PREVENTION OF PRURITIS FOLLOWING SPINAL MORPHINE

for Scheduled Cesarean Birth

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Abstract

Background: Intrathecal morphine provides effective analgesia after cesarean birth, yet up to 90% of women who receive it experience excessive itching, an undesirable dose-dependent effect. Pruritis may increase nursing workload, delay breastfeeding, and decrease patient satisfaction. When 0.1 mg spinal morphine is given, pruritis is markedly reduced while analgesia is preserved.

Purpose: The purpose of this project was to determine possible causes and solutions for pruritus after cesarean birth.

Methods: Anesthesia providers were educated and encouraged to limit spinal morphine to 0.1 mg as a strategy to prevent pruritus. In a repeated measures design, the rate of treatment-required pruritus and opioid consumption were measured 24 hours after surgery. The project included an evaluation of 30 medical records before and 30 medical records after the project intervention.

Results: Preintervention rate of treatment-required pruritis was 37%, all received spinal morphine ≥ 1.5 mg. Postintervention rate of treatment-required pruritis was 13% and 57% after spinal morphine 0.1 mg and 0.2 mg, respectively. Opioid consumption was similar between groups.

Clinical Implications: Mother–baby nurses can have an impact on the practice of anesthesia providers by advocating for evidence-based dosing of intrathecal morphine to reduce the incidence of pruritis while maintaining effective analgesia for women after cesarean birth.

Key words: Cesarean; Intrathecal; Morphine; Pruritus; Spinal.

Introduction and Significance

Cesarean birth accounts for nearly one in every three births in the United States (Hamilton et al., 2019). Spinal anesthesia is the most common anesthetic for elective cesarean birth and is advocated to facilitate maternal–infant bonding and early breastfeeding (Cottrell, 2015). Morphine is often administered intrathecally to provide pain relief for up to 24 hours after cesarean birth, but may cause pruritus, notably with higher doses (Carvalho et al., 2016; Vice-O'Con et al., 2018). Nursing implications for managing pruritis include allocating time to provide comfort care measures, support postoperative women in cases of impaired maternal–child bonding, and carefully administering antipruritic medications with sedative effects. Unresolved pruritis may also adversely affect patient satisfaction, a metric used by hospitals to compare quality of care (Cottrell).

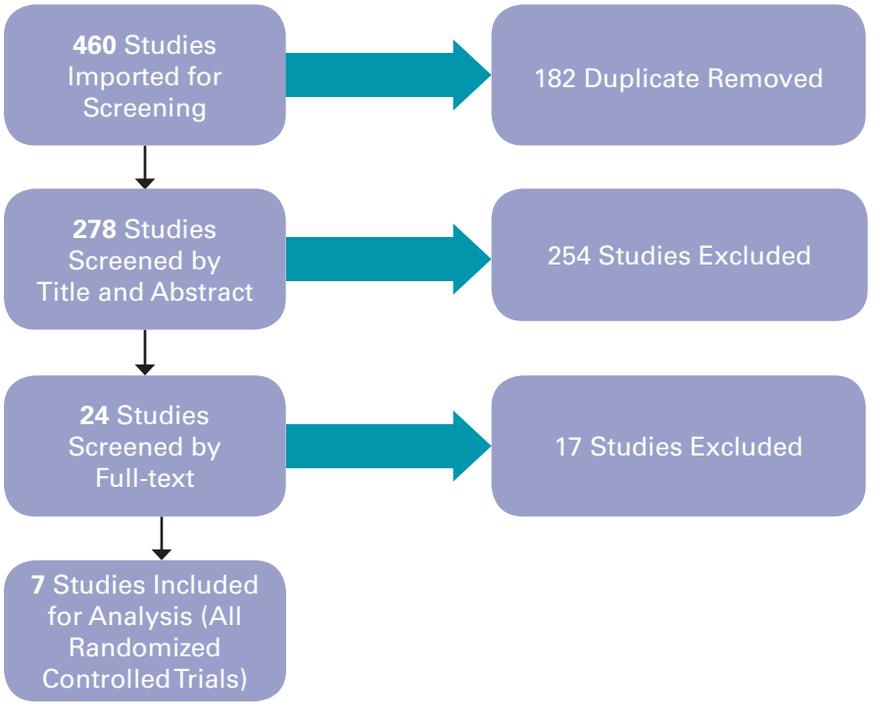
At a military hospital, nurses identified pruritus as one of the most significant negative contributors to the patient experience after cesarean birth. The project team interviewed the postpartum unit's clinical nurse specialist and the postpartum nurses. Nurses framed vignettes of frustrating situations in which they had been caring for a patient and the pruritis was difficult to manage. Before the project introduced a change, baseline data were needed, so nurses recorded pruritis in the electronic record to facilitate tracking.

Available Knowledge

The project team recognized pruritis was a significant problem for our patient population, so the team reviewed the evidence for the following question, *For women having scheduled cesarean birth, what is the minimum effective dose of intrathecal morphine to provide effective analgesia and while avoiding pruritus?* We searched PubMed, Excerpta Medica Database, the Cumulative Index to Nursing, and Allied Health Literature to identify articles, abstracts, or dissertations for inclusion in this systematic literature review. The PubMed, Embase, and CINAHL search used the Medical Subject Heading (MeSH) term "cesarean" OR "caesarean" OR "c-section" OR cesarean section AND "morphine" OR "Duramorph" AND "pruritus" OR "itching." Interventions used to treat intrathecal morphine-induced pruritus were included in the literature search for additional understanding of the problem and solution. The search was retrospective and not truncated by year to capture the broadest scope of literature on the subject. It was limited to articles published in English. As of 1 December 2018, this search strategy yielded 460 peer-reviewed articles and abstracts; 182 duplicates were removed to yield 278 articles.

Titles and abstracts of these 278 articles were screened for inclusion in this review of the literature. We included studies of patients having planned cesarean birth that used intrathecal morphine for pain management, reported pruritus as a patient outcome, and reported pruritis for varying doses of intrathecal morphine. We excluded sources that included epidural routes of opioid administration, intrathecal opioids administered other than morphine, emergent cesarean birth, or a varied dose of local anesthetic. After title and abstract review, 24 sources remained. Eight sources remained after full-text review and application of inclusion and exclusion criteria (Figure 1). The method described by Melnyk and Fineout-Overholt (2016) was used to assess the level of evidence. The GRADE framework was used to assess quality of evidence. Seven level II evidence sources were appraised with five being assessed as high, one as moderate, and one as low quality of evidence. All were randomized controlled trials. See Table 1.

FIGURE 1. SELECTION OF ARTICLES INCLUDED IN EVIDENCE SUMMARY



Quality of Analgesia

Intrathecal morphine may be given in doses as low as 0.05 mg to provide effective postoperative analgesia for cesarean birth, but only one study (Carvalho & Tenorio, 2013) demonstrated analgesia with 0.05 mg dosing. Insufficient evidence exists to recommend this dose. A dose-ranging study by Jiang et al. (1991) showed reduced analgesia with 0.05 mg versus higher doses. As the 0.1 mg dose has been shown to provide effective analgesia for up to 24 hours with no

TABLE 1. EVIDENCE SUMMARY

First Author, Study Design, Quality	*N*	Intrathecal Morphine Dose	Outcome Measures	Findings
Aly (2018) RCT High	440	0.1 mg and 0.2 mg	P	Pruritus in 0.1 mg group was 55%, vs. 75% in 0.2 mg group (p = .32). Pruritis at 6 and 8 hours greater in 0.2 mg group.
(Carvalho & Tenorio, 2013) RCT Moderate	1,123	0.05 mg and 0.1 mg	A, P	Pruritus in 0.05 mg group was 70%, compared with 87% in 0.1 mg group (p = .026). Analgesic effects were similar.
Jiang (1991) RCT High	663	0 mg to 0.125 mg	A, P, N, V	Linear dose-response relationship analgesic duration and dose of intrathecal morphine.
Milner (1996) RCT High	550	0.1 mg to 0.2 mg	P, N, V	Pruritis rates were similar. N/V increased with higher doses.
Palmer (1999) RCT High	1,108	None to 0.5 mg	A, P, N, V	No difference in analgesia with escalating doses of intrathecal morphine. Pruritis exhibited a linear relationship with intrathecal morphine dose.
Sharma (2013) RCT Low	660	0.1 mg to 0.2 mg	A, P, N, V	Rates were similar across all variables.
Uchiyama (1994) RCT High	880	Intrathecal morphine dose of 0 mg to 0.2 mg	A, P, N, V	Higher N/V/P with increased dose. Duration of analgesia had linear dose-response relationship.

Note. A = Duration or quality of analgesia, N = Nausea, V = Vomiting, P = Pruritus, RCT = Randomized Controlled Trial.

significant differences in quality or duration of analgesia when compared with higher doses, the project team selected the 0.1 mg dose for this project.

Risk for Pruritis

Across all included studies, pruritus after intrathecal morphine increased linearly with the dose of intrathecal morphine. Carvalho and Tenorio (2016) found pruritus was more common when patients received 0.1 mg versus 0.05 mg, but this study did not include higher dose groups. When compared with higher doses, the 0.1 mg dose of intrathecal morphine consistently resulted in a decreased incidence of pruritus across multiple studies (Aly et al., 2018; Jiang et al., 1991; Milner et al., 1996; Palmer et al., 1999; Sharma et al., 2013; Uchiyama et al., 1994). Based on these data, we determined 0.1 mg of intrathecal morphine as the minimum dose that provides adequate analgesia while minimizing risk for pruritis.

Rationale

The organizing framework that guided this project was the Model for Evidence-Based Practice Change (Rosswurm & Larrabee, 1999). Using the model, we assessed the need for a practice change then searched for and analyzed best evidence. Next, we defined and designed the proposed intervention, implemented it, evaluated processes and outcomes, and developed evidence-based conclusions and recommendations. The last step was aimed at sustainment of practice changes. Lewin's (1947) classic Three-Step Change Model was used to develop teaching strategies to reinforce positive behavior, reject incompatible practices, achieve consensus, and establish a sustained new normal best practice.

Specific Aims

The purpose of this project was to introduce an evidence-based dosing strategy to reduce incidence of postoperative pruritis in new mothers after scheduled cesarean. The team sought to better quantify the preintervention dosing strategy and incidence of pruritis at our hospital. Preintervention data were compared with the same postintervention outcomes, incidence of treatment-required pruritis, and anesthesia provider adherence to the recommended dosing strategy. The collaborative quality improvement project was conducted to determine if a standardized dose of intrathecal morphine for cesarean birth could reduce incidence of treatment-required pruritus while maintaining adequate analgesia.

Methods

Setting

This project occurred at a mid-sized U.S. military hospital that provides care for active duty, retirees, and dependents. Each month there are approximately 10 scheduled cesarean births in its two obstetric operating rooms, with cesarean births representing 30% of the 416 births on the

labor and delivery unit in 2019. Mothers recover in the postanesthesia care unit and are then transferred to the eight-bed postpartum unit. Anesthesia providers included nine certified registered nurse anesthetists and seven anesthesiologists, with each being afforded an equitable share of practice for obstetric cases at this facility. No differences were noted with respect to anesthetic type by discipline before the project began, with all providing regional anesthesia for elective cesarean birth within the preceding year. The anesthetic experience of these anesthesia providers ranged from 1 to 13 years. Nurses included 19 labor-delivery and 19 postpartum nurses.

Intervention

Anesthesia providers were encouraged to administer 0.1 mg of intrathecal morphine for patients having a cesarean. The project team agreed that anesthesia providers would have the capacity to adjust intrathecal morphine dosing if any unanticipated patient conditions arose. For example, if a patient were to report a past history of inadequate analgesia following cesarean or an allergy to other planned postoperative analgesics, a provider may choose to increase the dose. Department leaders agreed to leave the decision to change practice up to individual providers. Findings were presented at anesthesia department meetings over a 2-month period, reaching all anesthesia providers before outcomes were measured. The presentations disseminated the findings of the literature review and evidence-based solution, recommending 0.1 mg intrathecal morphine for cesarean birth to avoid pruritis.

Following the intervention period, data were collected by medical record review for the next 30 consecutive patients having a scheduled cesarean birth. Anesthesia providers were given a presentation to share the project results. To assess for an increase in knowledge and the intent to modify their practice, an anonymous questionnaire was administered in-person before the presentation, immediately after the presentation, and approximately 30 days after the end of the postimplementation data collection period. The questionnaire contained seven knowledge-check style questions where the participant would select the best answer as well as their confidence in that answer from 0% to 100% and a single question to assess for the intent to modify their practice from 0% (Not Likely) to 100% (Very Likely). Descriptive statistics were used to analyze data.

TABLE 2. DEMOGRAPHIC CHARACTERISTICS OF WOMEN IN THE STUDY ($N = 30$)

Demographic	Preintervention	Postintervention	*p*
Age in years	29.9	30.3	0.42
Gravidity	3	3	1
Parity	1	1	1
Weeks of gestation	38.7	38.8	0.58
BMI	33.3	31.8	1
Race/Ethnicity			
Caucasian	18	14	
African American	3	9	
Other	9	7	

Measures

The primary outcome measure was a change in anesthesia provider practice administering intrathecal morphine prior to cesarean birth, comparing frequency of the 0.1 mg versus higher doses between the pre- and postintervention periods. In each period, demographic data, intrathecal morphine dose, incidence of pruritus requiring treatment, and opioid requirements over the first 24 hours after surgery were recorded. Demographic data collected included: maternal age, gestational age, ethnicity, body mass index (BMI), gravidity, and parity.

Each medical record was reviewed 24 hours from the time of intrathecal administration to match expected duration of effects on analgesia or pruritis. Treatments for pruritis within 24 hours postoperatively were recorded, with any dose of diphenhydramine administration chosen as the clinical marker for significant pruritus. Intravenous diphenhydramine 25 mg was the only treatment listed for pruritus on the standard order set. There were no established mechanisms to record pruritis severity on the electronic medical record, so severity was not included as an outcome measure. Secondary measures included opioid consumption and time to first administration of postoperative opioids. As providers had expressed concern for decreased analgesia with the 0.1 mg intrathecal morphine dose, mean number of oxycodone with acetaminophen tablets administered to each group was also monitored for the first 24 hours as this was the only opioid used during the project.

Analysis

Data were analyzed using descriptive statistics. Demographic data were similar between groups (Table 2). A chi-squared test was used for categorical variables, and alpha of $< .05$ was set for statistical significance.

Ethical Considerations

This project was reviewed by the IRB designee, and was deemed exempt from further review. Deidentified data were used in our analysis. Data security was maintained.

Results

Sixty medical records were included in the analysis; 30 in the preimplementation group and 30 in the postimplementation group. The cesareans occurred within 4 months preceding and 4 months following the educational intervention. Of the 15 anesthesia providers who attended the educational intervention, 12 of the providers had cases that were included in the postintervention analysis. Of those, 75% self-reported changing their practice for the project, and according to the follow-up questionnaires, 56% of the providers changed their practice for the long term after the project ended as determined by a response of 75% or greater to the question-

naire item related to likelihood for sustained practice change of using the recommended 0.1 mg intrathecal morphine dose. Chi-square analysis of demographic variables revealed no significant between-group differences for race, age, BMI, gravidity, parity, or weeks of gestational age (Table 2).

Treatment-Required Pruritis

Preintervention Pruritis

Table 3 describes the frequency of patients requiring treatment for pruritis in each period where data were collected, also showing the number of patients who received a particular dosing strategy and the rate of pruritis observed following that dose. Four preintervention dosing strategies were observed: 0.15 mg, 0.2 mg, 0.25 mg, and 0.3 mg intrathecal morphine (Table 3). The 0.2 mg dose was observed in 22 of 30 cases, the most common dosing strategy at baseline representing 73% of the preintervention group. Treatment-required pruritis was also common, observed in 36% of patients receiving the 0.2 mg dose. A higher incidence in treatment-required pruritis was noted with the 0.25 and 0.3 mg doses.

Postintervention Pruritis

Postintervention dosing, incidence of treatment-required pruritis, and analgesic consumption in the first 24 hours postoperatively are listed in Table 3. When compared with the 0.1 mg group, the increased rate of pruritus in the 0.2 mg group (57%, $n = 8$) was significant, $p < .01$. Pruritis was the listed indication for each of the recorded diphenhydramine doses. Of the providers who chose not to adhere to the recommend dose, 0.2 mg was the only other dose used in the postintervention group possibly reflecting a compromise among nonadherent providers to at least decrease the chosen dose to 0.2 mg.

Analgesic Consumption

Opioid Analgesia in the First 24 Hours

Preintervention opioid consumption ranged from 0 to 2 tablets of oxycodone 5 mg with acetaminophen 325 mg in 24 hours. In the preintervention period, there were no cases where 0.1 mg intrathecal morphine was used, so a between-groups comparison to cases using greater than 0.1 mg intrathecal morphine was not possible. In the postintervention group, the mean number of oxycodone with acetaminophen tablets given to the 0.1 mg intrathecal morphine dose group was 2.8 tablets or 21 morphine equivalents. When compared with the 2.6 tablets (19.5 morphine equivalents) given for the 0.2 mg intrathecal morphine dose group, there was no significant difference, $p = .27$. All patients were ordered ketorolac 30 mg IV intraoperatively and every 6 hours in that 24-hour period.

Time to First Postoperative Opioid

Time to first treatment for oxycodone/acetaminophen tablet in the 0.1 mg group ranged from 3 hours to 23.5 hours, mean of 11 hours. Time to first oxycodone with acetaminophen tablet in this 0.2 mg group ranged from 1 to 20 hours, mean of 10.3 hours. No other opioids were administered.

TABLE 3. FREQUENCY OF TREATMENT-REQUIRED PRURITIS

	Intrathecal Morphine Dose (mg)	*n*	Cases of Treatment-Required Pruritus
Before intervention	0.3	5	2
	0.25	1	1
	0.2	22	8
	0.15	2	0
After intervention	0.2	14	8
	0.1[a]	16	2

[a]Recommended dose

Discussion

Our results were consistent with prior research where risk reduction for opioid-induced pruritis favors 0.1 mg intrathecal morphine over 0.2 mg. Early analgesic consumption and analgesia over 24 hours were similar between groups, indicating postoperative analgesia is not different with either strategy. Anesthesia provider adherence to the new dosing strategy improved. No cases were adherent to this dosing strategy before the intervention, and 53% were adherent after the intervention. We found increased compliance from providers, but recognized there is need for improvement. Sustainment of the intervention is encouraged and training along with annual reports of past sustainment efforts are presented to new team members.

Although adjusting the dose of intrathecal morphine may prevent most cases of opioid-induced pruritis after cesarean birth, for some women it will still be a problem. Adjuncts such as ondansetron and nalbuphine have been shown to be effective in treating pruritis in this population without increasing pain scores (Moustafa et al., 2016). Prophylactic ondansetron is more effective than diphenhydramine for preventing pruritis for women after cesarean birth (Tan et al., 2019). Use of these adjuncts combined with a standardized 0.1 mg intrathecal morphine dose may be of greater value for pruritis prevention and management, a strategy deserving further study. We used opioid consumption as a marker for pain because we did not have trained observers to record pain scores. Pain scores would be beneficial for future projects. The literature search was updated until January 1, 2020 with no additional studies identified to meet inclusion criteria. Nurses at other facilities may consider bundling other pruritis-mitigating interventions such as nalbuphine, while limiting intrathecal morphine to 0.1 mg when designing these types of projects.

Conclusions

Pruritis prevention provides for a better patient experience to mothers after cesarean birth. Enhanced recovery after surgery guidelines for cesarean birth are available to improve perioperative outcomes; however, these guidelines do not currently address intrathecal morphine dosing

CLINICAL NURSING IMPLICATIONS

- Reducing the spinal morphine dose to 0.1 mg reduced frequency of pruritis in this patient population.
- Opioid consumption was comparable between patients who received 0.1 mg versus 0.2 mg spinal morphine.
- Providers changed their spinal morphine dosing strategy after being educated about its role in preventing pruritis.
- Nurses are uniquely positioned to advocate for their patients when current prevention strategies to minimize pruritis are not effective.
- Nurses should actively contribute to interdisciplinary protocols that support effective analgesia and reduced risk for pruritis.

(Caughey et al., 2018). All strategies for pruritis prevention, including adjuncts such as ondansetron or nalbuphine, should be considered when developing societal guidelines or even local protocols. Nurses may be the first to notice unwanted trends, as was the case in our hospital. Our project team recommends that nurses should be empowered to speak up to their department leaders and anesthesia providers as new trends are noticed. In this facility, a committee for perinatal care fosters that ongoing relationship. As patient advocates and those who provide the majority of direct patient care, nurses are uniquely positioned to provide a voice in developing practice protocols, leading to interdisciplinary strategies that effectively prevent postcesarean pruritis. ✣

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