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Optimal Intrathecal Morphine Dose in Scheduled Cesarean Delivery

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Running head: OPTIMAL INTRATHECAL MORPHINE DOSE

Table of Contents

Abstract……3

Introduction…….…….6

Significance of the Problem...…….…….6

Clinical Question..…….....7

Focus Areas...……..……..…….7

Project Short and Long Term Goals...……..…….……8

Global Impact...……..……8

Organizing Framework...……...……...……..9

Project Design..…….……10

Evidence Evaluation.....…….……..……10

Setting...……..……..……16

Procedural Steps...……...…….……16

HIPAA Concerns…….....…..…….…...……..17

References….……...……..…...……18

Timeline……...……..…...……....23

Abstract

Up to 90% of patients experience pruritus after receiving intrathecal morphine (ITM) for cesarean delivery, which may manifest as excessive itching of the face, torso, or arms. Pruritus may cause severe discomfort, increase staff workload, delay initiation of breastfeeding, and decrease patient satisfaction. Effective analgesia is achieved with as little as 0.1 mg of ITM, which also prevents pruritus in most cases; however, many anesthesia providers give twice this amount. An evidence-based practice project was developed to encourage anesthesia providers to use the 0.1 mg dose as a strategy to prevent pruritus. An initial chart review was completed on 30 cesarean deliveries, finding 37% were given treatment for pruritus. An educational presentation and knowledge assessment were conducted to encourage the new dosing strategy. Two months following the presentation, another 30 charts were reviewed and analyzed for post-intervention outcomes. Treatment-required pruritus in the 0.1mg group was 13% vs 57% in the 0.2 mg group. Of the providers who participated, 56% indicated they would change their practice long-term in favor of the 0.1 mg dose of ITM.

Introduction

Intrathecal (IT) morphine, an opioid narcotic, is commonly administered by anesthesia providers to provide post-operative analgesia for patients undergoing cesarean delivery (CD) (Koju, Gurung, & Dongol, 2015). Anesthesia providers combine morphine with local anesthetics and place this mixture into the subarachnoid space immediately prior to a CD to provide long acting analgesia. However, a common complication of IT morphine is opioid-induced pruritus, or excessive itching to the face, arms, and torso (Bucklin & Santos, 2014; Sultan, Halpern, Pushpanathan, Patel, & Carvalho, 2016; Butterworth, Mackey, & Wasnick, 2013). Interestingly, there are no consensus guidelines that provide optimal or standardized IT morphine dosing for patients undergoing CD that provides analgesia while concurrently minimizing opioid-induced pruritus (Sultan et al., 2016). A lack of evidence-based IT morphine dosing has led to significant variability in dosing, incidence and severity of postoperative pruritus and reduced patient satisfaction reports at Naval Hospital Jacksonville (NHJAX) (C. Moore, personal communication, October 13, 2017).

Significance of the Problem

1.2 million CDs are performed annually in the United States (U.S.) and approximately 240 per year are performed at NHJAX. A CD is a painful surgery that often requires postoperative opioid analgesia (Jaffe, Schmiesing, & Golianu, 2014). Therefore, anesthesia providers will typically administer IT morphine mixed with local anesthetics immediately prior to surgery to provide anesthesia and long acting postoperative analgesia. Intrathecal morphine is the preferred opioid because compared with lipid-soluble agents (e.g., fentanyl) it results in a lower postoperative pain scores (Carvalho & Tenorio, 2012) and provides prolonged post cesarean analgesia for up to 12 to 24 hours (Tsen, 2014).

The most common side effect of IT morphine at higher doses is opioid-induced pruritus (Koju et al., 2015). Pruritus or excessive itching occurs in nearly 90% of women who receive IT morphine for CD (Moustafa, Baaror, and Abdelazim, 2016; Sultan et al., 2016). If excessive, patients require treatments such as naloxone, an opioid antagonist, that reduces pruritus, but also reduces effectiveness of the morphine analgesia. Pruritus is a side effect that severely impacts patient well-being during their inpatient stay. Van Os-Medendorp et al. (2006) described patients undergoing CD are at increased risk of these adverse effects because they are already at risk of surgical site infection, sleep deprivation due to caring for the newborn, and postpartum depression. Additionally, severe pruritus interferes with mother-baby bonding (Vice-O'Con, Austin, & Pugh, 2018). Extensive review of the evidence suggests that a morphine dose of 0.1 mg (IT) provides effective post-operative analgesia while reducing the incidence of pruritis compared to higher dosages (Aly et al., 2018; Uchiyama, Ueyama, Nakano, Nishimura, & Tashiro, 1994; Sultan et al., 2016; Jiang et al., 1991).

Clinical Question

In parturients undergoing scheduled CD, does an evidence-based morphine dose of 0.1 mg (IT) reduce the incidence of pruritus compared to current clinical practice at NHJAX?

Focus Areas

This evidence-based practice project focus area is the dosage of IT morphine to provide analgesia while minimizing the occurrence of pruritus. There are four main steps in accomplishing this focus. The first is to conduct a review of the literature and recommend IT morphine dosing for CD. Second, we will perform chart review and data collection in parturients that had a scheduled CD prior to project implementation, collecting demographics, dose of IT morphine administered, and incidence of treatment required pruritus. Third, we will provide

recommendations for IT morphine dosing to anesthesia staff and local data collected. Fourth, we will collect the same demographics, post-implementation dosing of IT morphine administered, and incidence of treatment required pruritus. Lastly, we will brief the anesthesia department with the outcomes of the post-implementation data collection and present a sustainability plan with a proposal for standardizing IT morphine dosing.

Military and Nursing Relevance

EBP guidance for the administration of IT morphine will usher Military Treatment Facilities (MTF) towards achieving the goals of the Military Health System Quadruple Aim by decreasing cost and improving efficiency and quality of care (Department of Defense, 2013). Reducing the dose of IT morphine has both short and long-term impacts.

Short Term Goals

The short-term goals include reducing or eliminating pruritus caused by IT morphine, reducing pruritus as a barrier to maternal/infant bonding, and eliminating pruritus as a source of distress for patients recovering from CD while still providing adequate pain control. The short-term benefits to providers include increasing the availability of evidenced-based practice (EBP) to guide clinical decisions, higher reported patient satisfaction levels, and fewer provider resources and man hours expended to care for this patient population.

Long Term Goals

The long-term benefits include institutional and financial interests. Satisfied patients give institutions higher scores through patient satisfaction surveys like the Tricare Inpatient Satisfaction Survey (DHA, n.d.). The EBP guidelines created at NHJAX will be made available for use by other MTFs and eventually published for broader distribution to all healthcare professionals and institutions. The long-term benefits also have the potential to reduce the cost

of caring for patients after CD with IT morphine-induced pruritus by way of decreasing provider time allocated to treating post CD pruritus and decrease overall cost due to unnecessary use of supplemental medications.

Organizing Framework

The organizing framework that will guide this project is the Model for Evidence-Based Practice Change (Larrabee, 2009). This model is organized into six steps. Step one involves assessing a need for change in practice, which we have determined as a need to reduce the incidence of pruritus following administration of IT morphine in patients undergoing cesarean delivery. Steps two and three involve the location and analysis of best evidence, which we have completed through the literature review and synthesis. Step four includes defining the proposed change, gathering resources needed to make the change, and designing the implementation plan. The proposed change is dosing IT morphine at 0.1 mg with an educational presentation of the literature review to the identified resource audience. Step five includes the implementation of the plan, evaluating the process and outcomes, and developing conclusions and recommendations. We will conduct a pre-implementation data collection to determine current dosing practice and incidence of pruritus then we will present the results of our literature review and dosing recommendations to the anesthesia staff. After the educational presentation, post-education data collection to identify any change in practice or incidence of pruritus will be completed. Step six ends the process by integrating practice changes and maintaining those changes. This includes continuing education and standardizing clinical guidelines to support the use of evidence-based IT morphine dosing.

Change Theory

Lewin's Three Step Change Model addresses the theoretical underpinnings for the implementation of clinical practice change (Kritsonis, 2004). This change model consists of three steps. The first step is to unfreeze the existing situation or status quo by reinforcing positive behavior that influences providers to move away from the status quo, as well as decreasing any negative perceptions associated with moving away from the status quo. The second step is moving the target system to a new level of equilibrium. This is accomplished by seeking agreement with anesthesia providers that the current practice is not beneficial. We will implement this step by working with the anesthesia providers to gain their input on our proposed changes to the current policy. The third and final stage, or the refreezing stage, is where stabilization of the change is preserved. This is accomplished through the implementation of standardized clinical guideline to ensure that our new practice change is maintained.

Project Design

General Approach

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 on the dose utilization of IT morphine in patients undergoing scheduled cesarean delivery. Interventions used to treat IT morphine-induced pruritus were included in the literature search for additional understanding of the problem and solution. The PubMed, Embase and CINAHL search utilized the Medical Subject Heading (MeSH) term "cesarean" OR "caesarean" OR "c-section" OR cesarean section AND "morphine" OR "Duramorph" AND "pruritus" OR "itching". The search was retrospective and not truncated by year to capture the broadest scope of literature on the subject. The search was limited to articles

published in English. As of 1 December 2018, this search strategy yielded 461 peer-reviewed articles and abstracts; 182 duplicates were removed to yield 279 articles.

Titles of these 279 articles were evaluated for inclusion in this review of the literature. We included studies of patients undergoing planned CD which utilized IT morphine for pain management and reported pruritus as a patient outcome. In addition, inclusion criteria required studies that either detailed the impact of varying IT morphine dose on pruritus. Common pruritus interventions will be reviewed in the discussion portion as a subject closely related to IT morphine induced pruritus. We excluded papers that measured opioids other than morphine (fentanyl, sufentanil, etc.) within the IT mixture. IT morphine induced pruritus has been extensively studied and IT opioid induced pruritus is less definitive when admixtures other than morphine are used. We excluded articles that included non-IT routes of opioid administration, IT opioids administered other than morphine, emergent CD, and/or a discrepancy of local anesthesia doses between comparison groups included in the IT. After implementing inclusion and exclusion criteria with a title review, 51 articles remained. All members of the group reviewed the abstracts together and eliminated 27 to yield 24. All articles were read applying inclusion and exclusion criteria, 17 were discarded to yield 7 (Appendix A).

The Melnyk & Fineout-Overholt Level of Evidence Pyramid (Figure 1) was utilized to assess the level of evidence for the remaining 7 articles (Melnyk & Fineout-Overholt, 2011). The evidence pyramid has seven levels. Level I evidence consists of systematic meta-analyses, level II are well designed randomized controlled-trials, and the bottom level is level VII which are expert opinions. The University of Oxford's Center of Evidence Based Medicine (CEBM, 2018) appraisal tool was utilized to evaluate the quality of the remaining 7 articles. The articles were assigned a grade of high, good, or low and placed in a table to allow cross-comparison of

IT morphine dose, efficacy, side effects, level of evidence and quality of the study (Appendix B). From the seven high quality articles addressing optimal IT morphine dose, there were six level II and one level I evidence articles. Four articles determined 0.1 mg of IT morphine (duramorph) as the optimal dose that provides adequate analgesia while minimizing pruritis side effects compared to a higher dosage (Aly et al., 2018; Milner, Bogod, & Harwood, 1996; Uchiyama, Ueyama, Nakano, Nishimura, & Tashiro, 1994; Jiang et al., 1991).

Setting

This project will occur at Naval Hospital Jacksonville (NHJAX). This is a medium-sized military treatment facility in northeast Florida that provides care for active duty, retirees, and dependents. NHJAX has two labor and delivery (L&D) operating rooms which average 18 cesarean deliveries per month and five labor, delivery, and recovery rooms. All patients receiving a CD recover in the L&D post-anesthesia care unit and are then transferred to the eight-bed unit. The anesthesia providers consist of nine certified registered nurse anesthetists, seven anesthesiologists, and five student registered nurse anesthetists. The L&D and postpartum staff are made up of five obstetricians, five nurse midwives, 19 labor and delivery nurses, 21 labor and delivery corpsman, 19 postpartum nurses, and 16 postpartum corpsman.

Procedural Steps

1. Pre-Implementation Steps: The project will begin with a retrospective chart review of 30 scheduled CD at NHJAX. We will collect demographic data (Age, BMI, Race, Gravidity, Parity), IT morphine dose, and incidence of treatment required pruritus over the first 24 hours after surgery.

2. Implementation Steps: We will present our findings via PowerPoint presentation on two consecutive Tuesday mornings when all providers are available on a late start day. There will be

a log of providers present and those that are missing will be noted for one-on-one capture if unable to attend the two educational meetings being held. Anesthesia leadership will be present at both meetings. Our presentation will include an evidence based educational solution recommending the utilization of a 0.1mg IT morphine dose over a two-month trial period. Anesthesia staff will undergo and a pre and post-test with questions on IT morphine knowledge base and personal practice preferences.

3. Post-Implementation Steps: We will conduct a chart review of scheduled CD over the two-month lower IT morphine dose trial period. We will collect data on demographics, IT morphine dosage, postoperative pain medication use, and incidence of treatment required pruritus over the first 24 hours after surgery.

4. Data analysis: We will compare demographic data between the pre and post implementation to verify similar patient populations. Next, we will compare the average IT morphine dosages and incidence of treatment required pruritus between pre and post implementation using a Chi squared analysis.

HIPAA Concerns

We will submit our process improvement EBP proposal for an Institutional Review Board (IRB) exemption since we are not collecting personally identifiable information (PII) or protected health information (PHI). We will store all non-identified data collection on a Common Access Card (CAC) enabled computer stored within a locked office setting.

Project Results

A total of 60 charts met inclusion/exclusion parameters. Of these, 30 were in the pre-implementation group and 30 in the post-implementation group. These cesarean deliveries occurred within 4 months preceding and 4 months following the educational intervention.

Analysis of Results

Pre-intervention dosing and pruritus

A range of 4 doses of ITM were used prior to the intervention. Pre-intervention dosing patterns ranged from 0.15 mg to 0.3 mg, with 0.2 mg being used in 22 out of the 30 cases. Of those 22 that received 0.2 mg, the incidence of pruritus was 36%. Of the patients that required treatment for pruritus, the time to the first dose of diphenhydramine for pruritus in the pre-intervention group ranged from 2.5 hours to 10.5 hours, with a mean of 5.2 hours (Figure 2).

Post-intervention dosing and pruritus

Post-intervention dosing was noted to be either 0.1 mg or 0.2 mg of ITM. Chart review revealed 16 patients received 0.1 mg of ITM, while the remaining 14 received 0.2 mg. The rate of pruritus for the 0.1 mg group was 13%, or 2 patients. The rate of pruritus in the 0.2 mg group was 57%, or 8 patients. Of the patients requiring treatment for pruritus, time to first rescue treatment for pruritus in the 0.1 mg group ranged from 6.2 hours to 8.5 hours, mean of 7.4 hours. For the 0.2mg group, the time of first rescue for pruritus ranged from 0.75 hours to 12.7 hours, mean of 6.2 hours (Figure 2). There were no reports of diphenhydramine given for an indication other than pruritis.

Since providers had expressed concern for decreased analgesia with the evidence-based 0.1 mg ITM dose, the mean number of oxycodone/acetaminophen tablets administered to each dose group was also monitored for the first 24 hours as this was the only opioid used throughout

the duration of the project. The mean number of oxycodone/acetaminophen(5mg/325mg) tablets given to the 0.1 mg ITM dose group was 2.8 tablets compared to 2.6 tablets for the 0.2 mg ITM dose group. 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. The time to first oxycodone/acetaminophen tablet in this 0.2 mg group ranged from 1 to 20 hours, mean of 10.3 hours.

Provider Compliance

A total of 12 of the hospital's 15 anesthesia providers participated in the project. Of those, 75% indicated a willingness to change their practice long-term according to the pre-intervention survey. Three providers did not adjust their practice to fit the recommended dosing, representing 9 of the 30 post-intervention cases. Five providers, spanning 10 cases, were 100% adherent to the project's ITM dosing recommendations. Four providers administered ITM to the remaining 11 cases, with adherence to ITM dosing recommendations between 20%-66%. Overall provider adherence to recommended ITM dosing was 53%. Of the providers that participated, 56% indicated they would make a long-term practice change according to the post-intervention survey, a 13% increase from the pre-intervention survey.

Organizational Impact / Implications to Practice & Policy

Implementing EBP at the deck plate aligns with the Military Health System Quadruple Aim by initiating effort toward improved efficiency and quality of care. This project promotes the Defense Health Agency goals to become a Value Based Care enterprise, by finding weaknesses in care delivery and implementing systematic approaches to improve. The project has the potential to decrease costs by decreasing the need for additional medications for pruritus treatment and decreasing staff workload attending to patients experiencing pruritus. Pruritus was

decreased at the local level overall. There is potential for information dissemination to anesthesia departments at sister MTFs which could have a larger impact on this patient population. Ultimately, a dose chosen is the provider's decision. Therefore, a dose cannot be mandated with Policy. However, a broader impact on implications to practice is possible if the same project was implemented at larger MTFs.

Future Directions for Research and Practice

The completion of this projects opens many opportunities for future research and practice change. Potential future topics include ondansetron administration before IT morphine administration to see if pruritus rates decrease further, the use of IT preservative free Dilaudid instead of morphine, Nalbuphine as a rescue treatment for IT induced pruritus, postoperative transverse abdominal plane blocks as a method for analgesia instead of IT opioids. The reduced dose does not eliminate pruritus; therefore, evidence-based treatment methods are a great addition to the arsenal of practice. Additionally, the consideration of a Transverse Abdominal Plane block for postoperative pain management instead opioids for patients that cannot receive opioids.

Conclusion

A 0.1 mg dose of intrathecal morphine for cesarean delivery decreases the incidence of opioid-induced pruritus and maintains postoperative analgesia. These local findings were consistent with the findings from the literature review. Limitations to the project include small sample size and attendance of anesthesia staff at initial presentation. Variances in orders for pain medications between obstetric providers were found, where some called for scheduled versus as-needed opioids. Upon review, this did not seem to have a significant impact on total opioids given, likely due to the patient's ability to decline a scheduled medication. Staff buy-in for this

intervention may have limited its effect, whether due to perceptions on quality of evidence or favoring past experience over results from the literature. Future projects could poll providers to discover barriers to suggested practice change or utilize visual reminders about project goals at the point of care.

Although adjusting the dose of ITM may prevent most cases of opioid-induced pruritis after cesarean section, some patients will still experience it. Adjuncts such as ondansetron and nalbuphine have been shown to be effective in treating pruritis in this population without increasing pain scores (Somrat, Oranuch, Ketchada, Siriprapa, & Thipawan, 1999). Prophylactic ondansetron has also been shown to be more effective than diphenhydramine in reducing the occurrence of pruritus with a dosage of 0.1 mg/kg prior to the start of the cesarean section (Yeh, et al., 2000). The use of these adjuncts combined with a standardized 0.1 mg ITM dose may be of greater value for pruritis prevention and management, a strategy that deserves further study.

Overall, this project brought to light some of the hurdles that occur when attempting to implement a new clinical suggestion based on evidence to a diverse group of anesthesia providers. However, the project seemed to influence provider practices. The results from this project will also serve to inform future projects to incorporate strategies that enhance provider buy-in. This project was able to convince over half of the providers that participated to alter their practice long-term, and the patients ultimately benefitted from a substantial decrease in rate of pruritis following their cesarean section.

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Figure 1. Levels of Evidence. From "Psychiatric Nursing: EBP" by Massasoit Libraries, n.d., *Massasoit Community College,* Retrieved from https://library.massasoit.edu/psychnurs/ebp. Copyright 2017 by Massasoit Libraries.

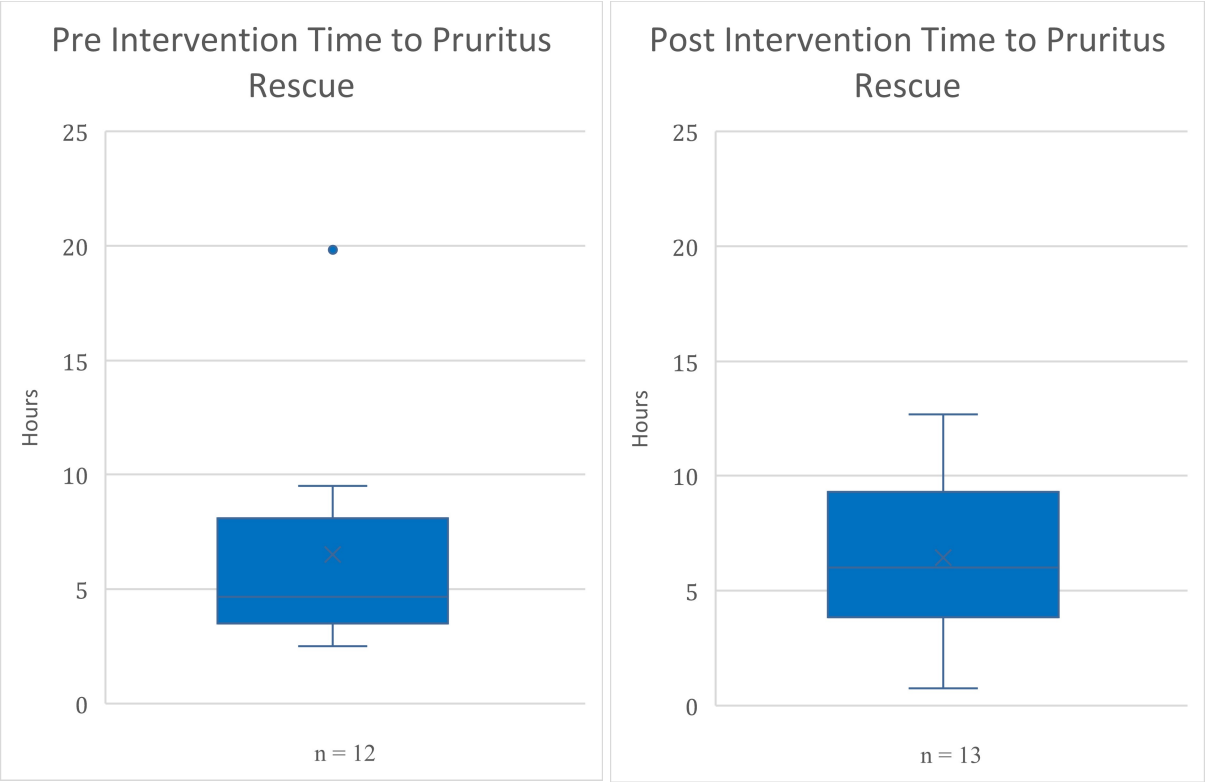
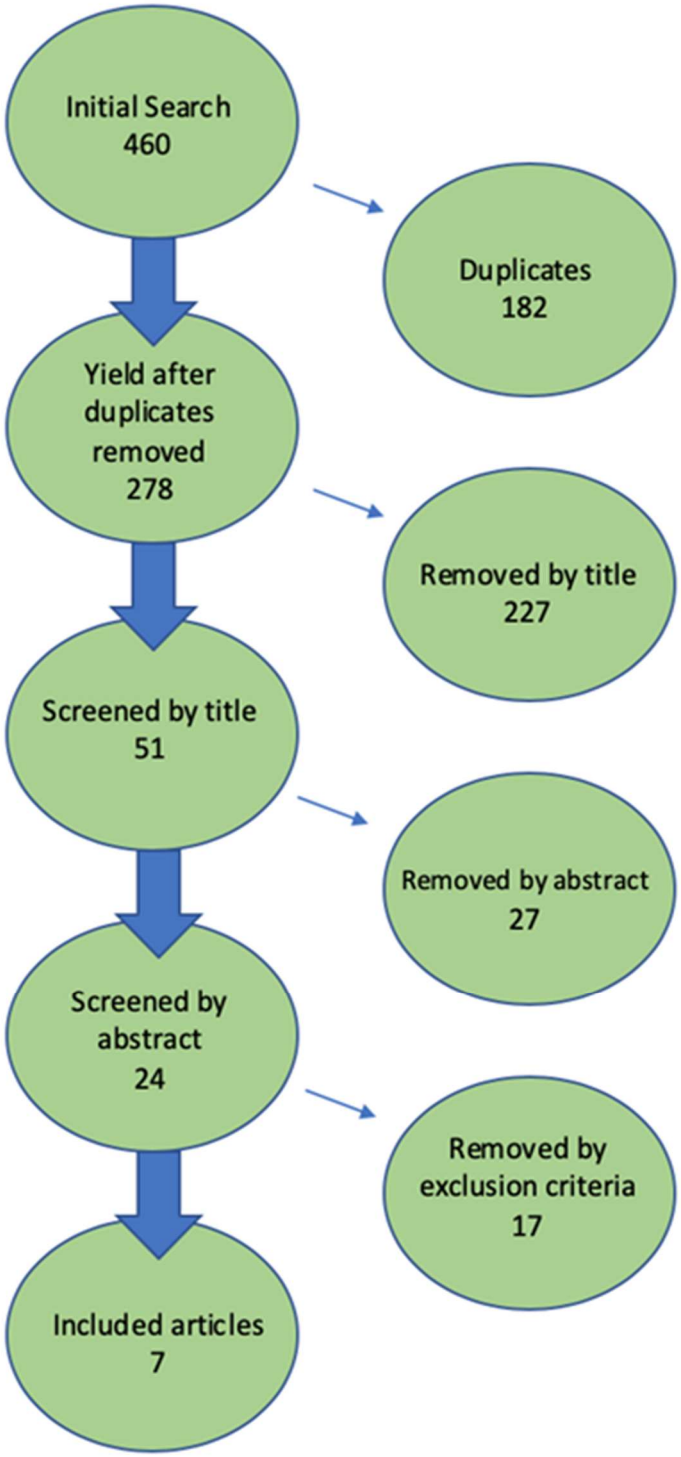


Figure 2. Time to first diphenhydramine rescue for pruritis.

Appendix A - PRISMA Diagram



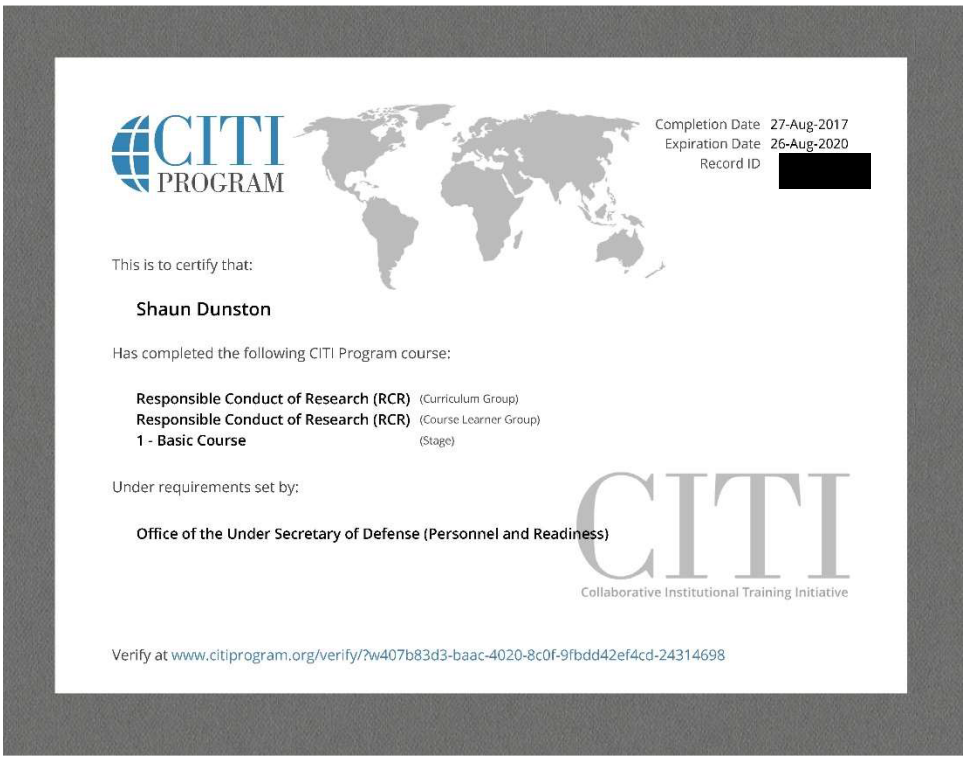
Appendix B - Evidence Table

Citation	Purpose	Sample	Design	Independent Variable	Dependent Variable	Statistical Analysis	Results	Level	Quality
Aly, M., Ibrahim, A., Farrag, W., Abdelsalam, K., Mohamed, H., & Tawfik, A. (2018). Pruritus after intrathecal morphine for cesarean delivery: Incidence, severity and its relation to serum serotonin level. International Journal of Obstetric Anesthesia, 35, 52-56. doi:10.1016/j.ijoa.2018.02.004	Determine the correlation of serum serotonin level with dose specific IT morphine and it's effects on opioid-induced pruritus with parturients undergoing elective c-sections.	Forty parturients divided into two groups of 20, undergoing elective C-section	Prospective, Double-Blinded RCT	IT morphine dose of 0.1mg and 0.2mg	Serum serotonin levels, incidence and severity of pruritus	Parametric data were analyzed using Student's t-test and nonparametric data were analyzed using the Mann–Whitney U-test, Chi-squared test and Fisher's exact test. A non-parametric correlation test was used to find the strength of association between the postoperative serum serotonin level and the pruritus severity score at four hours. A P-value <0.05 was considered statistically significant.	The incidence of pruritus in the M100 group was 55%, compared to 75% in the M200 group (P=0.32). There was no significant difference between the groups with respect to the severity of pruritus at all time points, except at 6 and 8 h when it was significantly higher in the M200 group. There was a significant positive correlation between the postoperative serum serotonin level and the pruritus severity score (correlation coefficient (CC) 0.720, P <0.001).	II	High
Carvalho, F. A. E., Tenorio, S. B. (2012). Comparative Study between doses of intrathecal Morphine for analgesia after Casesarean. Sociedade Brasileira de Anetesiologia. doi: 10.1016/j.bjane.2013.01.001	Compare the quality of pain management and side effects of two doses of intrathecal morphine in cesarean sections	123 pregnant women, gestational age > 38 weeks, scheduled for cesarean	Double Blinded Randomized Control Trial	Spinal Morhpine dose	patient reported quality of analgesic, analgesic consumption, side effects @ 9, 11, 22 and 24 hr, main cause of discomfort in first 24 hrs of surgery	student's t-test, Mann-Whitney, nonparametric Wilcoxon's test, chi-squre or Fisher's exact, confidence intervals of 95%	no statistical significance reguarding pain, therefore, no relationship between dose and analgesic quality, statistically significant findings: incidence of moderate/severe pain was higher in first 12 hrs, dose dependent incidence of pruritus with 70% incidence in Group 50 and 87% in Group 100 (p=0.026). Synthesis: 50mcg of intrathecal is optimal to 100mcg because they both provide the same analgesic quality but higher dose is associated with more incidence of side effects. Also, multimodality of pain managment should be incorporated because both dose groups still experienced moderate/severe pain.	II	High
Jiang, C. J., Liu, C. C., Wu, T. J., Sun, W. Z., Lin, S. Y., Huang, F. Y., & Choa, C. C. (1991). Mini-dose intrathecal morphine for post-cesarean section analgesia. Ma Zui Xue Za Zhi, 29(4), 683-688. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/1800872	Determine the dose relationship of mini-dose intrathecal morphine (0.025-0.125mg) for analgesia after Cesarean section.	63 patients scheduled for elective C-section w/out maternal or fetal compromise	Prospective study, randomized, double-blinded RTC	Intrathecal morphine dose recieved 0mg - 0.125mg	Analgesia duration, in hours, & the first 24hr pain scores.	ANOVA, Fisher's exact test, Kruskal-Wallis ANOVA test when appropriate. p < 0.05 was considered significant.	Duration of analgesia longer in all morphine groups compared to control group. Duration of analgesia longer in groups 5 and 6 than in groups 2-4. Significant linear dose-response relationship b/w analgesic duration and dose of intrathecal morphine.	II	High

Running head: OPTIMAL INTRATHECAL MORPHINE DOSE

Citation	Purpose	Sample	Design	Independent Variable	Dependent Variable	Statistical Analysis	Results	Level	Quality
Milner, A. R., Bogod, D. G., & Harwood, R. J. (1996). Intrathecal administration of morphine for elective Caesarean section. A comparison between 0.1 mg and 0.2 mg. Anaesthesia, 51(9), 871-873.	Determine if smaller doses of intrathecal morphine can preserve quality of analgesia while generating fewer adverse effects.	50 ASA I & II elective c-section patients	Prospective, Double-Blinded RCT	Dose of intrathecal morphine (0.1 to 0.2mg)	Incidence of adverse effects (N/V/P)	Kruskal-Wallis test, range and distribution	Pruritis is not dependent on dose of intrathecal morphine. N&V is dependent on dose of intrathecal morphine.	II	High
Sharma, N. R., Timalsena, P., & S, D. C. (2013). Intrathecal morphine in combination with bupivacaine: A comparative study following caesarean section. Nepal Medical College Journal : NMCJ, 15(1), 37.	Determine if 0.1mg of IT morphine produced adequate analgesia and reduced side effects compared to 0.2mg of IT morphine	60 ASA I & II elective c-section patients	Prospective RCT	Dose of intrathecal morphine (0.1 to 0.2mg)	Adequacy of analgesia and incidence of adverse effects (N/V/P)	Chi-square tests to determine significance and p-values	0.1mg dose of IT morphine produced less side effects but also had shorter duration of analgesia as compared to 0.2mg dose. Both of these outcomes were determined to not be statistically significant.	II	High
Sultan, P., Halpern, S. H., Pushpanathan, E., Patel, S., & Carvalho, B. (2016). The Effect of Intrathecal Morphine Dose on Outcomes After Elective Cesarean Delivery: A Meta-Analysis. Anesth Analg, 123(1), 154-164	Determine if low or high dose intrathecal morphine provides sufficient analgesia with fewer side effects	480 elective c-section patients	Meta-anaylsis	Dose of intrathecal morphine LD: 50-100mcg / HD: 100-250mcg	Incidence of pruritis and N/V	Continuous data analyzed with mean difference (MD) and 95% CI; dichotomous data odds ratio (OR) and 95% CI. All data combined and analyzed with DerSimonian-Laird random effects model.	HD doses of intrathecal morphine prolonged analgesia (approx 4.5 hours) but came with an increased incidence of N/V/P.	I	High
Uchiyama, A., Ueyama, H., Nakano, S., Nishimura, M., Tashiro, C. (1994). Low dose intrathecal morphine and pain relief following caesarean section. International journal of Obstetric Anesthesia (?) 3 87-91	Compare varying doses (0, 0.05, 0.1, 0.2mg) of IT Morphine and assess pain control quality	80 women (evenly split) who underwent elective or urgent c-section delivery under spinal anesthesia	Double blind RCT	Spinal morphine dose	Adequate level and length of time pain control	Numerical values were compared using one way analysis of variance. When significance observed, Scheffe's multiple comparison test was used. X2 test used to compare catergorical variables. Kruska-Wallis test followed by Scheffes multiple comparison test was used for postoperative nausea and pruritus. P<0.05 = statistical significance	The higher the moprhine dose, the higher incidence of nausea and pruritus(group 1 vs group 4). Duration of Anesthesia proportionate to dose given (group 1 - 7.7 hours, group 2 - 18.7 hours, group 3 - 28.9, group 4 - 28.3). Amount of analgesia needed was significantly lower in group 3/4 than group 1.	II	High

Appendix C – CITI Certificates



CITI PROGRAM

Completion Date 27-Aug-2017
Expiration Date 26-Aug-2020
Record ID [redacted]

This is to certify that:

Shaun Dunston

Has completed the following CITI Program course:

Responsible Conduct of Research (RCR) (Curriculum Group)
Responsible Conduct of Research (RCR) (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

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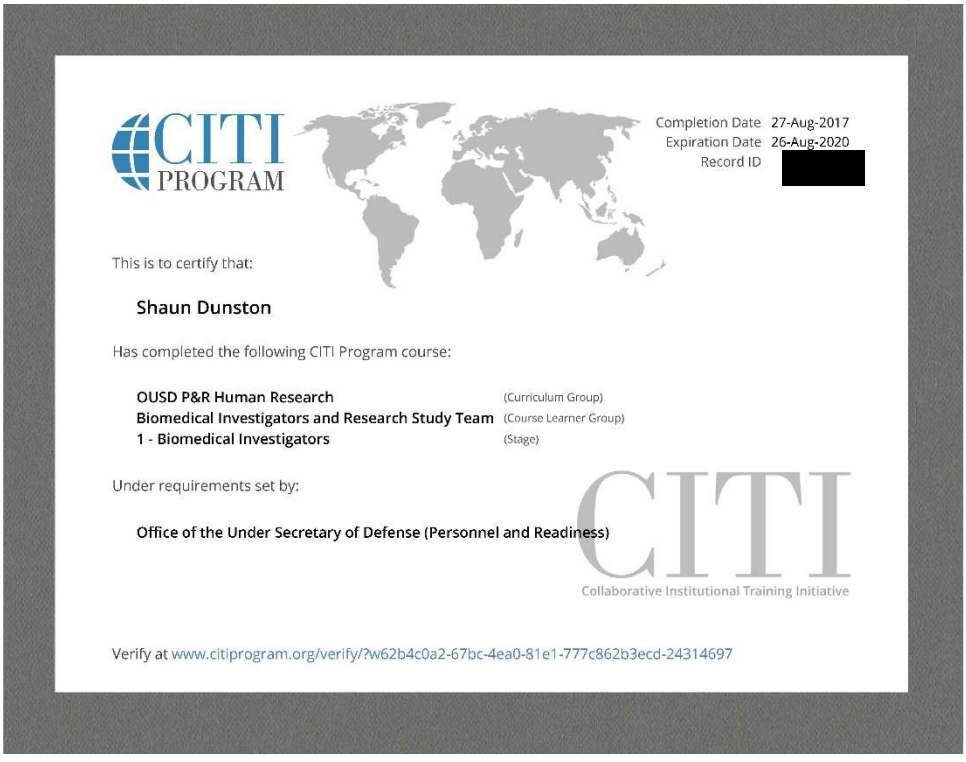

CITI PROGRAM

Completion Date 27-Aug-2017
Expiration Date 26-Aug-2020
Record ID [redacted]

This is to certify that:

Shaun Dunston

Has completed the following CITI Program course:

OUSD P&R Human Research (Curriculum Group)
Biomedical Investigators and Research Study Team (Course Learner Group)
1 - Biomedical Investigators (Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

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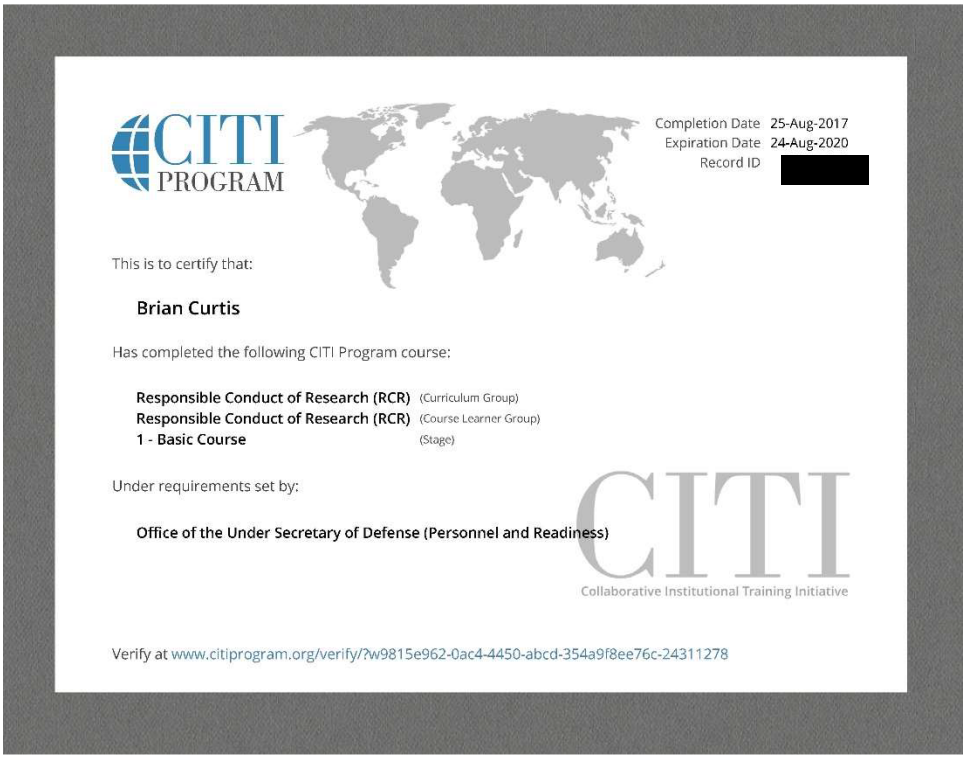

CITI PROGRAM

Completion Date 25-Aug-2017
Expiration Date 24-Aug-2020
Record ID [redacted]

This is to certify that:

Brian Curtis

Has completed the following CITI Program course:

Responsible Conduct of Research (RCR) (Curriculum Group)
Responsible Conduct of Research (RCR) (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

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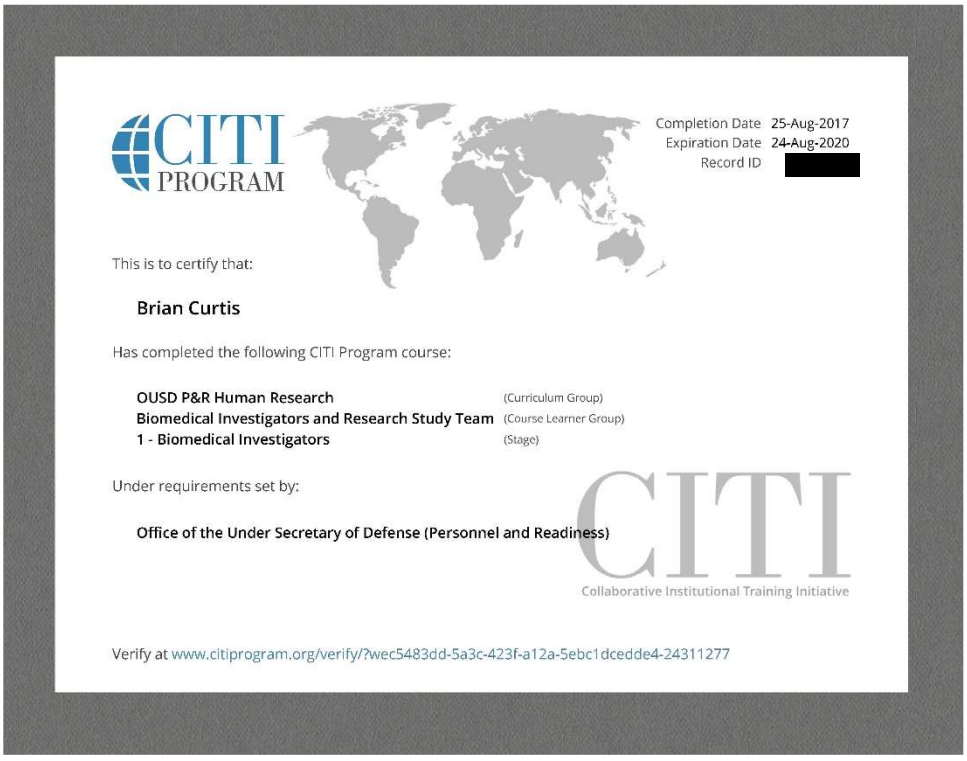

CITI PROGRAM

Completion Date 25-Aug-2017
Expiration Date 24-Aug-2020
Record ID [redacted]

This is to certify that:

Brian Curtis

Has completed the following CITI Program course:

OUSD P&R Human Research (Curriculum Group)
Biomedical Investigators and Research Study Team (Course Learner Group)
1 - Biomedical Investigators (Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

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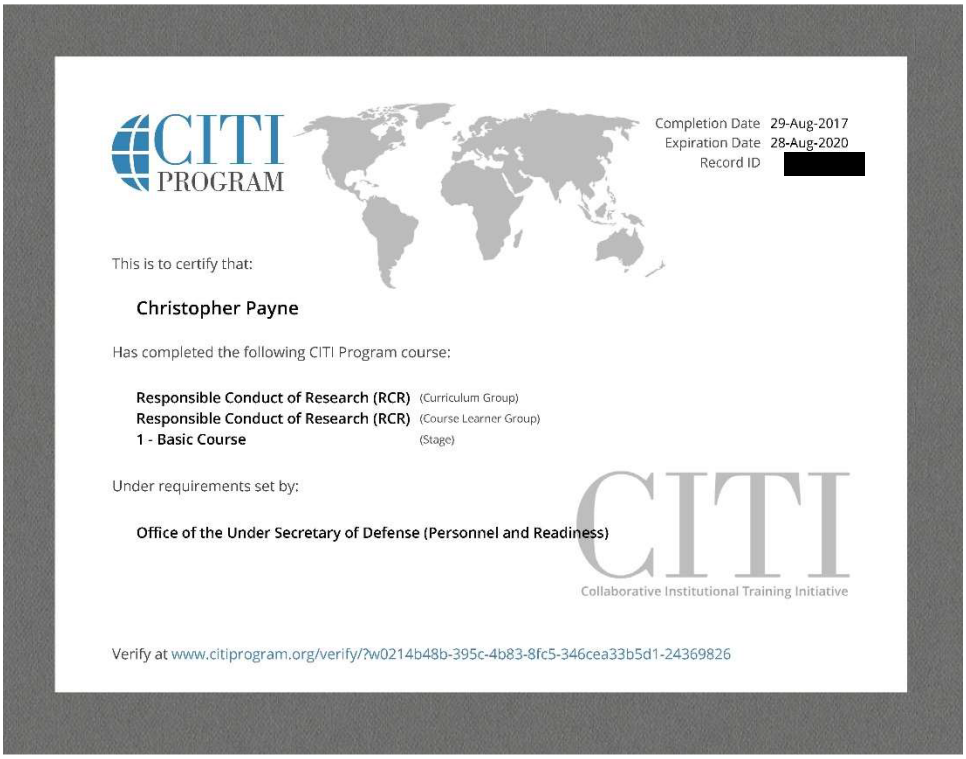

CITI PROGRAM

Completion Date 29-Aug-2017
Expiration Date 28-Aug-2020
Record ID [redacted]

This is to certify that:

Christopher Payne

Has completed the following CITI Program course:

Responsible Conduct of Research (RCR) (Curriculum Group)
Responsible Conduct of Research (RCR) (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

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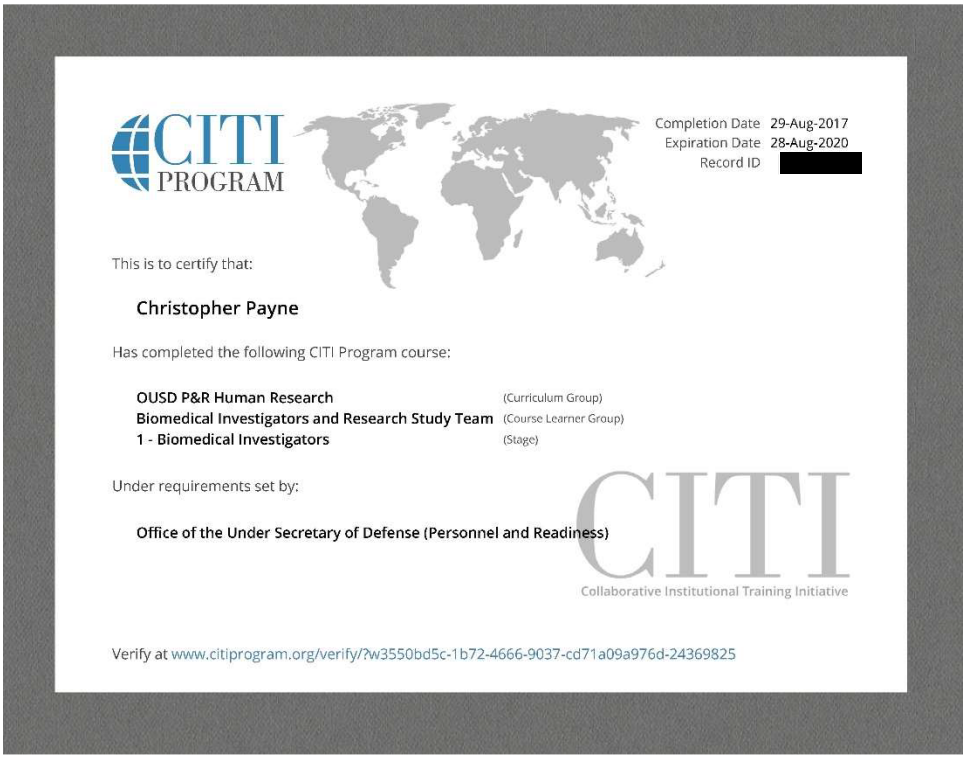

CITI PROGRAM

Completion Date 29-Aug-2017
Expiration Date 28-Aug-2020
Record ID [redacted]

This is to certify that:

Christopher Payne

Has completed the following CITI Program course:

OUSD P&R Human Research (Curriculum Group)
Biomedical Investigators and Research Study Team (Course Learner Group)
1 - Biomedical Investigators (Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

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CITI PROGRAM

Completion Date 29-Aug-2017
Expiration Date 28-Aug-2020
Record ID [redacted]

This is to certify that:

Devon Dan

Has completed the following CITI Program course:

Responsible Conduct of Research (RCR) (Curriculum Group)
Responsible Conduct of Research (RCR) (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

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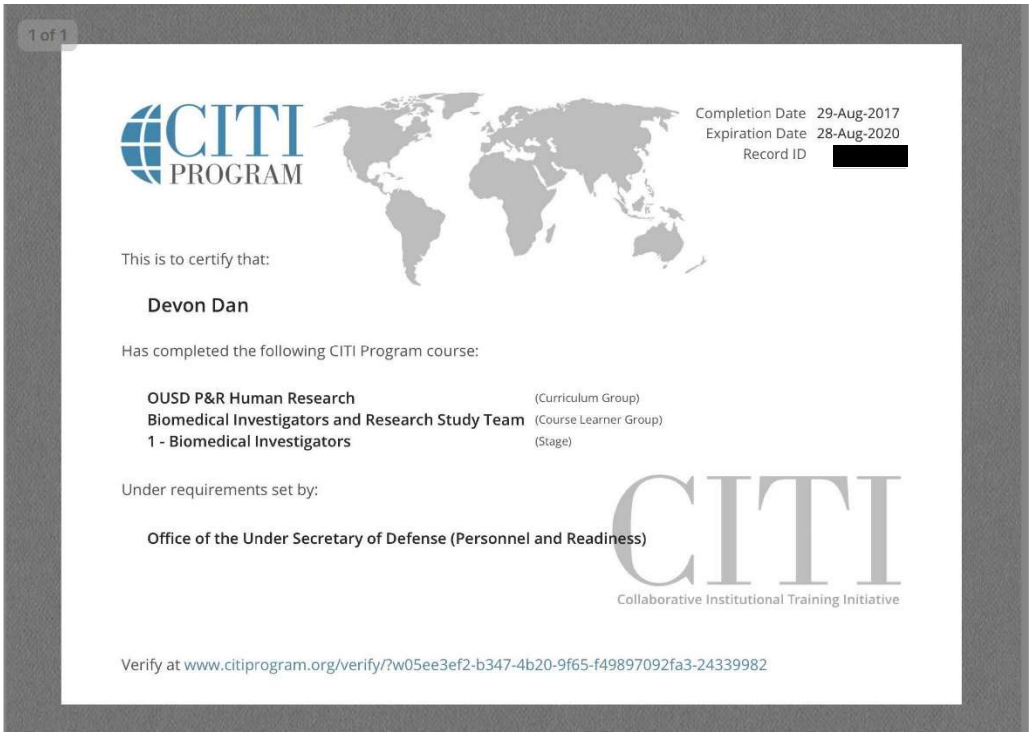

1 of 1

CITI PROGRAM

Completion Date 29-Aug-2017
Expiration Date 28-Aug-2020
Record ID [redacted]

This is to certify that:

Devon Dan

Has completed the following CITI Program course:

OUSD P&R Human Research (Curriculum Group)
Biomedical Investigators and Research Study Team (Course Learner Group)
1 - Biomedical Investigators (Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w05ee3ef2-b347-4b20-9f65-f49897092fa3-24339982

Appendix D – NOPA

USU
Uniformed Services University

OFFICE OF RESEARCH
4301 JONES BRIDGE ROAD
BETHESDA, MAYLAND 20814
PHONE: (301) 295-3303; FAX: (301) 295-6771

NOTICE OF PROJECT APPROVAL

Change Number: Original

VPR Site Number:	GSN-61-10782
Principal Investigator:	Dunston, Shaun
Department:	Graduate School of Nursing
Project Type:	Student
Project Title:	Optimal Intrathecal Morphine Dose in Scheduled Cesaean Delivery
Project Period:	8/14/2019 to 12/31/2019

Assurance and Progress Report Information:

Name	Sup	Approval Type	Status	Approved On	Forms Received
Progress Report	0			To be Submitted	N/A

Remarks:
This Notice of Project Approval has been reviewed and approved. Please remember that you must submit a final Progress Report (Form 3210) upon completion of this project.

Questions regarding this approval should be directed to the following person in the Office of Research:
Sharon McIver, (301) 295-9814.

[redacted] 9/26/2019

Yvonne T. Maddox, Ph.D. Date
Vice President for Research
Uniformed Services University of the Health Sciences

cc:
File
Radford, Kennett
Wanzer, Linda
Taylor, Laura

Appendix E – IRB Waiver

Clinical Investigation Department, Naval Medical Center Portsmouth
620 John Paul Jones Circle, Portsmouth, VA 23708 (757) 953-5939 Fax (757) 953-5298, DSN 377-5939

Thomas S. Rieg, PhD
Research Director

Kersten N. Wheeler, MS
Deputy Director
Division Head,
Research Subjects Protection

June G. Brockman, BA
Division Head,
Research Resources

Joanna E. Fishback, DVM
Major, VC, USA
Division Head,
Laboratory Animal Medicine

05 October 2018

From: Deputy, Clinical Investigation Department
To: LCDR Justin Hefley, MC, USN

SUBJ: LETTER OF WAIVER OF IRB REVIEW FOR PROGRAM EVALUATION/QUALITY IMPROVEMENT PROJECT

1. Your project titled, "NHJX.2019.0002: Optimal Spinal Morphine Dosing in Scheduled Cesarean Delivery" does not require IRB review. Navy policy states that these types of program evaluation projects are exempt from IRB review.

2. Projects that do not require IRB approval are not eligible for Clinical Investigation Department travel funds.

3. You will still need to obtain publication approval for the project which is required for all works presented or published outside of your Command.

4. I remain available and may be reached at (757)953-5939.

[redacted]

K. N. WHEELER

Appendix F – PAO Clearance

Appendix G – Provider Pre/Post Questionnaire

Provider Pre/Post Questionnaire

The information for this survey will be kept confidential and is intended to improve clinical practice through education

1) True or False? There is a current professionally endorsed (i.e. ASA, AANA, ACOG) practice guideline suggesting the optimal dose of intrathecal morphine for cesarean sections.

    a) True
    b) False

    0% 10 20 30 40 50 60 70 80 90 100%
    No confidence Moderate Confidence Complete confidence

2) The onset of pruritus 6 hours after neuraxial anesthesia in the parturient is most likely caused by intrathecal _____.

    a) Fentanyl
    b) Morphine
    c) Bupivacaine
    d) Lidocaine

    0% 10 20 30 40 50 60 70 80 90 100%
    No confidence Moderate Confidence Complete confidence

****Questions 3 and 4 relate to the most current evidence for IT morphine dose that optimizes analgesia and limits pruritus.****

3) What dose of intrathecal morphine provides adequate analgesia while minimizing pruritus?

    a) 0.05mg
    b) 0.1mg
    c) 0.2mg
    d) 0.3mg

    0% 10 20 30 40 50 60 70 80 90 100%
    No confidence Moderate Confidence Complete confidence

Number:

4) Which of the following side effects of intrathecal morphine can have an occurrence rate as high as 90% in the parturient?

   a) Sedation
   b) Respiratory Depression
   c) Anxiety
   d) Pruritus

   0% 10 20 30 40 50 60 70 80 90 100%
   No confidence Moderate Confidence Complete confidence

5) The IT morphine dose I use is based on current evidence.
   a) Strongly agree
   b) Agree
   c) Neither agree nor disagree
   d) Disagree
   e) Strongly Disagree

   0% 10 20 30 40 50 60 70 80 90 100%
   No confidence Moderate Confidence Complete confidence

6) The onset of IT Morphine is:
   a) 60 mins
   b) 30 mins
   c) 10 min
   d) 5 mins

   0% 10 20 30 40 50 60 70 80 90 100%
   No confidence Moderate Confidence Complete confidence

7) The duration of IT Morphine is:
   a) 2 hrs
   b) 4 hrs
   c) Up to 12 hrs
   d) Up to 24 hrs

   0% 10 20 30 40 50 60 70 80 90 100%
   No confidence Moderate Confidence Complete confidence

8) How likely are you to change your practice based on the information you have just been presented.

   0% 25 50 75 100%
   Not likely Likely Very likely

We would like the sincerely thank you for your time, attention, and valuable input!

Appendix H – Project Completion Verification Form

Appendix G: Daniel K. Inouye Graduate School of Nursing
DNP Project Completion Verification Form

DOCTOR OF NURSING PRACTICE PROJECT
Completion Verification Form

The DNP Project titled: **Intrathecal Morphine Dosing Strategies to Reduce Pruritus after Cesarean Delivery** was completed at **Naval Hospital Jacksonville** by the following student(s):

(type student name)	*(signature)*	*(date)*
LT Shaun Dunston	[redacted]	01OCT2019
LT Brian Curtis		01OCT2019
LT Devon Dan		01OCT2019
LT Christopher Payne		01OCT2019

The DNP Practice Project Team verifies that the following components of the DNP project, accomplished by the above students, is of sufficient rigor and demonstrates doctoral level scholarship to meet the requirements for USUHS GSN graduation:

- Presentation of DNP project to the leadership/stakeholders at the Phase II Site,
- Abstract/Impact Statement (*Appendix F*), and
- DNP Project written report.

Verified by:

(type name)	*(signature)*	*(date)*	
LCDR Justin Hefley	Justin Hefley [redacted]	01OCT2019	Senior Mentor
CDR Chad Moore	Chad Moore [redacted]	01OCT2019	Team Mentor & Phase II Site Director

For RNA Students only - add the following additional signature for final verification of project completion:

CDR Kennett Raddford	[redacted]	01OCT2019
RNA Project Director *(type name)*	*(Signature)*	*(Date)*

Form Version: 26 Aug 2017