial in treating labor pain, thus reducing narcotic use. The lack of research in this area supports the need for further investigation of the CALM Scale. Research on the CALM Scale should be performed in a variety of labor and delivery units across the United States to draw more profound conclusions about its true potential.

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Coping with Labor Algorithm ©  
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